

2023–2024

# Chromatography Columns and Supplies Catalog

Waters

THE SCIENCE OF WHAT'S POSSIBLE.™

# Table of Contents

- 04 [Sample Preparation](#)
- 51 [Sample Vials and Accessories](#)
- 83 [How to Choose a Column](#)
- 93 [MaxPeak Premier Columns](#)
- 105 [Sub-2- \$\mu\text{m}\$  UPLC Columns](#)
- 129 [2.x  \$\mu\text{m}\$  UHPLC Columns](#)
- 179  [\$\geq 3\$   \$\mu\text{m}\$  Analytical HPLC Columns](#)
- 247  [\$\geq 5\$   \$\mu\text{m}\$  Preparative HPLC Columns](#)
- 309 [SFC Analytical and Preparative Columns](#)
- 323 [Biomolecule Purification, Characterization, and Analysis](#)
- 453 [Size-Exclusion Chromatography Columns and Standards](#)
- 481 [Nano- and Micro-Flow LC-MS](#)
- 493 [Application-Specific Columns, Kits and Spare Parts](#)
- 529 [Waters Quality Parts and Supplies](#)
- 585 [Indices](#)
  - [457 Alphabetical Index](#)
  - [463 Part Number Index](#)

# Quality Policy

Meeting Customer Requirements, Exceeding Expectations.

We provide innovative technological solutions that enable customer success, by consistently delivering safe, effective, and reliable products and services.

We maintain the effectiveness of our quality management system and foster an environment of continual improvement while meeting statutory and regulatory requirements.

We are dedicated to customer experience excellence through our core values, the engagement of our people, and our strategic vision.



Dr. Udit Batra  
President and Chief Executive Officer  
Waters Corporation

**Waters**  
THE SCIENCE OF WHAT'S POSSIBLE.™





# Sample Preparation and Laboratory Automation

# Contents

<b>Goals of Sample Preparation .....</b>	<b><a href="#">5</a></b>	<b>PoraPak Rxn Cartridges for Post-Synthesis Cleanup .....</b>	<b><a href="#">34</a></b>
<b>Benefits of Solid-Phase Extraction .....</b>	<b><a href="#">5</a></b>	<b>Vacuum Manifold and Accessories .....</b>	<b><a href="#">35</a></b>
<b>Selecting the Correct SPE Format .....</b>	<b><a href="#">6</a></b>	Vacuum Manifold for Use with SPE Cartridges .....	<a href="#">35</a>
<b>Oasis Solid-Phase Extraction (SPE) Products .....</b>	<b><a href="#">8</a></b>	Sep-Pak Cartridge Connections Kit .....	<a href="#">36</a>
A Breakthrough in SPE .....	<a href="#">9</a>	Sep-Pak Cartridge Accessories .....	<a href="#">36</a>
Oasis PRiME HLB .....	<a href="#">12</a>	<b>DisQuE Sample Preparation Solutions for QuEChERS .....</b>	<b><a href="#">37</a></b>
Oasis PRiME MCX .....	<a href="#">13</a>	DisQuE Kitted Solutions .....	<a href="#">37</a>
Oasis MCX for Basic Compounds .....	<a href="#">14</a>	DisQuE Extraction and Cleanup Tubes and Pouches .....	<a href="#">38</a>
Oasis MAX for Acidic Compounds .....	<a href="#">15</a>	<b>Waters/Pall Life Sciences Sample and Solvent Filtration Products .....</b>	<b><a href="#">39</a></b>
Oasis WCX for Strong Basic Compounds .....	<a href="#">15</a>	Filter Design and Membrane Choices .....	<a href="#">40</a>
Oasis WAX for Strong Acidic Compounds .....	<a href="#">16</a>	Solvent Filtration Apparatus .....	<a href="#">43</a>
Oasis Sorbent Selection Tools for Convenient Method Development .....	<a href="#">16</a>	<b>Liquid Handling Automations .....</b>	<b><a href="#">44</a></b>
XBridge OSM Cartridges .....	<a href="#">18</a>	Andrew+ Pipetting Robot .....	<a href="#">44</a>
SPE Columns for Waters UPLC with On-Line SPE Technology .....	<a href="#">18</a>	Pipette+ System .....	<a href="#">46</a>
Oasis Glass Cartridges for PPT Detection Levels .....	<a href="#">18</a>	OneLab+ Software .....	<a href="#">48</a>
<b>Ostro Pass-Through Sample Preparation Product .....</b>	<b><a href="#">19</a></b>	<b>Sample Processing Devices and Accessories .....</b>	<b><a href="#">49</a></b>
<b>Sep-Pak Solid-Phase Extraction (SPE) Products .....</b>	<b><a href="#">20</a></b>	Otto SPEcialist .....	<a href="#">49</a>
Anatomy of Sep-Pak Cartridges .....	<a href="#">26</a>		
General Extraction Protocols for Sep-Pak Cartridges .....	<a href="#">27</a>		
<b>Certified Sep-Pak Solid-Phase Extraction (SPE) Cartridges .....</b>	<b><a href="#">31</a></b>		
Certified Sep-Pak Sorbent Selection Guide .....	<a href="#">32</a>		

# Sample Preparation

## Goals of Sample Preparation

Successful sample preparation for most analytical techniques (HPLC, UPLC,<sup>™</sup> LC-MS, UV, GC, etc.) has three primary objectives. It needs to provide the sample component of interest:

- In solution
- Free from interfering matrix elements
- At a concentration appropriate for detection or measurement

Waters<sup>™</sup> Sample Preparation Solutions make it easy to produce samples that are free of matrix interferences, leading to more robust and predictable analytical results. Based on simple, logical workflows that produce cleaner samples through targeted separations, Waters Sample Preparation Products maximize sensitivity, increase throughput, and enable the development of robust methods.

## Benefits of Solid-Phase Extraction

Solid-phase extraction (SPE) is a sample preparation technology that uses solid particle, chromatographic packing material contained in a device to chemically separate the different components of a sample. It is used across many different industries and application areas to ensure that the sample of interest is in an appropriate state of cleanliness and concentration to achieve successful analytical results for a variety of analytical measurement techniques.

While there are many reasons for using SPE, there are several major benefits that SPE provides:

- Simplification of complex sample matrix - SPE separates the compound of interest from matrix interferences that make accurate and reproducible analysis difficult to obtain
- Reduce ion suppression or enhancement in MS applications - SPE provides cleaner sample extracts resulting in improved MS-signal response and overall method robustness
- Trace enrichment of very low level compounds - SPE provides the ability to concentrate specific compounds of interest in a sample to improve method sensitivity and detection limits
- Ability to fractionate compounds by class from a sample matrix - SPE can target and isolate specific classes of compounds depending on the needs of the analysis
- Improve robustness of analytical methods - SPE provides a cleaner sample extract that translates directly to more robust and reproducible analytical results
- Increase column lifetime - SPE removes matrix interferences which can accumulate on chromatographic columns and cause poor lifetime and premature column failure

## Selecting the Correct SPE Format

Formats		
<b>μElution Plates</b>	<ul style="list-style-type: none"><li>Patented μElution™ plate design.</li><li>Ideal for SPE cleanup and analyte enrichment of sample volumes ranging from 10 μL to 375 μL.</li><li>No evaporation and reconstitution necessary due to elution volumes as low as 25 μL.</li><li>Up to a 15x increase in concentration.</li><li>Compatible with most liquid-handling robotic systems for automated, reliable, high-throughput SPE (HT-SPE).</li></ul>	
<b>96-well Extraction Plates</b>	<ul style="list-style-type: none"><li>Innovative, award-winning, two-stage well design.</li><li>High throughput and high recovery.</li><li>Available with 5 mg, 10 mg, 30 mg, and 60 mg of sorbent per well.</li><li>Compatible with most liquid-handling robotic systems for automated, reliable, high throughput SPE (HT-SPE).</li></ul>	
<b>Syringe-barrel Cartridges</b>	<ul style="list-style-type: none"><li>Ultra-clean syringe barrel and frits.</li><li>Available with cartridge sizes ranging from 1 cc/10 mg up to 35 cc/6 g.</li><li>Flangeless syringe-barrel cartridges available in 1 cc, 3 cc, and 6 cc configurations.</li></ul>	
<b>Luer-tip Plus Cartridge (Format)</b>	<ul style="list-style-type: none"><li>Plus-style cartridge with Luer inlet hub easily attaches to a syringe.</li><li>Allows for easy SPE without the need for a vacuum manifold.</li><li>Available in many sorbent types and specialty chemistries.</li></ul>	
<b>Glass Cartridges</b>	<ul style="list-style-type: none"><li>Ultra-clean glass syringe with Teflon frit.</li><li>For trace level detection and analysis at part-per-trillion levels.</li><li>Available in 5 cc with 200 mg of sorbent configuration.</li></ul>	
<b>On-line Columns and Cartridges</b>	<ul style="list-style-type: none"><li>For rugged, reproducible, and ultra-fast online analysis.</li><li>Wide choice of configurations, particle sizes, and sorbent chemistries.</li><li>Available with six, patented, Oasis™ Sorbents—HLB, PRiME HLB, MCX, MAX, WCX, and WAX.</li><li>High recovery and reproducible results for a wide range of compounds.</li><li>Cartridge format for use with Spark Holland Prospekt-2/Symbiosis systems also available.</li></ul>	

## Sorbent Amount and Solvent Selection for the Generic SPE Method

The suggested amount of sorbent in a cartridge or a plate required for your application is given in the table to the right. Due to the increased capacity of the Oasis sorbents, you can use less sorbent than you would normally need if you used a silica-based packing. When converting from C<sub>18</sub> silica-based sorbents to Oasis SPE Sorbents, use approximately two-thirds less Oasis sorbent (100 mg C<sub>18</sub> sorbent = 30 mg Oasis sorbent).

### DID YOU KNOW...

#### Sample Pretreatment Suggestion

Applying one or more of the following steps before loading your sample may improve your results:

1. Dilute sample 1:1 with buffer to improve flow during loading
2. Dilute 1:1 or greater with 4% phosphoric acid or other acids
3. Filter through 0.45 µm membrane
4. Centrifuge @ ≥3000 rpm

### Capacity and Elution Volume of Oasis 96-well Plates and Cartridges

Sorbent Per Device	Maximum Mass Capacity	Typical Sample Volumes	Elution Volume
2 mg (µElution Plate)*	60–400 µg	10–375 µL	25 µL**
5 mg*	0.15–1 mg	10–100 µL	≤150 µL
10 mg	0.35–2 mg	50–200 µL	≤250 µL
30 mg	1–5 mg	100 µL–1 mL	≥400 µL
60 mg	2–10 mg	200 µL–2 mL	≥800 µL

\* Available only in 96-well plate formats.

\*\*µElution Plate requires no evaporation step.

### Tips for Selecting Elution Solvents for the Generic SPE Method (1-D)\* *The elution solvent is selected based on polarity of analyte.*

Solvent	Solvent Type	Relative Elution Strength**	Comments
Methanol	Proton donor	1.0	Disrupts H-bonding
Acetonitrile	Dipole-dipole	3.1	Medium polarity drugs
Tetrahydrofuran	Dipole-dipole	3.7	Medium polarity drugs
Acetone	Dipole-dipole	8.8	Medium polarity drugs
Ethyl acetate	Dipole-dipole	High	Non-polar drugs and GC compatible
Methylene chloride	Dipole-dipole	High	Non-polar drugs and GC compatible

\* When using solvents other than methanol, add 10–30% of proton donor solvent such as methanol to disrupt H-bonding on the Oasis HLB sorbent.

\*\*High-Purity Solvent Guide, Burdick and Jackson Laboratories, Inc. Solvent Properties of Common Liquids, L.R. Snyder, J. Chromatogr., 92, 223 (1974); J. Chromatogr. Sci. 16, 223 (1978).

## Need more help getting started with solid phase extraction?

[Download our Oasis Reference Cards](#)

[Download our Oasis Peptide Bioanalysis Reference Cards](#)



### APPLICATION AREA: Sample Preparation for Analysis of THC and Metabolites in Whole Blood from Impaired Drivers

"After evaluating many of the SPE products currently on the market on the criteria of recovery, matrix cleanup, ease of use, and cost, Oasis PRiME HLB µElution plate by far is the best option for the analysis of drugs of abuse in whole blood samples. Waters provided excellent support through application notes, in-person training and method development, troubleshooting, and equipment support throughout the optimization and validation process. The µElution plates demonstrate excellent reproducibility, recovery, and matrix cleanup, even with a complex matrix such as whole blood. The 96-well plate form factor will support a lot of scalability for our lab as we receive additional samples, and the Waters positive pressure manifold makes sample processing extremely easy and rapid. Overall, a great system for tricky analytes and matrices!"

**REVIEWER:** David Patlak

**ORGANIZATION:** Vermont Forensic Laboratory



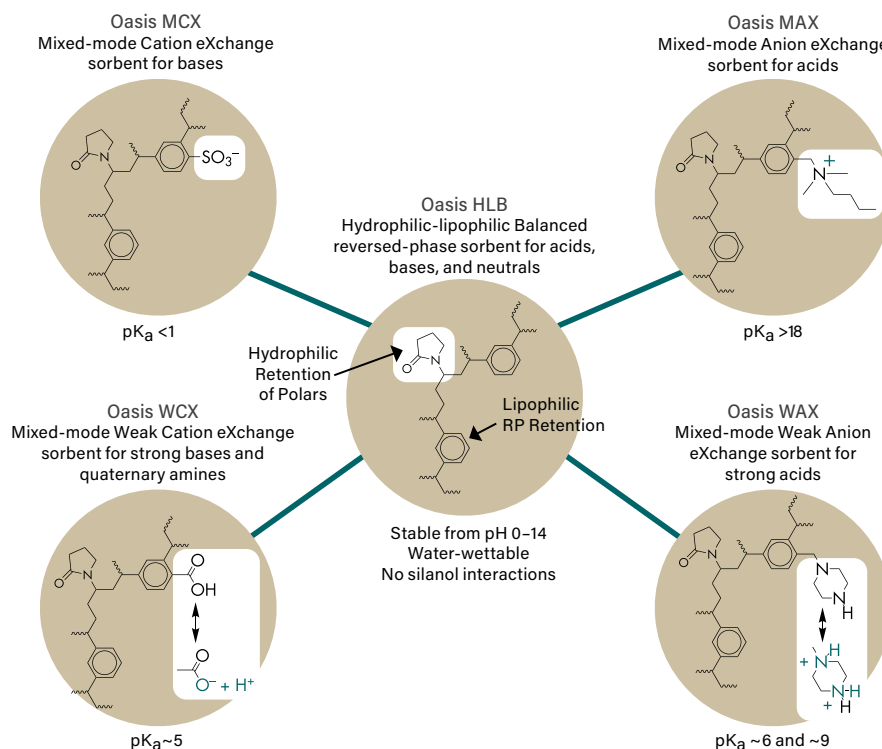


## Oasis Solid-Phase Extraction (SPE) Products

Waters introduced Oasis HLB in 1996, effectively changing the way scientists performed SPE. Constructed with a water-wettable copolymer that is stable from pH 0–14, Oasis HLB created a whole new range of solid-phase extraction method development possibilities. It is the gold standard in SPE, trusted by scientists around the world.

### The Oasis SPE Family of Sorbents

As a unique, water-wettable polymeric sorbent, Oasis products can be used without the conditioning and equilibration steps required by other polymeric and silica-based sorbents. Historically, those steps were required to obtain retention of analytes by reversed-phase SPE. The water-wettable nature of Oasis sorbents allows direct loading of aqueous samples without sacrificing recovery.



**Oasis HLB** is the backbone of all Oasis sorbents. It is a multi-purpose, reversed-phase sorbent that provides high capacity for a wide range of compounds.

**Oasis PRiME HLB\*** was designed to make solid-phase extraction easy to implement into routine laboratory use by providing generic, simple methods that remove 95% of common matrix interferences such as phospholipids, fats, salts, and proteins. It produces the cleanest sample eluates with a simple, two- or three-step protocol.

**Oasis PRiME MCX\*** combines the simplicity and cleanliness of Oasis PRiME HLB with the specificity of a cation-exchanger for compounds with basic characteristics, and provides the perfect solution for targeted sample cleanup.

Analyte specificity and sensitivity can be increased by using a **Mixed-Mode Oasis** sorbent, which includes both reversed-phase and ion-exchange functionality for orthogonal sample preparation.

\*Oasis PRiME HLB is a proprietary, patent-pending sorbent. Oasis PRiME HLB and MCX have application patents pending.

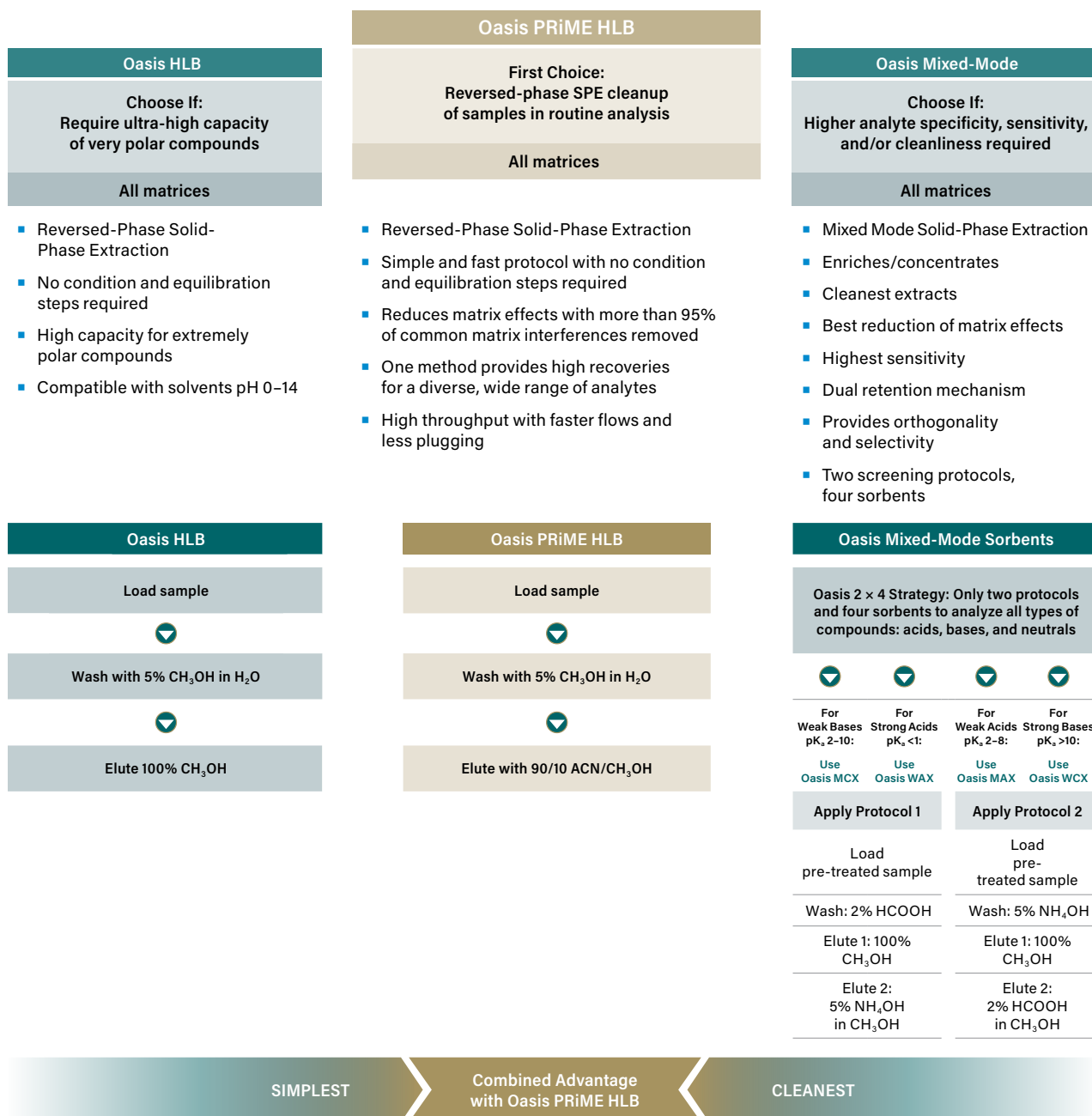
## A BREAKTHROUGH IN SPE

Through the combination of innovative sorbent technology and hardware design, Oasis products have become the first choice in solid-phase extraction (SPE). Oasis products are trusted by separation scientists across the globe to meet a wide variety of sample preparation needs, ranging from a simple and fast matrix cleanup to the need to solve the most difficult and highly selective sample preparation challenges. Researchers rely on the superior technical performance of Oasis products to achieve unmatched purity, consistency, and quality in their sample preparation methods.

### What Is the Ideal SPE Method?

- ✓ Easy to implement
- ✓ Reproducible and robust
- ✓ Fast
- ✓ Achieves your goals


[ Start Here ]



For an additional level of phospholipid clean-up for basic analytes, Oasis PRiME MCX is recommended. See more details on [page 13](#).

## Ordering Information

### Oasis Product Selection Guide




	1 cc/10 mg	1 cc/10 mg	1 cc/30 mg	1 cc/30 mg	1 cc/30 mg	3 cc/60 mg	3 cc/60 mg	3 cc/60 mg	3 cc/150 mg	3 cc/540 mg	3 cc/540 mg	6 cc/150 mg
	Flangeless		Flangeless		Gilson Adapter	Flangeless		Gilson Adapter	Flangeless			
Sorbent	100/box	100/box	100/box	100/box	500/box	100/box	100/box	500/box	100/box	100/box	100/box	30/box
Oasis PRIME HLB	—	—	<a href="#">186008055</a>	—	—	<a href="#">186008056</a>	—	—	<a href="#">186008717</a>	—	—	—
Oasis PRIME MCX	—	—	<a href="#">186008917</a>	—	—	<a href="#">186008918</a>	—	—	—	—	—	<a href="#">186008919</a>
Oasis HLB 30 µm	<a href="#">186000383</a>	<a href="#">186006339</a>	<a href="#">WAT094225</a>	<a href="#">186001879</a>	<a href="#">WAT058882</a>	<a href="#">WAT094226</a>	<a href="#">186001880</a>	<a href="#">WAT058883</a>	—	—	—	<a href="#">186003365</a>
Oasis HLB 60 µm	—	—	—	—	—	—	—	—	—	<a href="#">186004134</a>	<a href="#">186003852</a>	<a href="#">186003379</a>
Oasis MCX 30 µm	<a href="#">186004648</a>	<a href="#">186006340</a>	<a href="#">186000252</a>	<a href="#">186001881</a>	<a href="#">186001888</a>	<a href="#">186000254</a>	<a href="#">186001882</a>	—	—	—	—	<a href="#">186000256</a>
Oasis MCX 60 µm	—	—	<a href="#">186000782</a>	—	—	<a href="#">186000253</a>	—	—	—	—	—	<a href="#">186000255</a>
Oasis MAX 30 µm	<a href="#">186004649</a>	<a href="#">186006341</a>	<a href="#">186000366</a>	<a href="#">186001883</a>	—	<a href="#">186000367</a>	<a href="#">186001884</a>	—	—	—	—	<a href="#">186000369</a>
Oasis MAX 60 µm	—	—	—	—	—	<a href="#">186000368</a>	—	—	—	—	—	<a href="#">186000370</a>
Oasis WCX 30 µm	<a href="#">186004650</a>	<a href="#">186006342</a>	<a href="#">186002494</a>	<a href="#">186006499</a>	—	<a href="#">186002495</a>	<a href="#">186006501</a>	—	—	—	—	<a href="#">186002498</a>
Oasis WCX 60 µm	—	—	<a href="#">186002496</a>	—	—	<a href="#">186002497</a>	—	—	—	—	—	—
Oasis WAX 30 µm	<a href="#">186004651</a>	<a href="#">186006343</a>	<a href="#">186002489</a>	<a href="#">186006500</a>	—	<a href="#">186002490</a>	<a href="#">186006502</a>	—	—	—	—	<a href="#">186002493</a>
Oasis WAX 60 µm	—	—	<a href="#">186002491</a>	—	—	<a href="#">186002492</a>	—	—	—	—	—	—

### Simplifying Solid-Phase Extraction

Traditionally, solid-phase extraction methods have required condition and equilibration steps to prepare the sorbent for sample introduction. The condition step was required to wet the sorbent and allow liquid to enter the pores, enabling retention within the sorbent. Once wetted, the sorbent needed to be equilibrated with aqueous solution to prepare it for aqueous sample loading. Since Oasis HLB is a water-wettable sorbent, the analytes can interact with the sorbent and are retained when loaded directly onto the sorbent in an aqueous sample solution. This eliminates the condition and equilibration steps from the traditional solid-phase extraction protocol and reduces the number of processing steps from 5 to 3. The result is an average reduction in solvent consumption of up to 70% and a 40% savings in sample preparation time.

The ability to simplify and shorten SPE protocols is due to the unique water-wettable, balanced nature of the hydrophilic/lipophilic Oasis sorbent.

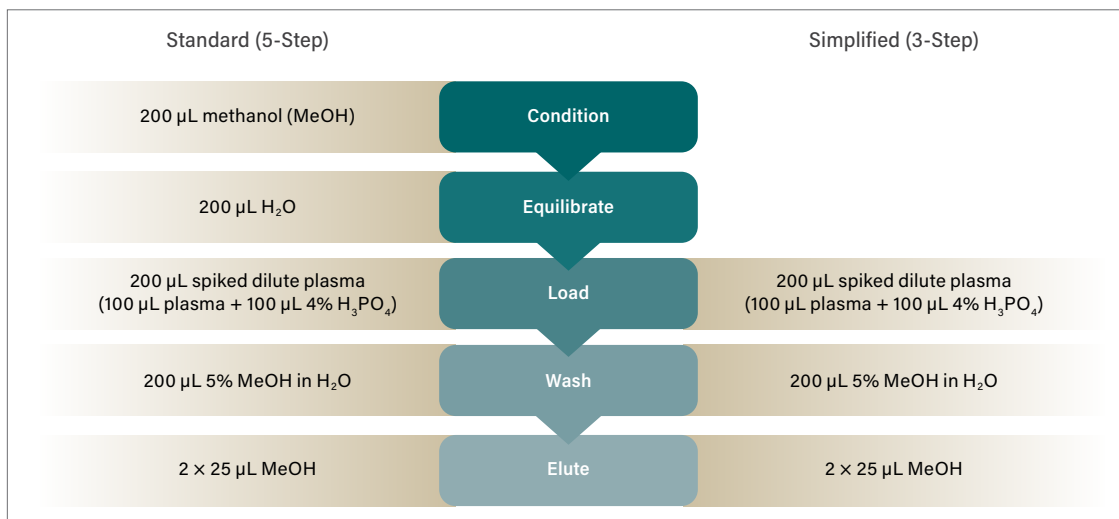


	6 cc/200 mg	6 cc/400 mg	6 cc/500 mg	12 cc/500 mg	20 cc/1 g	35 cc/6 g	225 mg	100 mg	30 mg	60 mg	5 cc/200 mg
	Flangeless						Plus Short	Plus Light	Vac RC	Vac RC	Glass Cartridge
Sorbent	30/box	100/box	30/box	20/box	20/box	10/box	50/box	50/box	50/box	50/box	30/box
Oasis PRiME HLB	<a href="#">186008057</a>	—	<a href="#">186008718</a>	—	—	—	<a href="#">186008887<sup>1</sup></a>	<a href="#">186008886</a>	—	—	—
Oasis HLB 30 µm	<a href="#">WAT106202</a>	—	—	—	—	—	—	<a href="#">186005125<sup>2</sup></a>	<a href="#">186000382</a>	<a href="#">186000381</a>	—
Oasis HLB 60 µm	—	—	<a href="#">186000115</a>	<a href="#">186000116</a>	<a href="#">186000117</a>	<a href="#">186000118</a>	<a href="#">186000132</a>	—	—	—	<a href="#">186000683</a>
Oasis MCX 30 µm	—	—	—	—	—	—	—	—	—	<a href="#">186000261</a>	—
Oasis MCX 60 µm	—	—	<a href="#">186000776</a>	—	<a href="#">186000777</a>	<a href="#">186000778</a>	<a href="#">186003516</a>	—	—	<a href="#">186000380</a>	—
Oasis MAX 30 µm	—	<a href="#">186001855</a>	—	—	—	—	—	—	<a href="#">186000372</a>	<a href="#">186000371</a>	—
Oasis MAX 60 µm	—	—	<a href="#">186000865</a>	—	—	—	<a href="#">186003517</a>	—	—	<a href="#">186000378</a>	—
Oasis WCX 30 µm	—	—	—	—	—	—	—	—	—	—	—
Oasis WCX 60 µm	—	—	<a href="#">186004646</a>	—	—	—	<a href="#">186003518</a>	—	—	—	—
Oasis WAX 30 µm	—	—	—	—	—	—	—	—	—	—	—
Oasis WAX 60 µm	—	—	<a href="#">186004647</a>	—	—	—	<a href="#">186003519</a>	—	—	—	—

<sup>1</sup>335 mg for Oasis PRiME HLB.

<sup>2</sup>30 mg for Oasis HLB.

### Save Time and Solvent by Moving from a 5-Step Protocol to a 3-Step



Traditional 5-step SPE protocol vs. the 3-step SPE protocol using an Oasis HLB µElution Plate. (Typical loading range between 10–375 µL undiluted plasma.)

## OASIS PRiME HLB

Oasis PRiME HLB is the first-of-its-kind SPE sorbent that sets the new performance standard for routine analyses. The unique, patent-pending Oasis PRiME HLB sorbent provides cleaner samples in less time and with less effort.

- Removes 95% of common matrix interferences such as salts, proteins, and phospholipids
- Ability to concentrate analytes
- Faster, more predictable analysis times
- Directly load pre-treated samples without conditioning and equilibration

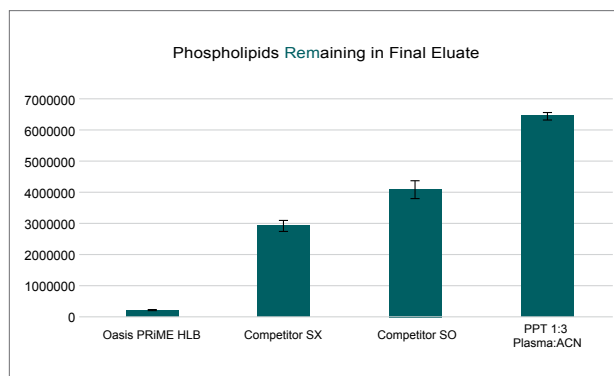
### Simpler: Easy, efficient protocols

The Oasis PRiME HLB copolymer is extremely water-wettable, making it possible to eliminate the condition and equilibration steps that are absolutely essential when using silica-based or other polymeric sorbents. This saves valuable sample processing time and costly solvent purchase and disposal.

### Faster: More even flows across cartridges and plates with less plugging

Oasis PRiME HLB has been designed to increase speed within the device and in your workflow. Flow times through the device are 30–50% faster for urine and plasma. Desired flow rates are achieved using less vacuum or positive pressure than required with other SPE devices.

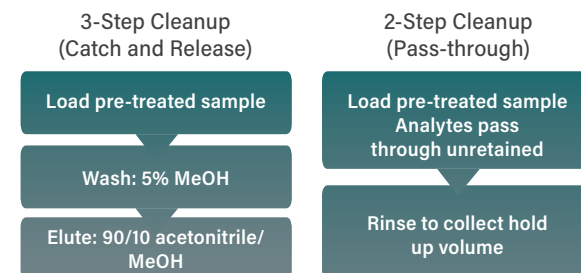
### Protocol Phospholipids Remaining in Final Eluate



Fewer phospholipids remain in the final sample eluate with the Oasis PRiME HLB sorbent and 3-step protocol, compared to the final eluates using traditional 5-step protocol on the competitors' sorbents or protein precipitation (PPT). This removal is also more reproducible with Oasis PRiME HLB as indicated by the error bars ( $n=5$ ).

**Even Cleaner:** The optimally designed sorbent removes more than 95% of common matrix interferences like proteins, salts, fats, and phospholipids

Choose the sample preparation method that meets your analytical needs.



Use 3-step solid-phase extraction to remove the most matrix interferences, including salts, phospholipids, and proteins. This technique also allows for sample concentration/enrichment. Perfectly suited for routine bioanalytical sample cleanup.

Use 2-step sample cleanup to remove matrix interferences quickly if your beginning sample solution is high organic, and concentration and/or salt removal is not required. Perfectly suited for multiple residue veterinary drug screening in meats.

## Ordering Information

### Oasis PRiME HLB Sample Extraction Products

Description	Format	Qty.	P/N
Oasis PRiME HLB Cartridge	1 cc/30 mg	100/box	<a href="#">186008055</a>
Oasis PRiME HLB Cartridge	3 cc/150 mg	100/box	<a href="#">186008717</a>
Oasis PRiME HLB Cartridge	6 cc/500 mg	30/box	<a href="#">186008718</a>
Oasis PRiME HLB Cartridge	3 cc/60 mg	100/pk	<a href="#">186008056</a>
Oasis PRiME HLB Cartridge	6 cc/200 mg	30/pk	<a href="#">186008057</a>
Oasis PRiME HLB Plus Light Cartridge	100 mg	50/box	<a href="#">186008886</a>
Oasis PRiME HLB Plus Short Cartridge	335 mg	50/box	<a href="#">186008887</a>
Oasis PRiME HLB $\mu$ Elution Plate	3 mg/96-well	1/pk	<a href="#">186008052</a>
Oasis PRiME HLB Plate	10 mg/96-well	1/pk	<a href="#">186008053</a>
Oasis PRiME HLB Plate	30 mg/96-well	1/pk	<a href="#">186008054</a>

### DID YOU KNOW...

Oasis Cartridges and Plates are available in two particle sizes (30  $\mu$ m and 60  $\mu$ m).

This allows you to select the appropriate product based on the viscosity and turbidity of your sample. For extraction of most plasma, serum, and human urine, choose the 30  $\mu$ m sorbent. For more viscous samples such as animal urine, excellent flow can be achieved using the 60  $\mu$ m sorbent in either cartridges or plates.

## Ordering Information

### Oasis HLB Sample Extraction Products

Description	Format	Particle Size	Qty.	P/N
Oasis HLB Cartridge	1 cc/10 mg	30 µm	100/box	<a href="#">186000383</a>
Oasis HLB Cartridge	1 cc/30 mg	30 µm	100/box	<a href="#">WAT094225</a>
Oasis HLB Cartridge	1 cc/30 mg	30 µm	1000/box	<a href="#">186003908</a>
Oasis HLB Flangeless Cartridge	1 cc/30 mg	30 µm	100/box	<a href="#">186001879</a>
Oasis HLB Cartridge with Gilson ASPEC Adapter	1 cc/10 mg	30 µm	500/box	<a href="#">186000988</a>
Oasis HLB Cartridge with Gilson ASPEC Adapter	1 cc/30 mg	30 µm	500/box	<a href="#">WAT058882</a>
Oasis HLB Cartridge	3 cc/60 mg	30 µm	100/box	<a href="#">WAT094226</a>
Oasis HLB Cartridge	3 cc/60 mg	30 µm	1000/box	186007646
Oasis HLB Flangeless Cartridge	3 cc/60 mg	30 µm	100/box	<a href="#">186001880</a>
Oasis HLB Cartridge with Gilson ASPEC Adapter	3 cc/60 mg	30 µm	500/box	<a href="#">WAT058883</a>
Oasis HLB Cartridge	6 cc/200 mg	30 µm	30/box	<a href="#">WAT106202</a>
Oasis HLB Cartridge	3 cc/400 mg	60 µm	100/box	<a href="#">186003849</a>
Oasis HLB Cartridge	3 cc/540 mg	60 µm	100/box	<a href="#">186004134</a>
Oasis HLB Flangeless Cartridge	3 cc/540 mg	60 µm	100/box	<a href="#">186003852</a>
Oasis HLB Cartridge	6 cc/150 mg	30 µm	30/box	<a href="#">186003365</a>
Oasis HLB Cartridge	6 cc/150 mg	60 µm	30/box	<a href="#">186003379</a>
Oasis HLB Cartridge	6 cc/500 mg	60 µm	30/box	<a href="#">186000115</a>
Oasis HLB Cartridge	12 cc/500 mg	60 µm	20/box	<a href="#">186000116</a>
Oasis HLB Cartridge	20 cc/1 g	60 µm	20/box	<a href="#">186000117</a>
Oasis HLB Cartridge	35 cc/6 g	60 µm	10/box	<a href="#">186000118</a>
Oasis HLB Plus Short Cartridge	225 mg	60 µm	50/box	<a href="#">186000132</a>
Oasis HLB Plus Light Cartridge	30 mg	30 µm	50/box	<a href="#">186005125</a>
Oasis HLB Vac RC Cartridge	20 cc/30 mg	30 µm	50/box	<a href="#">186000382</a>
Oasis HLB Vac RC Cartridge	20 cc/60 mg	30 µm	50/box	<a href="#">186000381</a>
Oasis HLB Glass Cartridge	5 cc/200 mg	60 µm	30/box	<a href="#">186000683</a>
Oasis HLB µElution Plate	2 mg/96-well	30 µm	1/pk	<a href="#">186001828BA</a>
Oasis HLB Plate	5 mg/96-well	30 µm	1/pk	<a href="#">186000309</a>
Oasis HLB Plate	10 mg/96-well	30 µm	1/pk	<a href="#">186000128</a>
Oasis HLB Plate	30 mg/96-well	30 µm	1/pk	<a href="#">WAT058951</a>
Oasis HLB Plate	60 mg/96-well	60 µm	1/pk	<a href="#">186000679</a>

## OASIS PRIME MCX

Oasis PRiME MCX is a highly efficient, orthogonal (reversed-phase and ion-exchange) solid-phase extraction product based on Oasis MCX technology.



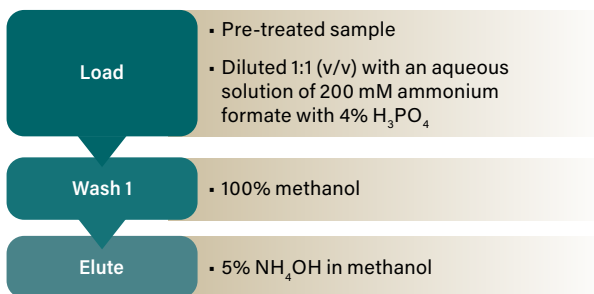
**SIMPLER:** A defined, generic 3- or 4-step SPE protocol based on the water-wettable Oasis MCX strong cation-exchange/reversed-phase sorbent that does not require extensive method development. It allows targeted cleanup of basic compounds with  $pK_a \geq 4.5$ . Methods are patent pending.

**CLEANER:** Simpler methods remove up to 99% of phospholipids, a major cause of matrix effects, ion suppression, shorter column lifetimes, increased MS maintenance, and higher variability in LC-MS quantification. Oasis PRiME MCX is QC tested with this protocol for phospholipid removal.

**FASTER:** Cartridges and plates are designed with a manufacturing optimization to increase flow reproducibility across devices, making processing time more predictable. No conditioning and equilibration steps are required.

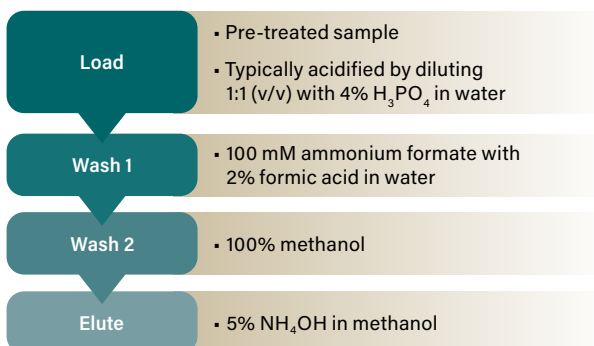
### Oasis PRiME MCX 3- and 4-Step Protocols

#### 3-Step Oasis PRiME MCX Protocol\*



\* The sample is diluted 1:1 with 200 mM ammonium formate with 4%  $H_3PO_4$ , making a final concentration of 100 mM ammonium formate and 2%  $H_3PO_4$ .

#### 4-Step Oasis PRiME MCX Protocol\*\*



\*\* Contains an extra wash step that can be used to remove additional matrix interferences if needed.

Oasis PRiME MCX methods are designed to capture and concentrate basic compounds while matrix interferences are removed from the sample. The 3-step method provides the simplest path to cleaner, while the 4-step method contains an additional wash step to remove even more matrix components, if needed.

## OASIS MCX FOR BASIC COMPOUNDS

Obtain selective retention of basic drugs with cation-exchange groups on the sorbent surface. The Oasis MCX (Mixed-Mode Cation eXchange) Sorbent has a tightly controlled ion-exchange capacity (1 meq/g). There are no silanol groups to complicate the retention mode or method development. This novel, water-wettable, polymeric sorbent is stable from pH 0–14, making method development simple and fast.

## Ordering Information

### Oasis PRiME MCX Sample Extraction Products

Description	Format	Particle Size	Qty.	P/N
Oasis PRiME MCX Vac Cartridge	1 cc/30 mg	30 µm	100/box	<a href="#">186008917</a>
Oasis PRiME MCX Vac Cartridge	3 cc/60 mg	30 µm	100/box	<a href="#">186008918</a>
Oasis PRiME MCX Vac Cartridge	6 cc/150 mg	30 µm	100/box	<a href="#">186008919</a>
Oasis PRiME MCX Plate	10 mg/96-well	30 µm	1/pk	<a href="#">186008915</a>
Oasis PRiME MCX Plate	30 mg/96-well	30 µm	1/pk	<a href="#">186008916</a>
Oasis PRiME MCX µElution Plate	2 mg/96-well	30 µm	1/pk	<a href="#">186008914</a>

## Ordering Information

### Oasis MCX Sample Extraction Products (Cation Exchange)

Description	Format	Particle Size	Qty.	P/N
Oasis MCX Cartridge	1 cc/10 mg	30 µm	100/box	<a href="#">186004648</a>
Oasis MCX Cartridge	1 cc/30 mg	30 µm	100/box	<a href="#">186000252</a>
Oasis MCX Flangeless Cartridge	1 cc/30 mg	30 µm	100/box	<a href="#">186001881</a>
Oasis MCX Cartridge	1 cc/30 mg	60 µm	100/box	<a href="#">186000782</a>
Oasis MCX Cartridge	3 cc/60 mg	30 µm	100/box	<a href="#">186000254</a>
Oasis MCX Flangeless Cartridge	3 cc/60 mg	30 µm	100/box	<a href="#">186001882</a>
Oasis MCX Cartridge	3 cc/60 mg	60 µm	100/box	<a href="#">186000253</a>
Oasis MCX Cartridge	6 cc/150 mg	30 µm	30/box	<a href="#">186000256</a>
Oasis MCX Cartridge	6 cc/150 mg	60 µm	30/box	<a href="#">186000255</a>
Oasis MCX Cartridge	6 cc/500 mg	60 µm	30/box	<a href="#">186000776</a>
Oasis MCX Cartridge	20 cc/1 g	60 µm	20/box	<a href="#">186000777</a>
Oasis MCX Cartridge	35 cc/6 g	60 µm	10/box	<a href="#">186000778</a>
Oasis MCX Plus Short Cartridge	225 mg	60 µm	50/box	<a href="#">186003516</a>
Oasis MCX Vac RC Cartridge	20 cc/60 mg	30 µm	50/box	<a href="#">186000261</a>
Oasis MCX Vac RC Cartridge	20 cc/60 mg	60 µm	50/box	<a href="#">186000380</a>
Oasis MCX µElution Plate	2 mg/96-well	30 µm	1/pk	<a href="#">186001830BA</a>
Oasis MCX Plate	10 mg/96-well	30 µm	1/pk	<a href="#">186000259</a>
Oasis MCX Plate	30 mg/96-well	30 µm	1/pk	<a href="#">186000248</a>
Oasis MCX Plate	30 mg/96-well	60 µm	1/pk	<a href="#">186000250</a>
Oasis MCX Plate	60 mg/96-well	60 µm	1/pk	<a href="#">186000678</a>



### APPLICATION AREA: Peptide Desalting and Enrichment

"The best part of (Oasis) PRiME line products is being able to load samples directly without pre-conditioning, which saves time and solvent. It is more "GREEN" than other products."

**REVIEWER:** Hui Chen

**ORGANIZATION:** University of Illinois at Chicago

## OASIS MAX FOR ACIDIC COMPOUNDS

The Oasis MAX (Mixed-Mode Anion eXchange) sorbent has a tightly controlled ion-exchange capacity of 0.25 meq/g, ensuring reproducible SPE protocols for extraction of acidic compounds and metabolites from biological fluids. There are no silanol groups to complicate the retention mode or method development. This novel, water-wettable, polymeric sorbent is stable from pH 0–14, making method development simple and fast.

### DID YOU KNOW...



When compared to other sample preparation techniques, SPE offers:

- Faster sample prep
- Compatibility with high throughput
- Greater recoveries
- Greater accuracy
- Powerful enrichment of analytes
- Additional selectivity and specificity

## OASIS WCX FOR STRONG BASIC COMPOUNDS

The Oasis WCX (Weak Cation eXchange) SPE material provides better sample preparation for strong bases and quaternary amines. The retention mechanism is mixed mode (both ion exchange and reversed phase), which improves retention for all types of basic analytes, especially strong bases.

## Ordering Information

### Oasis MAX Sample Extraction Products (Anion Exchange)

Description	Format	Particle Size	Qty.	P/N
Oasis MAX Cartridge	1 cc/10 mg	30 µm	100/box	<a href="#">186004649</a>
Oasis MAX Cartridge	1 cc/30 mg	30 µm	100/box	<a href="#">186000366</a>
Oasis MAX Flangeless Cartridge	1 cc/30 mg	30 µm	100/box	<a href="#">186001883</a>
Oasis MAX Cartridge	3 cc/60 mg	30 µm	100/box	<a href="#">186000367</a>
Oasis MAX Cartridge	3 cc/60 mg	60 µm	100/box	<a href="#">186000368</a>
Oasis MAX Flangeless Cartridge	3 cc/60 mg	30 µm	100/box	<a href="#">186001884</a>
Oasis MAX Cartridge	6 cc/150 mg	30 µm	30/box	<a href="#">186000369</a>
Oasis MAX Cartridge	6 cc/150 mg	60 µm	30/box	<a href="#">186000370</a>
Oasis MAX Cartridge	6 cc/500 mg	60 µm	30/box	<a href="#">186000865</a>
Oasis MAX Plus Short Cartridge	225 mg	60 µm	50/box	<a href="#">186003517</a>
Oasis MAX Vac RC Cartridge	20 cc/30 mg	30 µm	50/box	<a href="#">186000372</a>
Oasis MAX Vac RC Cartridge	20 cc/60 mg	30 µm	50/box	<a href="#">186000371</a>
Oasis MAX Vac RC Cartridge	20 cc/60 mg	60 µm	50/box	<a href="#">186000378</a>
Oasis MAX µElution Plate	2 mg/96-well	30 µm	1/pk	<a href="#">186001829</a>
Oasis MAX Plate	10 mg/96-well	30 µm	1/pk	<a href="#">186000375</a>
Oasis MAX Plate	30 mg/96-well	30 µm	1/pk	<a href="#">186000373</a>
Oasis MAX Plate	60 mg/96-well	30 µm	1/pk	<a href="#">186001256</a>
Oasis MAX Plate	60 mg/96-well	60 µm	1/pk	<a href="#">186001205</a>

## Ordering Information

### Oasis WCX Sample Extraction Products (Weak Cation Exchange)

Description	Format	Particle Size	Qty.	P/N
Oasis WCX Cartridge	1 cc/10 mg	30 µm	100/box	<a href="#">186004650</a>
Oasis WCX Cartridge	1 cc/30 mg	30 µm	100/box	<a href="#">186002494</a>
Oasis WCX Cartridge	3 cc/60 mg	30 µm	100/box	<a href="#">186002495</a>
Oasis WCX Cartridge	6 cc/150 mg	30 µm	30/box	<a href="#">186002498</a>
Oasis WCX Cartridge	1 cc/30 mg	60 µm	100/box	<a href="#">186002496</a>
Oasis WCX Cartridge	3 cc/60 mg	60 µm	100/box	<a href="#">186002497</a>
Oasis WCX Cartridge	6 cc/500 mg	60 µm	30/box	<a href="#">186004646</a>
Oasis WCX Plus Short Cartridge	225 mg	60 µm	50/box	<a href="#">186003518</a>
Oasis WCX µElution Plate	2 mg/96-well	30 µm	1/pk	<a href="#">186002499</a>
Oasis WCX 96-well Plate	10 mg/96-well	30 µm	1/pk	<a href="#">186002501</a>
Oasis WCX 96-well Plate	30 mg/96-well	30 µm	1/pk	<a href="#">186002503</a>



## OASIS WAX FOR STRONG ACIDIC COMPOUNDS

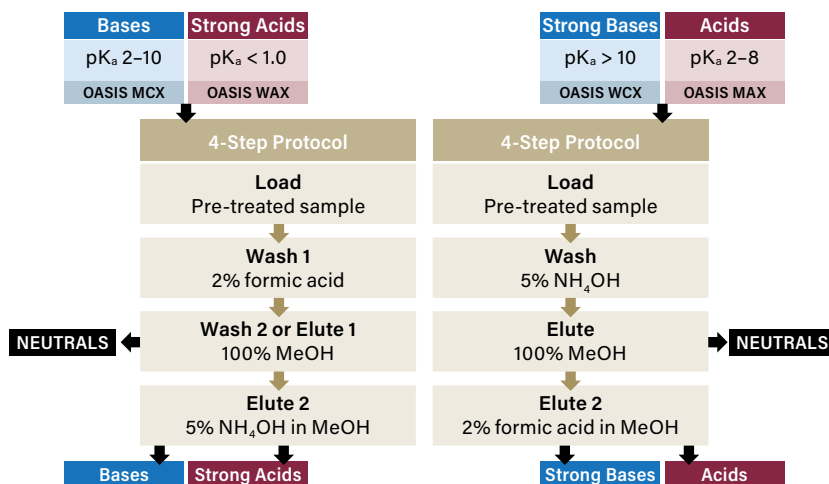
The Oasis WAX (Weak Anion eXchange) SPE material provides sample preparation for strong acidic compounds. The retention mechanism is mixed mode (both ion exchange and reversed phase), which improves retention for strong acidic compounds.

## Ordering Information

### Oasis WAX Sample Extraction Products (Weak Anion Exchange)

Description	Format	Particle Size	Qty.	P/N
Oasis WAX Cartridge	1 cc/10 mg	30 µm	100/box	<a href="#">186004651</a>
Oasis WAX Cartridge	1 cc/30 mg	30 µm	100/box	<a href="#">186002489</a>
Oasis WAX Cartridge	3 cc/60 mg	30 µm	100/box	<a href="#">186002490</a>
Oasis WAX Cartridge	6 cc/150 mg	30 µm	30/box	<a href="#">186002493</a>
Oasis WAX Cartridge	1 cc/30 mg	60 µm	100/box	<a href="#">186002491</a>
Oasis WAX Cartridge	3 cc/60 mg	60 µm	100/box	<a href="#">186002492</a>
Oasis WAX Cartridge	6 cc/500 mg	60 µm	30/box	<a href="#">186004647</a>
Oasis WAX Plus Cartridge	225 mg	60 µm	50/box	<a href="#">186003519</a>
Oasis WAX µElution Plate	2 mg/96-well	30 µm	1/pk	<a href="#">186002500</a>
Oasis WAX 96-well Plate	10 mg/96-well	30 µm	1/pk	<a href="#">186002502</a>
Oasis WAX 96-well Plate	30 mg/96-well	30 µm	1/pk	<a href="#">186002504</a>
Oasis WAX 96-well Plate	60 mg	30 µm	1/pk	<a href="#">186003915</a>

### Oasis 2 × 4 Method Development Protocol



### DID YOU KNOW...



You can reduce non-specific binding, as well as sample loss, when working with therapeutic peptides on µElution plates.

## OASIS SORBENT SELECTION TOOLS FOR CONVENIENT METHOD DEVELOPMENT

The Oasis Sorbent Selection Plate and Cartridge Kits enable rapid development of SPE methods for LC-MS analysis. Having all four Oasis ion-exchange sorbents (MCX, MAX, WAX, and WCX) in a single plate or a cartridge kit is convenient for scouting the best methods to accomplish efficient isolation of unknown analytes, zwitterionic compounds, or mixtures of analytes with different retention/elution properties.

## Ordering Information

### Oasis Method Development Kits

Description	Format	Particle Size	P/N
Oasis Sorbent Selection Plate, 3 rows each: MCX, MAX, WCX, and WAX	10 mg/96-well	30 µm	<a href="#">186003249</a>
Oasis µElution Sorbent Selection Plate, 3 rows each: MCX, MAX, WCX, and WAX	2 mg/96-well	30 µm	<a href="#">186004475</a>
Oasis Sorbent Selection Cartridge Kit, 10 each: MCX, MAX, WCX, and WAX	1 cc/30 mg	30 µm	<a href="#">186003463</a>
Oasis Sorbent Selection Flangeless Cartridge Kit, 10 each: MCX, MAX, WCX, and WAX	1 cc/10 mg	30 µm	<a href="#">186006344</a>
Oasis Sorbent Selection Flangeless Cartridge Kit, 10 each: MCX, MAX, WCX, and WAX	1 cc/30 mg	30 µm	<a href="#">186006345</a>

## Oasis $\mu$ Elution 96-well Plates

Description	Particle Size	Qty.	P/N
Oasis PRIME HLB	—	1/pk	<a href="#">186008052</a>
Oasis HLB	30 $\mu$ m	1/pk	<a href="#">186001828BA</a>
Oasis PRIME MCX	30 $\mu$ m	1/pk	<a href="#">186008914</a>
Oasis MCX	30 $\mu$ m	1/pk	<a href="#">186001830BA</a>
Oasis MAX	30 $\mu$ m	1/pk	<a href="#">186001829</a>
Oasis WCX	30 $\mu$ m	1/pk	<a href="#">186002499</a>
Oasis WAX	30 $\mu$ m	1/pk	<a href="#">186002500</a>
Oasis Method Development	30 $\mu$ m	1/pk	<a href="#">186004475</a>
Peptide Method Development	30 $\mu$ m	1/pk	<a href="#">186004713</a>

## Oasis 96-well Plates

Description	Particle Size	5 mg/	10 mg/	30 mg/	60 mg/
		96-well	96-well	96-well	96-well
		1/pk	1/pk	1/pk	1/pk
Oasis PRIME HLB	—	—	<a href="#">186008053</a>	<a href="#">186008054</a>	—
Oasis HLB	30 $\mu$ m	<a href="#">186000309</a>	<a href="#">186000128</a>	<a href="#">WAT058951</a>	—
Oasis HLB	60 $\mu$ m	—	—	—	<a href="#">186000679</a>
Oasis PRIME MCX	—	—	<a href="#">186008915</a>	<a href="#">186008916</a>	—
Oasis MCX	30 $\mu$ m	—	<a href="#">186000259</a>	<a href="#">186000248</a>	—
Oasis MCX	60 $\mu$ m	—	—	<a href="#">186000250</a>	<a href="#">186000678</a>
Oasis MAX	30 $\mu$ m	—	<a href="#">186000375</a>	<a href="#">186000373</a>	<a href="#">186001256</a>
Oasis MAX	60 $\mu$ m	—	—	—	<a href="#">186001205</a>
Oasis WCX	30 $\mu$ m	—	<a href="#">186002501</a>	<a href="#">186002503</a>	—
Oasis WAX	30 $\mu$ m	—	<a href="#">186002502</a>	<a href="#">186002504</a>	<a href="#">186003915</a>



## Oasis Symbiosis/ Prospekt-2 Cartridges

Description	Format	Particle Size	Qty.	P/N
Oasis HLB Symbiosis/ Prospekt-2 Cartridge	1 $\times$ 10 mm	30 $\mu$ m	96/box	<a href="#">186005781</a>
Oasis HLB Symbiosis/ Prospekt-2 Cartridge	1 $\times$ 20 mm	30 $\mu$ m	96/box	<a href="#">186005786</a>
Oasis MCX Symbiosis/ Prospekt-2 Cartridge	1 $\times$ 10 mm	30 $\mu$ m	96/box	<a href="#">186005782</a>
Oasis MCX Symbiosis/ Prospekt-2 Cartridge	1 $\times$ 20 mm	30 $\mu$ m	96/box	<a href="#">186004653</a>
Oasis MAX Symbiosis/ Prospekt-2 Cartridge	1 $\times$ 10 mm	30 $\mu$ m	96/box	<a href="#">186005783</a>
Oasis MAX Symbiosis/ Prospekt-2 Cartridge	1 $\times$ 20 mm	30 $\mu$ m	96/box	<a href="#">186004654</a>
Oasis WCX Symbiosis/ Prospekt-2 Cartridge	1 $\times$ 10 mm	30 $\mu$ m	96/box	<a href="#">186005784</a>
Oasis WCX Symbiosis/ Prospekt-2 Cartridge	1 $\times$ 20 mm	30 $\mu$ m	96/box	<a href="#">186004655</a>
Oasis WAX Symbiosis/ Prospekt-2 Cartridge	1 $\times$ 10 mm	30 $\mu$ m	96/box	<a href="#">186005785</a>
Oasis WAX Symbiosis/ Prospekt-2 Cartridge	1 $\times$ 20 mm	30 $\mu$ m	96/box	<a href="#">186004656</a>

## On-Line SPE Columns and Cartridge Columns

Description	Format	Particle Size	Qty.	P/N
Oasis HLB Column	2.1 $\times$ 20 mm	5 $\mu$ m	1/pk	<a href="#">186002034</a>
Oasis HLB Column	3.0 $\times$ 20 mm	5 $\mu$ m	1/pk	<a href="#">186002037</a>
Oasis HLB Column	3.9 $\times$ 20 mm	5 $\mu$ m	1/pk	<a href="#">186002040</a>
Oasis HLB Cartridge Column	3.9 $\times$ 20 mm	5 $\mu$ m	1/pk	<a href="#">186001413</a>
Oasis HLB Column	4.6 $\times$ 20 mm	5 $\mu$ m	1/pk	<a href="#">186002043</a>
Oasis HLB Column	2.1 $\times$ 20 mm	15 $\mu$ m	1/pk	<a href="#">186002035</a>
Oasis HLB Column	3.0 $\times$ 20 mm	15 $\mu$ m	1/pk	<a href="#">186002038</a>
Oasis HLB Column	3.9 $\times$ 20 mm	15 $\mu$ m	1/pk	<a href="#">186002041</a>
Oasis HLB Cartridge Column	3.9 $\times$ 20 mm	15 $\mu$ m	1/pk	<a href="#">186001414</a>
Oasis HLB Column	4.6 $\times$ 20 mm	15 $\mu$ m	1/pk	<a href="#">186002044</a>
Oasis HLB Column	2.1 $\times$ 20 mm	25 $\mu$ m	1/pk	<a href="#">186002036</a>
Oasis HLB Cartridge Column	2.1 $\times$ 20 mm	25 $\mu$ m	1/pk	<a href="#">186000706</a>
Oasis HLB Column	3.0 $\times$ 20 mm	25 $\mu$ m	1/pk	<a href="#">186002039</a>
Oasis HLB Column	4.6 $\times$ 20 mm	25 $\mu$ m	1/pk	<a href="#">186002045</a>
Oasis HLB Direct Connect Column	2.0 $\times$ 15 mm	25 $\mu$ m	1/pk	<a href="#">186001792</a>
Oasis MCX Column	2.1 $\times$ 20 mm	30 $\mu$ m	1/pk	<a href="#">186002046</a>
Oasis MCX Cartridge Column	2.1 $\times$ 20 mm	30 $\mu$ m	1/pk	<a href="#">186002051</a>
Oasis MCX Column	3.0 $\times$ 20 mm	30 $\mu$ m	1/pk	<a href="#">186002047</a>
Oasis MCX Column	3.9 $\times$ 20 mm	30 $\mu$ m	1/pk	<a href="#">186002048</a>
Oasis MCX Column	4.6 $\times$ 20 mm	30 $\mu$ m	1/pk	<a href="#">186002049</a>
Oasis MAX Column	2.1 $\times$ 20 mm	30 $\mu$ m	1/pk	<a href="#">186002052</a>
Oasis MAX Cartridge Column	2.1 $\times$ 20 mm	30 $\mu$ m	1/pk	<a href="#">186002057</a>
Oasis MAX Column	3.0 $\times$ 20 mm	30 $\mu$ m	1/pk	<a href="#">186002053</a>
Oasis MAX Column	3.9 $\times$ 20 mm	30 $\mu$ m	1/pk	<a href="#">186002054</a>
Oasis MAX Column	4.6 $\times$ 20 mm	30 $\mu$ m	1/pk	<a href="#">186002055</a>
Oasis WCX Column	2.1 $\times$ 20 mm	30 $\mu$ m	1/pk	<a href="#">186002505</a>
Oasis WCX Column	3.9 $\times$ 20 mm	30 $\mu$ m	1/pk	<a href="#">186002507</a>
Oasis WAX Column	2.1 $\times$ 20 mm	30 $\mu$ m	1/pk	<a href="#">186002508</a>
Oasis WAX Column	3.9 $\times$ 20 mm	30 $\mu$ m	1/pk	<a href="#">186002509</a>

Custom sorbents and configurations available upon request.

## On-Line Solid-Phase Extraction (SPE) Cartridge

Description	Format	Particle Size	Qty.	P/N
Oasis WCX OSM Cartridge	1 $\times$ 10 mm	30 $\mu$ m	96/pk	<a href="#">186005671</a>

## XBRIDGE OSM CARTRIDGES

The XBridge™ C<sub>18</sub> and C<sub>8</sub> sorbents use Waters' proprietary Ethylene Bridged Hybrid (BEH™) Technology to produce a sorbent with high mechanical strength and excellent stability for reversed-phase separations. These sorbents can provide separations with superior peak shape and high efficiency.

## SPE COLUMNS FOR WATERS UPLC WITH ON-LINE SPE TECHNOLOGY



UPLC with On-Line SPE Technology combines automated sample handling, chromatographic media, and ultra-sensitive optical and mass spectrometry detection into an on-line SPE-LC-MS/MS solution. When paired with one of the three UPLC pressure-enabled on-line SPE column chemistries, you have the ability to extract a wide range of analytes.

This proven system and column chemistries dramatically streamlines the analysis of drinking water samples by providing analyte extraction, concentration, separation, and detection in one turnkey solution.

## Ordering Information

### XBridge OSM Cartridges

Description	Format	Particle Size	Qty.	P/N
XBridge C <sub>18</sub> OSM Cartridge	1 × 10 mm	10 µm	96/pk	<a href="#">186005672</a>
XBridge C <sub>8</sub> OSM Cartridge	1 × 10 mm	10 µm	96/pk	<a href="#">186005673</a>

## Ordering Information

### Oasis Bulk Sorbents

Description	Dimension	Particle Size	Qty.	P/N
Oasis HLB	—	30 µm/100 gm	—	<a href="#">186007549</a>
Oasis HLB	—	30 µm/250 gm	—	<a href="#">186007550</a>
Oasis MAX	—	30 µm/100 gm	—	<a href="#">186007553</a>
Oasis MAX	—	30 µm/250 gm	—	<a href="#">186007554</a>
Oasis MCX	—	30 µm/100 gm	—	<a href="#">186007551</a>
Oasis MCX	—	30 µm/250 gm	—	<a href="#">186007552</a>
Oasis HLB Glass Cartridge	—	60 µm	30/box	<a href="#">186000683</a>
Oasis HLB Direct Connect HP Column	2.1 × 30 mm	20 µm	1/pk	<a href="#">186005231</a>
XBridge C <sub>18</sub> Direct Connect HP Column	2.1 × 30 mm	10 µm	1/pk	<a href="#">186005232</a>
XBridge C <sub>8</sub> Direct Connect HP Column	2.1 × 30 mm	10 µm	1/pk	<a href="#">186005233</a>

### Columns for On-Line Sample Manager (OSM)

Description	Dimension	Particle Size	Qty.	P/N
Oasis HLB Direct Connect HP Column	2.1 × 30 mm	20 µm	1/pk	<a href="#">186005231</a>
XBridge C <sub>18</sub> Direct Connect HP Column	2.1 × 30 mm	10 µm	1/pk	<a href="#">186005232</a>
XBridge C <sub>8</sub> Direct Connect HP Column	2.1 × 30 mm	10 µm	1/pk	<a href="#">186005233</a>

## OASIS GLASS CARTRIDGES FOR PPT DETECTION LEVELS

Oasis Glass Cartridges are available in a 5 cc (200 mg) configuration with Teflon Frits for trace analysis at parts per trillion (PPT) levels. Each lot is tested for the presence of bisphenol A and other phenols and phthalates, assuring that endocrine disruptors in water samples can be analyzed to PPT levels.

## Ordering Information

### Oasis HLB Glass Cartridge

Description	Dimension	Particle Size	Qty.	P/N
Oasis HLB Glass Cartridge	—	60 µm	30/box	<a href="#">186000683</a>



# Ostro Pass-Through Sample Preparation Product

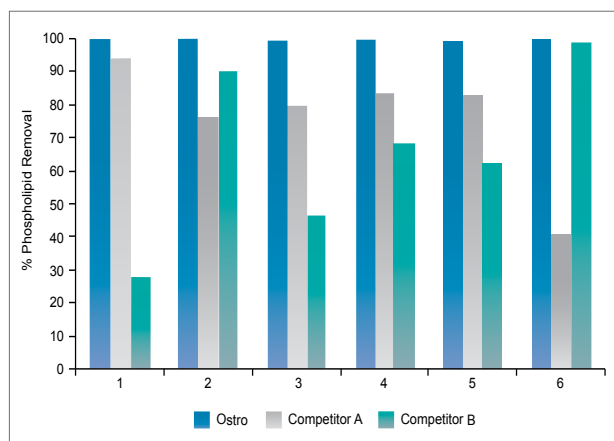


The Simplest Way to Cleaner Samples: Ostro™ Pass-through 96-well Plate provides a novel solution for cleanup, requiring minimal-to-no method development, using a combination of filtration and sorbent interactions to produce cleaner samples in less time.

- Pass-through sample preparation technique
- Removes 95% of phospholipids and proteins
- For reproducible, consistent, and robust methods
- Increases throughput with easy-to-implement protocol



## Reproducibility



Comparative % removal of total phospholipids from six different lots of plasma using the Ostro (0.19% RSD), phospholipid removal plate from competitor A (24.5% RSD) and phospholipid removal plate from competitor B (40.9% RSD).

## Increased Instrument Uptime

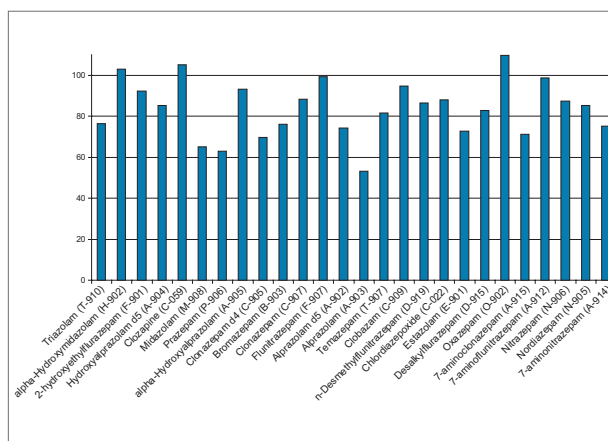
Phospholipids can build up on your LC column and MS system. This leads to unpredictable, inaccurate results and necessitates extensive system cleaning and instrument downtime. Removing these contaminants before they enter your system provides increased instrument robustness, improved results, and maximum laboratory efficiency.

## Ordering Information

### Ostro Pass-Through Sample Preparation Plate

Description	Qty.	P/N
Ostro Protein Precipitation and Phospholipid Removal Plate, 25 mg	1/pk	<a href="#">186005518</a>

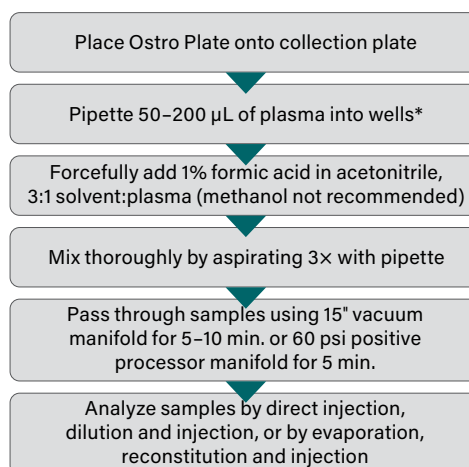
## Recovery



The Ostro Plate can be used with its standard protocol in a drug discovery setting for rapid sample cleanup. In this example, proteins and the vast majority of phospholipids were removed from a sample containing 26 structural analogs and metabolites while maintaining high analyte recovery.

## Protocol

Minimizing method development time, the standard Ostro protocol will provide excellent results for a wide variety of acidic, basic, and neutral compounds.



\*For sample volumes 50 µL or less, a higher solvent to plasma ratio may be necessary.

## Sep-Pak Solid-Phase Extraction (SPE) Products

### The Most Referenced and Widely Used Sample Preparation Technology

Sep-Pak™ devices are recognized throughout the world and remain the most referenced SPE product for sample preparation. A diverse selection of formats and sorbents make Sep-Pak SPE Products ideally suited for all types of samples for GC, HPLC, and UPLC analysis methods.



#### Formats:

- Cartridges in both Vac syringes and Plus format devices
- 96-Well plate
- $\mu$ Elution plate

#### Chemistries:

- Reversed-Phase (silica-based)
- $tC_2$ -bonded phase with low hydrophobic characteristics
- $C_8$ -bonded phase with moderate hydrophobicity
- $C_{18}$ -monofunctional bonded phase, a Waters original
- $tC_{18}$ -tri-functional bonded phase with increased hydrolytic stability
- Reversed or Normal-Phase (less polar alternatives to silica)
- Amino Propyl ( $NH_2$ )-basic polar bonded phase
- Cyano Propyl (CN)-polar bonded phase
- Diol-neutral polar bonded phase
- PSA-Primary-Secondary Amine
- Normal-Phase
- Silica-polar surface used to adsorb analytes from non-polar solvents
- Alumina (A, B, N)- a highly active grade of alumina that is available in acidic, basic and neutral surface chemistries
- Florisil-polar, highly active, weakly basic sorbent for adsorption of low-to-moderate polarity species from nonaqueous solutions
- Ion-Exchange (silica-based)
- AccellPlus QMA-hydrophilic strong anion-exchanger with large pore size
- AccellPlus CM-hydrophilic weak cation-exchanger with large pore size
- Specialty
- PoraPak™ RDX-for analysis of explosives in ground and surface water, EPA-8330
- Sep-Pak Dry-anhydrous  $Na_2SO_4$  for removal of residual water from non-aqueous extracts
- DNPH-Silica-for air analysis of aldehydes and ketones, EPA-TO-11A, ASTM D-5791
- XPoSure-for indoor air monitoring of aldehydes and ketones
- AC2-activated carbon used to concentrate pesticides and herbicides
- PS2-styrene-divinyl benzene polymer used to concentrate pesticides and herbicides
- Carbon Black/Amino Propyl-for pesticides from food
- Carbon Black/PSA-for concentrating pesticides from food
- Potassium Carbonate-for synthesis of radiopharmaceuticals

## Sep-Pak Sorbent Selection Guide

Reversed Phase			
	Description	Applications	Properties
<b>Sep-Pak C<sub>18</sub></b> Si(CH <sub>3</sub> ) <sub>2</sub> C <sub>18</sub> H <sub>37</sub>	Hydrophobic, silica-based bonded phase used to adsorb analytes from aqueous solutions. Monofunctional bonding provides alternate selectivity versus tC <sub>18</sub> .	<ul style="list-style-type: none"> <li>Lipid fractionation; ganglioside isolation</li> <li>Organic acids in fruit juice, wine</li> <li>JPMHLW and CDFA official methods for pesticides in food</li> <li>Natural products</li> <li>AOAC methods for food colors, sugars</li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 55–105 μm</li> <li>Pore size: 125 Å</li> <li>Surface area: 325 m<sup>2</sup>/g</li> <li>Carbon load: 12%</li> <li>pH range: 2–8</li> </ul>
<b>Sep-Pak tC<sub>18</sub></b> SiC <sub>18</sub> H <sub>37</sub>	Strongly hydrophobic, silica-based bonded phase used to adsorb analytes from aqueous solutions. Trifunctional bonding chemistry for increased hydrolytic stability.	<ul style="list-style-type: none"> <li>JPMHLW official methods for pesticides in water</li> <li>JPMHLW official methods for odorants in water</li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 37–55 μm</li> <li>Pore size: 125 Å</li> <li>Surface area: 325 m<sup>2</sup>/g</li> <li>Carbon load: 17%</li> <li>pH range: 2–8</li> </ul>
<b>Sep-Pak C<sub>8</sub></b> Si(CH <sub>3</sub> ) <sub>2</sub> C <sub>8</sub> H <sub>17</sub>	Moderately hydrophobic, silica-based bonded phase used in methods when less retention than that of HLB or C <sub>18</sub> is required.	<ul style="list-style-type: none"> <li>Drugs and their metabolites in biofluids</li> <li>Peptides in serum and plasma</li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 37–55 μm</li> <li>Pore size: 125 Å</li> <li>Surface area: 325 m<sup>2</sup>/g</li> <li>Carbon load: 9%</li> <li>pH range: 2–8</li> </ul>
<b>Sep-Pak tC<sub>2</sub></b> SiC <sub>2</sub> H <sub>5</sub>	Weakly hydrophobic, silica-based bonded phase used in methods when less retention than that of C <sub>8</sub> is required. Trifunctional bonding chemistry for increased hydrolytic stability.	<ul style="list-style-type: none"> <li>Applications are similar to those of C<sub>18</sub> and C<sub>8</sub></li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 37–55 μm</li> <li>Pore size: 125 Å</li> <li>Surface area: 325 m<sup>2</sup>/g</li> <li>Carbon load: 2.7%</li> <li>pH range: 2–8</li> </ul>

Reversed or Normal Phase			
	Description	Applications	Properties
<b>Sep-Pak Aminopropyl</b> Si(CH <sub>2</sub> ) <sub>3</sub> NH <sub>2</sub>	Moderately polar, silica-based bonded phase with weakly basic surface. Can be used as a polar sorbent with different selectivity for acidic/basic analytes or as weak anion exchanges in aqueous medium below pH 8.	<ul style="list-style-type: none"> <li>Phenols, phenolic pigments, natural products</li> <li>Petroleum fractionation</li> <li>Saccharides</li> <li>Drugs and drug metabolites</li> <li>JPMHLW official methods for pesticides in food</li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 55–105 μm</li> <li>Pore size: 125 Å</li> <li>Surface area: 325 m<sup>2</sup>/g</li> <li>Carbon load: 3.5%</li> <li>pH range: 2–8</li> </ul>
<b>Sep-Pak Cyanopropyl</b> Si(CH <sub>3</sub> )(CH <sub>2</sub> ) <sub>3</sub> (CN)	Silica-based bonded phase with low hydrophobicity. Can be used as a less polar alternative to silica or as a less hydrophobic alternative to C <sub>18</sub> or C <sub>8</sub> .	<ul style="list-style-type: none"> <li>Drugs and their metabolites</li> <li>Pesticides</li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 55–105 μm</li> <li>Pore size: 125 Å</li> <li>Surface area: 325 m<sup>2</sup>/g</li> <li>Carbon load: 6.5%</li> <li>pH range: 2–8</li> </ul>
<b>Sep-Pak Diol</b> Si(CH <sub>2</sub> ) <sub>3</sub> OCH <sub>2</sub> CH(OH)CH <sub>2</sub> OH	Moderately polar, neutral, silica-based bonded phase. Used in normal-phase applications where acidic character of silica is undesirable or as a weakly hydrophobic phase in aqueous media.	<ul style="list-style-type: none"> <li>Antibiotics in cosmetics</li> <li>Protein and peptide isolation by HIC (hydrophobic-interaction chromatography)</li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 37–55 μm</li> <li>Pore size: 300 Å</li> <li>Surface area: 100 m<sup>2</sup>/g</li> <li>Carbon load: 2%</li> <li>pH range: 2–8</li> </ul>

AOAC = Association of Official Analytical Chemists; ASTM = American Society for Testing and Materials [International]; CDFA = California Department of Agriculture; EPA = U.S. Environmental Protection Agency; JPMHLW = Japanese Ministry of Health, Labour and Welfare; JPMOE = Japanese Ministry of the Environment; NIOSH = National Institute for Occupational Safety and Health.

Sep-Pak Sorbent Selection Guide *Continued*

Normal Phase			
	Description	Applications	Properties
<b>Sep-Pak Silica</b> SiO <sub>2</sub>	Polar sorbent binds analytes in non-aqueous solvents. Also used as an intermediate-strength cation exchanger in aqueous media and as a support for liquid-liquid partition separations.	<ul style="list-style-type: none"> <li>Vitamins and food additives</li> <li>Lipid classification</li> <li>Synthetic organic compounds</li> <li>Natural products, plant pigments</li> <li>JPMHLW official methods for pesticides in food</li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 55–105 μm</li> <li>Pore size: 125 Å</li> <li>Surface area: 325 m<sup>2</sup>/g</li> <li>Activity: High (≤3.2% water)</li> </ul>
<b>Sep-Pak Alumina (A, B, N)</b> Al <sub>2</sub> O <sub>3</sub>	Highly surface-active polar, acidic (A), neutral (N), and basic (B) sorbents. Exhibits specific pi-electron interactions with aromatic hydrocarbons. Acidic and basic alumina are also low-capacity ion exchangers in aqueous media, unaffected by high-energy radioactivity.	<ul style="list-style-type: none"> <li>Petroleum, synthetic crude oil fractionation (N)</li> <li>Radioactive compound isolation, isotope generators (A, B)</li> <li>Phospholipids, steroids, catecholamines (B)</li> <li>Food, feed additives (A, N), synthetic organic compounds (N)</li> <li>Pesticide, herbicide, priority pollutant isolation (N, B)</li> <li>Alternative to official AOAC and EPA methods (A, N, B)</li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 50–300 μm</li> <li>Pore size: 120 Å</li> <li>Activity: High, ≤1 on Brockmann scale (≤1.5% water)</li> <li>pH of 10% aqueous slurry: A: 4, N: 7.5, B: 10</li> </ul>
<b>Sep-Pak Florisil</b> MgO·SiO <sub>2</sub>	Polar, highly active, weakly basic sorbent for the adsorption of low-to-moderately polar species from non-aqueous solutions.	<ul style="list-style-type: none"> <li>AOAC and EPA official methods for pesticides</li> <li>JPMHLW official methods for pesticides in food</li> <li>Polychlorinated biphenyls (PCBs) in transformer oil</li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 50–200 μm</li> <li>Pore size: 60 Å</li> <li>Activity: High (≤2.5% water)</li> <li>pH of 10% aqueous slurry: 8.5</li> </ul>

Ion Exchange			
	Description	Applications	Properties
<b>Sep-Pak Accell Plus QMA</b> Strong Anion Exchanger C(O)NH(CH <sub>2</sub> ) <sub>3</sub> N(CH <sub>3</sub> ) <sub>3</sub> <sup>+</sup> Cl <sup>-</sup>	Silica-based, hydrophilic, strong anion exchanger with large pore size used to extract anionic analytes in aqueous and non-aqueous solutions.	<ul style="list-style-type: none"> <li>Isolation of anionic proteins</li> <li>Acidic pigments in wine, fruit juices, food extracts</li> <li>Phenolic compounds</li> <li>Peptide pool fractionation</li> <li>Inorganic anions in environmental samples</li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 37–55 μm</li> <li>Pore size: 300 Å</li> <li>pH range: 2–9</li> <li>Carbon load: 6%</li> <li>Ligand density: 220 μmol/g</li> </ul>
<b>Sep-Pak AccellPlus CM</b> Weak Cation Exchanger COO <sup>-</sup> Na <sup>+</sup>	Silica-based, hydrophilic, weak cation exchanger with large pore size used to extract cationic analytes in aqueous and non-aqueous solutions.	<ul style="list-style-type: none"> <li>Isolation of cationic proteins</li> <li>Pesticides, herbicides</li> <li>Steroids</li> <li>Inorganic cations in environmental samples</li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 37–55 μm</li> <li>Pore size: 300 Å</li> <li>pH range: 2–9</li> <li>Carbon load: 5.5%</li> <li>Ligand density: 350 μmol/g</li> </ul>

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Application Specific			
	Description	Applications	Properties
<b>PoraPak RDX</b> Divinylbenzene/ vinylpyrrolidone	For the analysis of explosives in surface and ground water. Meets or exceeds requirements of EPA Method 8330. Reduces use of organic solvent by 10-fold. PoraPak RDX is a divinylbenzene/vinylpyrrolidone copolymer.	<ul style="list-style-type: none"> <li>EPA Method 8330 Nitroaromatics, Nitrosamines</li> <li>EPA Method 529 Explosives and Related Compounds</li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 125–150 µm</li> <li>Pore size: 200 Å</li> </ul>
<b>Sep-Pak DNPH</b> Diphenylhydrazine coated on silica	Acidified dinitrophenylhydrazine reagent coated on silica used for collection of air samples. Aldehydes and ketones react <i>in situ</i> to form hydrazone derivatives; these are then eluted and quantitated by HPLC analysis.	<ul style="list-style-type: none"> <li>EPA Method TO-11A; ASTM D5197 for carbonyl compounds in air</li> <li>JPMOE Official Methods for aldehydes: odor in outdoor air and in exhaust gas</li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 55–105 µm</li> <li>Pore size: 125 Å</li> <li>Recommended maximum capacity: 75 µg (2.5 µmol) formaldehyde/cartridge</li> </ul>
<b>Sep-Pak XPOSure</b> Aldehyde sampler Diphenylhydrazine coated on silica	Acidified dinitrophenylhydrazine reagent coated on silica used for collection of air samples. Aldehydes and ketones react <i>in situ</i> to form hydrazone derivatives; these are then eluted and quantitated by HPLC analysis. Larger particle size optimized for low-pressure personal air monitors.	<ul style="list-style-type: none"> <li>JPMHLW official methods for aldehydes in indoor air</li> <li>EPA Methods TO-11A and IP-6A, ASTM D5197 for carbonyl compounds in air</li> <li>NIOSH Method 2532 for glutaraldehyde in air</li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 500–1000 µm</li> <li>Pore size: 125 Å</li> <li>Recommended maximum capacity: 70 µg (2.3 µmol) formaldehyde/cartridge</li> </ul>
<b>Sep-Pak Ozone Scrubber</b> Potassium iodide	Potassium iodide cartridge is used in series with Sep-Pak DNPH and XPOSure Aldehyde Sampler cartridges to remove ozone interferences.	<ul style="list-style-type: none"> <li>EPA Method IP-6A and ASTM D5197 for carbonyl compounds in air</li> </ul>	<ul style="list-style-type: none"> <li>Quantity: 1.4 g KI</li> <li>Capacity: 4.2 mmol ozone/cartridge (theoretical)</li> </ul>
<b>Sep-Pak Dry</b> Anhydrous sodium sulfate	High-capacity desiccant used to remove residual water from normal-phase SPE extracts (in water-immiscible organic solvents).	<ul style="list-style-type: none"> <li>General purpose</li> </ul>	<ul style="list-style-type: none"> <li>Quantity: 2.85 g anhydrous Na<sub>2</sub>SO<sub>4</sub></li> <li>Theoretical capacity: 3.6 g H<sub>2</sub>O</li> </ul>
<b>Sep-Pak PS2</b> Styrene-DVB copolymer	Very hydrophobic copolymer designed for multi-residue pesticide analysis in water samples.	<ul style="list-style-type: none"> <li>JPMHLW official methods for pesticides in water and food</li> <li>EPA Method 537</li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 80 µm</li> <li>Quantity: 200 mg and 500 mg in Vac syringes, 300 mg in Plus short cartridges</li> <li>pH range 0–14</li> </ul>
<b>Sep-Pak AC2</b> Activated carbon	Highly hydrophobic, low ash content, activated carbon used to remove or enrich very polar organic molecules from water.	<ul style="list-style-type: none"> <li>JPMHLW official method for 1,4-dioxane analysis in water</li> <li>Pesticides, herbicides, especially highly polar small molecules</li> <li>EPA Methods 522 and 541</li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 85 µm</li> <li>Quantity: 400 mg/cartridge</li> <li>pH range 1–12</li> </ul>
<b>Sep-Pak Carbon Black/Aminopropyl</b> Carbon black aminopropyl silica	Two-layer sorbent bed used for pesticide cleanup in food matrices prior to GC analysis.	<ul style="list-style-type: none"> <li>JPMHLW official methods for pesticides in food</li> <li>JPMHLW official method for propham</li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 37–105 µm (carbon black, top layer); 55–105 µm (aminopropyl silica, bottom layer)</li> <li>Quantity: 500 mg of each sorbent, separated by frit</li> </ul>
<b>Sep-Pak Carbon Black/PSA</b> Primary-secondary amine silica	Two-layer sorbent bed used for pesticide cleanup in food matrices prior to GC analysis. PSA provides alternative selectivity compared to aminopropyl.	<ul style="list-style-type: none"> <li>JPMHLW official methods for pesticides in food</li> </ul>	<ul style="list-style-type: none"> <li>Particle size: 37–105 µm (carbon black, top layer); 37–55 µm (PSA, bottom layer)</li> <li>Quantity: 500 mg of each sorbent, separated by frit</li> </ul>
<b>Sep-Pak Potassium Carbonate</b> K <sub>2</sub> CO <sub>3</sub>	Potassium carbonate has been used as a mild base. When reacting with strong acids, it will produce salts, water, and carbon dioxide gas due to the carbonate breakdown.	<ul style="list-style-type: none"> <li>Synthesis of radiopharmaceuticals</li> </ul>	<ul style="list-style-type: none"> <li>Quantity: 2 g of sorbent in Plus long cartridge</li> </ul>



## Ordering Information

### Sep-Pak Cartridge Selection Guide



	Plus Short	Plus Long	Plus Light	Classic Short	Classic Long	Vac 1 cc/50 mg	Vac 1 cc/100 mg	Vac RC/100 mg
	50/box	50/box	50/box	50/box	50/box	100/box	100/box	50/box
Sorbent	P/N Mass/Volume*	P/N Mass/Volume*	P/N Mass/Volume*	P/N Mass/Volume*	P/N Mass/Volume*	P/N Volume*	P/N Volume*	P/N Volume*
C <sub>18</sub>	<a href="#">WAT020515</a> 360 mg/0.7 mL	<a href="#">WAT023635</a> 820 mg/1.6 mL	<a href="#">WAT023501</a> 130 mg/0.3 mL	<a href="#">WAT051910</a> 360 mg/0.85 mL	—	<a href="#">WAT054955</a> 0.13 mL	<a href="#">WAT023590</a> 0.2 mL	<a href="#">WAT036935</a> 0.2 mL
tC <sub>18</sub>	<a href="#">WAT036810</a> 400 mg/0.8 mL	<a href="#">WAT036800</a> 900 mg/1.4 mL	<a href="#">WAT036805</a> 145 mg/0.4 mL	—	—	<a href="#">WAT054960</a> 0.11 mL	<a href="#">WAT036820</a> 0.25 mL	<a href="#">WAT043410</a> 0.25 mL
C <sub>8</sub>	<a href="#">WAT036775</a> 400 mg/0.8 mL	—	<a href="#">WAT036770</a> 145 mg/0.4 mL	—	—	<a href="#">WAT054965</a> 0.11 mL	<a href="#">WAT036785</a> 0.25 mL	<a href="#">WAT043415</a> 0.25 mL
tC <sub>2</sub>	<a href="#">WAT052720</a> 400 mg/0.8 mL	—	<a href="#">WAT052725</a> 145 mg/0.4 mL	—	—	—	<a href="#">WAT052710</a> 0.25 mL	—
Silica	—	<a href="#">WAT020520</a> 690 mg/1.6 mL	<a href="#">WAT023537</a> 120 mg/0.4 mL	—	<a href="#">WAT051900</a> 690 mg/2.0 mL	<a href="#">WAT054980</a> 0.15 mL	<a href="#">WAT023595</a> 0.25 mL	<a href="#">WAT036940</a> 0.25 mL
Florisol	—	<a href="#">WAT020525</a> 910 mg/1.4 mL	<a href="#">WAT023543</a> 145 mg/0.3 mL	—	<a href="#">WAT051960</a> 900 mg/1.7 mL	<a href="#">WAT054985</a> 0.12 mL	<a href="#">WAT023600</a> 0.2 mL	—
AccellPlus CM	<a href="#">WAT020550</a> 360 mg/0.8 mL	—	<a href="#">WAT023531</a> 130 mg/0.4 mL	<a href="#">WAT010910</a> 360 mg/1.1 mL	—	—	<a href="#">WAT023625</a> 0.25 mL	—
AccellPlus QMA	<a href="#">WAT020545</a> 360 mg/0.8 mL	—	<a href="#">WAT023525</a> 130 mg/0.4 mL	<a href="#">WAT010835</a> 360 mg/1.1 mL	—	—	<a href="#">WAT023620</a> 0.25 mL	<a href="#">WAT043460</a> 0.25 mL
Alumina A	—	<a href="#">WAT020500</a> 1710 mg/1.2 mL	<a href="#">WAT023549</a> 280 mg/0.35 mL	—	<a href="#">WAT051800</a> 1850 mg/1.8 mL	—	<a href="#">WAT023575</a> 0.1 mL	—
Alumina B	—	<a href="#">WAT020505</a> 1710 mg/1.2 mL	<a href="#">WAT023555</a> 280 mg/0.35 mL	—	<a href="#">WAT051820</a> 1850 mg/1.8 mL	—	<a href="#">WAT023580</a> 0.1 mL	—
Alumina N	—	<a href="#">WAT020510</a> 1710 mg/1.2 mL	<a href="#">WAT023561</a> 280 mg/0.35 mL	—	<a href="#">WAT051810</a> 1850 mg/1.8 mL	—	<a href="#">WAT023585</a> 0.1 mL	—
Aminopropyl (NH <sub>2</sub> )	<a href="#">WAT020535</a> 360 mg/0.7 mL	—	<a href="#">WAT023513</a> 130 mg/0.3 mL	<a href="#">WAT010830</a> 360 mg/0.85 mL	—	—	<a href="#">WAT023610</a> 0.2 mL	<a href="#">WAT043475</a> 0.2 mL
Cyanopropyl (CN)	<a href="#">WAT020540</a> 360 mg/0.7 mL	—	<a href="#">WAT023507</a> 130 mg/0.3 mL	<a href="#">WAT010823</a> 360 mg/0.85 mL	—	<a href="#">WAT054975</a> 0.13 mL	<a href="#">WAT023615</a> 0.2 mL	—
PSA	186004538 360 mg/0.7 mL	—	186004578 130 mg/0.3 mL	186004560 360 mg/0.85 mL	—	186004562 0.1 mL	186004561 0.2 mL	186004567 0.2 mL
Diol	<a href="#">WAT020530</a> 360 mg/0.8 mL	—	<a href="#">WAT023519</a> 130 mg/0.4 mL	—	—	—	<a href="#">WAT023605</a> 0.25 mL	—
Potassium Carbonate (K <sub>2</sub> CO <sub>3</sub> )	—	186009005** 2 g	—	—	—	—	—	—

\*Hold-up volume.

\*\*Only in Plus Long cartridge, 100/box\*

### Sep-Pak 96-well Plates

Description	P/N
Sep-Pak tC <sub>18</sub> , 25 mg Plate	<a href="#">186002319</a>
Sep-Pak tC <sub>18</sub> , 40 mg Plate	<a href="#">186002320</a>
Sep-Pak tC <sub>18</sub> , 100 mg Plate	<a href="#">186002321</a>
Sep-Pak AccellPlus QMA, 100 mg Plate	<a href="#">186001917</a>
Sep-Pak C <sub>18</sub> , 40 mg Plate	<a href="#">186003966</a>





	Vac 3 cc/200 mg	Vac 3 cc/500 mg	Vac RC/500 mg	Vac 6 cc/500 mg	Vac 6 cc/1 g	Vac 12 cc/2 g	Vac 20 cc/5 g	Vac 35 cc/10 g
	50/box	50/box	50/box	30/box	30/box	20/box	20/box	10/box
Sorbent	P/N Volume*	P/N Volume*	P/N Volume*	P/N Volume*	P/N Volume*	P/N Volume*	P/N Volume*	P/N Volume*
C <sub>18</sub>	<a href="#">WAT054945</a> 0.42 mL	<a href="#">WAT020805</a> 0.8 mL	<a href="#">WAT036945</a> 0.8 mL	<a href="#">WAT043395</a> 1.2 mL	<a href="#">WAT036905</a> 2.0 mL	<a href="#">WAT036915</a> 3.6 mL	<a href="#">WAT036925</a> 8.0 mL	<a href="#">WAT043345</a> 16.8 mL
tC <sub>18</sub>	<a href="#">WAT054925</a> 0.34 mL	<a href="#">WAT036815</a> 1.0 mL	<a href="#">WAT043425</a> 1.0 mL	<a href="#">WAT036790</a> 1.1 mL	<a href="#">WAT036795</a> 1.9 mL	<a href="#">WAT043380</a> 3.5 mL	<a href="#">WAT043365</a> 7.8 mL	<a href="#">WAT043350</a> 16.3 mL
C <sub>8</sub>	<a href="#">WAT054940</a> 0.34 mL	<a href="#">WAT036780</a> 1.0 mL	<a href="#">WAT043430</a> 1.0 mL	<a href="#">WAT054525</a> 1.1 mL	<a href="#">WAT054570</a> 1.9 mL	<a href="#">WAT054615</a> 3.5 mL	<a href="#">WAT054660</a> 7.8 mL	<a href="#">WAT054700</a> 16.3 mL
tC <sub>2</sub>	—	<a href="#">WAT052715</a> 1.0 mL	—	—	<a href="#">WAT052705</a> 1.9 mL	—	—	—
Silica	<a href="#">WAT054930</a> 0.53 mL	<a href="#">WAT020810</a> 1.2 mL	<a href="#">WAT036950</a> 1.2 mL	<a href="#">WAT043400</a> 1.2 mL	<a href="#">WAT036910</a> 1.9 mL	<a href="#">WAT036920</a> 3.9 mL	<a href="#">WAT036930</a> 11.0 mL	<a href="#">WAT043355</a> 23.4 mL
Florisil	—	<a href="#">WAT020815</a> 0.8 mL	<a href="#">WAT043435</a> 0.8 mL	<a href="#">WAT043405</a> 1.2 mL	<a href="#">WAT043390</a> 2.0 mL	<a href="#">WAT043385</a> 3.6 mL	<a href="#">WAT043370</a> 8.0 mL	<a href="#">WAT043360</a> 16.8 mL
AccellPlus CM	—	<a href="#">WAT020855</a> 1.1 mL	<a href="#">WAT054505</a> 1.1 mL	<a href="#">WAT054545</a> 1.2 mL	<a href="#">WAT054590</a> 1.9 mL	<a href="#">WAT054635</a> 3.5 mL	<a href="#">WAT054675</a> 7.8 mL	<a href="#">WAT054720</a> 16.3 mL
AccellPlus QMA	—	<a href="#">WAT020850</a> 1.1 mL	<a href="#">WAT054500</a> 1.1 mL	<a href="#">WAT054550</a> 1.2 mL	<a href="#">WAT054595</a> 1.9 mL	<a href="#">WAT054640</a> 3.5 mL	<a href="#">WAT054680</a> 7.8 mL	<a href="#">WAT054725</a> 16.3 mL
Alumina A	—	<a href="#">WAT020820</a> 0.4 mL	—	<a href="#">WAT054535</a> 0.5 mL	<a href="#">WAT054580</a> 0.8 mL	<a href="#">WAT054620</a> 1.8 mL	<a href="#">WAT054670</a> 3.9 mL	<a href="#">WAT054710</a> 8.2 mL
Alumina B	—	<a href="#">WAT020825</a> 0.4 mL	—	<a href="#">WAT054540</a> 0.5 mL	<a href="#">WAT054585</a> 0.8 mL	<a href="#">WAT054625</a> 1.8 mL	<a href="#">WAT054665</a> 3.9 mL	<a href="#">WAT054715</a> 8.2 mL
Alumina N	—	<a href="#">WAT020830</a> 0.4 mL	<a href="#">WAT043485</a> 0.4 mL	<a href="#">WAT054530</a> 0.5 mL	<a href="#">WAT054575</a> 0.8 mL	<a href="#">WAT054630</a> 1.8 mL	<a href="#">WAT043375</a> 3.9 mL	<a href="#">WAT054705</a> 8.2 mL
Aminopropyl (NH <sub>2</sub> )	—	<a href="#">WAT020840</a> 0.8 mL	<a href="#">WAT054515</a> 0.8 mL	<a href="#">WAT054560</a> 1.2 mL	<a href="#">WAT054605</a> 2.0 mL	<a href="#">WAT054650</a> 3.6 mL	<a href="#">WAT054695</a> 8.0 mL	<a href="#">WAT054740</a> 16.8 mL
Cyanopropyl (CN)	<a href="#">WAT054935</a> 0.42 mL	<a href="#">WAT020835</a> 0.8 mL	—	<a href="#">WAT054555</a> 1.2 mL	<a href="#">WAT054600</a> 2.0 mL	<a href="#">WAT054645</a> 3.6 mL	<a href="#">WAT054685</a> 8.0 mL	<a href="#">WAT054730</a> 16.8 mL
PSA	186004598 0.42 mL	<a href="#">186004536</a> 0.8 mL	186004568 0.8 mL	<a href="#">186004563</a> 1.2 mL	186004537 2.0 mL	186004564 3.6 mL	186004565 8.0 mL	186004566 16.8 mL
Diol <sup>a</sup>	—	<a href="#">WAT020845</a> 1.0 mL	<a href="#">WAT054520</a> 1.0 mL	<a href="#">WAT054565</a> 1.1 mL	<a href="#">WAT054610</a> 1.9 mL	<a href="#">WAT054655</a> 3.5 mL	WAT054690 7.8 mL	WAT054735 16.3 mL
Potassium Carbonate (K <sub>2</sub> CO <sub>3</sub> )	—	—	—	—	—	—	—	—

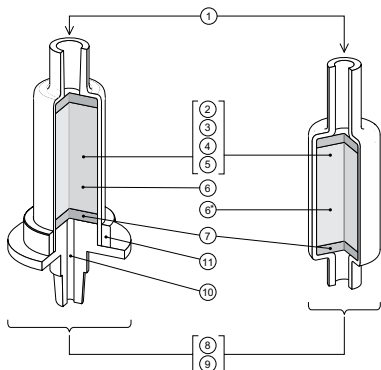
\*Hold-up volume.

### Sep-Pak 96-well $\mu$ Elution Plate

Description	P/N
Sep-Pak tC <sub>18</sub> , 10 mg $\mu$ Elution Plate	<a href="#">186002318</a>

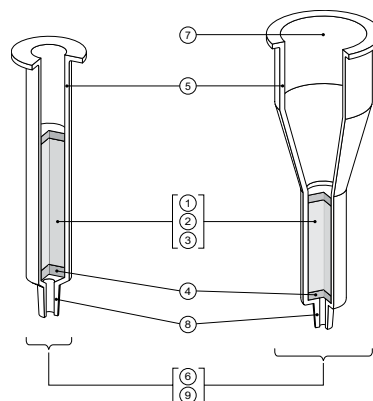


## ANATOMY OF SEP-PAK CARTRIDGES



### The Anatomy of Sep-Pak Plus and Classic Cartridge Design

1. Female Luer inlet accepts male Luer tip. Plus cartridge design can be stacked.
2. Highest quality sorbents designed and made specifically for sample preparation; clean, dry, reproducible in activity and capacity with optimal surface area, pore, and particle size distributions.
3. Broad range of sorbent surface activities available; each lot is tested under rigid specifications for chromatographic activity, retention, and selectivity.
4. Sorbent type and bed dimensions equal to corresponding Sep-Pak Classic Cartridges enable direct transfer of previously developed and published methods to new Plus design.
5. Weight of sorbent in each cartridge is controlled within +/- 5% of specification to assure reproducible performance.
6. Advanced bed formation to minimize voids and channels. Patented\* Radial Compression Technology used to form homogeneous packed bed free of voids and channels.
7. Special blend of HD and UHMW polyethylenes used for 20 µm frits imparts excellent solvent resistance, extremely low extractables level, and good flow properties. Frit also acts as depth filter for small amounts of sample debris.
8. Polyethylene body has excellent solvent resistance. All body parts are quality tested to verify extremely low level of UV-absorbing extractables. Plus design is molded for precise dimensions making it suitable for automated equipment.
9. Cartridges are sealed in a special polyfoil pouch to protect product integrity, sorbent activity, and purity.
10. Male Luer outlet has reduced internal volume for minimal sample hold up.
11. Color-coded ring compresses and seals the cartridge and identifies sorbent.



### The Anatomy of Sep-Pak Vac and Vac RC Cartridge Designs

12. Highest quality sorbents design and made specially for sample preparation; clean, dry, reproducible in activity and capacity, with optimal surface area, pore, and particle size.
13. Broad range of sorbent surface activities available; each lot is tested under rigid specifications for chromatographic activity, retention, and selectivity.
14. Weight of sorbent in each cartridge is controlled within +/- 5% of specification to assure reproducible performance.
15. Special blend of HD and UHMW polyethylenes used for 20 µm frits.
16. Molded, medical-grade, polypropylene body.
17. Cartridges are sealed in a special polyfoil pouch to protect product integrity, sorbent activity, and purity.
18. Integral reservoir approximately 20 mL, robotic compatible.
19. Outlet make Luer tip.
20. Color-coded labeling in the cartridge to identify the sorbent.

\*P.D. McDonald, C.W. Rausch, Radial Compression of Packed Beds, U.S. Patent #4,250,035 (1981); Great Britain # 1,568,700 (1976); Canada # 1,101,785 (1981); Japan # 1,400,983 (1987); Sweden # 450,750 (1987); Germany # 2,655,650 (1988); other patents pending.

## GENERAL EXTRACTION PROTOCOLS FOR SEP-PAK CARTRIDGES

### Normal-Phase Chromatography with Sep-Pak Cartridges

To perform normal-phase chromatography with Sep-Pak Cartridges, use a gradient of non-polar solvents with polar silica, florisil, NH<sub>2</sub>, diol, CN, alumina A, B, or N as a sorbent\*.

1. You may condition the cartridge with 6–10 hold-up volumes of non-polar solvent, usually the sample solvent.
2. Load the sample into the cartridge.
3. Elute unwanted components with a non-polar solvent.
4. Elute the first component of interest with a polar solvent.
5. Elute remaining components of interest with progressively more polar solvents.
6. When you recover all of your components, discard the used cartridge in an appropriate manner.

\*Depending upon your chromatographic conditions, you may also use CN as a packing material for normal-phase chromatography.

### Reversed-Phase Chromatography with Sep-Pak Cartridges

To perform reversed-phase chromatography with Sep-Pak Cartridges, use a gradient of strongly-to-weakly polar solvents with non-polar C<sub>18</sub>, tC<sub>18</sub>, C<sub>8</sub>, tC<sub>8</sub>, diol, NH<sub>2</sub>, or CN as a sorbent.

1. Solvate the bonded phase with 6–10 cartridge hold-up volumes of methanol or acetonitrile. Flush the cartridge with 6–10 hold-up volumes of water or buffer. Do not allow the cartridge to dry out.
2. Load the sample dissolved in a strongly polar solvent.
3. Elute unwanted components with a strongly polar solvent.
4. Elute weakly held components of interest with a less polar solvent.
5. Elute more tightly bound components with progressively more non-polar solvents.
6. When you recover all of your components, discard the used cartridge in an appropriate manner.

### Ion-Exchange Chromatography with Sep-Pak Cartridges

To perform ion-exchange chromatography with Sep-Pak Cartridges, use a gradient of pH or ionic strength with AccellPlus CM, AccellPlus QMA, or NH<sub>2</sub> as a sorbent.

1. Condition the cartridge with 6–10 held-up volumes of deionized water or weak buffer.
2. Load the sample dissolved in a solution of deionized water or buffer.

3. Elute unwanted weakly bound components with a weak buffer.
4. Elute the first component of interest with a stronger buffer (change the pH or ionic strength).
5. Elute other components of interest with progressively stronger buffers.
6. When you recover all of your components, discard the used cartridge in an appropriate manner.

### General Elution Protocol for Normal-Phase Chromatography on Sep-Pak Cartridges (Silica, Alumina, Florisil, Diol, NH<sub>2</sub>)

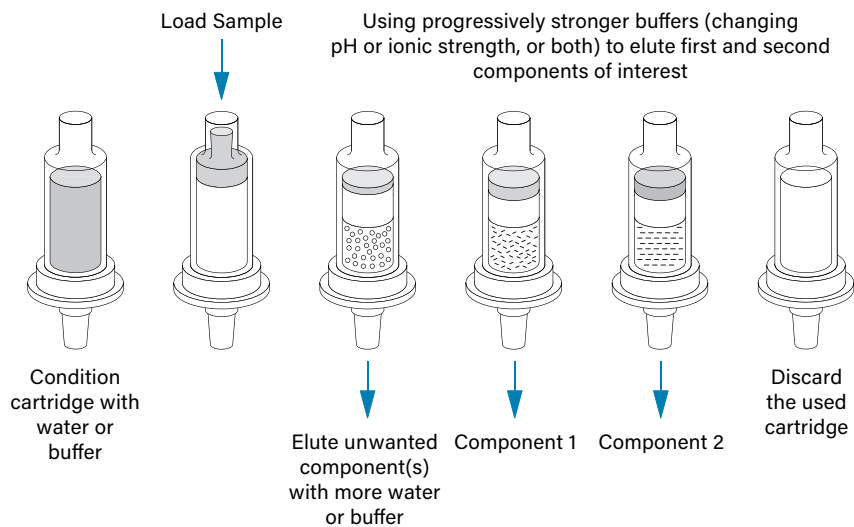
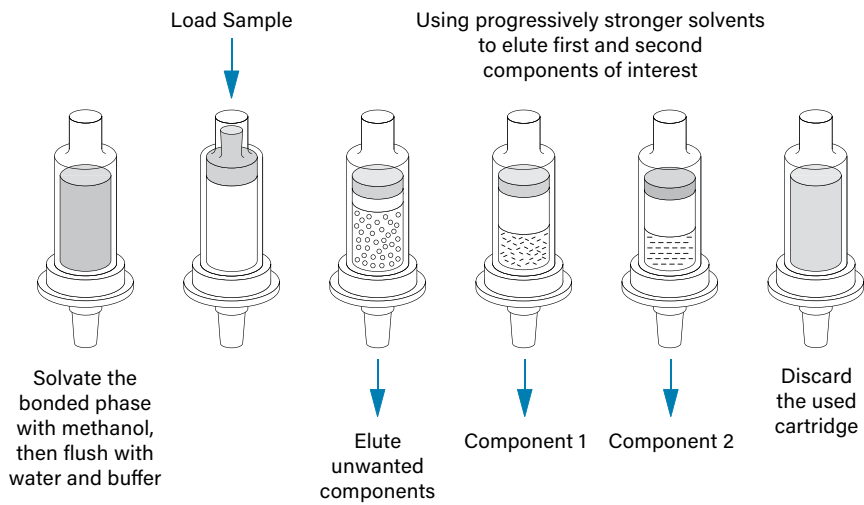
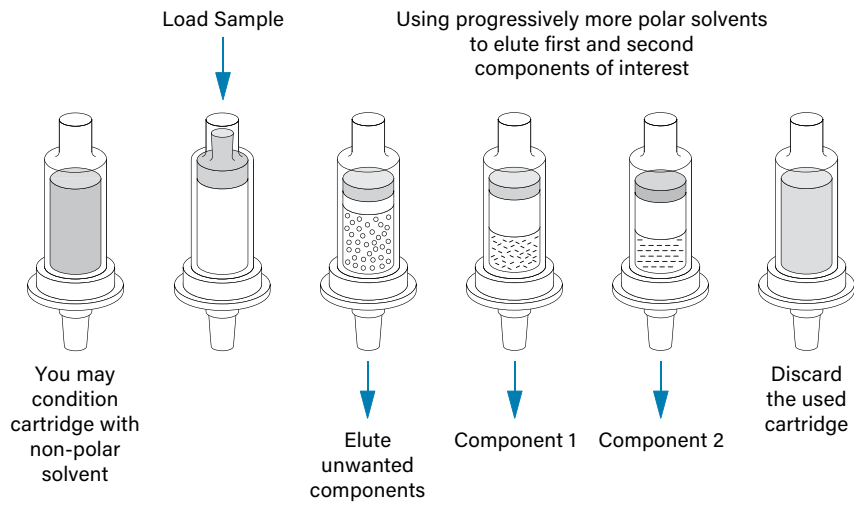
1. Load sample.
2. Use progressively more polar solvents to elute first and second components of interest.
3. You may condition cartridge with non-polar solvent.
4. Elute unwanted components.
5. Elute first component of interest (Component 1).
6. Elute second component of interest (Component 2).
7. Discard the used cartridge.

### General Elution Protocol for Reversed-Phase Chromatography on Sep-Pak Cartridges (C<sub>18</sub>, CN)

1. Load sample.
2. Use progressively stronger solvents to elute first and second components of interest.
3. Solvate the bonded phase with methanol, then flush with water and buffer.
4. Elute unwanted components.
5. Elute first component of interest (Component 1).
6. Elute second component of interest (Component 2).
7. Discard the used cartridge.

### General Elution Protocol for Ion-Exchange Chromatography on Sep-Pak Cartridges (NH<sub>2</sub>, AccellPlus QMA, AccellPlus CM)

1. Load sample.
2. Use progressively stronger buffers (changing pH or ionic strength) to elute first and second components of interest.
3. Condition cartridge with water or buffer.
4. Elute unwanted component(s) with more water or buffer.
5. Elute first component of interest (Component 1).
6. Elute second component of interest (Component 2).
7. Discard the used cartridge.



## Advantages of Sep-Pak DNPH-Silica Cartridges

These cartridges provide you with significant advantages when compared to other techniques, such as liquid impingers, for the analysis of aldehydes and ketones. In addition, a new high speed, high resolution HPLC application has been developed to provide excellent quantitation capability in the low parts-per-billion range.

- Sep-Pak DNPH-Silica Cartridges meet the requirements of EPA Method TO-11A and ASTM-D-5791-1
- Results from impingers and these cartridges are in excellent agreement
- Solvent consumption, solvent exposure, and hazardous waste disposal costs are reduced
- Sep-Pak DNPH-Silica Cartridges provide superior convenience and reproducibility, making them ideal for field sampling and process monitoring applications
- Sep-Pak DNPH-Silica Cartridges can save time and increase productivity
- Increased safety

## Ordering Information



### Sep-Pak DNPH-Silica Cartridge

Description	Qty.	P/N
Sep-Pak DNPH-Silica Short Body Cartridge	20/box	<a href="#">WAT037500</a>
Sep-Pak DNPH-Silica Long Body Cartridge	20/box	<a href="#">WAT039550</a>

## Ozone Scrubber Cartridges

Ozone has been shown to interfere with the analysis of carbonyl compounds in air samples that have been drawn through cartridges containing silica coating with 2,4-dinitrophenylhydrazine (DNPH). Ozone Scrubber Cartridges are designed to remove this ozone interference.

These disposable devices are intended for use in series combination with Sep-Pak DNPH-Silica Cartridges or XPoSure Aldehyde Sampler Cartridges.

## Ordering Information



### Sep-Pak Ozone Scrubber

Description	Qty.	P/N
Sep-Pak Ozone Scrubber	20/box	<a href="#">WAT054420</a>

## Sep-Pak XPoSure Aldehyde Sampler Cartridges for Monitoring Aldehydes in Indoor Air

Based on an extension of Waters' DNPH coating technology, Sep-Pak XPoSure Aldehyde Sampler Cartridges are the most sensitive active samplers available today.

## Ordering Information



### Sep-Pak XPoSure Aldehyde Sampler Cartridge

Description	Qty.	P/N
Sep-Pak XPoSure Aldehyde Sampler Cartridge	20/box	<a href="#">WAT047205</a>

## PoraPak RDX Sep-Pak Extraction Cartridge for the Analysis of Explosives in Surface and Ground Waters

Designed to meet or exceed the QA/QC requirements of EPA Method 8330, the PoraPak RDX Sep-Pak Extraction Cartridge is ideal for environmental testing laboratories supporting Department of Defense remediation programs.

## Ordering Information

### PoraPak RDX Cartridges and Accessories

Description	Qty.	P/N
PoraPak RDX Cartridges	30/box	<a href="#">WAT047220</a>
Tubing, Tefzel, 1/8 in. O.D. × 0.040 in. I.D.	10 ft.	WAT023344
Sep-Pak Vac Adapter	12/box	<a href="#">WAT054260</a>
60 cc Sep-Pak Reservoir	12/box	<a href="#">186005587</a>
Male-Male Adapter	100/box	<a href="#">WAT024310</a>

## Sep-Pak Dry SPE Cartridge

Sep-Pak Dry Cartridges are packed with 2.85 g of anhydrous sodium sulfate. These cartridges are designed to remove residual water from the SPE extract.



## Ordering Information

### Sep-Pak Dry Cartridge

Description	Qty.	P/N
Sep-Pak Dry Cartridge	50/box	<a href="#">WAT054265</a>

## Sep-Pak Specialty Chemistries

Description	Mass/Volume/Type	Qty.	P/N
<b>Air Testing</b>			
Sep-Pak DNPH-Silica Cartridge	350 mg/0.7 mL/Plus Short	20/box	<a href="#">WAT037500</a>
Sep-Pak DNPH-Silica Cartridge	800 mg/1.6 mL/Plus Long	20/box	<a href="#">WAT039550</a>
Sep-Pak XPoSure Aldehyde Sampler Cartridge	350 mg/0.7 mL/Plus Short	20/box	<a href="#">WAT047205</a>
Sep-Pak Ozone Scrubber Cartridge	1.4 g/1.6 mL/Plus Short	20/box	<a href="#">WAT054420</a>
<b>Food, Environmental, and Biological Testing</b>			
PoraPak RDX Cartridge	500 mg/1 mL/6 cc Vac	30/box	<a href="#">WAT047220</a>
Sep-Pak Dry Cartridge	2.85 g/1.6 mL/Plus Long	50/box	<a href="#">WAT054265</a>
Sep-Pak Carbon Black/Aminopropyl Cartridge	500 mg carbon black, 500 mg aminopropyl/1.4 mL/6 cc Vac	30/box	<a href="#">186003369</a>
Sep-Pak Carbon Black/PSA Silica Cartridge	500 mg carbon black, 500 mg PSA/1.4 mL/6 cc Vac	30/box	<a href="#">186004590</a>
Sep-Pak AccellPlus QMA Carbonate Cartridge	150 mg/0.4 mL/Plus Light	50/box	<a href="#">186004051</a>
Sep-Pak AccellPlus QMA Carbonate Plus Light Cartridge	46 mg/0.15 mL/Plus Light	50/box	<a href="#">186004540</a>
Sep-Pak PS2	6 cc Vac syringe 500 mg sorbent weight, 30/pk	00/box	<a href="#">WAT200610</a>
Sep-Pak AC2	Plus Short cartridge, 400 mg sorbent per cartridge, 50/pk	00/box	<a href="#">JJAN20229</a>

## Certified Sep-Pak Solid-Phase Extraction (SPE) Cartridges

As a pioneer in SPE, Waters has advanced SPE performance and quality by offering Certified Sep-Pak Sample Preparation Products. By manufacturing these devices to strict performance and cleanliness specifications, we ensure that the detection limits and performance of your analytical methods will not be compromised by interfering substances commonly found in SPE hardware.

### Improve Workflow and Reduce Solvent Waste

Certified Sep-Pak Sample Preparation Devices are available in the most commonly used formats and sorbents to allow easy integration into your sample preparation protocol. Reduced background interferences reduce solvent waste by eliminating unnecessary solvent pre-washing steps that are often required for trace residue methods.

### Manufacturing

Our world-class manufacturing facilities strive to improve quality expectations for SPE product performance. We manufacture under the highest quality standard in the industry including ISO 9001, ISO 13485, and current Good Manufacturing Practices (CGMP). Each Certified Sep-Pak product is thoroughly QC tested.

Sorbent specifications based on:

- Contaminants including hydrocarbons and other environmental contaminants
- Sorbent functionality including:
  - ligand density
  - particle size distribution
  - surface activity
- Chromatographic performance

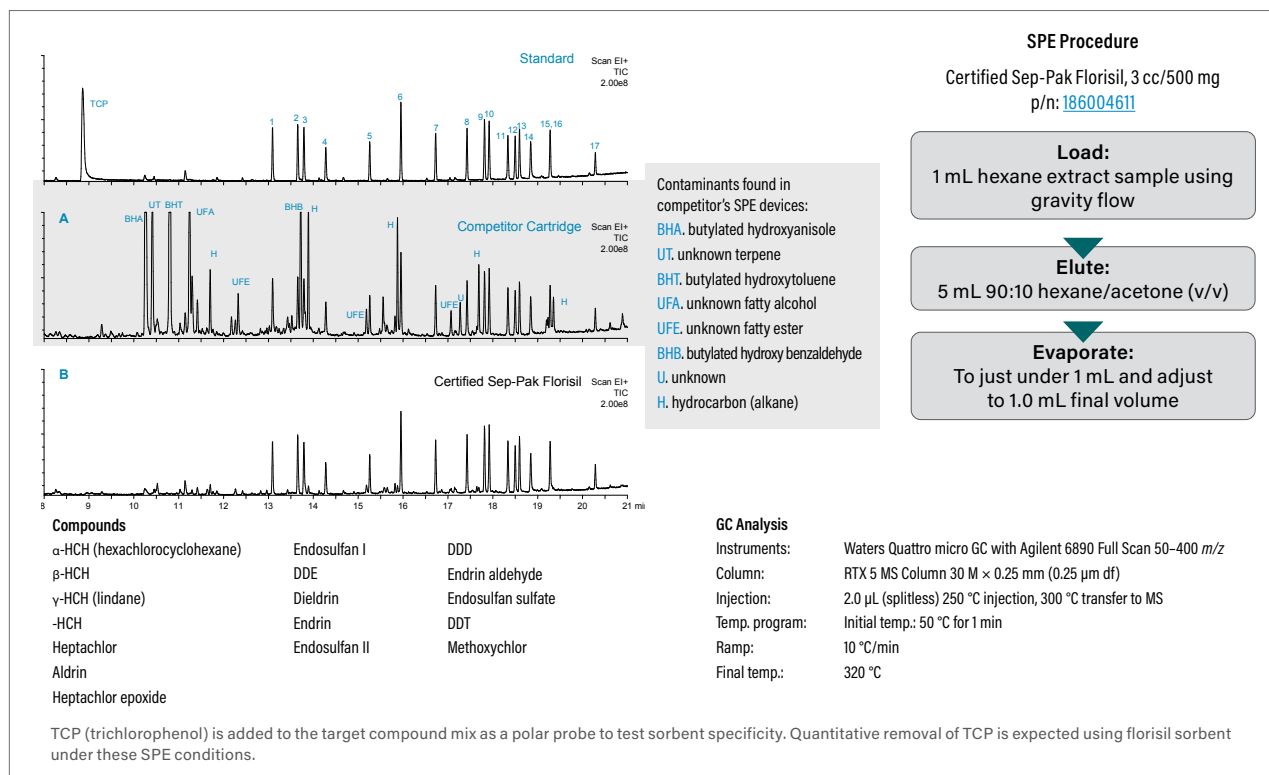
Assembly specifications based on:

- Frit and barrel dimensional tolerance
- Chromatographic testing of total residual extractables including:
  - hydrocarbons
  - plasticizers
  - antioxidants
- Sorbent bed voiding
- Consistent sample flow characteristics





## Comparison of Extracted Interference Levels in Organochlorine Pesticide Analysis at 1 ppm



## CERTIFIED SEP-PAK SORBENT SELECTION GUIDE

C<sub>18</sub>

- Silica-based, trifunctionally-bonded octadecyl sorbent
- High carbon load provides excellent hydrolytic stability for a wide range of samples
- Strong hydrophobic sorbent used to adsorb analytes of even weak hydrophobicity from aqueous solutions
- Typical applications include drugs and their metabolites in serum, plasma or urine; desalting of peptides; trace organics in environmental water samples; organic acids in beverages



Silica

- Unbonded, highly activated silica stationary phase
- A polar sorbent for analyte isolation from non-polar solvents like hydrocarbons and less polar esters and ethers
- Analyte retention can occur through hydrogen bonding or dipole-dipole interactions in non-aqueous samples
- Silica provides a slightly acidic surface for moderate cation-exchange interactions in aqueous samples
- Elution with more polar solvents like polar esters, ethers, alcohols, acetonitrile, or water



### Ordering Information

C<sub>18</sub> Sorbent

	3 cc/200 mg	3 cc/500 mg	6 cc/500 mg	6 cc/1 g
Sorbent	50/box	50/box	30/box	30/box
C <sub>18</sub>	<a href="#">186004618</a>	<a href="#">186004619</a>	<a href="#">186004620</a>	<a href="#">186004621</a>

Silica Sorbent

	3 cc/200 mg	3 cc/500 mg	6 cc/500 mg	6 cc/1 g
Sorbent	50/box	50/box	30/box	30/box
Silica	<a href="#">186004614</a>	<a href="#">186004615</a>	<a href="#">186004616</a>	<a href="#">186004617</a>

## Alumina (A, B, N)

- Alumina is very similar to silica; however, the alumina surface tends to be slightly more stable under high pH conditions than unfunctionalized silica
- The aluminum oxide surface provides an extremely polar surface for analyte retention and has properties of a Lewis acid
- Depending on the sorbent's surface treatment, alumina is available in three forms: Alumina A, Alumina B, and Alumina N
- Alumina exhibits specific interactions with the  $\pi$ -electrons of aromatic hydrocarbons, making it useful for applications like crude oil fractionation
- Acidic and basic grades can be used as low-capacity ion exchangers



## Florisisil

- Very-polar, highly-active, weakly-basic sorbent for adsorption of low-to-moderate polarity species from non-aqueous solutions
- Specifically designed for the adsorption of pesticides using official AOAC, EPA, and JPMHLW regulated methods
- Applications include polychlorinated biphenyls (PCBs) in transformer oil



## Ordering Information

### Florisisil Sorbent

	3 cc/500 mg	6 cc/500 mg	6 cc/1 g
Sorbent	50/box	30/box	30/box
Florisisil	<a href="#">186004611</a>	<a href="#">186004612</a>	<a href="#">186004613</a>

## Ordering Information

### Alumina (A, B, N) Sorbents

	3 cc/500 mg	6 cc/500 mg	6 cc/1 g
Sorbent	50/box	30/box	30/box
Alumina A	<a href="#">186004602</a>	<a href="#">186004603</a>	<a href="#">186004604</a>
Alumina B	<a href="#">186004605</a>	<a href="#">186004606</a>	<a href="#">186004607</a>
Alumina N	<a href="#">186004608</a>	<a href="#">186004609</a>	<a href="#">186004610</a>

## DID YOU KNOW...

### Strategies for Isolating and Cleaning Up Analytes of Interest

Two general SPE strategies are implemented for isolating and cleaning up sample components of interest. A retention-cleanup-elution strategy is frequently used when the compounds of interest are present in levels too low for accurate and precise quantitation. Concentration of dilute samples and trace enrichment of compounds are achieved by this strategy. A pass-through cleanup strategy may be chosen when the desired sample component is present at a high concentration. However, no sample enrichment occurs when a pass-through cleanup strategy is used.

## PoraPak Rxn Cartridges for Post-Synthesis Cleanup



PoraPak products are polymer based for superior cleanup of synthetic reactions. They are available in two chemistries:

- PoraPak Rxn CX (strong cation-exchange sorbent)
- PoraPak Rxn RP (reversed-phase sorbent)

PoraPak Rxn Sorbents are available in fritted, syringe-barrel devices in 6, 20, and 60 cc volumes. The resins are also sold in bulk units, and custom configurations are available on request.

### New Solutions for Faster Results

PoraPak Rxn Sorbents are based on copolymers that exhibit these properties:

- Hard material that does not develop increasing back pressure with flow
- Little swelling or shrinking across a range of solvents and pH extremes
- Low hydraulic resistance enables flow by gravity
- pH extreme tolerance without dissolution or hydrolysis, both limitations of silica-based sorbents



This combination of physical and chemical properties makes PoraPak Rxn Cartridges ideal for synthesis cleanup. The polymers characteristics and particle size maintain gravity-, pressure-, or vacuum-assisted flow; even when reaction mixtures contain precipitate that may contribute additional resistance to flow. The sample will still pass through the cartridge.

The polymer used in PoraPak Rxn Products is resistant to shrinking or swelling in the organic solvents typically used in synthetic reactions. Tests with the following solvents demonstrate that the packed bed maintains good flow properties:

- DCE
- THF
- DMF
- DMSO
- DCM
- Acetone

Some medicinal chemists are familiar with silica-based chromatographic products for reaction cleanup. One of the limitations of these silica-based ion-exchange materials is pH. Silica will dissolve at high pH, while bonded phases are hydrolyzed at low pH; both conditions result in loss of sample and/or impurities (silica and bonded phase) collected in product fractions. PoraPak Rxn polymer-based chromatographic phases are stable at extreme pH. This feature permits using pH as a very powerful tool to create a separation, particularly in ion-exchange mode.

### Providing Separations Solutions

Waters is highly respected worldwide for its expertise in chromatography. Coupled with our ability to seamlessly link critical instrumentation, chemistries, separation technologies, and software, this expertise puts us in a unique position to deliver value-added solutions to our customers.

### Manufacturing

Our world-class manufacturing facilities are continuously expanded and upgraded to keep pace with market demand for our new and existing products. We manufacture under the highest quality standards in the industry, including ISO 9001, ISO 13485, and Current Good Manufacturing Practices (cGMP).

### Ordering Information

#### PoraPak Rxn Cartridges and Bulk Material

Description	PoraPak Rxn CX	PoraPak Rxn RP
6 cc Flanged Cartridges, 400 mg, 30/pk	<a href="#">186004541</a>	<a href="#">186004545</a>
6 cc Flangeless Cartridges, 400 mg, 30/pk	<a href="#">186004542</a>	<a href="#">186004546</a>
20 cc Cartridges, 2 g, 20/pk	<a href="#">186004543</a>	<a href="#">186004547</a>
60 cc Cartridges, 5 g, 10/pk	<a href="#">186004544</a>	<a href="#">186004548</a>
Bulk, 200 mL Container	<a href="#">186004569</a>	<a href="#">186004570</a>

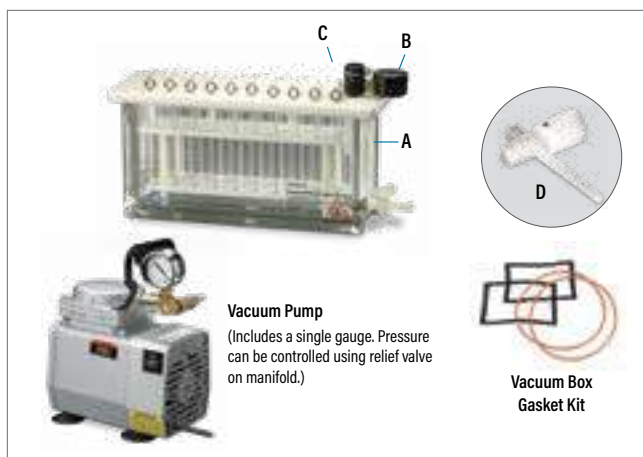
## Vacuum Manifold and Accessories

### VACUUM MANIFOLD FOR USE WITH SPE CARTRIDGES

The vacuum manifold has the capacity to process up to 20 samples simultaneously. The extraction manifold has enhanced features designed for use with conventional silica-based, SPE cartridges as well as modifications that allow you to take full advantage of the unique performance characteristics of our Oasis Extraction Cartridges.

This manifold offers:

- Precision-machined Delrin cover with alignment posts for quick and easy alignment with test tube rack.
- Vacuum gauge placement on cover, not in fluid path, allows for quick and easy waste removal at bottom by vacuum.
- Enhanced vacuum control valve designed for use with Oasis Extraction Cartridges, allows for a quick and momentary rise in vacuum above the frit bubble point at the touch of a finger.
- High-purity, polypropylene needle valves and needle tips with minimum dead volume (opening and closing the valves is required to prevent silica-based SPE cartridges from drying out).

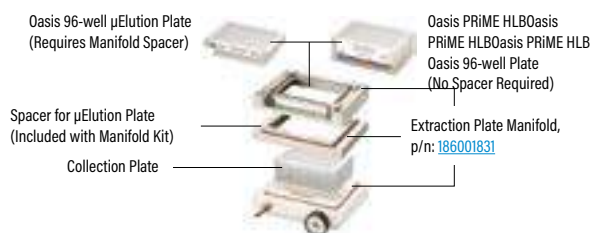


### Ordering Information

#### Spare Parts for Waters Extraction Manifolds

Description	Qty.	P/N
Needle Valves (required when using silica-based SPE cartridges; not required for use with extraction cartridges)	20/pk	<a href="#">WAT200685</a>
Needle Tips	20/pk	<a href="#">WAT200691</a>
Cover, 20 Position without Gauge Assembly	1/pk	186008990
Gauge Assembly, Vacuum	1/pk	<a href="#">WAT200687</a>
Reservoir, Glass with Outlet Valve	1/pk	186008991
Outlet Valve Kit	1/pk	<a href="#">WAT200689</a>
Gasket for Cover	1/pk	<a href="#">WAT200690</a>
Ejector Tool	1/pk	<a href="#">WAT058839</a>
Luer Plugs	25/pk	<a href="#">WAT058851</a>
Rubber Ball Ring (for vacuum gauge assembly)	1/pk	<a href="#">WAT058840</a>
Reversible Vial Rack for 1 mL or 4 mL Autosampler Vials	1/pk	186009084
2 mL Vial Rack for Manifold	1/pk	186009083
13 × 75 mm Test Tube Rack	1/pk	186008994
13 × 100 mm Test Tube Rack	1/pk	186008995
16 × 75 mm Test Tube Rack	1/pk	186008996
16 × 100 mm Test Tube Rack	1/pk	<a href="#">186008997</a>
Reservoir, 30 cc (for Plus, Vac, and Classic Cartridges)	48/pk	<a href="#">WAT011390</a>
Reservoir, 60 cc (for Plus, and Vac Cartridges)	12/pk	<a href="#">186005587</a>
Adapter, Male-Male Luer (for Classic Cartridges)	100/pk	<a href="#">WAT024310</a>
Adapter (to attach reservoir to 1, 3, and 6 cc Vac Cartridges)	12/pk	<a href="#">WAT054260</a>
Adapter (to attach reservoir to 12, 20, and 35 cc Vac Cartridges)	10/pk	<a href="#">WAT048160</a>
Vacuum Pump (110 V, 60 Hz)	1/pk	725000417
Vacuum Pump (220 V, 50 Hz)	1/pk	<a href="#">725000604</a>

#### Manifold and Accessories for Extraction Plate



Description	Qty.	P/N
Extraction Plate Manifold for Oasis 96-well Plates	1/pk	<a href="#">186001831</a>
Extraction Plate Manifold Kit A (includes extraction plate manifold, reservoir tray, sealing cap, and 350 μL sample collection plate)	—	<a href="#">WAT097944</a>
Extraction Plate Manifold Kit B (as Kit A, with 1 mL sample collection plate)	—	<a href="#">WAT097945</a>
Extraction Plate Manifold Kit C (as Kit A, with 2 mL sample collection plate)	—	<a href="#">WAT097946</a>
Disposable Reservoir Tray	25/box	<a href="#">WAT058942</a>
Sample Collection Plate, 350 μL	50/box	<a href="#">WAT058943</a>
Sample Collection Plate, 2 mL	50/box	<a href="#">WAT058958</a>
Sealing Cap for 96-well Collection Plate	50/box	<a href="#">WAT058959</a>
Vacuum Pump (115 V, 60 Hz)	1/pk	725000417
Vacuum Pump (240 V, 50 Hz)	1/pk	<a href="#">725000604</a>
Vacuum Box Gasket Kit (Kit contains: 2 foam top gaskets, 2 orange O-rings)	—	<a href="#">186003522</a>

## Manifold and Accessories for Extraction Cartridges

Description	Qty.	P/N
Waters Extraction Manifold, 20-position without rack (includes 20 needle tips, 25 plugs, and ejector tool)	1/pk	<a href="#">186008998</a>
Waters Extraction Manifold, 20-position (complete with rack for 13 × 75 mm tubes)	1/pk	<a href="#">WAT200606</a>
Waters Extraction Manifold, 20-position (complete with rack for 13 × 100 mm tubes)	1/pk	<a href="#">WAT200607</a>
Waters Extraction Manifold, 20-position (complete with rack for 16 × 75 mm tubes)	1/pk	<a href="#">WAT200608</a>
Waters Extraction Manifold, 20-position (complete with rack for 16 × 100 mm tubes)	1/pk	<a href="#">WAT200609</a>
Female Luer Plugs	100/pk	<a href="#">WAT044385</a>
30 cc Reservoir	48/pk	<a href="#">WAT011390</a>
60 cc Reservoir	12/pk	<a href="#">186005587</a>
Reservoir Adapters for 1, 3, and 6 cc Cartridges	12/pk	<a href="#">WAT054260</a>
Reservoir Adapters for 12, 20, and 35 cc Cartridges	10/pk	<a href="#">WAT048160</a>
Male-Male Adapter	100/pk	<a href="#">WAT024310</a>
Male Luer Plugs	100/pk	<a href="#">WAT044395</a>

### Sep-Pak Cartridge Connections Kit

This kit contains a selection of the most commonly needed fittings, adapters, valves, and tubing for use with Sep-Pak Cartridges.

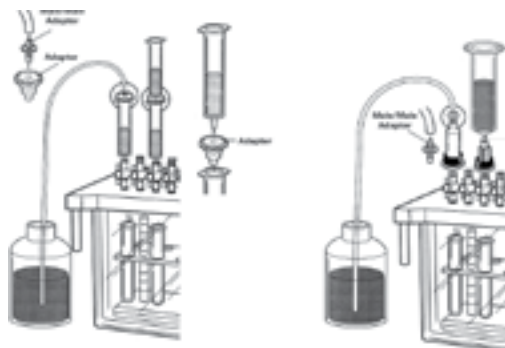


### Ordering Information

#### Sep-Pak Cartridge Connections Kit

Description	P/N
Sep-Pak Connections Kit	<a href="#">WAT011400</a>

### SEP-PAK CARTRIDGE ACCESSORIES



### Ordering Information

#### Accessories for Extraction Columns and Cartridges

Description	Qty.	P/N
Holder Kit for 2.1 × 20 mm Cartridge Column	1/pk	<a href="#">186000262</a>
Holder Kit for 3.9 × 20 mm Cartridge Column	1/pk	<a href="#">WAT046910</a>
Extraction Column Connector	1/pk	<a href="#">WAT082745</a>
Inline Pre-Column Filter Kit	1/pk	<a href="#">WAT084560</a>
Replacement Filters	5/pk	<a href="#">WAT005139</a>
Vacuum Pump (115 V, 60 Hz)	1/pk	<a href="#">725000417</a>
Vacuum Pump (240 V, 50 Hz)	1/pk	<a href="#">725000604</a>
Reservoir, 30 cc (for Plus and Vac Cartridges)	48/pk	<a href="#">WAT011390</a>
Reservoir, 60 cc (for Plus and Vac Cartridges)	12/pk	<a href="#">186005587</a>
Adapter, Male-Male Luer (for Classic Cartridges)	100/pk	<a href="#">WAT024310</a>
Adapter (to attach reservoir to 1, 3, and 6 cc Vac Cartridges)	12/pk	<a href="#">WAT054260</a>
Adapter (to attach reservoir to 12, 20, and 35 cc Vac Cartridges)	10/pk	<a href="#">WAT048160</a>
2 mL Vial Rack for Manifold	1/pk	<a href="#">186009083</a>

## DisQuE Sample Preparation Solutions for QuEChERS



QuEChERS (an acronym for Quick, Easy, Cheap, Effective, Rugged, and Safe) methods offer a simple and straightforward sample preparation technique ideal for multi-residue analysis for pesticides, veterinary drugs, and mycotoxins in a wide variety of food and agricultural products. DisQuE Dispersive Sample Preparation Products are conveniently packaged with pre-weighed sorbents and buffers in pouches and tubes as described in regulatory methods and protocols.



These products offer several advantages over traditional sample preparation techniques:

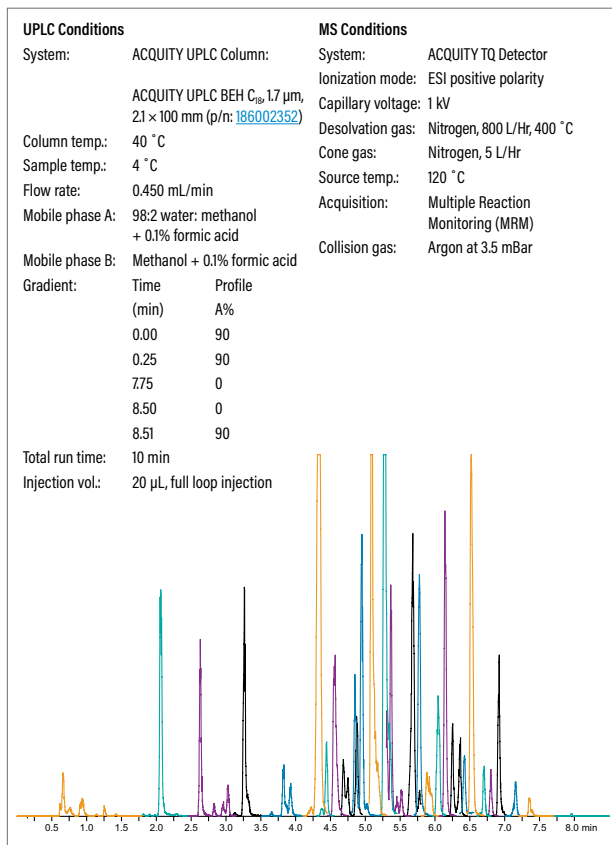
- Simplified QuEChERS protocols
- Decreased sample preparation time
- Efficient and cost-effective sample preparation
- Consistent, high-quality sorbents and packaging

### DisQuE KITED SOLUTIONS

Complete solutions and kitted methods add value to your laboratory function by addressing the need for simple, easy-to-follow protocols that require very little training.




Waters offers several different versions of pre-packaged QuEChERS kits which conform to both AOAC and CEN protocols.

#### 402 Pesticide Residues at 10 ppb ng/g In One 10-Minute Run



### Ordering Information

#### DisQuE Dispersive Sample Preparation Kits

Description	P/N
<b>DisQuE Kits</b>	
 DisQuE AOAC Dispersive SPE Kit-Pouch Format	<ul style="list-style-type: none"> <li>■ <b>Pouch:</b> 1.5 g sodium acetate and 6 g MgSO<sub>4</sub></li> <li>■ <b>50 mL Tube:</b> Empty</li> <li>■ <b>2 mL Tube:</b> 150 mg MgSO<sub>4</sub> and 50 mg PSA</li> </ul> <a href="#">176002922</a>
 DisQuE CEN Dispersive SPE Kit-Pouch Format	<ul style="list-style-type: none"> <li>■ <b>Pouch:</b> 1 g trisodium citrate dihydrate, 0.5 g disodium hydrogencitrate sesquihydrate, 1 NaCl and 4 g MgSO<sub>4</sub></li> <li>■ <b>50 mL Tube:</b> Empty</li> <li>■ <b>2 mL Tube:</b> 150 mg MgSO<sub>4</sub>, 25 mg PSA, and 25 mg C<sub>18</sub></li> </ul> <a href="#">176002923</a>
 DisQuE AOAC Dispersive SPE Kit	<ul style="list-style-type: none"> <li>■ <b>Tube 1:</b> 50 mL tube containing: 1.5 g sodium acetate and 6 g MgSO<sub>4</sub></li> <li>■ <b>Tube 2:</b> 2 mL tube containing: 150 mg MgSO<sub>4</sub> and 50 mg PSA</li> </ul> <a href="#">176001676</a>
 DisQuE CEN Dispersive SPE Kit	<ul style="list-style-type: none"> <li>■ <b>Tube 1:</b> 50 mL tube containing: 1 g trisodium citrate dihydrate, 0.5 g disodium hydrogencitrate sesquihydrate, 1 g NaCl and 4 g MgSO<sub>4</sub></li> <li>■ <b>Tube 2:</b> 2 mL tube containing: 150 mg MgSO<sub>4</sub>, 25 mg PSA, and 25 mg C<sub>18</sub></li> </ul> <a href="#">176001903</a>

## DisQuE Extraction and Cleanup Tubes and Pouches

DisQuE Extraction and Cleanup Tubes and Pouches are available separately for customized applications and method development. The salts contained in the 50 mL tubes are also available in a pouch format for greater flexibility. The cleanup tubes are available in a standard 2 mL size as well as a 15 mL size for sample enrichment.

### Ordering Information

#### DisQuE Dispersive Sample Preparation Products

Description	P/N
<b>Individual Extraction Tubes (Tube 1)</b>	
50 mL Empty Tube for QuEChERS Extraction	<a href="#">186006814</a>
DisQuE 50 mL Tube/ AOAC-Acetate	<b>DisQuE 50 mL tube containing:</b> 1.5 g sodium acetate and 6 g MgSO <sub>4</sub> , 100/pk <a href="#">186004571</a>
DisQuE 50 mL Tube/ CEN-Citrate	<b>DisQuE 50 mL tube containing:</b> 1 g trisodium citrate dihydrate, 0.5 g disodium hydrogencitrate sesquihydrate, 1 g NaCl and 4 g MgSO <sub>4</sub> , 100/pk <a href="#">186004837</a>

Description	P/N
<b>Individual Extraction Pouch</b>	
DisQuE Pouch	1.5 g sodium acetate, 6 g MgSO <sub>4</sub> , 50/pk <a href="#">186006812</a>
	4 g MgSO <sub>4</sub> , 1 g NaCl, 1 g trisodium citrate dehydrate, 0.5 g disodium hydrogencitrate sesquihydrate, 50/pk <a href="#">186006813</a>

#### DisQuE Cleanup Tubes (Tube 2)

AOAC Method		
Description	Tube Size	P/N
DisQuE Tube containing: 150 mg MgSO <sub>4</sub> and 50 mg PSA, 100/pk	2 mL	<a href="#">186004572</a>
DisQuE Tube containing: 150 mg MgSO <sub>4</sub> , 50 mg PSA and 50 mg C <sub>18</sub> , 100/pk	2 mL	<a href="#">186004830</a>
DisQuE Tube containing: 900 mg MgSO <sub>4</sub> and 300 mg PSA, 50/pk	15 mL	<a href="#">186008077</a>
DisQuE Tube containing: 900 mg MgSO <sub>4</sub> , 300 mg PSA and 300 mg C <sub>18</sub> , 50/pk	15 mL	<a href="#">186008078</a>
DisQuE Tube containing: 1200 mg MgSO <sub>4</sub> and 400 mg PSA, 50/pk	15 mL	<a href="#">186008072</a>
DisQuE Tube containing: 1200 mg MgSO <sub>4</sub> , 400 mg PSA and 400 mg C <sub>18</sub> , 50/pk	15 mL	<a href="#">186008073</a>
DisQuE Tube containing: 1200 mg MgSO <sub>4</sub> , 400 mg PSA, 400 mg C <sub>18</sub> , and 400 mg GCB, 50/pk	15 mL	<a href="#">186008074</a>

#### DisQuE Cleanup Tubes (Tube 2)

CEN Method		
Description	Tube Size	P/N
DisQuE Tube containing: 150 mg MgSO <sub>4</sub> and 25 mg PSA, 100/pk	2 mL	<a href="#">186004831</a>
DisQuE Tube containing: 150 mg MgSO <sub>4</sub> , 25 mg PSA, and 25 mg C <sub>18</sub> , 100/pk	2 mL	<a href="#">186004832</a>
DisQuE Tube containing: 150 mg MgSO <sub>4</sub> , 25 mg PSA, and 2.5 mg GCB, 100/pk	2 mL	<a href="#">186008076</a>
DisQuE Tube containing: 900 mg MgSO <sub>4</sub> , 150 mg PSA, 50/pk	15 mL	<a href="#">186004833</a>
DisQuE Tube containing: 900 mg MgSO <sub>4</sub> , 150 mg PSA, and 150 mg C <sub>18</sub> , 50/pk	15 mL	<a href="#">186004834</a>

#### DisQuE Cleanup Tubes (Tube 2)

Specialty Cleanup Tubes		
Description	Tube Size	P/N
DisQuE Tube containing: 150 mg MgSO <sub>4</sub> and 50 mg C <sub>18</sub> , 100/pk	2 mL	<a href="#">186008075</a>
DisQuE Tube containing: 150 mg MgSO <sub>4</sub> , 25 mg PSA, 25 mg C <sub>18</sub> , and 7 mg GCB, 100/pk	2 mL	<a href="#">186008071</a>
DisQuE Tube containing: 900 mg MgSO <sub>4</sub> , 450 mg PSA, 300 mg C <sub>18</sub> , and 50 mg GCB, 50/pk	15 mL	<a href="#">186008079</a>
DisQuE Tube containing: 150 mg MgSO <sub>4</sub> , 50 mg PSA, 30 mg C <sub>18</sub> , and 30 mg alumina-N, 100/pk	2 mL	<a href="#">186008081</a>
DisQuE Tube containing: 750 mg MgSO <sub>4</sub> , 250 mg PSA, 150 mg C <sub>18</sub> , and 150 mg alumina-N, 50/pk	15 mL	<a href="#">186008080</a>



#### Bulk Sorbents

Description	P/N
Graphitized Carbon Black, 25 g Bottle	<a href="#">186004835</a>
C <sub>18</sub> , 100 g Bottle	<a href="#">WAT035672</a>

## Waters/Pall Life Sciences Sample and Solvent Filtration Products

Filtration of samples and solvents is a preventative maintenance procedure that saves lab time and money. Filtration provides immediate protection for the components of column and instrumentation by minimizing down time.

Waters/Pall Life Sciences Filters have been certified for compliance, which means they have been designed and developed to assist customers in complying with their regulatory and quality objectives.

Waters carries a broad range of Pall Life Sciences Filter Products, a range of different membranes for solvent and sample compatibility, and a variety of devices for various filtration applications.



### Literature References

Title	Literature Code
The First LC-MS Certified Filter with Extremely Low Levels of Extractables	<a href="#">720007168EN</a>
Acrodisc wwPTFE Syringe Filters Versus Syringe Filters with Hydrophilic Polypropylene (GHP) Membranes White Paper	<a href="#">720007171EN</a>

### Choosing the Right Filter for Your Application

To choose the right filter, you need to consider sample characteristics, volume, pore size; and decide if the sample may require prefiltration because it is laden with particulate matter.

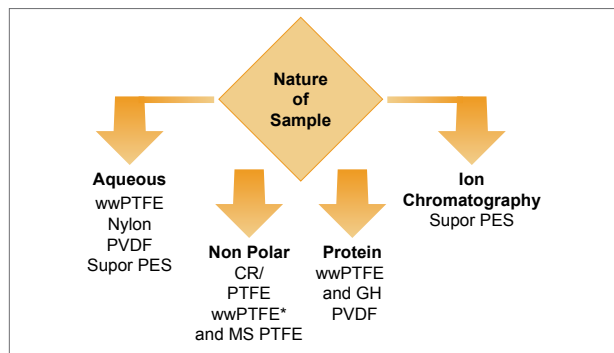
#### Membrane Choices

- **Acrodisc MS wwPTFE Syringe Filters:** Designed specifically to extend the lifespan of LC columns used for LC-MS analyses without adding significant extractables and with minimal analyte adsorption. These filters are constructed with a water-wettable polytetrafluoroethylene (wwPTFE) membrane in high density polyethylene (HDPE) housings.
- **wwPTFE Acrodiscs:** Water wettable, hydrophilic, polytetrafluoroethylene membranes are a "next generation", all-purpose, hydrophilic membrane for aqueous, acidic, basic, non-aggressive organic, and aggressive organic solutions. It offers low protein binding and low levels of UV-absorbing extractables.
- **Nylon Acrodiscs:** This hydrophilic membrane works well with both aqueous and organic solvents. Nylon is particularly suitable for high-pH samples but should be avoided in any protein recovery applications.
- **wwPTFE Acrodisc GF and Nylon Acrodisc GF:** Designed with a glass fiber prefilter over the membrane for hard to filter samples laden with particulate matter
- **Glass Fiber (GF) Acrodiscs:** Can be used alone or as a prefilter with another Acrodisc in series
- **Acrodisc PVDF (LC):** Hydrophilic polyvinylidene fluoride (PVDF) membranes good for aqueous and organic solvents
- **Acrodisc PTFE (CR):** Hydrophobic, polytetrafluoroethylene (PTFE) membranes are recommended for use with non-aqueous solvents. Organic-based, highly acidic or basic samples and solvents
- **Supor PES (IC) Filters for Ion Chromatography:** Polyethersulfone (PES) IC filters are certified to contain low ionic backgrounds for ion chromatography



## Concerned about particulate matter in your sample?

### Step 1: What is the nature of your sample?



\*For samples with laden particulate that are difficult to filter, it is best to use a syringe filter with a glass fiber prefilter over the membrane. These are available in wwPTFE and Nylon.

### Step 2: What micron size are the particles in the column you are using?

Column	Pore Size of Filter
>3 µm	0.45 µm
<3 µm	0.20 µm

### Step 3: What is the volume of your sample?

Volume	Acrodisc Size	Hold Up Volume
<2 mL	4 mm	<10 µL
<10 mL	13 mm minispikes	<14 µL
<10 mL	13 mm male Luer	<30 µL
<100 mL	25 mm	<100 µL

**Example 1:** 1.5 mL of aqueous sample to be filtered for injection on a 5 µm column

Step	Question	Answer	Choice
1	Sample	Aqueous	GHP and others
2	Column's particle size	5 µm	0.45 µm
3	Volume	1.5 mL	13 mm or 25 mm

**Choice:** Membrane 0.45 µm wwPTFE Acrodisc in 4 mm or larger. You can also use the Nylon, PVDF or Supor PES (other choices of hydrophilic membranes under the aqueous sample path). In terms of device size, if you are injecting only a few µL of sample on the column, you can use any device size. The 13 and 25 mm Acrodiscs have hold up volumes of at most 100 µL, leaving plenty of filtered sample for the application.

## FILTER DESIGN AND MEMBRANE CHOICES

		PVDF (LC) Membrane	Glass Fiber Media	Nylon Membrane	Supor PES (IC) Membrane	RPTFE (CR) Membrane	wwPTFE Membrane
<b>Media Materials</b>							
<b>ACIDS</b>	Acetic acid, glacial	R	R	N	R	R	R
	Acetic acid, 90%	R	R	N	R	R	R
	Acetic acid, 30%	R	R	L	R	R	R
	Acetic acid, 10%	R	R	R	R	R	R
	Hydrochloric acid, conc. (35%)	R	R	R	R	R	R
	Hydrochloric acid, 6 N (20%)	R	R	R	R	R	R
	Hydrochloric acid, 1 N (3.3%)	R	R	R	R	R	R
	Nitric acid, conc. (67%)	R	L	N	N	R	R
	Nitric acid, 6 N (27%)	R	—	L	—	R	R
	Sulfuric acid, conc. (96%)	N	R	N	N	R	R
Sulfuric acid, 6 N (16%)	—	R	L	—	R	R	
<b>ALCOHOLS</b>	Amyl alcohol	R	R	L	N	R	R
	Benzyl alcohol	R	N	N	N	R	R
	Butanol	R	R	L	R	R	R
	Ethanol	R	R	R	R	R	R
	Isopropanol	R	R	L	R	R	R
	Methanol	R	R	L	R	R	R
<b>BASES</b>	Ammonium hydroxide, 3 N (5.7%)	N	R	R	R	R	R
	Ammonium hydroxide, 6 N (11.4%)	N	R	L	R	R	R
	Potassium hydroxide, 3 N (15%)	N	N	R	R	R	R

## FILTER DESIGN AND MEMBRANE CHOICES *Continued*

		PVDF (LC) Membrane	Glass Fiber Media	Nylon Membrane	Supor PES (IC) Membrane	PTFE (CR) Membrane	wwPTFE Membrane
<b>Media Materials</b>							
BASES	Sodium hydroxide, 3 N (11%)	N	—	R	R	R	R
	Sodium hydroxide, 6 N (22%)	N	—	L	R	R	R
ESTERS	Amyl acetate	R	R	L	R	R	R
	Butyl acetate	R	R	R	R	R	R
	2-Ethoxyethyl acetate	L	R	—	R	R	R
	Ethyl acetate	R	R	R	N	R	R
	Isopropyl acetate	R	R	N	R	R	R
	Methyl acetate	R	R	N	N	R	R
ETHERS	Ethyl ether	R	R	N	R	R	R
	Tetrahydrofuran	N	L	R	N	R	R
	Tetrahydrofuran/water (50/50,v/v)	—	—	—	—	R	R
GLYCOLS	Ethylene glycol	R	R	R	R	R	R
	Glycerol	R	R	R	R	R	R
	Propylene glycol	R	R	—	R	R	R
AROMATIC HYDROCARBONS	Benzene	R	R	R	R	R	R
	Toluene	R	R	L	R	R	R
	Xylene	R	R	L	R	R	R
HALOGENATED HYDROCARBONS	Carbon tetrachloride	R	R	R	R	R	R
	Chloroform	R	R	R	N	R	R
	Ethylene dichloride	R	R	N	N	R	R
	Methylene chloride	R	R	R	N	R	R
	Tetrachloroethylene	R	R	L	R	R	R
KEYTONES	Acetone	N	R	L	N	R	R
	Cyclohexanone	L	R	R	N	R	R
	Methyl ethyl ketone (MEK)	N	R	L	N	R	R
	Methyl isobutyl ketone	N	R	L	R	R	R
OILS	Cottonseed	R	R	R	R	R	R
	Peanut	R	R	R	R	R	R
MISCELLANEOUS	Acetonitrile	R	R	—	R	R	R
	Dimethyl formamide (DMF)	N	R	N	N	R	R
	Dimethyl sulfoxide (DMSO)	N	R	—	N	R	R
	Formaldehyde, 37%	R	R	R	R	R	R
	Formaldehyde, 4%	R	R	R	R	R	R
	Hexane, dry	R	R	L	L	R	R
	Kerosene	R	R	L	R	R	R
	Pyridine	N	R	N	N	R	R
	18 Megohm water	R	R	R	R	R	R

**Test Methods:** The data presented in this chart is a compilation of testing by Pall Corporation with certain chemicals, manufacturer's data, or compatibility recommendations from the Compass Corrosion Guide by Kenneth M. Pruett. This data is intended to provide expected results when filtration devices are exposed to chemicals under static conditions for 48 hours at 25 °C (77 °F), unless otherwise noted. Membrane integrity for syringe filters was tested by bubble point.

This chart is intended only as a guide. Accuracy cannot be guaranteed. Users should verify chemical compatibility with a specific filter under actual use conditions. Because chemical compatibility is affected by many variables (including temperature, pressure, concentration, and purity), various chemical combinations prevent complete accuracy.

**Caution:** Alcohol residues that are allowed to dry on a filter may cause stress cracks. Pall Corporation recommends that filters used in alcohol processing should remain alcohol wet or should be flushed with copious quantities of water to remove residuals

prior to drying and subsequent reuse.

**R = Resistant:** No significant change was observed in flow rate or bubble point of the membrane. No visible indication of chemical attack was detected.

**N = Not Resistant:** The membrane or housing is basically unstable and is not recommended for use.

**L = Limited Resistance:** Moderate changes in physical properties or dimensions of the membrane were observed. The filter may be suitable for short term, non-critical use. Hardware or housing may be suitable for short-term exposure at low pressures and ambient temperatures.

**— = Insufficient Data:** Information is not available. Trial testing is recommended.

## Ordering Information

### Syringe Filters

Acrodisc 4 mm							
Sample	Membrane	P/N (50/pk)	P/N (100/pk)	P/N (1000/pk)	P/N (50/pk)	P/N (250/pk)	P/N (1000/pk)
		Pore Size: 0.2 µm	Pore Size: 0.2 µm	Pore Size: 0.2 µm	Pore Size: 0.45 µm	Pore Size: 0.45 µm	Pore Size: 0.45 µm
Organic / Non Polar	PTFE (CR)	—	—	—	—	<a href="#">WAT200508</a>	—
Acrodisc 13 mm							
		P/N (50/pk)	P/N (100/pk)	P/N (1000/pk)	P/N (50/pk)	P/N (100/pk)	P/N (1000/pk)
		Pore Size: 0.2 µm	Pore Size: 0.2 µm	Pore Size: 0.2 µm	Pore Size: 0.45 µm	Pore Size: 0.45 µm	Pore Size: 0.45 µm
Aqueous / Polar	Nylon	—	<a href="#">WAT200524</a>	<a href="#">WAT200834</a>	—	<a href="#">WAT200520</a>	<a href="#">WAT200832</a>
	PVDF (LC)	—	<a href="#">WAT200806</a>	—	—	<a href="#">WAT200512</a>	<a href="#">WAT200827</a>
	wwPTFE	—	<a href="#">186009314</a>	<a href="#">186009331</a>	—	<a href="#">186009315</a>	<a href="#">186009319</a>
	wwPTFE GF	—	—	—	—	—	—
	MS wwPTFE	<a href="#">186009243</a>	—	—	—	—	—
Organic / Non Polar	PTFE (CR)	—	<a href="#">WAT200506</a>	<a href="#">WAT200823</a>	—	<a href="#">WAT200502</a>	<a href="#">WAT200821</a>
Ion Chromatography	PES (IC)	—	—	<a href="#">WAT200844</a>	—	—	—
Acrodisc 13 mm Minispikes							
		P/N (50/pk)	P/N (100/pk)	P/N (1000/pk)	P/N (50/pk)	P/N (100/pk)	P/N (1000/pk)
		Pore Size: 0.2 µm	Pore Size: 0.2 µm	Pore Size: 0.2 µm	Pore Size: 0.45 µm	Pore Size: 0.45 µm	Pore Size: 0.45 µm
Aqueous / Polar	Nylon	—	<a href="#">WAT200562</a>	<a href="#">WAT200835</a>	—	<a href="#">WAT200564</a>	<a href="#">WAT200836</a>
	PVDF (LC)	—	<a href="#">WAT200804</a>	<a href="#">WAT200838</a>	—	<a href="#">WAT200560</a>	<a href="#">WAT200828</a>
Organic / Non Polar	PTFE (CR)	—	<a href="#">WAT200556</a>	<a href="#">WAT200824</a>	—	<a href="#">WAT200558</a>	<a href="#">WAT200825</a>
Ion Chromatography	PES (IC)	—	<a href="#">WAT200810</a>	—	—	<a href="#">WAT200812</a>	—
Acrodisc 25 mm							
		P/N (50/pk)	P/N (100/pk)	P/N (1000/pk)	P/N (50/pk)	P/N 100/pk)	P/N (1000/pk)
		Pore Size: 0.2 µm	Pore Size: 0.2 µm	Pore Size: 0.2 µm	Pore Size: 0.45 µm	Pore Size: 0.45 µm	Pore Size: 0.45 µm
Aqueous / Polar	Nylon	<a href="#">WAT200522</a>	—	<a href="#">WAT200833</a>	<a href="#">WAT200518</a>	—	<a href="#">WAT200831</a>
	Nylon GF*	—	—	—	<a href="#">WAT200800</a>	—	<a href="#">WAT200846</a>
	PVDF (LC)	<a href="#">WAT200808</a>	—	<a href="#">WAT200839</a>	<a href="#">WAT200510</a>	—	<a href="#">WAT200826</a>
	wwPTFE	<a href="#">186009327</a>	—	—	<a href="#">186009326</a>	—	<a href="#">186009323</a>
	wwPTFE GF*	—	—	—	<a href="#">186009329</a>	—	<a href="#">186009328</a>
	MS wwPTFE	<a href="#">186009244</a>	—	—	—	—	—
Organic / Non Polar	PTFE (CR)	<a href="#">WAT200504</a>	—	<a href="#">WAT200822</a>	<a href="#">WAT200500</a>	—	<a href="#">WAT200820</a>
Ion Chromatography	PES (IC)	—	—	—	—	—	<a href="#">WAT200843</a>
Acrodisc 25 mm							
		P/N (50/pk)	P/N (1000/pk)				
		Pore Size: 1 µm	Pore Size: 1 µm				
Aqueous / Polar	Glass Filter	<a href="#">WAT200818</a>	<a href="#">WAT200840</a>				

Also available are 20–45 µm polypropylene filters in 96-well plates, 1.5–1.7 mL per well; 54 per pack, p/n: [186002799](#)

\*wwPTFE GF and Nylon GF are glass fiber prefilters in combination with wwPTFE and Nylon filters for precipitate laden samples.

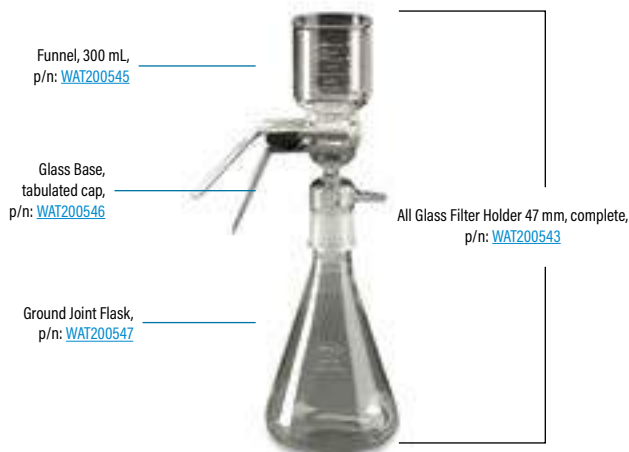
## SOLVENT FILTRATION APPARATUS

The 300 mL capacity 47 mm Glass Filter Funnel and 1 L capacity 47 mm Glass Funnel/Support Assembly are ideal for vacuum filtration of liquids and degassing of HPLC solvent and mobile phases. The 100% borosilicate glass construction assures resistance to even the most aggressive solvents.

### Ordering Information

#### Solvent Filtration Apparatus

Description	P/N
All Glass Filter Holder 47 mm, complete	<a href="#">WAT200543</a>
Funnel, 300 mL	<a href="#">WAT200545</a>
Glass Base, tabulated cap	<a href="#">WAT200546</a>
Ground Joint Flask	<a href="#">WAT200547</a>
Swinney Holder	<a href="#">WAT200566</a>
Vacuum Pump 110 V, 60 Hz	725000417
Vacuum Pump 220 V, 50 Hz	<a href="#">725000604</a>



#### Syringe Filters

Acrodisc 47 mm							
Sample	Membrane	P/N (50/pk)	P/N (100/pk)	P/N (1000/pk)	P/N (50/pk)	P/N (100/pk)	P/N (1000/pk)
		Pore Size: 0.2 µm	Pore Size: 0.2 µm	Pore Size: 0.2 µm	Pore Size: 0.45 µm	Pore Size: 0.45 µm	Pore Size: 0.45 µm
Aqueous / Polar	Nylon	—	<a href="#">WAT200533</a>	—	—	<a href="#">WAT200532</a>	—
	PVDF (LC)	—	WAT200531	—	—	—	—
	wwPTFE	<a href="#">186009330</a>	—	<a href="#">186009324</a>	<a href="#">186009316</a>	—	—
Organic / Non Polar	PTFE (CR)	—	<a href="#">WAT200535</a>	—	—	<a href="#">WAT200534</a>	—
Ion Chromatography	PES (IC)	—	<a href="#">WAT200539</a>	—	—	<a href="#">WAT200538</a>	—

Acrodisc 13 mm							
	Membrane	P/N (50/pk)	P/N (100/pk)	P/N (1000/pk)	P/N (50/pk)	P/N (100/pk)	P/N (1000/pk)
		Pore Size: 0.2 µm	Pore Size: 0.2 µm	Pore Size: 0.2 µm	Pore Size: 0.45 µm	Pore Size: 0.45 µm	Pore Size: 0.45 µm
Organic / Non Polar	PTFE (CR)	—	—	—	—	<a href="#">WAT200536</a>	—
Ion Chromatography	PES (IC)	—	—	—	—	<a href="#">WAT200540</a>	—

### FLEXIBLE AUTOMATION FOR THE CONNECTED LABORATORY

The Andrew+ robot and OneLab software is your modern, liquid-handling automation platform that is easy to set up, without the need for extensive programming or engineering experience.

#### Benefits of Andrew+ Pipetting Robot Include:

- **Reproducibility:** Automated pipetting minimizes error
- **Productivity:** Time freed up for higher level tasks. User choice of any combination of single/multichannel pipetting increases flexibility
- **Promoting Health:** Reduced repetitive movement and exposure to hazardous materials

### ONE ROBOT—MANY APPLICATIONS



Single/Multichannel Pipetting	Flexible Working Deck	Small Footprint	OneLab Communication
<ul style="list-style-type: none"> <li>■ Best-in-Class Andrew Alliance electronic pipettes</li> <li>■ Manufactured by Sartorius</li> <li>■ Bluetooth communication with <b>Andrew+</b></li> </ul>	<ul style="list-style-type: none"> <li>■ Wide range of consumables</li> <li>■ Supported by an ever expanding range of domino accessories</li> </ul>	<ul style="list-style-type: none"> <li>■ Compact multichannel pipetting robot</li> <li>■ Doesn't require dedicated space</li> <li>■ Easily located under a hood</li> </ul>	<ul style="list-style-type: none"> <li>■ Intuitive design of pipetting protocols</li> <li>■ Execute OneLab protocols on <b>Andrew+</b> through a WiFi/Ethernet connection</li> <li>■ Securely share protocols with other lab members</li> </ul>

The Andrew+ robot executes OneLab protocols, enabling fully automated, traceable, and highly repeatable pipetting, in addition to an expanding range of more complex protocols.

#### General Liquid Handling

- Serial Dilution – OneLab calculates required volumes and concentrations, taking full account of sample viscosity and dilution of inhibitors/substances in the samples that can interfere with downstream analytics.
- Standard Curve – Create a series of standards of increasing concentration in order to produce a calibration curve.
- Concentration Normalization – OneLab, through its Normalization Wizard, and Andrew+ automates the production of concentration normalized volumes, typically saving time required for what is often a highly laborious exercise.
- Microplate Reformatting – Handle a wide range of aliquoting operations between different types of microplate, microtube, vials, and racked HPLC tubes.

#### General Sample Preparation

- Dilute and Shoot – Samples are diluted with an internal standard to be directly injected onto an LC-MS system.
- Protein Precipitation (PPT) – Methods to concentrate proteins and purify them from various matrices.
- Phospholipid Removal – One of the major causes of ion suppression in bio-analysis is phospholipids.
- Solid-Phase Extraction – With the Vacuum+ you can automate micro and macro elution SPE plates. Addition of the Ika pump allows for vacuum control.


#### Complex Workflows

There are a wide range of protocols available on [onelab.andrewalliance.com](http://onelab.andrewalliance.com) for automation of more complex workflows that require liquid handling, SPE, heating/shaking, magnetic bead based separation and more. Protocol categories include:

- Bioanalysis
- Biopharmaceutical
- Biomedical Research
- Cell Biology
- Diagnostics
- Drug Discovery
- Food testing

## Request a Quote

Fill out our purchase inquiry form and receive a quote from an automation specialist today.

 For more information please visit: [waters.com/andrewalliance](http://waters.com/andrewalliance)



**APPLICATION AREA:** Automated liquid handling in all the labs where transferring methods between devices

"Excellent product as easy to design and executive protocols. Minimizes human intervention and ensures compliance."

**REVIEWER:** Ningappa H M

**ORGANIZATION:** AIC ENTERPRICES PVT. LTD

## SMARTER, REPRODUCIBLE AND TRACEABLE PIPETTING

Electronic pipettes made smart through connectivity. Using step-by-step visual guidance, Pipette+ allows you to execute protocols designed in OneLab with connected, electronic pipettes to minimize execution errors and provide full experimental traceability.

**Pipette**   
easy pipetting

### Benefits of Pipette+ Guided Pipetting System Include:

- **Reproducibility:** Volume and pipette parameters are set automatically, correct pipette selection confirmed, and usage monitored; all contributing to minimizing error
- **Productivity:** Researchers spend less time repeating experiments
- **Traceability:** Ensures systematic and accurate identification of sources of pipetting error



#### OneLab

- Intuitive graphical design of executable pipetting protocols.
- Step-by-step guidance of experiment protocols, ensuring repeatability.
- Facilitates sharing protocols with other researchers.



#### Pipette+ Stand

- Intelligent, computerized stand communicating with OneLab through Wifi/Ethernet and with pipettes by Bluetooth.
- Identifies and confirms correct pipette selection.
- Pipette parameters are set by OneLab. Correct use assured by real-time monitoring of pipette identity, performance and possible errors.
- Charges pipettes.



#### Andrew Alliance Pipettes

- Range of single channel (0.2  $\mu$ L to 10 mL) and 8- and 12-channel electronic pipettes provides maximum flexibility of use.
- Pipette parameters are set automatically by OneLab while user conducts experiment.
- Lightest electronic pipettes on the market + electronic tip ejection = best-in-class ergonomics.


## Ordering Information

### Pipettes

Description	Compatibility	P/N
Single channel AA Pipette, 0.2-10 µL	Andrew+, Pipette+	<a href="#">186009769</a>
Single channel AA Pipette, 5-120 µL	Andrew+, Pipette+	<a href="#">186009765</a>
Single channel Pipette, 10-300 µL	Andrew+, Pipette+	<a href="#">186009606</a>
Single channel AA Pipette, 50-1000 µL	Andrew+, Pipette+	<a href="#">186009766</a>
Single channel Pipette, 100-5000 µL	Andrew+, Pipette+	<a href="#">186009608</a>
Single channel AA Pipette, 500-10000 µL	Andrew+, Pipette+	<a href="#">186009767</a>
8-channel AA Pipette, 0.2-10 µL	Andrew+, Pipette+	<a href="#">186009768</a>
8-Channel AA Pipette, 5-120 µL	Andrew+, Pipette+	<a href="#">186009605</a>
8-Channel AA Pipette, 10-300 µL	Andrew+, Pipette+	<a href="#">186009607</a>
8-Channel AA Pipette, 5-1200 µL	Andrew+, Pipette+	<a href="#">186009615</a>
12-channel AA pipette, 0.2-10 µL	Pipette+	<a href="#">186010102</a>
12-channel AA Pipette, 5-120 µL	Pipette+	<a href="#">186010103</a>
12-channel AA Pipette, 10-300 µL	Pipette+	<a href="#">186010104</a>
12-channel AA Pipette, 50-1200 µL	Pipette+	<a href="#">186010105</a>

## Request a Quote

Fill out our purchase inquiry form and receive a quote from an automation specialist today.

 For more information please visit: [waters.com/andrewalliance](https://waters.com/andrewalliance)



**APPLICATION AREA:** Power generation


"Excellent product with good value for money. Easy to use and ease of operation for water treatment plant operators."

**REVIEWER:** Garimesh Sharma

**ORGANIZATION:** Sidhee Cement Limited

### CONNECTED DEVICES + TOOLS

Discover the rapidly evolving ecosystem of connected devices and tools for use with Andrew+, Pipette+ and OneLab to support a wide range of laboratory workflows.

 For more information please visit: [andrewalliance.com/additional-connected-devices](https://andrewalliance.com/additional-connected-devices)

## Ordering Information

### Connected Devices + Tools

Description	P/N*
96-PCR Plate Magnet+	176004850
50 mL Tube Magnet+	176004851
Deepwell Magnet+	176004854
Microplate Peltier+	176004852
96-PCR Plate Peltier+	176004584
Tube Shaker+	176004853
Microplate Shaker+	176004577
Microplate Vacuum+	176004579
Microplate Gripper	<a href="#">186009776</a>
Tube Gripper	<a href="#">186010179</a>

\*Includes Device+ license to connect with OneLab



## UNIQUE SOFTWARE FOR THE DESIGN AND EXECUTION OF LAB PROTOCOLS

OneLab is a browser-based software environment enabling researchers to design, share, and execute protocols, through an intuitive graphical interface. Use drag-and-drop to design new protocols on any PC or tablet from anywhere, whether you are in the lab or at your desk. You can also start with existing protocols, by selecting from the comprehensive OneLab library, enabling you to get up and running even faster. Executed step-by-step experiments with Pipette+ for manual, guided pipetting, or with Andrew+ and connected devices for a fully automated, walk-away solution.

### Benefits of OneLab Laboratory Software Include:

- **Traceability:** Trace all steps from protocol design to experiment execution and report generation
- **Security and Data Privacy:** Ensures security of lab protocols through secure user identification and access control
- **Laboratory Management:** Seamless collaboration and training and the elimination of tedious manual procedures


**APPLICATION AREA:** Automated liquid handling in all the labs where transferring methods between devices

**OneLab**   
design & execute



### Request a Quote

Fill out our purchase inquiry form and receive a quote from an automation specialist today.

 For more information please visit: [waters.com/andrewalliance](https://waters.com/andrewalliance)



"Good results for every day use in lab. Allowing full traceability of biological experiments with browser-based software environment, graphically design own pipetting protocols with short term executed results and option for monitoring ongoing experiments, it's high quality user friendly interface with modern design, great sampling and good return of investment."

**REVIEWER:** Bernard Zjakic

**ORGANIZATION:** Kajak kanu klub Una Bihac

## Sample Processing Devices and Accessories



### SEMI-AUTOMATED SOLID PHASE EXTRACTION PROCESSING

The Otto™ SPEcialist Positive Pressure Manifold is designed to further improve method robustness and sample reproducibility for solid-phase extraction. Controlled by an interfaced tablet with easy-to-use software, the semi-automated Otto SPEcialist simplifies method development and transfer, positive pressure optimization, and real-time manipulation of pressure profiles while removing the variability of manual extraction systems. The Otto SPEcialist is compatible with  $\mu$ Elution and macro elution plates; and 1 cc, 3 cc, and 6 cc cartridges.



#### Compatible SPE Devices:

- (1)  $\mu$ Elution™ Plate
  - (1) Macro Elution Plate
- (24) 1 cc Flanged/Flangeless Cartridges
- (96) 1 cc Flangeless Cartridges
- (24) 3 cc Flanged/Flangeless Cartridges
- (18) 6 cc Flanged/Flangeless Cartridges

#### Ordering Information

Description	Contents	P/N
Otto SPEcialist Positive Pressure Manifold	Otto SPEcialist Positive Pressure Manifold	<a href="#">725000682</a>
Otto Elution Plate Startup Kit	<a href="#">186009712</a> $\mu$ Elution Spacer <a href="#">186009713</a> $\mu$ Elution Platform <a href="#">186009714</a> Drainless Waste Reservoir	<a href="#">176004605</a>
Otto 1 cc Cartridge for 13 mm Collection Tubes Startup Kit	<a href="#">186009716</a> 1 cc Top Rack <a href="#">186009715</a> 13 mm Tube Collection Rack <a href="#">186009708</a> 13 mm Tube Spacer for 75 mm <a href="#">186009714</a> Drainless Waste Reservoir	<a href="#">176004606</a>
Otto 1 cc Flangeless Cartridge for 96-Well Collection Plate Startup Kit	<a href="#">186009717</a> Flangeless 1 cc Top Rack <a href="#">186009713</a> $\mu$ Elution Platform <a href="#">186009718</a> 2 mL Collection Plate Position <a href="#">186009714</a> Drainless Waste Reservoir	<a href="#">176004607</a>
Otto 3 cc Cartridge for 13 mm Collection Tubes Startup Kit	<a href="#">186009719</a> 3 cc Top Rack <a href="#">186009715</a> 13 mm Tube Collection Rack <a href="#">186009708</a> 13 mm Tube Spacer for 75 mm <a href="#">186009714</a> Drainless Waste Reservoir	<a href="#">176004608</a>
Otto 3 cc Cartridge for 16 mm Collection Tubes Startup Kit	<a href="#">186009719</a> 3 cc Top Rack <a href="#">186009720</a> 16 mm Tube Collection Rack for 3 cc <a href="#">186009721</a> 3 cc 16 mm Tube Spacer for 75 mm <a href="#">186009714</a> Drainless Waste Reservoir	<a href="#">176004609</a>
Otto 6 cc Cartridge for 13 mm Collection Tubes Startup Kit	<a href="#">186009722</a> 6 cc Top Rack <a href="#">186009723</a> 13 mm Tube Collection Rack for 6 cc <a href="#">186009724</a> 6 cc 13 mm Tube Spacer for 75 mm <a href="#">186009714</a> Drainless Waste Reservoir	<a href="#">176004610</a>
Otto 6 cc Cartridge for 16 mm Collection Tubes Startup Kit	<a href="#">186009722</a> 6 cc Top Rack <a href="#">186009725</a> 16 mm Tube Collection Rack for 6 cc <a href="#">186009726</a> 6 cc 16 mm Tube Spacer for 75 mm <a href="#">186009714</a> Drainless Waste Reservoir	<a href="#">176004611</a>
Waste Reservoir with Drain	Waste Reservoir with Drain	<a href="#">186009727</a>

# Fit-for-Purpose Sample Vials for LC and LC-MS

Reduce risks and costs while increasing data quality by choosing the most reliable Waters vial for your LC analysis.



Vial Type	Routine Analysis		Advanced Analysis	
	High Value Glass and Polypropylene	LCGC Certified	TruView™ pH Control LCMS Certified	QuanRecovery™ with MaxPeak™ HPS
Applications	Legacy methods and higher analyte concentrations. Common polypropylene vials where glass surface is not applicable.	High-throughput QC analysis in the regulated environment, for compounds in aqueous. No lot-to-lot variations from glass manufacturing, packaging, residues, or waste materials.	LC-MS and routine QC analysis and quantification for sample concentrations below 1 ng/mL. Ideal for pH sensitive assays. Reduced adsorption of polar analytes. For pH sensitive compounds and analytes, reduced adsorption of polar bases with high lot-to-lot consistency.	Qualification and quantification of low abundance species with complex structures (aesthetics and hydrophobic compounds).
Benefits	High value, low cost. Choose cap and septum separately.			High recovery and reproducibility after short or long term storage of low abundance species with complex structures.
Features		Vials are assembled and tested for contaminants with a standard LPLC/LM separation at 100 nm resolution. Performance.	Chemically enhanced glass surface to reduce leaching of Na and other metal ions into solutions with high lot-to-lot consistency (0.3 ppm) and reduced adsorption effects.	Coating the vial's recast polypropylene surface to reduce active sites, non-specific binding, and hydrophobic interaction.
Certification Tests	<ul style="list-style-type: none"> <li>Dimensionally tested</li> <li>Lot traceability</li> </ul>	<ul style="list-style-type: none"> <li>Dimensional checks</li> <li>LPLC/LM certified assembly</li> <li>Dimensionally tested</li> </ul>	<ul style="list-style-type: none"> <li>pH certified</li> <li>Low adsorption certified</li> <li>MS certified cap and septa</li> <li>LPLC/LM certified assembly</li> </ul>	<ul style="list-style-type: none"> <li>Protein recovery QC tested</li> <li>Dimensionally tested</li> </ul>
Shapes				
Surfaces	USP Type 1, 23 Glass (amber) USP Type 1, 21 Glass (amber) Polypropylene	USP Type 1, 23 Glass (amber) USP Type 1, 21 Glass (amber)	USP Type 1, 23 Glass, Low Na (amber) USP Type 1, 21 Glass, Low Na (amber)	MaxPeak HPS (High Performance Surface) Polypropylene

Visit us online to view our infographic [waters.com/vials](https://waters.com/vials)

LCGC Certified

TruView™ pH Control  
LCMS Certified

QuanRecovery™  
with MaxPeak™ HPS

Learn more by visiting [waters.com/vialselector](https://waters.com/vialselector)

# Sample Vials and Accessories

# Contents

<b>Certified Vials</b> .....	<b><a href="#">53</a></b>
Dimensional Test.....	<a href="#">53</a>
Chemistry Tests.....	<a href="#">54</a>
<b>Vial Selection</b> .....	<b><a href="#">54</a></b>
Choosing the Right Vial .....	<a href="#">54</a>
<b>Sample Plates and Seals</b> .....	<b><a href="#">57</a></b>
Sample Plates.....	<a href="#">57</a>
Seals.....	<a href="#">57</a>
<b>Quan Recovery Vials and Plates</b> .....	<b><a href="#">58</a></b>
<b>Vials and Accessories for ACQUITY UPLC Systems</b> .....	<b><a href="#">59</a></b>
Quick Selection Guide: Fixed-Loop-Needle ACQUITY Systems.....	<a href="#">61</a>
Quick Selection Guide: Flow-Through-Needle ACQUITY Systems .....	<a href="#">64</a>
<b>Vials and Accessories for Alliance HPLC Systems</b> .....	<b><a href="#">66</a></b>
Autosampler Vials, Plates, and Seals for Use with Alliance HPLC Systems.....	<a href="#">66</a>
Settings for Alliance HPLC Vials and Low Volume Inserts (LVI).....	<a href="#">66</a>
Quick Selection Guide: Alliance HPLC Systems.....	<a href="#">67</a>
Autosampler Vials for Waters Systems .....	<a href="#">72</a>
Autosampler Vials for Compatible Systems .....	<a href="#">75</a>
<b>Vials Descriptions</b> .....	<b><a href="#">79</a></b>
<b>Vials Troubleshooting Guide</b> .....	<b><a href="#">81</a></b>
<b>Certified Containers</b> .....	<b><a href="#">82</a></b>

# Sample Vials and Accessories

Your choices of vials or plates should be well informed and consistent with your application and instrumentation. To facilitate your decisions, we organized information about vials and accessories into three sections.

Section 1: Technical Information

Section 2: Quick Selection Guide

Section 3: Complete Product listing

## Certified Vials

Waters offers three lines of certified vials:

- LC/GC Certified
- LCMS Certified
- TruView™ LCMS Certified

Find the best sample vial for your Autosampler and application online with our Vial Selector Tool

 To try this tool, visit [waters.com/VialSelector](https://waters.com/VialSelector)

### DIMENSIONAL TEST

All lines of Waters Vials are certified to be within the dimensional tolerances for height, width, neck opening, neck center, threads, and bottom thickness specified for autosamplers. Conformance of vials to these permissible limits is essential. Out-of-dimension vials can cause needle damage and consequent system downtime.

### CHEMISTRY TESTS

**LC/GC Certified Vials** are UV tested by HPLC.

The HPLC test detects trace levels of chemicals used in the manufacturing and packaging process. These chemicals include lubricants, surfactants, antistatic agents, and antioxidants from packaging. To ensure cleanliness, we test each batch of vials after it has been packaged for several days. An additional test, a headspace GC test, determines whether the silicone septa cured properly.

**LCMS Certified Vials** are MS tested using an unbiased test to look for any ionized masses, regardless of their source. The test, performed in the mass spectrometer's scan mode, determines the total ion count and the presence of clusters in the high-mass range.

**TruView LCMS Certified Vials** are tested to ensure their conformance to stringent dimensional tolerances, UV and MS cleanliness, and polar-analyte adsorption. The vials are manufactured by a process that limits the concentration of free ions on the glass surface. Ionic sites can cause non-specific binding of polar analytes. Waters TruView LCMS Certified Vials are tested for high recovery of analyte at a concentration of 1 ng/mL using UPLC-MS/MS (MRM) and yield little adsorption. These vials exhibit the lowest adsorption of autosampler vials in the market.

#### Types of Certified Vials

Certification Tests	Waters LC/GC CERTIFIED	Waters LCMS CERTIFIED	Waters TruView™ LCMS CERTIFIED
Dimensional Test	✓	✓	✓
Septum GC Test	✓	✓	✓
HPLC UV Test	✓	✓	✓
MS Scan		✓	✓
Low Adsorption Test			✓
To download these whitepapers, visit <a href="https://waters.com">waters.com</a> and search by their part numbers.	Waters Certified Sample Vials Whitepaper <a href="https://waters.com/720001303EN">720001303EN</a>	Waters LCMS Certified Sample Vials Whitepaper <a href="https://waters.com/720001517EN">720001517EN</a>	TruView LCMS Certified Sample Vials Whitepaper <a href="https://waters.com/720004097EN">720004097EN</a>

## Vial Selection

### CHOOSING THE RIGHT VIAL

Choosing the correct vial for your application is important. Equally important, however, is your choice of septum and closure.

The selection options below help you choose the appropriate combination of vial and accessories. For convenience in ordering, we offer many of these items in combination packs of 100.



#### Step 1

Septa Selection Guide			
PTFE	PTFE/Silicone	Pre-slit PTFE/Silicone	PE Septumless
Recommended for single injection applications.	Recommended for multiple injections and sample storage.	Provides adequate venting to prevent vacuum formation in sample vial, delivering excellent sample-draw reproducibility.	Same advantages as PTFE.
Excellent solvent resistance and chemical compatibility.	Demonstrates excellent resealing characteristics.	Eliminates coring from bottom draw needles.	—
Does not reseal upon puncturing.	PTFE chemical resistance until punctured, then the septum will have the chemical compatibility of silicone.	Good resealing capabilities.	—
Not recommended for long-term sample storage.	Working temperature range from -40 °C to 200 °C.	Recommended for multiple injections.	—
—	—	Working temperature range from -40 °C to 200 °C.	—

Waters recommends pre-slit PTFE/silicone septa, for venting and accurate sample draw. They also reduce the possibility of septum coring in bottom-draw needles.

For applications with a volatile solvent that require non-slit septa, there are simple steps you can take to reduce creating a vacuum. Do not fill the vial; leave headspace. You may have to reduce the syringe draw rate to improve sample volume accuracy. (Refer to your sample manager's operator guide on how to adjust draw rate.)

#### Step 2

Vial Closures Guide		
Vials are available in three closure types: crimp, snap, and screw cap. Each closure has its advantages.		
Cap	Seal	Comment
Crimp	Excellent seal	Requires tools
Snap	Moderate seal	Fast, no tools, some cap cracking
Screw	Excellent seal	Universal

**Crimp caps** squeeze the septum between the vial's rim and the crimped aluminum cap forming an excellent seal. The crimp cap vial requires the use of a crimping tool to form the cap around the glass vial lip. When you plan to sample only a few vials, a manual crimper suffices. For large numbers of samples, however, the use of automated crimpers is more efficient.

**Snap caps** function similarly to crimp caps. The use of plastic snap caps requires no tools.

Snap caps are not as effective a seal as other closures:

- If the cap fits too tightly, it proves difficult to apply and may crack
- If the cap fits too loosely, the resultant seal is inadequate, and the septum may dislodge

**Screw caps**, which are universal, form an excellent seal. A cap screwed onto a vial applies a mechanical force that squeezes the septum between the vial rim and the cap. The use of screw caps requires no tools.

### Step 3

Vial Selection Guide		
Analyte Concentration	Detection Source	Recommended Product
µg/mL	UV, RI (non-MS)	LC/GC Certified Vials
100's ng/mL	Older single quadrupole and MS-MS	LCMS Certified Vials
1 ng/mL and lower	MS-MS, ToF	TruView LCMS Certified Vials

#### Type 1, 33-Expansion Borosilicate Glass

Analytical laboratories use type 1, 33-expansion glass, the most chemically-inert glass obtainable, in for high-quality test results. Composed primarily of silicon and oxygen, with trace amounts of boron and sodium, the expansion coefficient of this glass is approximately  $33 \times 10^{-7} \text{ }^\circ\text{C}$ . All of our clear glass vials are made using type 1, 33-expansion glass.

#### Type 1, 51-Expansion Glass

More alkaline than type 1, 33-expansion glass, type 1, 51-expansion glass, is nonetheless adequate for use in many laboratories. Composed primarily of silicon and oxygen, with trace amounts of boron, its expansion coefficient is  $51 \times 10^{-7} \text{ }^\circ\text{C}$ . All of our amber glassware is made using type 1, 51-expansion glass.

#### Deactivated Glass (DV)

For highly polar analytes that may associate with the polar glass surface, deactivated vials are an effective choice. These glass vials are treated with gas-phase, reactive organosilane, producing a hydrophobic glass surface. Deactivated vials can be stored dry indefinitely.

#### Polypropylene Plastic

Nonreactive polypropylene plastic (PP) are useful where glass is not an appropriate option. The vials can be incinerated while sealed, minimizing personal exposure to potentially hazardous substances. The maximum-temperature use is  $135 \text{ }^\circ\text{C}$ .



**APPLICATION AREA:** Analyze Metabolites in *in vitro* Dissolutions and Tissue Samples

"Excellent reproducibility and compatibility with multiple analysis systems and metabolites. We use these for storage as well as sample preparation and running samples. Very happy with the product as a whole."

**REVIEWER:** Erik Pierstorff

**ORGANIZATION:** O-Ray



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## Sample Plates and Seals

### SAMPLE PLATES

We offer a selection of 96- and 384-well sample plates for use in autosamplers. The plates are SBS/ANSI compliant, for robot compatible systems. The 96-well plates can also serve as collection plates for 96-well SPE and filtration-plate formats. All of our plates are made of polypropylene, for chemical resistance. We also offer 96-well plates fitted with glass inserts that maintain sample in contact only with a glass surface. The glass inserts are also available in deactivated glass format. Refer to the vials section for information about glass and deactivated glass.

The sample plates can be centrifuged to the following maximum centrifugal forces. Exceeding this limit can deform the plates. A deformed plate can cause autosampler error and instrument shutdown.

### SEALS

Waters offers a selection of cap mats, heat seals, and an adhesive seal for plates.

#### Polypropylene Cap Mats

The selection of polypropylene cap mats fits all 96-well plates and offer the chemical resistance of polypropylene. The temperature range is -20 to 55 °C.

#### Silicone/PTFE Cap Mats

Silicone/PTFE cap mats, manufactured in slit and non-slit versions, are available for 96-well plates, including those fitted with glass inserts. We recommend using the slit versions in autosamplers, where they promote proper venting and accuracy of sample draw. We recommend the non-slit versions for long-term sample storage. The temperature range is -40 to 200 °C.

#### Clear Polyester Heat Seal

The clear polyester seal, usable between -80 °C and 80 °C, is effective for most sample solvents and buffers, including DMSO. To use the seal, place its shiny side facing up, and then use a heat sealer to apply heat in both directions for two to three seconds.



### Ordering Information

#### 96- and 384-well Plates

Description	Maximum Centrifugal Force	P/N
96-well Plate, 350 µL per well	5000 g	<a href="#">186002643</a>
96-well Plate, 700 µL per well	2000 g	<a href="#">186005837</a>
96-well Plate, 800 µL per well	2000 g	<a href="#">186002481</a>
96-well Plate, 2 mL per well	5000 g	<a href="#">186002482</a>
384-well Plate, 100 µL per well	5000 g	<a href="#">186002631</a>
384-well Plate, 250 µL per well	5000 g	<a href="#">186002632</a>



#### Aluminum Foil Heat Seal

The aluminum foil heat seal is a polyester/aluminum laminate. The addition of the aluminum layer reduces the gas permeability of the seal. For long-term storage, the aluminum foil heat seal is a better choice for reducing evaporative loss. The seal is usable over the temperature range from -200 °C to 90 °C. Position the seal with its white side facing up, and then apply heat in both directions for three seconds using a heat sealer.

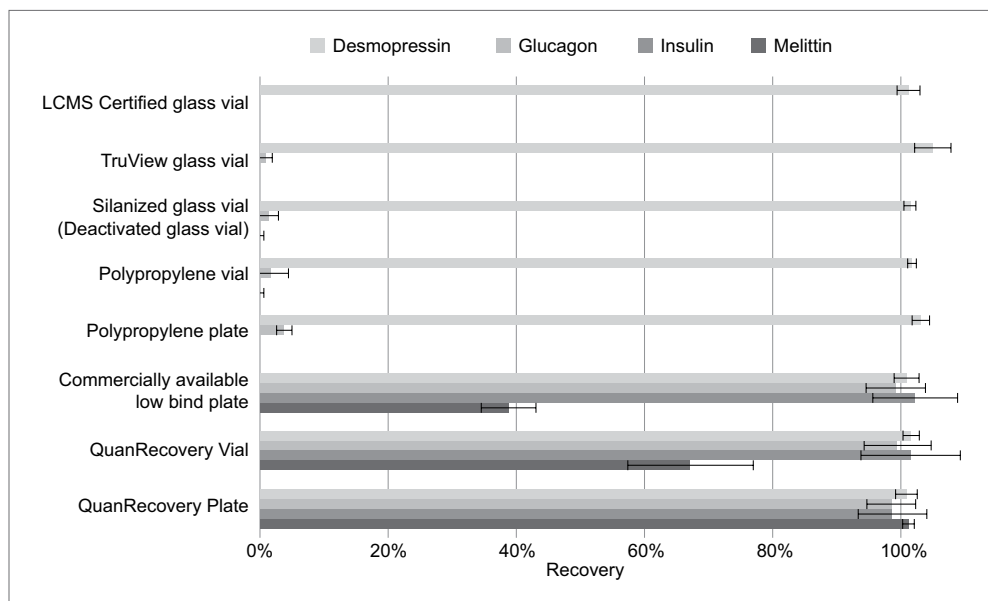
#### Adhesive Seal

The adhesive seal is a polyolefin film with a synthetic rubber adhesive. This seal is ideal for protein and peptide analyses, where samples are in buffers. The adhesive, which is usable between -80 °C and 80 °C, is resistant to low concentrations (0–30%) of polar organic solvents. No heat sealing equipment is needed to apply the seal.

## Quan Recovery Vials and Plates

Designed for LC-MS bioanalysts, QuanRecovery Vials with MaxPeak HPS reduce peptide and protein losses due to ionic interactions and non specific binding. A reduction in these losses lead to higher recovery, sensitivity and repeatability in analytical results. Non -specific binding and ionic interactions can cause losses and be a problem at low and at higher concentrations. Quan Recovery minimized this level of uncertainty with the use of High Performance Surfaces.

MaxPeak High Performance Surfaces are technologies designed to increase analyte recovery, sensitivity and reproducibility by minimizing analyte/surface interactions that can lead to sample losses.





Average recovery ( $n = 4$ ) of four peptides (1 ng/mL per peptide) after 24 hours of storage at 4 °C. The error bars show the standard deviations. Peptide solutions were prepared in 80:20 water-acetonitrile which was acidified with 0.2% trifluoroacetic acid (TFA). The more hydrophobic peptides are marked with darker grey.

## Ordering Information

QuanRecovery for ACQUITY UPLC H-Class, I-Class, M-Class and PREMIER, Arc/Arc Bio, Alliance HPLC

Description	P/N
QuanRecovery with MaxPeak HPS Vial Package ( <a href="#">186009186</a> ) with pre-slit PTFE silicone cap and septum, 100/pk	<a href="#">176004434</a>
QuanRecovery with MaxPeak HPS 300 $\mu$ L vials, 100/pk	<a href="#">186009186</a>
QuanRecovery with MaxPeak HPS 700 $\mu$ L 96 well plates, 25/pk	<a href="#">186009184</a>

QuanRecovery Vials and Plate details - for ACQUITY UPLC H-Class, I-Class, M-Class and PREMIER, Arc/Arc Bio, Alliance HPLC

	Vials	Plates
Shape		
P/N	<a href="#">176004434</a> (pk/100 with PTFE/Silicone preslit caps) <a href="#">186009186</a> (pk/100)	<a href="#">186009184</a> (pk/25)
Format	12 $\times$ 32 (2 mL) vial	96 Well plate
Total Volume (Vial or Well)	300 $\mu$ L	700 $\mu$ L
Bottom Shape	Conical	Conical
Plate Selection from Chromatographic Data System	ANSI-48-vial, 2 mL vial holder	ANSI-96-well 1 mL
Residual volume at default needle setting for ACQUITY UPLC	$\geq$ 5 $\mu$ L (FL: 2 mm - default; FTN: 3 mm)	$\geq$ 8 $\mu$ L (FL and FTN 2 mm - default)
Max Centrifugal Force	N/A	2000 g
pH range	0-14	0-14

## Vials and Accessories for ACQUITY UPLC Systems

The family of ACQUITY™ UPLC Systems continues to evolve and expand, providing various solutions for improved resolution, sensitivity, and throughput. Several different UPLC sample managers are available, each of which offer a choice of needle type to meet the requirements of a laboratory's workflow. Following is the approved selection of vials, plates, and plate seals for current ACQUITY UPLC System configurations.



ACQUITY UPLC System.

### Compatibility Tables

The tables below recommend vials and plates for the ACQUITY UPLC System configurations.

#### Fixed Loop Needle

**Vials:** ACQUITY UPLC, ACQUITY UPLC M-Class, nanoACQUITY™ UPLC, ACQUITY UPC<sup>2</sup> and ACQUITY UPLC I-Class FL; Sample Managers

**Plates:** ACQUITY UPLC, ACQUITY UPLC M-Class, nanoACQUITY UPLC, and ACQUITY UPLC I-Class FL; Metal and Metal Tip Needles

ACQUITY UPLC, ACQUITY UPLC M-Class, nanoACQUITY UPLC, ACQUITY UPC<sup>2</sup> and ACQUITY UPLC I-Class FL; PEEK and PEEKsil Needles

#### Flow Through Needle

**Vials:** ACQUITY UPLC H-Class/H-Class Bio, ACQUITY Arc™, ACQUITY Arc™ Bio, ACQUITY UPLC I-Class FTN, and ACQUITY Advanced Polymer Chromatography™

**Plates:** ACQUITY UPLC H-Class/H-Class Bio, ACQUITY Arc/Arc Bio, and ACQUITY UPLC I-Class FTN

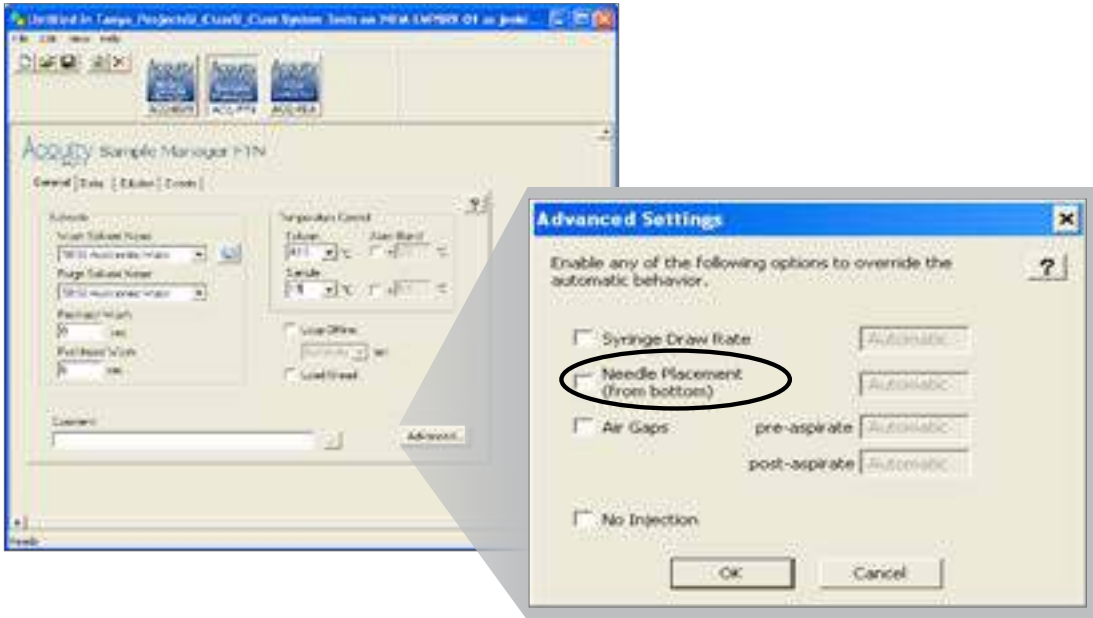
### Residual Volumes

All residual volumes shown in the following table are calculated at the default needle placement setting. For sample-limited applications, you can adjust the needle placement via the software, in the Advanced Settings dialog box of the sample manager's instrument method editor ([see figure on the following page](#)). In the case of flow through needles (FTN), exercise care when specifying a lower needle-placement setting: FTN needle tips are susceptible to damage caused by striking against hard surfaces, resulting in sealing or carryover problems.

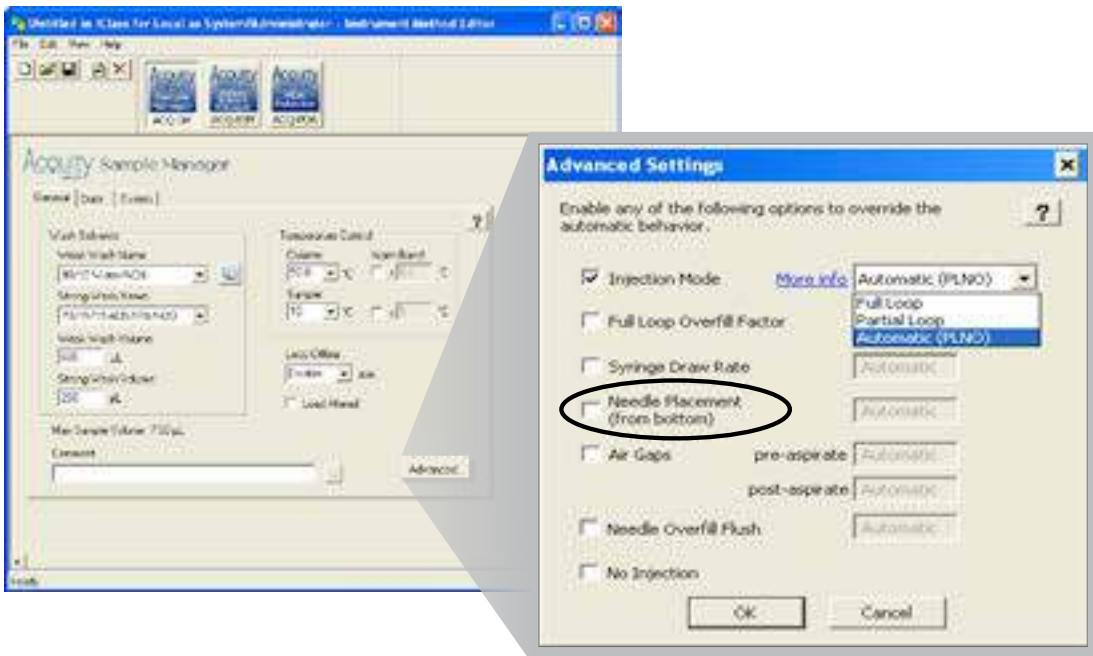
Default Needle Placement		
Needle Type	Plates	Vials
FTN	2 mm	4 mm
FL	2 mm	2 mm

## How to Change Needle Depth with the ACQUITY Sample Manager

Flow Through Needle (FTN) ACQUITY UPLC H-Class/H-Class Bio, ACQUITY UPLC I-Class, ACQUITY APC, and ACQUITY Arc/Arc Bio Systems



## Fixed Loop Needle (FL)











## QUICK SELECTION GUIDE: FIXED-LOOP-NEEDLE ACQUITY SYSTEMS

The tables below, which show the most frequently purchased vials and plates for fixed-loop-needle ACQUITY Systems, serve as a quick selection guide.

### Ordering Information

Vials for ACQUITY UPLC, ACQUITY UPLC I-Class, ACQUITY UPLC M-Class, nanoACQUITY UPLC, and ACQUITY UPC<sup>2</sup>

Fixed Loop (FL), All Needles	Clear	Amber	Max Recovery	Amber Max	300 µL PP	750 µL PP	Clear Glass with Septumless Cap	Total Recovery
12 × 32 mm								
<b>Vial Number</b>	1	2	3	4	5	6	7	8
<b>TruView LCMS Certified Combination Packs</b>								
Vial, Cap, and Pre-slit Silicone/PTFE Septum	<a href="#">186005666CV</a>	<a href="#">186005661CV</a>	<a href="#">186005662CV</a>	<a href="#">186005670CV</a>	—	—	—	<a href="#">186005663CV</a>
<b>LCMS Certified Combination Packs</b>								
Vial, Cap, and Pre-slit Silicone/PTFE Septum	<a href="#">600000668CV</a>	<a href="#">600000669CV</a>	<a href="#">600000670CV</a>	<a href="#">600000755CV</a>	—	—	—	<a href="#">600000671CV</a>
<b>LC/GC Certified Combination Packs</b>								
Bonded Pre-slit Silicone/PTFE Septum	<a href="#">186000307C</a>	<a href="#">186000847C</a>	<a href="#">186000327C</a>	<a href="#">186003886C</a>	—	—	—	<a href="#">186000385C</a>
Combination with PE Septumless Cap	<a href="#">186004132C</a>	<a href="#">186004133C</a>	<a href="#">186004168C</a>	—	—	—	<a href="#">186004132C</a>	<a href="#">186004167C</a>
<b>Combination Packs</b>								
Bonded Pre-slit Silicone/PTFE Septum Deactivated	<a href="#">186000307DV</a>	<a href="#">186000847DV</a>	<a href="#">186000327DV</a>	—	—	—	—	<a href="#">186000385DV</a>
Bonded Pre-slit Silicone/PTFE Septum	—	—	—	—	<a href="#">186002639</a>	<a href="#">186005221</a>	—	—
Combination with PE Septumless Cap	—	—	—	—	<a href="#">186004112</a>	<a href="#">186005230</a>	—	—
<b>Injectable Volumes</b>								
Max	1600 µL	1600 µL	1100 µL	1100 µL	210 µL	530 µL	1600 µL	950 µL
Residual	165 µL	165 µL	22 µL	22 µL	20 µL	70 µL	165 µL	4 µL
Vial Selection from Chromatography Data System	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder
<b>Storage Cap</b>								
Black Solid 9 mm Cap with Silicone/PTFE Liner for Sample Storage	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>







All items come in quantities of 100 unless otherwise noted.

### ACQUITY Sample Organizer Accessories

Description	P/N
Vial Holder, 48-well, 2 mL Vial	<a href="#">700011047</a>
Label, 48-well, 2 mL Vial, Open Access	<a href="#">615003783</a>
Sleeve, 2 mL Vials within the Standard 4 mL Auxiliary Position in the Sample Manager Shuttle Tray, 4/pk	<a href="#">700005338</a>

 For the complete selection of vials and accessories for ACQUITY Systems, refer to [page 59](#).

Plates for ACQUITY UPLC, ACQUITY UPLC I-Class, ACQUITY UPLC M-Class, and nanoACQUITY UPLC

Fixed Loop (FL), Metal and Metal Tip Needles	96-well Plates				384-well Plates	
						
<b>Well Shape</b>						
<b>Plates</b>	<a href="#">186002643</a>	<a href="#">186005837</a>	<a href="#">186002481</a>	<a href="#">186002482</a>	<a href="#">186002632</a>	<a href="#">186002631</a>
Pack Size	100	25	50	50	50	50
Well Volume	350 µL	700 µL	800 µL	2 mL	250 µL	100 µL
<b>Sealing Options</b>						
PTFE/Silicone Pre-slit, 5/pk	<a href="#">186006332</a>	<a href="#">186006332</a>	<a href="#">186006332</a>	<a href="#">186006335</a>	—	—
Polypropylene Cap Mat, 50/pk	—	<a href="#">186002483</a>	<a href="#">186002483</a>	<a href="#">186002484</a>	—	—
Clear Polyester Heat Seal, 100/pk	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>
Aluminum Foil Laminate Heat Seal, 100/pk	<a href="#">186002789</a>	<a href="#">186002789</a>	<a href="#">186002789</a>	<a href="#">186002789</a>	<a href="#">186002789</a>	<a href="#">186002789</a>
Adhesive Seal, 100/pk	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>
Number of Plates in Sample Organizer	21	10	10	7	10	21
Shape	Round	Round	Round	Square	Square	Square
Bottom	Round	Conical	Conical	Conical	Conical	Conical
Material	PP	PP	PP	PP	PP	PP
Plate Height	14 mm	31 mm	31 mm	42.5 mm	22 mm	15.5 mm
Well Depth	11.25 mm	27 mm	27 mm	39 mm	19.5 mm	12.3 mm
Residual Volume in ACQUITY at Default Needle Placement of 2 mm	35 µL	8 µL	15 µL	20 µL	15 µL	15 µL
Plate Selection from Chromatography Data System	ANSI-96-well 350 µL	ANSI-96-well 1 mL	ANSI-96-well 1 mL	ANSI-96-well 2 mL	ANSI-384-well 250 µL	ANSI-384-well 100 µL

96-well Glass Inserts

Glass Insert 96-well Plates	700 µL	1 mL
Plate for Quick Load Inserts, 20/pk	<a href="#">186001438</a>	<a href="#">186001438</a>
Quick Load Glass Insert, 1/pk	<a href="#">186001437(DV)</a>	<a href="#">186001436(DV)</a>
96-well Plate with Inserts	<a href="#">186000349(DV)</a> , 1/pk	<a href="#">186000855(DV)</a> , 18/pk
Pre-slit PTFE Silicone Seal, 5/pk (Clear)—seals against plate wall	<a href="#">186006335</a>	—
Clear Polyester Heat Seal, 100/pk	<a href="#">186002788</a>	—
Aluminum Foil Laminate Heat Seal, 100/pk	<a href="#">186002789</a>	—
Adhesive Seal*, 100/pk	<a href="#">186006336</a>	—
Residual Volume in ACQUITY at Default Needle Placement of 2 mm	15 µL	15 µL
Plate Selection from Chromatography Data System	ANSI-96-well 700 µL Glass Insert	ANSI-96-well 1 mL Glass Insert

When (DV) appears beside a number, a deactivated version of the part can be ordered by adding a DV to the right of the part number.

\*Adhesive seal is designed for use with buffer solutions and can tolerate alcohols and acetonitrile content in buffers.

Plates for ACQUITY UPLC, ACQUITY UPLC I-Class, ACQUITY UPLC M-Class, nanoACQUITY UPLC, and ACQUITY UPC<sup>2</sup>

Fixed Loop (FL), PEEK and PEEKsil Needles	96-well Plates				384-well Plates	
<b>Plates</b>	<a href="#">186002643</a>	<a href="#">186005837</a>	<a href="#">186002481</a>	<a href="#">186002482</a>	<a href="#">186002632</a>	<a href="#">186002631</a>
Pack Size	100	25	50	50	50	50
Well Volume	350 µL	700 µL	800 µL	2 mL	250 µL	100 µL
<b>Sealing Options</b>						
Polypropylene Cap Mat, 50/pk	—	<a href="#">186002483</a>	<a href="#">186002483</a>	<a href="#">186002484</a>	—	—
Clear Polyester Heat Seal, 100/pk	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>
Aluminum Foil Laminate Heat Seal, 100/pk	<a href="#">186002789</a>	<a href="#">186002789</a>	<a href="#">186002789</a>	<a href="#">186002789</a>	<a href="#">186002789</a>	<a href="#">186002789</a>
Adhesive Seal*, 100/pk	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>
Number of Plates in Sample Organizer	21	10	10	7	10	21
Shape	Round	Round	Round	Square	Square	Square
Bottom	Round	Conical	Conical	Conical	Conical	Conical
Material	PP	PP	PP	PP	PP	PP
Plate Height	14 mm	31 mm	31 mm	42.5 mm	22 mm	15.5 mm
Well Depth	11.25 mm	27 mm	27 mm	39 mm	19.5 mm	12.3 mm
Residual Volume in ACQUITY at Default Needle Placement of 2 mm	35 µL	8 µL	15 µL	20 µL	15 µL	15 µL
Plate Selection from Chromatography Data System	ANSI-96-well 350 µL	ANSI-96-well 1 mL	ANSI-96-well 1 mL	ANSI-96-well 2 mL	ANSI-384-well 250 µL	ANSI-384-well 100 µL

\*Adhesive seal is designed for use with buffer solutions and can tolerate alcohols and acetonitrile content in buffers.

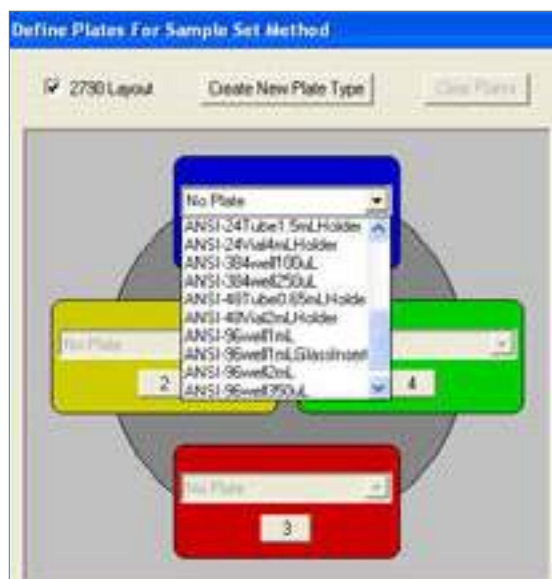
96-well Glass Inserts	
<b>Glass Insert 96-well Plates</b>	<b>700 µL</b>
Plate for Quick Load Inserts, 20/pk	<a href="#">186001438</a>
Quick Load Glass Insert, 1/pk	<a href="#">186001437</a> (DV)
96-well Plate with Inserts	<a href="#">186000349</a> (DV), 1/pk
Clear Polyester Heat Seal, 100/pk	<a href="#">186002788</a>
Aluminum Foil Laminate Heat Seal, 100/pk	<a href="#">186002789</a>
Adhesive Seal*, 100/pk	<a href="#">186006336</a>
Residual Volume in ACQUITY at Default Needle Placement of 2 mm	15 µL
Plate Selection from Chromatography Data System	ANSI-96-well 700 µL Glass Insert

When (DV) appears beside a number, a deactivated version of the part can be ordered by adding a DV to the right of the part number.

\*Adhesive seal is designed for use with buffer solutions and can tolerate alcohols and acetonitrile content in buffers.

### Plate Selection

Chromatographic system: Plate selection indicates a preprogrammed geometric plate configuration, with the proper x, y, and z dimensions for the plate. Select the proper plate from the drop-down menu.













## QUICK SELECTION GUIDE: FLOW-THROUGH-NEEDLE ACQUITY SYSTEMS

The tables below, which show the most frequently purchased vials and plates for flow-through-needle ACQUITY Systems, serve as a quick selection guide.

### Ordering Information

Vials for ACQUITY UPLC H-Class/H-Class Bio, ACQUITY UPLC I-Class, ACQUITY Arc/Arc Bio, and ACQUITY APC Systems

Flow Through Needles (FTN)	Clear	Amber	Max Recovery	Amber Max	300 µL PP	750 µL PP	Clear Glass with Septumless Cap	Total Recovery
12 × 32 mm								
<b>Vial Number</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
<b>TruView LCMS Certified Combination Packs</b>								
Vial, Cap, and Pre-slit Silicone/PTFE Septum	<a href="#">186005666CV</a>	<a href="#">186005661CV</a>	<a href="#">186005662CV</a>	<a href="#">186005670CV</a>	—	—	—	<a href="#">186005663CV</a>
<b>LCMS Certified Combination Packs</b>								
Vial, Cap, and Pre-slit Silicone/PTFE Septum	<a href="#">600000668CV</a>	<a href="#">600000669CV</a>	<a href="#">600000670CV</a>	<a href="#">600000755CV</a>	—	—	—	<a href="#">600000671CV</a>
<b>LC/GC Certified Combination Packs</b>								
Bonded Pre-slit Silicone/PTFE Septum	<a href="#">186000307C</a>	<a href="#">186000847C</a>	<a href="#">186000327C</a>	<a href="#">186003886C</a>	—	—	—	<a href="#">186000385C</a>
Combination with PE Septumless Cap	<a href="#">186004132C</a>	<a href="#">186004133C</a>	<a href="#">186004168C</a>	—	—	—	<a href="#">186004132C</a>	<a href="#">186004167C</a>
<b>Combination Packs</b>								
Bonded Pre-slit Silicone/PTFE Septum Deactivated	<a href="#">186000307DV</a>	<a href="#">186000847DV</a>	<a href="#">186000327DV</a>	—	—	—	—	<a href="#">186000385DV</a>
Bonded Pre-slit Silicone/PTFE Septum	—	—	—	—	<a href="#">186002639</a>	<a href="#">186005221</a>	—	—
Combination with PE Septumless Cap	—	—	—	—	<a href="#">186004112</a>	<a href="#">186005230</a>	—	—
<b>Injectable Volumes</b>								
Max	1450 µL	1450 µL	1365 µL	1365 µL	290 µL	610 µL	1450 µL	940 µL
Residual	360 µL	360 µL	135 µL	135 µL	10 µL	90 µL	360 µL	10 µL
Vial Selection from Chromatography Data System	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder
<b>Storage Cap</b>								
Black Solid 9 mm Cap with Silicone/PTFE Liner for Sample Storage	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>






All items come in quantities of 100 unless otherwise noted.

### ACQUITY Sample Organizer Accessories

Description	P/N
Vial Holder, 48-well, 2 mL Vial	<a href="#">700011047</a>
Label, 48-well, 2 mL Vial, Open Access	<a href="#">615003783</a>
Sleeve, 2 mL Vials within the Standard 4 mL Auxiliary Position in the Sample Manager Shuttle Tray, 4/pk	<a href="#">700005338</a>

 For the complete selection of vials and accessories for ACQUITY Systems, refer to [page 59](#).

Plates for ACQUITY UPLC H-Class/H-Class Bio, ACQUITY Arc/Arc Bio, and ACQUITY UPLC I-Class

Flow Through Needle	96-well Plates				384-well Plates
					
<b>Plates</b>	<a href="#">186002643</a>	<a href="#">186005837</a>	<a href="#">186002481</a>	<a href="#">186002482</a>	<a href="#">186002632</a>
Pack Size	100	25	50	50	50
Well Volume	350 µL	700 µL	800 µL	2 mL	250 µL
<b>Sealing Options</b>					
PTFE/Silicone Pre-slit, 5/pk	<a href="#">186006332</a>	<a href="#">186006332</a>	<a href="#">186006332</a>	<a href="#">186006335</a>	—
Clear Polyester Heat Seal, 100/pk	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>
Adhesive Seal*, 100/pk	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>
Number of Plates in Sample Organizer	21	10	10	7	10
Shape	Round	Round	Round	Square	Square
Bottom	Round	Conical	Conical	Conical	Conical
Material	PP	PP	PP	PP	PP
Plate Height	14 mm	31 mm	31 mm	42.5 mm	22 mm
Well Depth	11.25 mm	27 mm	27 mm	39 mm	19.5 mm
Residual Volume in ACQUITY at Default Needle Placement of 2 mm	35 µL	8 µL	15 µL	20 µL	15 µL
Plate Selection from Chromatography Data System	ANSI-96-well 350 µL	ANSI-96-well 1 mL	ANSI-96-well 1 mL	ANSI-96-well 2 mL	ANSI-384-well 250 µL
Plate Selection from Chromatography Data System	ANSI-96-well 350 µL	ANSI-96-well 1 mL	ANSI-96-well 1 mL	ANSI-96-well 2 mL	ANSI-384-well 250 µL

\*Adhesive seal is designed for use with buffer solutions and can tolerate alcohols and acetonitrile content in buffers.

Glass Insert 96-well Plates	96-well Glass Inserts	
	700 µL	1 mL
Plate for Quick Load Inserts, 20/pk	<a href="#">186001438</a>	<a href="#">186001438</a>
Quick-Load Glass Insert, 1/pk	<a href="#">186001437</a> (DV)	<a href="#">186001436</a> (DV)
96-well Plate with Inserts	<a href="#">186000349</a> (DV), 1/pk	<a href="#">186000855</a> (DV), 18/pk
Pre-slit PTFE Silicone Seal, 5/pk (Clear)—Seals Against Plate Wall	<a href="#">186006335</a>	—
Clear Polyester Heat Seal, 100/pk	<a href="#">186002788</a>	—
Adhesive Seal*, 100/pk	<a href="#">186006336</a>	—
Residual Volume in ACQUITY at Default Needle Placement of 2 mm	15 µL	15 µL
Plate Selection from Chromatography Data System	ANSI-96-well 700 µL Glass Insert	ANSI-96-well 1 mL Glass Insert

When (DV) appears beside a number, a deactivated version of the part can be ordered by adding a DV to the right of the part number.

\*Adhesive seal is designed for use with buffer solutions and can tolerate alcohols and acetonitrile content in buffers.

## Vials and Accessories for Alliance HPLC Systems

### AUTOSAMPLER VIALS, PLATES, AND SEALS FOR USE WITH ALLIANCE HPLC SYSTEMS

We offer a complete selection of vials, including certified and low-recovery vials suited to the needle designs used in Alliance™ Systems. We also offer a complete line of plate and seal options for the Alliance 2790/2795 HTS System.

### SETTINGS FOR ALLIANCE HPLC VIALS AND LOW VOLUME INSERTS (LVI)

The Waters Alliance Separations Module is set initially to accept vials with a bottom thickness of less than 1.6 mm. Any vial that does not meet this criterion must not be used without first adding a positive needle-offset value to the sample draw depth specified in the software. Failure to do so can cause vial breakage or needle damage.

Alliance 2690 and 2695 Needle Offset

Settings for Alliance 2690 and 2695	
Vial	Needle Offset (add)
300 µL Polypropylene Vial	1 mm
750 µL Polypropylene Vial	1 mm
Crimp Cap Vial	1 mm
Low Volume Insert and Vial	1 mm



Alliance HPLC System.



**APPLICATION AREA:** Sample Preparation for Sphingolipid Biomarkers in Biofluids and Tissues

"Using Waters Certified Vials for my research provides me with the confidence that my prepared samples are safely contained in certified clean vials and that there are no contaminants which might interfere with the LC-MS/MS analysis. I can inject from very low volumes knowing that the vials are shaped to maximize the sample depth to assure good reproducibility between injections. My samples are precious and many are "one-of-a-kind" which I don't want to risk putting into any vial other than Waters Certified vials."

**REVIEWER:** Christopher Willis








**ORGANIZATION:** Sanofi

## QUICK SELECTION GUIDE: ALLIANCE HPLC SYSTEMS

This selection of 12 × 32 mm vials are the most commonly ordered vials by customers using Waters' Alliance Separations Modules. This page is intended to be a quick selection guide.

### Ordering Information

#### Vials for Alliance 2690/2695/e2695 and 2790/2795 Systems









	Clear	Amber	Max Recovery	300 µL PP	10 mm Cap Clear	Total Recovery	Amber Max	Clear Glass with Septumless Cap
12 × 32 mm								
<b>Vial Number</b>	9	10	11	12	13	14	15	16
<b>Compatible Systems</b>								
Alliance 2690/2695	.	.	—	.	.	.	—	.
Alliance 2790/2795	.	.	.	.	—	—	.	.
<b>TruView LCMS Certified Combination Packs</b>								
Vial, Cap, and Pre-slit Silicone/PTFE Septum	<a href="#">186005666CV</a>	<a href="#">186005661CV</a>	<a href="#">186005662CV</a>	—	—	<a href="#">186005663CV</a>	<a href="#">186005670CV</a>	—
<b>LCMS Certified Combination Packs</b>								
Vial, Cap, and Pre-slit Silicone/PTFE Septum	<a href="#">600000668CV</a>	<a href="#">600000669CV</a>	<a href="#">600000670CV</a>	—	—	<a href="#">600000671CV</a>	<a href="#">600000755CV</a>	—
<b>LC/GC Certified Combination Packs</b>								
Bonded Pre-slit Silicone/PTFE Septum	<a href="#">186000307C</a>	<a href="#">186000847C</a>	<a href="#">186000327C</a>	<a href="#">186002639*</a>	—	<a href="#">186000385C</a>	<a href="#">186003886C</a>	—
Silicone/PTFE Septum	—	—	—	—	<a href="#">WAT270946C</a>	—	—	—
Combination with PE Septumless Cap	—	—	—	—	—	—	—	<a href="#">186004132C</a>
<b>Combination Packs</b>								
Combination Deactivated	<a href="#">186000307DV</a>	<a href="#">186000847DV</a>	<a href="#">186000327DV</a>	—	—	<a href="#">186000385DV</a>	—	—
<b>Injectable Volumes Alliance 2690/2695</b>								
Max	1100 µL	1100 µL	—	280 µL	1100 µL	950 µL	—	1100 µL
Residual	750 µL	750 µL	—	20 µL	750 µL	9 µL	—	750 µL
<b>Injectable Volumes Alliance 2790/2795</b>								
Max	1700 µL	1700 µL	1500 µL	290 µL	1700 µL	—	1500 µL	1700 µL
Residual	170 µL	170 µL	22 µL	10 µL	170 µL	—	22 µL	170 µL
<b>Insert</b>								
150 µL with Poly Spring	<a href="#">WAT094171(DV)</a>	<a href="#">WAT094171(DV)</a>	—	—	<a href="#">WAT094171(DV)</a>	—	—	<a href="#">WAT094171(DV)</a>
Max Volume Injection/ Max Residual Volume	144 µL/6 µL	144 µL/6 µL	—	—	144 µL/6 µL	—	—	144 µL/6 µL
<b>Storage Cap</b>								
Black Solid 9 mm Cap with Silicone/PTFE Liner for Sample Storage	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	—	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>

All items come in quantities of 100 unless otherwise noted.

When (DV) appears beside a number, a deactivated version of the part can be ordered by adding a DV to the right of the part number.

\*Not certified.









Complete Listing of 12 × 32 mm Vials and Accessories

Screw Cap Vials	Clear	Amber	Max Recovery	300 µL PP	750 µL PP	10 mm Cap Clear	Total Recovery	Amber Max
12 × 32 mm								
Vial Number	17	18	19	20	21	22	23	24
<b>Compatible Systems</b>								
Alliance 2690/2695	.	.	—	.	.	.	.	—
Alliance 2790/2795	.	.	.	.	.	—	—	.
ACQUITY	.	.	.	.	.	—	.	.
<b>TruView LCMS Certified Combination Packs</b>								
Vial, Cap, and Silicone/PTFE Septum	<a href="#">186005660CV</a>	<a href="#">186005667CV</a>	<a href="#">186005668CV</a>	—	—	—	<a href="#">186005669CV</a>	<a href="#">186005664CV</a>
Vial, Cap, and Pre-slit Silicone/PTFE Septum	<a href="#">186005666CV</a>	<a href="#">186005661CV</a>	<a href="#">186005662CV</a>	—	—	—	<a href="#">186005663CV</a>	<a href="#">186005670CV</a>
<b>LCMS Certified Combination Packs</b>								
Vial, Cap, and Silicone/PTFE Septum	<a href="#">600000751CV</a>	<a href="#">600000752CV</a>	<a href="#">600000749CV</a>	—	—	—	<a href="#">600000750CV</a>	<a href="#">600000754CV</a>
Vial, Cap, and Pre-slit Silicone/PTFE Septum	<a href="#">600000668CV</a>	<a href="#">600000669CV</a>	<a href="#">600000670CV</a>	—	—	—	<a href="#">600000671CV</a>	<a href="#">600000755CV</a>
<b>LC/GC Certified Combination Packs</b>								
Bonded Silicone/PTFE Septum	<a href="#">186000272C</a>	<a href="#">186000846C</a>	<a href="#">186000326C</a>	<a href="#">186002640*</a>	<a href="#">186005220*</a>	<a href="#">WAT270946C</a>	<a href="#">186000384C</a>	<a href="#">186003885C</a>
Combination Deactivated*	<a href="#">186000272DV</a>	<a href="#">186000846DV</a>	<a href="#">186000326DV</a>	—	—	<a href="#">WAT270946DV</a>	<a href="#">186000384DV</a>	—
Bonded Pre-slit Silicone/PTFE Septum	<a href="#">186000307C</a>	<a href="#">186000847C</a>	<a href="#">186000327C</a>	<a href="#">186002639*</a>	<a href="#">186005221*</a>	—	<a href="#">186000385C</a>	<a href="#">186003886C</a>
Combination Deactivated*	<a href="#">186000307DV</a>	<a href="#">186000847DV</a>	<a href="#">186000327DV</a>	—	—	—	<a href="#">186000385DV</a>	—
Combination with PE Septumless Cap	<a href="#">186004132C</a>	<a href="#">186004133C</a>	<a href="#">186004168C</a>	<a href="#">186004112*</a>	<a href="#">186005230*</a>	—	<a href="#">186004167C</a>	—
LC/GC Certified Combination Pack with Cap and PTFE Septum	<a href="#">186007193C</a>	<a href="#">186007194C</a>	<a href="#">186007195C</a>	—	—	—	<a href="#">186007197C</a>	<a href="#">186007196C</a>
Certified Combination Pack with Cap and LB Silicone/PTFE Septum	<a href="#">186007199C</a>	<a href="#">186007200C</a>	<a href="#">186007201C</a>	—	—	—	<a href="#">186007203C</a>	<a href="#">186007202C</a>
<b>Vials Only</b>								
Vials Only	<a href="#">186000273</a>	<a href="#">186000848</a>	<a href="#">186002802</a>	<a href="#">186002626</a>	<a href="#">186005219</a>	<a href="#">WAT063300</a>	<a href="#">186002805</a>	—
Deactivated Vials Only	<a href="#">186000273DV</a>	<a href="#">186000848DV</a>	—	—	—	<a href="#">WAT063300DV</a>	—	—
<b>Injectable Volumes Alliance 2690/2695</b>								
Max	1100 µL	1100 µL	—	280 µL	400 µL	1100 µL	950 µL	—
Residual	750 µL	750 µL	—	20 µL	300 µL	750 µL	9 µL	—
<b>Injectable Volumes Alliance 2790/2795</b>								
Max	1700 µL	1700 µL	1500 µL	290 µL	530 µL	1700 µL	—	1500 µL
Residual	170 µL	170 µL	22 µL	10 µL	170 µL	170 µL	—	22 µL

All items come in quantities of 100 unless otherwise noted.

\*Not certified.









Complete Listing of 12 × 32 mm Vials and Accessories

	Clear	Amber	Max Recovery	300 µL PP	750 µL PP	10 mm Cap Clear	Total Recovery	Amber Max
12 × 32 mm								
<b>Vial Number</b>	17	18	19	20	21	22	23	24
<b>Compatible Systems</b>								
Alliance 2690/2695	•	•	—	•	•	•	•	—
Alliance 2790/2795	•	•	•	•	•	—	—	•
ACQUITY	•	•	•	•	•	—	•	•
<b>Inserts</b>								
300 µL with Poly Spring	<a href="#">WAT094170(DV)</a>	<a href="#">WAT094170(DV)</a>	—	—	—	<a href="#">WAT094170(DV)</a>	—	—
Max Volume Injection/ Max Residual Volume	230 µL/20 µL	230 µL/20 µL	—	—	—	230 µL/20 µL	—	—
150 µL with Poly Spring	<a href="#">WAT094171(DV)</a>	<a href="#">WAT094171(DV)</a>	—	—	—	<a href="#">WAT094171(DV)</a>	—	—
Max Volume Injection/ Max Residual Volume	144 µL/6 µL	144 µL/6 µL	—	—	—	144 µL/6 µL	—	—
<b>Black Screw Cap for TruView Vials</b>								
PTFE/Silicone Septum	<a href="#">186005826</a>	<a href="#">186005826</a>	<a href="#">186005826</a>	—	—	—	<a href="#">186005826</a>	<a href="#">186005826</a>
Pre-slit PTFE/Silicone Septum	<a href="#">186005827</a>	<a href="#">186005827</a>	<a href="#">186005827</a>	—	—	—	<a href="#">186005827</a>	<a href="#">186005827</a>
<b>Light Blue Screw Cap for LCMS Certified Vials</b>								
PTFE/Silicone Septum	<a href="#">186005828</a>	<a href="#">186005828</a>	<a href="#">186005828</a>	—	—	—	<a href="#">186005828</a>	<a href="#">186005828</a>
Pre-slit PTFE/Silicone Septum	<a href="#">186005829</a>	<a href="#">186005829</a>	<a href="#">186005829</a>	—	—	—	<a href="#">186005829</a>	<a href="#">186005829</a>
<b>Screw Cap and Septum—Silicone/PTFE</b>								
PE Septumless Cap	<a href="#">186004169</a>	<a href="#">186004169</a>	<a href="#">186004169</a>	<a href="#">186004169</a>	<a href="#">186004169</a>	—	<a href="#">186004169</a>	<a href="#">186004169</a>
Blue LectraBond	<a href="#">186000274</a>	<a href="#">186000274</a>	<a href="#">186000274</a>	<a href="#">186000274</a>	<a href="#">186000274</a>	—	<a href="#">186000274</a>	<a href="#">186000274</a>
Red LectraBond	<a href="#">186002129</a>	<a href="#">186002129</a>	<a href="#">186002129</a>	<a href="#">186002129</a>	<a href="#">186002129</a>	—	<a href="#">186002129</a>	<a href="#">186002129</a>
Green LectraBond	<a href="#">186002130</a>	<a href="#">186002130</a>	<a href="#">186002130</a>	<a href="#">186002130</a>	<a href="#">186002130</a>	—	<a href="#">186002130</a>	<a href="#">186002130</a>
White LectraBond	<a href="#">186002456</a>	<a href="#">186002456</a>	<a href="#">186002456</a>	<a href="#">186002456</a>	<a href="#">186002456</a>	—	<a href="#">186002456</a>	<a href="#">186002456</a>
Black Cap with PTFE Septum, 100/pk	<a href="#">186007198</a>	<a href="#">186007198</a>	<a href="#">186007198</a>	<a href="#">186007198</a>	<a href="#">186007198</a>	—	<a href="#">186007198</a>	<a href="#">186007198</a>
<b>Screw Cap and Pre-slit Septum—Silicone/PTFE</b>								
Blue LectraBond	<a href="#">186000305</a>	<a href="#">186000305</a>	<a href="#">186000305</a>	<a href="#">186000305</a>	<a href="#">186000305</a>	—	<a href="#">186000305</a>	<a href="#">186000305</a>
Red LectraBond	<a href="#">186002128</a>	<a href="#">186002128</a>	<a href="#">186002128</a>	<a href="#">186002128</a>	<a href="#">186002128</a>	—	<a href="#">186002128</a>	<a href="#">186002128</a>
Green LectraBond	<a href="#">186002127</a>	<a href="#">186002127</a>	<a href="#">186002127</a>	<a href="#">186002127</a>	<a href="#">186002127</a>	—	<a href="#">186002127</a>	<a href="#">186002127</a>
White LectraBond	<a href="#">186002457</a>	<a href="#">186002457</a>	<a href="#">186002457</a>	<a href="#">186002457</a>	<a href="#">186002457</a>	—	<a href="#">186002457</a>	<a href="#">186002457</a>
<b>For Dissolution System</b>								
Pre-assembled Vial, Cap, and Pre-slit Septum	<a href="#">186000989(DV)</a>	<a href="#">186003455</a>	—	—	—	—	—	—
<b>Storage Cap</b>								
Black Solid 9 mm Cap with Silicone/ PTFE Liner for Sample Storage	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	—	<a href="#">186007187</a>	<a href="#">186007187</a>
Black Cap	—	—	—	—	—	<a href="#">WAT058875</a>	—	—
Septum Only, Silicone/PTFE	—	—	—	—	—	<a href="#">WAT058874</a>	—	—

All items come in quantities of 100 unless otherwise noted.

When (DV) appears beside a number, a deactivated version of the part can be ordered by adding a DV to the right of the part number.







Complete Listing of 12 × 32 mm Vials and Accessories *Continued*

Snap and Crimp Cap Vials	Clear	Amber	Max Recovery	300 µL PP	750 µL PP	Clear Glass Crimp	Amber Crimp	Total Recovery
12 × 32 mm								
<b>Vial Number</b>	<b>25</b>	<b>26</b>	<b>27</b>	<b>28</b>	<b>29</b>	<b>30</b>	<b>31</b>	<b>32</b>
<b>Compatible Systems</b>								
Alliance 2690/2695	•	•	—	•	•	•	•	•
Alliance 2790/2795	•	•	•	•	•	•	•	—
ACQUITY	•	•	•	•	•	•	•	•
<b>Combination Packs</b>								
Vial, Cap, and Silicone/PTFE Septum	—	—	—	<a href="#">186002642</a>	<a href="#">186005223</a>	—	—	<a href="#">186000234</a> (DV)
Vial, Cap, and Pre-slit Silicone/PTFE Septum	—	—	—	<a href="#">186002641</a>	<a href="#">186005222</a>	—	—	—
<b>Vials</b>								
Vials Only	<a href="#">WAT094219</a>	<a href="#">WAT094220</a>	<a href="#">186000984</a>	<a href="#">186002628</a>	<a href="#">186005224</a>	<a href="#">WAT094222</a>	<a href="#">WAT094223</a>	<a href="#">186000302</a>
Deactivated Vials Only	<a href="#">WAT094219DV</a>	<a href="#">WAT094220DV</a>	<a href="#">186000984DV</a>	—	—	<a href="#">WAT094222DV</a>	<a href="#">WAT094223DV</a>	<a href="#">186000302DV</a>
<b>Injectable Volumes Alliance 2690/2695</b>								
Max	1100 µL	1100 µL	—	280 µL	400 µL	1100 µL	1100 µL	950 µL
Residual	750 µL	750 µL	—	20 µL	300 µL	750 µL	750 µL	9 µL
<b>Injectable Volumes Alliance 2790/2795</b>								
Max	1700 µL	1700 µL	1500 µL	290 µL	530 µL	1700 µL	1700 µL	—
Residual	170 µL	170 µL	22 µL	10 µL	170 µL	170 µL	170 µL	—
<b>Inserts</b>								
300 µL with Poly Spring	<a href="#">WAT094170</a> (DV)	<a href="#">WAT094170</a> (DV)	—	—	—	<a href="#">WAT094170</a> (DV)	<a href="#">WAT094170</a> (DV)	—
Max Volume Injection/Max Residual Volume	230 µL/20 µL	230 µL/20 µL	—	—	—	230 µL/20 µL	230 µL/20 µL	—
150 µL with Poly Spring	<a href="#">WAT094171</a> (DV)	<a href="#">WAT094171</a> (DV)	—	—	—	<a href="#">WAT094171</a> (DV)	<a href="#">WAT094171</a> (DV)	—
Max Volume Injection/Max Residual Volume	144 µL/6 µL	144 µL/6 µL	—	—	—	144 µL/6 µL	144 µL/6 µL	—
<b>Snap Cap and Septum-Silicone/PTFE</b>								
Blue	<a href="#">186000303</a>	<a href="#">186000303</a>	<a href="#">186000303</a>	<a href="#">186000303</a>	<a href="#">186000303</a>	—	—	<a href="#">186000303</a>
Black	<a href="#">186002649</a>	<a href="#">186002649</a>	<a href="#">186002649</a>	<a href="#">186002649</a>	<a href="#">186002649</a>	—	—	<a href="#">186002649</a>
Red	<a href="#">186002650</a>	<a href="#">186002650</a>	<a href="#">186002650</a>	<a href="#">186002650</a>	<a href="#">186002650</a>	—	—	<a href="#">186002650</a>
<b>Snap Cap and Pre-slit Septum-Silicone/PTFE</b>								
Blue	<a href="#">186000304</a>	<a href="#">186000304</a>	<a href="#">186000304</a>	<a href="#">186000304</a>	<a href="#">186000304</a>	—	—	<a href="#">186000304</a>
Black	<a href="#">186002648</a>	<a href="#">186002648</a>	<a href="#">186002648</a>	<a href="#">186002648</a>	<a href="#">186002648</a>	—	—	<a href="#">186002648</a>
Red	<a href="#">186002647</a>	<a href="#">186002647</a>	<a href="#">186002647</a>	<a href="#">186002647</a>	<a href="#">186002647</a>	—	—	<a href="#">186002647</a>
<b>Snap Cap and PTFE Septum</b>								
Blue	<a href="#">186000328</a>	<a href="#">186000328</a>	<a href="#">186000328</a>	<a href="#">186000328</a>	<a href="#">186000328</a>	—	—	<a href="#">186000328</a>
Black	<a href="#">186002645</a>	<a href="#">186002645</a>	<a href="#">186002645</a>	<a href="#">186002645</a>	<a href="#">186002645</a>	—	—	<a href="#">186002645</a>
Red	<a href="#">186002646</a>	<a href="#">186002646</a>	<a href="#">186002646</a>	<a href="#">186002646</a>	<a href="#">186002646</a>	—	—	<a href="#">186002646</a>
<b>Crimp Cap</b>								
Crimp Cap Silicone/PTFE Septum	—	—	—	—	—	<a href="#">PSL404219</a>	<a href="#">PSL404219</a>	—
Crimp Cap PTFE/Silicone/PTFE Septum	—	—	—	—	—	<a href="#">PSL404231</a>	<a href="#">PSL404231</a>	—
Crimp Cap with Silicone/PTFE Septa	—	—	—	—	—	<a href="#">186006967</a>	<a href="#">186006967</a>	—
Crimper	—	—	—	—	—	<a href="#">PSL904301</a>	<a href="#">PSL904301</a>	—

All items come in quantities of 100 unless otherwise noted.

When (DV) appears beside the part number, a deactivated version of this product can be ordered by adding DV to the right of the part number.

## Plates for Alliance 2790/2795 Systems

	96-well Plates				384-well Plates	
Well Shape						
Plates	<a href="#">186002643</a>	<a href="#">186005837</a>	<a href="#">186002481</a>	<a href="#">186002482</a>	<a href="#">186002632</a>	<a href="#">186002631</a>
Pack Size	100	25	50	50	50	50
Well Volume	350 µL	700 µL	800 µL	2 mL	250 µL	100 µL
Sealing Options						
PTFE/Silicone, 5/pk	<a href="#">186006333</a>	<a href="#">186006333</a>	<a href="#">186006333</a>	<a href="#">186006334</a>	—	—
PTFE/Silicone Pre-slit, 5/pk	<a href="#">186006332</a>	<a href="#">186006332</a>	<a href="#">186006332</a>	<a href="#">186006335</a>	—	—
Polypropylene Cap Mat, 50/pk	<a href="#">186002483</a>	<a href="#">186002483</a>	<a href="#">186002483</a>	<a href="#">186002484</a>	—	—
Clear Polyester Heat Seal, 100/pk	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>
Aluminum Foil Laminate Heat Seal, 100/pk	<a href="#">186002789</a>	<a href="#">186002789</a>	<a href="#">186002789</a>	<a href="#">186002789</a>	<a href="#">186002789</a>	<a href="#">186002789</a>
Adhesive Seal,* 100/pk	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>
Number of Plates in Sample Organizer	21	10	10	7	10	21
Shape	Round	Round	Round	Square	Square	Square
Bottom	Round	Conical	Conical	Conical	Conical	Conical
Material	PP	PP	PP	PP	PP	PP
Plate Height	14 mm	31 mm	31 mm	42.5 mm	22 mm	15.5 mm
Well Depth	11.25 mm	27 mm	27 mm	39 mm	19.5 mm	12.3 mm
Residual Volume in Alliance 2795 at Default Needle Placement of 2 mm	35 µL	8 µL	15 µL	20 µL	15 µL	15 µL

\*Adhesive seal is designed for use with buffer solutions and can tolerate alcohols and acetonitrile content in buffers.



Roller for Cap Mats

Description	P/N
Roller for Cap Mats	<a href="#">186002633</a>










Holder for 12 × 32 mm Vials

Description	P/N
Holder for 12 × 32 mm Vials, 5/pk	<a href="#">186004487</a>



## AUTOSAMPLER VIALS FOR WATERS SYSTEMS

### Vials for Waters 717 Autosampler





	4 mL Screw Neck	Amber Screw Neck	Total Recovery	PP Screw Neck Vial	PP Conical	Glass Shell Vial	Amber Glass Shell Vial
15 × 45 mm							
48-position Carousel	33	34	35	36	37	38	39
<b>Combination Packs</b>							
Vial, Cap, and LectraBond PTFE/Silicone Septum	<a href="#">186000838C</a>	<a href="#">186001133C</a>	<a href="#">186002629C</a>	—	—	—	—
Combination Deactivated	<a href="#">186000838DV</a>	<a href="#">186001133DV</a>	—	—	—	—	—
Vial, Cap, and LectraBond Pre-slit PTFE/Silicone Septum	<a href="#">186000839C</a>	<a href="#">186001134C</a>	<a href="#">186002630C</a>	—	—	—	—
Combination Deactivated	<a href="#">186000839DV</a>	<a href="#">186001134DV</a>	—	—	—	—	—
Vial and PE Snap Cap	—	—	—	—	186004031	<a href="#">WAT025051</a>	<a href="#">WAT025050</a>
<b>Components</b>							
Vials Only	<a href="#">186000840(DV)</a>	<a href="#">186001135(DV)</a>	<a href="#">186002520</a>	<a href="#">186000999<sup>1</sup></a>	—	—	—
Max Volume Injection/Max Residual Volume	2400 µL/1600 µL	2400 µL/1600 µL	3000 µL/40 µL	2000 µL/1000 µL	2950 µL/50 µL	2400 µL/1600 µL	2400 µL/1600 µL
Cap LectraBond PTFE/Silicone 100/pk	<a href="#">186000841</a>	<a href="#">186000841</a>	<a href="#">186000841</a>	—	—	—	—
Screw Cap with Bonded PTFE/Silicone Septum, 1000/pk	—	—	—	<a href="#">186000965</a>	—	—	—
Cap LectraBond Pre-slit PTFE/Silicone, 100/pk	<a href="#">186000842</a>	<a href="#">186000842</a>	<a href="#">186000842</a>	—	—	—	—
Black Phenol Cap, 144/pk	<a href="#">WAT072711</a>	<a href="#">WAT072711</a>	<a href="#">WAT072711</a>	—	—	—	—
PTFE Septum, 1440/pk	<a href="#">WAT073005</a>	<a href="#">WAT073005</a>	<a href="#">WAT073005</a>	—	—	—	—
PTFE Septum, 144/pk	<a href="#">WAT072714</a>	<a href="#">WAT072714</a>	<a href="#">WAT072714</a>	—	—	—	—
Self Sealing Septum, 144/pk	<a href="#">WAT022861</a>	<a href="#">WAT022861</a>	<a href="#">WAT022861</a>	—	—	—	—
250 µL Glass Insert <sup>2</sup>	<a href="#">WAT072704(DV)</a>	<a href="#">WAT072704(DV)</a>	—	—	—	—	—
Max Volume Injection/Max Residual Volume	244 µL/6 µL	244 µL/6 µL	—	—	—	—	—
250 µL Glass Insert, 144/pk <sup>2</sup>	<a href="#">WAT015199(DV)</a>	<a href="#">WAT015199(DV)</a>	—	—	—	—	—
Max Volume Injection/Max Residual Volume	230 µL/20 µL	230 µL/20 µL	—	—	—	—	—
250 µL Plastic Conical Insert (PMP), 144/pk <sup>2</sup>	<a href="#">WAT072030</a>	<a href="#">WAT072030</a>	—	—	—	—	—
Max Volume Injection/Max Residual Volume	230 µL/20 µL	230 µL/20 µL	—	—	—	—	—
Springs for LVI, 100/pk	<a href="#">WAT072708</a>	<a href="#">WAT072708</a>	—	—	—	—	—
<b>Storage Cap</b>							
Solid Black Cap with Silicone/PTFE Liner for Sample Storage	<a href="#">186007224</a>	<a href="#">186007224</a>	<a href="#">186007224</a>	—	—	—	—

When (DV) appears beside the part number, a deactivated version of this product can be ordered by adding DV to the right of the part number.

<sup>1</sup>Item contains 1000 vials.

<sup>2</sup>Inserts require springs, p/n: [WAT072708](#).

## Vials for Waters 717 Autosampler

	1 mL Shell	Amber	Total Recovery	PP Conical
8 × 40 mm				
<b>96-position Carousel</b>	<b>40</b>	<b>41</b>	<b>42</b>	<b>43</b>



Components				
Shell Vial and Snap Cap	<a href="#">WAT025054C</a>	<a href="#">WAT025053C</a>	<a href="#">186000837C</a>	<a href="#">WAT022476*</a>
Shell Vial and Snap Cap Deactivated	<a href="#">WAT025054DV</a>	<a href="#">WAT025053DV</a>	186000837DV	—
Pack Size	250	250	100	100
Max Volume Injection/Max Residual Volume	600 µL/400 µL	600 µL/400 µL	700 µL/6 µL	650 µL/50 µL
150 µL Glass Insert (requires spring)	<a href="#">WAT072294(DV)</a>	<a href="#">WAT072294(DV)</a>	—	—
Max Volume Injection/Max Residual Volume	144 µL/6 µL	144 µL/6 µL	—	—
PE Snap Cap, 1000/pk	<a href="#">WAT078515</a>	<a href="#">WAT078515</a>	<a href="#">WAT078515</a>	<a href="#">WAT078515</a>
200 µL PE Vial Insert with Poly Spring, 1000/pk	<a href="#">186001728</a>	<a href="#">186001728</a>	—	—
1 mL Shell Vial Assembled for Dissolution System, 500/pk	<a href="#">WAT022479</a>	—	—	—

All items come in quantities of 100 unless otherwise noted.

When (DV) appears beside the part number, a deactivated version of this product can be ordered by adding DV to the right of the part number.

\*Vials not certified.

## Vials for GPC 2000

	4 mL Screw Cap	10 mL Screw Neck
		
<b>Vial Number</b>	<b>75</b>	<b>76</b>
Components		
	P/N	P/N
Vial	<a href="#">186000840</a>	<a href="#">186001420</a>
Black Screw Cap	<a href="#">WAT072711*</a>	<a href="#">186001421</a>
PTFE Septum	<a href="#">WAT072714*</a>	<a href="#">186001422</a>
Black Solid Cap with Silicone/PTFE Liner for Sample Storage, 4 mL	<a href="#">186007224</a>	—

\*Item contains 144 pieces.



*PATROL™ UPLC Process Analysis System.*







## Vials for Aqua Analysis System

Components	P/N
22 mL Vial with Pre-slit Silicone/PTFE Septum, 100/pk	<a href="#">186004108</a>
Solid Cap, PTFE/Silicone Liner, 100/pk	<a href="#">186004109</a>
Mailing Box for 22 mL vials, 100/pk	186004111

## Vials for PATROL UPLC Process Analysis System

Components	P/N
15 × 75 mm Clear Glass with PTFE/Silicone Non-slit Septum, 100/pk	<a href="#">186004902C</a>
15 × 75 mm Clear Glass with PTFE/Silicone Slit Septum, 100/pk	<a href="#">186004903C</a>
15 × 75 mm Clear Glass Total Recovery Vial only, 100/pk	<a href="#">186007573</a>







## Screw Cap Vials for Waters 2707 Autosampler and 2777 Sample Manager

	Clear	Amber	Max Recovery	Amber Max	300 µL PP	10 mL Screw Neck
12 × 32 mm						
Vial Number	44	45	46	47	48	49
<b>LCMS Certified Combination Packs</b>						
Vial, Cap, and Pre-slit Silicone/PTFE Septum	<a href="#">60000668CV</a>	<a href="#">60000669CV</a>	<a href="#">60000670CV</a>	<a href="#">60000755CV</a>	—	—
<b>LC/GC Certified Combination Packs</b>						
Bonded Pre-slit Silicone/PTFE Septum	<a href="#">186000307C</a>	<a href="#">186000847C</a>	<a href="#">186000327C</a>	<a href="#">186003886C</a>	—	—
Bonded Pre-slit Silicone/PTFE Septum Deactivated	<a href="#">186000307DV</a>	<a href="#">186000847DV</a>	<a href="#">186000327DV</a>	—	—	—
Bonded Silicone/PTFE Septum	<a href="#">186000272C</a>	<a href="#">186000846C</a>	<a href="#">186000326C</a>	<a href="#">186003885C</a>	—	—
<b>Combination Packs</b>						
Bonded Pre-slit Silicone/PTFE Septum	—	—	—	—	<a href="#">186002639</a>	—
Bonded Silicone/PTFE Septum	—	—	—	—	<a href="#">186002640</a>	—
<b>Injectable Volumes ACQUITY UPLC</b>						
Max	1600 µL	1600 µL	1100 µL	1100 µL	240 µL	—
Residual	150 µL	150 µL	10 µL	10 µL	10 µL	500 µL*
<b>Components</b>						
150 µL with Poly Spring	<a href="#">WAT094171</a>	<a href="#">WAT094171</a>	—	—	—	—
Max Volume Injection/Max Residual Volume	144 µL/6 µL	144 µL/6 µL	—	—	—	—
22 × 45 mm Clear Glass Vial	—	—	—	—	—	<a href="#">186001420</a>
Cap with X-Slit PTFE Silicone Septa	—	—	—	—	—	<a href="#">186004632</a>
<b>Storage Cap</b>						
Black Solid 9 mm Cap with Silicone/PTFE Liner for Sample Storage	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	—

All items come in quantities of 100 unless otherwise noted. For more details, [see vials descriptions on page 71](#).

\*500 µL residual volume for the 2707 Autosampler; 1500 µL residual volume for the 2777 Sample Manager.

## Plates for Waters 2707 Autosampler

	96-well Plates				384-well Plates	
Well Shape						
Plates	<a href="#">186002643</a>	<a href="#">186005837</a>	<a href="#">186002481</a>	<a href="#">186002482</a>	<a href="#">186002632</a>	<a href="#">186002631</a>
Pack Size	100	25	50	50	50	50
Well Volume	350 µL	700 µL	800 µL	2 mL	250 µL	100 µL
<b>Sealing Options</b>						
PTFE/Silicone, 5/pk	<a href="#">186006333</a>	<a href="#">186006333</a>	<a href="#">186006333</a>	<a href="#">186006334</a>	—	—
PTFE/Silicone, Pre-slit, 5/pk	<a href="#">186006332</a>	<a href="#">186006332</a>	<a href="#">186006332</a>	<a href="#">186006335</a>	—	—
Polypropylene Cap Mat, 50/pk	<a href="#">186002483</a>	<a href="#">186002483</a>	<a href="#">186002483</a>	<a href="#">186002484</a>	—	—
Clear Polyester Heat Seal, 100/pk	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>	<a href="#">186002788</a>
Aluminum Foil Laminate Heat Seal, 100/pk	<a href="#">186002789</a>	<a href="#">186002789</a>	<a href="#">186002789</a>	<a href="#">186002789</a>	<a href="#">186002789</a>	<a href="#">186002789</a>
Adhesive Seal*, 100/pk	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>	<a href="#">186006336</a>
Residual Volume	125 µL	20 µL	40 µL	60 µL	40 µL	40 µL









\*Adhesive seal is designed for use with buffer solutions and can tolerate alcohols and acetonitrile content in buffers.

## AUTOSAMPLER VIALS FOR COMPATIBLE SYSTEMS

Waters' high-quality vials are compatible with other manufacturers' autosamplers. The following tables serve as a quick selection guide.

### Ordering Information











#### Snap and Crimp Cap (9 mm) Vials for Compatible Systems

	Clear	Amber	Max Recovery	Qsert Vial	PP 300 µL	PP 750 µL	Clear Crimp	Amber Crimp
12 × 32 mm								
<b>Vial Number</b>	60	61	62	63	64	65	66	67
<b>Compatible Systems</b>								
Agilent Technologies, Beckman, Dynatech, Finnigan, Fisons, Gilson, Hitachi, LDC, Perkin-Elmer, Shimadzu, Spectra-Physics, Varian	.	.	.	.	.	.	.	.
CTC, Spark, Thermal Separations	—	—	—	—	—	—	.	.
<b>Combination Packs</b>								
Vial, Cap, and Silicone/PTFE Septum	—	—	—	<a href="#">186001124(DV)</a>	<a href="#">186002642</a>	<a href="#">186005223</a>	—	—
Vial, Cap, and Pre-slit Silicone/PTFE Septum	—	—	—	<a href="#">186001125(DV)</a>	<a href="#">186002641</a>	<a href="#">186005222</a>	—	—
Vial, Cap, and PTFE Septum	—	—	—	<a href="#">186001127(DV)</a>	—	—	—	—
<b>Vials Only</b>								
Vials Only	<a href="#">WAT094219</a>	<a href="#">WAT094220</a>	<a href="#">186000984</a>	—	<a href="#">186002628</a>	<a href="#">186005224</a>	<a href="#">WAT094222</a>	<a href="#">WAT094223</a>
Deactivated Vials Only	<a href="#">WAT094219DV</a>	<a href="#">WAT094220DV</a>	<a href="#">186000984DV</a>	—	—	—	<a href="#">WAT094222DV</a>	<a href="#">WAT094223DV</a>
<b>Inserts</b>								
300 µL with Poly Spring	<a href="#">WAT094170(DV)</a>	<a href="#">WAT094170(DV)</a>	—	—	—	—	<a href="#">WAT094170(DV)</a>	<a href="#">WAT094170(DV)</a>
150 µL with Poly Spring	<a href="#">WAT094171(DV)</a>	<a href="#">WAT094171(DV)</a>	—	—	—	—	<a href="#">WAT094171(DV)</a>	<a href="#">WAT094171(DV)</a>
<b>Snap Cap and Septum-Silicone/PTFE</b>								
Blue	<a href="#">186000303</a>	<a href="#">186000303</a>	<a href="#">186000303</a>	<a href="#">186000303</a>	<a href="#">186000303</a>	<a href="#">186000303</a>	—	—
Black	<a href="#">186002649</a>	<a href="#">186002649</a>	<a href="#">186002649</a>	<a href="#">186002649</a>	<a href="#">186002649</a>	<a href="#">186002649</a>	—	—
Red	<a href="#">186002650</a>	<a href="#">186002650</a>	<a href="#">186002650</a>	<a href="#">186002650</a>	<a href="#">186002650</a>	<a href="#">186002650</a>	—	—
<b>Snap Cap and Pre-slit Septum-Silicone/PTFE</b>								
Blue	<a href="#">186000304</a>	<a href="#">186000304</a>	<a href="#">186000304</a>	<a href="#">186000304</a>	<a href="#">186000304</a>	<a href="#">186000304</a>	—	—
Black	<a href="#">186002648</a>	<a href="#">186002648</a>	<a href="#">186002648</a>	<a href="#">186002648</a>	<a href="#">186002648</a>	<a href="#">186002648</a>	—	—
Red	<a href="#">186002647</a>	<a href="#">186002647</a>	<a href="#">186002647</a>	<a href="#">186002647</a>	<a href="#">186002647</a>	<a href="#">186002647</a>	—	—
<b>Snap Cap and PTFE Septum</b>								
Blue	<a href="#">186000328</a>	<a href="#">186000328</a>	<a href="#">186000328</a>	<a href="#">186000328</a>	<a href="#">186000328</a>	<a href="#">186000328</a>	—	—
Black	<a href="#">186002645</a>	<a href="#">186002645</a>	<a href="#">186002645</a>	<a href="#">186002645</a>	<a href="#">186002645</a>	<a href="#">186002645</a>	—	—
Red	<a href="#">186002646</a>	<a href="#">186002646</a>	<a href="#">186002646</a>	<a href="#">186002646</a>	<a href="#">186002646</a>	<a href="#">186002646</a>	—	—
<b>Crimp Cap</b>								
Crimp Cap Silicone/PTFE Septum	—	—	—	—	—	—	<a href="#">PSL404219</a>	<a href="#">PSL404219</a>
Crimp Cap PTFE/Silicone/PTFE Septum	—	—	—	—	—	—	<a href="#">PSL404231</a>	<a href="#">PSL404231</a>

All items come in quantities of 100 unless otherwise noted.

When (DV) appears beside the part number, a deactivated version of this product can be ordered by adding DV to the right of the part number.

## Screw Cap Vials for Compatible Systems











	Clear	Amber	Amber Max Recovery	Clear Glass Max Recovery	Qsert Vial	Amber Qsert	PP 300 µL	PP 750 µL	10 mm Cap	PP 250 µL 8 mm Cap
12 × 32 mm										
<b>Vial Number</b>	50	51	52	53	54	55	56	57	58	59
<b>Compatible Systems</b>										
Agilent Technologies	•	•	•	•	•	•	•	•	—	—
Alcott, Antek, CTC, Spark Thermal Separations	—	—	—	—	—	—	—	—	•	•
Beckman, Dynatech, Finnigan, Fisons, Gilson	•	•	•	•	•	•	•	•	—	—
Hitachi, LDC, Perkin- Elmer, Shimadzu, Spectra- Physics, Thermo, Varian	•	•	•	•	•	•	•	•	•	•
<b>LC/MS Certified Combination Packs</b>										
Vial, Cap, and Silicone/PTFE Septum	<a href="#">600000751CV</a>	<a href="#">600000752CV</a>	<a href="#">600000754CV</a>	<a href="#">600000749CV</a>	—	—	—	—	—	—
Vial, Cap, and Pre-slit Silicone/PTFE Septum	<a href="#">600000668CV</a>	<a href="#">600000669CV</a>	<a href="#">600000755CV</a>	<a href="#">600000670CV</a>	—	—	—	—	—	—
<b>LC/GC Certified Combination Packs</b>										
Bonded Silicone/ PTFE Septum	<a href="#">186000272C</a>	<a href="#">186000846C</a>	<a href="#">186003885C</a>	<a href="#">186000326C</a>	<a href="#">186001126C</a>	<a href="#">186001130C</a>	—	—	<a href="#">WAT270946C</a> <sup>1</sup>	—
Combination Deactivated <sup>2</sup>	<a href="#">186000272DV</a>	<a href="#">186000846DV</a>	—	<a href="#">186000326DV</a>	<a href="#">186001126DV</a>	<a href="#">186001130DV</a>	—	—	<a href="#">WAT270946DV</a>	—
Bonded Pre-slit Silicone/ PTFE Septum	<a href="#">186000307C</a>	<a href="#">186000847C</a>	<a href="#">186003886C</a>	<a href="#">186000327C</a>	<a href="#">186001128C</a>	<a href="#">186001131C</a>	—	—	—	—
Combination Deactivated <sup>2</sup>	<a href="#">186000307DV</a>	<a href="#">186000847DV</a>	—	<a href="#">186000327DV</a>	<a href="#">186001128DV</a>	<a href="#">186001131DV</a>	—	—	—	—
<b>Combination Packs</b>										
Bonded Silicone/PTFE Septum	—	—	—	—	—	—	<a href="#">186002640</a>	<a href="#">186005220</a>	—	—
Bonded Pre-slit Silicone/PTFE Septum	—	—	—	—	—	—	<a href="#">186002639</a>	<a href="#">186005221</a>	—	—
<b>Vials Only</b>										
Vials Only	<a href="#">186000273</a>	<a href="#">186000848</a>	—	<a href="#">186002802</a>	<a href="#">186002804</a>	<a href="#">186002803</a>	<a href="#">186002626</a>	<a href="#">186005219</a>	<a href="#">WAT063300</a>	<a href="#">WAT094172</a>
Deactivated Vials Only	<a href="#">186000273DV</a>	<a href="#">186000848DV</a>	—	—	—	—	—	—	<a href="#">WAT063300DV</a>	—
<b>Inserts</b>										
300 µL with Poly Spring	<a href="#">WAT094170</a>	<a href="#">WAT094170</a>	—	—	—	—	—	—	<a href="#">WAT094170</a>	—
300 µL with Poly Spring Deactivated	<a href="#">WAT094170DV</a>	<a href="#">WAT094170DV</a>	—	—	—	—	—	—	<a href="#">WAT094170DV</a>	—
150 µL with Poly Spring	<a href="#">WAT094171</a>	<a href="#">WAT094171</a>	—	—	—	—	—	—	<a href="#">WAT094171</a>	—
150 µL with Poly Spring Deactivated	<a href="#">WAT094171DV</a>	<a href="#">WAT094171DV</a>	—	—	—	—	—	—	<a href="#">WAT094171DV</a>	—

All items come in quantities of 100 unless otherwise noted.

<sup>1</sup>Septum not bonded.

<sup>2</sup>Not certified.

## Screw Cap Vials for Compatible Systems

	Clear	Amber	Amber Max Recovery	Clear Glass Max Recovery	Qsert Vial	Amber Qsert	PP 300 µL	PP 750 µL	10 mm Cap	PP 250 µL 8 mm Cap
12 × 32 mm										
<b>Vial Number</b>	50	51	52	53	54	55	56	57	58	59
<b>Compatible Systems</b>										
Agilent Technologies	•	•	•	•	•	•	•	•	–	–
Alcott, Antek, CTC, Spark Thermal Separations	–	–	–	–	–	–	–	–	•	•
Beckman, Dynatech, Finnigan, Fisons, Gilson	•	•	•	•	•	•	•	•	–	–
Hitachi, LDC, Perkin-Elmer, Shimadzu, Spectra-Physics, Thermo, Varian	•	•	•	•	•	•	•	•	•	•
<b>Cap and Septum</b>										
PE Septumless Caps	<a href="#">186004169</a>	<a href="#">186004169</a>	<a href="#">186004169</a>	<a href="#">186004169</a>	<a href="#">186004169</a>	<a href="#">186004169</a>	<a href="#">186004169</a>	<a href="#">186004169</a>	–	–
Black Cap	–	–	–	–	–	–	–	–	<a href="#">WAT058875</a>	<a href="#">186004717</a>
Cap and Septum, Silicone/ PTFE, Assembled	–	–	–	–	–	–	–	–	–	<a href="#">WAT094174</a>
Septum Only, PTFE/ Silicone, Pre-slit	–	–	–	–	–	–	–	–	–	<a href="#">WAT058876</a>
Septum Only, Silicone/PTFE	–	–	–	–	–	–	–	–	<a href="#">WAT058874</a>	<a href="#">WAT210685</a>
Septum Only, PTFE	–	–	–	–	–	–	–	–	–	<a href="#">WAT058886</a>
<b>Screw Cap and Septum-Silicone/PTFE</b>										
Blue LectraBond	<a href="#">186000274</a>	<a href="#">186000274</a>	<a href="#">186000274</a>	<a href="#">186000274</a>	<a href="#">186000274</a>	<a href="#">186000274</a>	<a href="#">186000274</a>	<a href="#">186000274</a>	–	–
Red LectraBond	<a href="#">186002129</a>	<a href="#">186002129</a>	<a href="#">186002129</a>	<a href="#">186002129</a>	<a href="#">186002129</a>	<a href="#">186002129</a>	<a href="#">186002129</a>	<a href="#">186002129</a>	–	–
Green LectraBond	<a href="#">186002130</a>	<a href="#">186002130</a>	<a href="#">186002130</a>	<a href="#">186002130</a>	<a href="#">186002130</a>	<a href="#">186002130</a>	<a href="#">186002130</a>	<a href="#">186002130</a>	–	–
<b>Screw Cap and Pre-slit Septum-Silicone/PTFE</b>										
Blue LectraBond	<a href="#">186000305</a>	<a href="#">186000305</a>	<a href="#">186000305</a>	<a href="#">186000305</a>	<a href="#">186000305</a>	<a href="#">186000305</a>	<a href="#">186000305</a>	<a href="#">186000305</a>	–	–
Red LectraBond	<a href="#">186002128</a>	<a href="#">186002128</a>	<a href="#">186002128</a>	<a href="#">186002128</a>	<a href="#">186002128</a>	<a href="#">186002128</a>	<a href="#">186002128</a>	<a href="#">186002128</a>	–	–
Green LectraBond	<a href="#">186002127</a>	<a href="#">186002127</a>	<a href="#">186002127</a>	<a href="#">186002127</a>	<a href="#">186002127</a>	<a href="#">186002127</a>	<a href="#">186002127</a>	<a href="#">186002127</a>	–	–
<b>Storage Cap</b>										
Black Solid Cap 9 mm with Silicone/PTFE Liner	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	<a href="#">186007187</a>	–	–

All items come in quantities of 100 unless otherwise noted.










**APPLICATION AREA:** Pharmacokinetics, Drug Metabolism, Proteomics

"The best vials I have used. It not only provides reproducible results, but also it is easy to use. It's the best choice for your sample, especially for the precious samples."

**REVIEWER:** Zhihong Peng

**ORGANIZATION:** University of Notre Dame

## Vials for Compatible Systems

	4 mL Screw Neck	Amber Screw Neck	Total Recovery	PP Screw Neck Vial	PP Snap Cap	Glass Shell Vial	Amber Glass Shell Vial
15 × 45 mm							
<b>Vial Number</b>	68	69	70	71	72	73	74
<b>Compatible Systems</b>							
Bruker, Kontron, Perkin-Elmer, Shimadzu, Tosoh, Unicam	•	•	•	•	•	•	•
<b>Combination Packs</b>							
Vial, Cap, and LectraBond PTFE/Silicone Septum	<a href="#">186000838C</a>	<a href="#">186001133C</a>	<a href="#">186002629C</a>	—	—	—	—
Combination Deactivated	<a href="#">186000838DV</a>	<a href="#">186001133DV</a>	—	—	—	—	—
Vial, Cap, and LectraBond Pre-slit PTFE/Silicone Septum	<a href="#">186000839C</a>	<a href="#">186001134C</a>	<a href="#">186002630C</a>	—	—	—	—
Combination Deactivated	<a href="#">186000839DV</a>	<a href="#">186001134DV</a>	—	—	—	—	—
Vial and PE Snap Cap	—	—	—	—	186004031	<a href="#">WAT025051</a>	<a href="#">WAT025050</a>
<b>Components</b>							
Vials Only	<a href="#">186000840</a>	<a href="#">186001135</a>	<a href="#">186002520</a>	<a href="#">186000999</a> <sup>1</sup>	—	—	—
Deactivated Vials Only	<a href="#">186000840DV</a>	<a href="#">186001135DV</a>	—	—	—	—	—
<b>LectraBond Cap and Septum</b>							
Black Cap PTFE/Silicone, 100/pk	<a href="#">186000841</a>	<a href="#">186000841</a>	<a href="#">186000841</a>	—	—	—	—
Screw Cap with Bonded PTFE/Silicone Septum, 1000/pk	—	—	—	<a href="#">186000965</a>	—	—	—
Black Cap Pre-slit PTFE/Silicone, 100/pk	<a href="#">186000842</a>	<a href="#">186000842</a>	<a href="#">186000842</a>	—	—	—	—
<b>Caps, Septa, and Inserts</b>							
Black Phenol Cap, 144/pk	<a href="#">WAT072711</a>	<a href="#">WAT072711</a>	<a href="#">WAT072711</a>	—	—	—	—
PTFE Septum, 1440/pk	<a href="#">WAT073005</a>	<a href="#">WAT073005</a>	<a href="#">WAT073005</a>	—	—	—	—
PTFE Septum, 144/pk	<a href="#">WAT072714</a>	<a href="#">WAT072714</a>	<a href="#">WAT072714</a>	—	—	—	—
Self Sealing Septum, 144/pk	<a href="#">WAT022861</a>	<a href="#">WAT022861</a>	<a href="#">WAT022861</a>	—	—	—	—
250 µL Glass Insert	<a href="#">WAT072704</a>	<a href="#">WAT072704</a>	<a href="#">WAT072704</a>	—	—	—	—
250 µL Glass Insert Deactivated	<a href="#">WAT072704DV</a>	<a href="#">WAT072704DV</a>	<a href="#">WAT072704DV</a>	—	—	—	—
250 µL Glass Insert, 144/pk	<a href="#">WAT015199</a>	<a href="#">WAT015199</a>	<a href="#">WAT015199</a>	—	—	—	—
250 µL Glass Insert, Deactivated, 144/pk	<a href="#">WAT015199DV</a>	<a href="#">WAT015199DV</a>	<a href="#">WAT015199DV</a>	—	—	—	—
250 µL Plastic Conical Insert (PMP), 144/pk	<a href="#">WAT072030</a>	<a href="#">WAT072030</a>	<a href="#">WAT072030</a>	—	—	—	—
Springs for LVI, 100/pk	<a href="#">WAT072708</a>	<a href="#">WAT072708</a>	<a href="#">WAT072708</a>	—	—	—	—
<b>Storage Cap</b>							
Black Solid Cap with Silicone/PTFE Liner for Sample Storage, 100/pk	<a href="#">186007224</a>	<a href="#">186007224</a>	<a href="#">186007224</a>	—	—	—	—

<sup>1</sup>Item contains 1000 vials.

### Beware of Poor Quality Look-Alike Vials

- Only Waters Alliance Total Recovery Vials and Maximum Recovery Vials utilize a proprietary manufacturing process, ensuring that the slope of the internal taper will deliver all of the sample to the bottom of the vial
- The bottom thickness is held to a close tolerance, eliminating needle damage caused by bottoming out

## Vials Descriptions

### Vials for ACQUITY UPLC Systems

Vial Number	Screw Cap 12 × 32 mm Vials for ACQUITY UPLC Systems
1	Clear 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
2	Amber 12 × 32, Type 1, 51-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
3	Clear Maximum Recovery, 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
4	Amber Maximum Recovery, 12 × 32, Type 1, 51-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
5	Polypropylene 12 × 32, 300 µL, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap). Reformulate clean PP vial.
6	Polypropylene 12 × 32, 750 µL, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap). Reformulate clean PP vial.
7	Clear 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design, (6 mm opening, 9 mm septumless cap).
8	Total Recovery, 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).

### Vials for Alliance Systems

Number	Most Commonly Used Vials for Alliance Systems
9	Clear, 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
10	Amber, 12 × 32, Type 1, 51-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
11	Clear Maximum Recovery, 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
12	Polypropylene, 12 × 32, 300 µL, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap). Reformulate clean PP vial.
13	Clear, 12 × 32, Type 1, 33-Expansion Glass, Screw Neck (7 mm opening, 10 mm cap).
14	Clear Total Recovery, 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
15	Amber Maximum Recovery, 12 × 32, Type 1, 51-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
16	Clear, 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm septumless cap).

Number	Screw Cap 12 × 32 mm Vials for Alliance Systems
17	Clear, 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
18	Amber, 12 × 32, Type 1, 51-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
19	Clear Maximum Recovery, 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
20	Polypropylene, 12 × 32, 300 µL, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap). Reformulate clean PP vial.
21	Polypropylene, 12 × 32, 750 µL, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap). Reformulate clean PP vial.
22	Clear, 12 × 32, Type 1, 33-Expansion Glass, Screw Neck (7 mm opening, 10 mm cap).
23	Clear Total Recovery, 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
24	Amber Maximum Recovery, 12 × 32, Type 1, 51-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).

Number	Snap Cap 12 × 32 mm Vials for Alliance Systems
25	Clear, 12 × 32, Type 1, 33-Expansion Glass, Snap Cap (6 mm opening, 9 mm cap).
26	Amber, 12 × 32, Type 1, 51-Expansion Glass, Snap Cap (6 mm opening, 9 mm cap).
27	Clear Maximum Recovery, 12 × 32, Type 1, 33-Expansion Glass, Snap Cap (6 mm opening, 9 mm cap).
28	Polypropylene, 12 × 32, 300 µL, Snap Cap (6 mm opening, 9 mm cap). Reformulate clean PP vial.
29	Polypropylene, 12 × 32, 750 µL, Snap Cap (6 mm opening, 9 mm cap). Reformulate clean PP vial.
30	Clear, 12 × 32, Type 1, 33-Expansion Glass, Crimp Top (6 mm opening, 12 mm cap).
31	Amber, 12 × 32, Type 1, 51-Expansion Glass, Crimp Top (6 mm opening, 12 mm cap).
32	Clear Total Recovery, 12 × 32, Type 1, 33-Expansion Glass, Snap Cap (6 mm opening, 9 mm cap).



Number	15 × 45 mm Vials for Waters 717 Autosampler
33	Clear, 15 × 45, Type 1, 33-Expansion Glass, Screw Neck.
34	Amber, 15 × 45, Type 1, 51-Expansion Glass, Screw Neck.
35	Clear Glass Total Recovery, 15 × 45, Type 1, 33-Expansion Glass Screw Neck.
36	Polypropylene, 15 × 45, 3 mL Round Bottom, Screw Neck.
37	Polypropylene Snap Cap with Conical Bottom, PE Snap Caps.
38	4 mL Glass Shell, Type 1, 51-Expansion Glass with Polyethylene Snap Cap.
39	4 mL Amber Shell, Type 1, 51-Expansion Glass with Polyethylene Snap Cap.

Number	8 × 40 mm Vials for Waters 717 Autosampler
40	1 mL Clear Glass Shell, (8 × 40 mm), Type 1, 51-Expansion Glass with Polyethylene Snap Cap.
41	1 mL Amber Glass Shell, (8 × 40 mm), Type 1, 51-Expansion Glass with Polyethylene Snap Cap.
42	Clear Glass Total Recovery, (8 × 40 mm), Type 1, 51-Expansion Glass with Polyethylene Snap Cap.
43	650 µL Polypropylene (8 × 40 mm), with Polyethylene Snap Cap.

### Vials for Compatible Systems

Number	Vials for Waters 2707 Autosampler
44	Clear, 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
45	Amber, 12 × 32, Type 1, 51-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
46	Maximum Recovery, 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
47	Amber Maximum Recovery, 12 × 32, Type 1, 51-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
48	Polypropylene, 12 × 32, 300 µL, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap). Reformulate clean PP vial.
49	Clear, 22 × 45 mm, Type I, 33-Expansion Glass with Screw Neck.

Number	Screw Cap 12 × 32 mm Vials for Compatible Systems
50	Clear, 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
51	Amber, 12 × 32, Type 1, 51-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
52	Amber Maximum Recovery, 12 × 32, Type 1, 51-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
53	Clear Maximum Recovery, 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
54	Qsert Clear Screw Cap Glass, Quick Thread Design with Fused in Glass Insert (6 mm opening, 9 mm cap).
55	Qsert Amber Screw Cap Glass, Quick Thread Design with Fused in Glass Insert (6 mm opening, 9 mm cap).
56	Polypropylene, 12 × 32, 300 µL, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap). Reformulate clean PP vial.
57	Polypropylene, 12 × 32, 750 µL, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap). Reformulate clean PP vial.
58	Clear, 12 × 32, Type 1, 33-Expansion Glass, Screw Neck (6 mm opening, 10 mm cap).
59	Polypropylene, 12 × 32, 250 µL, Screw Neck (6 mm opening, 8 mm cap).

Number	Snap and Crimp Cap 12 × 32 mm (9 mm Cap) Vials for Compatible Systems
60	Clear, 12 × 32, Type 1, 33-Expansion Glass, Snap Cap (6 mm opening, 9 mm cap).
61	Amber, 12 × 32, Type 1, 51-Expansion Glass, Snap Cap (6 mm opening, 9 mm cap).
62	Maximum Recovery, 12 × 32, Type 1, 33-Expansion Glass, Snap Cap (6 mm opening, 9 mm cap).
63	Qsert Clear Snap Cap Glass with Fused in Glass Insert (6 mm opening, 9 mm cap).
64	Polypropylene, 12 × 32, 300 µL with Snap Cap (6 mm opening, 9 mm cap). Reformulate clean PP vial.
65	Polypropylene, 12 × 32, 750 µL with Snap Cap (6 mm opening, 9 mm cap). Reformulate clean PP vial.
66	Clear, 12 × 32, Type 1, 33-Expansion Glass with Crimp Top (6 mm opening, 12 mm cap).
67	Amber, 12 × 32, Type 1, 51-Expansion Glass with Crimp Top (6 mm opening, 12 mm cap).

15 × 45 mm Vials for Compatible Systems	
68	Clear, 15 × 45, Type 1, 33-Expansion Glass with Screw Neck.
69	Amber, 15 × 45, Type 1, 51-Expansion Glass with Screw Neck.
70	Clear Glass Total Recovery, 15 × 45, Type 1, 33-Expansion Glass with Screw Neck.
71	Polypropylene, 15 × 45, 3 mL Screw Neck.
72	Polypropylene Snap Cap with Conical Bottom, PE Snap Caps.
73	4 mL Glass Shell, Type 1, 51-Expansion Glass with Polyethylene Snap Cap.
74	4 mL Amber Shell, Type 1, 51-Expansion Glass with Polyethylene Snap Cap.
15 × 45 mm Vials for Compatible Systems: GPC 2000 Vials	
75	4 mL Glass Screw Neck, Type 1, 33-Expansion Glass.
76	10 mL Screw Neck Glass.

## Vials Troubleshooting Guide

Problem	Impact	Solution
Septum dislodged during shipment or use	<ul style="list-style-type: none"> <li>Need to insert septum or rerun analysis</li> <li>Loss of time</li> </ul>	<ul style="list-style-type: none"> <li>Check to see if needle is piercing in center of septa</li> <li>Check to see if needle is sharp</li> </ul>
Vacuum forms in vial during sample draw	<ul style="list-style-type: none"> <li>Sample spill over</li> <li>Sample draw reproducibility problems</li> </ul>	<ul style="list-style-type: none"> <li>Use pre-slit septa, which provides proper venting, eliminating sample spill over and insuring reproducible sample draw volumes*</li> </ul>
Sample-limited applications require the use of cumbersome low-volume inserts	<ul style="list-style-type: none"> <li>Increased labor required for inserting the LVI into the vial leads to delays in sample processing</li> <li>Increased labor time and difficulty when <a href="#">pipetting</a> into small neck opening of LVI</li> <li>Additional handling increases chance of contamination</li> <li>Increased costs from purchasing multiple components: vial, cap, and LVI</li> </ul>	<ul style="list-style-type: none"> <li>Use Waters Total Recovery Vial and Maximum Recovery Vial: <ul style="list-style-type: none"> <li>No need to use LVIs</li> <li>Wide neck opening for easy sample <a href="#">pipetting</a></li> <li>One less handling step reduces chance of contamination</li> <li>Only need one component, saving storage space and costs</li> </ul> </li> </ul>
Need to perform multiple injections with minimum residual volume in each vial requires LVI to obtain minimum residual volume, but maximum capacity is only 300 µL	<ul style="list-style-type: none"> <li>Increased labor to fill additional sample vials</li> <li>Increased cost to purchase additional sample vials and LVIs</li> </ul>	<ul style="list-style-type: none"> <li>Use Waters Total Recovery Vial and Maximum Recovery Vial</li> <li>The increased capacity and low residual volume allows you to perform multiple injections with minimum residual volume in a single vial</li> </ul>
Need to use glass inserts in a 96-well plate format but it requires capping each insert one at a time.	<ul style="list-style-type: none"> <li>Delay in sample processing</li> </ul>	<ul style="list-style-type: none"> <li>The glass inserts in the Waters 96-well format allows for the use of a sealing cap mat, saving time and labor</li> </ul>
Frequent needle damage	<ul style="list-style-type: none"> <li>Downtime causing missed deadlines</li> <li>Cost of repairs</li> </ul>	<ul style="list-style-type: none"> <li>All Waters vials have dimensional specifications that eliminate the potential of needle damage</li> </ul>
Laboratory owns HPLC instruments from several different manufacturers	<ul style="list-style-type: none"> <li>Purchasing several different vials</li> <li>Increased number of purchase orders</li> <li>Unable to take advantage of quantity discounts, leading to higher costs</li> </ul>	<ul style="list-style-type: none"> <li>The tight dimensional tolerances on all Waters vials and accessories make them ideal for use with virtually all HPLC systems</li> <li>Reduce the number of purchase orders and take advantage of quantity discounts by buying all your sample vials from Waters</li> </ul>
Analyte compounds are sticking to the glass surface of the vial	<ul style="list-style-type: none"> <li>Loss of sample</li> <li>Loss of time</li> <li>Need to run the analysis again</li> </ul>	<ul style="list-style-type: none"> <li>Deactivated glass vials and inserts: Waters uses a gas phase deactivation process that renders the glass surface inert. Unlike other deactivated vials, the surface modification is permanent, resulting in an indefinite shelf life</li> </ul>
Inconsistent quality between laboratory sites	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Waters vials are distributed worldwide from the same source</li> </ul>

\*Adjust sample draw rate to a slower speed (refer to your sample manager's operator guide on how to adjust draw rate).

## Certified Containers

Certified Containers are designed to provide every chromatography and mass spectrometry scientist with mobile phase containers free from extraneous peaks and background noise that may result from high total organic carbon (TOC). This added attention to detail results in the cleanest and highest quality mobile phase reservoirs, which can be extremely critical when high sensitivity is required. Each Certified Container is constructed of Type 1, Class A borosilicate glass processed to contain <15 ppb TOC, making them ultra clean for high sensitivity chromatography or mass spectrometry analysis. To maintain this level of cleanliness after manufacture, each Certified Container is individually sealed in a Mylar bag to prevent particulate and phthalate contamination. Each container is supplied with a Certificate of Analysis that documents TOC level.



### Ordering Information

#### Certified Containers

Description	Contents	P/N
Certified Container Kit	Kit contains: (4) 1 L certified containers, (3) 500 mL certified containers, (1) certified container cap kit	<a href="#">186007088</a>
Certified Container, 1000 mL	1 certified container	<a href="#">186007089</a>
Certified Container, 500 mL	1 certified container	<a href="#">186007090</a>
Certified Container Cap Kit	Certified container cap kit contains 7 solid caps and 7 open caps with liners and plugs	<a href="#">205000642</a>
Certified Container Low Volume Kit	Kit contains: (5) 250 mL certified containers, (1) 500 mL certified container, (1) certified container cap kit	<a href="#">186007278</a>

#### Related Parts to Certified Containers

Description	P/N
Solvent Bottle Caps, 4 L, 4/pk - fits all certified containers	<a href="#">WAT062341</a>
ACQUITY/Alliance Bottle Accessory Kit	<a href="#">205000589</a>
Solvent Bottle Filter, 1/pk	<a href="#">700003615</a>
Solvent Bottle Filter, 7/pk	<a href="#">700003616</a>



#### APPLICATION AREA: Analyze Mycotoxins in Animal Feed

"TruView vials provide the quality product needed for our process. Amber glass protects our solution from degradation and the slated glass is critical in avoiding compound plating out on the glass. The slit top caps reduce pressure on the injection needle and we feel it maintains even atmospheric pressure in the vial resulting in consistent needle draws. The vials are easy to manipulate and cap. Waters provides superb support and sales follow up and the price has stayed quite stable for a while now."

**REVIEWER:** Steven Mobley

**ORGANIZATION:** Alltech

 For additional information, please go to [waters.com/certifiedcontainers](https://www.waters.com/certifiedcontainers)

# How to Choose a Column

# Contents

<b>Particle Technology</b> .....	<b><a href="#">85</a></b>
Ethylene Bridged Hybrid (BEH) Particle Technology.....	<a href="#">85</a>
Charged Surface Hybrid (CSH) Particle Technology.....	<a href="#">86</a>
High Strength Silica (HSS) Particle Technology.....	<a href="#">86</a>
Solid-Core Particle Technology.....	<a href="#">86</a>
Reversed Phase and HILIC Chemistries.....	<a href="#">86</a>
<b>Column Selection</b> .....	<b><a href="#">87</a></b>
USP "L" Column Listing.....	<a href="#">87</a>
<b>Column Configurations for Any LC System</b> .....	<b><a href="#">91</a></b>
Column Nomenclature.....	<a href="#">91</a>
Column Configuration.....	<a href="#">91</a>
L/dp Comparison Chart for LC Columns.....	<a href="#">92</a>

# How to Choose a Column

Separation scientists continue to search for innovative solutions to improve chromatographic performance. With a wide array of column choices and formats, they have the ability to select the ideal column for their application. The following section introduces Waters' particle technologies and column formats to help you choose the best column to deliver throughput, resolution, and efficiency for your next chromatographic challenge.

## Particle Technology

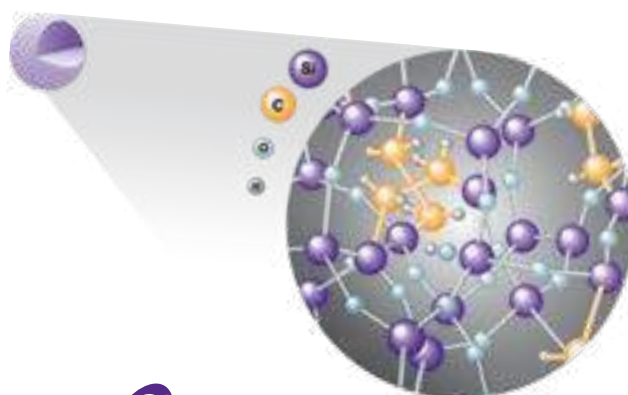
Reproducibility and transferability are the cornerstones of Waters' BEH, CSH,<sup>™</sup> HSS, and solid-core particle technologies. Our extensive portfolio of scalable LC columns exhibit all of the chemical and physical characteristics you would expect from modern LC packing materials.



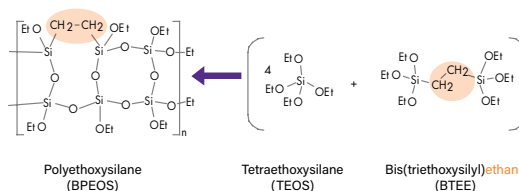
BEH Technology*	CSH Technology	HSS Technology	Solid-Core Technology
<ul style="list-style-type: none"> <li>High retentivity for basic compounds</li> <li>Exceptional peak shape at elevated pH</li> <li>Good universal column choice for a wide variety of compounds</li> <li>Stable across a wide pH range</li> <li>For separations at high temperatures (80 °C)</li> </ul>	<ul style="list-style-type: none"> <li>Good separations for basic compounds under low pH conditions</li> <li>Excellent MS performance with formic acid as a mobile phase modifier</li> <li>Fast pH switching and column equilibration</li> </ul>	<ul style="list-style-type: none"> <li>High retentivity for polar organic compounds and metabolites</li> <li>Balanced retention of polar and hydrophobic analytes</li> <li>High strength silica for mechanical stability</li> </ul>	<ul style="list-style-type: none"> <li>Maximum efficiency</li> <li>Increased sensitivity</li> <li>Seamless scalability from UPLC to UHPLC to HPLC</li> </ul>

### ETHYLENE BRIDGED HYBRID (BEH) PARTICLE TECHNOLOGY

Ethylene Bridged Hybrid (BEH) columns lead the industry for chromatographic versatility, chemical resistance, and mechanical stability. You can use them at extremes of pH and temperature to enhance retention and specificity for complex mixtures of acidic, basic, and neutral analytes. The BEH-particle family includes general-purpose and application-specific bonded phases that serve application areas.



#### Particle Synthesis



\*US Patents 6,686,035; 7,223,473; 7,250,214.

Refer to "Ethylene-Bridged (BEH Technology<sup>™</sup>) Hybrids and Their Use in Liquid Chromatography" whitepaper (p/n: [720001159EN](https://www.waters.com/720001159EN)) for further detail.

## CHARGED SURFACE HYBRID (CSH) PARTICLE TECHNOLOGY

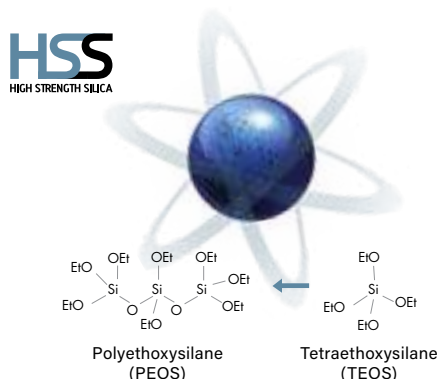
Columns packed with charged surface hybrid (CSH) particles manifest the best attributes of BEH particles. CSH stationary phases provide chromatographic selectivity and superior performance in the presence of mobile phases of low ionic strength. The optimized surface charge, pore properties, and bonded phases make charged-surface, hybrid-based columns ideal for rapid method development.

The Charged-Surface Hybrid Particle



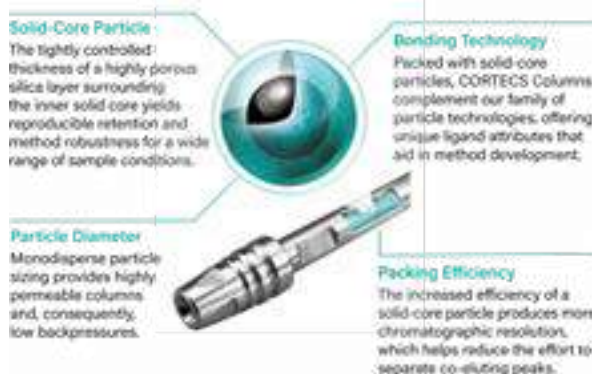
## HIGH STRENGTH SILICA (HSS) PARTICLE TECHNOLOGY

High strength silica (HSS) technology was developed specifically to complement the chromatographic performance of BEH and CSH particles. Compared with the ethylene-bridged BEH and CSH particles, the HSS particle's higher silanophilicity (100% silica) offers chromatographers significant advantages, including increased retention of polar compounds and significantly different selectivity. Additionally, as its name implies, the HSS particle possesses the mechanical strength to operate at pressures as high as 18,000 psi (1240 bar).



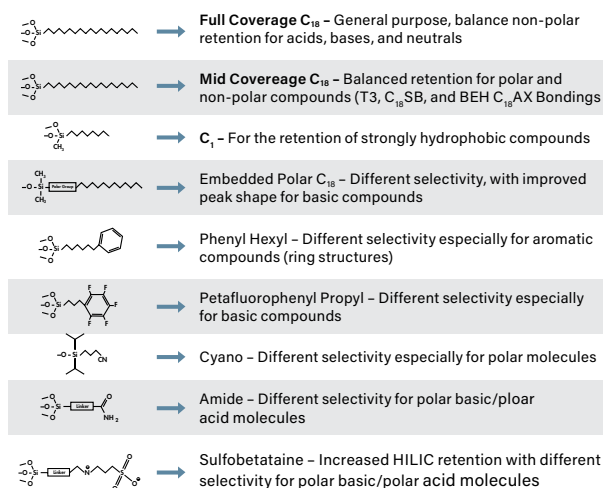
## SOLID-CORE PARTICLE TECHNOLOGY

Compared to columns packed with fully porous particles, columns packed with solid-core particles demonstrate higher chromatographic efficiency and lower backpressures. The optimized porous layer that surrounds the solid-silica core gives rise to the key benefits of speed and efficiency. UPLC columns packed with CORTECS™ 1.6 μm particles yield maximum efficiency when used with the ultra-low dispersion ACQUITY UPLC instrument platform. CORTECS Columns packed with 2.7 μm particles offer maximum flexibility, providing increased efficiencies at the backpressure limits of UHPLC and HPLC operation.



## REVERSED PHASE AND HILIC CHEMISTRIES

To maximize selectivity, which is critical for analytical methods development, Waters offers a wide range of chemistries to help you separate the most challenging of compounds. For both reversed-phase and HILIC applicators, Waters has the chemistry you need to get the job done. Rugged and robust ligands that ensure long column lifetimes and reproducible separations over the lifetime of your method. Highlighted are some of Waters chemistries used for reversed-phase and HILIC separations.



## Column Selection

Our quality mission is to ensure that the Waters' Columns you use today are the most reproducible and reliable LC columns available. As a primary manufacturer of silica and hybrid particles, scientists can be assured of consistent column performance, batch-to-batch reproducibility, and product availability over the life of the analytical method.

The following table lists all Waters Column Brands that are registered according to classifications prescribed in the United States Pharmacopeia (USP).

### USP "L" COLUMN LISTING

L1 Octadecyl silane chemically bonded to porous or non-porous silica or ceramic micro-particles, 1.5 to 10 µm in diameter, or monolithic rod			
Brand	Particle Size	Type	Page
AccQTag Ultra RP C <sub>18</sub>	1.7 µm	Spherical	<a href="#">347</a>
ACQUITY UPLC BEH C <sub>18</sub>	1.7 µm	Spherical	<a href="#">118</a> , <a href="#">373</a>
ACQUITY UPLC BEH Shield RP18	1.7 µm	Spherical	<a href="#">118</a>
ACQUITY UPLC CSH C <sub>18</sub>	1.7 µm	Spherical	<a href="#">114</a>
ACQUITY UPLC HSS C <sub>18</sub>	1.7 µm	Spherical	<a href="#">121</a>
ACQUITY UPLC HSS C <sub>18</sub> SB	1.7 µm	Spherical	<a href="#">121</a>
ACQUITY UPLC HSS T3	1.7 µm	Spherical	<a href="#">122</a>
ACQUITY UPLC Oligonucleotide C <sub>18</sub>	1.7 µm	Spherical	<a href="#">377</a>
ACQUITY UPLC Peptide BEH C <sub>18</sub>	1.7 µm	Spherical	<a href="#">377</a>
ACQUITY Premier BEH C <sub>18</sub>	1.7 µm	Spherical	<a href="#">99</a>
ACQUITY Premier HSS T3	187 µm	Spherical	<a href="#">99</a>
ACQUITY Premier Peptide BEH C <sub>18</sub>	1.7 µm	Spherical	<a href="#">100</a>
ACQUITY Premier Oligonucleotide C <sub>18</sub>	1.7 µm	Spherical	<a href="#">100</a>
ACQUITY Premier Shield RP18	1.7 µm	Spherical	<a href="#">99</a>
ACQUITY Premier CSH C <sub>18</sub>	1.7 µm	Spherical	<a href="#">99</a>
XBridge Premier C <sub>18</sub>	2.5 µm	Spherical	<a href="#">101</a>
XBridge Premier Shield RP18	2.5 µm	Spherical	<a href="#">101</a>
XBridge Premier Peptide 130 Å	2.5 µm	Spherical	<a href="#">377</a>
XBridge Premier Peptide 300 Å	2.5 µm	Spherical	<a href="#">377</a>
XBridge Premier Oligonucleotide C <sub>18</sub>	2.5 µm	Spherical	<a href="#">377</a>
XSelect Premier CSH C <sub>18</sub>	2.5 µm	Spherical	<a href="#">101</a>
XSelect Premier HSS T3	2.5 µm	Spherical	<a href="#">102</a>
Atlantis dC <sub>18</sub>	3, 5, 10 µm	Spherical	<a href="#">209</a>
Atlantis T3	3, 5, 10 µm	Spherical	<a href="#">208</a>
CORTECS C <sub>18</sub>	2.7 µm	Spherical	<a href="#">241</a>
CORTECS C <sub>18</sub> +	2.7 µm	Spherical	<a href="#">241</a>
CORTECS Shield RP18	2.7 µm	Spherical	<a href="#">241</a>
CORTECS T3	2.7 µm	Spherical	<a href="#">241</a>
CORTECS UPLC C <sub>18</sub>	1.6 µm	Spherical	<a href="#">110</a>

L1 Octadecyl silane chemically bonded to porous or non-porous silica or ceramic micro-particles, 1.5 to 10 µm in diameter, or a monolithic rod			
Brand	Particle Size	Type	Page
CORTECS UPLC C <sub>18</sub> +	1.6 µm	Spherical	<a href="#">110</a>
CORTECS UPLC Shield RP18	1.6 µm	Spherical	<a href="#">111</a>
CORTECS UPLC T3	1.6 µm	Spherical	<a href="#">111</a>
Delta-Pak C <sub>18</sub>	5 µm	Spherical	<a href="#">301</a>
µBondapak C <sub>18</sub>	10 µm	Irregular	<a href="#">300</a>
µBondapak C <sub>18</sub> Radial-Pak	10 µm	Irregular	<a href="#">307</a>
Nova-Pak C <sub>18</sub>	4, 6 µm	Spherical	<a href="#">299</a>
Prep Nova-Pak HR C <sub>18</sub>	6 µm	Spherical	<a href="#">308</a>
Radial-Pak C <sub>18</sub>	Spherical	Spherical	<a href="#">307</a>
Resolve C <sub>18</sub>	5, 10 µm	Spherical	<a href="#">244</a> , <a href="#">307</a>
Spherisorb ODS1	3, 5, 10 µm	Spherical	<a href="#">295</a>
Spherisorb ODS2	3, 5, 10 µm	Spherical	<a href="#">295</a>
Spherisorb ODS-B	5 µm	Spherical	<a href="#">228</a>
SunFire C <sub>18</sub>	2.5, 3.5, 5, 10 µm	Spherical	<a href="#">172</a> , <a href="#">277</a>
Symmetry C <sub>18</sub>	3.5, 5 µm	Spherical	<a href="#">291</a>
SymmetryPrep C <sub>18</sub>	5, 7 µm	Spherical	<a href="#">217</a> , <a href="#">292</a>
Symmetry 300 C <sub>18</sub>	3.5, 5 µm	Spherical	<a href="#">293</a>
SymmetryShield RP18	3.5, 5 µm	Spherical	<a href="#">292</a> , <a href="#">293</a>
XBridge C <sub>18</sub>	2.5, 3.5, 5, 10 µm	Spherical	<a href="#">255</a>
XBridge Peptide BEH, 130 Å	3.5, 5, 10 µm	Spherical	<a href="#">260</a>
XBridge Peptide BEH, 300 Å	3.5, 5, 10 µm	Spherical	<a href="#">261</a>
XBridge BEH C <sub>18</sub>	2.5, 3.5, 5, 10 µm	Spherical	<a href="#">254</a>
XBridge Oligonucleotide C <sub>18</sub>	2.5 µm	Spherical	<a href="#">262</a>
XBridge Shield RP18	2.5, 3.5, 5, 10 µm	Spherical	<a href="#">256</a>
XSelect CSH C <sub>18</sub>	2.5, 3.5, 5 µm	Spherical	<a href="#">267</a>
XSelect HSS C <sub>18</sub>	2.5, 3.5, 5 µm	Spherical	<a href="#">270</a>
XSelect HSS C <sub>18</sub> SB	2.5, 3.5, 5 µm	Spherical	<a href="#">270</a>
XSelect HSS T3	2.5, 3.5, 5 µm	Spherical	<a href="#">271</a>
XTerra MS C <sub>18</sub>	2.5, 3.5, 5, 10 µm	Spherical	<a href="#">286</a>
XTerra RP18	3.5, 5, 10 µm	Spherical	<a href="#">288</a> , <a href="#">289</a>

( ) - Denotes particle sizes available outside of L class.

Source: United States Pharmacopeia.



L2

Octadecyl silane chemically bonded to silica gel of a controlled surface porosity that has been bonded to a solid spherical core, 30 to 50 µm in diameter

Brand	Particle Size	Type	Page
Bondapak Prep C <sub>18</sub>	15–20 µm	Irregular	<a href="#">236</a>

L3

Porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod

Brand	Particle Size	Type	Page
ACQUITY UPLC BEH HILIC	1.7 µm	Spherical	<a href="#">118,119</a>
Atlantis HILIC Silica	3, 5 µm	Spherical	<a href="#">284</a>
CORTECS HILIC	2.7 µm	Spherical	<a href="#">134</a>
CORTECS UPLC HILIC	1.6 µm	Spherical	<a href="#">112</a>
µPorasil	10 µm	Spherical	<a href="#">237, 244</a>
Nova-Pak Silica	4, 6 µm	Spherical	<a href="#">299</a>
Prep Nova-Pak HR Silica	6 µm	Spherical	<a href="#">308</a>
Resolve Silica	5, 10 µm	Spherical	<a href="#">244, 307</a>
Spherisorb Silica	3, 5, 10 µm	Spherical	<a href="#">230, 295</a>
SunFire Silica	5, 10 µm	Spherical	<a href="#">172, 279</a>
XBridge BEH HILIC	2.5, 3.5, 5, 10 µm	Spherical	<a href="#">265</a>

L4

Silica gel controlled surface porosity bonded to a solid spherical core, 30 to 50 µm in diameter

Brand	Particle Size	Type	Page
Porasil Prep Silica	15–20 µm	Spherical	<a href="#">303</a>

L7

Octylsilane chemically bonded to totally or superficially porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod

Brand	Particle Size	Type	Page
ACQUITY UPLC BEH C <sub>8</sub>	1.7 µm	Spherical	<a href="#">118</a>
CORTECS C <sub>8</sub>	2.7 µm	Spherical	<a href="#">123</a>
CORTECS UPLC C <sub>8</sub>	1.6 µm	Spherical	<a href="#">111</a>
CORTECS Phenyl	2.7 µm	Spherical	<a href="#">112</a>
CORTECS UPLC Phenyl	1.6 µm	Spherical	<a href="#">124</a>
Nova-Pak C <sub>8</sub>	4, 6 µm	Spherical	<a href="#">299</a>
Resolve C <sub>8</sub>	10 µm	Spherical	<a href="#">307</a>
Spherisorb C <sub>8</sub>	3, 5, 10 µm	Spherical	<a href="#">229, 296</a>
SunFire C <sub>8</sub> Silica	3.5, 5, 10 µm	Spherical	<a href="#">173, 280</a>
Symmetry C <sub>8</sub>	3.5, 5, 7 µm	Spherical	<a href="#">292</a>
SymmetryPrep C <sub>8</sub>	7 µm	Spherical	<a href="#">213</a>
SymmetryShield RP8	3.5, 5 µm	Spherical	<a href="#">293</a>
XBridge BEH C <sub>8</sub>	2.5 3.5, 5, 10 µm	Spherical	<a href="#">102, 185</a>
XTerra MS C <sub>8</sub>	2.5 3.5, 5, 10 µm	Spherical	<a href="#">223, 287</a>
XTerra Shield RP8	3.5, 5, 10 µm	Spherical	<a href="#">225, 289</a>

L8

An essentially monomolecular layer of aminopropylsilane chemically bonded to totally porous silica gel support, 1.5 to 10 µm in diameter, or a monolithic silica rod

Brand	Particle Size	Type	Page
High Performance Carbohydrate Analysis	3, 5 µm	–	<a href="#">495</a>
µBondapak NH <sub>2</sub>	10 µm	Irregular	<a href="#">236</a>
Spherisorb NH <sub>2</sub>	3, 5, 10 µm	Spherical	<a href="#">229, 297</a>

L9

Irregular or spherical, totally porous silica gel having a chemically bonded, strongly acidic cation-exchange coating, 3 to 10 µm in diameter

Brand	Particle Size	Type	Page
Spherisorb SCX	5, 10 µm	Spherical	<a href="#">231, 298</a>

L10

Nitrile groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod

Brand	Particle Size	Type	Page
ACQUITY UPLC HSS CN	1.7 µm	Spherical	<a href="#">122</a>
µBondapak CN	10 µm	Irregular	<a href="#">236, 300</a>
NovaPak CN HP	4 µm	Spherical	<a href="#">299</a>
Resolve CN	10 µm	Spherical	<a href="#">307</a>
Spherisorb CN	3, 5, 10 µm	Spherical	<a href="#">230, 297</a>
Spherisorb CN RP	3, 5, 10 µm	Spherical	<a href="#">230, 298</a>
XSelect HSS CN	2.5, 3.5, 5 µm	Spherical	<a href="#">206</a>

L11

Phenyl groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod

Brand	Particle Size	Type	Page
ACQUITY UPLC BEH Phenyl	1.7 µm	Spherical	<a href="#">119</a>
ACQUITY UPLC CSH Phenyl-Hexyl	1.7 µm	Spherical	<a href="#">114</a>
ACQUITY Premier CSH Phenyl-Hexyl	1.7 µm	Spherical	<a href="#">99</a>
XSelect Premier CSH Phenyl-Hexyl	1.7 µm	Spherical	<a href="#">102</a>
CORTECS Phenyl	2.7 µm	Spherical	<a href="#">136</a>
CORTECS UPLC Phenyl	1.6 µm	Spherical	<a href="#">112</a>
µBondapak Phenyl	10 µm	Irregular	<a href="#">236</a>
NovaPak Phenyl	4 µm	Spherical	<a href="#">233</a>
Spherisorb Phenyl	3, 5, 10 µm	Spherical	<a href="#">230</a>
XBridge BEH Phenyl	2.5, 3.5, 5 µm	Spherical	<a href="#">147</a>
XSelect CSH Phenyl-Hexyl	2.5, 3.5, 5 µm	Spherical	<a href="#">158</a>
XTerra Phenyl	3.5, 5 µm	Spherical	<a href="#">177</a>

L12

A strong anion-exchange packing made by chemically bonding a quaternary amine to a solid silica spherical core, 30 to 50 µm in diameter

Brand	Particle Size	Type	Page
AccellPlus QMA	40 µm	Irregular	<a href="#">450</a>

( ) - Denotes particle sizes available outside of L class.

Source: United States Pharmacopeia.

<b>L13</b> Trimethylsilane chemically bonded to porous silica particles, 3 to 10 µm in diameter			
Brand	Particle Size	Type	Page
Spherisorb C <sub>1</sub>	3, 5, 10 µm	Spherical	<a href="#">229</a> , <a href="#">296</a>

<b>L14</b> Silica gel having a chemically bonded strongly basic quaternary ammonium anion-exchange coating, 5 to 10 µm in diameter			
Brand	Particle Size	Type	Page
Spherisorb SAX	5, 10 µm	Spherical	<a href="#">231</a> , <a href="#">298</a>

<b>L15</b> Hexylsilane chemically bonded to totally porous silica particles, 3 to 10 µm in diameter			
Brand	Particle Size	Type	Page
Spherisorb C <sub>6</sub>	3, 5, 10 µm	Spherical	<a href="#">229</a> , <a href="#">296</a>

<b>L17</b> Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 6 to 12 µm in diameter			
Brand	Particle Size	Type	Page
Fast Fruit Juice	N/A	N/A	<a href="#">497</a>
IC-Pak Cation	10 µm	Irregular	<a href="#">500</a>
IC-Pak Ion Exclusion	7 µm	Spherical	<a href="#">497</a>
Shodex RSPak DC-613	6 µm	Spherical	<a href="#">237</a>

<b>L19</b> Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the calcium form, 5 to 15 µm in diameter			
Brand	Particle Size	Type	Page
Shodex Sugar SC-1011	7 µm	Spherical	<a href="#">496</a>
Sugar-Pak 1	9 µm	Spherical	<a href="#">496</a>

<b>L20</b> Dihydroxypropane groups chemically bonded to porous silica or hybrid particles, 1.5 to 10 µm in diameter, or a monolithic silica rod			
Brand	Particle Size	Type	Page
ACQUITY BEH200SEC	1.7 µm	Spherical	<a href="#">119</a>
BioSuite 125, 250, 450 series	4, 5, 8, 10, (13), (17) µm	Spherical	<a href="#">433</a>
Insulin HMWP	-	N/A	<a href="#">429</a>
Protein-Pak 60	10 µm	Spherical	<a href="#">433</a>
Protein-Pak 125	10 µm	Spherical	<a href="#">433</a>
Protein-Pak 200SW and 300SW	10 µm	Spherical	<a href="#">433</a>
XBridge Protein BEH SEC, 125 Å	3.5 µm	Spherical	<a href="#">466</a>
XBridge Protein BEH SEC, 200 Å	3.5 µm	Spherical	<a href="#">466</a>
XBridge Protein BEH SEC, 450 Å	3.5 µm	Spherical	<a href="#">466</a>

<b>L21</b> A rigid, spherical styrene-divinylbenzene copolymer, 3 to 30 µm in diameter			
Brand	Particle Size	Type	Page
Styragel HR 0.5, 1, 2, 3 and 4	-	Spherical	<a href="#">406</a>
Styragel HR 4E	-	Spherical	<a href="#">406</a>
Styragel HR 5E	-	Spherical	<a href="#">406</a>

<b>L22</b> A cation-exchange resin made of porous polystyrene gel with sulfonic acid groups, 5 to 15 µm in diameter			
Brand	Particle Size	Type	Page
IC-Pak Ion Exclusion	7 µm	Spherical	<a href="#">500</a>
Shodex RSPak DC-613	6 µm	Spherical	<a href="#">237</a>
Shodex Sugar SP0810	8 µm	Spherical	<a href="#">496</a>

<b>L23</b> An anion-exchange resin made of porous polymethacrylate or polyacrylate gel with quaternary ammonium groups, 7 to 12 µm in size			
Brand	Particle Size	Type	Page
BioSuite DEAE	(2.5), 10, 13 µm	Spherical	<a href="#">446</a>
BioSuite Q AXC	10, 13 µm	Spherical	<a href="#">446</a>
BioSuite Q-PEEK	10 µm	Spherical	<a href="#">446</a>
IC-Pak Anion	10 µm	Spherical	<a href="#">500</a>
IC-Pak A HC	10 µm	Spherical	<a href="#">500</a>
Protein-Pak Q 8HR	8 µm	Spherical	<a href="#">447</a>

<b>L25</b> Packing having the capacity to separate compounds with a molecular weight range from 100-5000 (as determined by polyethylene oxide), applied to neutral, anionic, and cationic water-soluble polymers. A polymethacrylate resin base, cross-linked with polyhydroxylated ether (surface contained some residual carboxyl functional groups) was found suitable			
Brand	Particle Size	Type	Page
Ultrahydrogel DP, +120	10 µm	Spherical	<a href="#">473</a>

<b>L26</b> Butyl silane chemically bonded to totally porous or superficially porous silica particles, 1.5 to 10 µm in diameter			
Brand	Particle Size	Type	Page
ACQUITY UPLC BEH300 C <sub>4</sub>	1.7 µm	Spherical	<a href="#">416</a>
Delta-Pak C <sub>4</sub>	5 µm	Spherical	<a href="#">234</a>
Symmetry300 C <sub>4</sub>	3.5, 5 µm	Spherical	<a href="#">241</a> , <a href="#">242</a>
XBridge BEH300 C <sub>4</sub>	3.5, 5, 10 µm	Spherical	<a href="#">241</a>

<b>L27</b> Porous silica particles, 30 to 50 µm in diameter			
Brand	Particle Size	Type	Page
Porasil	37-55 µm	Spherical	<a href="#">303</a> , <a href="#">307</a>

<b>L33</b> Packing having the capacity to separate dextrans by molecular size over a range of 4000 to 500,000 Da. It is spherical, silica-based, and processed to provide pH stability			
Brand	Particle Size	Type	Page
ACQUITY UPLC Protein BEH SEC, 125 Å	1.7 µm	Spherical	<a href="#">427</a>

(-) - Denotes particle sizes available outside of L class.

Source: United States Pharmacopeia.

**L34**

Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the lead form, 7 to 9 µm in diameter

Brand	Particle Size	Type	Page
Shodex Sugar SP-0810	N/A	Spherical	<a href="#">496</a>

**L37**

Packing having the capacity to separate proteins by molecular size over a range of 2000 to 40,000 Da. It is a polymethacrylate gel

Brand	Particle Size	Type	Page
Ultrahydrogel 250	N/A	Spherical	<a href="#">473</a>

**L38**

A methacrylate-based size-exclusion packing for water-soluble samples

Brand	Particle Size	Type	Page
Ultrahydrogel series	N/A	Spherical	<a href="#">473</a>

**L39**

A hydrophilic polyhydroxymethacrylate gel of totally porous spherical resin

Brand	Particle Size	Type	Page
Ultrahydrogel series	N/A	Spherical	<a href="#">473</a>

**L43**

Pentafluorophenyl groups chemically bonded to silica particles by a propyl spacer, 1.5 to 10 µm in diameter

Brand	Particle Size	Type	Page
ACQUITY UPLC CSH Fluoro-Phenyl	1.7 µm	Spherical	<a href="#">114</a>
ACQUITY UPLC HSS PFP	1.8 µm	Spherical	<a href="#">122</a>
XSelect CSH Fluoro-Phenyl	2.5, 3.5, 5 µm	Spherical	<a href="#">157, 160, 161</a>
XSelect HSS PFP	2.5, 3.5, 5 µm	Spherical	<a href="#">165, 167</a>

**L52**

A strong cation exchange resin made of porous silica with sulfopropyl or sulfoethyl groups, 1 to 10 µm in diameter

Brand	Particle Size	Type	Page
IC-Pak Cation	10 µm	Irregular	<a href="#">500</a>

**L55**

A strong cation exchange resin made of porous silica coated with polybutadiene-maleic acid copolymer, about 5 µm in diameter

Brand	Particle Size	Type	Page
IC-Pak C M/D	N/A	N/A	<a href="#">500</a>

**L59**

Packing for the size-exclusion separations of proteins (separation by molecular weight) over the range of 5 to 7000 kDa. The packing is spherical 1.5 to 10 µm, silica or hybrid packing with a hydrophilic coating

Brand	Particle Size	Type	Page
ACQUITY BEH200 SEC	1.7 µm	Spherical	<a href="#">119</a>
BioSuite 125, 250, 450 series	4–17 µm	Spherical	<a href="#">433</a>
Protein-Pak 60	10 µm	Spherical	<a href="#">433, 471</a>
Protein-Pak 300SW	10 µm	Spherical	<a href="#">433, 471</a>

**L68**

Spherical, porous silica, 10 µm or less in diameter, the surface of which has been covalently modified with alkyl amide groups and not endcapped

Brand	Particle Size	Type	Page
ACQUITY UPLC Glycan BEH Amide	1.7 µm	Spherical	<a href="#">119</a>
ACQUITY UPLC BEH Amide	1.7 µm	Spherical	<a href="#">118</a>
ACQUITY Premier Glycan BEH Amide	1.7 µm	Spherical	<a href="#">369</a>
ACQUITY Premier BEH Amide	1.7 µm	Spherical	<a href="#">383</a>
XBridge Premier Glycan BEH Amide	2.5 µm	Spherical	<a href="#">338</a>
XBridge BEH Amide	2.5, 3.5, 5 µm	Spherical	<a href="#">338</a>
XBridge Premier BEH Amide	2.5 µm	Spherical	<a href="#">101</a>
XBridge BEH Amide Glycan	2.5, 3.5 µm	Spherical	<a href="#">370</a>

**L78**

A silane ligand that consists of both reversed-phase (an alkyl chain longer than C<sub>8</sub>) and anion-exchange (primary, secondary, tertiary, or quaternary amino groups) functional groups chemically bonded to porous or non-porous silica or ceramic micro-particles, 1.0 to 50 µm in diameter, or a monolithic rod.

Brand	Particle Size	Type	Page
Atlantis Premier BEH C <sub>18</sub> AX	1.7, 2.5, 5 µm	Spherical	<a href="#">104</a>

**L122**

Sulfobetaine graft-polymerized to totally or superficially porous hydrophilic polymer particles, 1.0 to 10 µm in diameter, or a monolithic rod. Packing having densely bonded zwitterionic groups with 1:1 charge balance

Brand	Particle Size	Type	Page
Atlantis Premier BEH Z-HILIC	1.7, 2.5, 5 µm	Spherical	<a href="#">104</a>

( ) - Denotes particle sizes available outside of L class.

Source: United States Pharmacopeia.

## Column Configurations for Any LC System

### COLUMN NOMENCLATURE

Our fully scalable particle technologies ensure that our LC columns perform with a broad range of chromatographic instrumentation. Depending on the goals of a separation, the instrument platform used, or the sample type, you can choose the most suitable column that is matched to your system's configuration without adversely affecting the chromatographic result.

The following table serves as a guide for selecting an appropriate LC column according to instrument classification.

Nano/Micro	UPLC	UHPLC	HPLC	Preparative
ACQUITY UPLC M-CLASS BEH (1.7 µm)	ACQUITY UPLC BEH (1.7 µm)	XBridge BEH <i>XP</i> (2.5 µm)	XBridge BEH (3.5, 5 µm)	XBridge BEH OBD™ (5, 10 µm)
ACQUITY UPLC M-CLASS CSH (1.7 µm)	ACQUITY UPLC CSH (1.7 µm)	XSelect CSH <i>XP</i> (2.5 µm)	XSelect CSH <i>XP</i> (3.5, 5 µm)	XSelect CSH OBD (5, 10 µm)
ACQUITY UPLC M-CLASS HSS (1.8 µm)	ACQUITY UPLC HSS (1.8 µm)	XSelect HSS <i>XP</i> (2.5 µm)	XSelect HSS <i>XP</i> (3.5, 5 µm)	XSelect HSS OBD (5 µm)
—	CORTECS UPLC (1.6 µm)	CORTECS (2.7 µm)	—	—

### COLUMN CONFIGURATION

System dispersion is inherent in every chromatographic system. It is the instrument's contribution to chromatographic band broadening and is dependent on the system's tubing volume, valve fittings, column fittings, and flow cell volume. System dispersion, in combination with column dispersion, makes up the total dispersion of a given separation. Therefore, it is important to understand the system's impact on chromatographic band broadening when choosing your column configuration. Systems that have high dispersion values will obtain the best column performance using columns that have larger volumes; and, systems that have low dispersion values are able to obtain excellent column performance using columns that have smaller volumes.

The following table summarizes the characteristics of Waters LC Systems and matches the column configuration that maintains chromatographic efficiency.



System	Nano/Micro	UPLC	UHPLC	HPLC	Preparative
Dispersion	1 µL	<20 µL	22–29 µL	>30 µL	—
Routine Pressure	<15,000 psi	<18,000 psi	<10,000 psi	<10,000 psi	<4000 psi
Particle Size	<2 µm	<2 µm	2–3 µm	3–5 µm	>5 µm
Column I.D.	75–300 µm	2.1 mm (1.0 mm)	3.0 mm (2.1 mm)	4.6 mm (3.0 mm)	>7.8 mm
Column Length	50–250 mm	<150 mm	50–150 mm	75–300 mm	50–300 mm

When you transfer LC methods, instrument dispersion is one of the most practical LC-instrument parameters to determine. Knowing the bandsread value helps you develop your own compatible methods, allowing you to seamlessly scale column dimensions or transfer methods between different instrumentation platforms and laboratory functions. The following table recommends column configurations based on nominal instrument bandsread values.

System	Bandsread*	Recommended Column Particle Sizes and I.D.s	System	Bandsread*	Recommended Column Particle Sizes and I.D.s
Shimadzu Prominence UFLC	41 µL	CORTECS 2.7 µm	ACQUITY UPLC	12 µL	ACQUITY UPLC BEH 1.7 µm
Alliance 2695 HPLC	29 µL	XBridge 3.5, 5 µm	ACQUITY UPLC H-Class with Column Manager	12 µL	ACQUITY UPLC CSH 1.7 µm
Agilent 1260 UHPLC (600 bar)	28 µL	XSelect 3.5, 5 µm			ACQUITY UPLC HSS 1.8 µm
		<b>3.0–4.6 mm I.D.</b>	ACQUITY UPLC H-Class	9 µL	CORTECS UPLC 1.6 µm
ACQUITY Arc	23 µL	XBridge 2.5, 3.5, 5 µm			<b>2.1 mm I.D.</b>
		XSelect 2.5, 3.5, 5 µm	ACQUITY UPLC I-Class (FTN)	7.5 µL	ACQUITY UPLC BEH 1.7 µm
		CORTECS 2.7 µm			ACQUITY UPLC CSH 1.7 µm
		<b>3.0 mm I.D.</b>	ACQUITY UPLC I-Class (FL)	5.5 µL	ACQUITY UPLC HSS 1.8 µm
Thermo Accela UHPLC	21 µL	XBridge 2.5, 3.5, 5 µm			CORTECS UPLC 1.6 µm
		XSelect 2.5, 3.5, 5 µm			<b>1.0–2.1 mm I.D.</b>
Agilent 1290 UHPLC (1200 bar)	17 µL	CORTECS 2.7 µm			
		<b>3.0 mm I.D.</b>			

\*These data are based on nominal values for unmodified systems. As such, they are intended for reference only. Any adjustment to a system's plumbing, connectivity, and configuration will change the instrument's bandsread, affecting the quality of chromatography.

### L/d<sub>p</sub> COMPARISON CHART FOR LC COLUMNS

To convert an HPLC method to a UPLC or UHPLC method with no loss in resolution, select columns that have equivalent length-to-particle-size (L/d<sub>p</sub>) ratio.

Waters uses this ratio to compare the resolving power of columns. If you keep the L/d<sub>p</sub> ratio the same for two columns, you will obtain the same resolution. Therefore, for two columns with the same L/d<sub>p</sub> ratio, the more efficient, shorter column (packed with smaller particles) will provide the same resolution in less time.

$$\text{EXAMPLE: } \frac{150 \text{ mm}}{5 \text{ }\mu\text{m}} = \frac{150,000 \text{ }\mu\text{m}}{5 \text{ }\mu\text{m}} = 30,000$$

L/d <sub>p</sub>		Column length (mm)							
		20	30	50	75	100	150	250	
Particle size (µm)	Fully porous	1.7	-	17,600	29,400	44,100	58,000	88,200	-
		2.5	8,000	12,000	20,000	30,000	40,000	60,000	-
		3.5	5,700	8,600	14,300	21,400	28,600	42,900	71,400
		5.0	4,000	6,000	10,000	15,000	20,000	30,000	50,000

# MaxPeak™ Premier Columns

MaxPeak Premier Columns

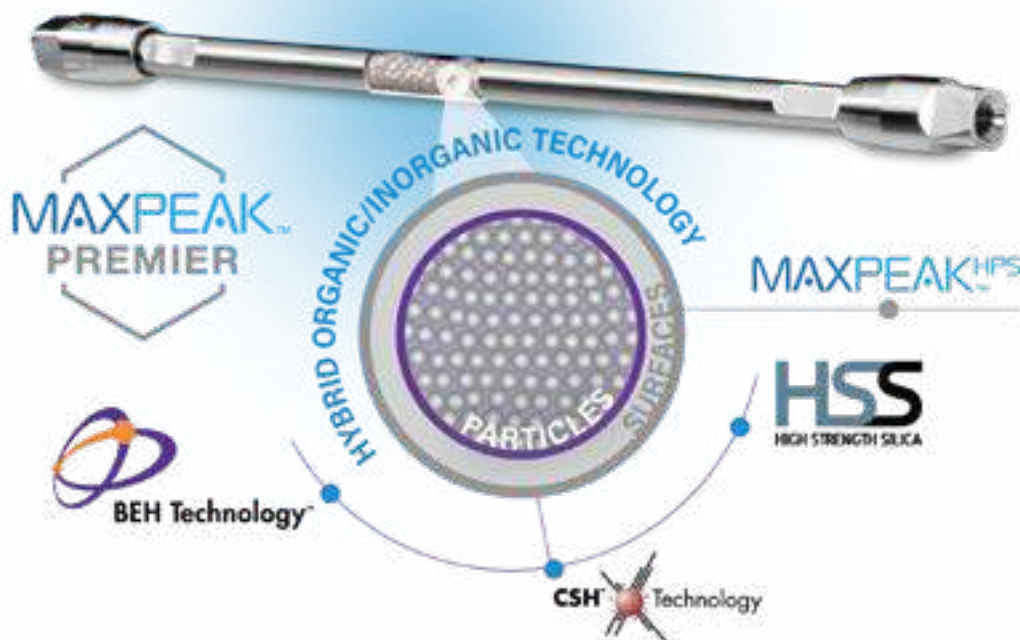
# Contents

<b>MaxPeak Premier Small Molecule Column Selection .....</b>	<b><a href="#">96</a></b>
Small Molecule Column Chemistries.....	<a href="#">96</a>
<b>Application-Specific Column Selection.....</b>	<b><a href="#">98</a></b>
Peptide Analysis .....	<a href="#">98</a>
Oligonucleotide Analysis.....	<a href="#">98</a>
Glycan Analysis.....	<a href="#">98</a>

# MaxPeak Premier Columns

Good Chromatography is as much about preventing the detrimental interactions you don't want, as it is creating the ones you do.

Waters™ MaxPeak™ Premier Columns enable scientists to have more control over their chromatographic separations by mitigating the loss of metal sensitive analytes, such as lipids, organic acids, acidic peptides, oligonucleotides, or other compounds containing phosphate or carboxylate functionalities. All MaxPeak Premier columns utilize MaxPeak™ High Performance Surfaces (HPS), new and innovative technologies designed to increase analyte recovery, sensitivity, and reproducibility by minimizing analyte/surface interactions that can lead to sample losses. MaxPeak HPS technology can also be found with Waters QuanRecovery™ plates and vial; for more information, please go to the QuanRecovery product information referenced here ([page 58](#)).



MaxPeak Premier Columns provide:

- Reduced column conditioning and passivation times
- Improved sensitivity and peak shapes
- Simpler mobile phases, without complex additives
- Time savings in method development
- Reduced risk and greater confidence in data and decision making

Available with particle technologies and quality manufacturing you can trust for small molecule, peptide, oligonucleotide, and glycan separations in both reversed-phase and HILIC separation modes.



## MaxPeak Premier Small Molecule Column Selection

Waters offers a wider range of MaxPeak Premier columns, available with different particle technologies and bonded phases to meet all of your application needs. Trusted Bridged Ethyl Hybrid, High Strength Silica, and Charged Surface Hybrid particle technologies ideal for high performance UPLC/UHPLC and HPLC separations.



### BEH Technology

- High retentivity for basic compounds
- Exceptional peak shape at elevated pH
- Good universal column choice for a wide variety of compounds
- Stable across a wide pH range
- For separations at high temperatures



### CSH Technology

- Good separations for basic compounds under low pH conditions
- Excellent MS performance with formic acid as a mobile phase modifier
- Fast pH switching and column equilibration



### HSS Technology

- High retentivity for polar organic compounds and metabolites
- Balanced retention of polar and hydrophobic analytes
- High strength silica for mechanical stability

## SMALL MOLECULE COLUMN CHEMISTRIES

There are ten chemistries to choose from, that range in utility and selectivity to maximize methods development flexibility.

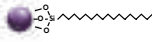
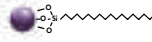
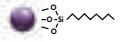
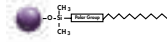
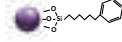

### Reversed-phase column chemistries:

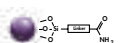
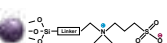
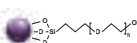
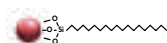
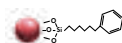
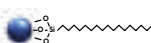
- BEH C<sub>18</sub> – General purpose phase ideally suited for methods development due to extreme pH and temperature stability
- BEH C<sub>18</sub> AX – High retention mixed mode reversed-phase/anion exchange chemistry for increased retention for acidic analytes at low pH
- BEH C<sub>8</sub> – General purpose phase ideally suited for method development due to pH and temperature stability; ideal for analyzing strongly hydrophobic compounds
- BEH Shield RP18 – alternative selectivity to alkyl C<sub>18</sub> phases particularly phenolic compounds, and improved peak shape for bases at neutral pH
- BEH Phenyl – Alternative selectivity particularly for polyaromatic compounds. Provides unique level of pH stability for a phenyl bonded phase
- CSH C<sub>18</sub> – General purpose phase that provides improved peak shape for bases at low pH, and rapid equilibration for methods development
- CSH Phenyl-Hexyl – Alternative selectivity to C<sub>18</sub> phases, particularly for aromatic compounds due to pi-pi bond interactions when using methanol
- HSS T3 – 100% aqueous mobile phase compatible, ideal for reversed phase polar analyte retention

### HILIC Column Chemistries:

- BEH Amide – pH and temperature stable amide chemistry, for the separation of a wide range of polar compounds including sugars and carbohydrates
- BEH Z-HILIC – sulfobetaine bonding that provides increased retention and alternative selectivity to other HILIC phases, excellent choice for metabolomics analysis

## Column Characteristics

	<b>C<sub>18</sub></b>	<b>C<sub>18</sub> AX</b>	<b>C<sub>8</sub></b>	<b>Shield RP18</b>	<b>Phenyl</b>	<b>C<sub>4</sub></b>
Particle/Ligand						
Ligand Density	3.1 μmol/m <sup>2</sup>	1.6 μmol/m <sup>2</sup>	3.2 μmol/m <sup>2</sup>	3.3 μmol/m <sup>2</sup>	3.0 μmol/m <sup>2</sup>	2.4 μmol/m <sup>2</sup>
Pore Diameter	130 Å, 300 Å	95 Å	130 Å	130 Å	130 Å	300 Å
Carbon Load	18%	17%	13%	17%	57%	8%
Endcapped	proprietary	proprietary	proprietary	TMS	proprietary	N/A
USP Class No.	L1	L78	L7	L1	L11	L26
pH Range	1-12	2-10	1-12	2-11	1-12	2-10
Temperature Limits	Low pH = 80 °C, High pH = 60 °C	Low pH = 60 °C, High pH = 65 °C	Low pH = 60 °C, High pH = 05 °C	Low pH = 50 °C, High pH = 45 °C	Low pH = 80 °C, High pH = 60 °C	Low pH = 80 °C, High pH = 50 °C
Surface Area	185 m <sup>2</sup> /g	270 m <sup>2</sup> /g	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g	90 m <sup>2</sup> /g

	<b>Amide</b>	<b>Z-HILIC</b>	<b>BEH-PEO</b>	<b>CSH C<sub>18</sub></b>	<b>CSH Phenyl-Hexyl</b>	<b>HSS T3</b>
Particle/Ligand						
Ligand Density	7.5 μmol/m <sup>2</sup>	3.0 μmol/m <sup>2</sup>	1.5 μmol/m <sup>2</sup>	2.3 μmol/m <sup>2</sup>	2.3 μmol/m <sup>2</sup>	1.6 μmol/m <sup>2</sup>
Pore Diameter	130 Å	95 Å	250 Å	130 Å	130 Å	100 Å
Carbon Load	12%	17%	12%	15%	14%	11%
Endcapped	N/A	N/A	N/A	proprietary	proprietary	proprietary
USP Class No.	L68	L122	L33	L1	L11	L1
pH Range	2-11	1-12	2-10	2-11	2-10	2-11
Temperature Limits	Low pH = 90 °C, High pH = 90 °C	Low pH = 60 °C, High pH = 60 °C	Low pH = 60 °C, High pH = 60 °C	Low pH = 80 °C, High pH = 45 °C	Low pH = 80 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
Surface Area	185 m <sup>2</sup> /g	270 m <sup>2</sup> /g	174 m <sup>2</sup> /g	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g	230 m <sup>2</sup> /g



Have confidence that the methods you develop today will have the same repeatable results tomorrow. Quality is at the heart of everything we do, whether it is column particles, reliable quality manufacturing, customer support, or supply chain.

## Application-Specific Column Selections

### PEPTIDE ANALYSIS

#### ACQUITY Premier BEH C<sub>18</sub> and XBridge™ Premier BEH C<sub>18</sub> Particle Technology

- Outstanding peak capacity and superior peak shape in TFA, DFA, and FA
- Two pore sizes (130 Å and 300 Å) to provide different separation selectivities for small and large peptides

#### ACQUITY Premier CSH C<sub>18</sub> and XSelect™ CSH C<sub>18</sub> Premier Particle Technology

- Accepts greater peptide mass loads for improved low-level detection of impurities
- Excellent performance with TFA for optical applications, FA for MS, and DFA for dual detection

#### ACQUITY Premier HSS T3 and XSelect HSS T3 Premier Particle Technology

- Ideal choice for the separation of small, polar peptides with greater retentivity than hybrid (BEH, CSH) particle technology columns

### PROTEIN AGGREGATE, MONOMER, AND FRAGMENT ANALYSIS

#### ACQUITY Premier Protein SEC and XBridge Premier Protein SEC 250 Å, 1.7 µm and 2.5 µm Particle Technology

- Efficiently separate protein size variants from simple to complex biotherapeutics (e.g., mAb, ADCs, bi-specifics, fusion proteins) that range from approximately 10,000 to 650,000 Daltons in a single SEC analysis for reliable component quantitation
- Minimize method development by using a single SEC buffer formulation without the need for co-solvents/additives for a variety of samples without sacrificing resolution
- Reduce the cost per analysis using MaxPeak Premier SEC 250 Å Guards that will not degrade the quality of challenging applications

### OLIGONUCLEOTIDE ANALYSIS

#### ACQUITY Premier BEH C<sub>18</sub> and XBridge Premier BEH C<sub>18</sub> Particle Technology

- Outstanding peak capacity and superior peak shape and lifetime in HFIP, HAA, and TEA
- Two pore sizes (130 Å and 300 Å) to provide different separation selectivities

### GLYCAN ANALYSIS

#### ACQUITY Premier BEH Amide and XBridge Premier BEH Amide Particle Technology

- Best suited for the analysis of released, N-labeled glycans using pre-column labeling with 2-AB, 2-AA, or Waters innovative and enabling *RapiFluor-MS™* reagent
- Two pore sizes (130 Å and 300 Å) to provide different selectivities from released glycans to large glycans, glycopeptides, and glycoproteins

#### ACQUITY Premier BEH C<sub>18</sub> AX and XBridge Premier BEH C<sub>18</sub> AX Particle Technology

- Large-based separation of neutral-to-highly acidic released N-glycans
- Improved resolution and recovery for sialylated and phosphorylated glycans

### INTACT AND SUBUNIT PROTEIN ANALYSIS

#### ACQUITY Premier Protein BEH C<sub>4</sub> and XBridge Premier Protein BEH C<sub>4</sub>, 300 Å, 1.7 µm and 2.5 µm Particle Technology

- Separates proteins of various sizes, hydrophobicities, and isoelectric points
- Tolerates extreme pH and temperature, and provides minimal secondary interactions
- Improves sensitivity for phosphorylated proteins and low-level intact and subunit mAb analyses

 For more information on Waters columns for bio separations, [see page 327](#).

## Ordering Information

### ACQUITY Premier Columns

BEH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009452</a>
2.1 × 100 mm	<a href="#">186009453</a>	
2.1 × 150 mm	<a href="#">186009454</a>	

BEH C <sub>18</sub> , 130 Å, VanGuard FIT	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009497</a>
2.1 × 100 mm	<a href="#">186009457</a>	
2.1 × 150 mm	<a href="#">186009458</a>	

BEH Phenyl 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186010336</a>
2.1 × 100 mm	<a href="#">186010337</a>	
2.1 × 150 mm	<a href="#">186010294</a>	

BEH Phenyl 130 Å, VanGuard FIT	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186010338</a>
2.1 × 100 mm	<a href="#">186010339</a>	
2.1 × 150 mm	<a href="#">186010340</a>	

BEH C <sub>8</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186010356</a>
2.1 × 100 mm	<a href="#">186010357</a>	
2.1 × 150 mm	<a href="#">186010358</a>	

BEH C <sub>8</sub> , 130 Å, VanGuard FIT	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186010359</a>
2.1 × 100 mm	<a href="#">186010360</a>	
2.1 × 150 mm	<a href="#">186010361</a>	

BEH Shield RP18, 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009490</a>
2.1 × 100 mm	<a href="#">186009498</a>	
2.1 × 150 mm	<a href="#">186009499</a>	

BEH Shield RP18, 130 Å, VanGuard FIT	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009500</a>
2.1 × 100 mm	<a href="#">186009501</a>	
2.1 × 150 mm	<a href="#">186009502</a>	

### ACQUITY Premier Van Guard FIT Cartridges

BEH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
2.1 × 5 mm	<a href="#">186009459</a>	

BEH Phenyl 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
2.1 × 5 mm	<a href="#">186010341</a>	

BEH C <sub>8</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
2.1 × 5 mm	<a href="#">186010362</a>	

BEH Shield RP18, 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
2.1 × 5 mm	<a href="#">186009503</a>	

BEH Amide, 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009504</a>
2.1 × 100 mm	<a href="#">186009505</a>	
2.1 × 150 mm	<a href="#">186009506</a>	

BEH Amide, 130 Å, VanGuard FIT	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009507</a>
2.1 × 100 mm	<a href="#">186009508</a>	
2.1 × 150 mm	<a href="#">186009509</a>	

CSH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009460</a>
2.1 × 100 mm	<a href="#">186009461</a>	
2.1 × 150 mm	<a href="#">186009462</a>	

CSH C <sub>18</sub> , 130 Å, VanGuard FIT	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009463</a>
2.1 × 100 mm	<a href="#">186009464</a>	
2.1 × 150 mm	<a href="#">186009465</a>	

CSH Phenyl Hexyl, 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009474</a>
2.1 × 100 mm	<a href="#">186009475</a>	
2.1 × 150 mm	<a href="#">186009476</a>	

CSH Phenyl Hexyl, 130 Å, VanGuard FIT	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009477</a>
2.1 × 100 mm	<a href="#">186009478</a>	
2.1 × 150 mm	<a href="#">186009479</a>	

HSS T3, 100 Å	Particle Size: 1.8 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009467</a>
2.1 × 100 mm	<a href="#">186009468</a>	
2.1 × 150 mm	<a href="#">186009469</a>	

HSS T3, 100 Å, VanGuard FIT	Particle Size: 1.8 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009470</a>
2.1 × 100 mm	<a href="#">186009471</a>	
2.1 × 150 mm	<a href="#">186009472</a>	

BEH Amide, 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
2.1 × 5 mm	<a href="#">186009510</a>	

CSH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
2.1 × 5 mm	<a href="#">186009466</a>	

CSH Phenyl Hexyl, 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
2.1 × 5 mm	<a href="#">186009480</a>	

HSS T3, 100 Å	Particle Size: 1.8 µm	
	Dimension	P/N
2.1 × 5 mm	<a href="#">186009473</a>	

## MaxPeak Premier 1.7 µm Columns for Bioseparations

Glycan BEH C <sub>18</sub> AX, 95 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009758</a>
	2.1 × 100 mm	<a href="#">186009759</a>
	2.1 × 150 mm	<a href="#">186009760</a>

Glycan BEH C <sub>18</sub> AX, 95 Å, VanGuard FIT	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009970</a>
	2.1 × 100 mm	<a href="#">186009971</a>
	2.1 × 150 mm	<a href="#">186009972</a>

Glycan BEH Amide, 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009522</a>
	2.1 × 100 mm	<a href="#">186009523</a>
	2.1 × 150 mm	<a href="#">186009524</a>

Glycan BEH Amide, 130 Å, VanGuard FIT	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009974</a>
	2.1 × 100 mm	<a href="#">186009975</a>
	2.1 × 150 mm	<a href="#">186009976</a>

Glycoprotein BEH Amide, 300 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009547</a>
	2.1 × 100 mm	<a href="#">186009548</a>
	2.1 × 150 mm	<a href="#">186009549</a>

Oligonucleotide BEH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009484</a>
	2.1 × 100 mm	<a href="#">186009485</a>
	2.1 × 150 mm	<a href="#">186009486</a>

Peptide BEH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009481</a>
	2.1 × 100 mm	<a href="#">186009482</a>
	2.1 × 150 mm	<a href="#">186009483</a>

Peptide BEH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009493*</a>
	2.1 × 100 mm	<a href="#">186009494*</a>
	2.1 × 150 mm	<a href="#">186009495*</a>

Peptide CSH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009487</a>
	2.1 × 100 mm	<a href="#">186009488</a>
	2.1 × 150 mm	<a href="#">186009489</a>

Peptide HSS T3, 100 Å	Particle Size: 1.8 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009490</a>
	2.1 × 100 mm	<a href="#">186009491</a>
	2.1 × 150 mm	<a href="#">186009492</a>

Protein BEH C <sub>4</sub> , 300 Å Column and Standard	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">176005107**</a>
	2.1 × 100 mm	<a href="#">176005108**</a>
	2.1 × 150 mm	<a href="#">176005109**</a>

Protein SEC, 250 Å Column and Standard	Particle Size: 1.7 µm	
	Dimension	P/N
	4.6 × 150 mm	<a href="#">176005071***</a>
	4.6 × 300 mm	<a href="#">176005072***</a>

Protein SEC, 250 Å Column, Standard, and Guard	Particle Size: 1.7 µm	
	Dimension	P/N
	4.6 × 150 mm	<a href="#">176004794***</a>
	4.6 × 300 mm	<a href="#">176004795***</a>

\*Peptide BEH 300 Å columns may also be used for oligonucleotide analyses requiring wider pore sizes.

\*\*MassPREP Protein Mix Standard p/n: [186004900](#)

\*\*\*mAb Size Variant Standard p/n: [186009429](#); MaxPeak Premier Protein SEC 250 Å, 2.5 µm, 4.6 × 30 mm Guard p/n: [186009969](#)

## MaxPeak Premier 1.7 µm Van Guard FIT Cartridges

Glycan BEH C <sub>18</sub> AX, 95 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009973</a>

Glycan BEH Amide, 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009977</a>

MaxPeak Premier 2.5 µm Columns

XBridge Premier BEH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009827</a>
	2.1 × 100 mm	<a href="#">186009828</a>
	2.1 × 150 mm	<a href="#">186009829</a>
	4.6 × 50 mm	<a href="#">186009847</a>
	4.6 × 100 mm	<a href="#">186009848</a>
	4.6 × 150 mm	<a href="#">186009849</a>

XBridge Premier BEH C <sub>18</sub> , 130 Å, VanGuard FIT	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009843</a>
	2.1 × 100 mm	<a href="#">186009844</a>
	2.1 × 150 mm	<a href="#">186009845</a>
	4.6 × 50 mm	<a href="#">186009850</a>
	4.6 × 100 mm	<a href="#">186009851</a>
	4.6 × 150 mm	<a href="#">186009852</a>

XBridge Premier BEH Amide, 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009928</a>
	2.1 × 100 mm	<a href="#">186009929</a>
	2.1 × 150 mm	<a href="#">186009930</a>
	4.6 × 50 mm	<a href="#">186009935</a>
	4.6 × 100 mm	<a href="#">186009936</a>
	4.6 × 150 mm	<a href="#">186009937</a>

XBridge Premier BEH Amide, 130 Å, VanGuard FIT	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009931</a>
	2.1 × 100 mm	<a href="#">186009932</a>
	2.1 × 150 mm	<a href="#">186009933</a>
	4.6 × 50 mm	<a href="#">186009938</a>
	4.6 × 100 mm	<a href="#">186009939</a>
	4.6 × 150 mm	<a href="#">186009940</a>

XBridge Premier BEH Phenyl, 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186010342</a>
	2.1 × 100 mm	<a href="#">186010343</a>
	2.1 × 150 mm	<a href="#">186010344</a>
	4.6 × 50 mm	<a href="#">186010349</a>
	4.6 × 100 mm	<a href="#">186010350</a>
	4.6 × 150 mm	<a href="#">186010351</a>

XBridge Premier BEH Phenyl, 130 Å, VanGuard FIT	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186010345</a>
	2.1 × 100 mm	<a href="#">186010346</a>
	2.1 × 150 mm	<a href="#">186010347</a>
	4.6 × 50 mm	<a href="#">186010352</a>
	4.6 × 100 mm	<a href="#">186010353</a>
	4.6 × 150 mm	<a href="#">186010354</a>

XBridge Premier BEH C <sub>8</sub> , 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186010363</a>
	2.1 × 100 mm	<a href="#">186010364</a>
	2.1 × 150 mm	<a href="#">186010365</a>
	4.6 × 50 mm	<a href="#">186010370</a>
	4.6 × 100 mm	<a href="#">186010371</a>
	4.6 × 150 mm	<a href="#">186010372</a>

XBridge Premier BEH C <sub>8</sub> , 130 Å, VanGuard FIT	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186010366</a>
	2.1 × 100 mm	<a href="#">186010367</a>
	2.1 × 150 mm	<a href="#">186010368</a>
	4.6 × 50 mm	<a href="#">186010373</a>
	4.6 × 100 mm	<a href="#">186010374</a>
	4.6 × 150 mm	<a href="#">186010375</a>

XBridge Premier BEH Shield RP18, 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009914</a>
	2.1 × 100 mm	<a href="#">186009915</a>
	2.1 × 150 mm	<a href="#">186009916</a>
	4.6 × 50 mm	<a href="#">186009921</a>
	4.6 × 100 mm	<a href="#">186009922</a>
	4.6 × 150 mm	<a href="#">186009923</a>

XBridge Premier BEH Shield RP18, 130 Å, VanGuard FIT	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009917</a>
	2.1 × 100 mm	<a href="#">186009918</a>
	2.1 × 150 mm	<a href="#">186009919</a>
	4.6 × 50 mm	<a href="#">186009924</a>
	4.6 × 100 mm	<a href="#">186009925</a>
	4.6 × 150 mm	<a href="#">186009926</a>

XSelect Premier CSH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009865</a>
	2.1 × 100 mm	<a href="#">186009866</a>
	2.1 × 150 mm	<a href="#">186009867</a>
	4.6 × 50 mm	<a href="#">186009872</a>
	4.6 × 100 mm	<a href="#">186009873</a>
	4.6 × 150 mm	<a href="#">186009874</a>

XSelect Premier CSH C <sub>18</sub> , 130 Å, VanGuard FIT	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009868</a>
	2.1 × 100 mm	<a href="#">186009869</a>
	2.1 × 150 mm	<a href="#">186009870</a>
	4.6 × 50 mm	<a href="#">186009875</a>
	4.6 × 100 mm	<a href="#">186009876</a>
	4.6 × 150 mm	<a href="#">186009877</a>

## MaxPeak Premier 2.5 µm Columns

XSelect Premier CSH Phenyl Hexyl, 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009879</a>
	2.1 × 100 mm	<a href="#">186009880</a>
	2.1 × 150 mm	<a href="#">186009881</a>
	4.6 × 50 mm	<a href="#">186009886</a>
	4.6 × 100 mm	<a href="#">186009887</a>
	4.6 × 150 mm	<a href="#">186009888</a>

XSelect Premier CSH Phenyl Hexyl, 130 Å, VanGuard FIT	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009882</a>
	2.1 × 100 mm	<a href="#">186009883</a>
	2.1 × 150 mm	<a href="#">186009884</a>
	4.6 × 50 mm	<a href="#">186009889</a>
	4.6 × 100 mm	<a href="#">186009890</a>
	4.6 × 150 mm	<a href="#">186009891</a>

XSelect Premier HSS T3, 100 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009830</a>
	2.1 × 100 mm	<a href="#">186009831</a>
	2.1 × 150 mm	<a href="#">186009832</a>
	4.6 × 50 mm	<a href="#">186009858</a>
	4.6 × 100 mm	<a href="#">186009859</a>
	4.6 × 150 mm	<a href="#">186009860</a>

XSelect Premier HSS T3, 100 Å, VanGuard FIT	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009854</a>
	2.1 × 100 mm	<a href="#">186009855</a>
	2.1 × 150 mm	<a href="#">186009856</a>
	4.6 × 50 mm	<a href="#">186009861</a>
	4.6 × 100 mm	<a href="#">186009862</a>
	4.6 × 150 mm	<a href="#">186009863</a>

## MaxPeak Premier 2.5 µm Van Guard FIT Cartridges

XBridge BEH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009842</a>
	3.9 × 5 mm	<a href="#">186009846</a>

XBridge BEH Amide, 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009927</a>
	3.9 × 5 mm	<a href="#">186009934</a>

XBridge BEH Phenyl 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186010348</a>
	3.9 × 5 mm	<a href="#">186010355</a>

XBridge BEH C <sub>8</sub> , 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186010369</a>
	3.9 × 5 mm	<a href="#">186010376</a>

XBridge BEH Shield RP18, 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009913</a>
	3.9 × 5 mm	<a href="#">186009920</a>

XSelect CSH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009864</a>
	3.9 × 5 mm	<a href="#">186009871</a>

XSelect CSH Phenyl Hexyl, 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009878</a>
	3.9 × 5 mm	<a href="#">186009885</a>

XSelect HSS T3, 100 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009853</a>
	3.9 × 5 mm	<a href="#">186009857</a>

### DID YOU KNOW...

To protect your investment, select columns are available with VanGuard™ FIT integrated guard column technology. With a FIT column design created specifically to integrate a guard column, separation efficiency is maintained, along with column lifetime.



**VAN GUARD**  
FIT

## MaxPeak Premier 2.5 µm Columns for Bioseparations

XBridge Premier Glycan BEH C <sub>18</sub> AX, 95 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009947</a>
	2.1 × 100 mm	<a href="#">186009948</a>
	2.1 × 150 mm	<a href="#">186009949</a>
	4.6 × 50 mm	<a href="#">186009950</a>
	4.6 × 100 mm	<a href="#">186009951</a>
	4.6 × 150 mm	<a href="#">186009952</a>

XBridge Premier Glycan BEH Amide, 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009941</a>
	2.1 × 100 mm	<a href="#">186009942</a>
	2.1 × 150 mm	<a href="#">186009943</a>
	4.6 × 50 mm	<a href="#">186009944</a>
	4.6 × 100 mm	<a href="#">186009945</a>
	4.6 × 150 mm	<a href="#">186009946</a>

XBridge Premier Oligonucleotide BEH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009836</a>
	2.1 × 100 mm	<a href="#">186009837</a>
	2.1 × 150 mm	<a href="#">186009838</a>
	4.6 × 50 mm	<a href="#">186009901</a>
	4.6 × 100 mm	<a href="#">186009902</a>
	4.6 × 150 mm	<a href="#">186009903</a>

XBridge Premier Peptide BEH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009733</a>
	2.1 × 100 mm	<a href="#">186009734</a>
	2.1 × 150 mm	<a href="#">186009835</a>
	4.6 × 50 mm	<a href="#">186009898</a>
	4.6 × 100 mm	<a href="#">186009899</a>
	4.6 × 150 mm	<a href="#">186009900</a>

XBridge Premier Peptide BEH C <sub>18</sub> , 300 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009892*</a>
	2.1 × 100 mm	<a href="#">186009893*</a>
	2.1 × 150 mm	<a href="#">186009894*</a>
	4.6 × 50 mm	<a href="#">186009895*</a>
	4.6 × 100 mm	<a href="#">186009896*</a>
	4.6 × 150 mm	<a href="#">186009897*</a>

XBridge Premier Protein BEH C <sub>4</sub> , 300 Å Column and Standard	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">176005110**</a>
	2.1 × 100 mm	<a href="#">176005111**</a>
	2.1 × 150 mm	<a href="#">176005112**</a>
	4.6 × 50 mm	<a href="#">176005113**</a>
	4.6 × 100 mm	<a href="#">176005114**</a>
	4.6 × 150 mm	<a href="#">176005115**</a>

XSelect Premier Peptide HSS T3, 100 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009839</a>
	2.1 × 100 mm	<a href="#">186009840</a>
	2.1 × 150 mm	<a href="#">186009841</a>
	4.6 × 50 mm	<a href="#">186009910</a>
	4.6 × 100 mm	<a href="#">186009911</a>
	4.6 × 150 mm	<a href="#">186009912</a>

XBridge Premier Protein SEC 250 Å, Column and Standard	Particle Size: 2.5 µm	
	Dimension	P/N
	4.6 × 150 mm	<a href="#">176005067***</a>
	4.6 × 300 mm	<a href="#">176005068***</a>
	7.8 × 150 mm	<a href="#">176005069***</a>
	7.8 × 150 mm	<a href="#">176005070***</a>

XBridge Premier Protein SEC 250 Å, Column, Standard, and Guard	Particle Size: 2.5 µm	
	Dimension	P/N
	4.6 × 150 mm	<a href="#">176004790***</a>
	4.6 × 300 mm	<a href="#">176004791***</a>
	7.8 × 150 mm	<a href="#">176004792***</a>
	7.8 × 150 mm	<a href="#">176004793***</a>

\*XBridge Premier Peptide BEH 300 Å Columns may also be used for oligonucleotide analyses requiring wider pore sizes.

\*\*MassPREP Protein Mix Standard p/n: [186004900](#)

\*\*\*mAb Size Variant Standard p/n: [186009429](#); MaxPeak Premier Protein SEC 250 Å, 2.5 µm, 4.6 × 30 mm Guard p/n: [186009969](#)



## Atlantis Premier Columns

	Particle Size: 1.7 $\mu$ m		Particle Size: 2.5 $\mu$ m		Particle Size: 5 $\mu$ m		
	Dimension	P/N	Dimension	P/N	Dimension	P/N	
BEH C <sub>18</sub> AX, 95 Å	2.1 × 30 mm	<a href="#">186009365</a>	2.1 × 30 mm	<a href="#">186009389</a>	2.1 × 50 mm	<a href="#">186009407</a>	
	2.1 × 50 mm	<a href="#">186009366</a>	2.1 × 50 mm	<a href="#">186009390</a>	2.1 × 100 mm	<a href="#">186009408</a>	
	2.1 × 75 mm	<a href="#">186009367</a>	2.1 × 75 mm	<a href="#">186009391</a>	2.1 × 150 mm	<a href="#">186009409</a>	
	2.1 × 100 mm	<a href="#">186009368</a>	2.1 × 100 mm	<a href="#">186009392</a>	4.6 × 50 mm	<a href="#">186009427</a>	
	2.1 × 150 mm	<a href="#">186009369</a>	2.1 × 150 mm	<a href="#">186009393</a>	4.6 × 100 mm	<a href="#">186009416</a>	
			4.6 × 50 mm	<a href="#">186009426</a>	4.6 × 150 mm	<a href="#">186009417</a>	
			4.6 × 100 mm	<a href="#">186009397</a>	4.6 × 250 mm	<a href="#">186009418</a>	
			4.6 × 150 mm	<a href="#">186009398</a>			
	BEH C <sub>18</sub> AX, 95 Å, VanGuard FIT	2.1 × 30 mm	<a href="#">186009357</a>	2.1 × 30 mm	<a href="#">186009374</a>	2.1 × 50 mm	<a href="#">186009404</a>
		2.1 × 50 mm	<a href="#">186009358</a>	2.1 × 50 mm	<a href="#">186009375</a>	2.1 × 100 mm	<a href="#">186009405</a>
2.1 × 75 mm		<a href="#">186009359</a>	2.1 × 75 mm	<a href="#">186009376</a>	2.1 × 150 mm	<a href="#">186009406</a>	
2.1 × 100 mm		<a href="#">186009360</a>	2.1 × 100 mm	<a href="#">186009378</a>	4.6 × 50 mm	<a href="#">186009410</a>	
2.1 × 150 mm		<a href="#">186009361</a>	2.1 × 150 mm	<a href="#">186009379</a>	4.6 × 100 mm	<a href="#">186009411</a>	
			4.6 × 50 mm	<a href="#">186009383</a>	4.6 × 150 mm	<a href="#">186009412</a>	
			4.6 × 100 mm	<a href="#">186009384</a>	4.6 × 250 mm	<a href="#">186009413</a>	
			4.6 × 150 mm	<a href="#">186009385</a>			
BEH Z-HILIC, 95 Å		2.1 × 50 mm	<a href="#">186009978</a>	2.1 × 50 mm	<a href="#">186009985</a>	2.1 × 50 mm	<a href="#">186009999</a>
		2.1 × 100 mm	<a href="#">186009979</a>	2.1 × 100 mm	<a href="#">186009986</a>	2.1 × 100 mm	<a href="#">186010000</a>
	2.1 × 150 mm	<a href="#">186009980</a>	2.1 × 150 mm	<a href="#">186009987</a>	2.1 × 150 mm	<a href="#">186010001</a>	
			4.6 × 50 mm	<a href="#">186009992</a>	4.6 × 50 mm	<a href="#">186010006</a>	
			4.6 × 100 mm	<a href="#">186009993</a>	4.6 × 100 mm	<a href="#">186010007</a>	
			4.6 × 150 mm	<a href="#">186009994</a>	4.6 × 150 mm	<a href="#">186010008</a>	
					4.6 × 250 mm	<a href="#">186010009</a>	
BEH Z-HILIC, 95 Å, VanGuard FIT	2.1 × 50 mm	<a href="#">186009981</a>	2.1 × 50 mm	<a href="#">186009988</a>	2.1 × 50 mm	<a href="#">186010002</a>	
	2.1 × 100 mm	<a href="#">186009982</a>	2.1 × 100 mm	<a href="#">186009989</a>	2.1 × 100 mm	<a href="#">186010003</a>	
	2.1 × 150 mm	<a href="#">186009983</a>	2.1 × 150 mm	<a href="#">186009990</a>	2.1 × 150 mm	<a href="#">186010004</a>	
			4.6 × 50 mm	<a href="#">186009995</a>	4.6 × 50 mm	<a href="#">186010010</a>	
			4.6 × 100 mm	<a href="#">186009996</a>	4.6 × 100 mm	<a href="#">186010011</a>	
			4.6 × 150 mm	<a href="#">186009997</a>	4.6 × 150 mm	<a href="#">186010012</a>	
					4.6 × 250 mm	<a href="#">186010013</a>	

## Atlantis Premier Van Guard FIT Cartridges

	Particle Size: 1.7 $\mu$ m		Particle Size: 2.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N	Dimension	P/N	Dimension	P/N
BEH C <sub>18</sub> AX, 95 Å	2.1 × 5 mm	<a href="#">186009373</a>	2.1 × 5 mm	<a href="#">186009402</a>	2.1 × 5 mm	<a href="#">186009421</a>
			3.9 × 5 mm	<a href="#">186009403</a>	3.9 × 5 mm	<a href="#">186009422</a>
BEH Z-HILIC, 95 Å	2.1 × 5 mm	<a href="#">186009984</a>	2.1 × 5 mm	<a href="#">186009991</a>	2.1 × 5 mm	<a href="#">186010005</a>
			3.9 × 5 mm	<a href="#">186009998</a>	3.9 × 5 mm	<a href="#">186010014</a>

# Sub-2 $\mu\text{m}$ UPLC Columns

# Contents

<b>UltraPerformance Liquid Chromatography</b> .....	<a href="#">107</a>
<b>CORTECS UPLC Columns</b> .....	<a href="#">108</a>
<b>ACQUITY UPLC Columns</b> .....	<a href="#">113</a>
ACQUITY UPLC Charged Surface Hybrid (CSH) Columns.....	<a href="#">113</a>
ACQUITY UPLC Ethylene Bridged Hybrid (BEH) Columns .....	<a href="#">116</a>
ACQUITY UPLC High Strength Silica (HSS) Columns.....	<a href="#">120</a>
<b>ACQUITY UPLC and CORTECS 1.6 <math>\mu\text{m}</math> Method Validation Kits</b> .....	<a href="#">123</a>
<b>ACQUITY UPLC Method Development Kits</b> .....	<a href="#">127</a>

# Sub-2- $\mu\text{m}$ UPLC Columns



## UltraPerformance Liquid Chromatography


UltraPerformance Liquid Chromatography (UPLC) combines innovations in both instrumentation and column technology, providing maximum separation efficiency.

Column efficiency can be increased in two ways: by reducing the size of stationary-phase particles and by utilizing solid-core particle technology. The result is significant improvements in the resolution, speed, and sensitivity of separations. Efficiency gains are maximized when UPLC Columns are used in conjunction with low-dispersive ACQUITY UPLC Systems. A momentous advance in LC technology, the ACQUITY UPLC System maximizes column efficiency by maintaining ultra-low system dispersion. Narrow-bore columns packed with small particles, 1.6–1.8  $\mu\text{m}$  particle sizes, can achieve maximum performance while operating at pressures as high as 1240 bar (12,400 pK<sub>a</sub>; 18,000 psi).

Our sub-2- $\mu\text{m}$  UPLC Columns continues to evolve. Among its offerings are solid-core and fully porous particle substrates (CORTECS, BEH 95 Å, BEH 125 Å, 130 Å, 200 Å, 300 Å, and 450 Å; HSS; and CSH) scalable between HPLC, UHPLC, and UPLC particle sizes. Additionally, we offer application-directed UPLC chemistries for SEC, amino acid analysis, proteins, peptides, oligonucleotides, and glycan analysis. Our vast range of selectivity choices, for both small-molecule and biopharmaceutical applications, ensures that there is a UPLC Column for your specific application.

### DID YOU KNOW...

A select group of ACQUITY UPLC Columns are also available in Waters MaxPeak High Performance Surface hardware.

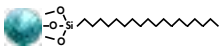
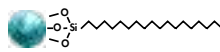

 A complete list of the MaxPeak Premier Columns can be found on [page 99](#).



## CORTECS UPLC Columns

CORTECS UPLC 1.6  $\mu\text{m}$  Solid-Core Particle Columns are the performance standard. The sub-2- $\mu\text{m}$ , solid-core particle technology provides the highest column efficiencies when used with low-dispersive UPLC instrumentation. There are seven unique CORTECS chemistries to choose from, available in either reversed-phase or HILIC, that provide flexibility to rapidly separate a wide array of compounds. CORTECS UPLC 1.6  $\mu\text{m}$  Solid-Core Columns produce sharper, narrower peaks when compared with fully porous particles of similar size. They are the best column choice for increased resolution, speed, and sensitivity.

### Column Characteristics

	<b>C<sub>18</sub><sup>+</sup>, 90 Å</b> UPLC: 1.6 $\mu\text{m}$	<b>C<sub>18</sub>, 90 Å</b> UPLC: 1.6 $\mu\text{m}$	<b>Shield RP18, 90 Å</b> UPLC: 1.6 $\mu\text{m}$
Particle/Ligand			
Ligand Density*	2.4 $\mu\text{mol}/\text{m}^2$	2.7 $\mu\text{mol}/\text{m}^2$	3.2 $\mu\text{mol}/\text{m}^2$
Carbon Load*	5.7%	6.6%	6.4%
Endcapped	Yes	Yes	Yes
USP Class No.	L1	L1	L1
pH Range	2–8	2–8	2–8
Temperature Limits	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
Surface Area*	100 $\text{m}^2/\text{g}$	100 $\text{m}^2/\text{g}$	100 $\text{m}^2/\text{g}$
Performance Standards	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>
Application Standards	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>

\*Expected or approximate value.

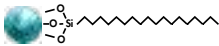
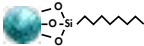
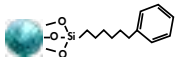

### DID YOU KNOW...

We offer CORTECS Columns packed with 2.7  $\mu\text{m}$  particles to use with HPLC and UHPLC systems.



For more information, see [page 132](#).



T3, 120 Å	C <sub>8</sub> , 90 Å	Phenyl, 90 Å	HILIC, 90 Å
UPLC: 1.6 μm	UPLC: 1.6 μm	UPLC: 1.6 μm	UPLC: 1.6 μm
			
1.6 μmol/m <sup>2</sup>	3.4 μmol/m <sup>2</sup>	3.2 μmol/m <sup>2</sup>	N/A
4.7%	4.5%	5.9%	Unbonded
Yes	Yes	Yes	N/A
L1	L7	L11	L3
2–8	2–8	2–8	1–5
Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
100 m <sup>2</sup> /g	100 m <sup>2</sup> /g	100 m <sup>2</sup> /g	100 m <sup>2</sup> /g
<b>Neutrals QC Reference Material</b> p/n: <a href="#">186006360</a>	<b>Neutrals QC Reference Material</b> p/n: <a href="#">186006360</a>	<b>Neutrals QC Reference Material</b> p/n: <a href="#">186006360</a>	<b>HILIC QC Reference Material</b> p/n: <a href="#">186007226</a>
<b>Reversed-Phase QC Reference Material</b> p/n: <a href="#">186006363</a>	<b>Reversed-Phase QC Reference Material</b> p/n: <a href="#">186006363</a>	<b>Reversed-Phase QC Reference Material</b> p/n: <a href="#">186006363</a>	—



**APPLICATION AREA:** Compounds Related to Oak Maturation of Spirits

"The CORTECS range are now the go to columns for UPLC application in our lab. Improved resolution and sensitivity over anything we have seen so far. Robust as well making for value for money."

**REVIEWER:** Peter Cockburn

**ORGANIZATION:** The Scotch Whisky Research Institute

## Ordering Information

### CORTECS UPLC Columns

	Particle Size: 1.6 $\mu\text{m}$			Particle Size: 2.7 $\mu\text{m}$		
	Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	P/N (3/pk)
<b>C<sub>18</sub>+</b>	2.1 × 30 mm	<a href="#">186007113</a>	<a href="#">176003166</a>	2.1 × 30 mm	<a href="#">186007394</a>	<a href="#">176003289</a>
	2.1 × 50 mm	<a href="#">186007114</a>	<a href="#">176003167</a>	2.1 × 50 mm	<a href="#">186007395</a>	<a href="#">176003290</a>
	2.1 × 75 mm	<a href="#">186007115</a>	<a href="#">176003168</a>	2.1 × 75 mm	<a href="#">186007396</a>	<a href="#">176003291</a>
	2.1 × 100 mm	<a href="#">186007116</a>	<a href="#">176003169</a>	2.1 × 100 mm	<a href="#">186007397</a>	<a href="#">176003292</a>
	2.1 × 150 mm	<a href="#">186007117</a>	<a href="#">176003170</a>	2.1 × 150 mm	<a href="#">186007398</a>	<a href="#">176003293</a>
	3.0 × 30 mm	<a href="#">186007118</a>	<a href="#">176003171</a>	3.0 × 30 mm	<a href="#">186007399</a>	<a href="#">176003294</a>
	3.0 × 50 mm	<a href="#">186007119</a>	<a href="#">176003172</a>	3.0 × 50 mm	<a href="#">186007400</a>	<a href="#">176003295</a>
	3.0 × 75 mm	<a href="#">186007120</a>	<a href="#">176003173</a>	3.0 × 75 mm	<a href="#">186007401</a>	<a href="#">176003296</a>
	3.0 × 100 mm	<a href="#">186007121</a>	<a href="#">176003174</a>	3.0 × 100 mm	<a href="#">186007402</a>	<a href="#">176003297</a>
	3.0 × 150 mm	<a href="#">186007122</a>	<a href="#">176003175</a>	3.0 × 150 mm	<a href="#">186007403</a>	<a href="#">176003298</a>
				4.6 × 30 mm	<a href="#">186007404</a>	<a href="#">176003322</a>
				4.6 × 50 mm	<a href="#">186007405</a>	<a href="#">176003323</a>
				4.6 × 75 mm	<a href="#">186007406</a>	<a href="#">176003324</a>
				4.6 × 100 mm	<a href="#">186007407</a>	<a href="#">176003325</a>
			4.6 × 150 mm	<a href="#">186007408</a>	<a href="#">176003326</a>	
<b>C<sub>18</sub></b>	2.1 × 30 mm	<a href="#">186007092</a>	<a href="#">176003146</a>	2.1 × 30 mm	<a href="#">186007364</a>	<a href="#">176003269</a>
	2.1 × 50 mm	<a href="#">186007093</a>	<a href="#">176003147</a>	2.1 × 50 mm	<a href="#">186007365</a>	<a href="#">176003270</a>
	2.1 × 75 mm	<a href="#">186007094</a>	<a href="#">176003148</a>	2.1 × 75 mm	<a href="#">186007366</a>	<a href="#">176003271</a>
	2.1 × 100 mm	<a href="#">186007095</a>	<a href="#">176003149</a>	2.1 × 100 mm	<a href="#">186007367</a>	<a href="#">176003272</a>
	2.1 × 150 mm	<a href="#">186007096</a>	<a href="#">176003150</a>	2.1 × 150 mm	<a href="#">186007368</a>	<a href="#">176003273</a>
	3.0 × 30 mm	<a href="#">186007097</a>	<a href="#">176003151</a>	3.0 × 30 mm	<a href="#">186007369</a>	<a href="#">176003274</a>
	3.0 × 50 mm	<a href="#">186007098</a>	<a href="#">176003152</a>	3.0 × 50 mm	<a href="#">186007370</a>	<a href="#">176003275</a>
	3.0 × 75 mm	<a href="#">186007099</a>	<a href="#">176003153</a>	3.0 × 75 mm	<a href="#">186007371</a>	<a href="#">176003276</a>
	3.0 × 100 mm	<a href="#">186007100</a>	<a href="#">176003154</a>	3.0 × 100 mm	<a href="#">186007372</a>	<a href="#">176003277</a>
	3.0 × 150 mm	<a href="#">186007102</a>	<a href="#">176003155</a>	3.0 × 150 mm	<a href="#">186007373</a>	<a href="#">176003278</a>
				4.6 × 30 mm	<a href="#">186007374</a>	<a href="#">176003312</a>
				4.6 × 50 mm	<a href="#">186007375</a>	<a href="#">176003313</a>
				4.6 × 75 mm	<a href="#">186007376</a>	<a href="#">176003314</a>
				4.6 × 100 mm	<a href="#">186007377</a>	<a href="#">176003315</a>
			4.6 × 150 mm	<a href="#">186007378</a>	<a href="#">176003316</a>	



#### APPLICATION AREA: Analysis of Glycosphingolipids

"This (CORTECS) column provides excellent and reproducible LC-MS chromatogram for my glycosphingolipids analysis. In addition, I am getting very narrow peaks which increases my peak capacity. This could be due to the very small particles (1.6  $\mu\text{m}$ ) and core-shell type silica particles it has."

REVIEWER: Rodell Barrientos

ORGANIZATION: The University of North Carolina Greensboro

CORTECS UPLC Columns *Continued*

	Particle Size: 1.6 $\mu$ m			Particle Size: 2.7 $\mu$ m		
	Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	P/N (3/pk)
Shield RP18	2.1 $\times$ 30 mm	<a href="#">186008691</a>	<a href="#">176003927</a>	2.1 $\times$ 30 mm	<a href="#">186008661</a>	<a href="#">176003912</a>
	2.1 $\times$ 50 mm	<a href="#">186008692</a>	<a href="#">176003928</a>	2.1 $\times$ 50 mm	<a href="#">186008662</a>	<a href="#">176003913</a>
	2.1 $\times$ 75 mm	<a href="#">186008693</a>	<a href="#">176003929</a>	2.1 $\times$ 75 mm	<a href="#">186008663</a>	<a href="#">176003914</a>
	2.1 $\times$ 100 mm	<a href="#">186008694</a>	<a href="#">176003930</a>	2.1 $\times$ 100 mm	<a href="#">186008664</a>	<a href="#">176003915</a>
	2.1 $\times$ 150 mm	<a href="#">186008695</a>	<a href="#">176003931</a>	2.1 $\times$ 150 mm	<a href="#">186008665</a>	<a href="#">176003916</a>
	3.0 $\times$ 30 mm	<a href="#">186008701</a>	<a href="#">176003932</a>	3.0 $\times$ 30 mm	<a href="#">186008671</a>	<a href="#">176003917</a>
	3.0 $\times$ 50 mm	<a href="#">186008702</a>	<a href="#">176003933</a>	3.0 $\times$ 50 mm	<a href="#">186008672</a>	<a href="#">176003918</a>
	3.0 $\times$ 75 mm	<a href="#">186008703</a>	<a href="#">176003934</a>	3.0 $\times$ 75 mm	<a href="#">186008673</a>	<a href="#">176003919</a>
	3.0 $\times$ 100 mm	<a href="#">186008704</a>	<a href="#">176003935</a>	3.0 $\times$ 100 mm	<a href="#">186008674</a>	<a href="#">176003920</a>
	3.0 $\times$ 150 mm	<a href="#">186008705</a>	<a href="#">176003936</a>	3.0 $\times$ 150 mm	<a href="#">186008675</a>	<a href="#">176003921</a>
				4.6 $\times$ 30 mm	<a href="#">186008681</a>	<a href="#">176003922</a>
				4.6 $\times$ 50 mm	<a href="#">186008682</a>	<a href="#">176003923</a>
				4.6 $\times$ 75 mm	<a href="#">186008683</a>	<a href="#">176003924</a>
				4.6 $\times$ 100 mm	<a href="#">186008684</a>	<a href="#">176003925</a>
				4.6 $\times$ 150 mm	<a href="#">186008685</a>	<a href="#">176003926</a>
T3	2.1 $\times$ 30 mm	<a href="#">186008496</a>	<a href="#">176003891</a>	2.1 $\times$ 30 mm	<a href="#">186008481</a>	<a href="#">176003876</a>
	2.1 $\times$ 50 mm	<a href="#">186008497</a>	<a href="#">176003892</a>	2.1 $\times$ 50 mm	<a href="#">186008482</a>	<a href="#">176003877</a>
	2.1 $\times$ 75 mm	<a href="#">186008498</a>	<a href="#">176003893</a>	2.1 $\times$ 75 mm	<a href="#">186008483</a>	<a href="#">176003878</a>
	2.1 $\times$ 100 mm	<a href="#">186008499</a>	<a href="#">176003894</a>	2.1 $\times$ 100 mm	<a href="#">186008484</a>	<a href="#">176003879</a>
	2.1 $\times$ 150 mm	<a href="#">186008500</a>	<a href="#">176003895</a>	2.1 $\times$ 150 mm	<a href="#">186008485</a>	<a href="#">176003880</a>
	3.0 $\times$ 30 mm	<a href="#">186008501</a>	<a href="#">176003896</a>	3.0 $\times$ 30 mm	<a href="#">186008486</a>	<a href="#">176003881</a>
	3.0 $\times$ 50 mm	<a href="#">186008502</a>	<a href="#">176003897</a>	3.0 $\times$ 50 mm	<a href="#">186008487</a>	<a href="#">176003882</a>
	3.0 $\times$ 75 mm	<a href="#">186008503</a>	<a href="#">176003898</a>	3.0 $\times$ 75 mm	<a href="#">186008488</a>	<a href="#">176003883</a>
	3.0 $\times$ 100 mm	<a href="#">186008504</a>	<a href="#">176003899</a>	3.0 $\times$ 100 mm	<a href="#">186008489</a>	<a href="#">176003884</a>
	3.0 $\times$ 150 mm	<a href="#">186008505</a>	<a href="#">176003900</a>	3.0 $\times$ 150 mm	<a href="#">186008490</a>	<a href="#">176003885</a>
				4.6 $\times$ 30 mm	<a href="#">186008491</a>	<a href="#">176003886</a>
				4.6 $\times$ 50 mm	<a href="#">186008492</a>	<a href="#">176003887</a>
				4.6 $\times$ 75 mm	<a href="#">186008493</a>	<a href="#">176003888</a>
				4.6 $\times$ 100 mm	<a href="#">186008494</a>	<a href="#">176003889</a>
				4.6 $\times$ 150 mm	<a href="#">186008495</a>	<a href="#">176003890</a>
C <sub>8</sub>	2.1 $\times$ 30 mm	<a href="#">186008398</a>	<a href="#">176003829</a>	2.1 $\times$ 30 mm	<a href="#">186008348</a>	<a href="#">176003804</a>
	2.1 $\times$ 50 mm	<a href="#">186008399</a>	<a href="#">176003830</a>	2.1 $\times$ 50 mm	<a href="#">186008349</a>	<a href="#">176003805</a>
	2.1 $\times$ 75 mm	<a href="#">186008400</a>	<a href="#">176003831</a>	2.1 $\times$ 75 mm	<a href="#">186008350</a>	<a href="#">176003806</a>
	2.1 $\times$ 100 mm	<a href="#">186008401</a>	<a href="#">176003832</a>	2.1 $\times$ 100 mm	<a href="#">186008351</a>	<a href="#">176003807</a>
	2.1 $\times$ 150 mm	<a href="#">186008402</a>	<a href="#">176003833</a>	2.1 $\times$ 150 mm	<a href="#">186008352</a>	<a href="#">176003808</a>
	3.0 $\times$ 30 mm	<a href="#">186008408</a>	<a href="#">176003834</a>	3.0 $\times$ 30 mm	<a href="#">186008358</a>	<a href="#">176003809</a>
	3.0 $\times$ 50 mm	<a href="#">186008409</a>	<a href="#">176003835</a>	3.0 $\times$ 50 mm	<a href="#">186008359</a>	<a href="#">176003810</a>
	3.0 $\times$ 75 mm	<a href="#">186008410</a>	<a href="#">176003836</a>	3.0 $\times$ 75 mm	<a href="#">186008360</a>	<a href="#">176003811</a>
	3.0 $\times$ 100 mm	<a href="#">186008411</a>	<a href="#">176003837</a>	3.0 $\times$ 100 mm	<a href="#">186008361</a>	<a href="#">176003812</a>
	3.0 $\times$ 150 mm	<a href="#">186008412</a>	<a href="#">176003838</a>	3.0 $\times$ 150 mm	<a href="#">186008362</a>	<a href="#">176003813</a>
				4.6 $\times$ 30 mm	<a href="#">186008368</a>	<a href="#">176003814</a>
				4.6 $\times$ 50 mm	<a href="#">186008369</a>	<a href="#">176003815</a>
				4.6 $\times$ 75 mm	<a href="#">186008370</a>	<a href="#">176003816</a>
				4.6 $\times$ 100 mm	<a href="#">186008371</a>	<a href="#">176003817</a>
				4.6 $\times$ 150 mm	<a href="#">186008372</a>	<a href="#">176003818</a>



CORTECS UPLC Columns *Continued*

	Particle Size: 1.6 $\mu\text{m}$			Particle Size: 2.7 $\mu\text{m}$		
	Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	P/N (3/pk)
Phenyl	2.1 $\times$ 30 mm	<a href="#">186008378</a>	<a href="#">176003819</a>	2.1 $\times$ 30 mm	<a href="#">186008318</a>	<a href="#">176003789</a>
	2.1 $\times$ 50 mm	<a href="#">186008379</a>	<a href="#">176003820</a>	2.1 $\times$ 50 mm	<a href="#">186008319</a>	<a href="#">176003790</a>
	2.1 $\times$ 75 mm	<a href="#">186008380</a>	<a href="#">176003821</a>	2.1 $\times$ 75 mm	<a href="#">186008320</a>	<a href="#">176003791</a>
	2.1 $\times$ 100 mm	<a href="#">186008381</a>	<a href="#">176003822</a>	2.1 $\times$ 100 mm	<a href="#">186008321</a>	<a href="#">176003792</a>
	2.1 $\times$ 150 mm	<a href="#">186008382</a>	<a href="#">176003823</a>	2.1 $\times$ 150 mm	<a href="#">186008322</a>	<a href="#">176003793</a>
	3.0 $\times$ 30 mm	<a href="#">186008388</a>	<a href="#">176003824</a>	3.0 $\times$ 30 mm	<a href="#">186008328</a>	<a href="#">176003794</a>
	3.0 $\times$ 50 mm	<a href="#">186008389</a>	<a href="#">176003825</a>	3.0 $\times$ 50 mm	<a href="#">186008329</a>	<a href="#">176003795</a>
	3.0 $\times$ 75 mm	<a href="#">186008390</a>	<a href="#">176003826</a>	3.0 $\times$ 75 mm	<a href="#">186008330</a>	<a href="#">176003796</a>
	3.0 $\times$ 100 mm	<a href="#">186008391</a>	<a href="#">176003827</a>	3.0 $\times$ 100 mm	<a href="#">186008331</a>	<a href="#">176003797</a>
	3.0 $\times$ 150 mm	<a href="#">186008392</a>	<a href="#">176003828</a>	3.0 $\times$ 150 mm	<a href="#">186008332</a>	<a href="#">176003798</a>
				4.6 $\times$ 30 mm	<a href="#">186008338</a>	<a href="#">176003799</a>
				4.6 $\times$ 50 mm	<a href="#">186008339</a>	<a href="#">176003800</a>
				4.6 $\times$ 75 mm	<a href="#">186008340</a>	<a href="#">176003801</a>
			4.6 $\times$ 100 mm	<a href="#">186008341</a>	<a href="#">176003802</a>	
			4.6 $\times$ 150 mm	<a href="#">186008342</a>	<a href="#">176003803</a>	
HILIC	2.1 $\times$ 30 mm	<a href="#">186007103</a>	<a href="#">176003156</a>	2.1 $\times$ 30 mm	<a href="#">186007379</a>	<a href="#">176003279</a>
	2.1 $\times$ 50 mm	<a href="#">186007104</a>	<a href="#">176003157</a>	2.1 $\times$ 50 mm	<a href="#">186007380</a>	<a href="#">176003280</a>
	2.1 $\times$ 75 mm	<a href="#">186007105</a>	<a href="#">176003158</a>	2.1 $\times$ 75 mm	<a href="#">186007381</a>	<a href="#">176003281</a>
	2.1 $\times$ 100 mm	<a href="#">186007106</a>	<a href="#">176003159</a>	2.1 $\times$ 100 mm	<a href="#">186007382</a>	<a href="#">176003282</a>
	2.1 $\times$ 150 mm	<a href="#">186007107</a>	<a href="#">176003160</a>	2.1 $\times$ 150 mm	<a href="#">186007383</a>	<a href="#">176003283</a>
	3.0 $\times$ 30 mm	<a href="#">186007108</a>	<a href="#">176003161</a>	3.0 $\times$ 30 mm	<a href="#">186007384</a>	<a href="#">176003284</a>
	3.0 $\times$ 50 mm	<a href="#">186007109</a>	<a href="#">176003162</a>	3.0 $\times$ 50 mm	<a href="#">186007385</a>	<a href="#">176003285</a>
	3.0 $\times$ 75 mm	<a href="#">186007110</a>	<a href="#">176003163</a>	3.0 $\times$ 75 mm	<a href="#">186007386</a>	<a href="#">176003286</a>
	3.0 $\times$ 100 mm	<a href="#">186007111</a>	<a href="#">176003164</a>	3.0 $\times$ 100 mm	<a href="#">186007387</a>	<a href="#">176003287</a>
	3.0 $\times$ 150 mm	<a href="#">186007112</a>	<a href="#">176003165</a>	3.0 $\times$ 150 mm	<a href="#">186007388</a>	<a href="#">176003288</a>
				4.6 $\times$ 30 mm	<a href="#">186007389</a>	<a href="#">176003317</a>
				4.6 $\times$ 50 mm	<a href="#">186007390</a>	<a href="#">176003318</a>
				4.6 $\times$ 75 mm	<a href="#">186007391</a>	<a href="#">176003319</a>
			4.6 $\times$ 100 mm	<a href="#">186007392</a>	<a href="#">176003320</a>	
			4.6 $\times$ 150 mm	<a href="#">186007393</a>	<a href="#">176003321</a>	

## CORTECS UPLC VanGuard Pre-columns (Guard Columns)

	Particle Size: 1.6 $\mu\text{m}$		Particle Size: 1.6 $\mu\text{m}$		
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	
<b>C<sub>18</sub>+</b>	2.1 $\times$ 5 mm	<a href="#">186007125</a>	<b>C<sub>8</sub></b>	2.1 $\times$ 5 mm	<a href="#">186008423</a>
<b>C<sub>18</sub></b>	2.1 $\times$ 5 mm	<a href="#">186007123</a>	<b>Phenyl</b>	2.1 $\times$ 5 mm	<a href="#">186008420</a>
<b>Shield RP18</b>	2.1 $\times$ 5 mm	<a href="#">186008713</a>	<b>HILIC</b>	2.1 $\times$ 5 mm	<a href="#">186007124</a>
<b>T3</b>	2.1 $\times$ 5 mm	<a href="#">186008508</a>			

## Quality Control Reference Materials

Description	P/N
Neutrals QC Reference Material	<a href="#">186006360</a>
Reversed-Phase QC Reference Material	<a href="#">186006363</a>
HILIC QC Reference Material	<a href="#">186007226</a>

## ACQUITY UPLC Columns In-line Filter Unit

Description	P/N
In-line filter holder and six, 0.2 $\mu\text{m}$ stainless steel replacement filters	<a href="#">205000343</a>
0.2 $\mu\text{m}$ stainless steel replacement filters ( $\times$ 5), with end nuts - for use with p/n: <a href="#">205000343</a>	<a href="#">700002775</a>

## ACQUITY UPLC Columns

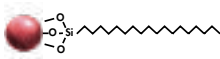
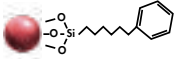
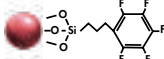
ACQUITY UPLC Columns are designed to work seamlessly with ACQUITY UPLC Systems. The sub-2- $\mu\text{m}$ , fully porous particles technologies (BEH, CSH, and HSS) provide high efficiencies along with the widest sub-2- $\mu\text{m}$  selectivity space. Rugged, base-particle technologies provide best-in-class column stability and ultimate flexibility for high-throughput method development.



### ACQUITY UPLC CHARGED SURFACE HYBRID (CSH) COLUMNS

Reversed-phase bonded phases typically have poor peak shape for basic compounds when using formic acid, even at analytical mass loads; but, ACQUITY UPLC CSH Columns are the exception. When used with formic acid or other low-ionic-strength, acidic mobile phases, these rugged columns provide superior peak shape for basic analytes. The controlled, low-level, positive surface charge bonded to the ethylene-bridged hybrid (BEH) particles provides excellent peak shape for bases—without the need for the use of ion-pairing reagents.

#### Column Characteristics

	<b>CSH C<sub>18</sub>, 130 Å</b>	<b>CSH Phenyl-Hexyl, 130 Å</b>	<b>CSH Fluoro-Phenyl, 130 Å</b>
	<b>UPLC: 1.7 <math>\mu\text{m}</math></b>	<b>UPLC: 1.7 <math>\mu\text{m}</math></b>	<b>UPLC: 1.7 <math>\mu\text{m}</math></b>
<b>Particle/Ligand</b>			
<b>Ligand Density*</b>	2.3 $\mu\text{mol}/\text{m}^2$	2.3 $\mu\text{mol}/\text{m}^2$	2.3 $\mu\text{mol}/\text{m}^2$
<b>Carbon Load*</b>	15%	14%	10%
<b>Endcapped</b>	Yes	Yes	No
<b>USP Class No.</b>	L1	L11	L43
<b>pH Range</b>	1-11	1-11	1-8
<b>Temperature Limits</b>	Low pH = 80 °C, High pH = 45 °C	Low pH = 80 °C, High pH = 45 °C	Low pH = 60 °C, High pH = 45 °C
<b>Surface Area*</b>	185 $\text{m}^2/\text{g}$	185 $\text{m}^2/\text{g}$	185 $\text{m}^2/\text{g}$
<b>Performance Standards</b>	<b>Neutrals QC Reference Material</b> p/n: <a href="#">186006360</a>	<b>Neutrals QC Reference Material</b> p/n: <a href="#">186006360</a>	<b>Neutrals QC Reference Material</b> p/n: <a href="#">186006360</a>
<b>Application Standards</b>	<b>Reversed-Phase QC Reference Material</b> p/n: <a href="#">186006363</a>	<b>Reversed-Phase QC Reference Material</b> p/n: <a href="#">186006363</a>	<b>Reversed-Phase QC Reference Material</b> p/n: <a href="#">186006363</a>

\*Expected or approximate value.

## Ordering Information

### ACQUITY UPLC CSH Columns

	Particle Size: 1.7 $\mu$ m		Particle Size: 1.7 $\mu$ m	
	Dimension	P/N (1/pk)	Dimension	P/N (3/pk)
CSH C <sub>18</sub>	1.0 × 50 mm	<a href="#">186005292</a>	1.0 × 50 mm	<a href="#">176002136</a>
	1.0 × 100 mm	<a href="#">186005293</a>	1.0 × 100 mm	<a href="#">176002137</a>
	1.0 × 150 mm	<a href="#">186005294</a>	1.0 × 150 mm	<a href="#">176002138</a>
	2.1 × 30 mm	<a href="#">186005295</a>	2.1 × 30 mm	<a href="#">176002139</a>
	2.1 × 50 mm	<a href="#">186005296</a>	2.1 × 50 mm	<a href="#">176002140</a>
	2.1 × 75 mm	<a href="#">186005620</a>	2.1 × 100 mm	<a href="#">176002141</a>
	2.1 × 100 mm	<a href="#">186005297</a>	2.1 × 150 mm	<a href="#">176002142</a>
	2.1 × 150 mm	<a href="#">186005298</a>	3.0 × 30 mm	<a href="#">176002143</a>
	3.0 × 30 mm	<a href="#">186005299</a>	3.0 × 50 mm	<a href="#">176002144</a>
	3.0 × 50 mm	<a href="#">186005300</a>	3.0 × 100 mm	<a href="#">176002145</a>
	3.0 × 75 mm	<a href="#">186005623</a>	3.0 × 150 mm	<a href="#">176002146</a>
	3.0 × 100 mm	<a href="#">186005301</a>		
	3.0 × 150 mm	<a href="#">186005302</a>		
	CSH Phenyl-Hexyl	1.0 × 50 mm	<a href="#">186005404</a>	1.0 × 50 mm
1.0 × 100 mm		<a href="#">186005402</a>	1.0 × 100 mm	<a href="#">176002159</a>
1.0 × 150 mm		<a href="#">186005403</a>	1.0 × 150 mm	<a href="#">176002160</a>
2.1 × 30 mm		<a href="#">186005405</a>	2.1 × 30 mm	<a href="#">176002162</a>
2.1 × 50 mm		<a href="#">186005406</a>	2.1 × 50 mm	<a href="#">176002163</a>
2.1 × 75 mm		<a href="#">186005621</a>	2.1 × 100 mm	<a href="#">176002164</a>
2.1 × 100 mm		<a href="#">186005407</a>	2.1 × 150 mm	<a href="#">176002165</a>
2.1 × 150 mm		<a href="#">186005408</a>	3.0 × 30 mm	<a href="#">176002166</a>
3.0 × 30 mm		<a href="#">186005409</a>	3.0 × 50 mm	<a href="#">176002167</a>
3.0 × 50 mm		<a href="#">186005410</a>	3.0 × 100 mm	<a href="#">176002168</a>
3.0 × 75 mm		<a href="#">186005624</a>	3.0 × 150 mm	<a href="#">176002169</a>
3.0 × 100 mm		<a href="#">186005411</a>		
3.0 × 150 mm		<a href="#">186005412</a>		
CSH Fluoro-Phenyl		1.0 × 50 mm	<a href="#">186005349</a>	1.0 × 50 mm
	1.0 × 100 mm	<a href="#">186005347</a>	1.0 × 100 mm	<a href="#">176002148</a>
	1.0 × 150 mm	<a href="#">186005348</a>	1.0 × 150 mm	<a href="#">176002149</a>
	2.1 × 30 mm	<a href="#">186005350</a>	2.1 × 30 mm	<a href="#">176002151</a>
	2.1 × 50 mm	<a href="#">186005351</a>	2.1 × 50 mm	<a href="#">176002152</a>
	2.1 × 75 mm	<a href="#">186005622</a>	2.1 × 100 mm	<a href="#">176002153</a>
	2.1 × 100 mm	<a href="#">186005352</a>	2.1 × 150 mm	<a href="#">176002154</a>
	2.1 × 150 mm	<a href="#">186005353</a>	3.0 × 30 mm	<a href="#">176002155</a>
	3.0 × 30 mm	<a href="#">186005354</a>	3.0 × 50 mm	<a href="#">176002156</a>
	3.0 × 50 mm	<a href="#">186005355</a>	3.0 × 100 mm	<a href="#">176002157</a>
	3.0 × 75 mm	<a href="#">186005625</a>	3.0 × 150 mm	<a href="#">176002158</a>
	3.0 × 100 mm	<a href="#">186005356</a>		
	3.0 × 150 mm	<a href="#">186005357</a>		

ACQUITY UPLC CSH Columns *Continued*

	Particle Size: 1.7 $\mu\text{m}$	
	Dimension	P/N (1/pk)
Peptide CSH C <sub>18</sub> , 130 Å	1.0 × 50 mm	<a href="#">186006933</a>
	1.0 × 100 mm	<a href="#">186006934</a>
	1.0 × 150 mm	<a href="#">186006935</a>
	2.1 × 50 mm	<a href="#">186006936</a>
	2.1 × 100 mm	<a href="#">186006937</a>
	2.1 × 150 mm	<a href="#">186006938</a>

ACQUITY UPLC CSH VanGuard Pre-columns (Guard Columns)

	Particle Size: 1.7 $\mu\text{m}$	
	Dimension	P/N (3/pk)
CSH C <sub>18</sub>	2.1 × 5 mm	<a href="#">186005303</a>
CSH Phenyl-Hexyl	2.1 × 5 mm	<a href="#">186005413</a>
CSH Fluoro-Phenyl	2.1 × 5 mm	<a href="#">186005358</a>
Peptide CSH C <sub>18</sub>	2.1 × 5 mm	<a href="#">186006939</a>
	2.1 × 5 mm	<a href="#">176003067</a> <sup>2</sup>

<sup>2</sup>Kit includes column and one vial of Cytochrome c Digestion Standard, p/n: [186006371](#).

ACQUITY UPLC Peptide CSH C<sub>18</sub> VanGuard Columns

	Particle Size: 1.7 $\mu\text{m}$	
	Dimension	P/N (3/pk)
CSH C <sub>18</sub>	2.1 × 5 mm	<a href="#">186006939</a>
	2.1 × 5 mm	<a href="#">176003067</a> <sup>2</sup>

<sup>2</sup>Kit includes column and one vial of Cytochrome c Digestion Standard, p/n: [186006371](#).



ACQUITY UPLC Columns In-line Filter Unit

Description	P/N
In-line filter holder and six 0.2 $\mu\text{m}$ stainless steel replacement filters	<a href="#">205000343</a>
0.2 $\mu\text{m}$ stainless steel replacement filters (×5), with end nuts - for use with p/n: <a href="#">205000343</a>	<a href="#">700002775</a>

Quality Control Reference Materials

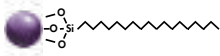
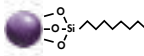

Description	P/N
Neutrals QC Reference Material	<a href="#">186006360</a>
Reversed-Phase QC Reference Material	<a href="#">186006363</a>

**i** For more information on Peptide Columns, [refer to page 385](#); for ACQUITY UPLC Peptide Column Ordering Information, [refer to page 392](#).

## ACQUITY UPLC ETHYLENE BRIDGED HYBRID (BEH) COLUMNS

ACQUITY UPLC BEH Columns provide unprecedented levels of peak asymmetry, efficiency, and chemical stability. Available in both reversed-phase and HILIC, with chemistries that provide selectivity for many small-molecule compounds, these robust columns can operate at conditions of extreme pH. With the ruggedness to operate under extreme pH conditions, ACQUITY UPLC BEH Columns enable the ability to utilize a wide pH range to influence retention, selectivity, and sensitivity of ionizable compounds.

### Column Characteristics

	BEH C <sub>18</sub> , 130 Å	BEH C <sub>8</sub> , 130 Å	BEH Shield RP18, 130 Å
	UPLC: 1.7 μm		
Particle/Ligand			
Ligand Density	3.1 μmol/m <sup>2</sup>	3.2 μmol/m <sup>2</sup>	3.3 μmol/m <sup>2</sup>
Carbon Load	18%	13%	17%
Endcapped	Yes	Yes	Yes
USP Class No.	L1	L7	L1
pH Range	1-12	1-12	2-11
Temperature Limits	Low pH = 80 °C, High pH = 60 °C	Low pH = 60 °C, High pH = 60 °C	Low pH = 50 °C, High pH = 45 °C
Surface Area	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g
Performance Standards	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>
Application Standards	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>

\*Expected or approximate value.

 BEH Technology is also available in HPLC particle sizes (XBridge HPLC BEH), please [refer to pages 181 and 184](#).



BEH Phenyl, 130 Å	BEH HILIC, 130 Å	BEH Amide, 130 Å
UPLC: 1.7 µm	UPLC: 1.7 µm	UPLC: 1.7 µm
3.0 µmol/m <sup>2</sup>	N/A	7.5 µmol/m <sup>2</sup>
15%	Unbonded	12%
Yes	N/A	N/A
L11	L3	L68
1-12	1-9	2-11
Low pH = 80 °C, High pH = 60 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 90 °C, High pH = 90 °C
185 m <sup>2</sup> /g	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g
<b>Neutrals QC Reference Material</b> p/n: <a href="#">186006360</a>	<b>HILIC QC Reference Material</b> p/n: <a href="#">186007226</a>	<b>HILIC QC Reference Material</b> p/n: <a href="#">186007226</a>
<b>Reversed-Phase QC Reference Material</b> p/n: <a href="#">186006363</a>	–	–



**APPLICATION AREA:** Targeted Metabolomics

"BEH columns are the best – great separation – even for isomers, long column life and peak shapes. I develop all my methods with use of BEH columns."

**REVIEWER:** Kamil Kuś

**ORGANIZATION:** Jagiellonian Center for Experimental Therapeutics

## Ordering Information

### ACQUITY UPLC BEH Columns

	Particle Size: 1.7 $\mu\text{m}$	
	Dimension	P/N (1/pk)
BEH C <sub>18</sub>	1.0 × 50 mm	<a href="#">186002344</a>
	1.0 × 100 mm	<a href="#">186002346</a>
	1.0 × 150 mm	<a href="#">186002347</a>
	2.1 × 30 mm	<a href="#">186002349</a>
	2.1 × 50 mm	<a href="#">186002350</a>
	2.1 × 75 mm	<a href="#">186005604</a>
	2.1 × 100 mm	<a href="#">186002352</a>
	2.1 × 150 mm	<a href="#">186002353</a>
	3.0 × 30 mm	<a href="#">186004659</a>
	3.0 × 50 mm	<a href="#">186004660</a>
	3.0 × 75 mm	<a href="#">186005609</a>
	3.0 × 100 mm	<a href="#">186004661</a>
	3.0 × 150 mm	<a href="#">186004690</a>

BEH Shield RP18	1.0 × 50 mm	<a href="#">186002851</a>
	1.0 × 100 mm	<a href="#">186002852</a>
	1.0 × 150 mm	<a href="#">186003373</a>
	2.1 × 30 mm	<a href="#">186003909</a>
	2.1 × 50 mm	<a href="#">186002853</a>
	2.1 × 75 mm	<a href="#">186005605</a>
	2.1 × 100 mm	<a href="#">186002854</a>
	2.1 × 150 mm	<a href="#">186003376</a>
	3.0 × 30 mm	<a href="#">186004667</a>
	3.0 × 50 mm	<a href="#">186004668</a>
	3.0 × 75 mm	<a href="#">186005610</a>
	3.0 × 100 mm	<a href="#">186004669</a>
	3.0 × 150 mm	<a href="#">186004670</a>

BEH C <sub>8</sub>	1.0 × 50 mm	<a href="#">186002875</a>
	1.0 × 100 mm	<a href="#">186002876</a>
	1.0 × 150 mm	<a href="#">186003374</a>
	2.1 × 30 mm	<a href="#">186003910</a>
	2.1 × 50 mm	<a href="#">186002877</a>
	2.1 × 75 mm	<a href="#">186005606</a>
	2.1 × 100 mm	<a href="#">186002878</a>
	2.1 × 150 mm	<a href="#">186003377</a>
	3.0 × 30 mm	<a href="#">186004663</a>
	3.0 × 50 mm	<a href="#">186004664</a>
	3.0 × 75 mm	<a href="#">186005611</a>
	3.0 × 100 mm	<a href="#">186004665</a>
	3.0 × 150 mm	<a href="#">186004666</a>

	Particle Size: 1.7 $\mu\text{m}$	
	Dimension	P/N (1/pk)
BEH Phenyl	1.0 × 50 mm	<a href="#">186002882</a>
	1.0 × 100 mm	<a href="#">186002883</a>
	1.0 × 150 mm	<a href="#">186003375</a>
	2.1 × 30 mm	<a href="#">186003911</a>
	2.1 × 50 mm	<a href="#">186002884</a>
	2.1 × 75 mm	<a href="#">186005607</a>
	2.1 × 100 mm	<a href="#">186002885</a>
	2.1 × 150 mm	<a href="#">186003378</a>
	3.0 × 30 mm	<a href="#">186004671</a>
	3.0 × 50 mm	<a href="#">186004672</a>
	3.0 × 75 mm	<a href="#">186005612</a>
	3.0 × 100 mm	<a href="#">186004673</a>
	3.0 × 150 mm	<a href="#">186004674</a>

BEH HILIC	1.0 × 50 mm	<a href="#">186003457</a>
	1.0 × 100 mm	<a href="#">186003458</a>
	1.0 × 150 mm	<a href="#">186003459</a>
	2.1 × 50 mm	<a href="#">186003460</a>
	2.1 × 75 mm	<a href="#">186005608</a>
	2.1 × 100 mm	<a href="#">186003461</a>
	2.1 × 150 mm	<a href="#">186003462</a>
	3.0 × 50 mm	<a href="#">186004675</a>
	3.0 × 75 mm	<a href="#">186005613</a>
	3.0 × 100 mm	<a href="#">186004676</a>
	3.0 × 150 mm	<a href="#">186004677</a>

BEH Amide	1.0 × 50 mm	<a href="#">186004848</a>
	1.0 × 100 mm	<a href="#">186004849</a>
	1.0 × 150 mm	<a href="#">186004850</a>
	2.1 × 30 mm	<a href="#">186004839</a>
	2.1 × 50 mm	<a href="#">186004800</a>
	2.1 × 75 mm	<a href="#">186005657</a>
	2.1 × 100 mm	<a href="#">186004801</a>
	2.1 × 150 mm	<a href="#">186004802</a>
	3.0 × 30 mm	<a href="#">186004803</a>
	3.0 × 50 mm	<a href="#">186004804</a>
	3.0 × 75 mm	<a href="#">186005658</a>
	3.0 × 100 mm	<a href="#">186004805</a>
	3.0 × 150 mm	<a href="#">186004806</a>

ACQUITY UPLC BEH Columns *Continued*

Particle Size: 1.7 µm		
	Dimension	P/N (1/pk)
Glycan BEH Amide, 130 Å	2.1 × 50 mm	<a href="#">186004740</a>
	2.1 × 100 mm	<a href="#">186004741</a>
	2.1 × 150 mm	<a href="#">186004742</a>
Peptide BEH C <sub>18</sub> , 130 Å	2.1 × 50 mm	<a href="#">186003554</a>
	2.1 × 100 mm	<a href="#">186003555</a>
	2.1 × 150 mm	<a href="#">186003556</a>
	2.1 × 300 mm	<a href="#">186005792</a>
Peptide BEH C <sub>18</sub> , 300 Å	1.0 × 50 mm	<a href="#">186005592</a>
	1.0 × 100 mm	<a href="#">186005593</a>
	1.0 × 150 mm	<a href="#">186005594</a>
	2.1 × 50 mm	<a href="#">186003685</a>
	2.1 × 100 mm	<a href="#">186003686</a>
	2.1 × 150 mm	<a href="#">186003687</a>
Protein BEH SEC, 125 Å	4.6 × 30 mm, Guard Column	<a href="#">186006504</a>
	4.6 × 150 mm, Column	<a href="#">186006505</a>
	4.6 × 150 mm, Column and Standard <sup>2</sup>	<a href="#">176003906</a>
	4.6 × 300 mm, Column	<a href="#">186006506</a>
	4.6 × 300 mm, Column and Standard <sup>2</sup>	<a href="#">176003907</a>
Protein BEH SEC, 200 Å	2.1 × 150 mm, Column	<a href="#">186008471</a>
	4.6 × 30 mm, Guard Column	<a href="#">186005793</a>
	4.6 × 150 mm, Column	<a href="#">186005225</a>
	4.6 × 150 mm, Column and Standard <sup>1</sup>	<a href="#">176003904</a>
	4.6 × 300 mm, Column	<a href="#">186005226</a>
	4.6 × 300 mm, Column and Standard <sup>1</sup>	<a href="#">176003905</a>

<sup>1</sup>Includes one BEH200 SEC standard.

<sup>2</sup>Includes one BEH125 SEC standard.

ACQUITY UPLC BEH VanGuard Pre-columns (Guard Columns)

Particle Size: 1.7 µm		
	Dimension	P/N (3/pk)
BEH C <sub>18</sub>	2.1 × 5 mm	<a href="#">186003975</a>
BEH Shield RP18	2.1 × 5 mm	<a href="#">186003977</a>
BEH C <sub>8</sub>	2.1 × 5 mm	<a href="#">186003978</a>
BEH Phenyl	2.1 × 5 mm	<a href="#">186003979</a>
BEH HILIC	2.1 × 5 mm	<a href="#">186003980</a>
BEH Amide	2.1 × 5 mm	<a href="#">186004799</a>
Glycan BEH Amide, 130 Å	2.1 × 5 mm	<a href="#">186004739</a>
Peptide BEH C <sub>18</sub> , 130 Å	2.1 × 5 mm	<a href="#">186003975</a>

Quality Control Reference Materials

Description	P/N
Neutrals QC Reference Materials	<a href="#">186006360</a>
Reversed-Phase QC Reference Materials	<a href="#">186006363</a>
HILIC QC Reference Materials	<a href="#">186007226</a>

ACQUITY UPLC Protein BEH SEC Column Accessories

Description	P/N
ELSD Outlet Tubing (0.004" I.D. × 6" length)	<a href="#">430001562</a>
SEC UPLC Connection Tubing (0.005" I.D. × 1.75" length), 2/pk	<a href="#">186006613</a>

ACQUITY UPLC Columns In-line Filter Unit

Description	P/N
In-line filter holder and six 0.2 µm stainless steel replacement filters	<a href="#">205000343</a>
0.2 µm stainless steel replacement filters (×5), with end nuts - for p/n: <a href="#">205000343</a>	<a href="#">700002775</a>



## ACQUITY UPLC HIGH STRENGTH SILICA (HSS) COLUMNS

ACQUITY UPLC HSS Columns provide increased retention for both polar and non-polar analytes when compared to CORTECS, CSH, and BEH particles. The thermally treated silica particle provides mechanical strength and stability when operating under UPLC system pressures. Available in five bonded phases, this robust particle technology maximizes the selectivity space. The ample array of bonded phases associated with ACQUITY UPLC HSS Columns enable traditional hydrophobic, reversed-phase interactions as well as dipole-dipole, aromatic, and hydrogen-bonding interactions.



### Column Characteristics

	HSS C <sub>18</sub> , 100 Å	HSS C <sub>18</sub> SB, 100 Å	HSS T <sub>3</sub> , 100 Å	HSS PFP, 100 Å	HSS CN, 100 Å
	UPLC: 1.8 μm	UPLC: 1.8 μm	UPLC: 1.8 μm	UPLC: 1.8 μm	UPLC: 1.8 μm
Particle/Ligand					
Ligand Density	3.2 μmol/m <sup>2</sup>	1.6 μmol/m <sup>2</sup>	1.6 μmol/m <sup>2</sup>	3.2 μmol/m <sup>2</sup>	2.0 μmol/m <sup>2</sup>
Carbon Load	15%	8%	11%	7%	5%
Endcapped	Yes	N/A	Yes	N/A	N/A
USP Class No.	L1	L1	L1	L43	L10
pH Range	1-8	2-8	2-8	2-8	2-8
Temperature Limits	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
Surface Area	230 m <sup>2</sup> /g	230 m <sup>2</sup> /g	230 m <sup>2</sup> /g	230 m <sup>2</sup> /g	230 m <sup>2</sup> /g
Performance Standards	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>
Application Standards	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	—

\*Expected or approximate value.

## Ordering Information

### ACQUITY UPLC HSS Columns

	Particle Size: 1.8 $\mu$ m		Particle Size: 1.8 $\mu$ m	
	Dimension	P/N (1/pk)	Dimension	P/N (3/pk)
<b>HSS T3</b>	1.0 $\times$ 50 mm	<a href="#">186003535</a>	1.0 $\times$ 50 mm	<a href="#">176001127</a>
	1.0 $\times$ 100 mm	<a href="#">186003536</a>	1.0 $\times$ 100 mm	<a href="#">176001129</a>
	1.0 $\times$ 150 mm	<a href="#">186003537</a>	1.0 $\times$ 150 mm	<a href="#">176001130</a>
	2.1 $\times$ 30 mm	<a href="#">186003944</a>	2.1 $\times$ 30 mm	<a href="#">176001375</a>
	2.1 $\times$ 50 mm	<a href="#">186003538</a>	2.1 $\times$ 50 mm	<a href="#">176001131</a>
	2.1 $\times$ 75 mm	<a href="#">186005614</a>	2.1 $\times$ 100 mm	<a href="#">176001132</a>
	2.1 $\times$ 100 mm	<a href="#">186003539</a>	2.1 $\times$ 150 mm	<a href="#">176001133</a>
	2.1 $\times$ 150 mm	<a href="#">186003540</a>	3.0 $\times$ 30 mm	<a href="#">176001813</a>
	3.0 $\times$ 30 mm	<a href="#">186004678</a>	3.0 $\times$ 50 mm	<a href="#">176001814</a>
	3.0 $\times$ 50 mm	<a href="#">186004679</a>	3.0 $\times$ 100 mm	<a href="#">176001815</a>
	3.0 $\times$ 75 mm	<a href="#">186005617</a>	3.0 $\times$ 150 mm	<a href="#">176001816</a>
	3.0 $\times$ 100 mm	<a href="#">186004680</a>		
	3.0 $\times$ 150 mm	<a href="#">186004681</a>		
	<b>HSS C<sub>18</sub></b>	1.0 $\times$ 50 mm	<a href="#">186003529</a>	1.0 $\times$ 50 mm
1.0 $\times$ 100 mm		<a href="#">186003530</a>	1.0 $\times$ 100 mm	<a href="#">176001122</a>
1.0 $\times$ 150 mm		<a href="#">186003531</a>	1.0 $\times$ 150 mm	<a href="#">176001123</a>
2.1 $\times$ 30 mm		<a href="#">186003987</a>	2.1 $\times$ 30 mm	<a href="#">176001398</a>
2.1 $\times$ 50 mm		<a href="#">186003532</a>	2.1 $\times$ 50 mm	<a href="#">176001124</a>
2.1 $\times$ 75 mm		<a href="#">186005615</a>	2.1 $\times$ 100 mm	<a href="#">176001125</a>
2.1 $\times$ 100 mm		<a href="#">186003533</a>	2.1 $\times$ 150 mm	<a href="#">176001126</a>
2.1 $\times$ 150 mm		<a href="#">186003534</a>	3.0 $\times$ 30 mm	<a href="#">176001817</a>
3.0 $\times$ 30 mm		<a href="#">186004682</a>	3.0 $\times$ 50 mm	<a href="#">176001818</a>
3.0 $\times$ 50 mm		<a href="#">186004683</a>	3.0 $\times$ 100 mm	<a href="#">176001819</a>
3.0 $\times$ 75 mm		<a href="#">186005618</a>	3.0 $\times$ 150 mm	<a href="#">176001820</a>
3.0 $\times$ 100 mm		<a href="#">186004684</a>		
3.0 $\times$ 150 mm		<a href="#">186004685</a>		
<b>HSS C<sub>18</sub> SB</b>		1.0 $\times$ 50 mm	<a href="#">186004114</a>	1.0 $\times$ 50 mm
	1.0 $\times$ 100 mm	<a href="#">186004115</a>	1.0 $\times$ 100 mm	<a href="#">176001557</a>
	1.0 $\times$ 150 mm	<a href="#">186004116</a>	1.0 $\times$ 150 mm	<a href="#">176001558</a>
	2.1 $\times$ 30 mm	<a href="#">186004117</a>	2.1 $\times$ 30 mm	<a href="#">176001559</a>
	2.1 $\times$ 50 mm	<a href="#">186004118</a>	2.1 $\times$ 50 mm	<a href="#">176001560</a>
	2.1 $\times$ 75 mm	<a href="#">186005616</a>	2.1 $\times$ 100 mm	<a href="#">176001561</a>
	2.1 $\times$ 100 mm	<a href="#">186004119</a>	2.1 $\times$ 150 mm	<a href="#">176001562</a>
	2.1 $\times$ 150 mm	<a href="#">186004120</a>	3.0 $\times$ 30 mm	<a href="#">176001821</a>
	3.0 $\times$ 30 mm	<a href="#">186004686</a>	3.0 $\times$ 50 mm	<a href="#">176001822</a>
	3.0 $\times$ 50 mm	<a href="#">186004687</a>	3.0 $\times$ 100 mm	<a href="#">176001823</a>
	3.0 $\times$ 75 mm	<a href="#">186005619</a>	3.0 $\times$ 150 mm	<a href="#">176001824</a>
	3.0 $\times$ 100 mm	<a href="#">186004826</a>		
	3.0 $\times$ 150 mm	<a href="#">186004689</a>		



For more information on Peptide HSS Columns, [refer to page 390](#); for Ordering Information, refer to [page 392](#).

ACQUITY UPLC HSS Columns *Continued*

	Particle Size: 1.8 µm		Particle Size: 1.8 µm	
	Dimension	P/N (1/pk)	Dimension	P/N (3/pk)
<b>HSS Cyano</b>	1.0 × 50 mm	<a href="#">186005982</a>	1.0 × 50 mm	176002703
	1.0 × 100 mm	<a href="#">186005983</a>	1.0 × 100 mm	176002704
	1.0 × 150 mm	<a href="#">186005984</a>	1.0 × 150 mm	176002705
	2.1 × 30 mm	<a href="#">186005985</a>	2.1 × 30 mm	176002706
	2.1 × 50 mm	<a href="#">186005986</a>	2.1 × 50 mm	176002707
	2.1 × 75 mm	<a href="#">186005987</a>	2.1 × 75 mm	176002708
	2.1 × 100 mm	<a href="#">186005988</a>	2.1 × 100 mm	<a href="#">176002709</a>
	2.1 × 150 mm	<a href="#">186005989</a>	2.1 × 150 mm	176002710
	3.0 × 30 mm	<a href="#">186005990</a>	3.0 × 30 mm	176002711
	3.0 × 50 mm	<a href="#">186005991</a>	3.0 × 50 mm	176002712
	3.0 × 75 mm	<a href="#">186005992</a>	3.0 × 75 mm	176002713
	3.0 × 100 mm	<a href="#">186005993</a>	3.0 × 100 mm	176002714
	3.0 × 150 mm	<a href="#">186005994</a>	3.0 × 150 mm	176002715
<b>HSS PFP</b>	1.0 × 50 mm	<a href="#">186005961</a>	1.0 × 50 mm	176002690
	1.0 × 100 mm	<a href="#">186005962</a>	1.0 × 100 mm	176002691
	1.0 × 150 mm	<a href="#">186005963</a>	1.0 × 150 mm	176002692
	2.1 × 30 mm	<a href="#">186005964</a>	2.1 × 30 mm	176002693
	2.1 × 50 mm	<a href="#">186005965</a>	2.1 × 50 mm	176002694
	2.1 × 75 mm	<a href="#">186005966</a>	2.1 × 75 mm	176002695
	2.1 × 100 mm	<a href="#">186005967</a>	2.1 × 100 mm	176002696
	2.1 × 150 mm	<a href="#">186005968</a>	2.1 × 150 mm	<a href="#">176002697</a>
	3.0 × 30 mm	<a href="#">186005969</a>	3.0 × 30 mm	176002698
	3.0 × 50 mm	<a href="#">186005970</a>	3.0 × 50 mm	176002699
	3.0 × 75 mm	<a href="#">186005971</a>	3.0 × 75 mm	176002700
	3.0 × 100 mm	<a href="#">186005972</a>	3.0 × 100 mm	176002701
	3.0 × 150 mm	<a href="#">186005973</a>	3.0 × 150 mm	176002702

ACQUITY UPLC HSS VanGuard Pre-columns (Guard Columns)

Particle Size: 1.8 µm		Particle Size: 1.8 µm	
Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>HSS C<sub>8</sub></b>	2.1 × 5 mm	<a href="#">186003981</a>	<b>HSS PFP</b>
<b>HSS C<sub>18</sub> SB</b>	2.1 × 5 mm	<a href="#">186004136</a>	<b>HSS Cyano</b>
<b>HSS T3</b>	2.1 × 5 mm	<a href="#">186003976</a>	2.1 × 5 mm
			<a href="#">186005995</a>

Quality Control Reference Materials

Description	P/N
Neutrals QC Reference Materials	<a href="#">186006360</a>
Reversed-Phase QC Reference Materials	<a href="#">186006363</a>

ACQUITY UPLC Columns In-line Filter Unit

Description	P/N
In-line filter holder and six 0.2 µm stainless steel replacement filters	<a href="#">205000343</a>
0.2 µm stainless steel replacement filters (×5), with end nuts - for use with p/n: <a href="#">205000343</a>	<a href="#">700002775</a>

## ACQUITY UPLC and CORTECS 1.6 $\mu\text{m}$ Method Validation Kits

The reproducibility of a chromatographic column's performance significantly affects the long-term reliability and robustness of an analytical method. Reproducibility, however, is beyond the direct control of analysts. Yet all isn't lost. Our long-established, highly controlled particle- and column-manufacturing processes ensure batch-to-batch and column-to-column reproducibility that provide confidence in the continued use of your methods. ACQUITY UPLC Method Validation Kits include three batches of chromatographic media (derived from different base particles) to evaluate the quality, reliability, and consistency of your method.

### Ordering Information

#### CORTECS UPLC Columns Method Validation Kits (MVK)\*

	Particle Size: 1.6 $\mu\text{m}$		Particle Size: 2.7 $\mu\text{m}$	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>C<sub>8</sub></b>	2.1 × 30 mm	<a href="#">186008403</a>	2.1 × 30 mm	<a href="#">186008353</a>
	2.1 × 50 mm	<a href="#">186008404</a>	2.1 × 50 mm	<a href="#">186008354</a>
	2.1 × 75 mm	<a href="#">186008405</a>	2.1 × 75 mm	<a href="#">186008355</a>
	2.1 × 100 mm	<a href="#">186008406</a>	2.1 × 100 mm	<a href="#">186008356</a>
	2.1 × 150 mm	<a href="#">186008407</a>	2.1 × 150 mm	<a href="#">186008357</a>
	3.0 × 30 mm	<a href="#">186008413</a>	3.0 × 30 mm	<a href="#">186008363</a>
	3.0 × 50 mm	<a href="#">186008414</a>	3.0 × 50 mm	<a href="#">186008364</a>
	3.0 × 75 mm	<a href="#">186008415</a>	3.0 × 75 mm	<a href="#">186008365</a>
	3.0 × 100 mm	<a href="#">186008416</a>	3.0 × 100 mm	<a href="#">186008366</a>
	3.0 × 150 mm	<a href="#">186008417</a>	3.0 × 150 mm	<a href="#">186008367</a>
			4.6 × 30 mm	<a href="#">186008373</a>
			4.6 × 50 mm	<a href="#">186008374</a>
			4.6 × 75 mm	<a href="#">186008375</a>
			4.6 × 100 mm	<a href="#">186008376</a>
			4.6 × 150 mm	<a href="#">186008377</a>
<b>C<sub>18</sub>+</b>	2.1 × 30 mm	<a href="#">186007176</a>	2.1 × 30 mm	<a href="#">186007439</a>
	2.1 × 50 mm	<a href="#">186007177</a>	2.1 × 50 mm	<a href="#">186007440</a>
	2.1 × 75 mm	<a href="#">186007178</a>	2.1 × 75 mm	<a href="#">186007441</a>
	2.1 × 100 mm	<a href="#">186007179</a>	2.1 × 100 mm	<a href="#">186007442</a>
	2.1 × 150 mm	<a href="#">186007180</a>	2.1 × 150 mm	<a href="#">186007443</a>
	3.0 × 30 mm	<a href="#">186007181</a>	3.0 × 30 mm	<a href="#">186007444</a>
	3.0 × 50 mm	<a href="#">186007182</a>	3.0 × 50 mm	<a href="#">186007445</a>
	3.0 × 75 mm	<a href="#">186007183</a>	3.0 × 75 mm	<a href="#">186007446</a>
	3.0 × 100 mm	<a href="#">186007184</a>	3.0 × 100 mm	<a href="#">186007447</a>
	3.0 × 150 mm	<a href="#">186007185</a>	3.0 × 150 mm	<a href="#">186007448</a>
			4.6 × 30 mm	<a href="#">186007449</a>
			4.6 × 50 mm	<a href="#">186007450</a>
			4.6 × 75 mm	<a href="#">186007451</a>
			4.6 × 100 mm	<a href="#">186007452</a>
			4.6 × 150 mm	<a href="#">186007453</a>

\*Each kit contains three columns from three batches of material.

CORTECS UPLC Columns Method Validation Kits (MVK)\* *Continued*

	Particle Size: 1.6 $\mu$ m		Particle Size: 2.7 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>C<sub>18</sub></b>	2.1 × 30 mm	<a href="#">186007156</a>	2.1 × 30 mm	<a href="#">186007409</a>
	2.1 × 50 mm	<a href="#">186007157</a>	2.1 × 50 mm	<a href="#">186007410</a>
	2.1 × 75 mm	<a href="#">186007158</a>	2.1 × 75 mm	<a href="#">186007411</a>
	2.1 × 100 mm	<a href="#">186007159</a>	2.1 × 100 mm	<a href="#">186007412</a>
	2.1 × 150 mm	<a href="#">186007160</a>	2.1 × 150 mm	<a href="#">186007413</a>
	3.0 × 30 mm	<a href="#">186007161</a>	3.0 × 30 mm	<a href="#">186007414</a>
	3.0 × 50 mm	<a href="#">186007162</a>	3.0 × 50 mm	<a href="#">186007415</a>
	3.0 × 75 mm	<a href="#">186007163</a>	3.0 × 75 mm	<a href="#">186007416</a>
	3.0 × 100 mm	<a href="#">186007164</a>	3.0 × 100 mm	<a href="#">186007417</a>
	3.0 × 150 mm	<a href="#">186007165</a>	3.0 × 150 mm	<a href="#">186007418</a>
			4.6 × 30 mm	<a href="#">186007419</a>
			4.6 × 50 mm	<a href="#">186007420</a>
			4.6 × 75 mm	<a href="#">186007421</a>
			4.6 × 100 mm	<a href="#">186007422</a>
			4.6 × 150 mm	<a href="#">186007423</a>
<b>HILIC</b>	2.1 × 30 mm	<a href="#">186007166</a>	2.1 × 30 mm	<a href="#">186007424</a>
	2.1 × 50 mm	<a href="#">186007167</a>	2.1 × 50 mm	<a href="#">186007425</a>
	2.1 × 75 mm	<a href="#">186007168</a>	2.1 × 75 mm	<a href="#">186007426</a>
	2.1 × 100 mm	<a href="#">186007169</a>	2.1 × 100 mm	<a href="#">186007427</a>
	2.1 × 150 mm	<a href="#">186007170</a>	2.1 × 150 mm	<a href="#">186007428</a>
	3.0 × 30 mm	<a href="#">186007171</a>	3.0 × 30 mm	<a href="#">186007429</a>
	3.0 × 50 mm	<a href="#">186007172</a>	3.0 × 50 mm	<a href="#">186007430</a>
	3.0 × 75 mm	<a href="#">186007173</a>	3.0 × 75 mm	<a href="#">186007431</a>
	3.0 × 100 mm	<a href="#">186007174</a>	3.0 × 100 mm	<a href="#">186007432</a>
	3.0 × 150 mm	<a href="#">186007175</a>	3.0 × 150 mm	<a href="#">186007433</a>
			4.6 × 30 mm	<a href="#">186007434</a>
			4.6 × 50 mm	<a href="#">186007435</a>
			4.6 × 75 mm	<a href="#">186007436</a>
			4.6 × 100 mm	<a href="#">186007437</a>
			4.6 × 150 mm	<a href="#">186007438</a>
<b>Phenyl</b>	2.1 × 30 mm	<a href="#">186008383</a>	2.1 × 30 mm	<a href="#">186008323</a>
	2.1 × 50 mm	<a href="#">186008384</a>	2.1 × 50 mm	<a href="#">186008324</a>
	2.1 × 75 mm	<a href="#">186008405</a>	2.1 × 75 mm	<a href="#">186008325</a>
	2.1 × 100 mm	<a href="#">186008386</a>	2.1 × 100 mm	<a href="#">186008326</a>
	2.1 × 150 mm	<a href="#">186008387</a>	2.1 × 150 mm	<a href="#">186008327</a>
	3.0 × 30 mm	<a href="#">186008393</a>	3.0 × 30 mm	<a href="#">186008333</a>
	3.0 × 50 mm	<a href="#">186008394</a>	3.0 × 50 mm	<a href="#">186008334</a>
	3.0 × 75 mm	<a href="#">186008395</a>	3.0 × 75 mm	<a href="#">186008335</a>
	3.0 × 100 mm	<a href="#">186008396</a>	3.0 × 100 mm	<a href="#">186008336</a>
	3.0 × 150 mm	<a href="#">186008397</a>	3.0 × 150 mm	<a href="#">186008337</a>
			4.6 × 30 mm	<a href="#">186008343</a>
			4.6 × 50 mm	<a href="#">186008344</a>
			4.6 × 75 mm	<a href="#">186008345</a>
			4.6 × 100 mm	<a href="#">186008346</a>
			4.6 × 150 mm	<a href="#">186008347</a>

\*Each kit contains three columns from three batches of material.

CORTECS UPLC Columns Method Validation Kits (MVK)\* *Continued*

	Particle Size: 1.6 $\mu$ m		Particle Size: 2.7 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>T3</b>	2.1 $\times$ 30 mm	<a href="#">186008529</a>	2.1 $\times$ 30 mm	<a href="#">186008509</a>
	2.1 $\times$ 50 mm	<a href="#">186008530</a>	2.1 $\times$ 50 mm	<a href="#">186008510</a>
	2.1 $\times$ 75 mm	<a href="#">186008531</a>	2.1 $\times$ 75 mm	<a href="#">186008516</a>
	2.1 $\times$ 100 mm	<a href="#">186008536</a>	2.1 $\times$ 100 mm	<a href="#">186008517</a>
	2.1 $\times$ 150 mm	<a href="#">186008537</a>	2.1 $\times$ 150 mm	<a href="#">186008518</a>
	3.0 $\times$ 30 mm	<a href="#">186008538</a>	3.0 $\times$ 30 mm	<a href="#">186008519</a>
	3.0 $\times$ 50 mm	<a href="#">186008539</a>	3.0 $\times$ 50 mm	<a href="#">186008520</a>
	3.0 $\times$ 75 mm	<a href="#">186008540</a>	3.0 $\times$ 75 mm	<a href="#">186008521</a>
	3.0 $\times$ 100 mm	<a href="#">186008541</a>	3.0 $\times$ 100 mm	<a href="#">186008522</a>
	3.0 $\times$ 150 mm	<a href="#">186008542</a>	3.0 $\times$ 150 mm	<a href="#">186008523</a>
			4.6 $\times$ 30 mm	<a href="#">186008524</a>
			4.6 $\times$ 50 mm	<a href="#">186008525</a>
			4.6 $\times$ 75 mm	<a href="#">186008526</a>
			4.6 $\times$ 100 mm	<a href="#">186008527</a>
			4.6 $\times$ 150 mm	<a href="#">186008528</a>
	<b>Shield RP18</b>	2.1 $\times$ 30 mm	<a href="#">186008696</a>	2.1 $\times$ 30 mm
2.1 $\times$ 50 mm		<a href="#">186008697</a>	2.1 $\times$ 50 mm	<a href="#">186008667</a>
2.1 $\times$ 75 mm		<a href="#">186008698</a>	2.1 $\times$ 75 mm	<a href="#">186008668</a>
2.1 $\times$ 100 mm		<a href="#">186008699</a>	2.1 $\times$ 100 mm	<a href="#">186008669</a>
2.1 $\times$ 150 mm		<a href="#">186008700</a>	2.1 $\times$ 150 mm	<a href="#">186008670</a>
3.0 $\times$ 30 mm		<a href="#">186008706</a>	3.0 $\times$ 30 mm	186008676
3.0 $\times$ 50 mm		<a href="#">186008707</a>	3.0 $\times$ 50 mm	<a href="#">186008677</a>
3.0 $\times$ 75 mm		<a href="#">186008708</a>	3.0 $\times$ 75 mm	<a href="#">186008678</a>
3.0 $\times$ 100 mm		<a href="#">186008709</a>	3.0 $\times$ 100 mm	<a href="#">186008679</a>
3.0 $\times$ 150 mm		<a href="#">186008710</a>	3.0 $\times$ 150 mm	<a href="#">186008680</a>
			4.6 $\times$ 30 mm	186008686
			4.6 $\times$ 50 mm	<a href="#">186008687</a>
			4.6 $\times$ 75 mm	<a href="#">186008688</a>
			4.6 $\times$ 100 mm	<a href="#">186008689</a>
			4.6 $\times$ 150 mm	<a href="#">186008690</a>

\*Each kit contains three columns from three batches of material.

ACQUITY UPLC Method Validation Kits\* *Continued*

Particle Size: 1.7 µm		
	Dimension	P/N (3/pk)
CSH C <sub>18</sub>	2.1 × 50 mm	<a href="#">186005571</a>
	2.1 × 100 mm	<a href="#">186005572</a>
	2.1 × 150 mm	<a href="#">186006016</a>
	3.0 × 50 mm	<a href="#">186005573</a>
	3.0 × 100 mm	<a href="#">186005574</a>
CSH Phenyl-Hexyl	2.1 × 50 mm	<a href="#">186005579</a>
	2.1 × 100 mm	<a href="#">186005580</a>
	2.1 × 150 mm	<a href="#">186006017</a>
	3.0 × 50 mm	<a href="#">186005581</a>
	3.0 × 100 mm	<a href="#">186005582</a>
CSH Fluoro-Phenyl	2.1 × 50 mm	<a href="#">186005575</a>
	2.1 × 100 mm	<a href="#">186005576</a>
	2.1 × 150 mm	<a href="#">186006018</a>
	3.0 × 50 mm	<a href="#">186005577</a>
	3.0 × 100 mm	<a href="#">186005578</a>
BEH C <sub>18</sub>	2.1 × 50 mm	<a href="#">186004044</a>
	2.1 × 100 mm	<a href="#">186004045</a>
	2.1 × 150 mm	<a href="#">186006019</a>
	3.0 × 50 mm	<a href="#">186004691</a>
	3.0 × 100 mm	<a href="#">186004692</a>
BEH C <sub>8</sub>	2.1 × 50 mm	<a href="#">186004046</a>
	2.1 × 100 mm	<a href="#">186004047</a>
	2.1 × 150 mm	<a href="#">186006020</a>
	3.0 × 50 mm	<a href="#">186004693</a>
	3.0 × 100 mm	<a href="#">186004694</a>
BEH Shield RP18	2.1 × 50 mm	<a href="#">186004048</a>
	2.1 × 100 mm	<a href="#">186004049</a>
	2.1 × 150 mm	<a href="#">186006021</a>
	3.0 × 50 mm	<a href="#">186004695</a>
	3.0 × 100 mm	<a href="#">186004696</a>
BEH Phenyl	2.1 × 50 mm	<a href="#">186004050</a>
	2.1 × 100 mm	<a href="#">186004052</a>
	2.1 × 150 mm	<a href="#">186006022</a>
	3.0 × 50 mm	<a href="#">186004697</a>
	3.0 × 100 mm	<a href="#">186004698</a>
BEH HILIC	2.1 × 50 mm	<a href="#">186004053</a>
	2.1 × 100 mm	<a href="#">186004054</a>
	2.1 × 150 mm	<a href="#">186006023</a>
	3.0 × 50 mm	<a href="#">186004699</a>
	3.0 × 100 mm	<a href="#">186004700</a>

Particle Size: 1.7 µm		
	Dimension	P/N (3/pk)
BEH Amide	2.1 × 50 mm	<a href="#">186004807</a>
	2.1 × 100 mm	<a href="#">186004808</a>
	2.1 × 150 mm	<a href="#">186006024</a>
	3.0 × 50 mm	<a href="#">186004809</a>
	3.0 × 100 mm	<a href="#">186004810</a>
Glycan BEH Amide, 130 Å	2.1 × 100 mm	<a href="#">186004907</a>
Peptide BEH C <sub>18</sub> , 130 Å	2.1 × 100 mm	<a href="#">186004896</a>
	2.1 × 150 mm	<a href="#">186006517</a>
Peptide CSH C <sub>18</sub> , 130 Å	1.0 × 50 mm	<a href="#">176003061</a> <sup>1</sup>
	1.0 × 100 mm	<a href="#">176003062</a> <sup>1</sup>
	1.0 × 150 mm	<a href="#">176003063</a> <sup>1</sup>
	2.1 × 50 mm	<a href="#">176003064</a> <sup>1</sup>
	2.1 × 100 mm	<a href="#">176003065</a> <sup>1</sup>
	2.1 × 150 mm	<a href="#">186006940</a>
	2.1 × 150 mm	<a href="#">176003068</a> <sup>1</sup>

Particle Size: 1.8 µm		
	Dimension	P/N (3/pk)
HSS T3	2.1 × 50 mm	<a href="#">186004055</a>
	2.1 × 100 mm	<a href="#">186004056</a>
	2.1 × 150 mm	<a href="#">186006025</a>
	3.0 × 50 mm	<a href="#">186004701</a>
	3.0 × 100 mm	<a href="#">186004702</a>
HSS C <sub>18</sub>	2.1 × 50 mm	<a href="#">186004057</a>
	2.1 × 100 mm	<a href="#">186004058</a>
	2.1 × 150 mm	<a href="#">186006026</a>
	3.0 × 50 mm	<a href="#">186004703</a>
	3.0 × 100 mm	<a href="#">186004704</a>
HSS C <sub>18</sub> SB	2.1 × 50 mm	<a href="#">186004137</a>
	2.1 × 100 mm	<a href="#">186004138</a>
	2.1 × 150 mm	<a href="#">186006027</a>
	3.0 × 50 mm	<a href="#">186004705</a>
	3.0 × 100 mm	<a href="#">186004709</a>
HSS Cyano	2.1 × 50 mm	<a href="#">186005996</a>
	2.1 × 100 mm	<a href="#">186005997</a>
	3.0 × 50 mm	<a href="#">186005998</a>
	3.0 × 100 mm	<a href="#">186005999</a>
HSS PFP	2.1 × 50 mm	<a href="#">186005975</a>
	2.1 × 100 mm	<a href="#">186005976</a>
	3.0 × 50 mm	<a href="#">186005977</a>
	3.0 × 100 mm	<a href="#">186005978</a>

\* Each kit contains three columns from three batches of material.  
<sup>1</sup> Kit includes column and one vial of Cytochrome c Digestion Standard, p/n: [186006371](#).

## ACQUITY UPLC Method Development Kits

With a seemingly endless number of method parameters to try, developing a new chromatographic method can be an overwhelming, time-consuming experience. Finding a column that reliably and robustly delivers the desired separation results is essential to any method development strategy. The UPLC Columns in our Method Development Kits cover a broad range of selectivity, facilitating all method-development approaches.

Description	Chemistries	Method Development Strategy
Maximum Selectivity UPLC Method Development Kit	CSH C <sub>18</sub> , CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, HSS C <sub>18</sub> SB	The widest selectivity offering for method development at low and high pH. Best choice for low ionic strength additives (i.e., formic acid).
High and Low pH, Widest Selectivities UPLC Columns Kit	BEH C <sub>18</sub> , BEH C <sub>8</sub> , BEH Shield RP18, BEH Phenyl	Maximize separation selectivity by exploring low and high mobile-phase pH.
UPLC Method Development Kit	BEH C <sub>18</sub> , BEH Shield RP18, BEH Phenyl, HSS T3	Maximize separation selectivity by exploring low and high mobile phase pH (BEH columns) and accommodate for the retention of polar compounds (HSS T3 columns).
L1 UPLC Columns Kit	BEH C <sub>18</sub> , BEH Shield RP18, HSS C <sub>18</sub> , HSS T3	C <sub>18</sub> columns that differ in silanol activity and hydrophobicity within the US Pharmacopeia L1 classification.
Mass Spec UPLC Columns Kit	BEH C <sub>18</sub> , HSS C <sub>18</sub> , HSS T3, HSS C <sub>18</sub> SB	Straight-chain-alkyl C <sub>18</sub> columns that differ in silanol activity, shape, selectivity, and hydrophobicity; and exhibit no MS bleed.
Low pH, Widest Selectivities UPLC Columns Kit	BEH Shield RP18, BEH Phenyl, HSS C <sub>18</sub> , HSS C <sub>18</sub> SB	A diverse grouping of column selectivities for the development of a reversed-phase method in low-pH mobile phases.
Maximum Selectivity RP and HILIC UPLC Method Development Kit	CSH C <sub>18</sub> , CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, BEH Amide	Offers the widest separation selectivity by combining CSH reversed-phase and HILIC stationary phases to retain analytes encompassing a broad range of polarity.
UPLC RP and HILIC Method Development Kit	BEH C <sub>18</sub> , BEH Shield RP18, BEH Amide, HSS C <sub>18</sub> SB	A novel approach that maximizes separation selectivity by combining distinct RP and HILIC stationary phases to retain analytes encompassing a broad range of polarity.
UPLC HILIC Method Development Kit	BEH Amide, BEH HILIC	Effortlessly develop HILIC methods at low pH (bases) or high pH (acids) for polar and/or ionizable compounds.



## Ordering Information

### ACQUITY UPLC Method Development Kits

Description	Qty.	Chemistries	Particle Size(s)	Dimension	P/N
Maximum Selectivity UPLC	4/pk	CSH C <sub>18</sub> , CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, HSS C <sub>18</sub> SB	CSH: 1.7 µm; HSS: 1.8 µm	2.1 × 50 mm	<a href="#">176002123</a>
Maximum Selectivity UPLC	4/pk	CSH C <sub>18</sub> , CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, HSS C <sub>18</sub> SB	CSH: 1.7 µm; HSS: 1.8 µm	2.1 × 100 mm	<a href="#">176002124</a>
Maximum Selectivity UPLC	4/pk	CSH C <sub>18</sub> , CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, HSS C <sub>18</sub> SB	CSH: 1.7 µm; HSS: 1.8 µm	3.0 × 50 mm	<a href="#">176002125</a>
Maximum Selectivity UPLC	4/pk	CSH C <sub>18</sub> , CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, HSS C <sub>18</sub> SB	CSH: 1.7 µm; HSS: 1.8 µm	3.0 × 100 mm	<a href="#">176002126</a>
High and Low pH, Widest Selectivities UPLC Columns Kit	4/pk	BEH C <sub>18</sub> , BEH C <sub>8</sub> , BEH Shield RP18, BEH Phenyl	BEH: 1.7 µm	2.1 × 50 mm	<a href="#">176001042</a>
High and Low pH, Widest Selectivities UPLC Columns Kit	4/pk	BEH C <sub>18</sub> , BEH C <sub>8</sub> , BEH Shield RP18, BEH Phenyl	BEH: 1.7 µm	2.1 × 100 mm	<a href="#">176001043</a>
High and Low pH, Widest Selectivities UPLC Columns Kit	4/pk	BEH C <sub>18</sub> , BEH C <sub>8</sub> , BEH Shield RP18, BEH Phenyl	BEH: 1.7 µm	3.0 × 50 mm	<a href="#">176001881</a>
High and Low pH, Widest Selectivities UPLC Columns Kit	4/pk	BEH C <sub>18</sub> , BEH C <sub>8</sub> , BEH Shield RP18, BEH Phenyl	BEH: 1.7 µm	3.0 × 100 mm	<a href="#">176001882</a>
UPLC	4/pk	BEH C <sub>18</sub> , BEH Shield RP18, BEH Phenyl, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 50 mm	<a href="#">176001603</a>
UPLC	4/pk	BEH C <sub>18</sub> , BEH Shield RP18, BEH Phenyl, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 100 mm	<a href="#">176001604</a>
UPLC	4/pk	BEH C <sub>18</sub> , BEH Shield RP18, BEH Phenyl, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 50 mm	<a href="#">176001883</a>
UPLC	4/pk	BEH C <sub>18</sub> , BEH Shield RP18, BEH Phenyl, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 100 mm	<a href="#">176001884</a>
L1 UPLC Columns Kit	4/pk	BEH C <sub>18</sub> , BEH Shield RP18, HSS C <sub>18</sub> , HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 50 mm	<a href="#">176001605</a>
L1 UPLC Columns Kit	4/pk	BEH C <sub>18</sub> , BEH Shield RP18, HSS C <sub>18</sub> , HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 100 mm	<a href="#">176001606</a>
L1 UPLC Columns Kit	4/pk	BEH C <sub>18</sub> , BEH Shield RP18, HSS C <sub>18</sub> , HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 50 mm	<a href="#">176001885</a>
L1 UPLC Columns Kit	4/pk	BEH C <sub>18</sub> , BEH Shield RP18, HSS C <sub>18</sub> , HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 100 mm	<a href="#">176001886</a>
Mass Spec UPLC Columns Kit	4/pk	BEH C <sub>18</sub> , HSS C <sub>18</sub> , HSS C <sub>18</sub> SB, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 50 mm	<a href="#">176001607</a>
Mass Spec UPLC Columns Kit	4/pk	BEH C <sub>18</sub> , HSS C <sub>18</sub> , HSS C <sub>18</sub> SB, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 100 mm	<a href="#">176001608</a>
Mass Spec UPLC Columns Kit	4/pk	BEH C <sub>18</sub> , HSS C <sub>18</sub> , HSS C <sub>18</sub> SB, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 50 mm	<a href="#">176001887</a>
Mass Spec UPLC Columns Kit	4/pk	BEH C <sub>18</sub> , HSS C <sub>18</sub> , HSS C <sub>18</sub> SB, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 100 mm	<a href="#">176001888</a>
Low pH, Widest Selectivities UPLC Columns Kit	4/pk	BEH Shield RP18, BEH Phenyl, HSS C <sub>18</sub> , HSS C <sub>18</sub> SB	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 50 mm	<a href="#">176001609</a>
Low pH, Widest Selectivities UPLC Columns Kit	4/pk	BEH Shield RP18, BEH Phenyl, HSS C <sub>18</sub> , HSS C <sub>18</sub> SB	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 100 mm	<a href="#">176001610</a>
Low pH, Widest Selectivities UPLC Columns Kit	4/pk	BEH Shield RP18, BEH Phenyl, HSS C <sub>18</sub> , HSS C <sub>18</sub> SB	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 50 mm	<a href="#">176001889</a>
Low pH, Widest Selectivities UPLC Columns Kit	4/pk	BEH Shield RP18, BEH Phenyl, HSS C <sub>18</sub> , HSS C <sub>18</sub> SB	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 100 mm	<a href="#">176001890</a>
Maximum Selectivity RP and HILIC	4/pk	CSH C <sub>18</sub> , CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, BEH Amide	CSH: 1.7 µm; BEH: 1.7 µm	2.1 × 50 mm	<a href="#">176002127</a>
Maximum Selectivity RP and HILIC	4/pk	CSH C <sub>18</sub> , CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, BEH Amide	CSH: 1.7 µm; BEH: 1.7 µm	2.1 × 100 mm	<a href="#">176002128</a>
Maximum Selectivity RP and HILIC	4/pk	CSH C <sub>18</sub> , CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, BEH Amide	CSH: 1.7 µm; BEH: 1.7 µm	3.0 × 50 mm	<a href="#">176002129</a>
Maximum Selectivity RP and HILIC	4/pk	CSH C <sub>18</sub> , CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, BEH Amide	CSH: 1.7 µm; BEH: 1.7 µm	3.0 × 100 mm	<a href="#">176002130</a>
UPLC RP and HILIC	4/pk	BEH C <sub>18</sub> , BEH Shield RP18, BEH Amide, HSS C <sub>18</sub> SB	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 50 mm	<a href="#">176001959</a>
UPLC RP and HILIC	4/pk	BEH C <sub>18</sub> , BEH Shield RP18, BEH Amide, HSS C <sub>18</sub> SB	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 100 mm	<a href="#">176001960</a>
UPLC RP and HILIC	4/pk	BEH C <sub>18</sub> , BEH Shield RP18, BEH Amide, HSS C <sub>18</sub> SB	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 50 mm	<a href="#">176001961</a>
UPLC RP and HILIC	4/pk	BEH C <sub>18</sub> , BEH Shield RP18, BEH Amide, HSS C <sub>18</sub> SB	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 100 mm	<a href="#">176001962</a>
UPLC HILIC	2/pk	BEH Amide, BEH HILIC	BEH: 1.7 µm	2.1 × 50 mm	<a href="#">176001963</a>
UPLC HILIC	2/pk	BEH Amide, BEH HILIC	BEH: 1.7 µm	2.1 × 100 mm	<a href="#">176001964</a>
UPLC HILIC	2/pk	BEH Amide, BEH HILIC	BEH: 1.7 µm	3.0 × 50 mm	<a href="#">176001965</a>
UPLC HILIC	2/pk	BEH Amide, BEH HILIC	BEH: 1.7 µm	3.0 × 100 mm	<a href="#">176001966</a>



# 2.x $\mu\text{m}$ UHPLC Columns

# Contents

Column Selection Guide .....	<a href="#">131</a>
CORTECS 2.7 μm Columns .....	<a href="#">132</a>
XBridge BEH <i>XP</i> Columns .....	<a href="#">142</a>
XSelect CSH <i>XP</i> and HSS <i>XP</i> Columns .....	<a href="#">155</a>
SunFire Columns .....	<a href="#">169</a>
XTerra Columns .....	<a href="#">174</a>

## 2.x μm UHPLC Columns

Choosing the correct column configuration, one that matches a particular LC system, significantly improves the chromatographic results. System dispersion is inherent to all chromatographic instrumentation and contributes to measured losses in column efficiency. The cumulative dispersion from tubing, valves, and instrument components, such as detector flow cells, causes sample peaks to broaden through dilution in a process that begins at the sample injector and ends at the detector's outflow. As column particle size is reduced, or the internal diameter and length of the column decreases, the potential peak broadening in a non-optimized LC system increases.

The full benefit of higher-efficiency UHPLC columns is realized only when system dispersion does not substantially degrade column performance. For smaller particle columns, the increased efficiency produces narrower peaks and improves resolution; however, the narrower peaks are more susceptible to extra-column dispersion. Therefore, matching the column configuration to the system dispersion is critical to maintain separation performance.

### Column Selection Guide



System	HPLC	UHPLC	UPLC
Measured Dispersion	>40 μL	22–29 μL	<20 μL
Routine Pressure	<6000 psi	<10,000 psi	<18,000 psi
Particle Size	3–5 μm	2–3 μm	<2 μm
Column I.D.	4.6 mm (3.0 mm)	3.0 mm (2.1 mm)	2.1 mm (1.0 mm)
Column Length	75–250 mm	50–100 mm	≤150 mm

Recommended column dimension matched for Waters LC Systems.

### Ideal Column Configurations for Any LC System

When transferring LC methods, instrument bandspread is one of the most practical LC instrument parameters to determine. Knowing the bandspread value gives the separation scientist the ability to develop compatible methods on any LC system, independent of the instrument manufacturer. The following table recommends column configurations based on nominal instrument bandspread values.



Select 2.x μm columns are available with MaxPeak High Performance Surface Technology. A complete list of the MaxPeak Premier Columns can be found on [page 99](#).

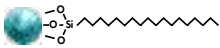
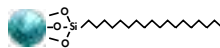

System	LC Technique	Bandspread*	Recommended Column Particle Sizes and I.D.s
Shimadzu Prominence UFLC	HPLC	41 μL	XBridge 3.5, 5 μm; XSelect 3.5, 5 μm; CORTECS 2.7 μm 3.0–4.6 mm I.D.
Arc HPLC or Alliance 2695 HPLC	HPLC	29 μL	
Agilent 1260 UHPLC (600 bar)	HPLC	28 μL	
Thermo Accela UHPLC	HPLC	21 μL	XBridge 2.5, 3.5, 5 μm; XSelect 2.5, 3.5, 5 μm; CORTECS 2.7 μm 3.0 mm I.D.
Agilent 1290 UHPLC (1200 bar)	UHPLC	17 μL	
Arc Premier or ACQUITY Arc	UHPLC	23 μL	XBridge 2.5, 3.5, 5 μm; XSelect 2.5, 3.5, 5 μm; ACQUITY UPLC HSS 1.8 μm, CORTECS 2.7 μm 3.0 mm I.D.
ACQUITY Premier or ACQUITY UPLC	UHPLC	12 μL	ACQUITY UPLC BEH 1.7 μm; ACQUITY UPLC CSH 1.7 μm; ACQUITY UPLC HSS 1.8 μm, CORTECS 1.6 μm 2.1 mm I.D.
ACQUITY UPLC H-Class w/Column Manager	UPLC	12 μL	
ACQUITY UPLC H-Class	UPLC	9 μL	

\*These data are based on nominal values for unmodified systems, and are intended for reference only. Any adjustment to the system's plumbing, connectivity and configuration changes the instrument bandspread.

## CORTECS 2.7 $\mu\text{m}$ Columns

CORTECS 2.7  $\mu\text{m}$  Solid-Core Particle Columns maximize resolution and peak capacity for all LC separations. Optimized to extend the performance of HPLC and UHPLC instruments, their innovative, solid-core technology and bonding chemistry is available in both reversed-phase and HILIC phases, offering the flexibility to rapidly separate a wide range of compound classes. Compared with columns using fully-porous substrates, the improved efficiency of CORTECS 2.7  $\mu\text{m}$  Solid-Core Columns produces sharper and narrower peaks, allowing faster flow rates at lower operational backpressure.

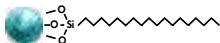
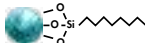
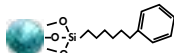

### Column Characteristics

	<b>C<sub>18</sub><sup>+</sup>, 90 Å</b>	<b>C<sub>18</sub>, 90 Å</b>	<b>Shield RP18, 90 Å</b>
	UPLC: 1.6 $\mu\text{m}$ , UHPLC: 2.7 $\mu\text{m}$	UPLC: 1.6 $\mu\text{m}$ , UHPLC: 2.7 $\mu\text{m}$	UPLC: 1.6 $\mu\text{m}$ , UHPLC: 2.7 $\mu\text{m}$
Particle/Ligand			
Ligand Density*	2.4 $\mu\text{mol}/\text{m}^2$	2.7 $\mu\text{mol}/\text{m}^2$	3.2 $\mu\text{mol}/\text{m}^2$
Carbon Load*	5.7%	6.6%	6.4%
Endcapped	Yes	Yes	Yes
USP Class No.	L1	L1	L1
pH Range	2–8	2–8	2–8
Temperature Limits	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
Surface Area*	100 $\text{m}^2/\text{g}$	100 $\text{m}^2/\text{g}$	100 $\text{m}^2/\text{g}$
Performance Standards	<b>Neutrals QC Reference Material</b> p/n: <a href="#">186006360</a>	<b>Neutrals QC Reference Material</b> p/n: <a href="#">186006360</a>	<b>Neutrals QC Reference Material</b> p/n: <a href="#">186006360</a>
Application Standards	<b>Reversed-Phase QC Reference Material</b> p/n: <a href="#">186006363</a>	<b>Reversed-Phase QC Reference Material</b> p/n: <a href="#">186006363</a>	<b>Reversed-Phase QC Reference Material</b> p/n: <a href="#">186006363</a>

\*Expected or approximate value.

 For more information on CORTECS Columns, [refer to page 108](#).



T3, 120 Å	C <sub>8</sub> , 90 Å	Phenyl, 90 Å	HILIC, 90 Å
UPLC: 1.6 µm, UHPLC: 2.7 µm	UPLC: 1.6 µm, UHPLC: 2.7 µm	UPLC: 1.6 µm, UHPLC: 2.7 µm	UPLC: 1.6 µm, UHPLC: 2.7 µm
			
1.6 µmol/m <sup>2</sup>	3.4 µmol/m <sup>2</sup>	3.2 µmol/m <sup>2</sup>	N/A
4.7%	4.5%	5.9%	Unbonded
Yes	Yes	Yes	N/A
L1	L7	L11	L3
2-8	2-8	2-8	1-5
Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
100 m <sup>2</sup> /g	100 m <sup>2</sup> /g	100 m <sup>2</sup> /g	100 m <sup>2</sup> /g
Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	HILIC QC Reference Material p/n: <a href="#">186007226</a>
Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	—

## Ordering Information

### CORTECS Columns

	Particle Size: 1.6 $\mu\text{m}$			Particle Size: 2.7 $\mu\text{m}$		
	Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	P/N (3/pk)
<b>C<sub>18</sub></b> +	2.1 × 30 mm	<a href="#">186007113</a>	<a href="#">176003166</a>	2.1 × 30 mm	<a href="#">186007394</a>	<a href="#">176003289</a>
	2.1 × 50 mm	<a href="#">186007114</a>	<a href="#">176003167</a>	2.1 × 50 mm	<a href="#">186007395</a>	<a href="#">176003290</a>
	2.1 × 75 mm	<a href="#">186007115</a>	<a href="#">176003168</a>	2.1 × 75 mm	<a href="#">186007396</a>	<a href="#">176003291</a>
	2.1 × 100 mm	<a href="#">186007116</a>	<a href="#">176003169</a>	2.1 × 100 mm	<a href="#">186007397</a>	<a href="#">176003292</a>
	2.1 × 150 mm	<a href="#">186007117</a>	<a href="#">176003170</a>	2.1 × 150 mm	<a href="#">186007398</a>	<a href="#">176003293</a>
	3.0 × 30 mm	<a href="#">186007118</a>	<a href="#">176003171</a>	3.0 × 30 mm	<a href="#">186007399</a>	<a href="#">176003294</a>
	3.0 × 50 mm	<a href="#">186007119</a>	<a href="#">176003172</a>	3.0 × 50 mm	<a href="#">186007400</a>	<a href="#">176003295</a>
	3.0 × 75 mm	<a href="#">186007120</a>	<a href="#">176003173</a>	3.0 × 75 mm	<a href="#">186007401</a>	<a href="#">176003296</a>
	3.0 × 100 mm	<a href="#">186007121</a>	<a href="#">176003174</a>	3.0 × 100 mm	<a href="#">186007402</a>	<a href="#">176003297</a>
	3.0 × 150 mm	<a href="#">186007122</a>	<a href="#">176003175</a>	3.0 × 150 mm	<a href="#">186007403</a>	<a href="#">176003298</a>
				4.6 × 30 mm	<a href="#">186007404</a>	<a href="#">176003322</a>
				4.6 × 50 mm	<a href="#">186007405</a>	<a href="#">176003323</a>
				4.6 × 75 mm	<a href="#">186007406</a>	<a href="#">176003324</a>
				4.6 × 100 mm	<a href="#">186007407</a>	<a href="#">176003325</a>
				4.6 × 150 mm	<a href="#">186007408</a>	<a href="#">176003326</a>
<b>C<sub>18</sub></b>	2.1 × 30 mm	<a href="#">186007092</a>	<a href="#">176003146</a>	2.1 × 30 mm	<a href="#">186007364</a>	<a href="#">176003269</a>
	2.1 × 50 mm	<a href="#">186007093</a>	<a href="#">176003147</a>	2.1 × 50 mm	<a href="#">186007365</a>	<a href="#">176003270</a>
	2.1 × 75 mm	<a href="#">186007094</a>	<a href="#">176003148</a>	2.1 × 75 mm	<a href="#">186007366</a>	<a href="#">176003271</a>
	2.1 × 100 mm	<a href="#">186007095</a>	<a href="#">176003149</a>	2.1 × 100 mm	<a href="#">186007367</a>	<a href="#">176003272</a>
	2.1 × 150 mm	<a href="#">186007096</a>	<a href="#">176003150</a>	2.1 × 150 mm	<a href="#">186007368</a>	<a href="#">176003273</a>
	3.0 × 30 mm	<a href="#">186007097</a>	<a href="#">176003151</a>	3.0 × 30 mm	<a href="#">186007369</a>	<a href="#">176003274</a>
	3.0 × 50 mm	<a href="#">186007098</a>	<a href="#">176003152</a>	3.0 × 50 mm	<a href="#">186007370</a>	<a href="#">176003275</a>
	3.0 × 75 mm	<a href="#">186007099</a>	<a href="#">176003153</a>	3.0 × 75 mm	<a href="#">186007371</a>	<a href="#">176003276</a>
	3.0 × 100 mm	<a href="#">186007100</a>	<a href="#">176003154</a>	3.0 × 100 mm	<a href="#">186007372</a>	<a href="#">176003277</a>
	3.0 × 150 mm	<a href="#">186007102</a>	<a href="#">176003155</a>	3.0 × 150 mm	<a href="#">186007373</a>	<a href="#">176003278</a>
				4.6 × 30 mm	<a href="#">186007374</a>	<a href="#">176003312</a>
				4.6 × 50 mm	<a href="#">186007375</a>	<a href="#">176003313</a>
				4.6 × 75 mm	<a href="#">186007376</a>	<a href="#">176003314</a>
				4.6 × 100 mm	<a href="#">186007377</a>	<a href="#">176003315</a>
				4.6 × 150 mm	<a href="#">186007378</a>	<a href="#">176003316</a>

CORTECS Columns *Continued*

	Particle Size: 1.6 $\mu$ m			Particle Size: 2.7 $\mu$ m		
	Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	P/N (3/pk)
<b>C<sub>8</sub></b>	2.1 $\times$ 30 mm	<a href="#">186008398</a>	<a href="#">176003829</a>	2.1 $\times$ 30 mm	<a href="#">186008348</a>	<a href="#">176003804</a>
	2.1 $\times$ 50 mm	<a href="#">186008399</a>	<a href="#">176003830</a>	2.1 $\times$ 50 mm	<a href="#">186008349</a>	<a href="#">176003805</a>
	2.1 $\times$ 75 mm	<a href="#">186008400</a>	<a href="#">176003831</a>	2.1 $\times$ 75 mm	<a href="#">186008350</a>	<a href="#">176003806</a>
	2.1 $\times$ 100 mm	<a href="#">186008401</a>	<a href="#">176003832</a>	2.1 $\times$ 100 mm	<a href="#">186008351</a>	<a href="#">176003807</a>
	2.1 $\times$ 150 mm	<a href="#">186008402</a>	<a href="#">176003833</a>	2.1 $\times$ 150 mm	<a href="#">186008352</a>	<a href="#">176003808</a>
	3.0 $\times$ 30 mm	<a href="#">186008408</a>	<a href="#">176003834</a>	3.0 $\times$ 30 mm	<a href="#">186008358</a>	<a href="#">176003809</a>
	3.0 $\times$ 50 mm	<a href="#">186008409</a>	<a href="#">176003835</a>	3.0 $\times$ 50 mm	<a href="#">186008359</a>	<a href="#">176003810</a>
	3.0 $\times$ 75 mm	<a href="#">186008410</a>	<a href="#">176003836</a>	3.0 $\times$ 75 mm	<a href="#">186008360</a>	<a href="#">176003811</a>
	3.0 $\times$ 100 mm	<a href="#">186008411</a>	<a href="#">176003837</a>	3.0 $\times$ 100 mm	<a href="#">186008361</a>	<a href="#">176003812</a>
	3.0 $\times$ 150 mm	<a href="#">186008412</a>	<a href="#">176003838</a>	3.0 $\times$ 150 mm	<a href="#">186008362</a>	<a href="#">176003813</a>
				4.6 $\times$ 30 mm	<a href="#">186008368</a>	<a href="#">176003814</a>
				4.6 $\times$ 50 mm	<a href="#">186008369</a>	<a href="#">176003815</a>
				4.6 $\times$ 75 mm	<a href="#">186008370</a>	<a href="#">176003816</a>
				4.6 $\times$ 100 mm	<a href="#">186008371</a>	<a href="#">176003817</a>
				4.6 $\times$ 150 mm	<a href="#">186008372</a>	<a href="#">176003818</a>
	<b>HILIC</b>	2.1 $\times$ 30 mm	<a href="#">186007103</a>	<a href="#">176003156</a>	2.1 $\times$ 30 mm	<a href="#">186007379</a>
2.1 $\times$ 50 mm		<a href="#">186007104</a>	<a href="#">176003157</a>	2.1 $\times$ 50 mm	<a href="#">186007380</a>	<a href="#">176003280</a>
2.1 $\times$ 75 mm		<a href="#">186007105</a>	<a href="#">176003158</a>	2.1 $\times$ 75 mm	<a href="#">186007381</a>	<a href="#">176003281</a>
2.1 $\times$ 100 mm		<a href="#">186007106</a>	<a href="#">176003159</a>	2.1 $\times$ 100 mm	<a href="#">186007382</a>	<a href="#">176003282</a>
2.1 $\times$ 150 mm		<a href="#">186007107</a>	<a href="#">176003160</a>	2.1 $\times$ 150 mm	<a href="#">186007383</a>	<a href="#">176003283</a>
3.0 $\times$ 30 mm		<a href="#">186007108</a>	<a href="#">176003161</a>	3.0 $\times$ 30 mm	<a href="#">186007384</a>	<a href="#">176003284</a>
3.0 $\times$ 50 mm		<a href="#">186007109</a>	<a href="#">176003162</a>	3.0 $\times$ 50 mm	<a href="#">186007385</a>	<a href="#">176003285</a>
3.0 $\times$ 75 mm		<a href="#">186007110</a>	<a href="#">176003163</a>	3.0 $\times$ 75 mm	<a href="#">186007386</a>	<a href="#">176003286</a>
3.0 $\times$ 100 mm		<a href="#">186007111</a>	<a href="#">176003164</a>	3.0 $\times$ 100 mm	<a href="#">186007387</a>	<a href="#">176003287</a>
3.0 $\times$ 150 mm		<a href="#">186007112</a>	<a href="#">176003165</a>	3.0 $\times$ 150 mm	<a href="#">186007388</a>	<a href="#">176003288</a>
				4.6 $\times$ 30 mm	<a href="#">186007389</a>	<a href="#">176003317</a>
				4.6 $\times$ 50 mm	<a href="#">186007390</a>	<a href="#">176003318</a>
				4.6 $\times$ 75 mm	<a href="#">186007391</a>	<a href="#">176003319</a>
				4.6 $\times$ 100 mm	<a href="#">186007392</a>	<a href="#">176003320</a>
				4.6 $\times$ 150 mm	<a href="#">186007393</a>	<a href="#">176003321</a>



CORTECS Columns *Continued*

	Particle Size: 1.6 $\mu$ m			Particle Size: 2.7 $\mu$ m		
	Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	P/N (3/pk)
Phenyl	2.1 $\times$ 30 mm	<a href="#">186008378</a>	<a href="#">176003819</a>	2.1 $\times$ 30 mm	<a href="#">186008318</a>	<a href="#">176003789</a>
	2.1 $\times$ 50 mm	<a href="#">186008379</a>	<a href="#">176003820</a>	2.1 $\times$ 50 mm	<a href="#">186008319</a>	<a href="#">176003790</a>
	2.1 $\times$ 75 mm	<a href="#">186008380</a>	<a href="#">176003821</a>	2.1 $\times$ 75 mm	<a href="#">186008320</a>	<a href="#">176003791</a>
	2.1 $\times$ 100 mm	<a href="#">186008381</a>	<a href="#">176003822</a>	2.1 $\times$ 100 mm	<a href="#">186008321</a>	<a href="#">176003792</a>
	2.1 $\times$ 150 mm	<a href="#">186008382</a>	<a href="#">176003823</a>	2.1 $\times$ 150 mm	<a href="#">186008322</a>	<a href="#">176003793</a>
	3.0 $\times$ 30 mm	<a href="#">186008388</a>	<a href="#">176003824</a>	3.0 $\times$ 30 mm	<a href="#">186008328</a>	<a href="#">176003794</a>
	3.0 $\times$ 50 mm	<a href="#">186008389</a>	<a href="#">176003825</a>	3.0 $\times$ 50 mm	<a href="#">186008329</a>	<a href="#">176003795</a>
	3.0 $\times$ 75 mm	<a href="#">186008390</a>	<a href="#">176003826</a>	3.0 $\times$ 75 mm	<a href="#">186008330</a>	<a href="#">176003796</a>
	3.0 $\times$ 100 mm	<a href="#">186008391</a>	<a href="#">176003827</a>	3.0 $\times$ 100 mm	<a href="#">186008331</a>	<a href="#">176003797</a>
	3.0 $\times$ 150 mm	<a href="#">186008392</a>	<a href="#">176003828</a>	3.0 $\times$ 150 mm	<a href="#">186008332</a>	<a href="#">176003798</a>
				4.6 $\times$ 30 mm	<a href="#">186008338</a>	<a href="#">176003799</a>
				4.6 $\times$ 50 mm	<a href="#">186008339</a>	<a href="#">176003800</a>
				4.6 $\times$ 75 mm	<a href="#">186008340</a>	<a href="#">176003801</a>
				4.6 $\times$ 100 mm	<a href="#">186008341</a>	<a href="#">176003802</a>
				4.6 $\times$ 150 mm	<a href="#">186008342</a>	<a href="#">176003803</a>
	Shield RP18	2.1 $\times$ 30 mm	<a href="#">186008691</a>	<a href="#">176003927</a>	2.1 $\times$ 30 mm	<a href="#">186008661</a>
2.1 $\times$ 50 mm		<a href="#">186008692</a>	<a href="#">176003928</a>	2.1 $\times$ 50 mm	<a href="#">186008662</a>	<a href="#">176003913</a>
2.1 $\times$ 75 mm		<a href="#">186008693</a>	<a href="#">176003929</a>	2.1 $\times$ 75 mm	<a href="#">186008663</a>	<a href="#">176003914</a>
2.1 $\times$ 100 mm		<a href="#">186008694</a>	<a href="#">176003930</a>	2.1 $\times$ 100 mm	<a href="#">186008664</a>	<a href="#">176003915</a>
2.1 $\times$ 150 mm		<a href="#">186008695</a>	<a href="#">176003931</a>	2.1 $\times$ 150 mm	<a href="#">186008665</a>	<a href="#">176003916</a>
3.0 $\times$ 30 mm		<a href="#">186008701</a>	<a href="#">176003932</a>	3.0 $\times$ 30 mm	<a href="#">186008671</a>	<a href="#">176003917</a>
3.0 $\times$ 50 mm		<a href="#">186008702</a>	<a href="#">176003933</a>	3.0 $\times$ 50 mm	<a href="#">186008672</a>	<a href="#">176003918</a>
3.0 $\times$ 75 mm		<a href="#">186008703</a>	<a href="#">176003934</a>	3.0 $\times$ 75 mm	<a href="#">186008673</a>	<a href="#">176003919</a>
3.0 $\times$ 100 mm		<a href="#">186008704</a>	<a href="#">176003935</a>	3.0 $\times$ 100 mm	<a href="#">186008674</a>	<a href="#">176003920</a>
3.0 $\times$ 150 mm		<a href="#">186008705</a>	<a href="#">176003936</a>	3.0 $\times$ 150 mm	<a href="#">186008675</a>	<a href="#">176003921</a>
				4.6 $\times$ 30 mm	<a href="#">186008681</a>	<a href="#">176003922</a>
				4.6 $\times$ 50 mm	<a href="#">186008682</a>	<a href="#">176003923</a>
				4.6 $\times$ 75 mm	<a href="#">186008683</a>	<a href="#">176003924</a>
				4.6 $\times$ 100 mm	<a href="#">186008684</a>	<a href="#">176003925</a>
				4.6 $\times$ 150 mm	<a href="#">186008685</a>	<a href="#">176003926</a>

	Particle Size: 1.6 $\mu$ m			Particle Size: 2.7 $\mu$ m		
	Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	P/N (3/pk)
T3	2.1 $\times$ 30 mm	<a href="#">186008496</a>	<a href="#">176003891</a>	2.1 $\times$ 30 mm	<a href="#">186008481</a>	<a href="#">176003876</a>
	2.1 $\times$ 50 mm	<a href="#">186008497</a>	<a href="#">176003892</a>	2.1 $\times$ 50 mm	<a href="#">186008482</a>	<a href="#">176003877</a>
	2.1 $\times$ 75 mm	<a href="#">186008498</a>	<a href="#">176003893</a>	2.1 $\times$ 75 mm	<a href="#">186008483</a>	<a href="#">176003878</a>
	2.1 $\times$ 100 mm	<a href="#">186008499</a>	<a href="#">176003894</a>	2.1 $\times$ 100 mm	<a href="#">186008484</a>	<a href="#">176003879</a>
	2.1 $\times$ 150 mm	<a href="#">186008500</a>	<a href="#">176003895</a>	2.1 $\times$ 150 mm	<a href="#">186008485</a>	<a href="#">176003880</a>
	3.0 $\times$ 30 mm	<a href="#">186008501</a>	<a href="#">176003896</a>	3.0 $\times$ 30 mm	<a href="#">186008486</a>	<a href="#">176003881</a>
	3.0 $\times$ 50 mm	<a href="#">186008502</a>	<a href="#">176003897</a>	3.0 $\times$ 50 mm	<a href="#">186008487</a>	<a href="#">176003882</a>
	3.0 $\times$ 75 mm	<a href="#">186008503</a>	<a href="#">176003898</a>	3.0 $\times$ 75 mm	<a href="#">186008488</a>	<a href="#">176003883</a>
	3.0 $\times$ 100 mm	<a href="#">186008504</a>	<a href="#">176003899</a>	3.0 $\times$ 100 mm	<a href="#">186008489</a>	<a href="#">176003884</a>
	3.0 $\times$ 150 mm	<a href="#">186008505</a>	<a href="#">176003900</a>	3.0 $\times$ 150 mm	<a href="#">186008490</a>	<a href="#">176003885</a>
				4.6 $\times$ 30 mm	<a href="#">186008491</a>	<a href="#">176003886</a>
				4.6 $\times$ 50 mm	<a href="#">186008492</a>	<a href="#">176003887</a>
				4.6 $\times$ 75 mm	<a href="#">186008493</a>	<a href="#">176003888</a>
				4.6 $\times$ 100 mm	<a href="#">186008494</a>	<a href="#">176003889</a>
				4.6 $\times$ 150 mm	<a href="#">186008495</a>	<a href="#">176003890</a>

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## CORTECS Columns Method Validation Kits\*

	Particle Size: 1.6 $\mu$ m		Particle Size: 2.7 $\mu$ m	
	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
<b>C<sub>18</sub></b> <sup>+</sup>	2.1 × 30 mm	<a href="#">186007176</a>	2.1 × 30 mm	<a href="#">186007439</a>
	2.1 × 50 mm	<a href="#">186007177</a>	2.1 × 50 mm	<a href="#">186007440</a>
	2.1 × 75 mm	<a href="#">186007178</a>	2.1 × 75 mm	<a href="#">186007441</a>
	2.1 × 100 mm	<a href="#">186007179</a>	2.1 × 100 mm	<a href="#">186007442</a>
	2.1 × 150 mm	<a href="#">186007180</a>	2.1 × 150 mm	<a href="#">186007443</a>
	3.0 × 30 mm	<a href="#">186007181</a>	3.0 × 30 mm	<a href="#">186007444</a>
	3.0 × 50 mm	<a href="#">186007182</a>	3.0 × 50 mm	<a href="#">186007445</a>
	3.0 × 75 mm	<a href="#">186007183</a>	3.0 × 75 mm	<a href="#">186007446</a>
	3.0 × 100 mm	<a href="#">186007184</a>	3.0 × 100 mm	<a href="#">186007447</a>
	3.0 × 150 mm	<a href="#">186007185</a>	3.0 × 150 mm	<a href="#">186007448</a>
			4.6 × 30 mm	<a href="#">186007449</a>
			4.6 × 50 mm	<a href="#">186007450</a>
			4.6 × 75 mm	<a href="#">186007451</a>
			4.6 × 100 mm	<a href="#">186007452</a>
			4.6 × 150 mm	<a href="#">186007453</a>
	<b>C<sub>18</sub></b>	2.1 × 30 mm	<a href="#">186007156</a>	2.1 × 30 mm
2.1 × 50 mm		<a href="#">186007157</a>	2.1 × 50 mm	<a href="#">186007410</a>
2.1 × 75 mm		<a href="#">186007158</a>	2.1 × 75 mm	<a href="#">186007411</a>
2.1 × 100 mm		<a href="#">186007159</a>	2.1 × 100 mm	<a href="#">186007412</a>
2.1 × 150 mm		<a href="#">186007160</a>	2.1 × 150 mm	<a href="#">186007413</a>
3.0 × 30 mm		<a href="#">186007161</a>	3.0 × 30 mm	<a href="#">186007414</a>
3.0 × 50 mm		<a href="#">186007162</a>	3.0 × 50 mm	<a href="#">186007415</a>
3.0 × 75 mm		<a href="#">186007163</a>	3.0 × 75 mm	<a href="#">186007416</a>
3.0 × 100 mm		<a href="#">186007164</a>	3.0 × 100 mm	<a href="#">186007417</a>
3.0 × 150 mm		<a href="#">186007165</a>	3.0 × 150 mm	<a href="#">186007418</a>
			4.6 × 30 mm	<a href="#">186007419</a>
			4.6 × 50 mm	<a href="#">186007420</a>
			4.6 × 75 mm	<a href="#">186007421</a>
			4.6 × 100 mm	<a href="#">186007422</a>
			4.6 × 150 mm	<a href="#">186007423</a>

\*Each Method Validation Kit contains 3 columns, each from a different batch.

CORTECS Columns Method Validation Kits\* *Continued*

	Particle Size: 1.6 $\mu$ m		Particle Size: 2.7 $\mu$ m	
	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
<b>C<sub>8</sub></b>	2.1 $\times$ 30 mm	<a href="#">186008403</a>	2.1 $\times$ 30 mm	<a href="#">186008353</a>
	2.1 $\times$ 50 mm	<a href="#">186008404</a>	2.1 $\times$ 50 mm	<a href="#">186008354</a>
	2.1 $\times$ 75 mm	<a href="#">186008405</a>	2.1 $\times$ 75 mm	<a href="#">186008355</a>
	2.1 $\times$ 100 mm	<a href="#">186008406</a>	2.1 $\times$ 100 mm	<a href="#">186008356</a>
	2.1 $\times$ 150 mm	<a href="#">186008407</a>	2.1 $\times$ 150 mm	<a href="#">186008357</a>
	3.0 $\times$ 30 mm	<a href="#">186008413</a>	3.0 $\times$ 30 mm	<a href="#">186008363</a>
	3.0 $\times$ 50 mm	<a href="#">186008414</a>	3.0 $\times$ 50 mm	<a href="#">186008364</a>
	3.0 $\times$ 75 mm	<a href="#">186008415</a>	3.0 $\times$ 75 mm	<a href="#">186008365</a>
	3.0 $\times$ 100 mm	<a href="#">186008416</a>	3.0 $\times$ 100 mm	<a href="#">186008366</a>
	3.0 $\times$ 150 mm	<a href="#">186008417</a>	3.0 $\times$ 150 mm	<a href="#">186008367</a>
			4.6 $\times$ 30 mm	<a href="#">186008373</a>
			4.6 $\times$ 50 mm	<a href="#">186008374</a>
			4.6 $\times$ 75 mm	<a href="#">186008375</a>
			4.6 $\times$ 100 mm	<a href="#">186008376</a>
			4.6 $\times$ 150 mm	<a href="#">186008377</a>
	<b>HILIC</b>	2.1 $\times$ 30 mm	<a href="#">186007166</a>	2.1 $\times$ 30 mm
2.1 $\times$ 50 mm		<a href="#">186007167</a>	2.1 $\times$ 50 mm	<a href="#">186007425</a>
2.1 $\times$ 75 mm		<a href="#">186007168</a>	2.1 $\times$ 75 mm	<a href="#">186007426</a>
2.1 $\times$ 100 mm		<a href="#">186007169</a>	2.1 $\times$ 100 mm	<a href="#">186007427</a>
2.1 $\times$ 150 mm		<a href="#">186007170</a>	2.1 $\times$ 150 mm	<a href="#">186007428</a>
3.0 $\times$ 30 mm		<a href="#">186007171</a>	3.0 $\times$ 30 mm	<a href="#">186007429</a>
3.0 $\times$ 50 mm		<a href="#">186007172</a>	3.0 $\times$ 50 mm	<a href="#">186007430</a>
3.0 $\times$ 75 mm		<a href="#">186007173</a>	3.0 $\times$ 75 mm	<a href="#">186007431</a>
3.0 $\times$ 100 mm		<a href="#">186007174</a>	3.0 $\times$ 100 mm	<a href="#">186007432</a>
3.0 $\times$ 150 mm		<a href="#">186007175</a>	3.0 $\times$ 150 mm	<a href="#">186007433</a>
			4.6 $\times$ 30 mm	<a href="#">186007434</a>
			4.6 $\times$ 50 mm	<a href="#">186007435</a>
			4.6 $\times$ 75 mm	<a href="#">186007436</a>
			4.6 $\times$ 100 mm	<a href="#">186007437</a>
			4.6 $\times$ 150 mm	<a href="#">186007438</a>

CORTECS Columns Method Validation Kits\* *Continued*

	Particle Size: 1.6 $\mu$ m		Particle Size: 2.7 $\mu$ m	
	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
Phenyl	2.1 $\times$ 30 mm	<a href="#">186008383</a>	2.1 $\times$ 30 mm	<a href="#">186008323</a>
	2.1 $\times$ 50 mm	<a href="#">186008384</a>	2.1 $\times$ 50 mm	<a href="#">186008324</a>
	2.1 $\times$ 75 mm	<a href="#">186008405</a>	2.1 $\times$ 75 mm	<a href="#">186008325</a>
	2.1 $\times$ 100 mm	<a href="#">186008386</a>	2.1 $\times$ 100 mm	<a href="#">186008326</a>
	2.1 $\times$ 150 mm	<a href="#">186008387</a>	2.1 $\times$ 150 mm	<a href="#">186008327</a>
	3.0 $\times$ 30 mm	<a href="#">186008393</a>	3.0 $\times$ 30 mm	<a href="#">186008333</a>
	3.0 $\times$ 50 mm	<a href="#">186008394</a>	3.0 $\times$ 50 mm	<a href="#">186008334</a>
	3.0 $\times$ 75 mm	<a href="#">186008395</a>	3.0 $\times$ 75 mm	<a href="#">186008335</a>
	3.0 $\times$ 100 mm	<a href="#">186008396</a>	3.0 $\times$ 100 mm	<a href="#">186008336</a>
	3.0 $\times$ 150 mm	<a href="#">186008397</a>	3.0 $\times$ 150 mm	<a href="#">186008337</a>
			4.6 $\times$ 30 mm	<a href="#">186008343</a>
			4.6 $\times$ 50 mm	<a href="#">186008344</a>
			4.6 $\times$ 75 mm	<a href="#">186008345</a>
			4.6 $\times$ 100 mm	<a href="#">186008346</a>
			4.6 $\times$ 150 mm	<a href="#">186008347</a>
	Shield RP18	2.1 $\times$ 30 mm	<a href="#">186008696</a>	2.1 $\times$ 30 mm
2.1 $\times$ 50 mm		<a href="#">186008697</a>	2.1 $\times$ 50 mm	<a href="#">186008667</a>
2.1 $\times$ 75 mm		<a href="#">186008698</a>	2.1 $\times$ 75 mm	<a href="#">186008668</a>
2.1 $\times$ 100 mm		<a href="#">186008699</a>	2.1 $\times$ 100 mm	<a href="#">186008669</a>
2.1 $\times$ 150 mm		<a href="#">186008700</a>	2.1 $\times$ 150 mm	<a href="#">186008670</a>
3.0 $\times$ 30 mm		<a href="#">186008706</a>	3.0 $\times$ 30 mm	186008676
3.0 $\times$ 50 mm		<a href="#">186008707</a>	3.0 $\times$ 50 mm	<a href="#">186008677</a>
3.0 $\times$ 75 mm		<a href="#">186008708</a>	3.0 $\times$ 75 mm	<a href="#">186008678</a>
3.0 $\times$ 100 mm		<a href="#">186008709</a>	3.0 $\times$ 100 mm	<a href="#">186008679</a>
3.0 $\times$ 150 mm		<a href="#">186008710</a>	3.0 $\times$ 150 mm	<a href="#">186008680</a>
			4.6 $\times$ 30 mm	186008686
			4.6 $\times$ 50 mm	<a href="#">186008687</a>
			4.6 $\times$ 75 mm	<a href="#">186008688</a>
			4.6 $\times$ 100 mm	<a href="#">186008689</a>
			4.6 $\times$ 150 mm	<a href="#">186008690</a>

\*Each Method Validation Kit contains 3 columns, each from a different batch.

CORTECS Columns Method Validation Kits\* *Continued*

	Particle Size: 1.6 $\mu$ m		Particle Size: 2.7 $\mu$ m	
	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
T3	2.1 $\times$ 30 mm	<a href="#">186008529</a>	2.1 $\times$ 30 mm	<a href="#">186008509</a>
	2.1 $\times$ 50 mm	<a href="#">186008530</a>	2.1 $\times$ 50 mm	<a href="#">186008510</a>
	2.1 $\times$ 75 mm	<a href="#">186008531</a>	2.1 $\times$ 75 mm	<a href="#">186008516</a>
	2.1 $\times$ 100 mm	<a href="#">186008536</a>	2.1 $\times$ 100 mm	<a href="#">186008517</a>
	2.1 $\times$ 150 mm	<a href="#">186008537</a>	2.1 $\times$ 150 mm	<a href="#">186008518</a>
	3.0 $\times$ 30 mm	<a href="#">186008538</a>	3.0 $\times$ 30 mm	<a href="#">186008519</a>
	3.0 $\times$ 50 mm	<a href="#">186008539</a>	3.0 $\times$ 50 mm	<a href="#">186008520</a>
	3.0 $\times$ 75 mm	<a href="#">186008540</a>	3.0 $\times$ 75 mm	<a href="#">186008521</a>
	3.0 $\times$ 100 mm	<a href="#">186008541</a>	3.0 $\times$ 100 mm	<a href="#">186008522</a>
	3.0 $\times$ 150 mm	<a href="#">186008542</a>	3.0 $\times$ 150 mm	<a href="#">186008523</a>
			4.6 $\times$ 30 mm	<a href="#">186008524</a>
			4.6 $\times$ 50 mm	<a href="#">186008525</a>
			4.6 $\times$ 75 mm	<a href="#">186008526</a>
			4.6 $\times$ 100 mm	<a href="#">186008527</a>
			4.6 $\times$ 150 mm	<a href="#">186008528</a>

## CORTECS VanGuard Cartridges

	Particle Size: 2.7 $\mu$ m	
	Dimension	P/N (1/pk)
C <sub>18</sub> <sup>+</sup>	2.1 $\times$ 5 mm	<a href="#">186007685</a>
	3.9 $\times$ 5 mm	<a href="#">186007687</a>
C <sub>18</sub>	2.1 $\times$ 5 mm	<a href="#">186007682</a>
	3.9 $\times$ 5 mm	<a href="#">186007684</a>
C <sub>8</sub>	2.1 $\times$ 5 mm	<a href="#">186008421</a>
	3.9 $\times$ 5 mm	<a href="#">186008422</a>
HILIC	2.1 $\times$ 5 mm	<a href="#">186007688</a>
	3.9 $\times$ 5 mm	<a href="#">186007690</a>
Phenyl	2.1 $\times$ 5 mm	<a href="#">186008418</a>
	3.9 $\times$ 5 mm	<a href="#">186008419</a>
Shield RP18	2.1 $\times$ 5 mm	<a href="#">186008712</a>
	3.9 $\times$ 5 mm	<a href="#">186008711</a>
T3	2.1 $\times$ 5 mm	<a href="#">186008506</a>
	3.9 $\times$ 5 mm	<a href="#">186008507</a>

## Universal VanGuard Cartridge Holder

Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>

## XBridge BEH *XP* Columns

XBridge BEH *XP* [eXtended Performance] Columns offer rugged and repeatable performance that maximize efficiency and retention for all HPLC and UHPLC separation conditions. The 2.5 µm particle columns are fully scalable and complement the full range of XBridge BEH particle sizes.



**i** Select XBridge MaxPeak Premier Columns can be found on [page 101](#).

### Column Characteristics

	General-Purpose Columns			Application-Specific Columns		
	BEH C <sub>18</sub> <sup>®</sup> 130 Å	BEH C <sub>8</sub> <sup>®</sup> 130 Å	BEH Shield RP18, 130 Å	Peptide BEH C <sub>18</sub> <sup>®</sup> 130 Å	Peptide BEH C <sub>18</sub> <sup>®</sup> 300 Å	Protein BEH C <sub>4</sub> <sup>®</sup> 300 Å
	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5, 5, 10 µm	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5, 5, 10 µm	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5, 5, 10 µm	HPLC: 3.5, 5, 10 µm	HPLC: 3.5, 5, 10 µm	HPLC: 3.5 µm
Particle/Ligand						
Ligand Density*	3.1 µmol/m <sup>2</sup>	3.2 µmol/m <sup>2</sup>	3.3 µmol/m <sup>2</sup>	3.1 µmol/m <sup>2</sup>	3.1 µmol/m <sup>2</sup>	2.4 µmol/m <sup>2</sup>
Carbon Load*	18%	13%	17%	18%	12%	8%
Endcapped	Yes	Yes	Yes	Yes	Yes	No
USP Class No.	L1	L7	L1	L1	L1	L26
pH Range	1–12	1–12	2–11	1–12	1–12	1–10
Temperature Limits	Low pH = 80 °C, High pH = 60 °C	Low pH = 60 °C, High pH = 60 °C	Low pH = 50 °C, High pH = 45 °C	Low pH = 80 °C, High pH = 60 °C	Low pH = 80 °C, High pH = 60 °C	Low pH = 80 °C, High pH = 50 °C
Surface Area*	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g	90 m <sup>2</sup> /g	90 m <sup>2</sup> /g
Performance Standards	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Cytochrome c Digestion Standard p/n: <a href="#">186006371</a>	Cytochrome c Digestion Standard p/n: <a href="#">186006371</a>	MassPREP Protein Standard Mix p/n: <a href="#">186004900</a>
Application Standards	Reversed-Phase QC Reference Material p/n: <a href="#">186006360</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006360</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006360</a>	Peptide Retention Standard p/n: <a href="#">186006555</a>	Peptide Retention Standard p/n: <a href="#">186006555</a>	—

BEH Technology is also available in UPLC particle sizes (ACQUITY UPLC BEH 1.7 µm), please refer to [page 96](#).

\*Expected or approximate value.

**i** For more information on XBridge BEH HPLC Columns, [refer to page 181](#).



Application-Specific Columns							
Protein BEH SEC, 125 Å	Protein BEH SEC, 200 Å	Protein BEH SEC, 450 Å	Oligonucleotide BEH C <sub>18</sub> , 130 Å	Glycan BEH Amide, 130 Å	BEH Phenyl, 130 Å	BEH HILIC, 130 Å	BEH Amide, 130 Å
HPLC: 3.5 µm	HPLC: 3.5 µm	HPLC: 3.5 µm	HPLC: 2.5 µm	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5 µm	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5, 5, 10 µm	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5 µm	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5 µm
4.9 µmol/m <sup>2</sup>	5.5 µmol/m <sup>2</sup>	4.8 µmol/m <sup>2</sup>	3.1 µmol/m <sup>2</sup>	7.5 µmol/m <sup>2</sup>	3.0 µmol/m <sup>2</sup>	N/A	7.5 µmol/m <sup>2</sup>
15%	12%	9%	18%	12%	15%	Unbonded	12%
No	No	No	Yes	No	Yes	N/A	No
L33	L33	L33	L1	L68	L11	L3	L68
1-8	1-8	1-8	1-12	2-11	1-12	1-9	2-11
Low pH = 60 °C, High pH = 60 °C	Low pH = 60 °C, High pH = 60 °C	Low pH = 60 °C, High pH = 60 °C	Low pH = 80 °C, High pH = 60 °C	Low pH = 90 °C, High pH = 90 °C	Low pH = 80 °C, High pH = 60 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 90 °C, High pH = 90 °C
395 m <sup>2</sup> /g	220 m <sup>2</sup> /g	80 m <sup>2</sup> /g	90 m <sup>2</sup> /g	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g
<b>BEH 125 Protein Standard Mix</b> p/n: <a href="#">186006519</a>	<b>BEH200 SEC Protein Standard Mix</b> p/n: <a href="#">186006518</a>	<b>BEH450 SEC Protein Standard Mix</b> p/n: <a href="#">186006842</a>	<b>MassPREP OST Standard</b> p/n: <a href="#">186004135</a>	<b>HILIC QC Reference Material</b> p/n: <a href="#">186007226</a>	<b>Neutrals QC Reference Material</b> p/n: <a href="#">186006360</a>	<b>HILIC QC Reference Material</b> p/n: <a href="#">186007226</a>	<b>HILIC QC Reference Material</b> p/n: <a href="#">186007226</a>
—	—	—	—	—	<b>Reversed-Phase QC Reference Material</b> p/n: <a href="#">186006363</a>	—	—



**APPLICATION AREA:** Oligonucleotides (Preparation and Analytical)

"Gold standard for separation of oligos."

**REVIEWER:** Jan Zimmermann

**ORGANIZATION:** ADX



## Ordering Information

### XBridge Columns

ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006028</a>	<a href="#">176002546</a>	2.1 × 20 mm <i>JS</i>	<a href="#">186003019</a>	2.1 × 20 mm <i>JS</i>	<a href="#">186003107</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006029</a>	<a href="#">176002547</a>	2.1 × 30 mm	<a href="#">186003020</a>	2.1 × 30 mm	<a href="#">186003129</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006030</a>	<a href="#">176002548</a>	2.1 × 50 mm	<a href="#">186003021</a>	2.1 × 50 mm	<a href="#">186003108</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006031</a>	<a href="#">176002549</a>	2.1 × 100 mm	<a href="#">186003022</a>	2.1 × 100 mm	<a href="#">186003109</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006709</a>	<a href="#">176002879</a>	2.1 × 150 mm	<a href="#">186003023</a>	2.1 × 150 mm	<a href="#">186003110</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006032</a>	<a href="#">176002550</a>	3.0 × 30 mm	<a href="#">186003025</a>	3.0 × 30 mm	<a href="#">186003111</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006033</a>	<a href="#">176002551</a>	3.0 × 50 mm	<a href="#">186003026</a>	3.0 × 50 mm	<a href="#">186003131</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006034</a>	<a href="#">176002552</a>	3.0 × 100 mm	<a href="#">186003027</a>	3.0 × 100 mm	<a href="#">186003132</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006035</a>	<a href="#">176002553</a>	3.0 × 150 mm	<a href="#">186003028</a>	3.0 × 150 mm	<a href="#">186003112</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006710</a>	<a href="#">176002880</a>	4.6 × 30 mm	<a href="#">186003030</a>	3.0 × 250 mm	<a href="#">186003133</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006036</a>	—	4.6 × 50 mm	<a href="#">186003031</a>	4.6 × 30 mm	<a href="#">186003135</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006037</a>	—	4.6 × 75 mm	<a href="#">186003032</a>	4.6 × 50 mm	<a href="#">186003113</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006038</a>	—	4.6 × 100 mm	<a href="#">186003033</a>	4.6 × 75 mm	<a href="#">186003114</a>
4.6 × 100 mm <i>XP</i>	<a href="#">186006039</a>	—	4.6 × 150 mm	<a href="#">186003034</a>	4.6 × 100 mm	<a href="#">186003115</a>
4.6 × 150 mm <i>XP</i>	<a href="#">186006711</a>	—	4.6 × 250 mm	<a href="#">186003943</a>	4.6 × 150 mm	<a href="#">186003116</a>
					4.6 × 250 mm	<a href="#">186003117</a>

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186002972</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186003889</a> <sup>1</sup>
10 × 50 mm	OBD Column	<a href="#">186008164</a>	19 × 10 mm	Guard Cartridge	<a href="#">186003892</a> <sup>2</sup>
10 × 100 mm	OBD Column	<a href="#">186008165</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006892</a> <sup>3</sup>
10 × 150 mm	OBD Column	<a href="#">186008166</a>	10 × 150 mm	OBD Column	<a href="#">186008210</a>
10 × 250 mm	OBD Column	<a href="#">186008167</a>	10 × 250 mm	OBD Column	<a href="#">186008211</a>
19 × 10 mm	Guard Cartridge	<a href="#">186002975</a> <sup>2</sup>	19 × 50 mm	OBD Column	<a href="#">186003893</a>
19 × 50 mm	OBD Column	<a href="#">186002977</a>	19 × 100 mm	OBD Column	<a href="#">186003901</a>
19 × 100 mm	OBD Column	<a href="#">186002978</a>	19 × 150 mm	OBD Column	<a href="#">186003894</a>
19 × 150 mm	OBD Column	<a href="#">186002979</a>	19 × 250 mm	OBD Column	<a href="#">186003895</a>
19 × 250 mm	OBD Column	<a href="#">186004021</a>	30 × 75 mm	OBD Column	<a href="#">186004711</a>
30 × 10 mm	Guard Cartridge	<a href="#">186006893</a> <sup>3</sup>	30 × 100 mm	OBD Column	<a href="#">186003930</a>
30 × 50 mm	OBD Column	<a href="#">186002980</a>	30 × 150 mm	OBD Column	<a href="#">186003896</a>
30 × 75 mm	OBD Column	<a href="#">186002981</a>	30 × 250 mm	OBD Column	<a href="#">186003897</a>
30 × 100 mm	OBD Column	<a href="#">186002982</a>	50 × 50 mm	OBD Column	<a href="#">186003898</a>
30 × 150 mm	OBD Column	<a href="#">186003284</a>	50 × 100 mm	OBD Column	<a href="#">186003902</a>
30 × 250 mm	OBD Column	<a href="#">186004025</a>	50 × 150 mm	OBD Column	<a href="#">186003899</a>
50 × 50 mm	OBD Column	<a href="#">186003933</a>	50 × 250 mm	OBD Column	<a href="#">186003900</a>
50 × 100 mm	OBD Column	<a href="#">186003937</a>			
50 × 150 mm	OBD Column	<a href="#">186003929</a>			
50 × 250 mm	OBD Column	<a href="#">186004107</a>			

<sup>1</sup> Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup> Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

XBridge Columns *Continued*

BEH C <sub>8</sub>						
ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006040</a>	<a href="#">176002554</a>	2.1 × 30 mm	<a href="#">186003046</a>	2.1 × 30 mm	<a href="#">186003187</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006041</a>	<a href="#">176002555</a>	2.1 × 50 mm	<a href="#">186003047</a>	2.1 × 50 mm	<a href="#">186003011</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006042</a>	<a href="#">176002556</a>	2.1 × 100 mm	<a href="#">186003048</a>	2.1 × 100 mm	<a href="#">186003012</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006043</a>	<a href="#">176002557</a>	2.1 × 150 mm	<a href="#">186003049</a>	2.1 × 150 mm	<a href="#">186003013</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006712</a>	<a href="#">176002881</a>	3.0 × 30 mm	<a href="#">186003182</a>	3.0 × 30 mm	<a href="#">186003189</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006044</a>	<a href="#">176002558</a>	3.0 × 50 mm	<a href="#">186003050</a>	3.0 × 50 mm	<a href="#">186003190</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006045</a>	<a href="#">176002559</a>	3.0 × 100 mm	<a href="#">186003051</a>	3.0 × 100 mm	<a href="#">186003191</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006046</a>	<a href="#">176002560</a>	3.0 × 150 mm	<a href="#">186003052</a>	3.0 × 150 mm	<a href="#">186003014</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006047</a>	<a href="#">176002561</a>	4.6 × 30 mm	<a href="#">186003184</a>	3.0 × 250 mm	<a href="#">186003192</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006713</a>	<a href="#">176002882</a>	4.6 × 50 mm	<a href="#">186003053</a>	4.6 × 30 mm	<a href="#">186003194</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006048</a>	—	4.6 × 75 mm	<a href="#">186003185</a>	4.6 × 50 mm	<a href="#">186003015</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006049</a>	—	4.6 × 100 mm	<a href="#">186003054</a>	4.6 × 75 mm	<a href="#">186003195</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006050</a>	—	4.6 × 150 mm	<a href="#">186003055</a>	4.6 × 100 mm	<a href="#">186003016</a>
4.6 × 100 mm <i>XP</i>	<a href="#">186006051</a>	—	4.6 × 250 mm	<a href="#">186003963</a>	4.6 × 150 mm	<a href="#">186003017</a>
4.6 × 150 mm <i>XP</i>	<a href="#">186006714</a>	—			4.6 × 250 mm	<a href="#">186003018</a>
PREPARATIVE COLUMNS						
Particle Size: 5 µm			Particle Size: 10 µm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
10 × 10 mm	Guard Cartridge	<a href="#">186002991</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186004003</a> <sup>1</sup>	
10 × 50 mm	OBD Column	<a href="#">186008172</a>	19 × 10 mm	Guard Cartridge	<a href="#">186004006</a> <sup>2</sup>	
10 × 100 mm	OBD Column	<a href="#">186008173</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006894</a> <sup>3</sup>	
10 × 150 mm	OBD Column	<a href="#">186008174</a>	10 × 150 mm	OBD Column	<a href="#">186008215</a>	
10 × 250 mm	OBD Column	<a href="#">186008175</a>	10 × 250 mm	OBD Column	<a href="#">186008216</a>	
19 × 10 mm	Guard Cartridge	<a href="#">186002992</a> <sup>2</sup>	19 × 50 mm	OBD Column	<a href="#">186004007</a>	
19 × 50 mm	OBD Column	<a href="#">186002993</a>	19 × 100 mm	OBD Column	<a href="#">186004008</a>	
19 × 100 mm	OBD Column	<a href="#">186002994</a>	19 × 150 mm	OBD Column	<a href="#">186004009</a>	
19 × 150 mm	OBD Column	<a href="#">186002995</a>	19 × 250 mm	OBD Column	<a href="#">186004010</a>	
19 × 250 mm	OBD Column	<a href="#">186004023</a>	30 × 150 mm	OBD Column	<a href="#">186004011</a>	
30 × 10 mm	Guard Cartridge	<a href="#">186006895</a> <sup>3</sup>	30 × 250 mm	OBD Column	<a href="#">186004012</a>	
30 × 50 mm	OBD Column	<a href="#">186002996</a>	50 × 50 mm	OBD Column	<a href="#">186004013</a>	
30 × 75 mm	OBD Column	<a href="#">186003269</a>	50 × 100 mm	OBD Column	<a href="#">186004014</a>	
30 × 100 mm	OBD Column	<a href="#">186002997</a>	50 × 150 mm	OBD Column	<a href="#">186004015</a>	
30 × 150 mm	OBD Column	<a href="#">186003083</a>	50 × 250 mm	OBD Column	<a href="#">186004016</a>	
50 × 50 mm	OBD Column	<a href="#">186003934</a>				
50 × 100 mm	OBD Column	<a href="#">186003938</a>				

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

BEH Shield RP18

ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006052</a>	<a href="#">176002562</a>	2.1 × 30 mm	<a href="#">186003035</a>	2.1 × 30 mm	<a href="#">186003157</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006053</a>	<a href="#">176002563</a>	2.1 × 50 mm	<a href="#">186003036</a>	2.1 × 50 mm	<a href="#">186002999</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006054</a>	<a href="#">176002564</a>	2.1 × 100 mm	<a href="#">186003037</a>	2.1 × 100 mm	<a href="#">186003002</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006055</a>	<a href="#">176002565</a>	2.1 × 150 mm	<a href="#">186003038</a>	2.1 × 150 mm	<a href="#">186003003</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006715</a>	<a href="#">176002883</a>	3.0 × 30 mm	<a href="#">186003153</a>	3.0 × 50 mm	<a href="#">186003160</a>
3.0 × 20 mm <i>IS</i>	<a href="#">186003140</a>	—	3.0 × 50 mm	<a href="#">186003039</a>	3.0 × 100 mm	<a href="#">186003004</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006056</a>	<a href="#">176002566</a>	3.0 × 100 mm	<a href="#">186003040</a>	3.0 × 150 mm	<a href="#">186003005</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006057</a>	<a href="#">176002567</a>	3.0 × 150 mm	<a href="#">186003041</a>	3.0 × 250 mm	<a href="#">186003161</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006058</a>	<a href="#">176002568</a>	4.6 × 30 mm	<a href="#">186003155</a>	4.6 × 50 mm	<a href="#">186003006</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006059</a>	<a href="#">176002569</a>	4.6 × 50 mm	<a href="#">186003042</a>	4.6 × 75 mm	<a href="#">186003007</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006716</a>	<a href="#">176002884</a>	4.6 × 75 mm	<a href="#">186003043</a>	4.6 × 100 mm	<a href="#">186003008</a>
4.6 × 20 mm <i>IS</i>	<a href="#">186003144</a>	—	4.6 × 100 mm	<a href="#">186003044</a>	4.6 × 150 mm	<a href="#">186003009</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006060</a>	—	4.6 × 150 mm	<a href="#">186003045</a>	4.6 × 250 mm	<a href="#">186003010</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006061</a>	—	4.6 × 250 mm	<a href="#">186003964</a>		
4.6 × 75 mm <i>XP</i>	<a href="#">186006062</a>	—				
4.6 × 100 mm <i>XP</i>	<a href="#">186006063</a>	—				
4.6 × 150 mm <i>XP</i>	<a href="#">186006717</a>	—				

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186002983</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186003988</a> <sup>1</sup>
10 × 50 mm	OBD Column	<a href="#">186008168</a>	19 × 10 mm	Guard Cartridge	<a href="#">186003991</a> <sup>2</sup>
10 × 100 mm	OBD Column	<a href="#">186008169</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006897</a> <sup>3</sup>
10 × 150 mm	OBD Column	<a href="#">186008170</a>	10 × 150 mm	OBD Column	<a href="#">186008213</a>
10 × 250 mm	OBD Column	<a href="#">186008171</a>	10 × 250 mm	OBD Column	<a href="#">186008214</a>
19 × 10 mm	Guard Cartridge	<a href="#">186002984</a> <sup>2</sup>	19 × 50 mm	OBD Column	<a href="#">186003992</a>
19 × 50 mm	OBD Column	<a href="#">186002985</a>	19 × 100 mm	OBD Column	<a href="#">186003993</a>
19 × 100 mm	OBD Column	<a href="#">186002986</a>	19 × 150 mm	OBD Column	<a href="#">186003994</a>
19 × 150 mm	OBD Column	<a href="#">186002987</a>	19 × 250 mm	OBD Column	<a href="#">186003995</a>
19 × 250 mm	OBD Column	<a href="#">186004022</a>	30 × 150 mm	OBD Column	<a href="#">186003996</a>
30 × 10 mm	Guard Cartridge	<a href="#">186006898</a> <sup>3</sup>	30 × 250 mm	OBD Column	<a href="#">186003997</a>
30 × 50 mm	OBD Column	<a href="#">186002988</a>	50 × 50 mm	OBD Column	<a href="#">186003998</a>
30 × 75 mm	OBD Column	<a href="#">186003262</a>	50 × 100 mm	OBD Column	<a href="#">186003999</a>
30 × 100 mm	OBD Column	<a href="#">186002989</a>	50 × 150 mm	OBD Column	<a href="#">186004001</a>
30 × 150 mm	OBD Column	<a href="#">186002990</a>	50 × 250 mm	OBD Column	<a href="#">186004002</a>
50 × 50 mm	OBD Column	<a href="#">186003935</a>			
50 × 100 mm	OBD Column	<a href="#">186003939</a>			

<sup>1</sup> Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup> Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

XBridge Columns *Continued*

BEH Phenyl

ANALYTICAL COLUMNS						
Particle Size: 2.5 $\mu\text{m}$			Particle Size: 3.5 $\mu\text{m}$		Particle Size: 5 $\mu\text{m}$	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 $\times$ 30 mm <i>XP</i>	<a href="#">186006064</a>	<a href="#">176002570</a>	2.1 $\times$ 30 mm	<a href="#">186003321</a>	2.1 $\times$ 50 mm	<a href="#">186003338</a>
2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006065</a>	<a href="#">176002571</a>	2.1 $\times$ 50 mm	<a href="#">186003322</a>	2.1 $\times$ 100 mm	<a href="#">186003339</a>
2.1 $\times$ 75 mm <i>XP</i>	<a href="#">186006066</a>	<a href="#">176002572</a>	2.1 $\times$ 100 mm	<a href="#">186003323</a>	2.1 $\times$ 150 mm	<a href="#">186003340</a>
2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006067</a>	<a href="#">176002573</a>	2.1 $\times$ 150 mm	<a href="#">186003324</a>	3.0 $\times$ 50 mm	<a href="#">186003343</a>
2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006718</a>	<a href="#">176002885</a>	3.0 $\times$ 50 mm	<a href="#">186003327</a>	3.0 $\times$ 100 mm	<a href="#">186003344</a>
3.0 $\times$ 30 mm <i>XP</i>	<a href="#">186006068</a>	<a href="#">176002574</a>	3.0 $\times$ 100 mm	<a href="#">186003328</a>	3.0 $\times$ 150 mm	<a href="#">186003345</a>
3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006069</a>	<a href="#">176002575</a>	3.0 $\times$ 150 mm	<a href="#">186003329</a>	3.0 $\times$ 250 mm	<a href="#">186003346</a>
3.0 $\times$ 75 mm <i>XP</i>	<a href="#">186006070</a>	<a href="#">176002576</a>	4.6 $\times$ 30 mm	<a href="#">186003331</a>	4.6 $\times$ 50 mm	<a href="#">186003349</a>
3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006071</a>	<a href="#">176002577</a>	4.6 $\times$ 50 mm	<a href="#">186003332</a>	4.6 $\times$ 75 mm	<a href="#">186003350</a>
3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006719</a>	<a href="#">176002886</a>	4.6 $\times$ 75 mm	<a href="#">186003333</a>	4.6 $\times$ 100 mm	<a href="#">186003351</a>
4.6 $\times$ 30 mm <i>XP</i>	<a href="#">186006072</a>	—	4.6 $\times$ 100 mm	<a href="#">186003334</a>	4.6 $\times$ 150 mm	<a href="#">186003352</a>
4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006073</a>	—	4.6 $\times$ 150 mm	<a href="#">186003335</a>	4.6 $\times$ 250 mm	<a href="#">186003353</a>
4.6 $\times$ 75 mm <i>XP</i>	<a href="#">186006074</a>	—	4.6 $\times$ 250 mm	<a href="#">186003965</a>		
4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006075</a>	—				
4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006720</a>	—				

PREPARATIVE COLUMNS		
Particle Size: 5 $\mu\text{m}$		
Dimension	Type	P/N (1/pk)
10 $\times$ 10 mm	Guard Cartridge	<a href="#">186003354</a> <sup>1</sup>
10 $\times$ 50 mm	OBD Column	<a href="#">186008176</a>
10 $\times$ 100 mm	OBD Column	<a href="#">186008177</a>
10 $\times$ 150 mm	OBD Column	<a href="#">186008178</a>
10 $\times$ 250 mm	OBD Column	<a href="#">186008179</a>
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186003355</a> <sup>2</sup>
19 $\times$ 50 mm	OBD Column	<a href="#">186003356</a>
19 $\times$ 100 mm	OBD Column	<a href="#">186003357</a>
19 $\times$ 150 mm	OBD Column	<a href="#">186003358</a>
19 $\times$ 250 mm	OBD Column	<a href="#">186004024</a>
30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006891</a> <sup>3</sup>
30 $\times$ 50 mm	OBD Column	<a href="#">186003277</a>
30 $\times$ 75 mm	OBD Column	<a href="#">186003278</a>
30 $\times$ 100 mm	OBD Column	<a href="#">186003279</a>
30 $\times$ 150 mm	OBD Column	<a href="#">186003276</a>
50 $\times$ 50 mm	OBD Column	<a href="#">186003936</a>
50 $\times$ 100 mm	OBD Column	<a href="#">186003940</a>

<sup>1</sup>Requires 10  $\times$  10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30  $\times$  10 mm Prep Guard Holder, p/n: [186006912](#).

BEH HILIC						
ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006076</a>	<a href="#">176002578</a>	2.1 × 50 mm	<a href="#">186004432</a>	2.1 × 50 mm	<a href="#">186004444</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006077</a>	<a href="#">176002579</a>	2.1 × 100 mm	<a href="#">186004433</a>	2.1 × 100 mm	<a href="#">186004445</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006078</a>	<a href="#">176002580</a>	2.1 × 150 mm	<a href="#">186004434</a>	2.1 × 150 mm	<a href="#">186004446</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006079</a>	<a href="#">176002581</a>	3.0 × 100 mm	<a href="#">186004436</a>	3.0 × 100 mm	<a href="#">186004448</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006721</a>	<a href="#">176002887</a>	4.6 × 50 mm	<a href="#">186004439</a>	4.6 × 50 mm	<a href="#">186004451</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006080</a>	<a href="#">176002582</a>	4.6 × 100 mm	<a href="#">186004440</a>	4.6 × 100 mm	<a href="#">186004452</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006081</a>	<a href="#">176002583</a>	4.6 × 150 mm	<a href="#">186004441</a>	4.6 × 150 mm	<a href="#">186004453</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006082</a>	<a href="#">176002584</a>			4.6 × 250 mm	<a href="#">186004454</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006083</a>	<a href="#">176002585</a>				
3.0 × 150 mm <i>XP</i>	<a href="#">186006722</a>	<a href="#">176002888</a>				
4.6 × 30 mm <i>XP</i>	<a href="#">186006084</a>	—				
4.6 × 50 mm <i>XP</i>	<a href="#">186006085</a>	—				
4.6 × 75 mm <i>XP</i>	<a href="#">186006086</a>	—				
4.6 × 100 mm <i>XP</i>	<a href="#">186006087</a>	—				
4.6 × 150 mm <i>XP</i>	<a href="#">186006723</a>	—				
PREPARATIVE COLUMNS						
Particle Size: 5 µm						
Dimension	Type	P/N (1/pk)				
10 × 10 mm	Guard Cartridge	<a href="#">186004720</a> <sup>1</sup>				
10 × 50 mm	OBD Column	<a href="#">186008217</a>				
10 × 100 mm	OBD Column	<a href="#">186008218</a>				
19 × 10 mm	Guard Cartridge	<a href="#">186004723</a> <sup>2</sup>				
19 × 50 mm	OBD Column	<a href="#">186004724</a>				
19 × 100 mm	OBD Column	<a href="#">186004725</a>				
19 × 150 mm	OBD Column	<a href="#">186004726</a>				
19 × 250 mm	OBD Column	<a href="#">186004730</a>				
30 × 10 mm	Guard Cartridge	<a href="#">186006896</a> <sup>3</sup>				
30 × 50 mm	OBD Column	<a href="#">186004727</a>				
30 × 100 mm	OBD Column	<a href="#">186004728</a>				
30 × 150 mm	OBD Column	<a href="#">186004729</a>				
30 × 250 mm	OBD Column	<a href="#">186004731</a>				
50 × 50 mm	OBD Column	<a href="#">186004732</a>				
50 × 100 mm	OBD Column	<a href="#">186004733</a>				
50 × 150 mm	OBD Column	<a href="#">186004734</a>				
50 × 250 mm	OBD Column	<a href="#">186004735</a>				

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

XBridge Columns *Continued*

BEH Amide						
ANALYTICAL COLUMNS						
Particle Size: 2.5 $\mu$ m			Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 $\times$ 30 mm <i>XP</i>	<a href="#">186006088</a>	<a href="#">176002586</a>	2.1 $\times$ 30 mm	<a href="#">186004858</a>	2.1 $\times$ 30 mm	<a href="#">186006587</a>
2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006089</a>	<a href="#">176002587</a>	2.1 $\times$ 50 mm	<a href="#">186004859</a>	2.1 $\times$ 50 mm	<a href="#">186006588</a>
2.1 $\times$ 75 mm <i>XP</i>	<a href="#">186006090</a>	<a href="#">176002588</a>	2.1 $\times$ 100 mm	<a href="#">186004860</a>	2.1 $\times$ 100 mm	<a href="#">186006589</a>
2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006091</a>	<a href="#">176002589</a>	2.1 $\times$ 150 mm	<a href="#">186004861</a>	2.1 $\times$ 150 mm	<a href="#">186006590</a>
2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006724</a>	<a href="#">176002889</a>	3.0 $\times$ 50 mm	<a href="#">186004863</a>	3.0 $\times$ 50 mm	<a href="#">186006591</a>
3.0 $\times$ 30 mm <i>XP</i>	<a href="#">186006092</a>	<a href="#">176002590</a>	3.0 $\times$ 100 mm	<a href="#">186004864</a>	3.0 $\times$ 100 mm	<a href="#">186006592</a>
3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006093</a>	<a href="#">176002591</a>	4.6 $\times$ 50 mm	<a href="#">186004867</a>	4.6 $\times$ 50 mm	<a href="#">186006593</a>
3.0 $\times$ 75 mm <i>XP</i>	<a href="#">186006094</a>	<a href="#">176002592</a>	4.6 $\times$ 100 mm	<a href="#">186004868</a>	4.6 $\times$ 100 mm	<a href="#">186006594</a>
3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006095</a>	<a href="#">176002593</a>	4.6 $\times$ 150 mm	<a href="#">186004869</a>	4.6 $\times$ 150 mm	<a href="#">186006595</a>
3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006725</a>	<a href="#">176002890</a>	4.6 $\times$ 250 mm	<a href="#">186004870</a>	4.6 $\times$ 250 mm	<a href="#">186006596</a>
4.6 $\times$ 30 mm <i>XP</i>	<a href="#">186006096</a>	—				
4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006097</a>	—				
4.6 $\times$ 75 mm <i>XP</i>	<a href="#">186006098</a>	—				
4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006099</a>	—				
4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006726</a>	—				
PREPARATIVE COLUMNS						
Particle Size: 5 $\mu$ m						
Dimension	Type	P/N (1/pk)				
10 $\times$ 10 mm	Guard Cartridge	<a href="#">186006597</a> <sup>1</sup>				
10 $\times$ 50 mm	OBD Column	<a href="#">186008260</a>				
10 $\times$ 100 mm	OBD Column	<a href="#">186008261</a>				
10 $\times$ 150 mm	OBD Column	<a href="#">186008262</a>				
10 $\times$ 250 mm	OBD Column	<a href="#">186008263</a>				
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186006598</a> <sup>2</sup>				
19 $\times$ 50 mm	OBD Column	<a href="#">186006603</a>				
19 $\times$ 100 mm	OBD Column	<a href="#">186006604</a>				
19 $\times$ 150 mm	OBD Column	<a href="#">186006605</a>				
19 $\times$ 250 mm	OBD Column	<a href="#">186006606</a>				
30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006890</a> <sup>3</sup>				
30 $\times$ 50 mm	OBD Column	<a href="#">186006607</a>				
30 $\times$ 75 mm	OBD Column	<a href="#">186006608</a>				
30 $\times$ 100 mm	OBD Column	<a href="#">186006609</a>				
30 $\times$ 150 mm	OBD Column	<a href="#">186006610</a>				
30 $\times$ 250 mm	OBD Column	<a href="#">186006611</a>				

<sup>1</sup>Requires 10  $\times$  10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30  $\times$  10 mm Prep Guard Holder, p/n: [186006912](#).

XBridge Columns *Continued*

Glycan BEH Amide, 130 Å	ANALYTICAL COLUMNS			
	Particle Size: 2.5 µm		Particle Size: 3.5 µm	
	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
	2.1 × 50 mm <i>XP</i>	<a href="#">186007263</a>	2.1 × 50 mm	<a href="#">186007502</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186007264</a>	2.1 × 100 mm	<a href="#">186007503</a>
	2.1 × 150 mm <i>XP</i>	<a href="#">186007265</a>	2.1 × 150 mm	<a href="#">186007504</a>
	3.0 × 30 mm <i>XP</i>	<a href="#">186008038</a>	4.6 × 50 mm	<a href="#">186007273</a>
	3.0 × 75 mm <i>XP</i>	<a href="#">186008039</a>	4.6 × 100 mm	<a href="#">186007274</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186008040</a>	4.6 × 150 mm	<a href="#">186007275</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186007268</a>	4.6 × 250 mm	<a href="#">186007276</a>
	4.6 × 100 mm <i>XP</i>	<a href="#">186007269</a>		
	4.6 × 150 mm <i>XP</i>	<a href="#">186007270</a>		

Peptide BEH C <sub>18</sub> , 130 Å	ANALYTICAL COLUMNS				PREPARATIVE COLUMNS					
	Particle Size: 3.5 µm		Particle Size: 5 µm		Particle Size: 5 µm			Particle Size: 10 µm		
	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)	Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
	1.0 × 50 mm	<a href="#">186003560</a>	1.0 × 50 mm	<a href="#">186003571</a>	10 × 10 mm	Guard Cartridge	<a href="#">186004469</a> <sup>1</sup>	4.6 × 50 mm	OBD Column	<a href="#">186003648</a>
	1.0 × 100 mm	<a href="#">186003561</a>	1.0 × 100 mm	<a href="#">186003572</a>	10 × 50 mm	OBD Column	<a href="#">186008186</a>	4.6 × 100 mm	OBD Column	<a href="#">186003649</a>
	1.0 × 150 mm	<a href="#">186003562</a>	1.0 × 150 mm	<a href="#">186003573</a>	10 × 100 mm	OBD Column	<a href="#">186008187</a>	4.6 × 150 mm	OBD Column	<a href="#">186003650</a>
	2.1 × 50 mm	<a href="#">186003563</a>	2.1 × 50 mm	<a href="#">186003574</a>	10 × 150 mm	OBD Column	<a href="#">186008188</a>	4.6 × 250 mm	OBD Column	<a href="#">186003651</a>
	2.1 × 100 mm	<a href="#">186003564</a>	2.1 × 100 mm	<a href="#">186003575</a>	10 × 250 mm	OBD Column	<a href="#">186008189</a>	10 × 10 mm	Guard Cartridge	<a href="#">186004465</a> <sup>1</sup>
	2.1 × 150 mm	<a href="#">186003565</a>	2.1 × 150 mm	<a href="#">186003576</a>	19 × 10 mm	Guard Cartridge	<a href="#">186004468</a> <sup>2</sup>	10 × 50 mm	OBD Column	<a href="#">186008194</a>
	2.1 × 250 mm	<a href="#">186003566</a>	2.1 × 250 mm	<a href="#">186003577</a>	19 × 50 mm	OBD Column	<a href="#">186003586</a>	10 × 100 mm	OBD Column	<a href="#">186008195</a>
	4.6 × 50 mm	<a href="#">186003567</a>	4.6 × 50 mm	<a href="#">186003578</a>	19 × 100 mm	OBD Column	<a href="#">186003587</a>	10 × 150 mm	OBD Column	<a href="#">186008196</a>
	4.6 × 100 mm	<a href="#">186003568</a>	4.6 × 100 mm	<a href="#">186003579</a>	19 × 150 mm	OBD Column	<a href="#">186003945</a>	10 × 250 mm	OBD Column	<a href="#">186008197</a>
	4.6 × 150 mm	<a href="#">186003569</a>	4.6 × 150 mm	<a href="#">186003580</a>				19 × 10 mm	Guard Cartridge	<a href="#">186004464</a> <sup>2</sup>
	4.6 × 250 mm	<a href="#">186003570</a>	4.6 × 250 mm	<a href="#">186003581</a>				19 × 50 mm	OBD Column	<a href="#">186003656</a>
								19 × 150 mm	OBD Column	<a href="#">186003657</a>
								19 × 250 mm	OBD Column	<a href="#">186003658</a>
								30 × 50 mm	OBD Column	<a href="#">186003659</a>
								30 × 100 mm	OBD Column	<a href="#">186003660</a>
								30 × 150 mm	OBD Column	<a href="#">186003661</a>
								30 × 250 mm	OBD Column	<a href="#">186003662</a>

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).



**APPLICATION AREA:** Analyze Marine Biotoxins

"High quality and repeatability. We are accredited by ISO 17025. Great results and necessary for our Institute! The most important is the support and the seminars that Waters offers."

**REVIEWER:** Anna Safont

**ORGANIZATION:** IRTA

XBridge Columns *Continued*

Peptide BEH C <sub>18</sub> , 300 Å		ANALYTICAL COLUMNS					
		Particle Size: 2.5 µm			Particle Size: 3.5 µm		
Dimension		P/N (1/pk)	Dimension		P/N (1/pk)		
2.1 × 30 mm <i>XP</i>		<a href="#">186006028</a>	1.0 × 50 mm		<a href="#">186003604</a>		
2.1 × 50 mm <i>XP</i>		<a href="#">186006029</a>	1.0 × 100 mm		<a href="#">186003605</a>		
2.1 × 75 mm <i>XP</i>		<a href="#">186006030</a>	1.0 × 150 mm		<a href="#">186003606</a>		
2.1 × 100 mm <i>XP</i>		<a href="#">186006031</a>	2.1 × 50 mm		<a href="#">186003607</a>		
2.1 × 150 mm <i>XP</i>		<a href="#">186006709</a>	2.1 × 100 mm		<a href="#">186003608</a>		
3.0 × 30 mm <i>XP</i>		<a href="#">186006032</a>	2.1 × 150 mm		<a href="#">186003609</a>		
3.0 × 50 mm <i>XP</i>		<a href="#">186006033</a>	2.1 × 250 mm		<a href="#">186003610</a>		
3.0 × 75 mm <i>XP</i>		<a href="#">186006034</a>	4.6 × 50 mm		<a href="#">186003611</a>		
3.0 × 100 mm <i>XP</i>		<a href="#">186006035</a>	4.6 × 100 mm		<a href="#">186003612</a>		
3.0 × 150 mm <i>XP</i>		<a href="#">186006710</a>	4.6 × 150 mm		<a href="#">186003613</a>		
4.6 × 30 mm <i>XP</i>		<a href="#">186006036</a>	4.6 × 250 mm		<a href="#">186003614</a>		
4.6 × 50 mm <i>XP</i>		<a href="#">186006037</a>					
4.6 × 75 mm <i>XP</i>		<a href="#">186006038</a>					
4.6 × 100 mm <i>XP</i>		<a href="#">186006039</a>					
4.6 × 150 mm <i>XP</i>		<a href="#">186006711</a>					

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186004471</a> <sup>1</sup>	4.6 × 50 mm	OBD Column	<a href="#">186003663</a>
10 × 50 mm	OBD Column	<a href="#">186008190</a>	4.6 × 100 mm	OBD Column	<a href="#">186003664</a>
10 × 100 mm	OBD Column	<a href="#">186008191</a>	4.6 × 150 mm	OBD Column	<a href="#">186003665</a>
10 × 150 mm	OBD Column	<a href="#">186008192</a>	4.6 × 250 mm	OBD Column	<a href="#">186003666</a>
10 × 250 mm	OBD Column	<a href="#">186008193</a>	10 × 10 mm	Guard Cartridge	<a href="#">186004467</a> <sup>1</sup>
19 × 10 mm	Guard Cartridge	<a href="#">186004470</a> <sup>2</sup>	10 × 50 mm	OBD Column	<a href="#">186008198</a>
19 × 50 mm	OBD Column	<a href="#">186003630</a>	10 × 100 mm	OBD Column	<a href="#">186008199</a>
19 × 100 mm	OBD Column	<a href="#">186003631</a>	10 × 150 mm	OBD Column	<a href="#">186008200</a>
19 × 150 mm	OBD Column	<a href="#">186003946</a>	10 × 250 mm	OBD Column	<a href="#">186008201</a>
			19 × 10 mm	Guard Cartridge	<a href="#">186004466</a> <sup>2</sup>
			19 × 50 mm	OBD Column	<a href="#">186003671</a>
			19 × 150 mm	OBD Column	<a href="#">186003672</a>
			19 × 250 mm	OBD Column	<a href="#">186003673</a>
			30 × 10 mm	Guard Cartridge	<a href="#">186006882</a> <sup>3</sup>
			30 × 50 mm	OBD Column	<a href="#">186003674</a>
			30 × 100 mm	OBD Column	<a href="#">186003675</a>
			30 × 150 mm	OBD Column	<a href="#">186003676</a>
			30 × 250 mm	OBD Column	<a href="#">186003677</a>

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Cartridge Holder, p/n: [186006912](#).



XBridge Columns *Continued*

Protein BEH C <sub>4</sub> , 300 Å	ANALYTICAL COLUMNS		PREPARATIVE COLUMNS				
	Particle Size: 3.5 µm		Particle Size: 5 µm			Particle Size: 10 µm	
	Dimension	P/N (1/pk)	Dimension	Type	P/N (1/pk)	Dimension	Type
2.1 × 50 mm	<a href="#">186004498</a>	10 × 10 mm	Guard Cartridge	<a href="#">186007305</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186007325</a> <sup>1</sup>
2.1 × 100 mm	<a href="#">186004499</a>	10 × 50 mm	OBD Column	<a href="#">186008272</a>	10 × 50 mm	OBD Column	<a href="#">186008276</a>
2.1 × 150 mm	<a href="#">186004500</a>	10 × 100 mm	OBD Column	<a href="#">186008273</a>	10 × 100 mm	OBD Column	<a href="#">186008277</a>
2.1 × 250 mm	<a href="#">186004501</a>	10 × 150 mm	OBD Column	<a href="#">186008274</a>	10 × 150 mm	OBD Column	<a href="#">186008278</a>
4.6 × 50 mm	<a href="#">186004502</a>	10 × 250 mm	OBD Column	<a href="#">186008275</a>	10 × 250 mm	OBD Column	<a href="#">186008279</a>
4.6 × 100 mm	<a href="#">186004503</a>	19 × 10 mm	Guard Cartridge	<a href="#">186007310</a> <sup>2</sup>	19 × 10 mm	Guard Cartridge	<a href="#">186007330</a> <sup>2</sup>
4.6 × 150 mm	<a href="#">186004504</a>	19 × 50 mm	OBD Column	<a href="#">186007311</a>	19 × 50 mm	OBD Column	<a href="#">186007331</a>
4.6 × 250 mm	<a href="#">186004505</a>	19 × 100 mm	OBD Column	<a href="#">186007312</a>	19 × 100 mm	OBD Column	<a href="#">186007332</a>
		19 × 150 mm	OBD Column	<a href="#">186007313</a>	19 × 150 mm	OBD Column	<a href="#">186007333</a>
		19 × 250 mm	OBD Column	<a href="#">186007314</a>	19 × 250 mm	OBD Column	<a href="#">186007334</a>
		30 × 10 mm	Guard Cartridge	<a href="#">186007315</a> <sup>3</sup>	30 × 10 mm	Guard Cartridge	<a href="#">186007335</a> <sup>3</sup>
		30 × 50 mm	OBD Column	<a href="#">186007316</a>	30 × 50 mm	OBD Column	<a href="#">186007336</a>
		30 × 75 mm	OBD Column	<a href="#">186007317</a>	30 × 75 mm	OBD Column	<a href="#">186007337</a>
		30 × 100 mm	OBD Column	<a href="#">186007318</a>	30 × 100 mm	OBD Column	<a href="#">186007338</a>
		30 × 150 mm	OBD Column	<a href="#">186007319</a>	30 × 150 mm	OBD Column	<a href="#">186007339</a>
		30 × 250 mm	OBD Column	<a href="#">186007320</a>	30 × 250 mm	OBD Column	<a href="#">186007340</a>

Oligonucleotide BEH C <sub>18</sub> , 130 Å	PREPARATIVE COLUMNS		
	Particle Size: 2.5 µm		
	Dimension	Type	P/N (1/pk)
10 × 50 mm	OBD Column	<a href="#">186008212</a>	

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).



**APPLICATION AREA:** Analyte/Metabolite Analysis from Human Plasma Samples

"I've always been a big fan of XBridge columns. Their versatility across wide pH ranges and ruggedness to withstand thousands of injections is ideal for our fast paced CRO environment. High plate counts demonstrate great column efficiency allowing us the versatility to forgo UPLC applications. Column durability and applicability across highly variable analyte chemistries make XBridge columns very attractive for our workflows."

**REVIEWER:** Matthew Mascarié

**ORGANIZATION:** Syneos Health

XBridge Columns Method Validation Kits\*

	Particle Size: 2.5 $\mu$ m		Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>BEH C<sub>18</sub></b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006197</a>	2.1 $\times$ 100 mm	<a href="#">186003766</a>	2.1 $\times$ 150 mm	<a href="#">186003771</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006198</a>	3.0 $\times$ 100 mm	<a href="#">186003767</a>	3.0 $\times$ 100 mm	<a href="#">186003772</a>
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006757</a>	3.0 $\times$ 150 mm	<a href="#">186003768</a>	3.0 $\times$ 150 mm	<a href="#">186003773</a>
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006199</a>	4.6 $\times$ 100 mm	<a href="#">186003769</a>	4.6 $\times$ 100 mm	<a href="#">186003774</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006200</a>	4.6 $\times$ 150 mm	<a href="#">186003770</a>	4.6 $\times$ 150 mm	<a href="#">186003775</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006758</a>			4.6 $\times$ 250 mm	<a href="#">186003776</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006201</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006202</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006759</a>				
<b>BEH C<sub>8</sub></b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006203</a>	2.1 $\times$ 100 mm	<a href="#">186003777</a>	2.1 $\times$ 150 mm	<a href="#">186003782</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006204</a>	3.0 $\times$ 100 mm	<a href="#">186003778</a>	3.0 $\times$ 100 mm	<a href="#">186003783</a>
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006760</a>	3.0 $\times$ 150 mm	<a href="#">186003779</a>	3.0 $\times$ 150 mm	186003784
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006205</a>	4.6 $\times$ 100 mm	<a href="#">186003780</a>	4.6 $\times$ 100 mm	<a href="#">186003785</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006206</a>	4.6 $\times$ 150 mm	<a href="#">186003781</a>	4.6 $\times$ 150 mm	<a href="#">186003786</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006761</a>			4.6 $\times$ 250 mm	<a href="#">186003787</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006207</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006208</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006762</a>				
<b>BEH Shield RP18</b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006209</a>	2.1 $\times$ 100 mm	<a href="#">186003788</a>	2.1 $\times$ 150 mm	<a href="#">186003793</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006210</a>	3.0 $\times$ 100 mm	<a href="#">186003789</a>	3.0 $\times$ 100 mm	186003794
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006763</a>	3.0 $\times$ 150 mm	<a href="#">186003790</a>	3.0 $\times$ 150 mm	<a href="#">186003795</a>
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006211</a>	4.6 $\times$ 100 mm	<a href="#">186003791</a>	4.6 $\times$ 100 mm	<a href="#">186003796</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006212</a>	4.6 $\times$ 150 mm	<a href="#">186003792</a>	4.6 $\times$ 150 mm	<a href="#">186003797</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006774</a>			4.6 $\times$ 250 mm	<a href="#">186003798</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006213</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006214</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006775</a>				
<b>BEH Phenyl</b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006215</a>	2.1 $\times$ 100 mm	<a href="#">186003799</a>	2.1 $\times$ 150 mm	<a href="#">186003804</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006216</a>	3.0 $\times$ 100 mm	<a href="#">186003800</a>	3.0 $\times$ 100 mm	<a href="#">186003805</a>
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006776</a>	3.0 $\times$ 150 mm	<a href="#">186003801</a>	3.0 $\times$ 150 mm	186003806
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006217</a>	4.6 $\times$ 100 mm	<a href="#">186003802</a>	4.6 $\times$ 100 mm	<a href="#">186003807</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006218</a>	4.6 $\times$ 150 mm	<a href="#">186003803</a>	4.6 $\times$ 150 mm	<a href="#">186003808</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006777</a>			4.6 $\times$ 250 mm	<a href="#">186003809</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006219</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006220</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006778</a>				

\*Each Method Validation Kit contains 3 columns, each from a different batch.

XBridge Columns Method Validation Kits\* *Continued*

Particle Size: 2.5 µm		
	Dimension	P/N (3/pk)
HILIC	2.1 × 50 mm <i>XP</i>	<a href="#">186006221</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006222</a>
	2.1 × 150 mm <i>XP</i>	<a href="#">186006779</a>
	3.0 × 50 mm <i>XP</i>	<a href="#">186006223</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006224</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006780</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006225</a>
	4.6 × 100 mm <i>XP</i>	<a href="#">186006226</a>
	4.6 × 150 mm <i>XP</i>	<a href="#">186006781</a>

\*Each Method Validation Kit contains 3 columns, each from a different batch.

Particle Size: 2.5 µm			
	Dimension	P/N (3/pk)	
Amide	2.1 × 50 mm <i>XP</i>	<a href="#">186006227</a>	
	2.1 × 100 mm <i>XP</i>	<a href="#">186006228</a>	
	2.1 × 150 mm <i>XP</i>	<a href="#">186006782</a>	
	3.0 × 50 mm <i>XP</i>	<a href="#">186006229</a>	
	3.0 × 100 mm <i>XP</i>	<a href="#">186006230</a>	
	3.0 × 150 mm <i>XP</i>	<a href="#">186006783</a>	
	4.6 × 50 mm <i>XP</i>	<a href="#">186006231</a>	
	4.6 × 100 mm <i>XP</i>	<a href="#">186006232</a>	
		4.6 × 150 mm <i>XP</i>	<a href="#">186006784</a>
	Glycan BEH Amide, 130 Å	2.1 × 150 mm <i>XP</i>	<a href="#">186007266</a>
4.6 × 150 mm <i>XP</i>		<a href="#">186007271</a>	
Oligonucleotide BEH C <sub>18</sub> , 130 Å	4.6 × 50 mm	<a href="#">186004906</a>	

XBridge VanGuard Cartridges

	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
BEH C <sub>18</sub>	2.1 × 5 mm <i>XP</i>	<a href="#">186007772</a>	2.1 × 5 mm	<a href="#">186007766</a>	2.1 × 5 mm	<a href="#">186007769</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007774</a>	3.9 × 5 mm	<a href="#">186007768</a>	3.9 × 5 mm	<a href="#">186007771</a>
BEH C <sub>8</sub>	2.1 × 5 mm <i>XP</i>	<a href="#">186007781</a>	2.1 × 5 mm	<a href="#">186007775</a>	2.1 × 5 mm	<a href="#">186007778</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007783</a>	3.9 × 5 mm	<a href="#">186007777</a>	3.9 × 5 mm	<a href="#">186007780</a>
BEH Shield RP18	2.1 × 5 mm <i>XP</i>	<a href="#">186007808</a>	2.1 × 5 mm	<a href="#">186007802</a>	2.1 × 5 mm	<a href="#">186007805</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007810</a>	3.9 × 5 mm	<a href="#">186007804</a>	3.9 × 5 mm	<a href="#">186007807</a>
BEH Phenyl	2.1 × 5 mm <i>XP</i>	<a href="#">186007799</a>	2.1 × 5 mm	<a href="#">186007793</a>	2.1 × 5 mm	<a href="#">186007796</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007801</a>	3.9 × 5 mm	<a href="#">186007795</a>	3.9 × 5 mm	<a href="#">186007798</a>
BEH HILIC	2.1 × 5 mm <i>XP</i>	<a href="#">186007790</a>	2.1 × 5 mm	<a href="#">186007784</a>	2.1 × 5 mm	<a href="#">186007787</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007792</a>	3.9 × 5 mm	<a href="#">186007786</a>	3.9 × 5 mm	<a href="#">186007789</a>
BEH Amide	2.1 × 5 mm <i>XP</i>	<a href="#">186007763</a>	2.1 × 5 mm	<a href="#">186007757</a>	2.1 × 5 mm	<a href="#">186007760</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007765</a>	3.9 × 5 mm	<a href="#">186007759</a>	3.9 × 5 mm	<a href="#">186007762</a>

Universal VanGuard Cartridge Holder

Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>

## XSelect CSH *XP* and HSS *XP* Columns



For the method developer, columns that maximize separation selectivity are among the most powerful tools for influencing chromatographic behavior. The carefully chosen bonded ligands used for XSelect CSH *XP* and XSelect HSS *XP* Columns redefine the broadly selective phases tailored for modern UHPLC separations. With a selection of two base particle technologies combined with eight selectivity optimized bonded phases, XSelect Columns help reduce method development effort.



**i** Select XSelect CSH and HSS MaxPeak Premier Columns can be found on [page 101](#).

### Column Characteristics

	<b>CSH C<sub>18</sub><sup>+</sup> 130 Å</b>	<b>CSH Phenyl-Hexyl, 130 Å</b>	<b>CSH Fluoro-Phenyl, 130 Å</b>
	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5, 5, 10 µm	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5, 5 µm	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5, 5 µm
Particle/Ligand			
Ligand Density*	2.3 µmol/m <sup>2</sup>	2.3 µmol/m <sup>2</sup>	2.3 µmol/m <sup>2</sup>
Carbon Load*	15%	14%	10%
Endcapped	Yes	Yes	No
USP Class No.	L1	L11	L43
pH Range	1-11	1-11	1-8
Temperature Limits	Low pH = 80 °C, High pH = 45 °C	Low pH = 80 °C, High pH = 45 °C	Low pH = 60 °C, High pH = 45 °C
Surface Area*	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g
Performance Standards	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>
Application Standards	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>

XSelect Columns are also available in UPLC particle sizes (ACQUITY UPLC CSH 1.7 µm and ACQUITY UPLC HSS 1.8 µm), [refer to pages 113 and 120](#).

\*Expected or approximate value.



**APPLICATION AREA:** Analyze PAH Metabolites in Water Samples

"The XSelect (column) has been very effective in proper chromatographic separation of OHPAHs."

**REVIEWER:** Lisandra Trine

**ORGANIZATION:** Oregon State University

**i** For more information on XSelect CSH and HSS HPLC Columns, [refer to page 196](#).

## Ordering Information

### XSelect CSH Columns

ANALYTICAL COLUMNS						
Particle Size: 2.5 $\mu$ m			Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 $\times$ 30 mm <i>XP</i>	<a href="#">186006100</a>	<a href="#">176002594</a>	1.0 $\times$ 50 mm	<a href="#">186005249</a>	2.1 $\times$ 50 mm	<a href="#">186005274</a>
2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006101</a>	<a href="#">176002595</a>	1.0 $\times$ 150 mm	<a href="#">186005251</a>	2.1 $\times$ 100 mm	<a href="#">186005275</a>
2.1 $\times$ 75 mm <i>XP</i>	<a href="#">186006102</a>	<a href="#">176002596</a>	2.1 $\times$ 30 mm	<a href="#">186005254</a>	2.1 $\times$ 150 mm	<a href="#">186005276</a>
2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006103</a>	<a href="#">176002597</a>	2.1 $\times$ 50 mm	<a href="#">186005255</a>	3.0 $\times$ 30 mm	<a href="#">186005279</a>
2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006727</a>	<a href="#">176002891</a>	2.1 $\times$ 75 mm	<a href="#">186005644</a>	3.0 $\times$ 50 mm	<a href="#">186005280</a>
3.0 $\times$ 30 mm <i>XP</i>	<a href="#">186006104</a>	<a href="#">176002598</a>	2.1 $\times$ 100 mm	<a href="#">186005256</a>	3.0 $\times$ 100 mm	<a href="#">186005281</a>
3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006105</a>	<a href="#">176002599</a>	2.1 $\times$ 150 mm	<a href="#">186005257</a>	3.0 $\times$ 150 mm	<a href="#">186005282</a>
3.0 $\times$ 75 mm <i>XP</i>	<a href="#">186006106</a>	<a href="#">176002600</a>	3.0 $\times$ 30 mm	<a href="#">186005260</a>	3.0 $\times$ 250 mm	<a href="#">186005283</a>
3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006107</a>	<a href="#">176002601</a>	3.0 $\times$ 50 mm	<a href="#">186005261</a>	4.6 $\times$ 50 mm	<a href="#">186005287</a>
3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006728</a>	<a href="#">176002892</a>	3.0 $\times$ 75 mm	<a href="#">186005647</a>	4.6 $\times$ 100 mm	<a href="#">186005289</a>
4.6 $\times$ 30 mm <i>XP</i>	<a href="#">186006108</a>	—	3.0 $\times$ 100 mm	<a href="#">186005262</a>	4.6 $\times$ 150 mm	<a href="#">186005290</a>
4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006109</a>	—	3.0 $\times$ 150 mm	<a href="#">186005263</a>	4.6 $\times$ 250 mm	<a href="#">186005291</a>
4.6 $\times$ 75 mm <i>XP</i>	<a href="#">186006110</a>	—	4.6 $\times$ 50 mm	<a href="#">186005267</a>		
4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006111</a>	—	4.6 $\times$ 75 mm	<a href="#">186005268</a>		
4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006729</a>	—	4.6 $\times$ 100 mm	<a href="#">186005269</a>		
			4.6 $\times$ 150 mm	<a href="#">186005270</a>		

PREPARATIVE COLUMNS					
Particle Size: 5 $\mu$ m			Particle Size: 10 $\mu$ m		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 $\times$ 10 mm	Guard Cartridge	<a href="#">186005491</a> <sup>1</sup>	Guard Cartridge	10 $\times$ 10 mm	<a href="#">186007285</a>
10 $\times$ 50 mm	OBD Column	<a href="#">186008236</a>	OBD Column	10 $\times$ 50 mm	<a href="#">186008268</a>
10 $\times$ 100 mm	OBD Column	<a href="#">186008237</a>	OBD Column	10 $\times$ 100 mm	<a href="#">186008269</a>
10 $\times$ 150 mm	OBD Column	<a href="#">186008238</a>	OBD Column	10 $\times$ 150 mm	<a href="#">186008270</a>
10 $\times$ 250 mm	OBD Column	<a href="#">186008239</a>	OBD Column	10 $\times$ 250 mm	<a href="#">186008271</a>
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186005418</a> <sup>2</sup>	Guard Cartridge	19 $\times$ 10 mm	<a href="#">186007290</a>
19 $\times$ 50 mm	OBD Column	<a href="#">186005420</a>	OBD Column	19 $\times$ 50 mm	<a href="#">186007291</a>
19 $\times$ 100 mm	OBD Column	<a href="#">186005421</a>	OBD Column	19 $\times$ 100 mm	<a href="#">186007292</a>
19 $\times$ 150 mm	OBD Column	<a href="#">186005422</a>	OBD Column	19 $\times$ 150 mm	<a href="#">186007293</a>
19 $\times$ 250 mm	OBD Column	<a href="#">186005492</a>	OBD Column	19 $\times$ 250 mm	<a href="#">186007294</a>
30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006899</a> <sup>3</sup>	Guard Cartridge	30 $\times$ 10 mm	<a href="#">186007295</a>
30 $\times$ 50 mm	OBD Column	<a href="#">186005423</a>	OBD Column	30 $\times$ 50 mm	<a href="#">186007296</a>
30 $\times$ 75 mm	OBD Column	<a href="#">186005424</a>	OBD Column	30 $\times$ 75 mm	<a href="#">186007297</a>
30 $\times$ 100 mm	OBD Column	<a href="#">186005425</a>	OBD Column	30 $\times$ 100 mm	<a href="#">186007298</a>
30 $\times$ 150 mm	OBD Column	<a href="#">186005426</a>	OBD Column	30 $\times$ 150 mm	<a href="#">186007299</a>
30 $\times$ 250 mm	OBD Column	<a href="#">186005493</a>	OBD Column	30 $\times$ 250 mm	<a href="#">186007300</a>
50 $\times$ 50 mm	OBD Column	<a href="#">186005494</a>	OBD Column	50 $\times$ 50 mm	<a href="#">186007301</a>
50 $\times$ 100 mm	OBD Column	<a href="#">186005495</a>	OBD Column	50 $\times$ 100 mm	<a href="#">186007302</a>
50 $\times$ 150 mm	OBD Column	<a href="#">186005496</a>	OBD Column	50 $\times$ 150 mm	<a href="#">186007303</a>
50 $\times$ 250 mm	OBD Column	<a href="#">186005497</a>	OBD Column	50 $\times$ 250 mm	<a href="#">186007304</a>

<sup>1</sup>Requires 10  $\times$  10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30  $\times$  10 mm Prep Guard Holder, p/n: [186006912](#).

XSelect CSH Columns *Continued*

CSH Fluoro-Phenyl	ANALYTICAL COLUMNS						
	Particle Size: 2.5 $\mu$ m			Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
	2.1 $\times$ 30 mm <i>XP</i>	<a href="#">186006112</a>	<a href="#">176002602</a>	2.1 $\times$ 50 mm	<a href="#">186005310</a>	2.1 $\times$ 50 mm	<a href="#">186005329</a>
	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006113</a>	<a href="#">176002603</a>	2.1 $\times$ 75 mm	<a href="#">186005646</a>	2.1 $\times$ 100 mm	<a href="#">186005330</a>
	2.1 $\times$ 75 mm <i>XP</i>	<a href="#">186006114</a>	<a href="#">176002604</a>	2.1 $\times$ 100 mm	<a href="#">186005311</a>	2.1 $\times$ 150 mm	<a href="#">186005331</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006115</a>	<a href="#">176002605</a>	2.1 $\times$ 150 mm	<a href="#">186005312</a>	3.0 $\times$ 50 mm	<a href="#">186005335</a>
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006730</a>	<a href="#">176002893</a>	3.0 $\times$ 50 mm	<a href="#">186005316</a>	3.0 $\times$ 100 mm	<a href="#">186005336</a>
	3.0 $\times$ 30 mm <i>XP</i>	<a href="#">186006116</a>	<a href="#">176002606</a>	3.0 $\times$ 75 mm	<a href="#">186005649</a>	3.0 $\times$ 150 mm	<a href="#">186005337</a>
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006117</a>	<a href="#">176002607</a>	3.0 $\times$ 100 mm	<a href="#">186005317</a>	3.0 $\times$ 250 mm	186005338
	3.0 $\times$ 75 mm <i>XP</i>	<a href="#">186006118</a>	<a href="#">176002608</a>	3.0 $\times$ 150 mm	<a href="#">186005318</a>	4.6 $\times$ 50 mm	<a href="#">186005342</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006119</a>	<a href="#">176002609</a>	4.6 $\times$ 50 mm	<a href="#">186005322</a>	4.6 $\times$ 75 mm	<a href="#">186005343</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006731</a>	<a href="#">176002894</a>	4.6 $\times$ 75 mm	<a href="#">186005323</a>	4.6 $\times$ 100 mm	<a href="#">186005344</a>
	4.6 $\times$ 30 mm <i>XP</i>	<a href="#">186006120</a>	—	4.6 $\times$ 100 mm	<a href="#">186005324</a>	4.6 $\times$ 150 mm	<a href="#">186005345</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006121</a>	—	4.6 $\times$ 150 mm	<a href="#">186005325</a>	4.6 $\times$ 250 mm	<a href="#">186005346</a>
	4.6 $\times$ 75 mm <i>XP</i>	<a href="#">186006122</a>	—				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006123</a>	—				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006732</a>	—				
PREPARATIVE COLUMNS							
Particle Size: 5 $\mu$ m							
Dimension	Type	P/N (1/pk)					
10 $\times$ 10 mm	Guard Cartridge	<a href="#">186005498</a> <sup>1</sup>					
10 $\times$ 50 mm	OBD Column	<a href="#">186008240</a>					
10 $\times$ 100 mm	OBD Column	<a href="#">186008241</a>					
10 $\times$ 150 mm	OBD Column	<a href="#">186008242</a>					
10 $\times$ 250 mm	OBD Column	<a href="#">186008243</a>					
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186005431</a> <sup>2</sup>					
19 $\times$ 50 mm	OBD Column	<a href="#">186005433</a>					
19 $\times$ 100 mm	OBD Column	<a href="#">186005434</a>					
19 $\times$ 150 mm	OBD Column	<a href="#">186005435</a>					
19 $\times$ 250 mm	OBD Column	<a href="#">186005499</a>					
30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006900</a> <sup>3</sup>					
30 $\times$ 50 mm	OBD Column	<a href="#">186005436</a>					
30 $\times$ 75 mm	OBD Column	<a href="#">186005437</a>					
30 $\times$ 100 mm	OBD Column	<a href="#">186005438</a>					
30 $\times$ 150 mm	OBD Column	<a href="#">186005439</a>					
30 $\times$ 250 mm	OBD Column	<a href="#">186005500</a>					
50 $\times$ 50 mm	OBD Column	<a href="#">186005501</a>					
50 $\times$ 100 mm	OBD Column	<a href="#">186005502</a>					
50 $\times$ 150 mm	OBD Column	<a href="#">186005503</a>					
50 $\times$ 250 mm	OBD Column	<a href="#">186005504</a>					

<sup>1</sup>Requires 10  $\times$  10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30  $\times$  10 mm Prep Guard Holder, p/n: [186006912](#).

XSelect CSH Columns *Continued*

CSH Phenyl-Hexyl	ANALYTICAL COLUMNS						
	Particle Size: 2.5 $\mu\text{m}$			Particle Size: 3.5 $\mu\text{m}$		Particle Size: 5 $\mu\text{m}$	
	Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
	2.1 $\times$ 30 mm <i>XP</i>	<a href="#">186006124</a>	<a href="#">176002610</a>	2.1 $\times$ 50 mm	<a href="#">186005365</a>	2.1 $\times$ 50 mm	<a href="#">186005384</a>
	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006125</a>	<a href="#">176002611</a>	2.1 $\times$ 75 mm	<a href="#">186005645</a>	2.1 $\times$ 100 mm	<a href="#">186005385</a>
	2.1 $\times$ 75 mm <i>XP</i>	<a href="#">186006126</a>	<a href="#">176002612</a>	2.1 $\times$ 100 mm	<a href="#">186005366</a>	2.1 $\times$ 150 mm	<a href="#">186005386</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006127</a>	<a href="#">176002613</a>	2.1 $\times$ 150 mm	<a href="#">186005367</a>	3.0 $\times$ 50 mm	<a href="#">186005390</a>
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006733</a>	<a href="#">176002895</a>	3.0 $\times$ 50 mm	<a href="#">186005371</a>	3.0 $\times$ 100 mm	<a href="#">186005391</a>
	3.0 $\times$ 30 mm <i>XP</i>	<a href="#">186006128</a>	<a href="#">176002614</a>	3.0 $\times$ 75 mm	<a href="#">186005648</a>	3.0 $\times$ 150 mm	<a href="#">186005392</a>
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006129</a>	<a href="#">176002615</a>	3.0 $\times$ 100 mm	<a href="#">186005372</a>	3.0 $\times$ 250 mm	<a href="#">186005393</a>
	3.0 $\times$ 75 mm <i>XP</i>	<a href="#">186006130</a>	<a href="#">176002616</a>	3.0 $\times$ 150 mm	<a href="#">186005373</a>	4.6 $\times$ 50 mm	<a href="#">186005397</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006131</a>	<a href="#">176002617</a>	4.6 $\times$ 50 mm	<a href="#">186005377</a>	4.6 $\times$ 75 mm	<a href="#">186005398</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006734</a>	<a href="#">176002896</a>	4.6 $\times$ 75 mm	<a href="#">186005378</a>	4.6 $\times$ 100 mm	<a href="#">186005399</a>
	4.6 $\times$ 30 mm <i>XP</i>	<a href="#">186006132</a>	—	4.6 $\times$ 100 mm	<a href="#">186005379</a>	4.6 $\times$ 150 mm	<a href="#">186005400</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006133</a>	—	4.6 $\times$ 150 mm	<a href="#">186005380</a>	4.6 $\times$ 250 mm	<a href="#">186005401</a>
	4.6 $\times$ 75 mm <i>XP</i>	<a href="#">186006134</a>	—				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006135</a>	—				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006735</a>	—				
PREPARATIVE COLUMNS							
Particle Size: 5 $\mu\text{m}$							
Dimension	Type	P/N (1/pk)					
10 $\times$ 10 mm	Guard Cartridge	<a href="#">186005505</a> <sup>1</sup>					
10 $\times$ 50 mm	OBD Column	<a href="#">186008244</a>					
10 $\times$ 100 mm	OBD Column	<a href="#">186008245</a>					
10 $\times$ 150 mm	OBD Column	<a href="#">186008246</a>					
10 $\times$ 250 mm	OBD Column	<a href="#">186008247</a>					
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186005444</a> <sup>2</sup>					
19 $\times$ 50 mm	OBD Column	<a href="#">186005446</a>					
19 $\times$ 100 mm	OBD Column	<a href="#">186005447</a>					
19 $\times$ 150 mm	OBD Column	<a href="#">186005448</a>					
19 $\times$ 250 mm	OBD Column	<a href="#">186005506</a>					
30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006901</a> <sup>3</sup>					
30 $\times$ 50 mm	OBD Column	<a href="#">186005520</a>					
30 $\times$ 75 mm	OBD Column	<a href="#">186005450</a>					
30 $\times$ 100 mm	OBD Column	<a href="#">186005451</a>					
30 $\times$ 150 mm	OBD Column	<a href="#">186005452</a>					
30 $\times$ 250 mm	OBD Column	<a href="#">186005507</a>					
50 $\times$ 50 mm	OBD Column	<a href="#">186005508</a>					
50 $\times$ 100 mm	OBD Column	<a href="#">186005509</a>					
50 $\times$ 150 mm	OBD Column	<a href="#">186005510</a>					
50 $\times$ 250 mm	OBD Column	<a href="#">186005511</a>					

<sup>1</sup>Requires 10  $\times$  10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30  $\times$  10 mm Prep Guard Holder, p/n: [186006912](#).

XSelect CSH Columns *Continued*

Peptide CSH C <sub>18</sub> , 130 Å					
ANALYTICAL COLUMNS					
Particle Size: 2.5 µm			Particle Size: 3.5 µm		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
2.1 × 50 mm <i>XP</i>	<a href="#">186006941</a>		2.1 × 50 mm	<a href="#">186006950</a>	
2.1 × 100 mm <i>XP</i>	<a href="#">186006942</a>		2.1 × 100 mm	<a href="#">186006951</a>	
2.1 × 150 mm <i>XP</i>	<a href="#">186006943</a>		2.1 × 150 mm	<a href="#">186006952</a>	
4.6 × 50 mm <i>XP</i>	<a href="#">186006946</a>		4.6 × 50 mm	<a href="#">186006955</a>	
4.6 × 100 mm <i>XP</i>	<a href="#">186006947</a>		4.6 × 100 mm	<a href="#">186006956</a>	
4.6 × 150 mm <i>XP</i>	<a href="#">186007038</a>		4.6 × 150 mm	<a href="#">186006957</a>	
PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 5 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
4.6 × 50 mm	Column	<a href="#">186007076</a> <sup>4</sup>	19 × 250 mm	OBD Column	<a href="#">186007031</a>
4.6 × 100 mm	Column	<a href="#">186007077</a> <sup>4</sup>	30 × 50 mm	OBD Column	<a href="#">186007026</a>
4.6 × 150 mm	Column	<a href="#">186007078</a> <sup>4</sup>	30 × 100 mm	OBD Column	<a href="#">186007025</a>
10 × 10 mm	Guard	<a href="#">186007015</a> <sup>1</sup>	30 × 150 mm	OBD Column	<a href="#">186007023</a>
10 × 50 mm	OBD Column	<a href="#">186008264</a>	30 × 250 mm	OBD Column	<a href="#">186007024</a>
10 × 100 mm	OBD Column	<a href="#">186008265</a>	50 × 50 mm	OBD Column	<a href="#">186007030</a>
10 × 150 mm	OBD Column	<a href="#">186008266</a>	50 × 100 mm	OBD Column	<a href="#">186007027</a>
10 × 250 mm	OBD Column	<a href="#">186008267</a>	50 × 150 mm	OBD Column	<a href="#">186007028</a>
19 × 10 mm	Guard	<a href="#">186007019</a> <sup>3</sup>	50 × 250 mm	OBD Column	<a href="#">186007029</a>
19 × 50 mm	OBD Column	<a href="#">186007022</a>			
19 × 100 mm	OBD Column	<a href="#">186007020</a>			
19 × 150 mm	OBD Column	<a href="#">186007021</a>			

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>3</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>4</sup>For use in developing lab-scale preparative chromatography.



**APPLICATION AREA:** HPLC Method Development

"The XSelect *XP* series of columns is definitely what you are looking for when seeking sharp peaks and great resolution with small particle size. The information provided with the column is easy to understand and utilize for best performance and the Waters staff is always willing to help in any way possible. I always have a few of these on hand and have developed multiple methods utilizing them!"

**REVIEWER:** Zahuindanda DeForrest

**ORGANIZATION:** Moses Lake Industries



XSelect CSH Columns Method Validation Kits\*

	Particle Size: 2.5 $\mu$ m		Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>CSH C<sub>18</sub></b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006233</a>	2.1 $\times$ 100 mm	<a href="#">186005538</a>	2.1 $\times$ 150 mm	<a href="#">186005543</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006234</a>	3.0 $\times$ 100 mm	<a href="#">186005539</a>	3.0 $\times$ 100 mm	186005544
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006785</a>	3.0 $\times$ 150 mm	<a href="#">186005540</a>	3.0 $\times$ 150 mm	<a href="#">186005545</a>
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006235</a>	4.6 $\times$ 100 mm	<a href="#">186005541</a>	4.6 $\times$ 100 mm	<a href="#">186005546</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006236</a>	4.6 $\times$ 150 mm	<a href="#">186005542</a>	4.6 $\times$ 150 mm	<a href="#">186005547</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006786</a>			4.6 $\times$ 250 mm	<a href="#">186005548</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006237</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006238</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006787</a>				
<b>CSH Fluoro-Phenyl</b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006239</a>	2.1 $\times$ 100 mm	<a href="#">186005549</a>	2.1 $\times$ 150 mm	<a href="#">186005554</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006240</a>	3.0 $\times$ 100 mm	186005550	3.0 $\times$ 100 mm	186005555
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006788</a>	3.0 $\times$ 150 mm	186005551	3.0 $\times$ 150 mm	<a href="#">186005556</a>
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006241</a>	4.6 $\times$ 100 mm	<a href="#">186005552</a>	4.6 $\times$ 100 mm	<a href="#">186005557</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006242</a>	4.6 $\times$ 150 mm	<a href="#">186005553</a>	4.6 $\times$ 150 mm	<a href="#">186005558</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006789</a>			4.6 $\times$ 250 mm	<a href="#">186005559</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006243</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006244</a>				
		4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006790</a>			
<b>CSH Phenyl-Hexyl</b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006245</a>	2.1 $\times$ 100 mm	<a href="#">186005560</a>	2.1 $\times$ 150 mm	<a href="#">186005565</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006246</a>	3.0 $\times$ 100 mm	<a href="#">186005561</a>	3.0 $\times$ 100 mm	186005566
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006791</a>	3.0 $\times$ 150 mm	<a href="#">186005562</a>	3.0 $\times$ 150 mm	186005567
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006247</a>	4.6 $\times$ 100 mm	<a href="#">186005563</a>	4.6 $\times$ 100 mm	<a href="#">186005568</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006248</a>	4.6 $\times$ 150 mm	<a href="#">186005564</a>	4.6 $\times$ 150 mm	<a href="#">186005569</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006792</a>			4.6 $\times$ 250 mm	<a href="#">186005570</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006249</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006250</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006793</a>				
<b>Peptide CSH C<sub>18</sub></b>	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006945</a>	2.1 $\times$ 100 mm	<a href="#">186006953</a>		
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006966</a>	4.6 $\times$ 100 mm	<a href="#">186006959</a>		

\*Each Method Validation Kit contains 3 columns, each from a different batch.

## XSelect VanGuard Cartridges

	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
CSH C <sub>18</sub>	2.1 × 5 mm <i>XP</i>	<a href="#">186007817</a>	2.1 × 5 mm	<a href="#">186007811</a>	2.1 × 5 mm	<a href="#">186007814</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007819</a>	3.9 × 5 mm	<a href="#">186007813</a>	3.9 × 5 mm	<a href="#">186007816</a>
CSH Fluoro-Phenyl	2.1 × 5 mm <i>XP</i>	<a href="#">186007827</a>	2.1 × 5 mm	<a href="#">186007820</a>	2.1 × 5 mm	<a href="#">186007824</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007829</a>	3.9 × 5 mm	<a href="#">186007822</a>	3.9 × 5 mm	<a href="#">186007826</a>
CSH Phenyl-Hexyl	2.1 × 5 mm <i>XP</i>	<a href="#">186007839</a>	2.1 × 5 mm	<a href="#">186007830</a>	2.1 × 5 mm	<a href="#">186007836</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007841</a>	3.9 × 5 mm	<a href="#">186007832</a>	3.9 × 5 mm	<a href="#">186007838</a>

## Universal VanGuard Cartridge Holder

Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>



**APPLICATION AREA:** Analyze Main Product and Its Impurities

"Basically, XSelect (columns) saved my job. I couldn't separate main products of its impurities but with XSelect I have managed to do it. Peaks are sharp and well separated."

**REVIEWER:** Michał Irzyłowski

**ORGANIZATION:** OncoArendi Therapeutics SA

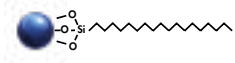
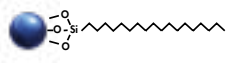
**APPLICATION AREA:** Pharmaceuticals and Metabolites

"This (XSelect *XP*) column has provided amazing and very reproducible results when coupling HPLC to MS. Great peak shapes and no retention time drifts after long batches of analysis."

**REVIEWER:** Javier Jimenez Villarin

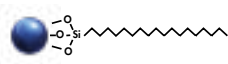
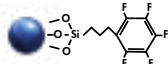
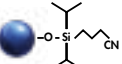
**ORGANIZATION:** University of Barcelona

Column Characteristics

	HSS C <sub>18</sub> r 100 Å	HSS C <sub>18</sub> SB, 100 Å
	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5, 5 µm	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5, 5 µm
Particle/Ligand		
Ligand Density*	3.2 µmol/m <sup>2</sup>	1.6 µmol/m <sup>2</sup>
Carbon Load*	15%	8%
Endcapped	Yes	No
USP Class No.	L1	L1
pH Range	1-8	2-8
Temperature Limits	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
Surface Area*	230 m <sup>2</sup> /g	230 m <sup>2</sup> /g
Performance Standards	<b>Neutrals QC Reference Material</b> p/n: <a href="#">186006360</a>	<b>Neutrals QC Reference Material</b> p/n: <a href="#">186006360</a>
Application Standards	<b>Reversed-Phase QC Reference Material</b> p/n: <a href="#">186006363</a>	<b>Reversed-Phase QC Reference Material</b> p/n: <a href="#">186006363</a>

The HSS Technology is available in UPLC particle sizes (ACQUITY UPLC HSS 1.8 µm).

\*Expected or approximate value.

HSS T3, 100 Å	HSS PFP, 100 Å	HSS CN, 100 Å
UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5, 5 µm	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5, 5 µm	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5, 5 µm
		
1.6 µmol/m <sup>2</sup>	3.2 µmol/m <sup>2</sup>	2.0 µmol/m <sup>2</sup>
11%	7%	5%
Yes	No	No
L1	L43	L10
2-8	2-8	2-8
Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
230 m <sup>2</sup> /g	230 m <sup>2</sup> /g	230 m <sup>2</sup> /g
<b>Neutrals QC Reference Material</b> p/n: <a href="#">186006360</a>	<b>Neutrals QC Reference Material</b> p/n: <a href="#">186006360</a>	<b>Neutrals QC Reference Material</b> p/n: <a href="#">186006360</a>
<b>Reversed-Phase QC Reference Material</b> p/n: <a href="#">186006363</a>	<b>Reversed-Phase QC Reference Material</b> p/n: <a href="#">186006363</a>	—

XSelect HSS Columns

HSS C <sub>18</sub> ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006136</a>	<a href="#">176002618</a>	2.1 × 30 mm	<a href="#">186006380</a>	2.1 × 50 mm	<a href="#">186006391</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006137</a>	<a href="#">176002619</a>	2.1 × 50 mm	<a href="#">186006381</a>	2.1 × 100 mm	<a href="#">186006392</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006138</a>	<a href="#">176002620</a>	2.1 × 75 mm	<a href="#">186006382</a>	2.1 × 150 mm	<a href="#">186006393</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006139</a>	<a href="#">176002621</a>	2.1 × 100 mm	<a href="#">186006383</a>	3.0 × 50 mm	<a href="#">186006396</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006736</a>	<a href="#">176002897</a>	2.1 × 150 mm	<a href="#">186006384</a>	3.0 × 100 mm	<a href="#">186006397</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006140</a>	<a href="#">176002622</a>	3.0 × 30 mm	<a href="#">186004765</a>	3.0 × 150 mm	<a href="#">186006398</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006141</a>	<a href="#">176002623</a>	3.0 × 50 mm	<a href="#">186004766</a>	3.0 × 250 mm	<a href="#">186006399</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006142</a>	<a href="#">176002624</a>	3.0 × 75 mm	<a href="#">186005642</a>	4.6 × 50 mm	<a href="#">186004852</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006143</a>	<a href="#">176002625</a>	3.0 × 100 mm	<a href="#">186004762</a>	4.6 × 75 mm	<a href="#">186006402</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006737</a>	<a href="#">176002898</a>	3.0 × 150 mm	<a href="#">186004763</a>	4.6 × 100 mm	<a href="#">186006403</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006144</a>	—	4.6 × 50 mm	<a href="#">186004772</a>	4.6 × 150 mm	<a href="#">186004773</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006145</a>	—	4.6 × 75 mm	<a href="#">186006387</a>	4.6 × 250 mm	<a href="#">186004775</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006146</a>	—	4.6 × 100 mm	<a href="#">186004767</a>		
4.6 × 100 mm <i>XP</i>	<a href="#">186006147</a>	—	4.6 × 150 mm	<a href="#">186004768</a>		
4.6 × 150 mm <i>XP</i>	<a href="#">186006738</a>	—	4.6 × 250 mm	<a href="#">186004770</a>		

PREPARATIVE COLUMNS

Particle Size: 5 µm			Particle Size: 5 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186004776</a> <sup>1</sup>	10 × 100 mm	OBD Column	<a href="#">186008223</a>
10 × 50 mm	OBD Column	<a href="#">186008222</a>	10 × 150 mm	OBD Column	<a href="#">186008224</a>

HSS C<sub>18</sub> SB

ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006160</a>	<a href="#">176002634</a>	2.1 × 50 mm	<a href="#">186006422</a>	2.1 × 50 mm	<a href="#">186006432</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006161</a>	<a href="#">176002635</a>	2.1 × 75 mm	<a href="#">186006423</a>	2.1 × 100 mm	<a href="#">186006433</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006162</a>	<a href="#">176002636</a>	2.1 × 100 mm	<a href="#">186006424</a>	2.1 × 150 mm	<a href="#">186006434</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006163</a>	<a href="#">176002637</a>	2.1 × 150 mm	<a href="#">186006425</a>	3.0 × 50 mm	<a href="#">186006437</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006742</a>	<a href="#">176002901</a>	3.0 × 50 mm	<a href="#">186004747</a>	3.0 × 100 mm	<a href="#">186006438</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006164</a>	<a href="#">176002638</a>	3.0 × 75 mm	186005643	3.0 × 150 mm	<a href="#">186006439</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006165</a>	<a href="#">176002639</a>	3.0 × 100 mm	<a href="#">186004743</a>	3.0 × 250 mm	<a href="#">186006440</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006166</a>	<a href="#">176002640</a>	3.0 × 150 mm	<a href="#">186004744</a>	4.6 × 50 mm	<a href="#">186004757</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006167</a>	<a href="#">176002641</a>	4.6 × 50 mm	<a href="#">186004753</a>	4.6 × 75 mm	<a href="#">186006443</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006743</a>	<a href="#">176002902</a>	4.6 × 75 mm	<a href="#">186006428</a>	4.6 × 100 mm	<a href="#">186006444</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006168</a>	—	4.6 × 100 mm	<a href="#">186004748</a>	4.6 × 150 mm	<a href="#">186004754</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006169</a>	—	4.6 × 150 mm	<a href="#">186004749</a>	4.6 × 250 mm	<a href="#">186004756</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006170</a>	—	4.6 × 250 mm	<a href="#">186004751</a>		
4.6 × 100 mm <i>XP</i>	<a href="#">186006171</a>	—				
4.6 × 150 mm <i>XP</i>	<a href="#">186006744</a>	—				

PREPARATIVE COLUMNS

Particle Size: 5 µm			Particle Size: 5 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186004758</a> <sup>1</sup>	10 × 100 mm	OBD Column	<a href="#">186008220</a>
10 × 50 mm	OBD Column	<a href="#">186008219</a>	10 × 150 mm	OBD Column	<a href="#">186008221</a>

<sup>1</sup> Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#). <sup>2</sup> Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#). <sup>3</sup> Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

XSelect HSS Columns *Continued*

HSS T3						
ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006148</a>	<a href="#">176002626</a>	1.0 × 100 mm	<a href="#">186006459</a>	2.1 × 50 mm	<a href="#">186006473</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006149</a>	<a href="#">176002627</a>	1.0 × 150 mm	<a href="#">186006460</a>	2.1 × 100 mm	<a href="#">186006474</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006150</a>	<a href="#">176002628</a>	2.1 × 30 mm	<a href="#">186006462</a>	2.1 × 150 mm	<a href="#">186006475</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006151</a>	<a href="#">176002629</a>	2.1 × 50 mm	<a href="#">186006463</a>	3.0 × 50 mm	<a href="#">186006478</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006739</a>	<a href="#">176002899</a>	2.1 × 75 mm	<a href="#">186006464</a>	3.0 × 100 mm	<a href="#">186006479</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006152</a>	<a href="#">176002630</a>	2.1 × 100 mm	<a href="#">186006465</a>	3.0 × 150 mm	<a href="#">186006480</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006153</a>	<a href="#">176002631</a>	2.1 × 150 mm	<a href="#">186006466</a>	3.0 × 250 mm	<a href="#">186006481</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006154</a>	<a href="#">176002632</a>	3.0 × 30 mm	<a href="#">186004783</a>	4.6 × 50 mm	<a href="#">186004794</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006155</a>	<a href="#">176002633</a>	3.0 × 50 mm	<a href="#">186004784</a>	4.6 × 75 mm	<a href="#">186006484</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006740</a>	<a href="#">176002900</a>	3.0 × 75 mm	<a href="#">186005641</a>	4.6 × 100 mm	<a href="#">186006485</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006156</a>	—	3.0 × 100 mm	<a href="#">186004780</a>	4.6 × 150 mm	<a href="#">186004791</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006157</a>	—	3.0 × 150 mm	<a href="#">186004781</a>	4.6 × 250 mm	<a href="#">186004793</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006158</a>	—	4.6 × 50 mm	<a href="#">186004790</a>		
4.6 × 100 mm <i>XP</i>	<a href="#">186006159</a>	—	4.6 × 75 mm	<a href="#">186006469</a>		
4.6 × 150 mm <i>XP</i>	<a href="#">186006741</a>	—	4.6 × 100 mm	<a href="#">186004785</a>		
			4.6 × 150 mm	<a href="#">186004786</a>		
			4.6 × 250 mm	<a href="#">186004788</a>		
PREPARATIVE COLUMNS						
Particle Size: 5 µm			Particle Size: 5 µm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
10 × 10 mm	Guard Cartridge	<a href="#">186004795</a> <sup>1</sup>	10 × 150 mm	OBD Column	<a href="#">186008227</a>	
10 × 50 mm	OBD Column	<a href="#">186008225</a>	10 × 250 mm	OBD Column	<a href="#">186008280</a>	
10 × 100 mm	OBD Column	<a href="#">186008226</a>				

HSS PFP						
ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006172</a>	<a href="#">176002642</a>	2.1 × 50 mm	<a href="#">186005847</a>	2.1 × 50 mm	<a href="#">186005869</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006173</a>	<a href="#">176002643</a>	2.1 × 75 mm	<a href="#">186005848</a>	2.1 × 100 mm	<a href="#">186005871</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006174</a>	<a href="#">176002644</a>	2.1 × 100 mm	<a href="#">186005849</a>	2.1 × 150 mm	<a href="#">186005872</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006175</a>	<a href="#">176002645</a>	2.1 × 150 mm	<a href="#">186005850</a>	3.0 × 50 mm	<a href="#">186005875</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006745</a>	<a href="#">176002903</a>	3.0 × 30 mm	<a href="#">186005852</a>	3.0 × 100 mm	<a href="#">186005877</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006176</a>	<a href="#">176002646</a>	3.0 × 50 mm	<a href="#">186005853</a>	3.0 × 150 mm	<a href="#">186005878</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006177</a>	<a href="#">176002647</a>	3.0 × 75 mm	<a href="#">186005854</a>	3.0 × 250 mm	<a href="#">186005879</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006178</a>	<a href="#">176002648</a>	3.0 × 100 mm	<a href="#">186005855</a>	4.6 × 50 mm	<a href="#">186005882</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006179</a>	<a href="#">176002649</a>	3.0 × 150 mm	<a href="#">186005856</a>	4.6 × 75 mm	<a href="#">186005883</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006746</a>	<a href="#">176002904</a>	4.6 × 50 mm	<a href="#">186005859</a>	4.6 × 100 mm	<a href="#">186005884</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006180</a>	—	4.6 × 75 mm	<a href="#">186005860</a>	4.6 × 150 mm	<a href="#">186005885</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006181</a>	—	4.6 × 100 mm	<a href="#">186005861</a>	4.6 × 250 mm	<a href="#">186005886</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006182</a>	—	4.6 × 150 mm	<a href="#">186005862</a>		
4.6 × 100 mm <i>XP</i>	<a href="#">186006183</a>	—	4.6 × 250 mm	<a href="#">186005863</a>		
4.6 × 150 mm <i>XP</i>	<a href="#">186006747</a>	—				

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

XSelect HSS Columns *Continued*

HSS CN	ANALYTICAL COLUMNS						
	Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
	2.1 × 30 mm <i>XP</i>	<a href="#">186006184</a>	<a href="#">176002650</a>	2.1 × 50 mm	<a href="#">186005907</a>	2.1 × 50 mm	<a href="#">186005929</a>
	2.1 × 50 mm <i>XP</i>	<a href="#">186006185</a>	<a href="#">176002651</a>	2.1 × 75 mm	<a href="#">186005908</a>	2.1 × 100 mm	<a href="#">186005931</a>
	2.1 × 75 mm <i>XP</i>	<a href="#">186006186</a>	<a href="#">176002652</a>	2.1 × 100 mm	<a href="#">186005909</a>	2.1 × 150 mm	<a href="#">186005932</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006187</a>	<a href="#">176002653</a>	2.1 × 150 mm	<a href="#">186005910</a>	3.0 × 50 mm	<a href="#">186005935</a>
	2.1 × 150 mm <i>XP</i>	<a href="#">186006748</a>	<a href="#">176002905</a>	3.0 × 50 mm	<a href="#">186005913</a>	3.0 × 100 mm	<a href="#">186005937</a>
	3.0 × 30 mm <i>XP</i>	<a href="#">186006188</a>	<a href="#">176002654</a>	3.0 × 75 mm	<a href="#">186005914</a>	3.0 × 150 mm	<a href="#">186005938</a>
	3.0 × 50 mm <i>XP</i>	<a href="#">186006189</a>	<a href="#">176002655</a>	3.0 × 100 mm	<a href="#">186005915</a>	3.0 × 250 mm	<a href="#">186005939</a>
	3.0 × 75 mm <i>XP</i>	<a href="#">186006190</a>	<a href="#">176002656</a>	3.0 × 150 mm	<a href="#">186005916</a>	4.6 × 50 mm	<a href="#">186005942</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006191</a>	<a href="#">176002657</a>	4.6 × 50 mm	<a href="#">186005919</a>	4.6 × 75 mm	<a href="#">186005943</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006749</a>	<a href="#">176002906</a>	4.6 × 75 mm	<a href="#">186005920</a>	4.6 × 100 mm	<a href="#">186005944</a>
	4.6 × 30 mm <i>XP</i>	<a href="#">186006192</a>	—	4.6 × 100 mm	<a href="#">186005921</a>	4.6 × 150 mm	<a href="#">186005945</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006193</a>	—	4.6 × 150 mm	<a href="#">186005922</a>	4.6 × 250 mm	<a href="#">186005946</a>
	4.6 × 75 mm <i>XP</i>	<a href="#">186006194</a>	—	4.6 × 250 mm	<a href="#">186005923</a>		
	4.6 × 100 mm <i>XP</i>	<a href="#">186006195</a>	—				
	4.6 × 150 mm <i>XP</i>	<a href="#">186006750</a>	—				

Universal VanGuard Cartridge Holder

Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>

XSelect HSS Columns Method Validation Kits\*

	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
HSS C <sub>18</sub>	2.1 × 50 mm <i>XP</i>	<a href="#">186006251</a>	2.1 × 100 mm	<a href="#">186006406</a>	2.1 × 150 mm	<a href="#">186006411</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006252</a>	3.0 × 100 mm	186006407	3.0 × 100 mm	186006412
	2.1 × 150 mm <i>XP</i>	<a href="#">186006794</a>	3.0 × 150 mm	186006408	3.0 × 150 mm	186006413
	3.0 × 50 mm <i>XP</i>	<a href="#">186006253</a>	4.6 × 100 mm	<a href="#">186006409</a>	4.6 × 100 mm	<a href="#">186006414</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006254</a>	4.6 × 150 mm	<a href="#">186006410</a>	4.6 × 150 mm	<a href="#">186006415</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006795</a>			4.6 × 250 mm	<a href="#">186006416</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006255</a>				
	4.6 × 100 mm <i>XP</i>	<a href="#">186006256</a>				
	4.6 × 150 mm <i>XP</i>	<a href="#">186006796</a>				
HSS C <sub>18</sub> SB	2.1 × 50 mm <i>XP</i>	<a href="#">186006263</a>	2.1 × 100 mm	<a href="#">186006447</a>	2.1 × 150 mm	<a href="#">186006452</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006264</a>	3.0 × 100 mm	186006448	3.0 × 100 mm	186006453
	2.1 × 150 mm <i>XP</i>	<a href="#">186006800</a>	3.0 × 150 mm	<a href="#">186006449</a>	3.0 × 150 mm	186006454
	3.0 × 50 mm <i>XP</i>	<a href="#">186006265</a>	4.6 × 100 mm	<a href="#">186006450</a>	4.6 × 100 mm	<a href="#">186006455</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006266</a>	4.6 × 150 mm	<a href="#">186006451</a>	4.6 × 150 mm	<a href="#">186006456</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006801</a>			4.6 × 250 mm	<a href="#">186006457</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006267</a>				
	4.6 × 100 mm <i>XP</i>	<a href="#">186006268</a>				
	4.6 × 150 mm <i>XP</i>	<a href="#">186006802</a>				

\*Each Method Validation Kit contains 3 columns, each from a different batch.

XSelect HSS Columns Method Validation Kits\* *Continued*

	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>HSS T3</b>	2.1 × 50 mm <i>XP</i>	<a href="#">186006257</a>	2.1 × 100 mm	<a href="#">186006488</a>	2.1 × 150 mm	<a href="#">186006493</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006258</a>	3.0 × 100 mm	<a href="#">186006489</a>	3.0 × 100 mm	186006494
	2.1 × 150 mm <i>XP</i>	<a href="#">186006797</a>	3.0 × 150 mm	<a href="#">186006490</a>	3.0 × 150 mm	186006495
	3.0 × 50 mm <i>XP</i>	<a href="#">186006259</a>	4.6 × 100 mm	<a href="#">186006491</a>	4.6 × 100 mm	<a href="#">186006496</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006260</a>	4.6 × 150 mm	<a href="#">186006492</a>	4.6 × 150 mm	<a href="#">186006497</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006798</a>			4.6 × 250 mm	<a href="#">186006498</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006261</a>				
	4.6 × 100 mm <i>XP</i>	<a href="#">186006262</a>				
	4.6 × 150 mm <i>XP</i>	<a href="#">186006799</a>				
<b>HSS PFP</b>	2.1 × 50 mm <i>XP</i>	<a href="#">186006815</a>	2.1 × 100 mm	<a href="#">186005890</a>	2.1 × 150 mm	186005895
	2.1 × 100 mm <i>XP</i>	<a href="#">186006816</a>	3.0 × 100 mm	186005891	3.0 × 100 mm	186005896
	2.1 × 150 mm <i>XP</i>	<a href="#">186006803</a>	3.0 × 150 mm	186005892	3.0 × 150 mm	186005897
	3.0 × 50 mm <i>XP</i>	<a href="#">186006817</a>	4.6 × 100 mm	186005893	4.6 × 100 mm	<a href="#">186005898</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006818</a>	4.6 × 150 mm	<a href="#">186005894</a>	4.6 × 150 mm	<a href="#">186005899</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006804</a>			4.6 × 250 mm	<a href="#">186005900</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006273</a>				
	4.6 × 100 mm <i>XP</i>	<a href="#">186006274</a>				
		4.6 × 150 mm <i>XP</i>	<a href="#">186006805</a>			
	<b>HSS CN</b>	2.1 × 50 mm <i>XP</i>	<a href="#">186006275</a>	2.1 × 100 mm	<a href="#">186005950</a>	2.1 × 150 mm
2.1 × 100 mm <i>XP</i>		<a href="#">186006276</a>	3.0 × 100 mm	186005951	3.0 × 100 mm	<a href="#">186005956</a>
2.1 × 150 mm <i>XP</i>		<a href="#">186006806</a>	3.0 × 150 mm	<a href="#">186005952</a>	3.0 × 150 mm	186005957
3.0 × 50 mm <i>XP</i>		<a href="#">186006277</a>	4.6 × 100 mm	<a href="#">186005953</a>	4.6 × 100 mm	<a href="#">186005958</a>
3.0 × 100 mm <i>XP</i>		<a href="#">186006278</a>	4.6 × 150 mm	<a href="#">186005954</a>	4.6 × 150 mm	<a href="#">186005959</a>
3.0 × 150 mm <i>XP</i>		<a href="#">186006807</a>			4.6 × 250 mm	<a href="#">186005960</a>
4.6 × 50 mm <i>XP</i>		<a href="#">186006279</a>				
4.6 × 100 mm <i>XP</i>		<a href="#">186006280</a>				
	4.6 × 150 mm <i>XP</i>	<a href="#">186006808</a>				

\*Each Method Validation Kit contains 3 columns, each from a different batch.

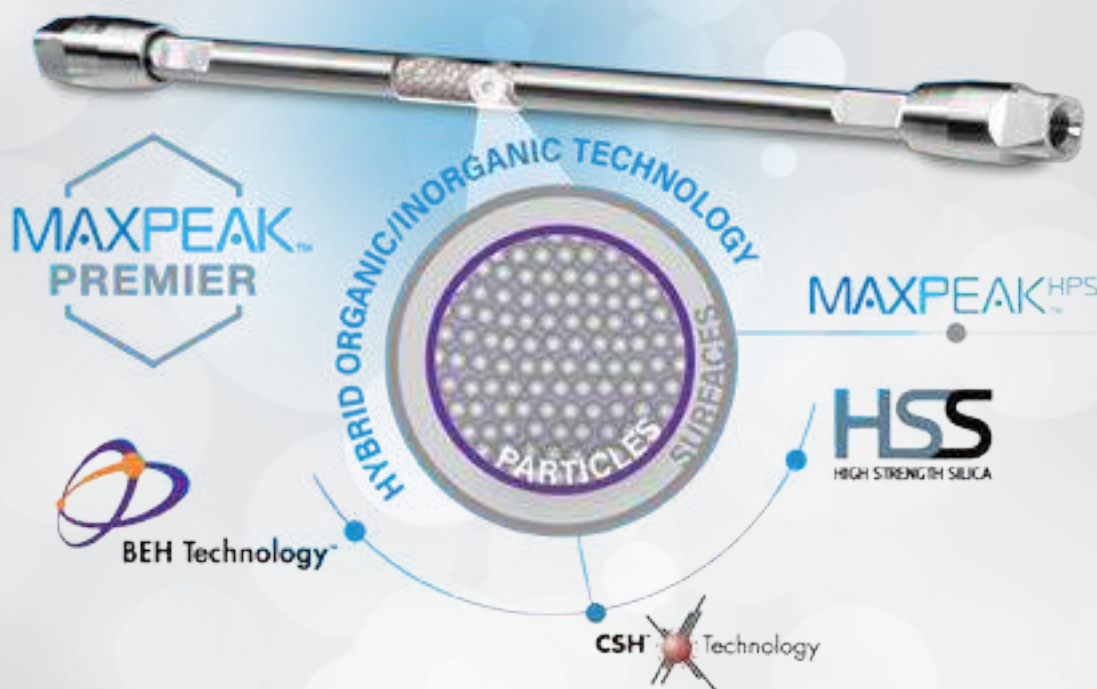
XSelect HSS VanGuard Cartridges

	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>HSS C<sub>18</sub></b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007857</a>	2.1 × 5 mm	<a href="#">186007851</a>	2.1 × 5 mm	<a href="#">186007854</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007859</a>	3.9 × 5 mm	<a href="#">186007853</a>	3.9 × 5 mm	<a href="#">186007856</a>
<b>HSS C<sub>18</sub> SB</b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007848</a>	2.1 × 5 mm	<a href="#">186007842</a>	2.1 × 5 mm	<a href="#">186007845</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007850</a>	3.9 × 5 mm	<a href="#">186007844</a>	3.9 × 5 mm	<a href="#">186007847</a>
<b>HSS T3</b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007884</a>	2.1 × 5 mm	<a href="#">186007878</a>	2.1 × 5 mm	<a href="#">186007881</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007886</a>	3.9 × 5 mm	<a href="#">186007880</a>	3.9 × 5 mm	<a href="#">186007883</a>
<b>HSS PFP</b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007875</a>	2.1 × 5 mm	<a href="#">186007869</a>	2.1 × 5 mm	<a href="#">186007872</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007877</a>	3.9 × 5 mm	<a href="#">186007871</a>	3.9 × 5 mm	<a href="#">186007874</a>
<b>HSS CN</b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007866</a>	2.1 × 5 mm	<a href="#">186007860</a>	2.1 × 5 mm	<a href="#">186007863</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007868</a>	3.9 × 5 mm	<a href="#">186007862</a>	3.9 × 5 mm	<a href="#">186007865</a>



# MaxPeak™ Premier Columns Featuring MaxPeak High Performance Surfaces

Good chromatography is as much about preventing the interactions you don't want, as it is creating the ones you do.



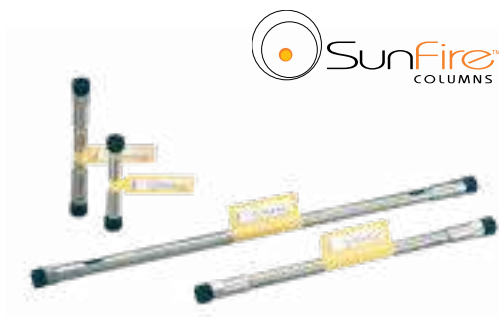
## MaxPeak Premier Columns provide:

- Reduced column conditioning and passivation times
- Improved sensitivity and peak shapes
- Simpler mobile phases, without complex additives
- Time savings in method development
- Reduced risk and greater confidence in data and decision making

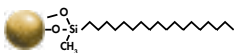
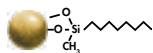
Visit us online to  
view our infographic

## SunFire Columns

SunFire™ Columns set the standard for state-of-the-art bonded C<sub>18</sub> and C<sub>8</sub> silica HPLC columns. Benefiting from years of research and product development, SunFire Columns represent the best in particle and bonding expertise and deliver the industry-leading level of chromatographic performance. The smaller 2.5 µm particle size allows chromatographers to gain improved sensitivity and greater efficiency. SunFire Columns with 2.5 µm particle size enable faster run times while maintaining the same resolution.



### Column Characteristics

	C <sub>18</sub> 100 Å	C <sub>8</sub> 100 Å
	HPLC: 2.5, 3.5, 5, 10 µm	HPLC: 2.5, 3.5, 5, 10 µm
Particle/Ligand		
Ligand Density*	3.5 µmol/m <sup>2</sup>	3.5 µmol/m <sup>2</sup>
Carbon Load*	16%	12%
Endcapped	Yes	Yes
USP Class No.	L1	L7
pH Range	2-8	2-8
Temperature Limits	Low pH = 50 °C, High pH = 40 °C	Low pH = 40 °C, High pH = 40 °C
Surface Area*	340 m <sup>2</sup> /g	340 m <sup>2</sup> /g
Performance Standards	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>
Application Standards	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>  HILIC QC Reference Material p/n: <a href="#">186007226</a>

SunFire HPLC Columns are rated for pressures up to 6000 psi (410 bar).

\*Expected or approximate value.



**APPLICATION AREA:** Analyze Small Molecules from Engineered Bacterial Fermentation Broth

"The column is very easy to use and the separation reproduces very well from run to run. The separation of small molecules is great with very sharp peaks. This is a very good C<sub>18</sub> column as well as XBridge C<sub>18</sub> column for isolating small molecules."

**REVIEWER:** Ende Pan

**ORGANIZATION:** Warp Drive Bio

 For more information on SunFire Columns, [refer to page 211](#).

## Ordering Information

### SunFire Columns

ANALYTICAL COLUMNS						
Particle Size: 2.5 $\mu$ m*			Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 $\times$ 30 mm	<a href="#">186003399</a>		2.1 $\times$ 50 mm	<a href="#">186002533</a>	2.1 $\times$ 50 mm	<a href="#">186002539</a>
2.1 $\times$ 50 mm	<a href="#">186003401</a>		2.1 $\times$ 100 mm	<a href="#">186002534</a>	2.1 $\times$ 100 mm	<a href="#">186002540</a>
2.1 $\times$ 75 mm	<a href="#">186005634</a>		2.1 $\times$ 150 mm	<a href="#">186002535</a>	2.1 $\times$ 150 mm	<a href="#">186002541</a>
3.0 $\times$ 30 mm	<a href="#">186003407</a>		3.0 $\times$ 50 mm	<a href="#">186002542</a>	3.0 $\times$ 50 mm	<a href="#">186002545</a>
3.0 $\times$ 50 mm	<a href="#">186003409</a>		3.0 $\times$ 100 mm	<a href="#">186002543</a>	3.0 $\times$ 100 mm	<a href="#">186002546</a>
3.0 $\times$ 75 mm	<a href="#">186005636</a>		3.0 $\times$ 150 mm	<a href="#">186002544</a>	3.0 $\times$ 150 mm	<a href="#">186002547</a>
4.6 $\times$ 50 mm	<a href="#">186003417</a>		4.6 $\times$ 20 mm /S	<a href="#">186002549</a>	3.0 $\times$ 250 mm	<a href="#">186002548</a>
			4.6 $\times$ 50 mm	<a href="#">186002551</a>	4.6 $\times$ 30 mm	<a href="#">186002556</a>
			4.6 $\times$ 75 mm	<a href="#">186002552</a>	4.6 $\times$ 50 mm	<a href="#">186002557</a>
			4.6 $\times$ 100 mm	<a href="#">186002553</a>	4.6 $\times$ 100 mm	<a href="#">186002558</a>
			4.6 $\times$ 150 mm	<a href="#">186002554</a>	4.6 $\times$ 150 mm	<a href="#">186002559</a>
					4.6 $\times$ 250 mm	<a href="#">186002560</a>

PREPARATIVE COLUMNS						
Particle Size: 5 $\mu$ m			Particle Size: 10 $\mu$ m			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
10 $\times$ 10 mm	Guard Cartridge	<a href="#">186002565</a> <sup>1</sup>	10 $\times$ 10 mm	Guard Cartridge	<a href="#">186002663</a> <sup>1</sup>	
10 $\times$ 50 mm	OBD Column	<a href="#">186008152</a>	10 $\times$ 50 mm	OBD Column	<a href="#">186008208</a>	
10 $\times$ 100 mm	OBD Column	<a href="#">186008153</a>	10 $\times$ 150 mm	OBD Column	<a href="#">186008156</a>	
10 $\times$ 150 mm	OBD Column	<a href="#">186008154</a>	10 $\times$ 250 mm	OBD Column	<a href="#">186008157</a>	
10 $\times$ 250 mm	OBD Column	<a href="#">186008155</a>	19 $\times$ 10 mm	Guard Cartridge	<a href="#">186002666</a> <sup>2</sup>	
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186002569</a> <sup>2</sup>	19 $\times$ 50 mm	OBD Column	<a href="#">186002667</a>	
19 $\times$ 50 mm	OBD Column	<a href="#">186002566</a>	19 $\times$ 150 mm	OBD Column	<a href="#">186002668</a>	
19 $\times$ 100 mm	OBD Column	<a href="#">186002567</a>	19 $\times$ 250 mm	OBD Column	<a href="#">186002669</a>	
19 $\times$ 150 mm	OBD Column	<a href="#">186002568</a>	30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006884</a> <sup>3</sup>	
19 $\times$ 250 mm	OBD Column	<a href="#">186004027</a>	30 $\times$ 50 mm	OBD Column	<a href="#">186003854</a>	
30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006885</a> <sup>3</sup>	30 $\times$ 100 mm	OBD Column	<a href="#">186003971</a>	
30 $\times$ 50 mm	OBD Column	<a href="#">186002570</a>	30 $\times$ 150 mm	OBD Column	<a href="#">186002670</a>	
30 $\times$ 75 mm	OBD Column	<a href="#">186002571</a>	30 $\times$ 250 mm	OBD Column	<a href="#">186002671</a>	
30 $\times$ 100 mm	OBD Column	<a href="#">186002572</a>	50 $\times$ 50 mm	OBD Column	<a href="#">186002871</a>	
30 $\times$ 150 mm	OBD Column	<a href="#">186002797</a>	50 $\times$ 100 mm	OBD Column	<a href="#">186003972</a>	
30 $\times$ 250 mm	OBD Column	<a href="#">186003969</a>	50 $\times$ 150 mm	OBD Column	<a href="#">186002672</a>	
50 $\times$ 50 mm	OBD Column	<a href="#">186002867</a>	50 $\times$ 250 mm	OBD Column	<a href="#">186002673</a>	
50 $\times$ 100 mm	OBD Column	<a href="#">186002869</a>				
50 $\times$ 150 mm	OBD Column	<a href="#">186003941</a>				
50 $\times$ 250 mm	OBD Column	<a href="#">186003970</a>				

\*Recommended maximum pressure of 6000 psi (400 bar).

<sup>1</sup>Requires 10  $\times$  10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30  $\times$  10 mm Prep Guard Holder, p/n: [186006912](#).

SunFire Columns *Continued*

C<sub>8</sub>

ANALYTICAL COLUMNS						
Particle Size: 2.5 µm*			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
3.0 × 50 mm	<a href="#">186003410</a>		2.1 × 50 mm	<a href="#">186002710</a>	2.1 × 50 mm	<a href="#">186002715</a>
			2.1 × 100 mm	<a href="#">186002711</a>	2.1 × 100 mm	<a href="#">186002716</a>
			2.1 × 150 mm	<a href="#">186002712</a>	2.1 × 150 mm	<a href="#">186002717</a>
			3.0 × 50 mm	<a href="#">186002719</a>	3.0 × 50 mm	<a href="#">186002723</a>
			3.0 × 100 mm	<a href="#">186002720</a>	3.0 × 100 mm	<a href="#">186002724</a>
			3.0 × 150 mm	<a href="#">186002721</a>	3.0 × 150 mm	<a href="#">186002725</a>
			4.6 × 50 mm	<a href="#">186002729</a>	4.6 × 30 mm	<a href="#">186002734</a>
			4.6 × 75 mm	<a href="#">186002730</a>	4.6 × 50 mm	<a href="#">186002735</a>
			4.6 × 100 mm	<a href="#">186002731</a>	4.6 × 100 mm	<a href="#">186002736</a>
			4.6 × 150 mm	<a href="#">186002732</a>	4.6 × 150 mm	<a href="#">186002737</a>
					4.6 × 250 mm	<a href="#">186002738</a>
PREPARATIVE COLUMNS						
Particle Size: 5 µm			Particle Size: 10 µm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
10 × 10 mm	Guard Cartridge	<a href="#">186002750</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186002758</a> <sup>1</sup>	
10 × 50 mm	OBD Column	<a href="#">186008158</a>	10 × 50 mm	OBD Column	<a href="#">186008209</a>	
10 × 100 mm	OBD Column	<a href="#">186008159</a>	10 × 150 mm	OBD Column	<a href="#">186008162</a>	
10 × 150 mm	OBD Column	<a href="#">186008160</a>	10 × 250 mm	OBD Column	<a href="#">186008163</a>	
10 × 250 mm	OBD Column	<a href="#">186008161</a>	19 × 10 mm	Guard Cartridge	<a href="#">186002761</a> <sup>2</sup>	
19 × 10 mm	Guard Cartridge	<a href="#">186002754</a> <sup>2</sup>	19 × 150 mm	OBD Column	<a href="#">186002763</a>	
19 × 50 mm	OBD Column	<a href="#">186002751</a>	19 × 250 mm	OBD Column	<a href="#">186002764</a>	
19 × 100 mm	OBD Column	<a href="#">186002752</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006886</a> <sup>3</sup>	
19 × 150 mm	OBD Column	<a href="#">186002753</a>	30 × 50 mm	OBD Column	<a href="#">186003853</a>	
19 × 250 mm	OBD Column	<a href="#">186004028</a>	30 × 150 mm	OBD Column	<a href="#">186002765</a>	
30 × 10 mm	Guard Cartridge	<a href="#">186006887</a> <sup>3</sup>	30 × 250 mm	OBD Column	<a href="#">186002766</a>	
30 × 50 mm	OBD Column	<a href="#">186002755</a>	50 × 50 mm	OBD Column	<a href="#">186002872</a>	
30 × 75 mm	OBD Column	<a href="#">186002756</a>	50 × 150 mm	OBD Column	<a href="#">186002767</a>	
30 × 100 mm	OBD Column	<a href="#">186002757</a>	50 × 250 mm	OBD Column	<a href="#">186002768</a>	
30 × 150 mm	OBD Column	<a href="#">186002795</a>				
50 × 50 mm	OBD Column	<a href="#">186002868</a>				
50 × 100 mm	OBD Column	<a href="#">186002870</a>				

\*Recommended maximum pressure of 6000 psi (400 bar).

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

SunFire Columns *Continued*

ANALYTICAL COLUMNS						
Particle Size: 3.5 µm			Particle Size: 5 µm			
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)		
4.6 × 150 mm	<a href="#">186003453</a>		4.6 × 150 mm	<a href="#">186003467</a>		
4.6 × 250 mm	<a href="#">186003454</a>		4.6 × 250 mm	<a href="#">186003468</a>		
PREPARATIVE COLUMNS						
Particle Size: 5 µm			Particle Size: 10 µm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
10 × 10 mm	Guard Cartridge	<a href="#">186003429</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186003441</a> <sup>1</sup>	
10 × 50 mm	OBD Column	<a href="#">186008180</a>	10 × 150 mm	OBD Column	<a href="#">186008184</a>	
10 × 100 mm	OBD Column	<a href="#">186008181</a>	10 × 250 mm	OBD Column	<a href="#">186008185</a>	
10 × 150 mm	OBD Column	<a href="#">186008182</a>	19 × 10 mm	Guard Cartridge	<a href="#">186003444</a> <sup>2</sup>	
10 × 250 mm	OBD Column	<a href="#">186008183</a>	19 × 50 mm	OBD Column	<a href="#">186003445</a>	
19 × 10 mm	Guard Cartridge	<a href="#">186003434</a> <sup>2</sup>	19 × 150 mm	OBD Column	<a href="#">186003446</a>	
19 × 50 mm	OBD Column	<a href="#">186003431</a>	19 × 250 mm	OBD Column	<a href="#">186003447</a>	
19 × 100 mm	OBD Column	<a href="#">186003432</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006888</a> <sup>3</sup>	
19 × 150 mm	OBD Column	<a href="#">186003433</a>	30 × 50 mm	OBD Column	186003855	
19 × 250 mm	OBD Column	<a href="#">186004029</a>	30 × 150 mm	OBD Column	<a href="#">186003448</a>	
30 × 10 mm	Guard Cartridge	<a href="#">186006889</a> <sup>3</sup>	30 × 250 mm	OBD Column	<a href="#">186003449</a>	
30 × 50 mm	OBD Column	<a href="#">186003435</a>	50 × 50 mm	OBD Column	<a href="#">186003450</a>	
30 × 75 mm	OBD Column	<a href="#">186003436</a>	50 × 150 mm	OBD Column	<a href="#">186003451</a>	
30 × 100 mm	OBD Column	<a href="#">186003437</a>	50 × 250 mm	OBD Column	<a href="#">186003452</a>	
30 × 150 mm	OBD Column	<a href="#">186003438</a>				
50 × 50 mm	OBD Column	<a href="#">186003439</a>				
50 × 100 mm	OBD Column	<a href="#">186003440</a>				

\*Recommended maximum pressure of 6000 psi (400 bar).

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

SunFire Preparative Scouting Columns

C <sub>18</sub>	PREPARATIVE COLUMNS					
	Particle Size: 10 µm					
	Dimension	P/N (1/pk)			Dimension	P/N (1/pk)
	4.6 × 150 mm	<a href="#">186003390</a>				
	4.6 × 250 mm	<a href="#">186003391</a>				
Silica	Particle Size: 5 µm			Particle Size: 10 µm		
	Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
	4.6 × 150 mm	<a href="#">186003453</a>		4.6 × 150 mm	<a href="#">186003467</a>	
	4.6 × 250 mm	<a href="#">186003454</a>		4.6 × 250 mm	<a href="#">186003468</a>	

### SunFire Columns Method Validation Kits\*

	Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>C<sub>18</sub></b>	4.6 $\times$ 100 mm	<a href="#">186002675</a>	4.6 $\times$ 150 mm	<a href="#">186002679</a>
	4.6 $\times$ 150 mm	<a href="#">186002676</a>	4.6 $\times$ 250 mm	<a href="#">186002680</a>
<b>C<sub>8</sub></b>	4.6 $\times$ 100 mm	<a href="#">186002740</a>	4.6 $\times$ 150 mm	<a href="#">186002744</a>
	4.6 $\times$ 150 mm	<a href="#">186002741</a>	4.6 $\times$ 250 mm	<a href="#">186002745</a>

\*Each Method Validation Kit contains 3 columns, each from a different batch.

### SunFire VanGuard Cartridges

	Particle Size: 2.5 $\mu$ m		Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>C<sub>18</sub></b>	2.1 $\times$ 5 mm	<a href="#">186007691</a>	2.1 $\times$ 5 mm	<a href="#">186007694</a>	2.1 $\times$ 5 mm	<a href="#">186007697</a>
	3.9 $\times$ 5 mm	<a href="#">186007693</a>	3.9 $\times$ 5 mm	<a href="#">186007696</a>	3.9 $\times$ 5 mm	<a href="#">186007699</a>
<b>C<sub>8</sub></b>	2.1 $\times$ 5 mm	<a href="#">186007700</a>	2.1 $\times$ 5 mm	<a href="#">186007703</a>	2.1 $\times$ 5 mm	<a href="#">186007706</a>
	3.9 $\times$ 5 mm	<a href="#">186007702</a>	3.9 $\times$ 5 mm	<a href="#">186007705</a>	3.9 $\times$ 5 mm	<a href="#">186007708</a>

### Universal VanGuard Cartridge Holder

Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>

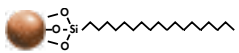
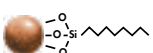
## XTerra Columns



XTerra™ MS and Phenyl 2.5 µm Columns combine the best properties of silica- and polymeric-bonded phases with patented Hybrid Particle Technology (HPT), which replaces one out of every three silanol groups with a methyl group during particle synthesis. HPT overcomes the limitations of silica-based materials while maintaining its best attributes for mechanical strength, chemical resistance, and easy scale up from analytical to preparative chromatography.



### Column Characteristics

	MS C <sub>18</sub> 125 Å	MS C <sub>8</sub> 125 Å
	HPLC: 2.5, 3.5, 5, 10 µm	HPLC: 2.5, 3.5, 5, 10 µm
Particle/Ligand		
Carbon Load*	15.5%	12%
Endcapped	Yes	Yes
USP Class No.	L1	L7
Performance Standards	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>
Application Standards	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>

XTerra HPLC Columns are rated for pressures up to 6000 psi (410 bar).



**APPLICATION AREA:** High Performance Liquid Chromatography

"These columns are the best value for your money. The reproducible results you get, along with the sharp peaks can't be matched. I highly recommend these to anyone looking for great results. The prices I feel are right on target with other columns that work as awesome as these."

**REVIEWER:** Michael Parsowith

**ORGANIZATION:** Akorn

 For more information on XTerra Columns, [refer to page 221](#).

## Ordering Information

### XTerra Columns

ANALYTICAL COLUMNS						
Particle Size: 2.5 µm*			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm	<a href="#">186000592</a>		2.1 × 30 mm	<a href="#">186000398</a>	2.1 × 20 mm JS	<a href="#">186001979</a>
4.6 × 20 mm JS	<a href="#">186001889</a>		2.1 × 50 mm	<a href="#">186000400</a>	2.1 × 50 mm	<a href="#">186000446</a>
4.6 × 30 mm	<a href="#">186000600</a>		2.1 × 100 mm	<a href="#">186000404</a>	2.1 × 100 mm	<a href="#">186000450</a>
4.6 × 50 mm	<a href="#">186000602</a>		2.1 × 150 mm	<a href="#">186000408</a>	2.1 × 150 mm	<a href="#">186000454</a>
4.6 × 75 mm	<a href="#">186000981</a>		3.0 × 50 mm	<a href="#">186000414</a>	2.1 × 250 mm	<a href="#">186000458</a>
			3.0 × 100 mm	<a href="#">186000418</a>	3.0 × 50 mm	<a href="#">186000462</a>
			3.0 × 150 mm	<a href="#">186000422</a>	3.0 × 100 mm	<a href="#">186000466</a>
			3.9 × 100 mm	<a href="#">186000426</a>	3.0 × 150 mm	<a href="#">186000470</a>
			4.6 × 30 mm	<a href="#">186000430</a>	3.0 × 250 mm	<a href="#">186000474</a>
			4.6 × 50 mm	<a href="#">186000432</a>	3.9 × 150 mm	<a href="#">186000478</a>
			4.6 × 100 mm	<a href="#">186000436</a>	4.6 × 50 mm	<a href="#">186000482</a>
			4.6 × 150 mm	<a href="#">186000440</a>	4.6 × 100 mm	<a href="#">186000486</a>
			4.6 × 250 mm	<a href="#">186001470</a>	4.6 × 150 mm	<a href="#">186000490</a>
					4.6 × 250 mm	<a href="#">186000494</a>

PREPARATIVE COLUMNS						
Particle Size: 5 µm			Particle Size: 10 µm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
7.8 × 10 mm	Guard Cartridge	<a href="#">186001168</a> <sup>5</sup>	7.8 × 10 mm	Guard Cartridge	<a href="#">186001172</a> <sup>5</sup>	
7.8 × 50 mm	Column	<a href="#">186001152</a>	7.8 × 150 mm	Column	<a href="#">186001160</a>	
7.8 × 100 mm	Column	<a href="#">186001156</a>	7.8 × 300 mm	Column	<a href="#">186001164</a>	
7.8 × 150 mm	Column	<a href="#">186001475</a>	10 × 10 mm	Guard Cartridge	<a href="#">186001002</a> <sup>1</sup>	
10 × 10 mm	Guard Cartridge	<a href="#">186001001</a> <sup>1</sup>	10 × 150 mm	OBD Column	<a href="#">186008129</a>	
10 × 50 mm	OBD Column	<a href="#">186008103</a>	10 × 250 mm	OBD Column	<a href="#">186008133</a>	
10 × 100 mm	OBD Column	<a href="#">186008107</a>	10 × 300 mm	OBD Column	<a href="#">186008137</a>	
10 × 150 mm	OBD Column	<a href="#">186008141</a>	19 × 10 mm	Guard Cartridge	<a href="#">186001034</a> <sup>2</sup>	
19 × 10 mm	Guard Cartridge	<a href="#">186001104</a> <sup>2</sup>	19 × 50 mm	OBD Column	<a href="#">186002254</a>	
19 × 50 mm	OBD Column	<a href="#">186001930</a>	19 × 150 mm	OBD Column	<a href="#">186002255</a>	
19 × 100 mm	OBD Column	<a href="#">186001934</a>	19 × 250 mm	OBD Column	<a href="#">186002259</a>	
19 × 150 mm	OBD Column	<a href="#">186002379</a>	19 × 300 mm	OBD Column	<a href="#">186002263</a>	
30 × 10 mm	Guard Cartridge	<a href="#">186006903</a> <sup>3</sup>	30 × 10 mm	Guard Cartridge	<a href="#">186006902</a> <sup>3</sup>	
30 × 50 mm	OBD Column	<a href="#">186001938</a>	30 × 150 mm	OBD Column	<a href="#">186002267</a>	
30 × 100 mm	OBD Column	<a href="#">186001942</a>	30 × 250 mm	OBD Column	<a href="#">186002271</a>	
50 × 50 mm	OBD Column	<a href="#">186002218</a>	30 × 300 mm	OBD Column	<a href="#">186002275</a>	
50 × 100 mm	OBD Column	<a href="#">186002222</a>	50 × 50 mm	OBD Column	<a href="#">186002279</a>	
			50 × 150 mm	OBD Column	<a href="#">186002843</a>	
			50 × 250 mm	OBD Column	<a href="#">186002847</a>	

\*Recommended maximum pressure of 6000 psi (400 bar).

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

<sup>5</sup>Requires 7.8 × 10 mm Cartridge Holder, p/n: [186000708](#).



MS C <sub>8</sub>						
ANALYTICAL COLUMNS						
Particle Size: 2.5 µm*			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
4.6 × 50 mm	<a href="#">186000603</a>		2.1 × 50 mm	<a href="#">186000401</a>	2.1 × 50 mm	<a href="#">186000447</a>
			2.1 × 100 mm	<a href="#">186000405</a>	2.1 × 100 mm	<a href="#">186000451</a>
			2.1 × 150 mm	<a href="#">186000409</a>	2.1 × 150 mm	<a href="#">186000455</a>
			3.9 × 100 mm	<a href="#">186000427</a>	2.1 × 250 mm	<a href="#">186000459</a>
			4.6 × 50 mm	<a href="#">186000433</a>	3.9 × 150 mm	<a href="#">186000479</a>
			4.6 × 100 mm	<a href="#">186000437</a>	4.6 × 50 mm	<a href="#">186000483</a>
			4.6 × 150 mm	<a href="#">186000441</a>	4.6 × 100 mm	<a href="#">186000487</a>
			4.6 × 250 mm	<a href="#">186001471</a>	4.6 × 150 mm	<a href="#">186000491</a>
					4.6 × 250 mm	<a href="#">186000495</a>
PREPARATIVE COLUMNS						
Particle Size: 5 µm			Particle Size: 10 µm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
7.8 × 10 mm	Guard Cartridge	<a href="#">186001169</a> <sup>5</sup>	7.8 × 10 mm	Guard Cartridge	<a href="#">186001173</a> <sup>5</sup>	
7.8 × 50 mm	Column	<a href="#">186001153</a>	7.8 × 150 mm	Column	<a href="#">186001161</a>	
7.8 × 100 mm	Column	<a href="#">186001157</a>	7.8 × 300 mm	Column	<a href="#">186001165</a>	
7.8 × 150 mm	Column	<a href="#">186001476</a>	10 × 150 mm	OBD Column	<a href="#">186008130</a>	
10 × 50 mm	OBD Column	<a href="#">186008104</a>	10 × 250 mm	OBD Column	<a href="#">186008134</a>	
10 × 150 mm	OBD Column	<a href="#">186008142</a>	10 × 300 mm	OBD Column	<a href="#">186008138</a>	
19 × 10 mm	Guard Cartridge	<a href="#">186001105</a> <sup>2</sup>	19 × 10 mm	Guard Cartridge	<a href="#">186001035</a> <sup>2</sup>	
19 × 50 mm	OBD Column	<a href="#">186001931</a>	19 × 150 mm	OBD Column	<a href="#">186002256</a>	
19 × 100 mm	OBD Column	<a href="#">186001935</a>	19 × 250 mm	OBD Column	<a href="#">186002260</a>	
19 × 150 mm	OBD Column	<a href="#">186002380</a>	19 × 300 mm	OBD Column	<a href="#">186002264</a>	
30 × 10 mm	Guard Cartridge	<a href="#">186006904</a> <sup>3</sup>	30 × 150 mm	OBD Column	<a href="#">186002268</a>	
30 × 75 mm	OBD Column	<a href="#">186002388</a>	30 × 250 mm	OBD Column	<a href="#">186002272</a>	
30 × 100 mm	OBD Column	<a href="#">186001943</a>	30 × 300 mm	OBD Column	<a href="#">186002276</a>	
50 × 50 mm	OBD Column	<a href="#">186002219</a>	50 × 50 mm	OBD Column	<a href="#">186002280</a>	
50 × 100 mm	OBD Column	<a href="#">186002223</a>	50 × 150 mm	OBD Column	<a href="#">186002844</a>	

\*Recommended maximum pressure of 6000 psi (400 bar).

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

<sup>5</sup>Requires 7.8 × 10 mm Cartridge Holder, p/n: [186000708](#).

XTerra Columns *Continued*

Phenyl	ANALYTICAL COLUMNS			
	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
	2.1 × 50 mm	<a href="#">186001179</a>	3.9 × 150 mm	<a href="#">186001184</a>
	2.1 × 100 mm	<a href="#">186001180</a>	4.6 × 50 mm	<a href="#">186001144</a>
	2.1 × 150 mm	<a href="#">186001181</a>	4.6 × 100 mm	<a href="#">186001145</a>
	3.0 × 100 mm	<a href="#">186001142</a>	4.6 × 150 mm	<a href="#">186001146</a>
	3.0 × 150 mm	<a href="#">186001143</a>	4.6 × 250 mm	<a href="#">186001147</a>
	3.9 × 150 mm	<a href="#">186001178</a>		
	4.6 × 50 mm	186001138		
	4.6 × 100 mm	<a href="#">186001139</a>		
	4.6 × 150 mm	<a href="#">186001140</a>		
	4.6 × 250 mm	<a href="#">186001474</a>		

XTerra Columns Method Validation Kits\*

	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
MS C <sub>18</sub>	4.6 × 150 mm	<a href="#">186000826</a>	4.6 × 150 mm	<a href="#">186000829</a>
			4.6 × 250 mm	<a href="#">186000830</a>
Shield RP18	4.6 × 150 mm	<a href="#">186000861</a>	4.6 × 150 mm	<a href="#">186000862</a>
			4.6 × 250 mm	<a href="#">186000863</a>

\*Each Method Validation Kit contains 3 columns, each from a different batch.

XTerra VanGuard Cartridges

	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
MS C <sub>18</sub>	2.1 × 5 mm	<a href="#">186007887</a>	2.1 × 5 mm	<a href="#">186007892</a>	2.1 × 5 mm	<a href="#">186007896</a>
	3.9 × 5 mm	<a href="#">186007889</a>	3.9 × 5 mm	<a href="#">186007894</a>	3.9 × 5 mm	<a href="#">186007899</a>
MS C <sub>8</sub>	2.1 × 5 mm	<a href="#">186007901</a>	2.1 × 5 mm	<a href="#">186007905</a>	2.1 × 5 mm	<a href="#">186007909</a>
	3.9 × 5 mm	<a href="#">186007903</a>	3.9 × 5 mm	<a href="#">186007735</a>	3.9 × 5 mm	<a href="#">186007739</a>
Shield RP18			2.1 × 5 mm	<a href="#">186007929</a>	2.1 × 5 mm	<a href="#">186007933</a>
			3.9 × 5 mm	<a href="#">186007931</a>	3.9 × 5 mm	<a href="#">186007935</a>
Shield RP8			2.1 × 5 mm	<a href="#">186007941</a>	3.9 × 5 mm	<a href="#">186007947</a>
			3.9 × 5 mm	<a href="#">186007943</a>		
Phenyl			2.1 × 5 mm	<a href="#">186007917</a>	2.1 × 5 mm	<a href="#">186007921</a>
			3.9 × 5 mm	<a href="#">186007919</a>	3.9 × 5 mm	<a href="#">186007923</a>

Universal VanGuard Cartridge Holder

Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>

# Cost Effective Column Protection Available in 3 Formats

**VANGUARD**<sup>™</sup>  
COLUMN PROTECTION

**VanGuard FIT:** Holistic, all in one guard and column design for select MaxPeak Premier Columns

- Fully Integrated Technology (FIT) that eliminates dead volume
- MaxPeak HPS Technology, available for specific MaxPeak Premier column chemistries



**VanGuard PreColumns:** Optimized for ACQUITY UPLC Columns

- One piece holistic designed that reduces dispersion; providing exceptional performance
- Packed with Sub 2  $\mu\text{m}$  particles that maximize separation efficiency



**VanGuard Cartridge and Holder:** Optimized for HPLC/UHPLC Columns and separations

- Two-piece cartridge and holder
- Accommodates Waters XP, CORTECS UHPLC and Waters HPLC Columns

Learn more on  
**page 241**  
or by visting  
**waters.com**

# >3 $\mu\text{m}$ Analytical HPLC Columns

# Contents

XBridge BEH Columns.....	<a href="#">181</a>
XSelect Columns .....	<a href="#">196</a>
Atlantis Columns .....	<a href="#">207</a>
SunFire Columns.....	<a href="#">211</a>
Symmetry Columns .....	<a href="#">216</a>
XTerra Columns.....	<a href="#">221</a>
Spherisorb Columns.....	<a href="#">227</a>
Nova-Pak Columns.....	<a href="#">232</a>
Resolve Columns.....	<a href="#">233</a>
Delta-Pak Columns .....	<a href="#">234</a>
$\mu$ Bondapak/Bondapak Columns.....	<a href="#">235</a>
$\mu$ Porasil/Porasil Columns .....	<a href="#">237</a>
Shodex RSpak Polymer Reversed-Phase Columns .....	<a href="#">237</a>
Primers .....	<a href="#">238</a>
<b>Cartridge and Guard Columns, Fittings, and Accessoriess.....</b>	<a href="#">240</a>
Cartridge Columns .....	<a href="#">240</a>
Spherisorb Cartridge and Guard Columns .....	<a href="#">240</a>
VanGuard Pre-columns and Cartridges.....	<a href="#">241</a>
Sentry Guard Cartridges.....	<a href="#">244</a>
Guard-Pak Holder and Inserts .....	<a href="#">246</a>

# ≥3 μm Analytical HPLC Columns



## XBridge BEH Columns

XBridge BEH HPLC Columns are designed for one purpose—to maximize productivity. Whether you are creating a quality-control method or developing a leading-edge LC-MS assay, there is an XBridge Column that will fit your separation needs.



- Unique, mobile-phase pH stability, increasing column lifetime
- Remarkable column reliability, ensuring the ruggedness of assays
- Exceptional particle efficiency, providing unmatched peak shape and capacity

With 13 general-purpose, application-specific sorbents and the widest range of particle sizes available, no other HPLC column family offers the tools you need to meet the most demanding chromatographic challenges. Whether you require robust HPLC methods, seamless UPLC transferability, or preparative scaling for product isolation, count on the versatility of an XBridge BEH HPLC Column.

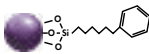

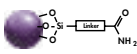

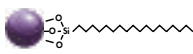
### Column Characteristics

	BEH C <sub>18</sub> 130 Å	BEH Shield RP18, 130 Å	BEH C <sub>8</sub> 130 Å
	UHPLC: 2.5 μm XP HPLC: 3.5, 5, 10 μm	UHPLC: 2.5 μm XP HPLC: 3.5, 5, 10 μm	UHPLC: 2.5 μm XP HPLC: 3.5, 5, 10 μm
Ligand Benefit	General purpose, ideally suited for method development due to extreme pH stability and applicability to the broadest range of compound classes.	Alternate selectivity compared to straight chain C <sub>18</sub> , particularly with phenolic analytes. Compatible with 100% aqueous-phase composition.	General purpose, ideally suited for method development due to extreme pH stability. Applicable to the broadest range of compound classes.
Particle/Ligand			
Ligand Density*	3.1 μmol/m <sup>2</sup>	3.3 μmol/m <sup>2</sup>	3.2 μmol/m <sup>2</sup>
Carbon Load*	18%	17%	13%
Endcapped	Yes	Yes	Yes
USP Class No.	L1	L1	L7
pH Range	1–12	2–11	1–12
Temperature Limits	Low pH = 80 °C, High pH = 60 °C	Low pH = 50 °C, High pH = 45 °C	Low pH = 60 °C, High pH = 60 °C
Surface Area*	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g
Performance Standards	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>
Application Standards	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>


\*Expected or approximate value.

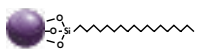




BEH Technology is also available in UPLC particle sizes (ACQUITY UPLC BEH 1.7 μm), please [refer to page 117](#).

Column Characteristics *Continued*

	BEH Phenyl, 130 Å	BEH HILIC, 130 Å	BEH Amide, 130 Å	Glycan BEH Amide, 130 Å	Peptide BEH C <sub>18</sub> , 130 Å
	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5, 5 µm	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5 µm	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5 µm	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5 µm	HPLC: 3.5, 5, 10 µm
Ligand Benefit	Excellent for method development and offers a unique level of pH stability. Provides alternate selectivity, particularly in regard to polyaromatic compounds.	Excellent for retention of very polar, basic, water soluble analytes. Excellent for mobile phases containing high concentrations of organic solvent.	Good to separate a wide range of very polar compounds, particularly good at separating carbohydrates (saccharides) using high concentrations of organic modifier, elevated temperature, and high pH.	Retention of polar acidic glycans.	High pH and temperature stable. Provides high peptide retention.
Particle/Ligand					
Ligand Density*	3.0 µmol/m <sup>2</sup>	N/A	7.5 µmol/m <sup>2</sup>	7.5 µmol/m <sup>2</sup>	3.1 µmol/m <sup>2</sup>
Carbon Load*	15%	Unbonded	12%	12%	18%
Endcapped	Yes	Yes	No	No	Yes
USP Class No.	L11	L3	L68	L68	L1
pH Range	1-12	1-9	2-11	2-11	1-12
Temperature Limits	Low pH = 80 °C, High pH = 60 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 90 °C, High pH = 90 °C	Low pH = 90 °C, High pH = 90 °C	Low pH = 80 °C, High pH = 60 °C
Surface Area*	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g
Performance Standards	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	HILIC QC Reference Material p/n: <a href="#">186007226</a>	HILIC QC Reference Material p/n: <a href="#">186007226</a>	Glycan Performance Test Standard p/n: <a href="#">186006349</a>	Cytochrome c Digestion Standard p/n: <a href="#">186006371</a>
Application Standards	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	HILIC QC Reference Material p/n: <a href="#">186007226</a>	HILIC QC Reference Material p/n: <a href="#">186007226</a>	Glycan Performance Test Standard p/n: <a href="#">186006349</a> Dextran Calibration Standard p/n: <a href="#">186006841</a>	Peptide Retention Standard p/n: <a href="#">186006555</a>

\*Expected or approximate value.

 BEH Technology is also available in UPLC particle sizes (ACQUITY UPLC BEH 1.7 µm), please [refer to page 117](#).

Oligonucleotide BEH C <sub>18</sub> , 130 Å	Protein BEH C <sub>4r</sub> , 300 Å	Protein BEH SEC, 125 Å	Protein BEH SEC, 200 Å	Protein BEH SEC, 450 Å
HPLC: 2.5 µm	HPLC: 3.5, 5, 10 µm	HPLC: 3.5 µm	HPLC: 3.5 µm	HPLC: 3.5 µm
High pH and temperature stable. Great separations for oligonucleotides (<45 mers).	High pH and temperature stable. The go-to option for intact proteins.	Helps to minimize secondary interactions in size exclusion mode. For use in fragment, monomer and aggregate analysis. Best for separations of proteins or peptides sized 1 kD - 80 kD.	Helps to minimize secondary interactions in size exclusion mode. For use in fragment, monomer and aggregate analysis. Best for separations of proteins sized 10 kD - 450 kD.	Helps to minimize secondary interactions in size exclusion mode. For use in fragment, monomer and aggregate analysis. Best for separations of proteins sized 100 kD - 1.5 million daltons.
				
3.1 µmol/m <sup>2</sup>	2.4 µmol/m <sup>2</sup>	4.9 µmol/m <sup>2</sup>	5.5 µmol/m <sup>2</sup>	4.8 µmol/m <sup>2</sup>
18%	8%	15%	12%	9%
Yes	No	No	No	No
L1	L26	L33	L33	L33
1-12	1-10	1-8	1-8	1-8
Low pH = 80 °C, High pH = 60 °C	Low pH = 80 °C, High pH = 50 °C	Low pH = 60 °C, High pH = 60 °C	Low pH = 60 °C, High pH = 60 °C	Low pH = 60 °C, High pH = 60 °C
90 m <sup>2</sup> /g	90 m <sup>2</sup> /g	395 m <sup>2</sup> /g	220 m <sup>2</sup> /g	80 m <sup>2</sup> /g
MassPREP OST Standard p/n: <a href="#">186004135</a>	MassPREP Protein Standard Mix p/n: <a href="#">186004900</a>	BEH125 Protein Standard Mix p/n: <a href="#">186006519</a>	BEH200 SEC Protein Standard Mix p/n: <a href="#">186006518</a>	BEH450 SEC Protein Standard Mix p/n: <a href="#">186006842</a>
MassPREP OST Standard p/n: <a href="#">186004135</a>	MassPREP Protein Standard Mix p/n: <a href="#">186004900</a>	BEH125 Protein Standard Mix p/n: <a href="#">186006519</a>	BEH200 SEC Protein Standard Mix p/n: <a href="#">186006518</a>	BEH450 SEC Protein Standard Mix p/n: <a href="#">186006842</a>



XBridge Columns

BEH C <sub>18</sub>	ANALYTICAL COLUMNS						
	Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
	2.1 × 30 mm <i>XP</i>	<a href="#">186006028</a>	<a href="#">176002546</a>	2.1 × 20 mm <i>JS</i>	<a href="#">186003019</a>	2.1 × 20 mm <i>JS</i>	<a href="#">186003107</a>
	2.1 × 50 mm <i>XP</i>	<a href="#">186006029</a>	<a href="#">176002547</a>	2.1 × 30 mm	<a href="#">186003020</a>	2.1 × 30 mm	<a href="#">186003129</a>
	2.1 × 75 mm <i>XP</i>	<a href="#">186006030</a>	<a href="#">176002548</a>	2.1 × 50 mm	<a href="#">186003021</a>	2.1 × 50 mm	<a href="#">186003108</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006031</a>	<a href="#">176002549</a>	2.1 × 100 mm	<a href="#">186003022</a>	2.1 × 100 mm	<a href="#">186003109</a>
	2.1 × 150 mm <i>XP</i>	<a href="#">186006709</a>	<a href="#">176002879</a>	2.1 × 150 mm	<a href="#">186003023</a>	2.1 × 150 mm	<a href="#">186003110</a>
	3.0 × 30 mm <i>XP</i>	<a href="#">186006032</a>	<a href="#">176002550</a>	3.0 × 30 mm	<a href="#">186003025</a>	3.0 × 30 mm	<a href="#">186003111</a>
	3.0 × 50 mm <i>XP</i>	<a href="#">186006033</a>	<a href="#">176002551</a>	3.0 × 50 mm	<a href="#">186003026</a>	3.0 × 50 mm	<a href="#">186003131</a>
	3.0 × 75 mm <i>XP</i>	<a href="#">186006034</a>	<a href="#">176002552</a>	3.0 × 100 mm	<a href="#">186003027</a>	3.0 × 100 mm	<a href="#">186003132</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006035</a>	<a href="#">176002553</a>	3.0 × 150 mm	<a href="#">186003028</a>	3.0 × 150 mm	<a href="#">186003112</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006710</a>	<a href="#">176002880</a>	4.6 × 30 mm	<a href="#">186003030</a>	3.0 × 250 mm	<a href="#">186003133</a>
	4.6 × 30 mm <i>XP</i>	<a href="#">186006036</a>	—	4.6 × 50 mm	<a href="#">186003031</a>	4.6 × 30 mm	<a href="#">186003135</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006037</a>	—	4.6 × 75 mm	<a href="#">186003032</a>	4.6 × 50 mm	<a href="#">186003113</a>
	4.6 × 75 mm <i>XP</i>	<a href="#">186006038</a>	—	4.6 × 100 mm	<a href="#">186003033</a>	4.6 × 75 mm	<a href="#">186003114</a>
	4.6 × 100 mm <i>XP</i>	<a href="#">186006039</a>	—	4.6 × 150 mm	<a href="#">186003034</a>	4.6 × 100 mm	<a href="#">186003115</a>
	4.6 × 150 mm <i>XP</i>	<a href="#">186006711</a>	—	4.6 × 250 mm	<a href="#">186003943</a>	4.6 × 150 mm	<a href="#">186003116</a>
						4.6 × 250 mm	<a href="#">186003117</a>

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186002972</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186003889</a> <sup>1</sup>
10 × 50 mm	OBD Column	<a href="#">186008164</a>	19 × 10 mm	Guard Cartridge	<a href="#">186003892</a> <sup>2</sup>
10 × 100 mm	OBD Column	<a href="#">186008165</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006892</a> <sup>3</sup>
10 × 150 mm	OBD Column	<a href="#">186008166</a>	10 × 150 mm	OBD Column	<a href="#">186008210</a>
10 × 250 mm	OBD Column	<a href="#">186008167</a>	10 × 250 mm	OBD Column	<a href="#">186008211</a>
19 × 10 mm	Guard Cartridge	<a href="#">186002975</a> <sup>2</sup>	19 × 50 mm	OBD Column	<a href="#">186003893</a>
19 × 50 mm	OBD Column	<a href="#">186002977</a>	19 × 100 mm	OBD Column	<a href="#">186003901</a>
19 × 100 mm	OBD Column	<a href="#">186002978</a>	19 × 150 mm	OBD Column	<a href="#">186003894</a>
19 × 150 mm	OBD Column	<a href="#">186002979</a>	19 × 250 mm	OBD Column	<a href="#">186003895</a>
19 × 250 mm	OBD Column	<a href="#">186004021</a>	30 × 75 mm	OBD Column	<a href="#">186004711</a>
30 × 10 mm	Guard Cartridge	<a href="#">186006893</a> <sup>3</sup>	30 × 100 mm	OBD Column	<a href="#">186003930</a>
30 × 50 mm	OBD Column	<a href="#">186002980</a>	30 × 150 mm	OBD Column	<a href="#">186003896</a>
30 × 75 mm	OBD Column	<a href="#">186002981</a>	30 × 250 mm	OBD Column	<a href="#">186003897</a>
30 × 100 mm	OBD Column	<a href="#">186002982</a>	50 × 50 mm	OBD Column	<a href="#">186003898</a>
30 × 150 mm	OBD Column	<a href="#">186003284</a>	50 × 100 mm	OBD Column	<a href="#">186003902</a>
30 × 250 mm	OBD Column	<a href="#">186004025</a>	50 × 150 mm	OBD Column	<a href="#">186003899</a>
50 × 50 mm	OBD Column	<a href="#">186003933</a>	50 × 250 mm	OBD Column	<a href="#">186003900</a>
50 × 100 mm	OBD Column	<a href="#">186003937</a>			
50 × 150 mm	OBD Column	<a href="#">186003929</a>			
50 × 250 mm	OBD Column	<a href="#">186004107</a>			

<sup>1</sup> Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).  
<sup>2</sup> Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).  
<sup>3</sup> Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

XBridge Columns *Continued*

ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006040</a>	<a href="#">176002554</a>	2.1 × 30 mm	<a href="#">186003046</a>	2.1 × 30 mm	<a href="#">186003187</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006041</a>	<a href="#">176002555</a>	2.1 × 50 mm	<a href="#">186003047</a>	2.1 × 50 mm	<a href="#">186003011</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006042</a>	<a href="#">176002556</a>	2.1 × 100 mm	<a href="#">186003048</a>	2.1 × 100 mm	<a href="#">186003012</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006043</a>	<a href="#">176002557</a>	2.1 × 150 mm	<a href="#">186003049</a>	2.1 × 150 mm	<a href="#">186003013</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006712</a>	<a href="#">176002881</a>	3.0 × 30 mm	<a href="#">186003182</a>	3.0 × 30 mm	<a href="#">186003189</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006044</a>	<a href="#">176002558</a>	3.0 × 50 mm	<a href="#">186003050</a>	3.0 × 50 mm	<a href="#">186003190</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006045</a>	<a href="#">176002559</a>	3.0 × 100 mm	<a href="#">186003051</a>	3.0 × 100 mm	<a href="#">186003191</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006046</a>	<a href="#">176002560</a>	3.0 × 150 mm	<a href="#">186003052</a>	3.0 × 150 mm	<a href="#">186003014</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006047</a>	<a href="#">176002561</a>	4.6 × 30 mm	<a href="#">186003184</a>	3.0 × 250 mm	<a href="#">186003192</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006713</a>	<a href="#">176002882</a>	4.6 × 50 mm	<a href="#">186003053</a>	4.6 × 30 mm	<a href="#">186003194</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006048</a>	—	4.6 × 75 mm	<a href="#">186003185</a>	4.6 × 50 mm	<a href="#">186003015</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006049</a>	—	4.6 × 100 mm	<a href="#">186003054</a>	4.6 × 75 mm	<a href="#">186003195</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006050</a>	—	4.6 × 150 mm	<a href="#">186003055</a>	4.6 × 100 mm	<a href="#">186003016</a>
4.6 × 100 mm <i>XP</i>	<a href="#">186006051</a>	—	4.6 × 250 mm	<a href="#">186003963</a>	4.6 × 150 mm	<a href="#">186003017</a>
4.6 × 150 mm <i>XP</i>	<a href="#">186006714</a>	—			4.6 × 250 mm	<a href="#">186003018</a>

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186002991</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186004003</a> <sup>1</sup>
10 × 50 mm	OBD Column	<a href="#">186008172</a>	19 × 10 mm	Guard Cartridge	<a href="#">186004006</a> <sup>2</sup>
10 × 100 mm	OBD Column	<a href="#">186008173</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006894</a> <sup>3</sup>
10 × 150 mm	OBD Column	<a href="#">186008174</a>	10 × 150 mm	OBD Column	<a href="#">186008215</a>
10 × 250 mm	OBD Column	<a href="#">186008175</a>	10 × 250 mm	OBD Column	<a href="#">186008216</a>
19 × 10 mm	Guard Cartridge	<a href="#">186002992</a> <sup>2</sup>	19 × 50 mm	OBD Column	<a href="#">186004007</a>
19 × 50 mm	OBD Column	<a href="#">186002993</a>	19 × 100 mm	OBD Column	<a href="#">186004008</a>
19 × 100 mm	OBD Column	<a href="#">186002994</a>	19 × 150 mm	OBD Column	<a href="#">186004009</a>
19 × 150 mm	OBD Column	<a href="#">186002995</a>	19 × 250 mm	OBD Column	<a href="#">186004010</a>
19 × 250 mm	OBD Column	<a href="#">186004023</a>	30 × 150 mm	OBD Column	<a href="#">186004011</a>
30 × 10 mm	Guard Cartridge	<a href="#">186006895</a> <sup>3</sup>	30 × 250 mm	OBD Column	<a href="#">186004012</a>
30 × 50 mm	OBD Column	<a href="#">186002996</a>	50 × 50 mm	OBD Column	<a href="#">186004013</a>
30 × 75 mm	OBD Column	<a href="#">186003269</a>	50 × 100 mm	OBD Column	<a href="#">186004014</a>
30 × 100 mm	OBD Column	<a href="#">186002997</a>	50 × 150 mm	OBD Column	<a href="#">186004015</a>
30 × 150 mm	OBD Column	<a href="#">186003083</a>	50 × 250 mm	OBD Column	<a href="#">186004016</a>
50 × 50 mm	OBD Column	<a href="#">186003934</a>			
50 × 100 mm	OBD Column	<a href="#">186003938</a>			

<sup>1</sup> Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup> Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

BEH Shield RP18 ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006052</a>	<a href="#">176002562</a>	2.1 × 30 mm	<a href="#">186003035</a>	2.1 × 30 mm	<a href="#">186003157</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006053</a>	<a href="#">176002563</a>	2.1 × 50 mm	<a href="#">186003036</a>	2.1 × 50 mm	<a href="#">186002999</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006054</a>	<a href="#">176002564</a>	2.1 × 100 mm	<a href="#">186003037</a>	2.1 × 100 mm	<a href="#">186003002</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006055</a>	<a href="#">176002565</a>	2.1 × 150 mm	<a href="#">186003038</a>	2.1 × 150 mm	<a href="#">186003003</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006715</a>	<a href="#">176002883</a>	3.0 × 30 mm	<a href="#">186003153</a>	3.0 × 50 mm	<a href="#">186003160</a>
3.0 × 20 mm <i>IS</i>	<a href="#">186003140</a>	—	3.0 × 50 mm	<a href="#">186003039</a>	3.0 × 100 mm	<a href="#">186003004</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006056</a>	<a href="#">176002566</a>	3.0 × 100 mm	<a href="#">186003040</a>	3.0 × 150 mm	<a href="#">186003005</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006057</a>	<a href="#">176002567</a>	3.0 × 150 mm	<a href="#">186003041</a>	3.0 × 250 mm	<a href="#">186003161</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006058</a>	<a href="#">176002568</a>	4.6 × 30 mm	<a href="#">186003155</a>	4.6 × 50 mm	<a href="#">186003006</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006059</a>	<a href="#">176002569</a>	4.6 × 50 mm	<a href="#">186003042</a>	4.6 × 75 mm	<a href="#">186003007</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006716</a>	<a href="#">176002884</a>	4.6 × 75 mm	<a href="#">186003043</a>	4.6 × 100 mm	<a href="#">186003008</a>
4.6 × 20 mm <i>IS</i>	<a href="#">186003144</a>	—	4.6 × 100 mm	<a href="#">186003044</a>	4.6 × 150 mm	<a href="#">186003009</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006060</a>	—	4.6 × 150 mm	<a href="#">186003045</a>	4.6 × 250 mm	<a href="#">186003010</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006061</a>	—	4.6 × 250 mm	<a href="#">186003964</a>		
4.6 × 75 mm <i>XP</i>	<a href="#">186006062</a>	—				
4.6 × 100 mm <i>XP</i>	<a href="#">186006063</a>	—				
4.6 × 150 mm <i>XP</i>	<a href="#">186006717</a>	—				

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186002983</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186003988</a> <sup>1</sup>
10 × 50 mm	OBD Column	<a href="#">186008168</a>	19 × 10 mm	Guard Cartridge	<a href="#">186003991</a> <sup>2</sup>
10 × 100 mm	OBD Column	<a href="#">186008169</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006897</a> <sup>3</sup>
10 × 150 mm	OBD Column	<a href="#">186008170</a>	10 × 150 mm	OBD Column	<a href="#">186008213</a>
10 × 250 mm	OBD Column	<a href="#">186008171</a>	10 × 250 mm	OBD Column	<a href="#">186008214</a>
19 × 10 mm	Guard Cartridge	<a href="#">186002984</a> <sup>2</sup>	19 × 50 mm	OBD Column	<a href="#">186003992</a>
19 × 50 mm	OBD Column	<a href="#">186002985</a>	19 × 100 mm	OBD Column	<a href="#">186003993</a>
19 × 100 mm	OBD Column	<a href="#">186002986</a>	19 × 150 mm	OBD Column	<a href="#">186003994</a>
19 × 150 mm	OBD Column	<a href="#">186002987</a>	19 × 250 mm	OBD Column	<a href="#">186003995</a>
19 × 250 mm	OBD Column	<a href="#">186004022</a>	30 × 150 mm	OBD Column	<a href="#">186003996</a>
30 × 10 mm	Guard Cartridge	<a href="#">186006898</a> <sup>3</sup>	30 × 250 mm	OBD Column	<a href="#">186003997</a>
30 × 50 mm	OBD Column	<a href="#">186002988</a>	50 × 50 mm	OBD Column	<a href="#">186003998</a>
30 × 75 mm	OBD Column	<a href="#">186003262</a>	50 × 100 mm	OBD Column	<a href="#">186003999</a>
30 × 100 mm	OBD Column	<a href="#">186002989</a>	50 × 150 mm	OBD Column	<a href="#">186004001</a>
30 × 150 mm	OBD Column	<a href="#">186002990</a>	50 × 250 mm	OBD Column	<a href="#">186004002</a>
50 × 50 mm	OBD Column	<a href="#">186003935</a>			
50 × 100 mm	OBD Column	<a href="#">186003939</a>			

<sup>1</sup> Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup> Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

XBridge Columns *Continued*

BEH Phenyl						
ANALYTICAL COLUMNS						
Particle Size: 2.5 $\mu$ m			Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 $\times$ 30 mm <i>XP</i>	<a href="#">186006064</a>	<a href="#">176002570</a>	2.1 $\times$ 30 mm	<a href="#">186003321</a>	2.1 $\times$ 50 mm	<a href="#">186003338</a>
2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006065</a>	<a href="#">176002571</a>	2.1 $\times$ 50 mm	<a href="#">186003322</a>	2.1 $\times$ 100 mm	<a href="#">186003339</a>
2.1 $\times$ 75 mm <i>XP</i>	<a href="#">186006066</a>	<a href="#">176002572</a>	2.1 $\times$ 100 mm	<a href="#">186003323</a>	2.1 $\times$ 150 mm	<a href="#">186003340</a>
2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006067</a>	<a href="#">176002573</a>	2.1 $\times$ 150 mm	<a href="#">186003324</a>	3.0 $\times$ 50 mm	<a href="#">186003343</a>
2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006718</a>	<a href="#">176002885</a>	3.0 $\times$ 50 mm	<a href="#">186003327</a>	3.0 $\times$ 100 mm	<a href="#">186003344</a>
3.0 $\times$ 30 mm <i>XP</i>	<a href="#">186006068</a>	<a href="#">176002574</a>	3.0 $\times$ 100 mm	<a href="#">186003328</a>	3.0 $\times$ 150 mm	<a href="#">186003345</a>
3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006069</a>	<a href="#">176002575</a>	3.0 $\times$ 150 mm	<a href="#">186003329</a>	3.0 $\times$ 250 mm	<a href="#">186003346</a>
3.0 $\times$ 75 mm <i>XP</i>	<a href="#">186006070</a>	<a href="#">176002576</a>	4.6 $\times$ 30 mm	<a href="#">186003331</a>	4.6 $\times$ 50 mm	<a href="#">186003349</a>
3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006071</a>	<a href="#">176002577</a>	4.6 $\times$ 50 mm	<a href="#">186003332</a>	4.6 $\times$ 75 mm	<a href="#">186003350</a>
3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006719</a>	<a href="#">176002886</a>	4.6 $\times$ 75 mm	<a href="#">186003333</a>	4.6 $\times$ 100 mm	<a href="#">186003351</a>
4.6 $\times$ 30 mm <i>XP</i>	<a href="#">186006072</a>	—	4.6 $\times$ 100 mm	<a href="#">186003334</a>	4.6 $\times$ 150 mm	<a href="#">186003352</a>
4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006073</a>	—	4.6 $\times$ 150 mm	<a href="#">186003335</a>	4.6 $\times$ 250 mm	<a href="#">186003353</a>
4.6 $\times$ 75 mm <i>XP</i>	<a href="#">186006074</a>	—	4.6 $\times$ 250 mm	<a href="#">186003965</a>		
4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006075</a>	—				
4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006720</a>	—				

PREPARATIVE COLUMNS		
Particle Size: 5 $\mu$ m		
Dimension	Type	P/N (1/pk)
10 $\times$ 10 mm	Guard Cartridge	<a href="#">186003354</a> <sup>1</sup>
10 $\times$ 50 mm	OBD Column	<a href="#">186008176</a>
10 $\times$ 100 mm	OBD Column	<a href="#">186008177</a>
10 $\times$ 150 mm	OBD Column	<a href="#">186008178</a>
10 $\times$ 250 mm	OBD Column	<a href="#">186008179</a>
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186003355</a> <sup>2</sup>
19 $\times$ 50 mm	OBD Column	<a href="#">186003356</a>
19 $\times$ 100 mm	OBD Column	<a href="#">186003357</a>
19 $\times$ 150 mm	OBD Column	<a href="#">186003358</a>
19 $\times$ 250 mm	OBD Column	<a href="#">186004024</a>
30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006891</a> <sup>3</sup>
30 $\times$ 50 mm	OBD Column	<a href="#">186003277</a>
30 $\times$ 75 mm	OBD Column	<a href="#">186003278</a>
30 $\times$ 100 mm	OBD Column	<a href="#">186003279</a>
30 $\times$ 150 mm	OBD Column	<a href="#">186003276</a>
50 $\times$ 50 mm	OBD Column	<a href="#">186003936</a>
50 $\times$ 100 mm	OBD Column	<a href="#">186003940</a>

<sup>1</sup>Requires 10  $\times$  10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30  $\times$  10 mm Prep Guard Holder, p/n: [186006912](#).

BEH HILIC						
ANALYTICAL COLUMNS						
Particle Size: 2.5 $\mu\text{m}$			Particle Size: 3.5 $\mu\text{m}$		Particle Size: 5 $\mu\text{m}$	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 $\times$ 30 mm <i>XP</i>	<a href="#">186006076</a>	<a href="#">176002578</a>	2.1 $\times$ 50 mm	<a href="#">186004432</a>	2.1 $\times$ 50 mm	<a href="#">186004444</a>
2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006077</a>	<a href="#">176002579</a>	2.1 $\times$ 100 mm	<a href="#">186004433</a>	2.1 $\times$ 100 mm	<a href="#">186004445</a>
2.1 $\times$ 75 mm <i>XP</i>	<a href="#">186006078</a>	<a href="#">176002580</a>	2.1 $\times$ 150 mm	<a href="#">186004434</a>	2.1 $\times$ 150 mm	<a href="#">186004446</a>
2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006079</a>	<a href="#">176002581</a>	3.0 $\times$ 100 mm	<a href="#">186004436</a>	3.0 $\times$ 100 mm	<a href="#">186004448</a>
2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006721</a>	<a href="#">176002887</a>	4.6 $\times$ 50 mm	<a href="#">186004439</a>	4.6 $\times$ 50 mm	<a href="#">186004451</a>
3.0 $\times$ 30 mm <i>XP</i>	<a href="#">186006080</a>	<a href="#">176002582</a>	4.6 $\times$ 100 mm	<a href="#">186004440</a>	4.6 $\times$ 100 mm	<a href="#">186004452</a>
3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006081</a>	<a href="#">176002583</a>	4.6 $\times$ 150 mm	<a href="#">186004441</a>	4.6 $\times$ 150 mm	<a href="#">186004453</a>
3.0 $\times$ 75 mm <i>XP</i>	<a href="#">186006082</a>	<a href="#">176002584</a>			4.6 $\times$ 250 mm	<a href="#">186004454</a>
3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006083</a>	<a href="#">176002585</a>				
3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006722</a>	<a href="#">176002888</a>				
4.6 $\times$ 30 mm <i>XP</i>	<a href="#">186006084</a>	—				
4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006085</a>	—				
4.6 $\times$ 75 mm <i>XP</i>	<a href="#">186006086</a>	—				
4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006087</a>	—				
4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006723</a>	—				

PREPARATIVE COLUMNS		
Particle Size: 5 $\mu\text{m}$		
Dimension	Type	P/N (1/pk)
10 $\times$ 10 mm	Guard Cartridge	<a href="#">186004720</a> <sup>1</sup>
10 $\times$ 50 mm	OBD Column	<a href="#">186008217</a>
10 $\times$ 100 mm	OBD Column	<a href="#">186008218</a>
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186004723</a> <sup>2</sup>
19 $\times$ 50 mm	OBD Column	<a href="#">186004724</a>
19 $\times$ 100 mm	OBD Column	<a href="#">186004725</a>
19 $\times$ 150 mm	OBD Column	<a href="#">186004726</a>
19 $\times$ 250 mm	OBD Column	<a href="#">186004730</a>
30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006896</a> <sup>3</sup>
30 $\times$ 50 mm	OBD Column	<a href="#">186004727</a>
30 $\times$ 100 mm	OBD Column	<a href="#">186004728</a>
30 $\times$ 150 mm	OBD Column	<a href="#">186004729</a>
30 $\times$ 250 mm	OBD Column	<a href="#">186004731</a>
50 $\times$ 50 mm	OBD Column	<a href="#">186004732</a>
50 $\times$ 100 mm	OBD Column	<a href="#">186004733</a>
50 $\times$ 150 mm	OBD Column	<a href="#">186004734</a>
50 $\times$ 250 mm	OBD Column	<a href="#">186004735</a>

<sup>1</sup> Requires 10  $\times$  10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup> Requires 30  $\times$  10 mm Prep Guard Holder, p/n: [186006912](#).

XBridge Columns *Continued*

BEH Amide						
ANALYTICAL COLUMNS						
Particle Size: 2.5 $\mu$ m			Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 $\times$ 30 mm <i>XP</i>	<a href="#">186006088</a>	<a href="#">176002586</a>	2.1 $\times$ 30 mm	<a href="#">186004858</a>	2.1 $\times$ 30 mm	<a href="#">186006587</a>
2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006089</a>	<a href="#">176002587</a>	2.1 $\times$ 50 mm	<a href="#">186004859</a>	2.1 $\times$ 50 mm	<a href="#">186006588</a>
2.1 $\times$ 75 mm <i>XP</i>	<a href="#">186006090</a>	<a href="#">176002588</a>	2.1 $\times$ 100 mm	<a href="#">186004860</a>	2.1 $\times$ 100 mm	<a href="#">186006589</a>
2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006091</a>	<a href="#">176002589</a>	2.1 $\times$ 150 mm	<a href="#">186004861</a>	2.1 $\times$ 150 mm	<a href="#">186006590</a>
2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006724</a>	<a href="#">176002889</a>	3.0 $\times$ 50 mm	<a href="#">186004863</a>	3.0 $\times$ 50 mm	<a href="#">186006591</a>
3.0 $\times$ 30 mm <i>XP</i>	<a href="#">186006092</a>	<a href="#">176002590</a>	3.0 $\times$ 100 mm	<a href="#">186004864</a>	3.0 $\times$ 100 mm	<a href="#">186006592</a>
3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006093</a>	<a href="#">176002591</a>	4.6 $\times$ 50 mm	<a href="#">186004867</a>	4.6 $\times$ 50 mm	<a href="#">186006593</a>
3.0 $\times$ 75 mm <i>XP</i>	<a href="#">186006094</a>	<a href="#">176002592</a>	4.6 $\times$ 100 mm	<a href="#">186004868</a>	4.6 $\times$ 100 mm	<a href="#">186006594</a>
3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006095</a>	<a href="#">176002593</a>	4.6 $\times$ 150 mm	<a href="#">186004869</a>	4.6 $\times$ 150 mm	<a href="#">186006595</a>
3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006725</a>	<a href="#">176002890</a>	4.6 $\times$ 250 mm	<a href="#">186004870</a>	4.6 $\times$ 250 mm	<a href="#">186006596</a>
4.6 $\times$ 30 mm <i>XP</i>	<a href="#">186006096</a>	—				
4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006097</a>	—				
4.6 $\times$ 75 mm <i>XP</i>	<a href="#">186006098</a>	—				
4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006099</a>	—				
4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006726</a>	—				

## PREPARATIVE COLUMNS

Particle Size: 5 $\mu$ m		
Dimension	Type	P/N (1/pk)
10 $\times$ 10 mm	Guard Cartridge	<a href="#">186006597</a> <sup>1</sup>
10 $\times$ 50 mm	OBD Column	<a href="#">186008260</a>
10 $\times$ 100 mm	OBD Column	<a href="#">186008261</a>
10 $\times$ 150 mm	OBD Column	<a href="#">186008262</a>
10 $\times$ 250 mm	OBD Column	<a href="#">186008263</a>
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186006598</a> <sup>2</sup>
19 $\times$ 50 mm	OBD Column	<a href="#">186006603</a>
19 $\times$ 100 mm	OBD Column	<a href="#">186006604</a>
19 $\times$ 150 mm	OBD Column	<a href="#">186006605</a>
19 $\times$ 250 mm	OBD Column	<a href="#">186006606</a>
30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006890</a> <sup>3</sup>
30 $\times$ 50 mm	OBD Column	<a href="#">186006607</a>
30 $\times$ 75 mm	OBD Column	<a href="#">186006608</a>
30 $\times$ 100 mm	OBD Column	<a href="#">186006609</a>
30 $\times$ 150 mm	OBD Column	<a href="#">186006610</a>
30 $\times$ 250 mm	OBD Column	<a href="#">186006611</a>

<sup>1</sup>Requires 10  $\times$  10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30  $\times$  10 mm Prep Guard Holder, p/n: [186006912](#).

XBridge Columns *Continued*

Glycan BEH Amide, 130 Å	ANALYTICAL COLUMNS			
	Particle Size: 2.5 µm		Particle Size: 3.5 µm	
	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
	2.1 × 50 mm <i>XP</i>	<a href="#">186007263</a>	2.1 × 50 mm	<a href="#">186007502</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186007264</a>	2.1 × 100 mm	<a href="#">186007503</a>
	2.1 × 150 mm <i>XP</i>	<a href="#">186007265</a>	2.1 × 150 mm	<a href="#">186007504</a>
	3.0 × 30 mm <i>XP</i>	<a href="#">186008038</a>	4.6 × 50 mm	<a href="#">186007273</a>
	3.0 × 75 mm <i>XP</i>	<a href="#">186008039</a>	4.6 × 100 mm	<a href="#">186007274</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186008040</a>	4.6 × 150 mm	<a href="#">186007275</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186007268</a>	4.6 × 250 mm	<a href="#">186007276</a>
	4.6 × 100 mm <i>XP</i>	<a href="#">186007269</a>		
	4.6 × 150 mm <i>XP</i>	<a href="#">186007270</a>		

Peptide BEH C <sub>18</sub> , 130 Å	ANALYTICAL COLUMNS				PREPARATIVE COLUMNS					
	Particle Size: 3.5 µm		Particle Size: 5 µm		Particle Size: 5 µm			Particle Size: 10 µm		
	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)	Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
	1.0 × 50 mm	<a href="#">186003560</a>	1.0 × 50 mm	<a href="#">186003571</a>	10 × 10 mm	Guard Cartridge	<a href="#">186004469</a> <sup>1</sup>	4.6 × 50 mm	OBD Column	<a href="#">186003648</a>
	1.0 × 100 mm	<a href="#">186003561</a>	1.0 × 100 mm	<a href="#">186003572</a>	10 × 50 mm	OBD Column	<a href="#">186008186</a>	4.6 × 100 mm	OBD Column	<a href="#">186003649</a>
	1.0 × 150 mm	<a href="#">186003562</a>	1.0 × 150 mm	<a href="#">186003573</a>	10 × 100 mm	OBD Column	<a href="#">186008187</a>	4.6 × 150 mm	OBD Column	<a href="#">186003650</a>
	2.1 × 50 mm	<a href="#">186003563</a>	2.1 × 50 mm	<a href="#">186003574</a>	10 × 150 mm	OBD Column	<a href="#">186008188</a>	4.6 × 250 mm	OBD Column	<a href="#">186003651</a>
	2.1 × 100 mm	<a href="#">186003564</a>	2.1 × 100 mm	<a href="#">186003575</a>	10 × 250 mm	OBD Column	<a href="#">186008189</a>	10 × 10 mm	Guard Cartridge	<a href="#">186004465</a> <sup>1</sup>
	2.1 × 150 mm	<a href="#">186003565</a>	2.1 × 150 mm	<a href="#">186003576</a>	19 × 10 mm	Guard Cartridge	<a href="#">186004468</a> <sup>2</sup>	10 × 50 mm	OBD Column	<a href="#">186008194</a>
	2.1 × 250 mm	<a href="#">186003566</a>	2.1 × 250 mm	<a href="#">186003577</a>	19 × 50 mm	OBD Column	<a href="#">186003586</a>	10 × 100 mm	OBD Column	<a href="#">186008195</a>
	4.6 × 50 mm	<a href="#">186003567</a>	4.6 × 50 mm	<a href="#">186003578</a>	19 × 100 mm	OBD Column	<a href="#">186003587</a>	10 × 150 mm	OBD Column	<a href="#">186008196</a>
	4.6 × 100 mm	<a href="#">186003568</a>	4.6 × 100 mm	<a href="#">186003579</a>	19 × 150 mm	OBD Column	<a href="#">186003945</a>	10 × 250 mm	OBD Column	<a href="#">186008197</a>
	4.6 × 150 mm	<a href="#">186003569</a>	4.6 × 150 mm	<a href="#">186003580</a>				19 × 10 mm	Guard Cartridge	<a href="#">186004464</a> <sup>2</sup>
	4.6 × 250 mm	<a href="#">186003570</a>	4.6 × 250 mm	<a href="#">186003581</a>				19 × 50 mm	OBD Column	<a href="#">186003656</a>
								19 × 150 mm	OBD Column	<a href="#">186003657</a>
								19 × 250 mm	OBD Column	<a href="#">186003658</a>
								30 × 50 mm	OBD Column	<a href="#">186003659</a>
								30 × 100 mm	OBD Column	<a href="#">186003660</a>
								30 × 150 mm	OBD Column	<a href="#">186003661</a>
								30 × 250 mm	OBD Column	<a href="#">186003662</a>

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

XBridge Columns *Continued*

 Peptide BEH C<sub>18</sub><sup>+</sup>  
300 Å

ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)		
2.1 × 30 mm <i>XP</i>	<a href="#">186006028</a>		1.0 × 50 mm	<a href="#">186003604</a>		
2.1 × 50 mm <i>XP</i>	<a href="#">186006029</a>		1.0 × 100 mm	<a href="#">186003605</a>		
2.1 × 75 mm <i>XP</i>	<a href="#">186006030</a>		1.0 × 150 mm	<a href="#">186003606</a>		
2.1 × 100 mm <i>XP</i>	<a href="#">186006031</a>		2.1 × 50 mm	<a href="#">186003607</a>		
2.1 × 150 mm <i>XP</i>	<a href="#">186006709</a>		2.1 × 100 mm	<a href="#">186003608</a>		
3.0 × 30 mm <i>XP</i>	<a href="#">186006032</a>		2.1 × 150 mm	<a href="#">186003609</a>		
3.0 × 50 mm <i>XP</i>	<a href="#">186006033</a>		2.1 × 250 mm	<a href="#">186003610</a>		
3.0 × 75 mm <i>XP</i>	<a href="#">186006034</a>		4.6 × 50 mm	<a href="#">186003611</a>		
3.0 × 100 mm <i>XP</i>	<a href="#">186006035</a>		4.6 × 100 mm	<a href="#">186003612</a>		
3.0 × 150 mm <i>XP</i>	<a href="#">186006710</a>		4.6 × 150 mm	<a href="#">186003613</a>		
4.6 × 30 mm <i>XP</i>	<a href="#">186006036</a>		4.6 × 250 mm	<a href="#">186003614</a>		
4.6 × 50 mm <i>XP</i>	<a href="#">186006037</a>					
4.6 × 75 mm <i>XP</i>	<a href="#">186006038</a>					
4.6 × 100 mm <i>XP</i>	<a href="#">186006039</a>					
4.6 × 150 mm <i>XP</i>	<a href="#">186006711</a>					

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186004471</a> <sup>1</sup>	4.6 × 50 mm	OBD Column	<a href="#">186003663</a>
10 × 50 mm	OBD Column	<a href="#">186008190</a>	4.6 × 100 mm	OBD Column	<a href="#">186003664</a>
10 × 100 mm	OBD Column	<a href="#">186008191</a>	4.6 × 150 mm	OBD Column	<a href="#">186003665</a>
10 × 150 mm	OBD Column	<a href="#">186008192</a>	4.6 × 250 mm	OBD Column	<a href="#">186003666</a>
10 × 250 mm	OBD Column	<a href="#">186008193</a>	10 × 10 mm	Guard Cartridge	<a href="#">186004467</a> <sup>1</sup>
19 × 10 mm	Guard Cartridge	<a href="#">186004470</a> <sup>2</sup>	10 × 50 mm	OBD Column	<a href="#">186008198</a>
19 × 50 mm	OBD Column	<a href="#">186003630</a>	10 × 100 mm	OBD Column	<a href="#">186008199</a>
19 × 100 mm	OBD Column	<a href="#">186003631</a>	10 × 150 mm	OBD Column	<a href="#">186008200</a>
19 × 150 mm	OBD Column	<a href="#">186003946</a>	10 × 250 mm	OBD Column	<a href="#">186008201</a>
			19 × 10 mm	Guard Cartridge	<a href="#">186004466</a> <sup>2</sup>
			19 × 50 mm	OBD Column	<a href="#">186003671</a>
			19 × 150 mm	OBD Column	<a href="#">186003672</a>
			19 × 250 mm	OBD Column	<a href="#">186003673</a>
			30 × 10 mm	Guard Cartridge	<a href="#">186006882</a> <sup>3</sup>
			30 × 50 mm	OBD Column	<a href="#">186003674</a>
			30 × 100 mm	OBD Column	<a href="#">186003675</a>
			30 × 150 mm	OBD Column	<a href="#">186003676</a>
			30 × 250 mm	OBD Column	<a href="#">186003677</a>

<sup>1</sup> Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup> Requires 30 × 10 mm Cartridge Holder, p/n: [186006912](#).



XBridge Columns *Continued*

Protein BEH C <sub>4</sub> , 300 Å	ANALYTICAL COLUMNS		PREPARATIVE COLUMNS					
	Particle Size: 3.5 µm		Particle Size: 5 µm			Particle Size: 10 µm		
	Dimension	P/N (1/pk)	Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
	2.1 × 50 mm	<a href="#">186004498</a>	10 × 10 mm	Guard Cartridge	<a href="#">186007305</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186007325</a> <sup>1</sup>
	2.1 × 100 mm	<a href="#">186004499</a>	10 × 50 mm	OBD Column	<a href="#">186008272</a>	10 × 50 mm	OBD Column	<a href="#">186008276</a>
	2.1 × 150 mm	<a href="#">186004500</a>	10 × 100 mm	OBD Column	<a href="#">186008273</a>	10 × 100 mm	OBD Column	<a href="#">186008277</a>
	2.1 × 250 mm	<a href="#">186004501</a>	10 × 150 mm	OBD Column	<a href="#">186008274</a>	10 × 150 mm	OBD Column	<a href="#">186008278</a>
	4.6 × 50 mm	<a href="#">186004502</a>	10 × 250 mm	OBD Column	<a href="#">186008275</a>	10 × 250 mm	OBD Column	<a href="#">186008279</a>
	4.6 × 100 mm	<a href="#">186004503</a>	19 × 10 mm	Guard Cartridge	<a href="#">186007310</a> <sup>2</sup>	19 × 10 mm	Guard Cartridge	<a href="#">186007330</a> <sup>2</sup>
	4.6 × 150 mm	<a href="#">186004504</a>	19 × 50 mm	OBD Column	<a href="#">186007311</a>	19 × 50 mm	OBD Column	<a href="#">186007331</a>
	4.6 × 250 mm	<a href="#">186004505</a>	19 × 100 mm	OBD Column	<a href="#">186007312</a>	19 × 100 mm	OBD Column	<a href="#">186007332</a>
			19 × 150 mm	OBD Column	<a href="#">186007313</a>	19 × 150 mm	OBD Column	<a href="#">186007333</a>
			19 × 250 mm	OBD Column	<a href="#">186007314</a>	19 × 250 mm	OBD Column	<a href="#">186007334</a>
			30 × 10 mm	Guard Cartridge	<a href="#">186007315</a> <sup>3</sup>	30 × 10 mm	Guard Cartridge	<a href="#">186007335</a> <sup>3</sup>
			30 × 50 mm	OBD Column	<a href="#">186007316</a>	30 × 50 mm	OBD Column	<a href="#">186007336</a>
			30 × 75 mm	OBD Column	<a href="#">186007317</a>	30 × 75 mm	OBD Column	<a href="#">186007337</a>
			30 × 100 mm	OBD Column	<a href="#">186007318</a>	30 × 100 mm	OBD Column	<a href="#">186007338</a>
			30 × 150 mm	OBD Column	<a href="#">186007319</a>	30 × 150 mm	OBD Column	<a href="#">186007339</a>
			30 × 250 mm	OBD Column	<a href="#">186007320</a>	30 × 250 mm	OBD Column	<a href="#">186007340</a>

Oligonucleotide BEH C <sub>18</sub> , 130 Å	PREPARATIVE COLUMNS		
	Particle Size: 2.5 µm		
	Dimension	Type	P/N (1/pk)
	10 × 50 mm	OBD Column	<a href="#">186008212</a>

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

XBridge Columns Method Validation Kits\*

	Particle Size: 2.5 $\mu$ m		Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>BEH C<sub>8</sub></b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006197</a>	2.1 $\times$ 100 mm	<a href="#">186003766</a>	2.1 $\times$ 150 mm	<a href="#">186003771</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006198</a>	3.0 $\times$ 100 mm	<a href="#">186003767</a>	3.0 $\times$ 100 mm	<a href="#">186003772</a>
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006757</a>	3.0 $\times$ 150 mm	<a href="#">186003768</a>	3.0 $\times$ 150 mm	<a href="#">186003773</a>
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006199</a>	4.6 $\times$ 100 mm	<a href="#">186003769</a>	4.6 $\times$ 100 mm	<a href="#">186003774</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006200</a>	4.6 $\times$ 150 mm	<a href="#">186003770</a>	4.6 $\times$ 150 mm	<a href="#">186003775</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006758</a>			4.6 $\times$ 250 mm	<a href="#">186003776</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006201</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006202</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006759</a>				
<b>BEH C<sub>6</sub></b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006203</a>	2.1 $\times$ 100 mm	<a href="#">186003777</a>	2.1 $\times$ 150 mm	<a href="#">186003782</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006204</a>	3.0 $\times$ 100 mm	<a href="#">186003778</a>	3.0 $\times$ 100 mm	<a href="#">186003783</a>
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006760</a>	3.0 $\times$ 150 mm	<a href="#">186003779</a>	3.0 $\times$ 150 mm	186003784
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006205</a>	4.6 $\times$ 100 mm	<a href="#">186003780</a>	4.6 $\times$ 100 mm	<a href="#">186003785</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006206</a>	4.6 $\times$ 150 mm	<a href="#">186003781</a>	4.6 $\times$ 150 mm	<a href="#">186003786</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006761</a>			4.6 $\times$ 250 mm	<a href="#">186003787</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006207</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006208</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006762</a>				
<b>BEH Shield RP18</b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006209</a>	2.1 $\times$ 100 mm	<a href="#">186003788</a>	2.1 $\times$ 150 mm	<a href="#">186003793</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006210</a>	3.0 $\times$ 100 mm	<a href="#">186003789</a>	3.0 $\times$ 100 mm	186003794
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006763</a>	3.0 $\times$ 150 mm	<a href="#">186003790</a>	3.0 $\times$ 150 mm	<a href="#">186003795</a>
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006211</a>	4.6 $\times$ 100 mm	<a href="#">186003791</a>	4.6 $\times$ 100 mm	<a href="#">186003796</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006212</a>	4.6 $\times$ 150 mm	<a href="#">186003792</a>	4.6 $\times$ 150 mm	<a href="#">186003797</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006774</a>			4.6 $\times$ 250 mm	<a href="#">186003798</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006213</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006214</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006775</a>				
<b>BEH Phenyl</b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006215</a>	2.1 $\times$ 100 mm	<a href="#">186003799</a>	2.1 $\times$ 150 mm	<a href="#">186003804</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006216</a>	3.0 $\times$ 100 mm	<a href="#">186003800</a>	3.0 $\times$ 100 mm	<a href="#">186003805</a>
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006776</a>	3.0 $\times$ 150 mm	<a href="#">186003801</a>	3.0 $\times$ 150 mm	186003806
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006217</a>	4.6 $\times$ 100 mm	<a href="#">186003802</a>	4.6 $\times$ 100 mm	<a href="#">186003807</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006218</a>	4.6 $\times$ 150 mm	<a href="#">186003803</a>	4.6 $\times$ 150 mm	<a href="#">186003808</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006777</a>			4.6 $\times$ 250 mm	<a href="#">186003809</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006219</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006220</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006778</a>				
<b>Oligonucleotide BEH C<sub>18</sub>, 130 Å</b>	4.6 $\times$ 50 mm	<a href="#">186004906</a>				

\*Each Method Validation Kit contains 3 columns, each from a different batch.

XBridge Columns Method Validation Kits\* *Continued*

Particle Size: 2.5 $\mu$ m		
	Dimension	P/N (3/pk)
<b>HILIC</b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006221</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006222</a>
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006779</a>
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006223</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006224</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006780</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006225</a>
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006226</a>
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006781</a>
<b>Amide</b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006227</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006228</a>
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006782</a>
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006229</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006230</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006783</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006231</a>
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006232</a>
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006784</a>
<b>Glycan BEH Amide, 130 Å</b>	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186007266</a>
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186007271</a>

\*Each Method Validation Kit contains 3 columns, each from a different batch.

## XBridge VanGuard Cartridges\*

	Particle Size: 2.5 $\mu$ m		Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
BEH C <sub>8</sub>	2.1 $\times$ 5 mm <i>XP</i>	<a href="#">186007772</a>	2.1 $\times$ 5 mm	<a href="#">186007766</a>	2.1 $\times$ 5 mm	<a href="#">186007769</a>
	3.9 $\times$ 5 mm <i>XP</i>	<a href="#">186007774</a>	3.9 $\times$ 5 mm	<a href="#">186007768</a>	3.9 $\times$ 5 mm	<a href="#">186007771</a>
BEH C <sub>8</sub>	2.1 $\times$ 5 mm <i>XP</i>	<a href="#">186007781</a>	2.1 $\times$ 5 mm	<a href="#">186007775</a>	2.1 $\times$ 5 mm	<a href="#">186007778</a>
	3.9 $\times$ 5 mm <i>XP</i>	<a href="#">186007783</a>	3.9 $\times$ 5 mm	<a href="#">186007777</a>	3.9 $\times$ 5 mm	<a href="#">186007780</a>
BEH Shield RP18	2.1 $\times$ 5 mm <i>XP</i>	<a href="#">186007808</a>	2.1 $\times$ 5 mm	<a href="#">186007802</a>	2.1 $\times$ 5 mm	<a href="#">186007805</a>
	3.9 $\times$ 5 mm <i>XP</i>	<a href="#">186007810</a>	3.9 $\times$ 5 mm	<a href="#">186007804</a>	3.9 $\times$ 5 mm	<a href="#">186007807</a>
BEH Phenyl	2.1 $\times$ 5 mm <i>XP</i>	<a href="#">186007799</a>	2.1 $\times$ 5 mm	<a href="#">186007793</a>	2.1 $\times$ 5 mm	<a href="#">186007796</a>
	3.9 $\times$ 5 mm <i>XP</i>	<a href="#">186007801</a>	3.9 $\times$ 5 mm	<a href="#">186007795</a>	3.9 $\times$ 5 mm	<a href="#">186007798</a>
BEH HILIC	2.1 $\times$ 5 mm <i>XP</i>	<a href="#">186007790</a>	2.1 $\times$ 5 mm	<a href="#">186007784</a>	2.1 $\times$ 5 mm	<a href="#">186007787</a>
	3.9 $\times$ 5 mm <i>XP</i>	<a href="#">186007792</a>	3.9 $\times$ 5 mm	<a href="#">186007786</a>	3.9 $\times$ 5 mm	<a href="#">186007789</a>
BEH Amide	2.1 $\times$ 5 mm <i>XP</i>	<a href="#">186007763</a>	2.1 $\times$ 5 mm	<a href="#">186007757</a>	2.1 $\times$ 5 mm	<a href="#">186007760</a>
	3.9 $\times$ 5 mm <i>XP</i>	<a href="#">186007765</a>	3.9 $\times$ 5 mm	<a href="#">186007759</a>	3.9 $\times$ 5 mm	<a href="#">186007762</a>

\*Each cartridge listed requires use of Universal VanGuard Cartridge Holder (Listed below, p/n [186007949](#))

## Universal VanGuard Cartridge Holder

Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>



**APPLICATION AREA:** Pharmaceutical Analysis

"Column protection products are very useful for samples with significant residual matrix, even after the use of small micron filtration. They are especially useful for UPLC, where column frits are much smaller than in traditional HPLC."

**REVIEWER:** Barrett Remington

**ORGANIZATION:** Particle Sciences, Inc.

XSelect HPLC Columns are designed for the method-development scientist who requires a diverse selection of sorbents to easily separate the most difficult analyte co-elutions.

XSelect Columns are:

- Designed for selectivity, improving the separation of closely eluting peaks
- Intended for isolation and purification, loading the highest analyte mass of any columns
- Ideal for rapid method development, reducing the time and cost spent developing methods



The base particle or substrate critically influences analyte selectivity; the bonded ligand influences selectivity to a lesser extent. Neither the substrate nor the ligand alone provides dramatic selectivity changes. Yet in combination, they provide the ultimate means of enhancing analyte selectivity, while ensuring reproducible and robust methods. Accordingly, the XSelect Column family offers the unique optimization of bonded ligands embodied in the particle technologies of high strength silica (HSS) and charged surface hybrid (CSH).

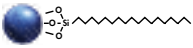
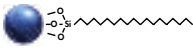
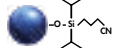
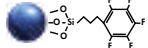
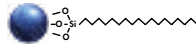
## Column Characteristics

	CSH C <sub>18</sub> , 130 Å	CSH Fluoro-Phenyl, 130 Å	CSH Phenyl-Hexyl, 130 Å	Peptide CSH C <sub>18</sub> , 130A
	UHPLC: 2.5 µm XP HPLC: 3.5, 5, 10 µm	UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm	UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm	UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm
Ligand Benefits	General purpose with excellent pH stability and rapid mobile-phase re-equilibration. Yields superior peak shape and increased loading capacity for basic compounds.	General purpose, provides a very high degree of analyte selectivity, especially in low-pH mobile phases. Provides superior peak shape and increased loading capacity for acidic compounds.	General purpose and alternative selectivity versus C <sub>18</sub> . Provides excellent retention for polyaromatic compounds. Maintains excellent reproducibility at pH extremes and delivers superior peak shape and increased loading capacity for basic compounds.	General purpose, offers excellent pH stability and peak shape for basic peptides in low ionic strength mobile phases.
Particle/Ligand				
Ligand Density*	2.3 µmol/m <sup>2</sup>	2.3 µmol/m <sup>2</sup>	2.3 µmol/m <sup>2</sup>	2.3 µmol/m <sup>2</sup>
Carbon Load*	15%	10%	14%	15%
Endcapped	Yes	No	Yes	Yes
USP Class No.	L1	L43	L11	L1
pH Range	1-11	1-8	1-11	1-11
Temperature Limits	Low pH = 80 °C, High pH = 45 °C	Low pH = 60 °C, High pH = 45 °C	Low pH = 80 °C, High pH = 45 °C	Low pH = 80 °C, High pH = 45 °C
Surface Area*	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g	185 m <sup>2</sup> /g
Performance Standards	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Cytochrome c Digestion Standard p/n: <a href="#">186006371</a>
Application Standards	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Peptide Retention Standard p/n: <a href="#">186006555</a>

\*Expected or approximate value.

XSelect Columns are also available in UPLC particle sizes (ACQUITY UPLC CSH and ACQUITY UPLC HSS), please refer to pages 113 and 120.

Column Characteristics *Continued*

	HSS C <sub>18</sub> <sup>SR</sup> , 130 Å	HSS C <sub>18</sub> SB, 130 Å	HSS CN, 130 Å	HSS PFP, 130 Å	HSS T3, 130 Å
	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5, 5 µm	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5, 5 µm	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5, 5 µm	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5, 5 µm	UHPLC: 2.5 µm <i>XP</i> HPLC: 3.5, 5 µm
Ligand Benefits	Ultra performance and general purpose, provides increased retention, superior peak shape and resists acid hydrolysis at low pH.	Provides unique selectivity for bases when operating in low-pH conditions.	General purpose, shows contrasting analyte selectivity when compared to C <sub>18</sub> phases, can be used in either reversed-phase and normal-phase mode.	General purpose, maximizes selectivity differences for Lewis bases through pi-pi interactions. The rigid aromatic ring provides additional selectivity based on shape, dipole moment, and hydrogen bonding interactions.	Exceptional polar compound retention and aqueous mobile-phase compatible.
Particle/Ligand					
Ligand Density*	3.2 µmol/m <sup>2</sup>	1.6 µmol/m <sup>2</sup>	2.0 µmol/m <sup>2</sup>	3.2 µmol/m <sup>2</sup>	1.6 µmol/m <sup>2</sup>
Carbon Load*	15%	8%	5%	7%	11%
Endcapped	Yes	No	No	No	Yes
USP Class No.	L1	L1	L10	L43	L1
pH Range	1–8	2–8	2–8	2–8	2–8
Temperature Limits	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
Surface Area*	230 m <sup>2</sup> /g	230 m <sup>2</sup> /g	230 m <sup>2</sup> /g	230 m <sup>2</sup> /g	230 m <sup>2</sup> /g
Performance Standards	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>
Application Standards	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	—	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>

\*Expected or approximate value.

XSelect Columns

ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006100</a>	<a href="#">176002594</a>	1.0 × 50 mm	<a href="#">186005249</a>	2.1 × 50 mm	<a href="#">186005274</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006101</a>	<a href="#">176002595</a>	1.0 × 150 mm	<a href="#">186005251</a>	2.1 × 100 mm	<a href="#">186005275</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006102</a>	<a href="#">176002596</a>	2.1 × 30 mm	<a href="#">186005254</a>	2.1 × 150 mm	<a href="#">186005276</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006103</a>	<a href="#">176002597</a>	2.1 × 50 mm	<a href="#">186005255</a>	3.0 × 30 mm	<a href="#">186005279</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006727</a>	<a href="#">176002891</a>	2.1 × 75 mm	<a href="#">186005644</a>	3.0 × 50 mm	<a href="#">186005280</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006104</a>	<a href="#">176002598</a>	2.1 × 100 mm	<a href="#">186005256</a>	3.0 × 100 mm	<a href="#">186005281</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006105</a>	<a href="#">176002599</a>	2.1 × 150 mm	<a href="#">186005257</a>	3.0 × 150 mm	<a href="#">186005282</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006106</a>	<a href="#">176002600</a>	3.0 × 30 mm	<a href="#">186005260</a>	3.0 × 250 mm	<a href="#">186005283</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006107</a>	<a href="#">176002601</a>	3.0 × 50 mm	<a href="#">186005261</a>	4.6 × 50 mm	<a href="#">186005287</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006728</a>	<a href="#">176002892</a>	3.0 × 75 mm	<a href="#">186005647</a>	4.6 × 100 mm	<a href="#">186005289</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006108</a>	—	3.0 × 100 mm	<a href="#">186005262</a>	4.6 × 150 mm	<a href="#">186005290</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006109</a>	—	3.0 × 150 mm	<a href="#">186005263</a>	4.6 × 250 mm	<a href="#">186005291</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006110</a>	—	4.6 × 50 mm	<a href="#">186005267</a>		
4.6 × 100 mm <i>XP</i>	<a href="#">186006111</a>	—	4.6 × 75 mm	<a href="#">186005268</a>		
4.6 × 150 mm <i>XP</i>	<a href="#">186006729</a>	—	4.6 × 100 mm	<a href="#">186005269</a>		
			4.6 × 150 mm	<a href="#">186005270</a>		

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186005491</a> <sup>1</sup>	Guard Cartridge	10 × 10 mm	<a href="#">186007285</a>
10 × 50 mm	OBD Column	<a href="#">186008236</a>	OBD Column	10 × 50 mm	<a href="#">186008268</a>
10 × 100 mm	OBD Column	<a href="#">186008237</a>	OBD Column	10 × 100 mm	<a href="#">186008269</a>
10 × 150 mm	OBD Column	<a href="#">186008238</a>	OBD Column	10 × 150 mm	<a href="#">186008270</a>
10 × 250 mm	OBD Column	<a href="#">186008239</a>	OBD Column	10 × 250 mm	<a href="#">186008271</a>
19 × 10 mm	Guard Cartridge	<a href="#">186005418</a> <sup>2</sup>	Guard Cartridge	19 × 10 mm	<a href="#">186007290</a>
19 × 50 mm	OBD Column	<a href="#">186005420</a>	OBD Column	19 × 50 mm	<a href="#">186007291</a>
19 × 100 mm	OBD Column	<a href="#">186005421</a>	OBD Column	19 × 100 mm	<a href="#">186007292</a>
19 × 150 mm	OBD Column	<a href="#">186005422</a>	OBD Column	19 × 150 mm	<a href="#">186007293</a>
19 × 250 mm	OBD Column	<a href="#">186005492</a>	OBD Column	19 × 250 mm	<a href="#">186007294</a>
30 × 10 mm	Guard Cartridge	<a href="#">186006899</a> <sup>3</sup>	Guard Cartridge	30 × 10 mm	<a href="#">186007295</a>
30 × 50 mm	OBD Column	<a href="#">186005423</a>	OBD Column	30 × 50 mm	<a href="#">186007296</a>
30 × 75 mm	OBD Column	<a href="#">186005424</a>	OBD Column	30 × 75 mm	<a href="#">186007297</a>
30 × 100 mm	OBD Column	<a href="#">186005425</a>	OBD Column	30 × 100 mm	<a href="#">186007298</a>
30 × 150 mm	OBD Column	<a href="#">186005426</a>	OBD Column	30 × 150 mm	<a href="#">186007299</a>
30 × 250 mm	OBD Column	<a href="#">186005493</a>	OBD Column	30 × 250 mm	<a href="#">186007300</a>
50 × 50 mm	OBD Column	<a href="#">186005494</a>	OBD Column	50 × 50 mm	<a href="#">186007301</a>
50 × 100 mm	OBD Column	<a href="#">186005495</a>	OBD Column	50 × 100 mm	<a href="#">186007302</a>
50 × 150 mm	OBD Column	<a href="#">186005496</a>	OBD Column	50 × 150 mm	<a href="#">186007303</a>
50 × 250 mm	OBD Column	<a href="#">186005497</a>	OBD Column	50 × 250 mm	<a href="#">186007304</a>

<sup>1</sup> Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup> Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

XSelect Columns *Continued*

CSH Fluoro-Phenyl	ANALYTICAL COLUMNS						
	Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006112</a>	<a href="#">176002602</a>	2.1 × 50 mm	<a href="#">186005310</a>	2.1 × 50 mm	<a href="#">186005329</a>	
2.1 × 50 mm <i>XP</i>	<a href="#">186006113</a>	<a href="#">176002603</a>	2.1 × 75 mm	<a href="#">186005646</a>	2.1 × 100 mm	<a href="#">186005330</a>	
2.1 × 75 mm <i>XP</i>	<a href="#">186006114</a>	<a href="#">176002604</a>	2.1 × 100 mm	<a href="#">186005311</a>	2.1 × 150 mm	<a href="#">186005331</a>	
2.1 × 100 mm <i>XP</i>	<a href="#">186006115</a>	<a href="#">176002605</a>	2.1 × 150 mm	<a href="#">186005312</a>	3.0 × 50 mm	<a href="#">186005335</a>	
2.1 × 150 mm <i>XP</i>	<a href="#">186006730</a>	<a href="#">176002893</a>	3.0 × 50 mm	<a href="#">186005316</a>	3.0 × 100 mm	<a href="#">186005336</a>	
3.0 × 30 mm <i>XP</i>	<a href="#">186006116</a>	<a href="#">176002606</a>	3.0 × 75 mm	<a href="#">186005649</a>	3.0 × 150 mm	<a href="#">186005337</a>	
3.0 × 50 mm <i>XP</i>	<a href="#">186006117</a>	<a href="#">176002607</a>	3.0 × 100 mm	<a href="#">186005317</a>	3.0 × 250 mm	<a href="#">186005338</a>	
3.0 × 75 mm <i>XP</i>	<a href="#">186006118</a>	<a href="#">176002608</a>	3.0 × 150 mm	<a href="#">186005318</a>	4.6 × 50 mm	<a href="#">186005342</a>	
3.0 × 100 mm <i>XP</i>	<a href="#">186006119</a>	<a href="#">176002609</a>	4.6 × 50 mm	<a href="#">186005322</a>	4.6 × 75 mm	<a href="#">186005343</a>	
3.0 × 150 mm <i>XP</i>	<a href="#">186006731</a>	<a href="#">176002894</a>	4.6 × 75 mm	<a href="#">186005323</a>	4.6 × 100 mm	<a href="#">186005344</a>	
4.6 × 30 mm <i>XP</i>	<a href="#">186006120</a>	—	4.6 × 100 mm	<a href="#">186005324</a>	4.6 × 150 mm	<a href="#">186005345</a>	
4.6 × 50 mm <i>XP</i>	<a href="#">186006121</a>	—	4.6 × 150 mm	<a href="#">186005325</a>	4.6 × 250 mm	<a href="#">186005346</a>	
4.6 × 75 mm <i>XP</i>	<a href="#">186006122</a>	—					
4.6 × 100 mm <i>XP</i>	<a href="#">186006123</a>	—					
4.6 × 150 mm <i>XP</i>	<a href="#">186006732</a>	—					

PREPARATIVE COLUMNS		
Particle Size: 5 µm		
Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186005498</a> <sup>1</sup>
10 × 50 mm	OBD Column	<a href="#">186008240</a>
10 × 100 mm	OBD Column	<a href="#">186008241</a>
10 × 150 mm	OBD Column	<a href="#">186008242</a>
10 × 250 mm	OBD Column	<a href="#">186008243</a>
19 × 10 mm	Guard Cartridge	<a href="#">186005431</a> <sup>2</sup>
19 × 50 mm	OBD Column	<a href="#">186005433</a>
19 × 100 mm	OBD Column	<a href="#">186005434</a>
19 × 150 mm	OBD Column	<a href="#">186005435</a>
19 × 250 mm	OBD Column	<a href="#">186005499</a>
30 × 10 mm	Guard Cartridge	<a href="#">186006900</a> <sup>3</sup>
30 × 50 mm	OBD Column	<a href="#">186005436</a>
30 × 75 mm	OBD Column	<a href="#">186005437</a>
30 × 100 mm	OBD Column	<a href="#">186005438</a>
30 × 150 mm	OBD Column	<a href="#">186005439</a>
30 × 250 mm	OBD Column	<a href="#">186005500</a>
50 × 50 mm	OBD Column	<a href="#">186005501</a>
50 × 100 mm	OBD Column	<a href="#">186005502</a>
50 × 150 mm	OBD Column	<a href="#">186005503</a>
50 × 250 mm	OBD Column	<a href="#">186005504</a>

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).



XSelect Columns *Continued*

CSH Phenyl-Hexyl	ANALYTICAL COLUMNS					
	Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm
	Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension
2.1 × 30 mm <i>XP</i>	<a href="#">186006124</a>	<a href="#">176002610</a>	2.1 × 50 mm	<a href="#">186005365</a>	2.1 × 50 mm	<a href="#">186005384</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006125</a>	<a href="#">176002611</a>	2.1 × 75 mm	<a href="#">186005645</a>	2.1 × 100 mm	<a href="#">186005385</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006126</a>	<a href="#">176002612</a>	2.1 × 100 mm	<a href="#">186005366</a>	2.1 × 150 mm	<a href="#">186005386</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006127</a>	<a href="#">176002613</a>	2.1 × 150 mm	<a href="#">186005367</a>	3.0 × 50 mm	<a href="#">186005390</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006733</a>	<a href="#">176002895</a>	3.0 × 50 mm	<a href="#">186005371</a>	3.0 × 100 mm	<a href="#">186005391</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006128</a>	<a href="#">176002614</a>	3.0 × 75 mm	<a href="#">186005648</a>	3.0 × 150 mm	<a href="#">186005392</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006129</a>	<a href="#">176002615</a>	3.0 × 100 mm	<a href="#">186005372</a>	3.0 × 250 mm	<a href="#">186005393</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006130</a>	<a href="#">176002616</a>	3.0 × 150 mm	<a href="#">186005373</a>	4.6 × 50 mm	<a href="#">186005397</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006131</a>	<a href="#">176002617</a>	4.6 × 50 mm	<a href="#">186005377</a>	4.6 × 75 mm	<a href="#">186005398</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006734</a>	<a href="#">176002896</a>	4.6 × 75 mm	<a href="#">186005378</a>	4.6 × 100 mm	<a href="#">186005399</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006132</a>	—	4.6 × 100 mm	<a href="#">186005379</a>	4.6 × 150 mm	<a href="#">186005400</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006133</a>	—	4.6 × 150 mm	<a href="#">186005380</a>	4.6 × 250 mm	<a href="#">186005401</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006134</a>	—				
4.6 × 100 mm <i>XP</i>	<a href="#">186006135</a>	—				
4.6 × 150 mm <i>XP</i>	<a href="#">186006735</a>	—				

PREPARATIVE COLUMNS		
Particle Size: 5 µm		
Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186005505</a> <sup>1</sup>
10 × 50 mm	OBD Column	<a href="#">186008244</a>
10 × 100 mm	OBD Column	<a href="#">186008245</a>
10 × 150 mm	OBD Column	<a href="#">186008246</a>
10 × 250 mm	OBD Column	<a href="#">186008247</a>
19 × 10 mm	Guard Cartridge	<a href="#">186005444</a> <sup>2</sup>
19 × 50 mm	OBD Column	<a href="#">186005446</a>
19 × 100 mm	OBD Column	<a href="#">186005447</a>
19 × 150 mm	OBD Column	<a href="#">186005448</a>
19 × 250 mm	OBD Column	<a href="#">186005506</a>
30 × 10 mm	Guard Cartridge	<a href="#">186006901</a> <sup>3</sup>
30 × 50 mm	OBD Column	<a href="#">186005520</a>
30 × 75 mm	OBD Column	<a href="#">186005450</a>
30 × 100 mm	OBD Column	<a href="#">186005451</a>
30 × 150 mm	OBD Column	<a href="#">186005452</a>
30 × 250 mm	OBD Column	<a href="#">186005507</a>
50 × 50 mm	OBD Column	<a href="#">186005508</a>
50 × 100 mm	OBD Column	<a href="#">186005509</a>
50 × 150 mm	OBD Column	<a href="#">186005510</a>
50 × 250 mm	OBD Column	<a href="#">186005511</a>

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

XSelect Columns *Continued*

HSS C <sub>18</sub> ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006136</a>	<a href="#">176002618</a>	2.1 × 30 mm	<a href="#">186006380</a>	2.1 × 50 mm	<a href="#">186006391</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006137</a>	<a href="#">176002619</a>	2.1 × 50 mm	<a href="#">186006381</a>	2.1 × 100 mm	<a href="#">186006392</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006138</a>	<a href="#">176002620</a>	2.1 × 75 mm	<a href="#">186006382</a>	2.1 × 150 mm	<a href="#">186006393</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006139</a>	<a href="#">176002621</a>	2.1 × 100 mm	<a href="#">186006383</a>	3.0 × 50 mm	<a href="#">186006396</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006736</a>	<a href="#">176002897</a>	2.1 × 150 mm	<a href="#">186006384</a>	3.0 × 100 mm	<a href="#">186006397</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006140</a>	<a href="#">176002622</a>	3.0 × 30 mm	<a href="#">186004765</a>	3.0 × 150 mm	<a href="#">186006398</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006141</a>	<a href="#">176002623</a>	3.0 × 50 mm	<a href="#">186004766</a>	3.0 × 250 mm	<a href="#">186006399</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006142</a>	<a href="#">176002624</a>	3.0 × 75 mm	<a href="#">186005642</a>	4.6 × 50 mm	<a href="#">186004852</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006143</a>	<a href="#">176002625</a>	3.0 × 100 mm	<a href="#">186004762</a>	4.6 × 75 mm	<a href="#">186006402</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006737</a>	<a href="#">176002898</a>	3.0 × 150 mm	<a href="#">186004763</a>	4.6 × 100 mm	<a href="#">186006403</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006144</a>	—	4.6 × 50 mm	<a href="#">186004772</a>	4.6 × 150 mm	<a href="#">186004773</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006145</a>	—	4.6 × 75 mm	<a href="#">186006387</a>	4.6 × 250 mm	<a href="#">186004775</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006146</a>	—	4.6 × 100 mm	<a href="#">186004767</a>		
4.6 × 100 mm <i>XP</i>	<a href="#">186006147</a>	—	4.6 × 150 mm	<a href="#">186004768</a>		
4.6 × 150 mm <i>XP</i>	<a href="#">186006738</a>	—	4.6 × 250 mm	<a href="#">186004770</a>		

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 5 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186004776</a> <sup>1</sup>	10 × 100 mm	OBD Column	<a href="#">186008223</a>
10 × 50 mm	OBD Column	<a href="#">186008222</a>	10 × 150 mm	OBD Column	<a href="#">186008224</a>

HSS C <sub>18</sub> SB ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006160</a>	<a href="#">176002634</a>	2.1 × 50 mm	<a href="#">186006422</a>	2.1 × 50 mm	<a href="#">186006432</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006161</a>	<a href="#">176002635</a>	2.1 × 75 mm	<a href="#">186006423</a>	2.1 × 100 mm	<a href="#">186006433</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006162</a>	<a href="#">176002636</a>	2.1 × 100 mm	<a href="#">186006424</a>	2.1 × 150 mm	<a href="#">186006434</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006163</a>	<a href="#">176002637</a>	2.1 × 150 mm	<a href="#">186006425</a>	3.0 × 50 mm	<a href="#">186006437</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006742</a>	<a href="#">176002901</a>	3.0 × 50 mm	<a href="#">186004747</a>	3.0 × 100 mm	<a href="#">186006438</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006164</a>	<a href="#">176002638</a>	3.0 × 75 mm	<a href="#">186005643</a>	3.0 × 150 mm	<a href="#">186006439</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006165</a>	<a href="#">176002639</a>	3.0 × 100 mm	<a href="#">186004743</a>	3.0 × 250 mm	<a href="#">186006440</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006166</a>	<a href="#">176002640</a>	3.0 × 150 mm	<a href="#">186004744</a>	4.6 × 50 mm	<a href="#">186004757</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006167</a>	<a href="#">176002641</a>	4.6 × 50 mm	<a href="#">186004753</a>	4.6 × 75 mm	<a href="#">186006443</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006743</a>	<a href="#">176002902</a>	4.6 × 75 mm	<a href="#">186006428</a>	4.6 × 100 mm	<a href="#">186006444</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006168</a>	—	4.6 × 100 mm	<a href="#">186004748</a>	4.6 × 150 mm	<a href="#">186004754</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006169</a>	—	4.6 × 150 mm	<a href="#">186004749</a>	4.6 × 250 mm	<a href="#">186004756</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006170</a>	—	4.6 × 250 mm	<a href="#">186004751</a>		
4.6 × 100 mm <i>XP</i>	<a href="#">186006171</a>	—				
4.6 × 150 mm <i>XP</i>	<a href="#">186006744</a>	—				

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 5 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186004758</a> <sup>1</sup>	10 × 100 mm	OBD Column	<a href="#">186008220</a>
10 × 50 mm	OBD Column	<a href="#">186008219</a>	10 × 150 mm	OBD Column	<a href="#">186008221</a>

<sup>1</sup> Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).  
<sup>2</sup> Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).  
<sup>3</sup> Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

XSelect Columns *Continued*

HSS T3						
ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006148</a>	<a href="#">176002626</a>	1.0 × 100 mm	<a href="#">186006459</a>	2.1 × 50 mm	<a href="#">186006473</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006149</a>	<a href="#">176002627</a>	1.0 × 150 mm	<a href="#">186006460</a>	2.1 × 100 mm	<a href="#">186006474</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006150</a>	<a href="#">176002628</a>	2.1 × 30 mm	<a href="#">186006462</a>	2.1 × 150 mm	<a href="#">186006475</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006151</a>	<a href="#">176002629</a>	2.1 × 50 mm	<a href="#">186006463</a>	3.0 × 50 mm	<a href="#">186006478</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006739</a>	<a href="#">176002899</a>	2.1 × 75 mm	<a href="#">186006464</a>	3.0 × 100 mm	<a href="#">186006479</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006152</a>	<a href="#">176002630</a>	2.1 × 100 mm	<a href="#">186006465</a>	3.0 × 150 mm	<a href="#">186006480</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006153</a>	<a href="#">176002631</a>	2.1 × 150 mm	<a href="#">186006466</a>	3.0 × 250 mm	<a href="#">186006481</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006154</a>	<a href="#">176002632</a>	3.0 × 30 mm	<a href="#">186004783</a>	4.6 × 50 mm	<a href="#">186004794</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006155</a>	<a href="#">176002633</a>	3.0 × 50 mm	<a href="#">186004784</a>	4.6 × 75 mm	<a href="#">186006484</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006740</a>	<a href="#">176002900</a>	3.0 × 75 mm	<a href="#">186005641</a>	4.6 × 100 mm	<a href="#">186006485</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006156</a>	—	3.0 × 100 mm	<a href="#">186004780</a>	4.6 × 150 mm	<a href="#">186004791</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006157</a>	—	3.0 × 150 mm	<a href="#">186004781</a>	4.6 × 250 mm	<a href="#">186004793</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006158</a>	—	4.6 × 50 mm	<a href="#">186004790</a>		
4.6 × 100 mm <i>XP</i>	<a href="#">186006159</a>	—	4.6 × 75 mm	<a href="#">186006469</a>		
4.6 × 150 mm <i>XP</i>	<a href="#">186006741</a>	—	4.6 × 100 mm	<a href="#">186004785</a>		
			4.6 × 150 mm	<a href="#">186004786</a>		
			4.6 × 250 mm	<a href="#">186004788</a>		

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 5 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186004795</a> <sup>1</sup>	10 × 150 mm	OBD Column	<a href="#">186008227</a>
10 × 50 mm	OBD Column	<a href="#">186008225</a>	10 × 250 mm	OBD Column	<a href="#">186008280</a>
10 × 100 mm	OBD Column	<a href="#">186008226</a>			

HSS PFP						
ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006172</a>	<a href="#">176002642</a>	2.1 × 50 mm	<a href="#">186005847</a>	2.1 × 50 mm	<a href="#">186005869</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006173</a>	<a href="#">176002643</a>	2.1 × 75 mm	<a href="#">186005848</a>	2.1 × 100 mm	<a href="#">186005871</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006174</a>	<a href="#">176002644</a>	2.1 × 100 mm	<a href="#">186005849</a>	2.1 × 150 mm	<a href="#">186005872</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006175</a>	<a href="#">176002645</a>	2.1 × 150 mm	<a href="#">186005850</a>	3.0 × 50 mm	<a href="#">186005875</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006745</a>	<a href="#">176002903</a>	3.0 × 30 mm	<a href="#">186005852</a>	3.0 × 100 mm	<a href="#">186005877</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006176</a>	<a href="#">176002646</a>	3.0 × 50 mm	<a href="#">186005853</a>	3.0 × 150 mm	<a href="#">186005878</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006177</a>	<a href="#">176002647</a>	3.0 × 75 mm	<a href="#">186005854</a>	3.0 × 250 mm	<a href="#">186005879</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006178</a>	<a href="#">176002648</a>	3.0 × 100 mm	<a href="#">186005855</a>	4.6 × 50 mm	<a href="#">186005882</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006179</a>	<a href="#">176002649</a>	3.0 × 150 mm	<a href="#">186005856</a>	4.6 × 75 mm	<a href="#">186005883</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006746</a>	<a href="#">176002904</a>	4.6 × 50 mm	<a href="#">186005859</a>	4.6 × 100 mm	<a href="#">186005884</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006180</a>	—	4.6 × 75 mm	<a href="#">186005860</a>	4.6 × 150 mm	<a href="#">186005885</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006181</a>	—	4.6 × 100 mm	<a href="#">186005861</a>	4.6 × 250 mm	<a href="#">186005886</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006182</a>	—	4.6 × 150 mm	<a href="#">186005862</a>		
4.6 × 100 mm <i>XP</i>	<a href="#">186006183</a>	—	4.6 × 250 mm	<a href="#">186005863</a>		
4.6 × 150 mm <i>XP</i>	<a href="#">186006747</a>	—				

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

XSelect Columns *Continued*

HSS CN ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006184</a>	<a href="#">176002650</a>	2.1 × 50 mm	<a href="#">186005907</a>	2.1 × 50 mm	<a href="#">186005929</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006185</a>	<a href="#">176002651</a>	2.1 × 75 mm	<a href="#">186005908</a>	2.1 × 100 mm	<a href="#">186005931</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006186</a>	<a href="#">176002652</a>	2.1 × 100 mm	<a href="#">186005909</a>	2.1 × 150 mm	<a href="#">186005932</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006187</a>	<a href="#">176002653</a>	2.1 × 150 mm	<a href="#">186005910</a>	3.0 × 50 mm	<a href="#">186005935</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006748</a>	<a href="#">176002905</a>	3.0 × 50 mm	<a href="#">186005913</a>	3.0 × 100 mm	<a href="#">186005937</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006188</a>	<a href="#">176002654</a>	3.0 × 75 mm	<a href="#">186005914</a>	3.0 × 150 mm	<a href="#">186005938</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006189</a>	<a href="#">176002655</a>	3.0 × 100 mm	<a href="#">186005915</a>	3.0 × 250 mm	<a href="#">186005939</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006190</a>	<a href="#">176002656</a>	3.0 × 150 mm	<a href="#">186005916</a>	4.6 × 50 mm	<a href="#">186005942</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006191</a>	<a href="#">176002657</a>	4.6 × 50 mm	<a href="#">186005919</a>	4.6 × 75 mm	<a href="#">186005943</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006749</a>	<a href="#">176002906</a>	4.6 × 75 mm	<a href="#">186005920</a>	4.6 × 100 mm	<a href="#">186005944</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006192</a>	—	4.6 × 100 mm	<a href="#">186005921</a>	4.6 × 150 mm	<a href="#">186005945</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006193</a>	—	4.6 × 150 mm	<a href="#">186005922</a>	4.6 × 250 mm	<a href="#">186005946</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006194</a>	—	4.6 × 250 mm	<a href="#">186005923</a>		
4.6 × 100 mm <i>XP</i>	<a href="#">186006195</a>	—				
4.6 × 150 mm <i>XP</i>	<a href="#">186006750</a>	—				

Peptide CSH C <sub>18</sub> 130 Å ANALYTICAL COLUMNS					
Particle Size: 2.5 µm			Particle Size: 3.5 µm		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
2.1 × 50 mm <i>XP</i>	<a href="#">186006941</a>		2.1 × 50 mm	<a href="#">186006950</a>	
2.1 × 100 mm <i>XP</i>	<a href="#">186006942</a>		2.1 × 100 mm	<a href="#">186006951</a>	
2.1 × 150 mm <i>XP</i>	<a href="#">186006943</a>		2.1 × 150 mm	<a href="#">186006952</a>	
4.6 × 50 mm <i>XP</i>	<a href="#">186006946</a>		4.6 × 50 mm	<a href="#">186006955</a>	
4.6 × 100 mm <i>XP</i>	<a href="#">186006947</a>		4.6 × 100 mm	<a href="#">186006956</a>	
4.6 × 150 mm <i>XP</i>	<a href="#">186007038</a>		4.6 × 150 mm	<a href="#">186006957</a>	

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 5 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
4.6 × 50 mm	Column	<a href="#">186007076</a> <sup>4</sup>	19 × 250 mm	OBD Column	<a href="#">186007031</a>
4.6 × 100 mm	Column	<a href="#">186007077</a> <sup>4</sup>	30 × 50 mm	OBD Column	<a href="#">186007026</a>
4.6 × 150 mm	Column	<a href="#">186007078</a> <sup>4</sup>	30 × 100 mm	OBD Column	<a href="#">186007025</a>
10 × 10 mm	Guard	<a href="#">186007015</a> <sup>1</sup>	30 × 150 mm	OBD Column	<a href="#">186007023</a>
10 × 50 mm	OBD Column	<a href="#">186008264</a>	30 × 250 mm	OBD Column	<a href="#">186007024</a>
10 × 100 mm	OBD Column	<a href="#">186008265</a>	50 × 50 mm	OBD Column	<a href="#">186007030</a>
10 × 150 mm	OBD Column	<a href="#">186008266</a>	50 × 100 mm	OBD Column	<a href="#">186007027</a>
10 × 250 mm	OBD Column	<a href="#">186008267</a>	50 × 150 mm	OBD Column	<a href="#">186007028</a>
19 × 10 mm	Guard	<a href="#">186007019</a> <sup>3</sup>	50 × 250 mm	OBD Column	<a href="#">186007029</a>
19 × 50 mm	OBD Column	<a href="#">186007022</a>			
19 × 100 mm	OBD Column	<a href="#">186007020</a>			
19 × 150 mm	OBD Column	<a href="#">186007021</a>			

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>3</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>4</sup>For use in developing lab-scale preparative chromatography.

XSelect Columns Method Validation Kits\*

	Particle Size: 2.5 $\mu$ m		Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>CSH C<sub>18</sub></b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006233</a>	2.1 $\times$ 100 mm	<a href="#">186005538</a>	2.1 $\times$ 150 mm	<a href="#">186005543</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006234</a>	3.0 $\times$ 100 mm	<a href="#">186005539</a>	3.0 $\times$ 100 mm	186005544
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006785</a>	3.0 $\times$ 150 mm	<a href="#">186005540</a>	3.0 $\times$ 150 mm	<a href="#">186005545</a>
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006235</a>	4.6 $\times$ 100 mm	<a href="#">186005541</a>	4.6 $\times$ 100 mm	<a href="#">186005546</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006236</a>	4.6 $\times$ 150 mm	<a href="#">186005542</a>	4.6 $\times$ 150 mm	<a href="#">186005547</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006786</a>			4.6 $\times$ 250 mm	<a href="#">186005548</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006237</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006238</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006787</a>				
<b>CSH Fluoro-Phenyl</b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006239</a>	2.1 $\times$ 100 mm	<a href="#">186005549</a>	2.1 $\times$ 150 mm	<a href="#">186005554</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006240</a>	3.0 $\times$ 100 mm	186005550	3.0 $\times$ 100 mm	186005555
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006788</a>	3.0 $\times$ 150 mm	186005551	3.0 $\times$ 150 mm	<a href="#">186005556</a>
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006241</a>	4.6 $\times$ 100 mm	<a href="#">186005552</a>	4.6 $\times$ 100 mm	<a href="#">186005557</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006242</a>	4.6 $\times$ 150 mm	<a href="#">186005553</a>	4.6 $\times$ 150 mm	<a href="#">186005558</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006789</a>			4.6 $\times$ 250 mm	<a href="#">186005559</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006243</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006244</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006790</a>				
<b>CSH Phenyl-Hexyl</b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006245</a>	2.1 $\times$ 100 mm	<a href="#">186005560</a>	2.1 $\times$ 150 mm	<a href="#">186005565</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006246</a>	3.0 $\times$ 100 mm	<a href="#">186005561</a>	3.0 $\times$ 100 mm	186005566
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006791</a>	3.0 $\times$ 150 mm	<a href="#">186005562</a>	3.0 $\times$ 150 mm	186005567
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006247</a>	4.6 $\times$ 100 mm	<a href="#">186005563</a>	4.6 $\times$ 100 mm	<a href="#">186005568</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006248</a>	4.6 $\times$ 150 mm	<a href="#">186005564</a>	4.6 $\times$ 150 mm	<a href="#">186005569</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006792</a>			4.6 $\times$ 250 mm	<a href="#">186005570</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006249</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006250</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006793</a>				
<b>Peptide CSH C<sub>18</sub></b>	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006945</a>	2.1 $\times$ 100 mm	<a href="#">186006953</a>		
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006966</a>	4.6 $\times$ 100 mm	<a href="#">186006959</a>		

\*Each Method Validation Kit contains 3 columns, each from a different batch.

XSelect Columns Method Validation Kits\* *Continued*

	Particle Size: 2.5 $\mu$ m		Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>HSS C<sub>18</sub></b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006251</a>	2.1 $\times$ 100 mm	<a href="#">186006406</a>	2.1 $\times$ 150 mm	<a href="#">186006411</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006252</a>	3.0 $\times$ 100 mm	186006407	3.0 $\times$ 100 mm	186006412
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006794</a>	3.0 $\times$ 150 mm	186006408	3.0 $\times$ 150 mm	186006413
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006253</a>	4.6 $\times$ 100 mm	<a href="#">186006409</a>	4.6 $\times$ 100 mm	<a href="#">186006414</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006254</a>	4.6 $\times$ 150 mm	<a href="#">186006410</a>	4.6 $\times$ 150 mm	<a href="#">186006415</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006795</a>			4.6 $\times$ 250 mm	<a href="#">186006416</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006255</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006256</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006796</a>				
<b>HSS C<sub>18</sub> SB</b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006263</a>	2.1 $\times$ 100 mm	<a href="#">186006447</a>	2.1 $\times$ 150 mm	<a href="#">186006452</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006264</a>	3.0 $\times$ 100 mm	186006448	3.0 $\times$ 100 mm	186006453
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006800</a>	3.0 $\times$ 150 mm	<a href="#">186006449</a>	3.0 $\times$ 150 mm	186006454
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006265</a>	4.6 $\times$ 100 mm	<a href="#">186006450</a>	4.6 $\times$ 100 mm	<a href="#">186006455</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006266</a>	4.6 $\times$ 150 mm	<a href="#">186006451</a>	4.6 $\times$ 150 mm	<a href="#">186006456</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006801</a>			4.6 $\times$ 250 mm	<a href="#">186006457</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006267</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006268</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006802</a>				
<b>HSS T3</b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006257</a>	2.1 $\times$ 100 mm	<a href="#">186006488</a>	2.1 $\times$ 150 mm	<a href="#">186006493</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006258</a>	3.0 $\times$ 100 mm	<a href="#">186006489</a>	3.0 $\times$ 100 mm	186006494
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006797</a>	3.0 $\times$ 150 mm	<a href="#">186006490</a>	3.0 $\times$ 150 mm	186006495
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006259</a>	4.6 $\times$ 100 mm	<a href="#">186006491</a>	4.6 $\times$ 100 mm	<a href="#">186006496</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006260</a>	4.6 $\times$ 150 mm	<a href="#">186006492</a>	4.6 $\times$ 150 mm	<a href="#">186006497</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006798</a>			4.6 $\times$ 250 mm	<a href="#">186006498</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006261</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006262</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006799</a>				
<b>HSS PFP</b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006815</a>	2.1 $\times$ 100 mm	<a href="#">186005890</a>	2.1 $\times$ 150 mm	186005895
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006816</a>	3.0 $\times$ 100 mm	186005891	3.0 $\times$ 100 mm	186005896
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006803</a>	3.0 $\times$ 150 mm	186005892	3.0 $\times$ 150 mm	186005897
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006817</a>	4.6 $\times$ 100 mm	186005893	4.6 $\times$ 100 mm	<a href="#">186005898</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006818</a>	4.6 $\times$ 150 mm	<a href="#">186005894</a>	4.6 $\times$ 150 mm	<a href="#">186005899</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006804</a>			4.6 $\times$ 250 mm	<a href="#">186005900</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006273</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006274</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006805</a>				

\*Each Method Validation Kit contains 3 columns, each from a different batch.

XSelect Columns Method Validation Kits\* *Continued*

	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>HSS CN</b>	2.1 × 50 mm <i>XP</i>	<a href="#">186006275</a>	2.1 × 100 mm	<a href="#">186005950</a>	2.1 × 150 mm	<a href="#">186005955</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006276</a>	3.0 × 100 mm	<a href="#">186005951</a>	3.0 × 100 mm	<a href="#">186005956</a>
	2.1 × 150 mm <i>XP</i>	<a href="#">186006806</a>	3.0 × 150 mm	<a href="#">186005952</a>	3.0 × 150 mm	<a href="#">186005957</a>
	3.0 × 50 mm <i>XP</i>	<a href="#">186006277</a>	4.6 × 100 mm	<a href="#">186005953</a>	4.6 × 100 mm	<a href="#">186005958</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006278</a>	4.6 × 150 mm	<a href="#">186005954</a>	4.6 × 150 mm	<a href="#">186005959</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006807</a>			4.6 × 250 mm	<a href="#">186005960</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006279</a>				
	4.6 × 100 mm <i>XP</i>	<a href="#">186006280</a>				
	4.6 × 150 mm <i>XP</i>	<a href="#">186006808</a>				

\*Each Method Validation Kit contains 3 columns, each from a different batch.

XSelect VanGuard Cartridges\*

	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>CSH C<sub>18</sub></b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007817</a>	2.1 × 5 mm	<a href="#">186007811</a>	2.1 × 5 mm	<a href="#">186007814</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007819</a>	3.9 × 5 mm	<a href="#">186007813</a>	3.9 × 5 mm	<a href="#">186007816</a>
<b>CSH Fluoro-Phenyl</b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007827</a>	2.1 × 5 mm	<a href="#">186007820</a>	2.1 × 5 mm	<a href="#">186007824</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007829</a>	3.9 × 5 mm	<a href="#">186007822</a>	3.9 × 5 mm	<a href="#">186007826</a>
<b>CSH Phenyl-Hexyl</b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007839</a>	2.1 × 5 mm	<a href="#">186007830</a>	2.1 × 5 mm	<a href="#">186007836</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007841</a>	3.9 × 5 mm	<a href="#">186007832</a>	3.9 × 5 mm	<a href="#">186007838</a>
<b>HSS C<sub>18</sub></b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007857</a>	2.1 × 5 mm	<a href="#">186007851</a>	2.1 × 5 mm	<a href="#">186007854</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007859</a>	3.9 × 5 mm	<a href="#">186007853</a>	3.9 × 5 mm	<a href="#">186007856</a>
<b>HSS C<sub>18</sub> SB</b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007848</a>	2.1 × 5 mm	<a href="#">186007842</a>	2.1 × 5 mm	<a href="#">186007845</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007850</a>	3.9 × 5 mm	<a href="#">186007844</a>	3.9 × 5 mm	<a href="#">186007847</a>
<b>HSS T3</b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007884</a>	2.1 × 5 mm	<a href="#">186007878</a>	2.1 × 5 mm	<a href="#">186007881</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007886</a>	3.9 × 5 mm	<a href="#">186007880</a>	3.9 × 5 mm	<a href="#">186007883</a>
<b>HSS PFP</b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007875</a>	2.1 × 5 mm	<a href="#">186007869</a>	2.1 × 5 mm	<a href="#">186007872</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007877</a>	3.9 × 5 mm	<a href="#">186007871</a>	3.9 × 5 mm	<a href="#">186007874</a>
<b>HSS CN</b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007866</a>	2.1 × 5 mm	<a href="#">186007860</a>	2.1 × 5 mm	<a href="#">186007863</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007868</a>	3.9 × 5 mm	<a href="#">186007862</a>	3.9 × 5 mm	<a href="#">186007865</a>

\*Each cartridge listed requires use of Universal VanGuard Cartridge Holder (Listed below, p/n [186007949](#))

Universal VanGuard Cartridge Holder

Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>

## Atlantis Columns

**Atlantis™**  
Columns

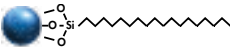
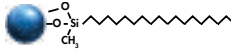

For polar compounds, Atlantis™ HPLC Columns provide exceptional performance, versatility, and retention when operating under reversed-phase conditions. The balanced retention of Atlantis Columns affords the separation of polar and non-polar analytes while providing:

- Compatibility with 100% aqueous mobile phases
- Polar-compound retention without ion-pairing reagents
- Long column life when used with mobile phases of low pH



**i** For Atlantis Premier BEH C<sub>18</sub> AX, and Atlantis Premier BEH Z-HILIC columns, please go to the MaxPeak Premier Column section found on page 104.

### Column Characteristics

	T3, 100 Å	dC <sub>18</sub> , 100 Å	HILIC Silica, 100 Å
	HPLC: 3, 5, 10 μm	HPLC: 3, 5, 10 μm	HPLC: 3, 5 μm
Ligand Benefit	Exceptional polar compound retention and balanced retention of acids, bases and neutrals. Aqueous mobile-phase compatibility, low MS bleed	General purpose, high efficiency, delivers balanced retention of acids, bases, and neutrals in mid-range pH conditions.	No ligand, general purpose separations of highly polar compounds for use in HILIC separations
Particle/Ligand			
Ligand Density*	1.6 μmol/m <sup>2</sup>	1.6 μmol/m <sup>2</sup>	N/A
Carbon Load*	14%	12%	N/A
Endcapped	Yes	Yes	No
USP Class No.	L1	L1	L3
pH Range	2-8	3-7	1-5
Temperature Limits	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
Surface Area*	330 m <sup>2</sup> /g	330 m <sup>2</sup> /g	330 m <sup>2</sup> /g
Performance Standards	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	HILIC QC Reference Material p/n: <a href="#">186007226</a>
Application Standards	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	HILIC QC Reference Material p/n: <a href="#">186007226</a>

\*Expected or approximate value.



**APPLICATION AREA:** Analyze Metabolites

"By using this column we can estimate seven compounds in a single injection."

**REVIEWER:** Suresh Babu Alaparathi

**ORGANIZATION:** West Virginia State University



## Ordering Information

### Atlantis Columns

ANALYTICAL COLUMNS			
Particle Size: 3 $\mu$ m		Particle Size: 5 $\mu$ m	
Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
1.0 $\times$ 50 mm	<a href="#">186003713</a>	2.1 $\times$ 30 mm	<a href="#">186003733</a>
1.0 $\times$ 150 mm	<a href="#">186003714</a>	2.1 $\times$ 50 mm	<a href="#">186003734</a>
2.1 $\times$ 20 mm /S	<a href="#">186003715</a>	2.1 $\times$ 100 mm	<a href="#">186003735</a>
2.1 $\times$ 30 mm	<a href="#">186003716</a>	2.1 $\times$ 150 mm	<a href="#">186003736</a>
2.1 $\times$ 50 mm	<a href="#">186003717</a>	3.0 $\times$ 50 mm	<a href="#">186003738</a>
2.1 $\times$ 75 mm	<a href="#">186005652</a>	3.0 $\times$ 100 mm	<a href="#">186003739</a>
2.1 $\times$ 100 mm	<a href="#">186003718</a>	3.0 $\times$ 150 mm	<a href="#">186003740</a>
2.1 $\times$ 150 mm	<a href="#">186003719</a>	3.0 $\times$ 250 mm	<a href="#">186003741</a>
3.0 $\times$ 50 mm	<a href="#">186003721</a>	4.6 $\times$ 50 mm	<a href="#">186003744</a>
3.0 $\times$ 75 mm	<a href="#">186005653</a>	4.6 $\times$ 75 mm	<a href="#">186003745</a>
3.0 $\times$ 100 mm	<a href="#">186003722</a>	4.6 $\times$ 100 mm	<a href="#">186003746</a>
3.0 $\times$ 150 mm	<a href="#">186003723</a>	4.6 $\times$ 150 mm	<a href="#">186003747</a>
4.6 $\times$ 50 mm	<a href="#">186003726</a>	4.6 $\times$ 250 mm	<a href="#">186003748</a>
4.6 $\times$ 75 mm	<a href="#">186003727</a>		
4.6 $\times$ 100 mm	<a href="#">186003728</a>		
4.6 $\times$ 150 mm	<a href="#">186003729</a>		

PREPARATIVE COLUMNS					
Particle Size: 5 $\mu$ m			Particle Size: 10 $\mu$ m		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 $\times$ 10 mm	Guard Cartridge	<a href="#">186003695</a> <sup>1</sup>	10 $\times$ 10 mm	Guard Cartridge	<a href="#">186003706</a> <sup>1</sup>
10 $\times$ 50 mm	OBD Column	<a href="#">186008202</a>	10 $\times$ 150 mm	OBD Column	<a href="#">186008206</a>
10 $\times$ 100 mm	OBD Column	<a href="#">186008203</a>	10 $\times$ 250 mm	OBD Column	<a href="#">186008207</a>
10 $\times$ 150 mm	OBD Column	<a href="#">186008204</a>	19 $\times$ 10 mm	Guard Cartridge	<a href="#">186003710</a> <sup>2</sup>
10 $\times$ 250 mm	OBD Column	<a href="#">186008205</a>	19 $\times$ 50 mm	OBD Column	<a href="#">186003707</a>
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186003699</a> <sup>2</sup>	19 $\times$ 150 mm	OBD Column	<a href="#">186003708</a>
19 $\times$ 50 mm	OBD Column	<a href="#">186003696</a>	19 $\times$ 250 mm	OBD Column	<a href="#">186003709</a>
19 $\times$ 100 mm	OBD Column	<a href="#">186003697</a>	30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006878</a> <sup>3</sup>
19 $\times$ 150 mm	OBD Column	<a href="#">186003698</a>	30 $\times$ 75 mm	OBD Column	<a href="#">186004712</a>
19 $\times$ 250 mm	OBD Column	<a href="#">186004026</a>	30 $\times$ 150 mm	OBD Column	<a href="#">186003711</a>
30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006879</a> <sup>3</sup>	30 $\times$ 250 mm	OBD Column	<a href="#">186003712</a>
30 $\times$ 50 mm	OBD Column	<a href="#">186003700</a>	50 $\times$ 50 mm	OBD Column	<a href="#">186004083</a>
30 $\times$ 75 mm	OBD Column	<a href="#">186003701</a>	50 $\times$ 100 mm	OBD Column	<a href="#">186004084</a>
30 $\times$ 100 mm	OBD Column	<a href="#">186003702</a>	50 $\times$ 150 mm	OBD Column	<a href="#">186004085</a>
30 $\times$ 150 mm	OBD Column	<a href="#">186003703</a>	50 $\times$ 250 mm	OBD Column	<a href="#">186004086</a>
50 $\times$ 50 mm	OBD Column	<a href="#">186004080</a>			
50 $\times$ 100 mm	OBD Column	<a href="#">186004081</a>			
50 $\times$ 150 mm	OBD Column	<a href="#">186004082</a>			

<sup>1</sup> Requires 10  $\times$  10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup> Requires 30  $\times$  10 mm Prep Guard Holder, p/n: [186006912](#).

Atlantis Columns *Continued*

ANALYTICAL COLUMNS					
Particle Size: 3 $\mu$ m			Particle Size: 5 $\mu$ m		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
2.1 $\times$ 30 mm	<a href="#">186001287</a>		2.1 $\times$ 50 mm	<a href="#">186001293</a>	
2.1 $\times$ 50 mm	<a href="#">186001291</a>		2.1 $\times$ 100 mm	<a href="#">186001297</a>	
2.1 $\times$ 100 mm	<a href="#">186001295</a>		2.1 $\times$ 150 mm	<a href="#">186001301</a>	
2.1 $\times$ 150 mm	<a href="#">186001299</a>		3.0 $\times$ 100 mm	<a href="#">186001305</a>	
3.0 $\times$ 50 mm	<a href="#">186001389</a>		3.0 $\times$ 150 mm	<a href="#">186001309</a>	
3.0 $\times$ 100 mm	<a href="#">186001303</a>		3.0 $\times$ 250 mm	<a href="#">186001311</a>	
3.0 $\times$ 150 mm	<a href="#">186001307</a>		3.9 $\times$ 150 mm	<a href="#">186001319</a>	
3.9 $\times$ 100 mm	<a href="#">186001393</a>		4.6 $\times$ 50 mm	<a href="#">186001331</a>	
3.9 $\times$ 150 mm	<a href="#">186001317</a>		4.6 $\times$ 75 mm	<a href="#">186001335</a>	
4.6 $\times$ 50 mm	<a href="#">186001329</a>		4.6 $\times$ 100 mm	<a href="#">186001340</a>	
4.6 $\times$ 75 mm	<a href="#">186001333</a>		4.6 $\times$ 150 mm	<a href="#">186001344</a>	
4.6 $\times$ 100 mm	<a href="#">186001337</a>		4.6 $\times$ 250 mm	<a href="#">186001346</a>	
4.6 $\times$ 150 mm	<a href="#">186001342</a>				

PREPARATIVE COLUMNS					
Particle Size: 5 $\mu$ m			Particle Size: 10 $\mu$ m		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 $\times$ 10 mm	Guard Cartridge	<a href="#">186002300</a> <sup>1</sup>	10 $\times$ 10 mm	Guard Cartridge	<a href="#">186002452</a> <sup>1</sup>
10 $\times$ 50 mm	OBD Column	<a href="#">186008146</a>	10 $\times$ 150 mm	OBD Column	<a href="#">186008149</a>
10 $\times$ 100 mm	OBD Column	<a href="#">186008148</a>	10 $\times$ 250 mm	OBD Column	<a href="#">186008151</a>
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186001361</a> <sup>2</sup>	19 $\times$ 10 mm	Guard Cartridge	<a href="#">186001363</a> <sup>2</sup>
19 $\times$ 50 mm	OBD Column	<a href="#">186001365</a>	19 $\times$ 150 mm	OBD Column	<a href="#">186001369</a>
19 $\times$ 100 mm	OBD Column	<a href="#">186001367</a>	19 $\times$ 250 mm	OBD Column	<a href="#">186001371</a>
19 $\times$ 150 mm	OBD Column	<a href="#">186002800</a>	30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006875</a> <sup>3</sup>
19 $\times$ 250 mm	OBD Column	<a href="#">186004030</a>	30 $\times$ 250 mm	OBD Column	<a href="#">186002418</a>
30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006876</a> <sup>3</sup>			
30 $\times$ 50 mm	OBD Column	<a href="#">186001373</a>			
30 $\times$ 75 mm	OBD Column	<a href="#">186002455</a>			
30 $\times$ 150 mm	OBD Column	<a href="#">186002801</a>			

<sup>1</sup>Requires 10  $\times$  10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30  $\times$  10 mm Prep Guard Holder, p/n: [186006912](#).

## Atlantis Columns *Continued*

HILIC Silica		ANALYTICAL COLUMNS			
		Particle Size: 3 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (1/pk)		Dimension	P/N (1/pk)
	2.1 $\times$ 15 mm Direct Connect	<a href="#">186002007</a>		2.1 $\times$ 50 mm	<a href="#">186002012</a>
	2.1 $\times$ 30 mm	<a href="#">186002009</a>		2.1 $\times$ 100 mm	<a href="#">186002014</a>
	2.1 $\times$ 50 mm	<a href="#">186002011</a>		2.1 $\times$ 150 mm	<a href="#">186002016</a>
	2.1 $\times$ 100 mm	<a href="#">186002013</a>		3.0 $\times$ 50 mm	<a href="#">186002018</a>
	2.1 $\times$ 150 mm	<a href="#">186002015</a>		4.6 $\times$ 50 mm	<a href="#">186002028</a>
	3.0 $\times$ 50 mm	<a href="#">186002017</a>		4.6 $\times$ 100 mm	<a href="#">186002030</a>
	3.0 $\times$ 100 mm	<a href="#">186002019</a>		4.6 $\times$ 150 mm	<a href="#">186002032</a>
	4.6 $\times$ 50 mm	<a href="#">186002027</a>		4.6 $\times$ 250 mm	<a href="#">186002033</a>
	4.6 $\times$ 100 mm	<a href="#">186002029</a>			
	4.6 $\times$ 150 mm	<a href="#">186002031</a>			

PREPARATIVE COLUMNS					
Particle Size: 5 $\mu$ m			Particle Size: 10 $\mu$ m		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186003956</a> <sup>2</sup>	10 $\times$ 10 mm	Guard Cartridge	<a href="#">186002452</a> <sup>1</sup>
19 $\times$ 50 mm	OBD Column	<a href="#">186003957</a>	10 $\times$ 150 mm	OBD Column	<a href="#">186008149</a>
19 $\times$ 100 mm	OBD Column	<a href="#">186003958</a>	10 $\times$ 250 mm	OBD Column	<a href="#">186008151</a>
19 $\times$ 150 mm	OBD Column	<a href="#">186003959</a>	19 $\times$ 10 mm	Guard Cartridge	<a href="#">186001363</a> <sup>2</sup>
30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006877</a> <sup>3</sup>	19 $\times$ 150 mm	OBD Column	<a href="#">186001369</a>
30 $\times$ 50 mm	OBD Column	<a href="#">186003960</a>	19 $\times$ 250 mm	OBD Column	<a href="#">186001371</a>
30 $\times$ 100 mm	OBD Column	<a href="#">186003961</a>	30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006875</a> <sup>3</sup>
30 $\times$ 150 mm	OBD Column	<a href="#">186003962</a>	30 $\times$ 250 mm	OBD Column	<a href="#">186002418</a>

<sup>1</sup>Requires 10  $\times$  10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30  $\times$  10 mm Prep Guard Holder, p/n: [186006912](#).

### Atlantis Columns Method Validation Kits\*

	Particle Size: 3 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>T3</b>	4.6 $\times$ 150 mm	<a href="#">186003751</a>	4.6 $\times$ 150 mm	<a href="#">186003754</a>
			4.6 $\times$ 250 mm	<a href="#">186003755</a>
<b>HILIC Silica</b>	4.6 $\times$ 150 mm	<a href="#">186002315</a>	4.6 $\times$ 150 mm	<a href="#">186002314</a>
			4.6 $\times$ 250 mm	<a href="#">186002316</a>

\*Each Method Validation Kit contains 3 columns, each from a different batch.

### Atlantis VanGuard Cartridges\*

	Particle Size: 3 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>T3</b>	2.1 $\times$ 5 mm	<a href="#">186007674</a>	2.1 $\times$ 5 mm	<a href="#">186007678</a>
	3.9 $\times$ 5 mm	<a href="#">186007676</a>	3.9 $\times$ 5 mm	<a href="#">186007680</a>
<b>dc<sub>18</sub></b>	2.1 $\times$ 5 mm	<a href="#">186007658</a>	2.1 $\times$ 5 mm	<a href="#">186007662</a>
	3.9 $\times$ 5 mm	<a href="#">186007660</a>	3.9 $\times$ 5 mm	<a href="#">186007664</a>
<b>HILIC Silica</b>	2.1 $\times$ 5 mm	<a href="#">186007666</a>	2.1 $\times$ 5 mm	<a href="#">186007670</a>
	3.9 $\times$ 5 mm	<a href="#">186007668</a>	3.9 $\times$ 5 mm	<a href="#">186007672</a>

\*Each cartridge listed requires use of Universal VanGuard Cartridge Holder (Listed below, p/n [186007949](#))

### Universal VanGuard Cartridge Holder

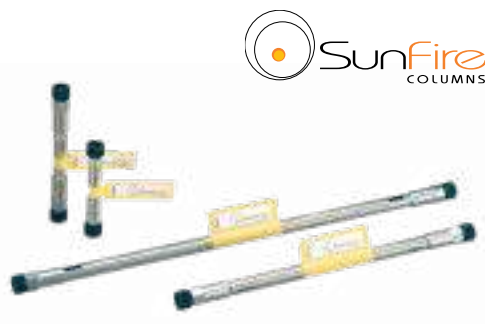
Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>

## SunFire Columns

SunFire Columns set the standard for state-of-the-art bonded C<sub>18</sub> and C<sub>8</sub> silica HPLC columns. Benefiting from years of research and product development, SunFire Columns deliver industry-leading levels of chromatographic performance, representing the best in particle and bonding expertise.

SunFire Columns offer:

- Excellent low-pH stability
- High chromatographic efficiency
- Superior peak shapes for charged analyte species



### Column Characteristics

	C <sub>18</sub> , 100 Å	C <sub>8</sub> , 100 Å	Silica, 100 Å
	HPLC: 2.5, 3.5, 5, 10 µm	HPLC: 2.5, 3.5, 5, 10 µm	HPLC: 5, 10 µm
Ligand Benefit	Highly efficient, general purpose for acids, bases, and neutrals with highest loading capacity in TFA mobile phases	General purpose, efficient and similar selectivity to C <sub>18</sub> but with less compound retentivity	No ligand, general purpose separations of highly polar compounds for use in normal phase mode
Particle/Ligand			
Ligand Density*	3.5 µmol/m <sup>2</sup>	3.5 µmol/m <sup>2</sup>	N/A
Carbon Load*	16%	12%	N/A
Endcapped	Yes	Yes	No
USP Class No.	L1	L7	L3
pH Range	2–8	2–8	2–8
Temperature Limits	Low pH = 50 °C, High pH = 40 °C	Low pH = 40 °C, High pH = 40 °C	Low pH = 55 °C, High pH = 45 °C
Surface Area*	340 m <sup>2</sup> /g	340 m <sup>2</sup> /g	340 m <sup>2</sup> /g
Performance Standards	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	—
Application Standards	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>  HILIC QC Reference Material p/n: <a href="#">186007226</a>	—

\*Expected or approximate value.

SunFire Columns

ANALYTICAL COLUMNS					
Particle Size: 2.5 µm*		Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm	<a href="#">186003399</a>	2.1 × 50 mm	<a href="#">186002533</a>	2.1 × 50 mm	<a href="#">186002539</a>
2.1 × 50 mm	<a href="#">186003401</a>	2.1 × 100 mm	<a href="#">186002534</a>	2.1 × 100 mm	<a href="#">186002540</a>
2.1 × 75 mm	<a href="#">186005634</a>	2.1 × 150 mm	<a href="#">186002535</a>	2.1 × 150 mm	<a href="#">186002541</a>
3.0 × 30 mm	<a href="#">186003407</a>	3.0 × 50 mm	<a href="#">186002542</a>	3.0 × 50 mm	<a href="#">186002545</a>
3.0 × 50 mm	<a href="#">186003409</a>	3.0 × 100 mm	<a href="#">186002543</a>	3.0 × 100 mm	<a href="#">186002546</a>
3.0 × 75 mm	<a href="#">186005636</a>	3.0 × 150 mm	<a href="#">186002544</a>	3.0 × 150 mm	<a href="#">186002547</a>
4.6 × 50 mm	<a href="#">186003417</a>	4.6 × 20 mm /S	<a href="#">186002549</a>	3.0 × 250 mm	<a href="#">186002548</a>
		4.6 × 50 mm	<a href="#">186002551</a>	4.6 × 30 mm	<a href="#">186002556</a>
		4.6 × 75 mm	<a href="#">186002552</a>	4.6 × 50 mm	<a href="#">186002557</a>
		4.6 × 100 mm	<a href="#">186002553</a>	4.6 × 100 mm	<a href="#">186002558</a>
		4.6 × 150 mm	<a href="#">186002554</a>	4.6 × 150 mm	<a href="#">186002559</a>
				4.6 × 250 mm	<a href="#">186002560</a>

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186002565</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186002663</a> <sup>1</sup>
10 × 50 mm	OBD Column	<a href="#">186008152</a>	10 × 50 mm	OBD Column	<a href="#">186008208</a>
10 × 100 mm	OBD Column	<a href="#">186008153</a>	10 × 150 mm	OBD Column	<a href="#">186008156</a>
10 × 150 mm	OBD Column	<a href="#">186008154</a>	10 × 250 mm	OBD Column	<a href="#">186008157</a>
10 × 250 mm	OBD Column	<a href="#">186008155</a>	19 × 10 mm	Guard Cartridge	<a href="#">186002666</a> <sup>2</sup>
19 × 10 mm	Guard Cartridge	<a href="#">186002569</a> <sup>2</sup>	19 × 50 mm	OBD Column	<a href="#">186002667</a>
19 × 50 mm	OBD Column	<a href="#">186002566</a>	19 × 150 mm	OBD Column	<a href="#">186002668</a>
19 × 100 mm	OBD Column	<a href="#">186002567</a>	19 × 250 mm	OBD Column	<a href="#">186002669</a>
19 × 150 mm	OBD Column	<a href="#">186002568</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006884</a> <sup>3</sup>
19 × 250 mm	OBD Column	<a href="#">186004027</a>	30 × 50 mm	OBD Column	<a href="#">186003854</a>
30 × 10 mm	Guard Cartridge	<a href="#">186006885</a> <sup>3</sup>	30 × 100 mm	OBD Column	<a href="#">186003971</a>
30 × 50 mm	OBD Column	<a href="#">186002570</a>	30 × 150 mm	OBD Column	<a href="#">186002670</a>
30 × 75 mm	OBD Column	<a href="#">186002571</a>	30 × 250 mm	OBD Column	<a href="#">186002671</a>
30 × 100 mm	OBD Column	<a href="#">186002572</a>	50 × 50 mm	OBD Column	<a href="#">186002871</a>
30 × 150 mm	OBD Column	<a href="#">186002797</a>	50 × 100 mm	OBD Column	<a href="#">186003972</a>
30 × 250 mm	OBD Column	<a href="#">186003969</a>	50 × 150 mm	OBD Column	<a href="#">186002672</a>
50 × 50 mm	OBD Column	<a href="#">186002867</a>	50 × 250 mm	OBD Column	<a href="#">186002673</a>
50 × 100 mm	OBD Column	<a href="#">186002869</a>			
50 × 150 mm	OBD Column	<a href="#">186003941</a>			
50 × 250 mm	OBD Column	<a href="#">186003970</a>			

\*Recommended maximum pressure of 6000 psi (400 bar).

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

SunFire Columns *Continued*

C<sub>8</sub>

ANALYTICAL COLUMNS					
Particle Size: 2.5 µm*		Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
3.0 × 50 mm	<a href="#">186003410</a>	2.1 × 50 mm	<a href="#">186002710</a>	2.1 × 50 mm	<a href="#">186002715</a>
		2.1 × 100 mm	<a href="#">186002711</a>	2.1 × 100 mm	<a href="#">186002716</a>
		2.1 × 150 mm	<a href="#">186002712</a>	2.1 × 150 mm	<a href="#">186002717</a>
		3.0 × 50 mm	<a href="#">186002719</a>	3.0 × 50 mm	<a href="#">186002723</a>
		3.0 × 100 mm	<a href="#">186002720</a>	3.0 × 100 mm	<a href="#">186002724</a>
		3.0 × 150 mm	<a href="#">186002721</a>	3.0 × 150 mm	<a href="#">186002725</a>
		4.6 × 50 mm	<a href="#">186002729</a>	4.6 × 30 mm	<a href="#">186002734</a>
		4.6 × 75 mm	<a href="#">186002730</a>	4.6 × 50 mm	<a href="#">186002735</a>
		4.6 × 100 mm	<a href="#">186002731</a>	4.6 × 100 mm	<a href="#">186002736</a>
		4.6 × 150 mm	<a href="#">186002732</a>	4.6 × 150 mm	<a href="#">186002737</a>
				4.6 × 250 mm	<a href="#">186002738</a>

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186002750</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186002758</a> <sup>1</sup>
10 × 50 mm	OBD Column	<a href="#">186008158</a>	10 × 50 mm	OBD Column	<a href="#">186008209</a>
10 × 100 mm	OBD Column	<a href="#">186008159</a>	10 × 150 mm	OBD Column	<a href="#">186008162</a>
10 × 150 mm	OBD Column	<a href="#">186008160</a>	10 × 250 mm	OBD Column	<a href="#">186008163</a>
10 × 250 mm	OBD Column	<a href="#">186008161</a>	19 × 10 mm	Guard Cartridge	<a href="#">186002761</a> <sup>2</sup>
19 × 10 mm	Guard Cartridge	<a href="#">186002754</a> <sup>2</sup>	19 × 150 mm	OBD Column	<a href="#">186002763</a>
19 × 50 mm	OBD Column	<a href="#">186002751</a>	19 × 250 mm	OBD Column	<a href="#">186002764</a>
19 × 100 mm	OBD Column	<a href="#">186002752</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006886</a> <sup>3</sup>
19 × 150 mm	OBD Column	<a href="#">186002753</a>	30 × 50 mm	OBD Column	<a href="#">186003853</a>
19 × 250 mm	OBD Column	<a href="#">186004028</a>	30 × 150 mm	OBD Column	<a href="#">186002765</a>
30 × 10 mm	Guard Cartridge	<a href="#">186006887</a> <sup>3</sup>	30 × 250 mm	OBD Column	<a href="#">186002766</a>
30 × 50 mm	OBD Column	<a href="#">186002755</a>	50 × 50 mm	OBD Column	<a href="#">186002872</a>
30 × 75 mm	OBD Column	<a href="#">186002756</a>	50 × 150 mm	OBD Column	<a href="#">186002767</a>
30 × 100 mm	OBD Column	<a href="#">186002757</a>	50 × 250 mm	OBD Column	<a href="#">186002768</a>
30 × 150 mm	OBD Column	<a href="#">186002795</a>			
50 × 50 mm	OBD Column	<a href="#">186002868</a>			
50 × 100 mm	OBD Column	<a href="#">186002870</a>			

\*Recommended maximum pressure of 6000 psi (400 bar).

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

SunFire Columns *Continued*

ANALYTICAL COLUMNS					
Particle Size: 3.5 µm			Particle Size: 5 µm		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
4.6 × 150 mm	<a href="#">186003453</a>		4.6 × 150 mm	<a href="#">186003467</a>	
4.6 × 250 mm	<a href="#">186003454</a>		4.6 × 250 mm	<a href="#">186003468</a>	

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186003429</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186003441</a> <sup>1</sup>
10 × 50 mm	OBD Column	<a href="#">186008180</a>	10 × 150 mm	OBD Column	<a href="#">186008184</a>
10 × 100 mm	OBD Column	<a href="#">186008181</a>	10 × 250 mm	OBD Column	<a href="#">186008185</a>
10 × 150 mm	OBD Column	<a href="#">186008182</a>	19 × 10 mm	Guard Cartridge	<a href="#">186003444</a> <sup>2</sup>
10 × 250 mm	OBD Column	<a href="#">186008183</a>	19 × 50 mm	OBD Column	<a href="#">186003445</a>
19 × 10 mm	Guard Cartridge	<a href="#">186003434</a> <sup>2</sup>	19 × 150 mm	OBD Column	<a href="#">186003446</a>
19 × 50 mm	OBD Column	<a href="#">186003431</a>	19 × 250 mm	OBD Column	<a href="#">186003447</a>
19 × 100 mm	OBD Column	<a href="#">186003432</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006888</a> <sup>3</sup>
19 × 150 mm	OBD Column	<a href="#">186003433</a>	30 × 50 mm	OBD Column	<a href="#">186003855</a>
19 × 250 mm	OBD Column	<a href="#">186004029</a>	30 × 150 mm	OBD Column	<a href="#">186003448</a>
30 × 10 mm	Guard Cartridge	<a href="#">186006889</a> <sup>3</sup>	30 × 250 mm	OBD Column	<a href="#">186003449</a>
30 × 50 mm	OBD Column	<a href="#">186003435</a>	50 × 50 mm	OBD Column	<a href="#">186003450</a>
30 × 75 mm	OBD Column	<a href="#">186003436</a>	50 × 150 mm	OBD Column	<a href="#">186003451</a>
30 × 100 mm	OBD Column	<a href="#">186003437</a>	50 × 250 mm	OBD Column	<a href="#">186003452</a>
30 × 150 mm	OBD Column	<a href="#">186003438</a>			
50 × 50 mm	OBD Column	<a href="#">186003439</a>			
50 × 100 mm	OBD Column	<a href="#">186003440</a>			

\*Recommended maximum pressure of 6000 psi (400 bar).

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

SunFire Preparative Scouting Columns

PREPARATIVE COLUMNS					
Particle Size: 10 µm					
Dimension	P/N (1/pk)				
4.6 × 150 mm	<a href="#">186003390</a>				
4.6 × 250 mm	<a href="#">186003391</a>				

ANALYTICAL COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
4.6 × 150 mm	<a href="#">186003453</a>		4.6 × 150 mm	<a href="#">186003467</a>	
4.6 × 250 mm	<a href="#">186003454</a>		4.6 × 250 mm	<a href="#">186003468</a>	

### SunFire Columns Method Validation Kits\*

	Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>C<sub>18</sub></b>	4.6 $\times$ 100 mm	<a href="#">186002675</a>	4.6 $\times$ 150 mm	<a href="#">186002679</a>
	4.6 $\times$ 150 mm	<a href="#">186002676</a>	4.6 $\times$ 250 mm	<a href="#">186002680</a>
<b>C<sub>8</sub></b>	4.6 $\times$ 100 mm	<a href="#">186002740</a>	4.6 $\times$ 150 mm	<a href="#">186002744</a>
	4.6 $\times$ 150 mm	<a href="#">186002741</a>	4.6 $\times$ 250 mm	<a href="#">186002745</a>

\*Each Method Validation Kit contains 3 columns, each from a different batch.

### SunFire VanGuard Cartridges\*

	Particle Size: 2.5 $\mu$ m		Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>C<sub>18</sub></b>	2.1 $\times$ 5 mm	<a href="#">186007691</a>	2.1 $\times$ 5 mm	<a href="#">186007694</a>	2.1 $\times$ 5 mm	<a href="#">186007697</a>
	3.9 $\times$ 5 mm	<a href="#">186007693</a>	3.9 $\times$ 5 mm	<a href="#">186007696</a>	3.9 $\times$ 5 mm	<a href="#">186007699</a>
<b>C<sub>8</sub></b>	2.1 $\times$ 5 mm	<a href="#">186007700</a>	2.1 $\times$ 5 mm	<a href="#">186007703</a>	2.1 $\times$ 5 mm	<a href="#">186007706</a>
	3.9 $\times$ 5 mm	<a href="#">186007702</a>	3.9 $\times$ 5 mm	<a href="#">186007705</a>	3.9 $\times$ 5 mm	<a href="#">186007708</a>

\*Each cartridge listed requires use of Universal VanGuard Cartridge Holder (Listed below, p/n [186007949](#))

### Universal VanGuard Cartridge Holder

Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>



**APPLICATION AREA:** Trap Peptides After Pepsin Digestion, Before Analytical Column

"Very easy-to-use, plug-and-play type of guard, we use it (VanGuard column) to trap peptides after on-column pepsin digestion before separation on an analytical column. The guard also serves as a tool to desalt prior to mass spectrometric analysis. Very reliable and reproducible results. Great value for the money!"

**REVIEWER:** George Bou-Assaf

**ORGANIZATION:** Biogen



# Symmetry Columns

Symmetry™ Columns exceed the standards for HPLC column performance. To ensure their optimum performance, they are packed with high-purity silica using stringently controlled manufacturing processes. No other silica-based LC column brand can match the column-to-column and batch-to-batch reproducibility of Symmetry Columns.

- Symmetry C<sub>18</sub> and C<sub>8</sub> Columns deliver maximum reproducibility
- SymmetryShield RP18 and RP8 Columns provide superior peak shape
- Symmetry300 C<sub>18</sub> and C<sub>4</sub> Columns offer high recoveries of peptides and proteins



## Column Characteristics

	Symmetry C <sub>8</sub> and SymmetryPrep C <sub>8</sub>	Symmetry C <sub>18</sub> and SymmetryPrep C <sub>18</sub>	SymmetryShield RP8	SymmetryShield RP18	Symmetry300 C <sub>4</sub>	Symmetry300 C <sub>18</sub>
	HPLC: 3.5, 5, 7 μm	HPLC: 3.5, 5, 7 μm	HPLC: 3.5, 5, 7 μm	HPLC: 3.5, 5, 7 μm	HPLC: 3.5, 5 μm	HPLC: 3.5, 5 μm
Ligand Benefit	General purpose, highly reproducible, similar selectivity to C <sub>18</sub> with slightly less retention	General purpose and highly reproducible, balanced retention for acids, bases, and neutrals	Alternate selectivity compared to straight chain C <sub>18</sub> , particularly with phenolic analytes. Provides reduced silanol activity ("shielding") to improve peak shape and resolution comparably	Alternate selectivity compared to straight chain C <sub>18</sub> , particularly with phenolic analytes. Provides reduced silanol activity ("shielding") to improve peak shape and resolution comparably	Wide-pore particle. Good retention of larger (> 1kD) molecules versus C <sub>18</sub>	Wide-pore particle. Good retention of large molecules (> 1kD)
Particle/Ligand						
Carbon Load*	12%	19%	15%	17%	2.8%	8.5%
Endcapped	Yes	Yes	Yes	Yes	Yes	Yes
USP Class No.	L7	L1	L1	L1	L26	L1
Performance Standards	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	MassPREP Protein Standard Mix p/n: <a href="#">186004900</a>	Cytochrome c Digestion Standard p/n: <a href="#">186006371</a>
Application Standards	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	MassPREP Protein Standard Mix p/n: <a href="#">186004900</a>	Peptide Retention Standard p/n: <a href="#">186006555</a>

\*Expected or approximate value.

## Ordering Information

### Symmetry, SymmetryShield, and Symmetry300 Columns

Symmetry C <sub>18</sub>	ANALYTICAL COLUMNS					
	Particle Size: 3.5 µm			Particle Size: 5 µm		
	Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
	2.1 × 30 mm	<a href="#">WAT058973</a>		2.1 × 50 mm	<a href="#">186000206</a>	
	2.1 × 50 mm	<a href="#">WAT200650</a>		2.1 × 100 mm	<a href="#">186002608</a>	
	2.1 × 100 mm	<a href="#">WAT058965</a>		2.1 × 150 mm	<a href="#">WAT056975</a>	
	2.1 × 150 mm	<a href="#">WAT106005</a>		3.0 × 150 mm	<a href="#">WAT054200</a>	
	3.0 × 50 mm	<a href="#">186002612</a>		3.0 × 250 mm	<a href="#">186000690</a>	
	3.0 × 100 mm	<a href="#">186000696</a>		3.9 × 20 mm /S	<a href="#">186002086</a>	
	3.0 × 150 mm	<a href="#">186000695</a>		3.9 × 150 mm	<a href="#">WAT046980</a>	
	3.9 × 20 mm /S	<a href="#">186002082</a>		4.6 × 20 mm /S	<a href="#">186002094</a>	
	4.6 × 30 mm	<a href="#">186000271</a>		4.6 × 50 mm	<a href="#">186000207</a>	
	4.6 × 50 mm	<a href="#">WAT200625</a>		4.6 × 100 mm	<a href="#">186002616</a>	
	4.6 × 75 mm	<a href="#">WAT066224</a>		4.6 × 150 mm	<a href="#">WAT045905</a>	
	4.6 × 100 mm	<a href="#">WAT066220</a>		4.6 × 250 mm	<a href="#">WAT054275</a>	
	4.6 × 150 mm	<a href="#">WAT200632</a>				
	4.6 × 250 mm	<a href="#">186005794</a>				

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 7 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
7.8 × 10 mm	Guard Cartridge	<a href="#">186000711</a> <sup>5</sup>	7.8 × 10 mm	Guard Cartridge	<a href="#">186000713</a> <sup>5</sup>
7.8 × 50 mm	Column	<a href="#">186000208</a>	7.8 × 150 mm	Column	<a href="#">WAT066288</a>
7.8 × 100 mm	Column	<a href="#">186000209</a>	7.8 × 300 mm	Column	<a href="#">WAT066235</a>
19 × 10 mm	Guard Cartridge	<a href="#">186000715</a> <sup>2</sup>	19 × 10 mm	Guard Cartridge	<a href="#">186000717</a> <sup>2</sup>
19 × 50 mm	Column	<a href="#">186000210</a>	19 × 150 mm	Column	<a href="#">WAT066240</a>
19 × 100 mm	Column	<a href="#">186000211</a>	19 × 300 mm	Column	<a href="#">WAT066245</a>
30 × 100 mm	Column	<a href="#">186000236</a>			

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>5</sup>Requires 7.8 × 10 mm Cartridge Holder, p/n: [186000708](#).

Symmetry, SymmetryShield, and Symmetry300 Columns *Continued*

Symmetry C <sub>8</sub> ANALYTICAL COLUMNS			
Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 50 mm	<a href="#">WAT200624</a>	2.1 × 100 mm	<a href="#">186002609</a>
2.1 × 100 mm	<a href="#">WAT058961</a>	2.1 × 150 mm	<a href="#">WAT056955</a>
2.1 × 150 mm	<a href="#">WAT106011</a>	3.0 × 150 mm	<a href="#">WAT054230</a>
3.0 × 100 mm	<a href="#">186000698</a>	3.0 × 250 mm	<a href="#">186000691</a>
3.0 × 150 mm	<a href="#">186000697</a>	3.9 × 20 mm /S	<a href="#">186002087</a>
4.6 × 30 mm	<a href="#">186000270</a>	3.9 × 150 mm	<a href="#">WAT046970</a>
4.6 × 50 mm	<a href="#">WAT200620</a>	4.6 × 50 mm	<a href="#">186000213</a>
4.6 × 75 mm	<a href="#">WAT066200</a>	4.6 × 100 mm	<a href="#">186002617</a>
4.6 × 100 mm	<a href="#">WAT066204</a>	4.6 × 150 mm	<a href="#">WAT045995</a>
4.6 × 150 mm	<a href="#">WAT200630</a>	4.6 × 250 mm	<a href="#">WAT054270</a>

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 7 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
7.8 × 10 mm	Guard Cartridge	<a href="#">186000712<sup>5</sup></a>	7.8 × 10 mm	Guard Cartridge	<a href="#">186000714<sup>5</sup></a>
7.8 × 50 mm	Column	<a href="#">186000214</a>	7.8 × 150 mm	Column	<a href="#">WAT066285</a>
7.8 × 100 mm	Column	<a href="#">186000215</a>	7.8 × 300 mm	Column	<a href="#">WAT066225</a>
19 × 100 mm	Column	<a href="#">186000229</a>	19 × 10 mm	Guard Cartridge	<a href="#">186000718<sup>2</sup></a>
30 × 50 mm	Column	<a href="#">186000237</a>	19 × 150 mm	Column	<a href="#">WAT066228</a>
30 × 100 mm	Column	<a href="#">186000238</a>	19 × 300 mm	Column	<a href="#">WAT066230</a>
30 × 100 mm	Column	<a href="#">186000236</a>			

Symmetry Shield RP18 ANALYTICAL COLUMNS			
Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 50 mm	<a href="#">186000172</a>	2.1 × 50 mm	<a href="#">186000217</a>
2.1 × 100 mm	<a href="#">186000173</a>	2.1 × 100 mm	<a href="#">186000998</a>
2.1 × 150 mm	<a href="#">186000174</a>	2.1 × 150 mm	<a href="#">186000111</a>
3.0 × 100 mm	<a href="#">186000700</a>	3.0 × 150 mm	<a href="#">186000692</a>
3.0 × 150 mm	<a href="#">186000699</a>	3.0 × 250 mm	<a href="#">186000693</a>
3.9 × 20 mm /S	<a href="#">186002084</a>	3.9 × 150 mm	<a href="#">186000108</a>
4.6 × 50 mm	<a href="#">186000177</a>	4.6 × 50 mm	<a href="#">186000218</a>
4.6 × 75 mm	<a href="#">186000178</a>	4.6 × 100 mm	<a href="#">186002618</a>
4.6 × 100 mm	<a href="#">186000179</a>	4.6 × 150 mm	<a href="#">186000109</a>
4.6 × 150 mm	<a href="#">186000180</a>	4.6 × 250 mm	<a href="#">186000112</a>

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 7 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
19 × 10 mm	Guard Cartridge	<a href="#">186001835<sup>2</sup></a>	19 × 150 mm	Column	<a href="#">186001839</a>
19 × 50 mm	Column	<a href="#">186001836</a>	19 × 300 mm	Column	<a href="#">186001840</a>
19 × 100 mm	Column	<a href="#">186001837</a>			
19 × 150 mm	Column	<a href="#">186001838</a>			

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).<sup>5</sup>Requires 7.8 × 10 mm Cartridge Holder, p/n: [186000708](#).

Symmetry, SymmetryShield, and Symmetry300 Columns *Continued*

Symmetry Shield RP8	ANALYTICAL COLUMNS					
	Particle Size: 3.5 $\mu\text{m}$			Particle Size: 5 $\mu\text{m}$		
	Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
	2.1 $\times$ 50 mm	<a href="#">WAT094257</a>		2.1 $\times$ 150 mm	<a href="#">WAT094245</a>	
	2.1 $\times$ 100 mm	<a href="#">WAT058969</a>		3.0 $\times$ 150 mm	<a href="#">WAT094243</a>	
	2.1 $\times$ 150 mm	<a href="#">WAT106008</a>		3.9 $\times$ 20 mm JS	<a href="#">186002089</a>	
	4.6 $\times$ 50 mm	<a href="#">WAT094260</a>		3.9 $\times$ 150 mm	<a href="#">WAT200655</a>	
	4.6 $\times$ 75 mm	<a href="#">WAT094263</a>		4.6 $\times$ 50 mm	<a href="#">186000224</a>	
	4.6 $\times$ 100 mm	<a href="#">WAT094266</a>		4.6 $\times$ 100 mm	<a href="#">186002619</a>	
	4.6 $\times$ 150 mm	<a href="#">WAT094269</a>		4.6 $\times$ 150 mm	<a href="#">WAT200662</a>	
				4.6 $\times$ 250 mm	<a href="#">WAT200670</a>	

PREPARATIVE COLUMNS					
Particle Size: 5 $\mu\text{m}$			Particle Size: 7 $\mu\text{m}$		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186001841</a> <sup>2</sup>	19 $\times$ 150 mm	Column	<a href="#">186001845</a>
19 $\times$ 50 mm	Column	<a href="#">186001842</a>	19 $\times$ 300 mm	Column	<a href="#">186001846</a>
19 $\times$ 100 mm	Column	<a href="#">186001843</a>			
19 $\times$ 150 mm	Column	<a href="#">186001844</a>			

Symmetry300 C <sub>18</sub>	ANALYTICAL COLUMNS					
	Particle Size: 3.5 $\mu\text{m}$			Particle Size: 5 $\mu\text{m}$		
	Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
	2.1 $\times$ 50 mm	<a href="#">186000187</a>		2.1 $\times$ 150 mm	<a href="#">WAT106172</a>	
	2.1 $\times$ 100 mm	<a href="#">186000188</a>		4.6 $\times$ 50 mm	<a href="#">WAT106209</a>	
	2.1 $\times$ 150 mm	<a href="#">186000200</a>		4.6 $\times$ 150 mm	<a href="#">WAT106157</a>	
	4.6 $\times$ 50 mm	<a href="#">186000201</a>		4.6 $\times$ 250 mm	<a href="#">WAT106151</a>	
	4.6 $\times$ 75 mm	<a href="#">186000189</a>				
	4.6 $\times$ 100 mm	<a href="#">186000190</a>				
	4.6 $\times$ 150 mm	<a href="#">186000197</a>				

PREPARATIVE COLUMNS					
Particle Size: 5 $\mu\text{m}$					
Dimension	Type	P/N (1/pk)			
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186001847</a> <sup>2</sup>			
19 $\times$ 50 mm	Column	<a href="#">186001848</a>			
19 $\times$ 100 mm	Column	<a href="#">186001849</a>			
19 $\times$ 150 mm	Column	<a href="#">186001850</a>			

<sup>2</sup>Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186000709](#).<sup>3</sup>Requires 7.8  $\times$  10 mm Cartridge Holder, p/n: [186000708](#).

Symmetry, SymmetryShield, and Symmetry300 Columns *Continued*

Symmetry300 C <sub>4</sub>	ANALYTICAL COLUMNS			
	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
	2.1 × 50 mm	<a href="#">186000277</a>	2.1 × 150 mm	<a href="#">186000285</a>
	2.1 × 100 mm	<a href="#">186000278</a>	3.9 × 150 mm	<a href="#">186000286</a>
	2.1 × 150 mm	<a href="#">186000279</a>	4.6 × 50 mm	<a href="#">186000287</a>
	4.6 × 50 mm	<a href="#">186000280</a>	4.6 × 150 mm	<a href="#">186000288</a>
	4.6 × 75 mm	<a href="#">186000281</a>	4.6 × 250 mm	<a href="#">186000289</a>
	4.6 × 100 mm	<a href="#">186000282</a>		
	4.6 × 150 mm	<a href="#">186000283</a>		

Symmetry, SymmetryShield, and Symmetry300 Method Validation Kits\*

	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
Symmetry C <sub>18</sub>	4.6 × 150 mm	<a href="#">WAT094240</a>	3.9 × 150 mm	<a href="#">WAT047210</a>
			4.6 × 150 mm	<a href="#">WAT054448</a>
			4.6 × 250 mm	<a href="#">WAT054450</a>
Symmetry C <sub>8</sub>	4.6 × 150 mm	<a href="#">WAT094237</a>	3.9 × 150 mm	<a href="#">WAT046955</a>
			4.6 × 150 mm	<a href="#">WAT054435</a>
			4.6 × 250 mm	<a href="#">WAT054438</a>
SymmetryShield RP18	4.6 × 150 mm	<a href="#">186000181</a>	4.6 × 150 mm	<a href="#">186000103</a>
			4.6 × 250 mm	<a href="#">186000102</a>
SymmetryShield RP8	4.6 × 150 mm	<a href="#">WAT094278</a>	4.6 × 250 mm	<a href="#">WAT210591</a>
Symmetry300 C <sub>18</sub>	4.6 × 150 mm	<a href="#">186000195</a>	3.9 × 150 mm	<a href="#">WAT106187</a>
			4.6 × 150 mm	<a href="#">WAT106190</a>
			4.6 × 250 mm	<a href="#">WAT106184</a>
Symmetry300 C <sub>4</sub>	4.6 × 150 mm	<a href="#">186000291</a>	3.9 × 150 mm	<a href="#">186000293</a>
			4.6 × 150 mm	<a href="#">186000294</a>
			4.6 × 250 mm	<a href="#">186000295</a>

\*Each Method Validation Kit contains 3 columns, each from a different batch.

Symmetry VanGuard Cartridges\*

	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
Symmetry C <sub>18</sub>	2.1 × 5 mm	<a href="#">186007725</a>	2.1 × 5 mm	<a href="#">186007729</a>
	3.9 × 5 mm	<a href="#">186007727</a>	3.9 × 5 mm	<a href="#">186007731</a>
Symmetry C <sub>8</sub>	2.1 × 5 mm	<a href="#">186007733</a>	2.1 × 5 mm	<a href="#">186007737</a>
	3.9 × 5 mm	<a href="#">186007735</a>	3.9 × 5 mm	<a href="#">186007739</a>
SymmetryShield RP18	2.1 × 5 mm	<a href="#">186007749</a>	2.1 × 5 mm	<a href="#">186007753</a>
	3.9 × 5 mm	<a href="#">186007751</a>	3.9 × 5 mm	<a href="#">186007755</a>
SymmetryShield RP8	2.1 × 5 mm	<a href="#">186007741</a>	2.1 × 5 mm	<a href="#">186007745</a>
	3.9 × 5 mm	<a href="#">186007743</a>	3.9 × 5 mm	<a href="#">186007747</a>
Symmetry300 C <sub>18</sub>	2.1 × 5 mm	<a href="#">186007709</a>	2.1 × 5 mm	<a href="#">186007713</a>
	3.9 × 5 mm	<a href="#">186007711</a>	3.9 × 5 mm	<a href="#">186007715</a>
Symmetry300 C <sub>4</sub>	2.1 × 5 mm	<a href="#">186007717</a>	2.1 × 5 mm	<a href="#">186007721</a>
	3.9 × 5 mm	<a href="#">186007719</a>	3.9 × 5 mm	<a href="#">186007723</a>

\*Each cartridge listed requires use of Universal VanGuard Cartridge Holder (Listed below, p/n [186007949](#))

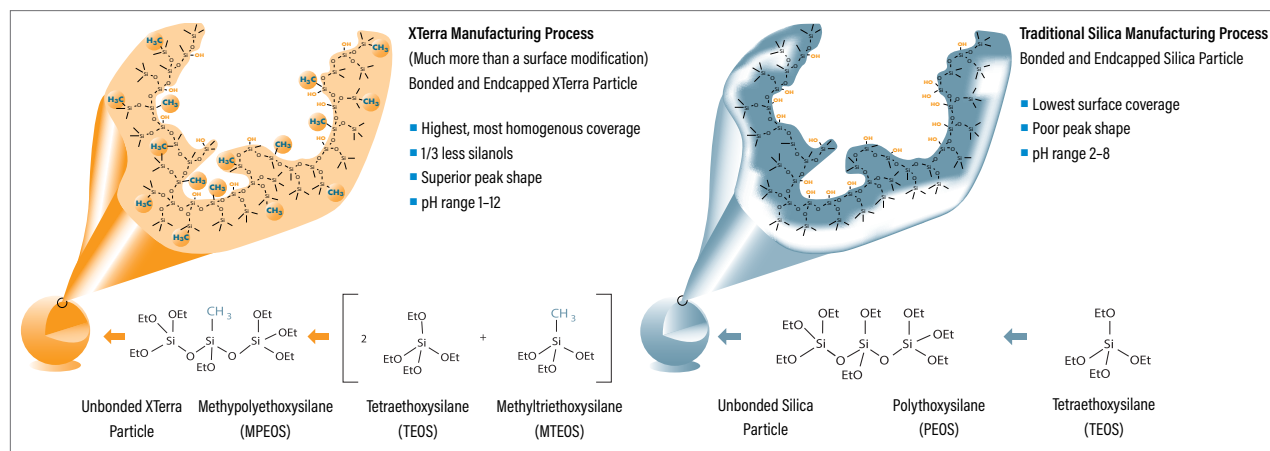
Universal VanGuard Cartridge Holder

Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>

XTerra MS, Shield RP, and Phenyl Columns combine the best properties of silica- and polymeric-bonded phases with patented Hybrid Particle Technology (HPT), which replaces one out of every three silanol groups with a methyl group during particle synthesis. HPT overcomes the limitations of silica-based materials while maintaining its best attributes for mechanical strength, chemical resistance, and easy scale up from analytical to preparative chromatography.



## Traditional Silica vs. XTerra Manufacturing Process



## Column Characteristics

	MS C <sub>18</sub> , 125 Å	Shield RP18, 125 Å	MS C <sub>8</sub> , 125 Å	Shield RP8, 125 Å	Phenyl, 125 Å
	HPLC: 3.5, 5 µm	HPLC: 3.5, 5 µm	HPLC: 3.5, 5 µm	HPLC: 3.5, 5 µm	HPLC: 3.5, 5 µm
Ligand Benefit	General purpose, efficient, low MS-bleed delivers good compound retentivity for acids, bases and neutrals	Highly efficient, provides alternate selectivity compared to straight chain C <sub>18</sub> , particularly with phenolic analytes. Compatible with 100% aqueous-phase composition	General purpose, efficient, low MS-bleed and similar selectivity to MS C <sub>18</sub> , but delivers less compound retentivity	Highly efficient and similar selectivity to Shield RP18, but delivers less compound retentivity	Alternate selectivity versus straight chain MS C <sub>18</sub> , alternate selectivity, particularly in regard to polyaromatic compounds
Particle/Ligand					
Carbon Load*	15.5%	15%	12%	13.5%	12%
Endcapped	Yes	Yes	Yes	Yes	Yes
USP Class No.	L1	L1	L7	L7	L11
Performance Standards	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>
Application Standards	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>

\*Expected or approximate value.

XTerra Columns

ANALYTICAL COLUMNS					
Particle Size: 2.5 µm*		Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm	<a href="#">186000592</a>	2.1 × 30 mm	<a href="#">186000398</a>	2.1 × 20 mm JS	<a href="#">186001979</a>
4.6 × 20 mm JS	<a href="#">186001889</a>	2.1 × 50 mm	<a href="#">186000400</a>	2.1 × 50 mm	<a href="#">186000446</a>
4.6 × 30 mm	<a href="#">186000600</a>	2.1 × 100 mm	<a href="#">186000404</a>	2.1 × 100 mm	<a href="#">186000450</a>
4.6 × 50 mm	<a href="#">186000602</a>	2.1 × 150 mm	<a href="#">186000408</a>	2.1 × 150 mm	<a href="#">186000454</a>
4.6 × 75 mm	<a href="#">186000981</a>	3.0 × 50 mm	<a href="#">186000414</a>	2.1 × 250 mm	<a href="#">186000458</a>
		3.0 × 100 mm	<a href="#">186000418</a>	3.0 × 50 mm	<a href="#">186000462</a>
		3.0 × 150 mm	<a href="#">186000422</a>	3.0 × 100 mm	<a href="#">186000466</a>
		3.9 × 100 mm	<a href="#">186000426</a>	3.0 × 150 mm	<a href="#">186000470</a>
		4.6 × 30 mm	<a href="#">186000430</a>	3.0 × 250 mm	<a href="#">186000474</a>
		4.6 × 50 mm	<a href="#">186000432</a>	3.9 × 150 mm	<a href="#">186000478</a>
		4.6 × 100 mm	<a href="#">186000436</a>	4.6 × 50 mm	<a href="#">186000482</a>
		4.6 × 150 mm	<a href="#">186000440</a>	4.6 × 100 mm	<a href="#">186000486</a>
		4.6 × 250 mm	<a href="#">186001470</a>	4.6 × 150 mm	<a href="#">186000490</a>
				4.6 × 250 mm	<a href="#">186000494</a>

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
7.8 × 10 mm	Guard Cartridge	<a href="#">186001168</a> <sup>5</sup>	7.8 × 10 mm	Guard Cartridge	<a href="#">186001172</a> <sup>5</sup>
7.8 × 50 mm	Column	<a href="#">186001152</a>	7.8 × 150 mm	Column	<a href="#">186001160</a>
7.8 × 100 mm	Column	<a href="#">186001156</a>	7.8 × 300 mm	Column	<a href="#">186001164</a>
7.8 × 150 mm	Column	<a href="#">186001475</a>	10 × 10 mm	Guard Cartridge	<a href="#">186001002</a> <sup>1</sup>
10 × 10 mm	Guard Cartridge	<a href="#">186001001</a> <sup>1</sup>	10 × 150 mm	OBD Column	<a href="#">186008129</a>
10 × 50 mm	OBD Column	<a href="#">186008103</a>	10 × 250 mm	OBD Column	<a href="#">186008133</a>
10 × 100 mm	OBD Column	<a href="#">186008107</a>	10 × 300 mm	OBD Column	<a href="#">186008137</a>
10 × 150 mm	OBD Column	<a href="#">186008141</a>	19 × 10 mm	Guard Cartridge	<a href="#">186001034</a> <sup>2</sup>
19 × 10 mm	Guard Cartridge	<a href="#">186001104</a> <sup>2</sup>	19 × 50 mm	OBD Column	<a href="#">186002254</a>
19 × 50 mm	OBD Column	<a href="#">186001930</a>	19 × 150 mm	OBD Column	<a href="#">186002255</a>
19 × 100 mm	OBD Column	<a href="#">186001934</a>	19 × 250 mm	OBD Column	<a href="#">186002259</a>
19 × 150 mm	OBD Column	<a href="#">186002379</a>	19 × 300 mm	OBD Column	<a href="#">186002263</a>
30 × 10 mm	Guard Cartridge	<a href="#">186006903</a> <sup>3</sup>	30 × 10 mm	Guard Cartridge	<a href="#">186006902</a> <sup>3</sup>
30 × 50 mm	OBD Column	<a href="#">186001938</a>	30 × 150 mm	OBD Column	<a href="#">186002267</a>
30 × 100 mm	OBD Column	<a href="#">186001942</a>	30 × 250 mm	OBD Column	<a href="#">186002271</a>
50 × 50 mm	OBD Column	<a href="#">186002218</a>	30 × 300 mm	OBD Column	<a href="#">186002275</a>
50 × 100 mm	OBD Column	<a href="#">186002222</a>	50 × 50 mm	OBD Column	<a href="#">186002279</a>
			50 × 150 mm	OBD Column	<a href="#">186002843</a>
			50 × 250 mm	OBD Column	<a href="#">186002847</a>

\*Recommended maximum pressure of 6000 psi (400 bar).  
<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).  
<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).  
<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).  
<sup>5</sup>Requires 7.8 × 10 mm Cartridge Holder, p/n: [186000708](#).

XTerra Columns *Continued*

ANALYTICAL COLUMNS					
Particle Size: 2.5 µm*		Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
4.6 × 50 mm	<a href="#">186000603</a>	2.1 × 50 mm	<a href="#">186000401</a>	2.1 × 50 mm	<a href="#">186000447</a>
		2.1 × 100 mm	<a href="#">186000405</a>	2.1 × 100 mm	<a href="#">186000451</a>
		2.1 × 150 mm	<a href="#">186000409</a>	2.1 × 150 mm	<a href="#">186000455</a>
		3.9 × 100 mm	<a href="#">186000427</a>	2.1 × 250 mm	<a href="#">186000459</a>
		4.6 × 50 mm	<a href="#">186000433</a>	3.9 × 150 mm	<a href="#">186000479</a>
		4.6 × 100 mm	<a href="#">186000437</a>	4.6 × 50 mm	<a href="#">186000483</a>
		4.6 × 150 mm	<a href="#">186000441</a>	4.6 × 100 mm	<a href="#">186000487</a>
		4.6 × 250 mm	<a href="#">186001471</a>	4.6 × 150 mm	<a href="#">186000491</a>
				4.6 × 250 mm	<a href="#">186000495</a>

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
7.8 × 10 mm	Guard Cartridge	<a href="#">186001169</a> <sup>5</sup>	7.8 × 10 mm	Guard Cartridge	<a href="#">186001173</a> <sup>5</sup>
7.8 × 50 mm	Column	<a href="#">186001153</a>	7.8 × 150 mm	Column	<a href="#">186001161</a>
7.8 × 100 mm	Column	<a href="#">186001157</a>	7.8 × 300 mm	Column	<a href="#">186001165</a>
7.8 × 150 mm	Column	<a href="#">186001476</a>	10 × 150 mm	OBD Column	<a href="#">186008130</a>
10 × 50 mm	OBD Column	<a href="#">186008104</a>	10 × 250 mm	OBD Column	<a href="#">186008134</a>
10 × 150 mm	OBD Column	<a href="#">186008142</a>	10 × 300 mm	OBD Column	<a href="#">186008138</a>
19 × 10 mm	Guard Cartridge	<a href="#">186001105</a> <sup>2</sup>	19 × 10 mm	Guard Cartridge	<a href="#">186001035</a> <sup>2</sup>
19 × 50 mm	OBD Column	<a href="#">186001931</a>	19 × 150 mm	OBD Column	<a href="#">186002256</a>
19 × 100 mm	OBD Column	<a href="#">186001935</a>	19 × 250 mm	OBD Column	<a href="#">186002260</a>
19 × 150 mm	OBD Column	<a href="#">186002380</a>	19 × 300 mm	OBD Column	<a href="#">186002264</a>
30 × 10 mm	Guard Cartridge	<a href="#">186006904</a> <sup>3</sup>	30 × 150 mm	OBD Column	<a href="#">186002268</a>
30 × 75 mm	OBD Column	<a href="#">186002388</a>	30 × 250 mm	OBD Column	<a href="#">186002272</a>
30 × 100 mm	OBD Column	<a href="#">186001943</a>	30 × 300 mm	OBD Column	<a href="#">186002276</a>
50 × 50 mm	OBD Column	<a href="#">186002219</a>	50 × 50 mm	OBD Column	<a href="#">186002280</a>
50 × 100 mm	OBD Column	<a href="#">186002223</a>	50 × 150 mm	OBD Column	<a href="#">186002844</a>

\*Recommended maximum pressure of 6000 psi (400 bar).

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

<sup>5</sup>Requires 7.8 × 10 mm Cartridge Holder, p/n: [186000708](#).



Shield RP18			
ANALYTICAL COLUMNS			
Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 20 mm /S	<a href="#">186001925</a>	2.1 × 50 mm	<a href="#">186000448</a>
2.1 × 50 mm	<a href="#">186000402</a>	2.1 × 100 mm	<a href="#">186000452</a>
2.1 × 100 mm	<a href="#">186000406</a>	2.1 × 150 mm	<a href="#">186000456</a>
2.1 × 150 mm	<a href="#">186000410</a>	2.1 × 250 mm	<a href="#">186000460</a>
3.0 × 50 mm	<a href="#">186000416</a>	3.0 × 50 mm	<a href="#">186000464</a>
3.0 × 100 mm	<a href="#">186000420</a>	3.0 × 100 mm	<a href="#">186000468</a>
3.0 × 150 mm	<a href="#">186000424</a>	3.0 × 150 mm	<a href="#">186000472</a>
3.9 × 100 mm	<a href="#">186000428</a>	3.0 × 250 mm	<a href="#">186000476</a>
4.6 × 50 mm	<a href="#">186000434</a>	3.9 × 150 mm	<a href="#">186000480</a>
4.6 × 100 mm	<a href="#">186000438</a>	4.6 × 50 mm	<a href="#">186000484</a>
4.6 × 150 mm	<a href="#">186000442</a>	4.6 × 100 mm	<a href="#">186000488</a>
4.6 × 250 mm	<a href="#">186001472</a>	4.6 × 150 mm	<a href="#">186000492</a>
		4.6 × 250 mm	<a href="#">186000496</a>

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
7.8 × 10 mm	Guard Cartridge	<a href="#">186001170<sup>5</sup></a>	7.8 × 10 mm	Guard Cartridge	<a href="#">186001174<sup>5</sup></a>
7.8 × 50 mm	Column	<a href="#">186001154</a>	7.8 × 150 mm	Column	<a href="#">186001162</a>
7.8 × 100 mm	Column	<a href="#">186001158</a>	7.8 × 300 mm	Column	<a href="#">186001166</a>
7.8 × 150 mm	Column	<a href="#">186001477</a>	10 × 10 mm	Guard Cartridge	<a href="#">186001007<sup>1</sup></a>
10 × 10 mm	Guard Cartridge	<a href="#">186001006<sup>1</sup></a>	10 × 150 mm	OBD Column	<a href="#">186008131</a>
10 × 50 mm	OBD Column	<a href="#">186008105</a>	10 × 250 mm	OBD Column	<a href="#">186008135</a>
10 × 100 mm	OBD Column	<a href="#">186008128</a>	10 × 300 mm	OBD Column	<a href="#">186008139</a>
10 × 150 mm	OBD Column	<a href="#">186008143</a>	19 × 10 mm	Guard Cartridge	<a href="#">186001036<sup>2</sup></a>
19 × 10 mm	Guard Cartridge	<a href="#">186001106<sup>2</sup></a>	19 × 150 mm	OBD Column	<a href="#">186002257</a>
19 × 50 mm	OBD Column	<a href="#">186001932</a>	19 × 250 mm	OBD Column	<a href="#">186002261</a>
19 × 100 mm	OBD Column	<a href="#">186001936</a>	19 × 300 mm	OBD Column	<a href="#">186002265</a>
19 × 150 mm	OBD Column	<a href="#">186002381</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006905<sup>3</sup></a>
30 × 10 mm	Guard Cartridge	<a href="#">186006906<sup>3</sup></a>	30 × 150 mm	OBD Column	<a href="#">186002269</a>
30 × 50 mm	OBD Column	<a href="#">186001940</a>	30 × 250 mm	OBD Column	<a href="#">186002273</a>
30 × 75 mm	OBD Column	<a href="#">186002389</a>	30 × 300 mm	OBD Column	<a href="#">186002277</a>
30 × 100 mm	OBD Column	<a href="#">186001944</a>	50 × 50 mm	OBD Column	<a href="#">186002281</a>
50 × 50 mm	OBD Column	<a href="#">186002220</a>	50 × 250 mm	OBD Column	<a href="#">186002849</a>
50 × 100 mm	OBD Column	<a href="#">186002224</a>			

<sup>1</sup> Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup> Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

<sup>5</sup> Requires 7.8 × 10 mm Cartridge Holder, p/n: [186000708](#).

XTerra Columns *Continued*

Shield RP8				ANALYTICAL COLUMNS			
Particle Size: 3.5 µm			Particle Size: 5 µm				
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)			
3.0 × 50 mm	<a href="#">186000417</a>		2.1 × 150 mm	<a href="#">186000457</a>			
3.0 × 100 mm	<a href="#">186000421</a>		3.0 × 100 mm	<a href="#">186000469</a>			
3.0 × 150 mm	<a href="#">186000425</a>		3.0 × 150 mm	<a href="#">186000473</a>			
3.9 × 100 mm	<a href="#">186000429</a>		3.9 × 150 mm	<a href="#">186000481</a>			
4.6 × 50 mm	<a href="#">186000435</a>		4.6 × 50 mm	<a href="#">186000485</a>			
4.6 × 100 mm	<a href="#">186000439</a>		4.6 × 100 mm	<a href="#">186000489</a>			
4.6 × 150 mm	<a href="#">186000443</a>		4.6 × 150 mm	<a href="#">186000493</a>			
4.6 × 250 mm	<a href="#">186001473</a>		4.6 × 250 mm	<a href="#">186000497</a>			

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
7.8 × 10 mm	Guard Cartridge	<a href="#">186001171</a> <sup>5</sup>	7.8 × 10 mm	Guard Cartridge	<a href="#">186001175</a> <sup>5</sup>
7.8 × 50 mm	Column	<a href="#">186001155</a>	7.8 × 150 mm	Column	<a href="#">186001163</a>
7.8 × 100 mm	Column	<a href="#">186001159</a>	7.8 × 300 mm	Column	<a href="#">186001167</a>
7.8 × 150 mm	Column	<a href="#">186001478</a>	10 × 10 mm	Guard Cartridge	<a href="#">186001009</a> <sup>1</sup>
10 × 10 mm	Guard Cartridge	<a href="#">186001008</a> <sup>1</sup>	10 × 150 mm	OBD Column	<a href="#">186008132</a>
10 × 50 mm	OBD Column	<a href="#">186008106</a>	10 × 250 mm	OBD Column	<a href="#">186008136</a>
10 × 150 mm	OBD Column	<a href="#">186008144</a>	10 × 300 mm	OBD Column	<a href="#">186008140</a>
19 × 10 mm	Guard Cartridge	<a href="#">186001107</a> <sup>2</sup>	19 × 10 mm	Guard Cartridge	<a href="#">186001037</a> <sup>2</sup>
19 × 100 mm	OBD Column	<a href="#">186001937</a>	19 × 150 mm	OBD Column	<a href="#">186002258</a>
19 × 150 mm	OBD Column	<a href="#">186002382</a>	19 × 250 mm	OBD Column	<a href="#">186002262</a>
30 × 50 mm	OBD Column	<a href="#">186001941</a>	19 × 300 mm	OBD Column	<a href="#">186002266</a>
30 × 75 mm	OBD Column	<a href="#">186002390</a>	30 × 150 mm	OBD Column	<a href="#">186002270</a>
30 × 100 mm	OBD Column	<a href="#">186001945</a>	30 × 250 mm	OBD Column	<a href="#">186002274</a>
50 × 50 mm	OBD Column	<a href="#">186002221</a>	30 × 300 mm	OBD Column	<a href="#">186002278</a>
50 × 100 mm	OBD Column	<a href="#">186002225</a>	50 × 50 mm	OBD Column	<a href="#">186002282</a>
			50 × 150 mm	OBD Column	<a href="#">186002846</a>
			50 × 250 mm	OBD Column	<a href="#">186002850</a>

<sup>1</sup> Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>5</sup> Requires 7.8 × 10 mm Cartridge Holder, p/n: [186000708](#).

XTerra Columns *Continued*

Phenyl	ANALYTICAL COLUMNS			
	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
	2.1 × 50 mm	<a href="#">186001179</a>	3.9 × 150 mm	<a href="#">186001184</a>
	2.1 × 100 mm	<a href="#">186001180</a>	4.6 × 50 mm	<a href="#">186001144</a>
	2.1 × 150 mm	<a href="#">186001181</a>	4.6 × 100 mm	<a href="#">186001145</a>
	3.0 × 100 mm	<a href="#">186001142</a>	4.6 × 150 mm	<a href="#">186001146</a>
	3.0 × 150 mm	<a href="#">186001143</a>	4.6 × 250 mm	<a href="#">186001147</a>
	3.9 × 150 mm	<a href="#">186001178</a>		
	4.6 × 50 mm	<a href="#">186001138</a>		
	4.6 × 100 mm	<a href="#">186001139</a>		
	4.6 × 150 mm	<a href="#">186001140</a>		
	4.6 × 250 mm	<a href="#">186001474</a>		

XTerra Columns Method Validation Kits\*

	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
MS C <sub>18</sub>	4.6 × 150 mm	<a href="#">186000826</a>	4.6 × 150 mm	<a href="#">186000829</a>
			4.6 × 250 mm	<a href="#">186000830</a>
Shield RP18	4.6 × 150 mm	<a href="#">186000861</a>	4.6 × 150 mm	<a href="#">186000862</a>
			4.6 × 250 mm	<a href="#">186000863</a>

\*Each Method Validation Kit contains 3 columns, each from a different batch.

XTerra VanGuard Cartridges\*

	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
MS C <sub>18</sub>	2.1 × 5 mm	<a href="#">186007887</a>	2.1 × 5 mm	<a href="#">186007892</a>	2.1 × 5 mm	<a href="#">186007896</a>
	3.9 × 5 mm	<a href="#">186007889</a>	3.9 × 5 mm	<a href="#">186007894</a>	3.9 × 5 mm	<a href="#">186007899</a>
MS C <sub>8</sub>	2.1 × 5 mm	<a href="#">186007901</a>	2.1 × 5 mm	<a href="#">186007905</a>	2.1 × 5 mm	<a href="#">186007909</a>
	3.9 × 5 mm	<a href="#">186007903</a>	3.9 × 5 mm	<a href="#">186007735</a>	3.9 × 5 mm	<a href="#">186007739</a>
Shield RP18			2.1 × 5 mm	<a href="#">186007929</a>	2.1 × 5 mm	<a href="#">186007933</a>
			3.9 × 5 mm	<a href="#">186007931</a>	3.9 × 5 mm	<a href="#">186007935</a>
Shield RP8			2.1 × 5 mm	<a href="#">186007941</a>	3.9 × 5 mm	<a href="#">186007947</a>
			3.9 × 5 mm	<a href="#">186007943</a>		
Phenyl			2.1 × 5 mm	<a href="#">186007917</a>	2.1 × 5 mm	<a href="#">186007921</a>
			3.9 × 5 mm	<a href="#">186007919</a>	3.9 × 5 mm	<a href="#">186007923</a>

\*Each cartridge listed requires use of Universal VanGuard Cartridge Holder (Listed below, p/n [186007949](#))

Universal VanGuard Cartridge Holder

Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>

## Spherisorb Columns

Waters Spherisorb™ Columns are available in a wide range of particle sizes (3, 5, and 10 μm) and bonded phases. Their high quality bonded phases afford many different and unique separation selectivities.

Analytical columns are supplied with icommon, Parker-style, column end fittings.



### Column Characteristics

	ODS2 (C <sub>18</sub> ), 80 Å	ODS1 (C <sub>18</sub> ), 80 Å	ODSB (C <sub>18</sub> ), 80 Å	C <sub>8</sub> , 80 Å	C <sub>6</sub> , 80 Å	C <sub>1</sub> , 80 Å
	HPLC: 3, 5, 10 μm	HPLC: 3, 5, 10 μm	HPLC: 5 μm	HPLC: 3, 5, 10 μm	HPLC: 3, 5, 10 μm	HPLC: 3, 5, 10 μm
Ligand Benefit	General purpose, balanced retention for acids, bases, and neutrals	General purpose, balanced retention for acids, bases, and neutrals	General purpose, balanced retention for acids, bases, and neutrals	Good retention for strong hydrophobic compounds	Increased retention for strong hydrophobic compounds	Superior retention for very strong hydrophobic compounds
Particle/Ligand						
Ligand Density*	3.0 μmol/m <sup>2</sup>	1.5 μmol/m <sup>2</sup>	3.0 μmol/m <sup>2</sup>	3.1 μmol/m <sup>2</sup>	3.4 μmol/m <sup>2</sup>	3.0 μmol/m <sup>2</sup>
Carbon Load*	11.5%	6.2%	11.5%	5.8%	4.7%	2.2%
Endcapped	Yes	No	No	Yes	Yes	No
USP Class No.	L1	L1	L1	L7	L15	L13
Surface Area*	220 m <sup>2</sup> /g	220 m <sup>2</sup> /g	220 m <sup>2</sup> /g	220 m <sup>2</sup> /g	220 m <sup>2</sup> /g	220 m <sup>2</sup> /g

\*Expected or approximate value.

	NH <sub>2</sub> (Amino), 80 Å	Phenyl, 80 Å	CN (Nitrile), 80 Å	OD/CN, 80 Å	W (Silica), 80 Å	SCX, 80 Å	SAX, 80 Å
	HPLC: 3, 5, 10 μm	HPLC: 3, 5, 10 μm	HPLC: 3, 5, 10 μm	HPLC: 5 μm	HPLC: 3, 5, 10 μm	HPLC: 5, 10 μm	HPLC: 5, 10 μm
Ligand Benefit	Alternate retention for polar compounds	Better retention for aromatic compounds	Alternate selectivity for polar compounds	Alternate selectivity for polar compounds	No ligand, for use in cation exchange mode for retention of large highly polar and/or charged compounds	No ligand, for general purpose separation of polar compounds in normal phase mode	No ligand, for use in anion exchange mode for retention of large highly polar and/or charged compounds
Particle/Ligand							
Ligand Density*	2.6 μmol/m <sup>2</sup>	1.7 μmol/m <sup>2</sup>	3.3 μmol/m <sup>2</sup>	1.2 μmol/m <sup>2</sup>	—	—	—
Carbon Load*	1.9%	2.5%	3.1%	5%	N/A	4%	4%
Endcapped	No	No	No	Yes	No	No	No
USP Class No.	L8	L11	L10	—	L3	L9	L14
Surface Area*	220 m <sup>2</sup> /g	220 m <sup>2</sup> /g	220 m <sup>2</sup> /g	220 m <sup>2</sup> /g	220 m <sup>2</sup> /g	220 m <sup>2</sup> /g	220 m <sup>2</sup> /g

\*Expected or approximate value.

For Spherisorb Preparative Columns, please refer to [pages 295-298](#).

## Ordering Information

### Spherisorb Columns

ODS1					
ANALYTICAL COLUMNS					
Particle Size: 3 $\mu$ m			Particle Size: 5 $\mu$ m		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
2.0 $\times$ 100 mm	<a href="#">PSS833422</a>		4.0 $\times$ 125 mm	<a href="#">PSS845541</a>	
4.6 $\times$ 50 mm	<a href="#">PSS833411</a>		4.0 $\times$ 250 mm	<a href="#">PSS845542</a>	
4.6 $\times$ 100 mm	<a href="#">PSS833412</a>		4.6 $\times$ 100 mm	<a href="#">PSS830612</a>	
4.6 $\times$ 150 mm	<a href="#">PSS833413</a>		4.6 $\times$ 150 mm	<a href="#">PSS830613</a>	
			4.6 $\times$ 250 mm	<a href="#">PSS830615</a>	

PREPARATIVE COLUMNS					
Particle Size: 5 $\mu$ m			Particle Size: 10 $\mu$ m		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 $\times$ 250 mm	OBD Column	<a href="#">186008284</a>	10 $\times$ 250 mm	OBD Column	<a href="#">186008285</a>
19 $\times$ 250 mm	OBD Column	<a href="#">186008846</a>	19 $\times$ 250 mm	OBD Column	<a href="#">186008857</a>

ODS2					
ANALYTICAL COLUMNS					
Particle Size: 3 $\mu$ m			Particle Size: 5 $\mu$ m		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
4.6 $\times$ 50 mm	<a href="#">PSS832111</a>		4.0 $\times$ 125 mm	<a href="#">PSS845543</a>	
4.6 $\times$ 100 mm	<a href="#">PSS832112</a>		4.0 $\times$ 250 mm	<a href="#">PSS845277</a>	
4.6 $\times$ 150 mm	<a href="#">PSS832113</a>		4.6 $\times$ 50 mm	<a href="#">PSS831911</a>	
			4.6 $\times$ 100 mm	<a href="#">PSS831912</a>	
			4.6 $\times$ 150 mm	<a href="#">PSS831913</a>	
			4.6 $\times$ 250 mm	<a href="#">PSS831915</a>	

PREPARATIVE COLUMNS					
Particle Size: 5 $\mu$ m			Particle Size: 10 $\mu$ m		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 $\times$ 250 mm	OBD Column	<a href="#">186008292</a>	10 $\times$ 250 mm	OBD Column	<a href="#">186008294</a>
19 $\times$ 250 mm	OBD Column	<a href="#">186008847</a>	19 $\times$ 250 mm	OBD Column	<a href="#">186008858</a>

C <sub>8</sub>					
ANALYTICAL COLUMNS					
Particle Size: 3 $\mu$ m			Particle Size: 5 $\mu$ m		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
4.6 $\times$ 50 mm	<a href="#">PSS832211</a>		4.0 $\times$ 125 mm	<a href="#">PSS845280</a>	
4.6 $\times$ 100 mm	<a href="#">PSS832212</a>		4.0 $\times$ 250 mm	<a href="#">PSS845281</a>	
4.6 $\times$ 150 mm	<a href="#">PSS832213</a>		4.6 $\times$ 100 mm	<a href="#">PSS831812</a>	
			4.6 $\times$ 150 mm	<a href="#">PSS831813</a>	
			4.6 $\times$ 250 mm	<a href="#">PSS831815</a>	

PREPARATIVE COLUMNS					
Particle Size: 5 $\mu$ m			Particle Size: 10 $\mu$ m		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 $\times$ 250 mm	OBD Column	<a href="#">186008291</a>	10 $\times$ 250 mm	OBD Column	<a href="#">186008297</a>
19 $\times$ 250 mm	OBD Column	<a href="#">186008848</a>	19 $\times$ 250 mm	OBD Column	<a href="#">186008859</a>

Spherisorb Columns *Continued*

<b>C<sub>6</sub></b>					
ANALYTICAL COLUMNS					
Particle Size: 3 μm			Particle Size: 5 μm		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
4.6 × 150 mm	<a href="#">PSS833113</a>		4.0 × 125 mm	<a href="#">PSS845284</a>	
			4.6 × 100 mm	<a href="#">PSS831012</a>	
			4.6 × 250 mm	<a href="#">PSS831015</a>	
PREPARATIVE COLUMNS					
Particle Size: 5 μm			Particle Size: 10 μm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 250 mm	OBD Column	<a href="#">186008288</a>	19 × 250 mm	OBD Column	<a href="#">186008860</a>
19 × 250 mm	OBD Column	<a href="#">186008849</a>			

<b>C<sub>1</sub></b>					
ANALYTICAL COLUMNS					
Particle Size: 5 μm					
			Dimension	P/N (1/pk)	
			4.6 × 100 mm	<a href="#">PSS832612</a>	
			4.6 × 150 mm	<a href="#">PSS832613</a>	
			4.6 × 250 mm	<a href="#">PSS832615</a>	
PREPARATIVE COLUMNS					
Particle Size: 5 μm			Particle Size: 10 μm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 250 mm	OBD Column	<a href="#">186008295</a>	19 × 250 mm	OBD Column	<a href="#">186008861</a>
19 × 250 mm	OBD Column	<a href="#">186008850</a>			

<b>NH<sub>2</sub></b>					
ANALYTICAL COLUMNS					
Particle Size: 3 μm			Particle Size: 5 μm		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
2.0 × 100 mm	<a href="#">PSS832322</a>		4.0 × 250 mm	<a href="#">PSS845301</a>	
4.6 × 50 mm	<a href="#">PSS832311</a>		4.6 × 150 mm	<a href="#">PSS831113</a>	
4.6 × 100 mm	<a href="#">PSS832312</a>		4.6 × 250 mm	<a href="#">PSS831115</a>	
4.6 × 150 mm	<a href="#">PSS832313</a>				
PREPARATIVE COLUMNS					
Particle Size: 5 μm			Particle Size: 10 μm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 250 mm	OBD Column	<a href="#">186008289</a>	10 × 250 mm	OBD Column	<a href="#">186008299</a>
19 × 250 mm	OBD Column	<a href="#">186008853</a>	19 × 250 mm	OBD Column	<a href="#">186008864</a>

Spherisorb Columns *Continued*

Phenyl					
ANALYTICAL COLUMNS					
Particle Size: 3 $\mu$ m			Particle Size: 5 $\mu$ m		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
4.6 $\times$ 150 mm	<a href="#">PSS833713</a>		4.0 $\times$ 250 mm	<a href="#">PSS845293</a>	
			4.6 $\times$ 250 mm	<a href="#">PSS830815</a>	
PREPARATIVE COLUMNS					
Particle Size: 5 $\mu$ m			Particle Size: 10 $\mu$ m		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 $\times$ 250 mm	OBD Column	<a href="#">186008286</a>	10 $\times$ 250 mm	OBD Column	<a href="#">186008300</a>
19 $\times$ 250 mm	OBD Column	<a href="#">186008854</a>	19 $\times$ 250 mm	OBD Column	<a href="#">186008865</a>

CN Normal Phase					
ANALYTICAL COLUMNS					
Particle Size: 3 $\mu$ m			Particle Size: 5 $\mu$ m		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
4.6 $\times$ 150 mm	<a href="#">PSS832413</a>		4.0 $\times$ 250 mm	<a href="#">PSS845297</a>	
			4.6 $\times$ 100 mm	<a href="#">PSS830912</a>	
			4.6 $\times$ 150 mm	<a href="#">PSS830913</a>	
			4.6 $\times$ 250 mm	<a href="#">PSS830915</a>	
PREPARATIVE COLUMNS					
Particle Size: 5 $\mu$ m			Particle Size: 10 $\mu$ m		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 $\times$ 250 mm	OBD Column	<a href="#">186008287</a>	10 $\times$ 250 mm	OBD Column	<a href="#">186008298</a>
19 $\times$ 250 mm	OBD Column	<a href="#">186008852</a>	19 $\times$ 250 mm	OBD Column	<a href="#">186008863</a>

CN Reversed Phase			
ANALYTICAL COLUMNS			
Particle Size: 5 $\mu$ m			
		Dimension	P/N (1/pk)
		4.6 $\times$ 150 mm	<a href="#">PSS830908</a>
		4.6 $\times$ 250 mm	<a href="#">PSS830909</a>

Silica					
ANALYTICAL COLUMNS					
Particle Size: 3 $\mu$ m			Particle Size: 5 $\mu$ m		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
4.6 $\times$ 150 mm	<a href="#">PSS832013</a>		2.0 $\times$ 250 mm	<a href="#">PSS830125</a>	
			4.0 $\times$ 250 mm	<a href="#">PSS845540</a>	
			4.6 $\times$ 250 mm	<a href="#">PSS830115</a>	
PREPARATIVE COLUMNS					
Particle Size: 5 $\mu$ m			Particle Size: 10 $\mu$ m		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 $\times$ 250 mm	OBD Column	<a href="#">186008281</a>	10 $\times$ 250 mm	OBD Column	<a href="#">186008282</a>
19 $\times$ 250 mm	OBD Column	<a href="#">186008851</a>	19 $\times$ 250 mm	OBD Column	<a href="#">186008862</a>

## Spherisorb Columns *Continued*

SAX	ANALYTICAL COLUMNS		PREPARATIVE COLUMNS					
	Particle Size: 5 µm		Particle Size: 5 µm			Particle Size: 10 µm		
	Dimension	P/N (1/pk)	Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
	4.0 × 250 mm	<a href="#">PSS845305</a>	10 × 250 mm	OBD Column	<a href="#">186008296</a>	10 × 250 mm	OBD Column	<a href="#">186008301</a>
	4.6 × 50 mm	<a href="#">PSS832711</a>	19 × 250 mm	OBD Column	<a href="#">186008855</a>	19 × 250 mm	OBD Column	<a href="#">186008866</a>
	4.6 × 150 mm	<a href="#">PSS832713</a>						
	4.6 × 250 mm	<a href="#">PSS832715</a>						

SCX	ANALYTICAL COLUMNS		PREPARATIVE COLUMNS					
	Particle Size: 5 µm		Particle Size: 5 µm			Particle Size: 10 µm		
	Dimension	P/N (1/pk)	Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
	4.0 × 250 mm	<a href="#">PSS845309</a>	10 × 250 mm	OBD Column	<a href="#">186008302</a>	10 × 250 mm	OBD Column	<a href="#">186008303</a>
	4.6 × 50 mm	<a href="#">PSS837511</a>	19 × 250 mm	OBD Column	<a href="#">186008856</a>	19 × 250 mm	OBD Column	<a href="#">186008867</a>
	4.6 × 100 mm	<a href="#">PSS837512</a>						
	4.6 × 150 mm	<a href="#">PSS837513</a>						
	4.6 × 250 mm	<a href="#">PSS837515</a>						

OD/CN	ANALYTICAL COLUMNS	
	Particle Size: 5 µm	
	Dimension	P/N (1/pk)
	4.6 × 150 mm	<a href="#">PSS837813</a>
	4.6 × 250 mm	<a href="#">PSS837815</a>

## Waters Spherisorb Guard Cartridges\*

Dimension	Type	Particle Size	Qty.	ODS1	ODS2	C <sub>8</sub>	C <sub>6</sub>	C <sub>1</sub>	NH <sub>2</sub>
10 × 4.6 mm	Guard	5 µm	3/pk	<a href="#">PSS830073</a>	<a href="#">PSS830053</a>	<a href="#">PSS830074</a>	<a href="#">PSS830075</a>	<a href="#">PSS830076</a>	<a href="#">PSS830079</a>
30 × 4.6 mm	Guard	5 µm	3/pk	—	<a href="#">PSS839458</a>	—	—	—	<a href="#">PSS839478</a>

Dimension	Type	Particle Size	Qty.	CN Normal Phase	W Silica	SAX	SCX
10 × 4.6 mm	Guard	5 µm	3/pk	<a href="#">PSS830077</a>	<a href="#">PSS830051</a>	<a href="#">PSS830055</a>	<a href="#">PSS830057</a>
30 × 4.6 mm	Guard	5 µm	3/pk	<a href="#">PSS839476</a>	<a href="#">PSS839451</a>	<a href="#">PSS839465</a>	<a href="#">PSS839471</a>

\*For the 10 × 4.6 mm guards, use either the In Line Guard Cartridge Holder (p/n: [PSS830008](#)) or an Extended Endfitting for 4.6 × 10 mm Guard Cartridge (p/n: [PSS614108](#)). The 30 × 4.6 mm guards require a Removable Endfitting (p/n: [PSS614100](#)) and a Column Coupler (p/n: [PSS614102](#)).

## Spherisorb Guard Cartridge Holders\*

Description	Qty.	P/N
In Line Guard Cartridge Holder Kit for 4.6 × 10 mm Guards		<a href="#">PSS830008</a>
Extended Endfitting for Integral Guard Cartridge (for use with 4.6 × 10 mm guard cartridge)	1/pk	<a href="#">PSS614108</a>
Removable Cartridge Column Endfitting (for use with 30 × 10 mm guard cartridge)	2/pk	<a href="#">PSS614100</a>
Column Coupler (for use with 30 × 10 mm guard cartridge)	2/pk	<a href="#">PSS614102</a>

\*See Cartridge and Guard Columns, Fittings, and Accessories section for more additional detail ([page 240](#))



## Nova-Pak Columns

The bonded phases of Nova-Pak™ Columns, available in 4 and 6 µm particle sizes, offer high resolution and fast, efficient chromatography. When used with relatively short column lengths, the smaller particles reduce solvent consumption while retaining their ability to resolve complex mixtures. Steel analytical columns packed with 4 µm particles are available in 75, 150, and 300 mm lengths. Packed with high efficiency 6 µm particles, semi-preparative Prep Nova-Pak Columns provide an unparalleled range of separation possibilities. Their faster separations produce concentrated fractions, and they require less solvent, significantly reducing costs.



### Column Characteristics

	C <sub>8</sub> , 60 Å	C <sub>18</sub> , 60 Å	Phenyl, 60 Å	CN, 60 Å	Silica, 60 Å
	HPLC: 4 µm	HPLC: 4, 6 µm	HPLC: 4 µm	HPLC: 4 µm	HPLC: 4, 6 µm
Ligand Benefit	Better retention for strong hydrophobic compounds	Balanced retention for polar and nonpolar compounds	Better retention for aromatic compounds	Alternate retention for polar compounds	No ligand, best for polar compound retention when used in normal phase mode
Particle/Ligand					
Carbon Load*	4%	7%	5%	2%	N/A
Endcapped	Yes	Yes	Yes	Yes	No
USP Class No.	L7	L1	L11	L10	L3
Performance Standards	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	—	—
Application Standards	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	—	—

\*Expected or approximate value.

### Ordering Information

#### Nova-Pak Columns

Nova-Pak C <sub>18</sub>	ANALYTICAL COLUMNS	
	Particle Size: 4 µm	
	Dimension	P/N (1/pk)
	2.1 × 150 mm	<a href="#">WAT023655</a>
	3.9 × 75 mm	<a href="#">WAT011670</a>
	3.9 × 150 mm	<a href="#">WAT086344</a>
	3.9 × 300 mm	<a href="#">WAT011695</a>
	4.6 × 150 mm	<a href="#">WAT044375</a>

Nova-Pak C <sub>18</sub>	PREPARATIVE COLUMNS	
	Particle Size: 6 µm	
	Dimension	P/N (1/pk)
	3.9 × 300 mm	<a href="#">WAT038500</a>
	7.8 × 300 mm	<a href="#">WAT025820</a>
	19 × 300 mm	<a href="#">WAT025822</a>

For Nova-Pak Preparative Columns, please refer to [page 299](#).

## Nova-Pak Columns *Continued*

Nova-Pak C <sub>8</sub>	ANALYTICAL COLUMNS	
	Particle Size: 4 μm	
	3.9 × 75 mm	<a href="#">WAT035877</a>
3.9 × 150 mm	<a href="#">WAT035876</a>	

Nova-Pak Phenyl	ANALYTICAL COLUMNS	
	Particle Size: 4 μm	
	Dimension	P/N (1/pk)
2.1 × 150 mm	<a href="#">WAT052740</a>	
3.9 × 75 mm	<a href="#">WAT011675</a>	
3.9 × 150 mm	<a href="#">WAT010656</a>	

Nova-Pak CN-HP	3.9 × 75 mm	<a href="#">WAT010270</a>
	3.9 × 150 mm	<a href="#">WAT044245</a>
	3.9 × 300 mm	<a href="#">WAT056920</a>

Nova-Pak Silica	2.1 × 150 mm	<a href="#">WAT052745</a>
	3.9 × 150 mm	<a href="#">WAT010025</a>

PREPARATIVE COLUMNS	
Particle Size: 6 μm	
Dimension	P/N (1/pk)
3.9 × 300 mm	<a href="#">WAT038501</a>
7.8 × 300 mm	<a href="#">WAT025821</a>
19 × 300 mm	<a href="#">WAT025823</a>

## Resolve Columns

The non-encapped Resolve Packing is significantly different compared to other Waters packing materials. The change in chromatographic behavior is most commonly noticed with polar compounds, which are typically more retained. For alkaline compounds, ion-pairing reagents are added to the mobile phase to reduce excessive tailing.



### Column Characteristics


	C <sub>8</sub> , 90 Å	C <sub>18</sub> , 90 Å	Silica, 90 Å	CN, 90 Å
	HPLC: 5, 10 μm	HPLC: 5, 10 μm	HPLC: 5, 10 μm	HPLC: 10 μm
Ligand Benefit	General purpose, balanced retention for acids, bases and neutrals. Less retentive than C <sub>18</sub>	General purpose, balanced retention for acids, bases and neutrals	No ligand, best for polar compound retention when used in normal phase mode	Alternate selectivity for polar molecules
Carbon Load*	5%	10%	10%	3%
Encapped	No	No	No	No
USP Class No.	L7	L1	L3	L10
Performance Standards	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	—	—
Application Standards	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	—	—

\*Expected or approximate value.

## Ordering Information

### Resolve Columns

C <sub>18</sub>	Particle Size: 5 μm	
	Dimension	P/N (1/pk)
	3.9 × 150 mm	<a href="#">WAT085711</a>
3.9 × 300 mm	<a href="#">WAT011740</a>	

 For Resolve Radial Compression Columns and PrepPak™ Cartridges, please [refer to page 307](#).

## Delta-Pak Columns

Delta-Pak Columns are ideal for separating and isolating peptides, proteins, and natural products. Optimized for large molecule separations and available in two pore sizes, they provide consistent and predictable scaling from milligram quantities to gram quantities between column formats.



### Column Characteristics

	$C_{18}$ , 100 Å	$C_{18}$ , 300 Å	$C_4$ , 100 Å	$C_4$ , 300 Å
	HPLC: 5, 15 $\mu$ m	HPLC: 5, 15 $\mu$ m	HPLC: 5, 15 $\mu$ m	HPLC: 5, 15 $\mu$ m
Ligand Benefit	General purpose, balanced retention for acids, bases, and neutrals	Wide-pore, general purpose, balanced retention for acids, bases, and neutral compounds	General purpose, provides less retention of hydrophobic compounds versus $C_{18}$	Wide-pore, provides less retention of larger hydrophobic compounds versus $C_{18}$
Carbon Load*	17%	7%	7%	3%
Endcapped	Yes	Yes	Yes	Yes
USP Class No.	L1	L1	L26	L26
Performance Standards	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	Neutrals QC Reference Material p/n: <a href="#">186006360</a>	MassPREP Protein Standard Mix p/n: <a href="#">186004900</a>	MassPREP Protein Standard Mix p/n: <a href="#">186004900</a>
Application Standards	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	Reversed-Phase QC Reference Material p/n: <a href="#">186006363</a>	MassPREP Protein Standard Mix p/n: <a href="#">186004900</a>	MassPREP Protein Standard Mix p/n: <a href="#">186004900</a>

\*Expected or approximate value.

### Ordering Information

#### Delta-Pak Columns

Delta-Pak $C_{18}$ , 300 Å	ANALYTICAL COLUMNS		Delta-Pak $C_4$ , 300 Å	ANALYTICAL COLUMNS	
	Particle Size: 5 $\mu$ m			Particle Size: 5 $\mu$ m	
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
3.9 × 150 mm	<a href="#">WAT011793</a>		3.9 × 150 mm	<a href="#">WAT011794</a>	
PREPARATIVE COLUMNS		PREPARATIVE COLUMNS		PREPARATIVE COLUMNS	
Particle Size: 15 $\mu$ m		Particle Size: 15 $\mu$ m		Particle Size: 15 $\mu$ m	
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
3.9 × 300 mm	<a href="#">WAT011802</a>		3.9 × 300 mm	<a href="#">WAT011812</a>	
7.8 × 300 mm	<a href="#">WAT011803</a>		7.8 × 300 mm	<a href="#">WAT011813</a>	
19 × 300 mm	<a href="#">WAT011804</a>		19 × 300 mm	<a href="#">WAT011814</a>	
30 × 300 mm	<a href="#">WAT011805</a>		30 × 300 mm	<a href="#">WAT011815</a>	

**i** For Delta-Pak Preparative Columns, please refer to [page 301](#).

## Delta-Pak Columns *Continued*

Delta-Pak C <sub>18</sub> , 100 Å	PREPARATIVE COLUMNS	
	Particle Size: 15 µm	
	Dimension	P/N (1/pk)
	3.9 × 300 mm	<a href="#">WAT011797</a>
	7.8 × 300 mm	<a href="#">WAT011798</a>
	19 × 300 mm	<a href="#">WAT011799</a>
	30 × 300 mm	WAT011800
	50 × 300 mm	<a href="#">WAT011801</a>

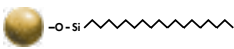
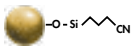
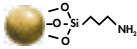
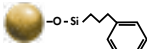
Delta-Pak C <sub>8</sub> , 100 Å	PREPARATIVE COLUMNS	
	Particle Size: 15 µm	
	Dimension	P/N (1/pk)
	3.9 × 300 mm	<a href="#">WAT011807</a>
	7.8 × 300 mm	<a href="#">WAT011808</a>
	19 × 300 mm	<a href="#">WAT011809</a>
	30 × 300 mm	<a href="#">WAT011810</a>

## µBondapak/Bondapak Columns

Waters makes the only column that contains the µBondapak™ C<sub>18</sub> packing material. Other column manufacturers claim their products exhibit “µBondapak-like” selectivity. Yet none of them have ever passed Waters’ stringent QC batch tests. Since 1973, µBondapak and Bondapak™ packing materials demonstrate year-to-year reproducibility, which is why µBondapak remains among the most frequently referenced column brands.



### Column Characteristics

	C <sub>18</sub> , 125 Å	CN, 125 Å	NH <sub>2</sub> , 125 Å	Phenyl, 125 Å
	HPLC: 10 µm	HPLC: 10 µm	HPLC: 10 µm	HPLC: 10 µm
<b>Ligand Benefit</b>	General purpose, balanced retention for acids, bases, and neutrals	General purpose, contrasting selectivity for polar compounds versus C <sub>18</sub> . For use in normal or reversed-phase modes	Contrasting selectivity for polar compounds versus C <sub>18</sub> . For use in normal or reversed-phase modes	Alternate selectivity versus C <sub>18</sub> ; provides better retention of aromatic compounds
<b>Particle/Ligand</b>				
Carbon Load*	10%	6%	3.5%	8%
Endcapped	Yes	Yes	No	Yes
USP Class No.	L1	L1	L8	L11
Performance Standards	<b>Neutrals QC Reference Material</b> p/n: <a href="#">186006360</a>	—	—	<b>Neutrals QC Reference Material</b> p/n: <a href="#">186006360</a>
Application Standards	<b>Reversed-Phase QC Reference Material</b> p/n: <a href="#">186006363</a>	—	—	<b>Reversed-Phase QC Reference Material</b> p/n: <a href="#">186006363</a>

\*Expected or approximate value.

## Ordering Information


### μBondapak/Bondapak

C <sub>18</sub> , 125 Å	
<b>ANALYTICAL COLUMNS</b>	
Particle Size: 10 μm	
Dimension	P/N (1/pk)
3.9 × 150 mm	<a href="#">WAT086684</a>
3.9 × 300 mm	<a href="#">WAT027324</a>
4.6 × 150 mm	<a href="#">WAT044370</a>
4.6 × 300 mm	<a href="#">186000925</a>
<b>PREPARATIVE COLUMNS</b>	
Particle Size: 10 μm	
Dimension	P/N (1/pk)
3.9 × 150 mm	<a href="#">WAT086684</a>
3.9 × 300 mm	<a href="#">WAT027324</a>
4.6 × 150 mm	<a href="#">WAT044370</a>
4.6 × 300 mm	<a href="#">186000925</a>
7.8 × 300 mm	<a href="#">WAT084176</a>
19 × 150 mm	<a href="#">WAT088500</a>
19 × 300 mm	<a href="#">WAT025828</a>
Particle Size: 15-20 μm	
3.9 × 150 mm	<a href="#">WAT025875</a>
7.8 × 300 mm	<a href="#">WAT025832</a>
19 × 300 mm	<a href="#">WAT025834</a>

CN, 125 Å	
<b>ANALYTICAL COLUMNS</b>	
Particle Size: 10 μm	
Dimension	P/N (1/pk)
3.9 × 150 mm	<a href="#">WAT086688</a>
3.9 × 300 mm	<a href="#">WAT084042</a>
<b>PREPARATIVE COLUMNS</b>	
Particle Size: 10 μm	
Dimension	P/N (1/pk)
3.9 × 150 mm	<a href="#">WAT086688</a>
3.9 × 300 mm	<a href="#">WAT084042</a>
7.8 × 300 mm	<a href="#">WAT084177</a>

NH <sub>2</sub> , 125 Å	
<b>ANALYTICAL COLUMNS</b>	
Particle Size: 10 μm	
Dimension	P/N (1/pk)
3.9 × 300 mm	<a href="#">WAT084040</a>
<b>PREPARATIVE COLUMNS</b>	
Particle Size: 10 μm	
Dimension	P/N (1/pk)
3.9 × 300 mm	<a href="#">WAT084040</a>
7.8 × 300 mm	<a href="#">WAT084178</a>

Phenyl, 125 Å	
<b>ANALYTICAL COLUMNS</b>	
Particle Size: 10 μm	
Dimension	P/N (1/pk)
3.9 × 150 mm	<a href="#">WAT086680</a>
3.9 × 300 mm	<a href="#">WAT027198</a>
<b>PREPARATIVE COLUMNS</b>	
Particle Size: 10 μm	
Dimension	P/N (1/pk)
3.9 × 150 mm	<a href="#">WAT086680</a>
3.9 × 300 mm	<a href="#">WAT027198</a>
7.8 × 300 mm	<a href="#">WAT084179</a>

 For μBondapak/Bondapak and μPorasil/Porasil Preparative Columns, please refer to [page 299](#).

## μPorasil/Porasil Columns

μPorasil and Porasil particles were one of the first commercially available, fully porous packing materials used for LC separations. In contrast to the reversed-phase separation ability of μBondapak C<sub>18</sub>, the non-bonded, silica-based material in μPorasil Columns was produced to provide normal-phase separations for a wide array of sample types.

### Column Characteristics

	HPLC: 10, 15-20 μm
	Silica, 125 Å
Carbon Load*	N/A
Endcapped	No
USP Class No.	L3

\*Expected or approximate value.

### Ordering Information

#### μPorasil/Porasil

μPorasil, 125 Å	ANALYTICAL COLUMNS	
	Particle Size: 10 μm	
	Dimension	P/N (1/pk)
	3.9 × 300 mm	<a href="#">WAT027477</a>
	PREPARATIVE COLUMNS	
	Particle Size: 10 μm	
	Dimension	P/N (1/pk)
	3.9 × 150 mm	<a href="#">WAT086692</a>
	3.9 × 300 mm	<a href="#">WAT027477</a>
	7.8 × 300 mm	<a href="#">WAT084175</a>
	19 × 150 mm	<a href="#">WAT091648</a>
	19 × 300 mm	<a href="#">WAT025829</a>
Porasil, 125 Å	PREPARATIVE COLUMNS	
	Particle Size: 15-20 μm	
	Dimension	P/N (1/pk)
	3.9 × 300 mm	<a href="#">WAT025874</a>
	19 × 300 mm	<a href="#">WAT025835</a>

## Shodex RSpak Polymer Reversed-Phase Columns

Shodex RSpak Columns are packed with porous polymeric particles that remain stable in a pH range of 2-12. Similar to conventional polymer-based materials, the DS-613 sorbent works well with samples that are more hydrophobic than hydrophilic, and which, consequently, require relatively high concentrations of organic modifiers. DE-613 columns, with a polymethacrylate packing, are more hydrophilic than hydrophobic, and work well with mobile phases containing relatively high concentrations of water. The least hydrophobic sorbent is used for the DE-613 columns.

For weakly cationic species, the DC-613 column is a cation exchanger with unique selectivity (mixed-mode, ion-exchange, and reversed-phase partition chromatography).

### Ordering Information

#### Shodex RSpak D Series Columns

Description	Base Polymer	Functional Group	Dimension	P/N (1/pk)
DS-613	Polystyrene	None	6 × 150 mm	<a href="#">WAT034220</a>
DE-613	Polymethacrylate	None	6 × 150 mm	<a href="#">WAT034221</a>
DC-613	Polystyrene	Sulfonated	6 × 150 mm	<a href="#">WAT034223</a>
DS-G Pre-column	—	—	4.6 × 10 mm	<a href="#">WAT034224</a>
DE-G Pre-column	—	—	4.6 × 10 mm	<a href="#">WAT034225</a>
DC-G Pre-column	—	—	4.6 × 10 mm	<a href="#">WAT034227</a>

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This primer describes the fundamentals of convergence chromatography and reviews some of the many applications that make UPC<sup>2</sup> an essential separation technique for modern laboratory analysis.

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Paperback, 84 pages, ISBN: 978-1-879-73211-7

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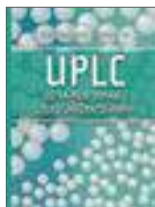


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Sample hydrolysis is an important first step in the workflow for analysis of bound amino acids, such as peptides and proteins. Hydrolysis allows for the analysis of the released amino acids, which can be separated using either ion-exchange or reversed-phase chromatographic methods. Given the challenges of the sample preparation workflow, this document was compiled to provide useful guidelines for sample hydrolysis.

Paperback, 69 pages, ISBN 978-1-879732-13-1

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Paperback, 52 pages, ISBN: 978-1-879732-07-0

Beginner's Guide to UPLC  
(Ultra-Performance Liquid Chromatography)

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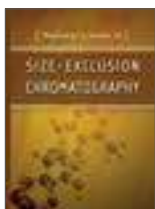
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Comprehensive Guide to HILIC  
(Hydrophilic Interaction Chromatography)

Part No. [715002531](#)



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Paperback, 64 pages, ISBN: 978-1-4675-9372-4

Beginner's Guide to Size-Exclusion Chromatography

Part No. [715004398](#)



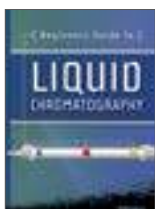
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Paperback, 80 pages, ISBN: 978-1-879732-04-1

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Part No. [715001940](#)



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Paperback, 52 pages, ISBN: 978-1-879732-02-5

Beginner's Guide to Liquid Chromatography

Part No. [715001531](#)



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Paperback, 212 pages, ISBN: 978-1-467539-20-3

Beginner's Guide to SPE (Solid-Phase Extraction)

Part No. [715003405](#)

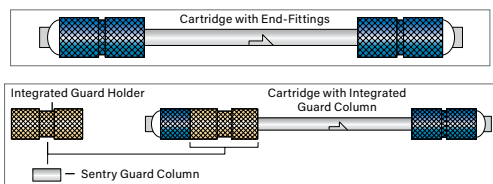


# Cartridge and Guard Columns, Fittings, and Accessories

## CARTRIDGE COLUMNS

### Ordering Information

#### Cartridge Columns



Applicable Column Dimension	Cartridge End Fitting P/N (1/pk)
2.1 × 50 mm, 2.1 × 100 mm, 2.1 × 150 mm, 2.1 × 250 mm	<a href="#">700000117</a>
3.0 × 50 mm, 3.0 × 100 mm, 3.0 × 150 mm, 3.0 × 250 mm	<a href="#">WAT037525</a>
3.9 × 50 mm, 3.9 × 100 mm, 3.9 × 150 mm, 3.9 × 250 mm	<a href="#">WAT037525</a>
4.6 × 50 mm, 4.6 × 100 mm, 4.6 × 150 mm, 4.6 × 250 mm	<a href="#">WAT037525</a>

#### Cartridge Columns

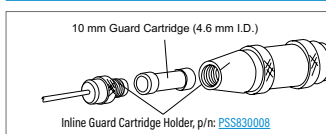
Description	Dimension	Particle Size	P/N (1/pk)
High-Performance Carbohydrate Cartridge Column (requires end fittings)	4.6 × 250 mm	4 μm	<a href="#">WAT044355</a>
μBondapak/Bondapak Cartridge Columns	4.6 × 250 mm	10 μm	<a href="#">WAT052860</a>

## SPHERISORB CARTRIDGE AND GUARD COLUMNS

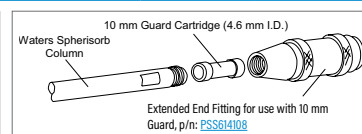
### Ordering Information



#### In-line Guard Cartridge Holder



#### Extended End Fitting for Use with 10 mm Guard Cartridges



Description	Qty.	P/N
Removable Column End Fitting	2/pk	<a href="#">PSS614100</a>
Frit Assembly (2 μm)	5/pk	<a href="#">PSS614103</a>
Frit Assembly (0.5 μm)	5/pk	<a href="#">PSS614104</a>
Column Coupler	2/pk	<a href="#">PSS614102</a>
Extended End Fitting for use with 10 mm Integral Guard	1/pk	<a href="#">PSS614108</a>
Nylon Column Plugs for storage of Complete Column	1/pk	<a href="#">WAT015674</a>
Nylon Column Caps for storage of Replacement Cartridge Column	10/pk	<a href="#">PSS614113</a>
In-line 10 mm Guard Cartridge Holder Kit for use with above items	—	<a href="#">PSS830008</a>

## Waters Spherisorb Guard Columns

Waters Spherisorb Guard columns provide cost-effective column protection for all Waters Spherisorb Analytical Columns.

### Waters Spherisorb Guard Cartridges\*

Dimension	Type	Particle Size	Qty.	ODS1	ODS2	C <sub>8</sub>	C <sub>6</sub>	C <sub>1</sub>	NH <sub>2</sub>
10 × 4.6 mm	Guard	5 μm	3/pk	<a href="#">PSS830073</a>	<a href="#">PSS830053</a>	<a href="#">PSS830074</a>	<a href="#">PSS830075</a>	<a href="#">PSS830076</a>	<a href="#">PSS830079</a>
30 × 4.6 mm	Guard	5 μm	3/pk	—	<a href="#">PSS839458</a>	—	—	—	<a href="#">PSS839478</a>

Dimension	Type	Particle Size	Qty.	CN Normal Phase	W Silica	SAX	SCX
10 × 4.6 mm	Guard	5 μm	3/pk	<a href="#">PSS830077</a>	<a href="#">PSS830051</a>	<a href="#">PSS830055</a>	<a href="#">PSS830057</a>
30 × 4.6 mm	Guard	5 μm	3/pk	<a href="#">PSS839476</a>	<a href="#">PSS839451</a>	<a href="#">PSS839465</a>	<a href="#">PSS839471</a>

\*Requires In-line Guard Cartridge Holder, p/n: [PSS830008](#).

## VANGUARD PRE-COLUMNS AND CARTRIDGES

Using a guard column extends the life of analytical columns without compromising chromatographic performance. Waters offers VanGuard™ Column Protection products in multiple particle sizes and stationary phases, making them ideally suited for the physical and chemical protection of all analytical columns.

Vanguard Columns offer:

- Minimal chromatographic effects and optimized performance
- Superior protection for UPLC, UHPLC, and HPLC columns with particle sizes between 5–16 µm
- Compatible operating pressures up to 18,000 psi (1240 bar)

### Selection Guide

VanGuard Column Protection Cartridge/Pre-column selection based on analytical column I.D.			
Column I.D.	Particle Size	Format	Dimension
2.1 mm	<2 µm	Pre-column	2.1 × 5 mm
2.1 mm	>2 µm	Cartridge Column	2.1 × 5 mm
3.0 mm	>2 µm	Cartridge Column	2.1 × 5 mm
3.9 mm	>2 µm	Cartridge Column	3.9 × 5 mm
4.6 mm	>2 µm	Cartridge Column	3.9 × 5 mm

### Ordering Information

#### Recommended VanGuard Cartridge

Brand	Particle Size	Analytical Columns	
		2.1 and 3.0 mm I.D.	3.9 and 4.6 mm I.D.
Atlantis	3, 5 µm	2.1 × 5 mm	3.9 × 5 mm
CORTECS	2.7 µm	2.1 × 5 mm	3.9 × 5 mm
SunFire	2.5, 3.5, 5 µm	2.1 × 5 mm	3.9 × 5 mm
Symmetry	3.5, 5 µm	2.1 × 5 mm	3.9 × 5 mm
XBridge	2.5, 3.5, 5 µm	2.1 × 5 mm	3.9 × 5 mm
XSelect CSH	2.5, 3.5, 5 µm	2.1 × 5 mm	3.9 × 5 mm
XSelect HSS	2.5, 3.5, 5 µm	2.1 × 5 mm	3.9 × 5 mm
XTerra	2.5, 3.5, 5 µm	2.1 × 5 mm	3.9 × 5 mm

#### Universal VanGuard Cartridge Holder

Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>

#### SunFire VanGuard Cartridges

	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
C <sub>18</sub>	2.1 × 5 mm	<a href="#">186007691</a>	2.1 × 5 mm	<a href="#">186007694</a>	2.1 × 5 mm	<a href="#">186007697</a>
	3.9 × 5 mm	<a href="#">186007693</a>	3.9 × 5 mm	<a href="#">186007696</a>	3.9 × 5 mm	<a href="#">186007699</a>
C <sub>8</sub>	2.1 × 5 mm	<a href="#">186007700</a>	2.1 × 5 mm	<a href="#">186007703</a>	2.1 × 5 mm	<a href="#">186007706</a>
	3.9 × 5 mm	<a href="#">186007702</a>	3.9 × 5 mm	<a href="#">186007705</a>	3.9 × 5 mm	<a href="#">186007708</a>

#### VanGuard Pre-columns (Guard Columns)


Chemistry	Particle Size	Dimension	P/N (3/pk)
BEH C <sub>18</sub>	1.7 µm	2.1 × 5 mm	<a href="#">186003975</a>
BEH Shield RP18	1.7 µm	2.1 × 5 mm	<a href="#">186003977</a>
BEH C <sub>8</sub>	1.7 µm	2.1 × 5 mm	<a href="#">186003978</a>
BEH Phenyl	1.7 µm	2.1 × 5 mm	<a href="#">186003979</a>
BEH HILIC	1.7 µm	2.1 × 5 mm	<a href="#">186003980</a>
BEH Amide	1.7 µm	2.1 × 5 mm	<a href="#">186004799</a>
CORTECS C <sub>18</sub> +	1.6 µm	2.1 × 5 mm	<a href="#">186007125</a>
CORTECS C <sub>18</sub>	1.6 µm	2.1 × 5 mm	<a href="#">186007123</a>
CORTECS HILIC	1.6 µm	2.1 × 5 mm	<a href="#">186007124</a>
CORTECS Shield RP18	1.6 µm	2.1 × 5 mm	<a href="#">186008713</a>
CORTECS C <sub>8</sub>	1.6 µm	2.1 × 5 mm	<a href="#">186008423</a>
CORTECS Phenyl	1.6 µm	2.1 × 5 mm	<a href="#">186008420</a>
CORTECS T3	1.6 µm	2.1 × 5 mm	<a href="#">186008508</a>
CSH C <sub>18</sub>	1.7 µm	2.1 × 5 mm	<a href="#">186005303</a>
CSH Fluoro-Phenyl	1.7 µm	2.1 × 5 mm	<a href="#">186005358</a>
CSH Phenyl-Hexyl	1.7 µm	2.1 × 5 mm	<a href="#">186005413</a>
HSS C <sub>18</sub>	1.8 µm	2.1 × 5 mm	<a href="#">186003981</a>
HSS C <sub>18</sub> SB	1.8 µm	2.1 × 5 mm	<a href="#">186004136</a>
HSST3	1.8 µm	2.1 × 5 mm	<a href="#">186003976</a>
HSS PFP	1.8 µm	2.1 × 5 mm	<a href="#">186005974</a>
HSS Cyano	1.8 µm	2.1 × 5 mm	<a href="#">186005995</a>

#### Atlantis VanGuard Cartridges

T3	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
	2.1 × 5 mm	<a href="#">186007674</a>	2.1 × 5 mm	<a href="#">186007678</a>
3.9 × 5 mm	<a href="#">186007676</a>	3.9 × 5 mm	<a href="#">186007680</a>	
dC <sub>18</sub>	2.1 × 5 mm	<a href="#">186007658</a>	2.1 × 5 mm	<a href="#">186007662</a>
	3.9 × 5 mm	<a href="#">186007660</a>	3.9 × 5 mm	<a href="#">186007664</a>
HILIC Silica	2.1 × 5 mm	<a href="#">186007666</a>	2.1 × 5 mm	<a href="#">186007670</a>
	3.9 × 5 mm	<a href="#">186007668</a>	3.9 × 5 mm	<a href="#">186007672</a>


## Symmetry VanGuard Cartridges

	Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
Symmetry C <sub>18</sub>	2.1 $\times$ 5 mm	<a href="#">186007725</a>	2.1 $\times$ 5 mm	<a href="#">186007729</a>
	3.9 $\times$ 5 mm	<a href="#">186007727</a>	3.9 $\times$ 5 mm	<a href="#">186007731</a>
Symmetry C <sub>8</sub>	2.1 $\times$ 5 mm	<a href="#">186007733</a>	2.1 $\times$ 5 mm	<a href="#">186007737</a>
	3.9 $\times$ 5 mm	<a href="#">186007735</a>	3.9 $\times$ 5 mm	<a href="#">186007739</a>
SymmetryShield RP18	2.1 $\times$ 5 mm	<a href="#">186007749</a>	2.1 $\times$ 5 mm	<a href="#">186007753</a>
	3.9 $\times$ 5 mm	<a href="#">186007751</a>	3.9 $\times$ 5 mm	<a href="#">186007755</a>
SymmetryShield RP8	2.1 $\times$ 5 mm	<a href="#">186007741</a>	2.1 $\times$ 5 mm	<a href="#">186007745</a>
	3.9 $\times$ 5 mm	<a href="#">186007743</a>	3.9 $\times$ 5 mm	<a href="#">186007747</a>
Symmetry300 C <sub>18</sub>	2.1 $\times$ 5 mm	<a href="#">186007709</a>	2.1 $\times$ 5 mm	<a href="#">186007713</a>
	3.9 $\times$ 5 mm	<a href="#">186007711</a>	3.9 $\times$ 5 mm	<a href="#">186007715</a>
Symmetry300 C <sub>4</sub>	2.1 $\times$ 5 mm	<a href="#">186007717</a>	2.1 $\times$ 5 mm	<a href="#">186007721</a>
	3.9 $\times$ 5 mm	<a href="#">186007719</a>	3.9 $\times$ 5 mm	<a href="#">186007723</a>

 For Symmetry Analytical Columns, please refer to [page 216](#).

## XBridge VanGuard Cartridges

	Particle Size: 2.5 $\mu$ m		Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
BEH C <sub>18</sub>	2.1 $\times$ 5 mm	<a href="#">186007772</a>	2.1 $\times$ 5 mm	<a href="#">186007766</a>	2.1 $\times$ 5 mm	<a href="#">186007769</a>
	3.9 $\times$ 5 mm	<a href="#">186007774</a>	3.9 $\times$ 5 mm	<a href="#">186007768</a>	3.9 $\times$ 5 mm	<a href="#">186007771</a>
BEH C <sub>8</sub>	2.1 $\times$ 5 mm	<a href="#">186007781</a>	2.1 $\times$ 5 mm	<a href="#">186007775</a>	2.1 $\times$ 5 mm	<a href="#">186007778</a>
	3.9 $\times$ 5 mm	<a href="#">186007783</a>	3.9 $\times$ 5 mm	<a href="#">186007777</a>	3.9 $\times$ 5 mm	<a href="#">186007780</a>
BEH Shield RP18	2.1 $\times$ 5 mm	<a href="#">186007808</a>	2.1 $\times$ 5 mm	<a href="#">186007802</a>	2.1 $\times$ 5 mm	<a href="#">186007805</a>
	3.9 $\times$ 5 mm	<a href="#">186007810</a>	3.9 $\times$ 5 mm	<a href="#">186007804</a>	3.9 $\times$ 5 mm	<a href="#">186007807</a>
Phenyl	2.1 $\times$ 5 mm	<a href="#">186007799</a>	2.1 $\times$ 5 mm	<a href="#">186007793</a>	2.1 $\times$ 5 mm	<a href="#">186007796</a>
	3.9 $\times$ 5 mm	<a href="#">186007801</a>	3.9 $\times$ 5 mm	<a href="#">186007795</a>	3.9 $\times$ 5 mm	<a href="#">186007798</a>
HILIC	2.1 $\times$ 5 mm	<a href="#">186007790</a>	2.1 $\times$ 5 mm	<a href="#">186007784</a>	2.1 $\times$ 5 mm	<a href="#">186007787</a>
	3.9 $\times$ 5 mm	<a href="#">186007792</a>	3.9 $\times$ 5 mm	<a href="#">186007786</a>	3.9 $\times$ 5 mm	<a href="#">186007789</a>
Amide	2.1 $\times$ 5 mm	<a href="#">186007763</a>	2.1 $\times$ 5 mm	<a href="#">186007757</a>	2.1 $\times$ 5 mm	<a href="#">186007760</a>
	3.9 $\times$ 5 mm	<a href="#">186007765</a>	3.9 $\times$ 5 mm	<a href="#">186007759</a>	3.9 $\times$ 5 mm	<a href="#">186007762</a>

 For XBridge Analytical Columns, please refer to [page 181](#).

## XSelect VanGuard Cartridges

	Particle Size: 2.5 $\mu$ m		Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
CSH C <sub>18</sub>	2.1 $\times$ 5 mm <i>XP</i>	<a href="#">186007817</a>	2.1 $\times$ 5 mm	<a href="#">186007811</a>	2.1 $\times$ 5 mm	<a href="#">186007814</a>
	3.9 $\times$ 5 mm <i>XP</i>	<a href="#">186007819</a>	3.9 $\times$ 5 mm	<a href="#">186007813</a>	3.9 $\times$ 5 mm	<a href="#">186007816</a>
CSH Fluoro-Phenyl	2.1 $\times$ 5 mm <i>XP</i>	<a href="#">186007827</a>	2.1 $\times$ 5 mm	<a href="#">186007820</a>	2.1 $\times$ 5 mm	<a href="#">186007824</a>
	3.9 $\times$ 5 mm <i>XP</i>	<a href="#">186007829</a>	3.9 $\times$ 5 mm	<a href="#">186007822</a>	3.9 $\times$ 5 mm	<a href="#">186007826</a>
CSH Phenyl-Hexyl	2.1 $\times$ 5 mm <i>XP</i>	<a href="#">186007839</a>	2.1 $\times$ 5 mm	<a href="#">186007830</a>	2.1 $\times$ 5 mm	<a href="#">186007836</a>
	3.9 $\times$ 5 mm <i>XP</i>	<a href="#">186007841</a>	3.9 $\times$ 5 mm	<a href="#">186007832</a>	3.9 $\times$ 5 mm	<a href="#">186007838</a>
HSS C <sub>18</sub>	2.1 $\times$ 5 mm	<a href="#">186007857</a>	2.1 $\times$ 5 mm	<a href="#">186007851</a>	2.1 $\times$ 5 mm	<a href="#">186007854</a>
	3.9 $\times$ 5 mm	<a href="#">186007859</a>	3.9 $\times$ 5 mm	<a href="#">186007853</a>	3.9 $\times$ 5 mm	<a href="#">186007856</a>
HSS C <sub>18</sub> SB	2.1 $\times$ 5 mm	<a href="#">186007848</a>	2.1 $\times$ 5 mm	<a href="#">186007842</a>	2.1 $\times$ 5 mm	<a href="#">186007845</a>
	3.9 $\times$ 5 mm	<a href="#">186007850</a>	3.9 $\times$ 5 mm	<a href="#">186007844</a>	3.9 $\times$ 5 mm	<a href="#">186007847</a>
HSS T3	2.1 $\times$ 5 mm	<a href="#">186007884</a>	2.1 $\times$ 5 mm	<a href="#">186007878</a>	2.1 $\times$ 5 mm	<a href="#">186007881</a>
	3.9 $\times$ 5 mm	<a href="#">186007886</a>	3.9 $\times$ 5 mm	<a href="#">186007880</a>	3.9 $\times$ 5 mm	<a href="#">186007883</a>
HSS PFP	2.1 $\times$ 5 mm	<a href="#">186007875</a>	2.1 $\times$ 5 mm	<a href="#">186007869</a>	2.1 $\times$ 5 mm	<a href="#">186007872</a>
	3.9 $\times$ 5 mm	<a href="#">186007877</a>	3.9 $\times$ 5 mm	<a href="#">186007871</a>	3.9 $\times$ 5 mm	<a href="#">186007874</a>
HSS CN	2.1 $\times$ 5 mm	<a href="#">186007866</a>	2.1 $\times$ 5 mm	<a href="#">186007860</a>	2.1 $\times$ 5 mm	<a href="#">186007863</a>
	3.9 $\times$ 5 mm	<a href="#">186007868</a>	3.9 $\times$ 5 mm	<a href="#">186007862</a>	3.9 $\times$ 5 mm	<a href="#">186007865</a>

 For XSelect Analytical Columns, please refer to [page 196](#).

## XTerra VanGuard Cartridges

	Particle Size: 2.5 $\mu$ m		Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
MS C <sub>18</sub>	2.1 $\times$ 5 mm	<a href="#">186007887</a>	2.1 $\times$ 5 mm	<a href="#">186007892</a>	2.1 $\times$ 5 mm	<a href="#">186007896</a>
	3.9 $\times$ 5 mm	<a href="#">186007889</a>	3.9 $\times$ 5 mm	<a href="#">186007894</a>	3.9 $\times$ 5 mm	<a href="#">186007899</a>
MS C <sub>8</sub>	2.1 $\times$ 5 mm	<a href="#">186007901</a>	2.1 $\times$ 5 mm	<a href="#">186007905</a>	2.1 $\times$ 5 mm	<a href="#">186007909</a>
	3.9 $\times$ 5 mm	<a href="#">186007903</a>	3.9 $\times$ 5 mm	<a href="#">186007907</a>	3.9 $\times$ 5 mm	<a href="#">186007911</a>
Shield RP18			2.1 $\times$ 5 mm	<a href="#">186007929</a>	2.1 $\times$ 5 mm	<a href="#">186007933</a>
			3.9 $\times$ 5 mm	<a href="#">186007931</a>	3.9 $\times$ 5 mm	<a href="#">186007935</a>
Shield RP8			2.1 $\times$ 5 mm	<a href="#">186007941</a>	3.9 $\times$ 5 mm	<a href="#">186007947</a>
			3.9 $\times$ 5 mm	<a href="#">186007943</a>		
Phenyl			2.1 $\times$ 5 mm	<a href="#">186007917</a>	2.1 $\times$ 5 mm	<a href="#">186007921</a>
			3.9 $\times$ 5 mm	<a href="#">186007919</a>	3.9 $\times$ 5 mm	<a href="#">186007923</a>

 For XTerra Analytical Columns, please refer to [page 221](#).

## SENTRY GUARD CARTRIDGES

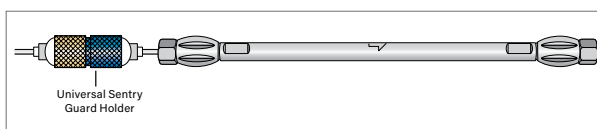
Waters Sentry Guard Cartridges are widely used as a cost-effective way to prolong HPLC column life by reducing particulate matter and chemical contaminants. Two holder designs are offered, one for use as an integrated part of the Waters Cartridge Column with reusable end fittings, the other for use with any HPLC column. Both designs allow the replacement of Sentry Guard Cartridges without tools.



### Ordering Information

#### Waters Cartridge and Guard Column Guide

##### Guard Columns Universal Sentry Guard Holder Kits



Dimension	P/N (1/pk)
2.1 × 10 mm	<a href="#">WAT097958</a>
2.1 × 20 mm	<a href="#">186000262</a>
3.0 × 20 mm	<a href="#">WAT046910</a>
3.9 × 20 mm	<a href="#">WAT046910</a>
4.6 × 20 mm	<a href="#">WAT046910</a>

#### Sentry Guard Holders and Replacement Parts\*

Description	P/N (1/pk)
Integrated Guard Holder (Use with Waters Cartridge Columns)	<a href="#">WAT046905</a>
<b>Replacement Parts</b>	
O-ring Kit for Sentry 2.1 mm Guard Holder, 2/pk	<a href="#">WAT097954</a>
O-Ring Kit for Sentry 3.0, 3.9, 4.6 mm Guard Holder, 2/pk	<a href="#">WAT023401</a>
Rigid Connector for Sentry 2.1 mm Guard Holder	<a href="#">WAT022681</a>

\*50 mm and 75 mm long Cartridge Columns must use the Universal Guard Holder.

#### µBondapak/Bondapak Sentry Guard Cartridges

Particle Size: 10 µm		
	Dimension	P/N (2/pk)
<b>C<sub>18</sub></b>	3.9 × 20 mm	<a href="#">WAT044480<sup>2</sup></a>
<b>CN</b>	3.9 × 20 mm	<a href="#">WAT046855<sup>2</sup></a>
<b>NH<sub>2</sub></b>	3.9 × 20 mm	<a href="#">WAT046865<sup>2</sup></a>
<b>Phenyl</b>	3.9 × 20 mm	<a href="#">WAT046850<sup>2</sup></a>

<sup>2</sup>Requires 3.0 × 20 mm/4.6 × 20 mm Universal Sentry Guard Holder, p/n: [WAT046910](#).

#### µPorasil/Porasil Sentry Guard Cartridges

Particle Size: 10 µm		
	Dimension	P/N (2/pk)
<b>µPorasil</b>	3.9 × 20 mm	<a href="#">WAT046860<sup>1</sup></a>

<sup>1</sup>Requires 2.1 × 10 mm Universal Sentry Guard Holder, p/n: [WAT097958](#).

#### Delta-Pak Sentry Guard Cartridges

Particle Size: 5 µm		
	Dimension	P/N (2/pk)
<b>C<sub>4</sub>, 100 Å</b>	3.9 × 20 mm	<a href="#">WAT046875<sup>2</sup></a>
<b>C<sub>4</sub>, 300 Å</b>	3.9 × 20 mm	<a href="#">WAT046885<sup>2</sup></a>
<b>C<sub>18</sub>, 100 Å</b>	3.9 × 20 mm	<a href="#">WAT046880<sup>2</sup></a>
<b>C<sub>18</sub>, 300 Å</b>	3.9 × 20 mm	<a href="#">WAT046890<sup>2</sup></a>

<sup>2</sup>Requires 3.0 × 20 mm/4.6 × 20 mm Universal Sentry Guard Holder, p/n: [WAT046910](#).

#### Nova-Pak Sentry Guard Cartridges

Particle Size: 4 µm		
	Dimension	P/N (2/pk)
<b>C<sub>8</sub></b>	3.9 × 20 mm	<a href="#">WAT046830<sup>2</sup></a>
<b>C<sub>18</sub></b>	3.9 × 20 mm	<a href="#">WAT044380<sup>2</sup></a>
<b>CN-HP</b>	3.9 × 20 mm	<a href="#">WAT046840<sup>2</sup></a>
<b>Phenyl</b>	3.9 × 20 mm	<a href="#">WAT046835<sup>2</sup></a>
<b>Silica</b>	3.9 × 20 mm	<a href="#">WAT046845<sup>2</sup></a>

<sup>2</sup>Requires 3.0 × 20 mm/4.6 × 20 mm Universal Sentry Guard Holder, p/n: [WAT046910](#).

#### Resolve Sentry Guard Cartridges

Particle Size: 5 µm		
	Dimension	P/N (2/pk)
<b>C<sub>18</sub></b>	3.9 × 20 mm	<a href="#">WAT046915<sup>1</sup></a>

<sup>1</sup>Requires 3.9 × 20 mm Universal Sentry Guard Holder, p/n: [WAT046910](#).

## Atlantis Sentry Guard Cartridges

	Particle Size: 3 µm		Particle Size: 5 µm	
	Dimension	P/N (2/pk)	Dimension	P/N (2/pk)
<b>T3</b>	2.1 × 10 mm	<a href="#">186003756</a> <sup>1</sup>	4.6 × 20 mm	<a href="#">186003761</a> <sup>2</sup>
	4.6 × 20 mm	<a href="#">186003758</a> <sup>2</sup>		
<b>dC<sub>18</sub></b>	2.1 × 10 mm	<a href="#">186001377</a> <sup>1</sup>	4.6 × 20 mm	<a href="#">186001323</a> <sup>2</sup>
	4.6 × 20 mm	<a href="#">186001321</a> <sup>2</sup>		
<b>HILIC Silica</b>	2.1 × 10 mm	<a href="#">186002005</a> <sup>1</sup>		

<sup>1</sup> Requires 2.1 × 10 mm Universal Sentry Guard Holder, p/n: [WAT097958](#).

<sup>2</sup> Requires 3.0 × 20 mm/4.6 × 20 mm Universal Sentry Guard Holder, p/n: [WAT046910](#).

## SunFire Sentry Guard Cartridges

	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (2/pk)	Dimension	P/N (2/pk)
<b>C<sub>8</sub></b>	2.1 × 10 mm	<a href="#">186002708</a> <sup>1</sup>	2.1 × 10 mm	<a href="#">186002713</a> <sup>1</sup>
	3.0 × 20 mm	<a href="#">186002718</a> <sup>2</sup>	3.0 × 20 mm	<a href="#">186002722</a> <sup>2</sup>
	4.6 × 20 mm	<a href="#">186002727</a> <sup>2</sup>	4.6 × 20 mm	<a href="#">186002732</a> <sup>2</sup>
<b>C<sub>18</sub></b>	2.1 × 10 mm	<a href="#">186002530</a> <sup>1</sup>	2.1 × 10 mm	<a href="#">186002536</a> <sup>1</sup>
	3.0 × 20 mm	<a href="#">186002681</a> <sup>2</sup>	3.0 × 20 mm	<a href="#">186002682</a> <sup>2</sup>
	4.6 × 20 mm	<a href="#">186002682</a> <sup>2</sup>	4.6 × 20 mm	<a href="#">186002684</a> <sup>2</sup>

<sup>1</sup> Requires 2.1 × 10 mm Universal Sentry Guard Holder, p/n: [WAT097958](#).

<sup>2</sup> Requires 3.0 × 20 mm/4.6 × 20 mm Universal Sentry Guard Holder, p/n: [WAT046910](#).

## Symmetry, SymmetryShield, and Symmetry300 Sentry Guard Cartridges

	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (2/pk)	Dimension	P/N (2/pk)
<b>Symmetry C<sub>8</sub></b>	2.1 × 10 mm	<a href="#">WAT106128</a> <sup>1</sup>	3.9 × 20 mm	<a href="#">WAT054250</a> <sup>2</sup>
<b>Symmetry C<sub>18</sub></b>	2.1 × 10 mm	<a href="#">WAT106127</a> <sup>1</sup>	3.9 × 20 mm	<a href="#">WAT054225</a> <sup>2</sup>
<b>SymmetryShield RP8</b>	2.1 × 10 mm	<a href="#">WAT106129</a> <sup>1</sup>	3.9 × 20 mm	<a href="#">WAT200675</a> <sup>2</sup>
<b>SymmetryShield RP18</b>	2.1 × 10 mm	<a href="#">186000169</a> <sup>1</sup>	3.9 × 20 mm	<a href="#">186000107</a> <sup>2</sup>
	3.9 × 20 mm	<a href="#">186000701</a> <sup>2</sup>		
<b>Symmetry300 C<sub>4</sub></b>	2.1 × 10 mm	<a href="#">186000275</a> <sup>1</sup>	3.9 × 20 mm	<a href="#">186000284</a> <sup>2</sup>
<b>Symmetry300 C<sub>18</sub></b>	2.1 × 10 mm	<a href="#">186000198</a> <sup>1</sup>	3.9 × 20 mm	<a href="#">WAT106166</a> <sup>2</sup>

<sup>1</sup> Requires 2.1 × 10 mm Universal Sentry Guard Holder, p/n: [WAT097958](#).

<sup>2</sup> Requires 3.0 × 20 mm/4.6 × 20 mm Universal Sentry Guard Holder, p/n: [WAT046910](#).

## XBridge Sentry Guard Cartridges

	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (2/pk)	Dimension	P/N (2/pk)
<b>BEH C<sub>8</sub></b>	3.0 × 20 mm	<a href="#">186003078</a> <sup>2</sup>	2.1 × 10 mm	<a href="#">186003080</a> <sup>1</sup>
	4.6 × 20 mm	<a href="#">186003079</a> <sup>2</sup>	3.0 × 20 mm	<a href="#">186003081</a> <sup>2</sup>
			4.6 × 20 mm	<a href="#">186003082</a> <sup>2</sup>
<b>BEH C<sub>18</sub></b>	3.0 × 20 mm	<a href="#">186003060</a> <sup>2</sup>	2.1 × 10 mm	<a href="#">186003062</a> <sup>1</sup>
	4.6 × 20 mm	<a href="#">186003061</a> <sup>2</sup>	3.0 × 20 mm	<a href="#">186003063</a> <sup>2</sup>
			4.6 × 20 mm	<a href="#">186003064</a> <sup>2</sup>
<b>BEH Shield RP18</b>	3.0 × 20 mm	<a href="#">186003069</a> <sup>2</sup>	2.1 × 10 mm	<a href="#">186003071</a> <sup>1</sup>
	4.6 × 20 mm	<a href="#">186003070</a> <sup>2</sup>	3.0 × 20 mm	<a href="#">186003072</a> <sup>2</sup>
			4.6 × 20 mm	<a href="#">186003073</a> <sup>2</sup>

<sup>1</sup> Requires 2.1 × 10 mm Universal Sentry Guard Holder, p/n: [WAT097958](#).

<sup>2</sup> Requires 3.0 × 20 mm/4.6 × 20 mm Universal Sentry Guard Holder, p/n: [WAT046910](#).

## XSelect Sentry Guard Cartridges

	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (2/pk)	Dimension	P/N (2/pk)
<b>CSH C<sub>18</sub></b>	2.1 × 10 mm	<a href="#">186005252</a> <sup>1</sup>	4.6 × 20 mm	<a href="#">186005285</a> <sup>2</sup>
	3.0 × 20 mm	<a href="#">186005258</a> <sup>2</sup>		
	4.6 × 20 mm	<a href="#">186005264</a> <sup>2</sup>		
<b>HSS T3</b>	2.1 × 10 mm	<a href="#">186006470</a> <sup>1</sup>	4.6 × 20 mm	<a href="#">186004792</a> <sup>2</sup>
	3.0 × 20 mm	<a href="#">186004782</a> <sup>2</sup>		
	4.6 × 20 mm	<a href="#">186004787</a> <sup>2</sup>		

<sup>1</sup> Requires 2.1 × 10 mm Universal Sentry Guard Holder, p/n: [WAT097958](#).

<sup>2</sup> Requires 3.0 × 20 mm/4.6 × 20 mm Universal Sentry Guard Holder, p/n: [WAT046910](#).

## XTerra Sentry Guard Cartridges

	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (2/pk)	Dimension	P/N (2/pk)
<b>MS C<sub>18</sub></b>	3.9 × 20 mm	<a href="#">186000644</a>	2.1 × 20 mm	<a href="#">186000653</a> <sup>3</sup>
	4.6 × 10 mm	<a href="#">186001927</a>	3.0 × 20 mm	<a href="#">186000656</a> <sup>2</sup>
			3.9 × 20 mm	<a href="#">186000660</a> <sup>2</sup>
			4.6 × 10 mm	<a href="#">186001920</a> <sup>4</sup>
<b>MS C<sub>8</sub></b>	—	—	3.9 × 20 mm	<a href="#">186000661</a> <sup>2</sup>
<b>RP18</b>	3.9 × 20 mm	<a href="#">186000646</a> <sup>2</sup>	2.1 × 20 mm	<a href="#">186000654</a> <sup>3</sup>
			3.0 × 20 mm	<a href="#">186000658</a>
			3.9 × 20 mm	<a href="#">186000662</a> <sup>2</sup>

<sup>2</sup> Requires 3.0 × 20 mm/4.6 × 20 mm Universal Sentry Guard Holder, p/n: [WAT046910](#).

<sup>3</sup> Requires Cartridge Column Holder, p/n: [186000262](#).

<sup>4</sup> Requires In-line Guard Cartridge Holder, p/n: [PSS830008](#).

## GUARD-PAK HOLDER AND INSERTS

Waters Guard-Pak Holder is a compact, stand-alone housing for our unique disposable Guard-Pak Inserts. Installed In-line with your HPLC system immediately before the analytical column, the Guard-Pak Holder and inserts protect analytical LC columns against the gradual accumulation of particulates and chemical contaminants originating from the sample.



### Ordering Information

#### Guard-Pak Holder

Description	P/N (1/pk)
Guard-Pak Holder	<a href="#">WAT088141</a>
Guard-Pak Holder Connector	<a href="#">WAT080046</a>

#### Guard-Pak Inserts

Description	Particle Size	P/N (10/pk)
Bondapak C <sub>18</sub> , 125 Å	10 µm	<a href="#">WAT088070</a> <sup>1</sup>
Bondapak NH <sub>2</sub> , 125 Å	10 µm	<a href="#">WAT026760</a> <sup>1</sup>
Bondapak Phenyl, 125 Å	10 µm	<a href="#">WAT026745</a> <sup>1</sup>
C <sub>8</sub> , 60 Å	4 µm	<a href="#">WAT035880</a> <sup>1</sup>
Nova-Pak C <sub>18</sub> , 60 Å	4 µm	<a href="#">WAT015220</a> <sup>1</sup>
Resolve C <sub>18</sub> , 90 Å	10 µm	<a href="#">WAT085824</a> <sup>1</sup>

<sup>1</sup>Requires Guard-Pak Holder, p/n: [WAT088141](#).

# >5 $\mu\text{m}$ Preparative HPLC Column



# Contents

<b>From Productivity Comes Predictability</b> .....	<b><a href="#">249</a></b>
Column Stability and Reliability—Long, Predictable Lifetimes.....	<a href="#">249</a>
How to Choose the Right OBD Preparative Column.....	<a href="#">250</a>
Mass Loading.....	<a href="#">251</a>
<b>XBridge OBD Preparative Columns</b> .....	<b><a href="#">253</a></b>
The Benchmark for Ruggedness and Longevity in LC Methods.....	<a href="#">253</a>
<b>XSelect OBD Preparative Columns</b> .....	<b><a href="#">266</a></b>
Versatility and Selectivity.....	<a href="#">266</a>
<b>SunFire OBD Preparative Columns</b> .....	<b><a href="#">276</a></b>
High-Mass Loading.....	<a href="#">276</a>
<b>Atlantis OBD Preparative Columns</b> .....	<b><a href="#">281</a></b>
Retention of Polar Compounds.....	<a href="#">281</a>
<b>XTerra OBD Preparative Columns</b> .....	<b><a href="#">285</a></b>
<b>Symmetry Preparative Columns</b> .....	<b><a href="#">291</a></b>
<b>Spherisorb Preparative Columns</b> .....	<b><a href="#">295</a></b>
<b>Nova-Pak Preparative Columns</b> .....	<b><a href="#">299</a></b>
<b>µBondapak/Bondapak and µPorasil/Porasil Columns</b> .....	<b><a href="#">299</a></b>
<b>Delta-Pak Preparative Columns</b> .....	<b><a href="#">301</a></b>
<b>Preparative Guard Cartridge Holders</b> .....	<b><a href="#">301</a></b>
<b>Preparative Standards</b> .....	<b><a href="#">302</a></b>
How Do You Know Your Chromatographic System Is In Proper Working Order?..	<a href="#">302</a>
<b>Preparative Bulk Material</b> .....	<b><a href="#">303</a></b>
<b>Gas Chromatography Packings</b> .....	<b><a href="#">304</a></b>
Versatility for Specialty Applications.....	<a href="#">304</a>
<b>Radial Compression Module Products</b> .....	<b><a href="#">305</a></b>

# ≥5 μm Preparative HPLC Columns

## From Productivity Comes Predictability

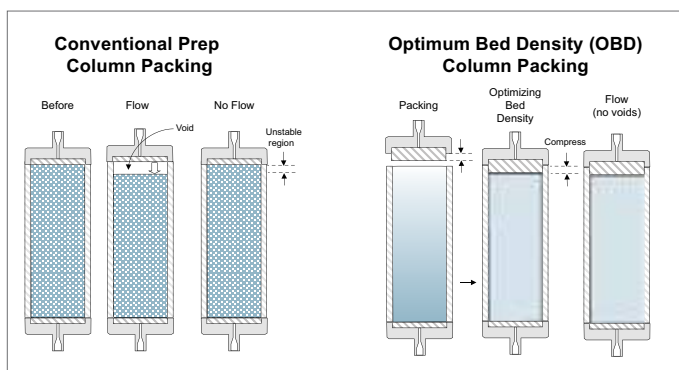
Why struggle with inconsistencies in column-to-column performance, unpredictable column lifetimes, lost samples, repeat purification runs, and poor scalability from small- to large-volume columns?

Increase your productivity through higher recoveries and longer column lifetimes. With Optimum Bed Density (OBD) Preparative Columns, you can:

- Achieve fast, efficient, lab-scale separations, for greater throughput
- Directly scale from UPLC, UHPLC, or HPLC screening to lab-scale purification
- Select robust chromatographic particles designed for purification



### The OBD Column Design

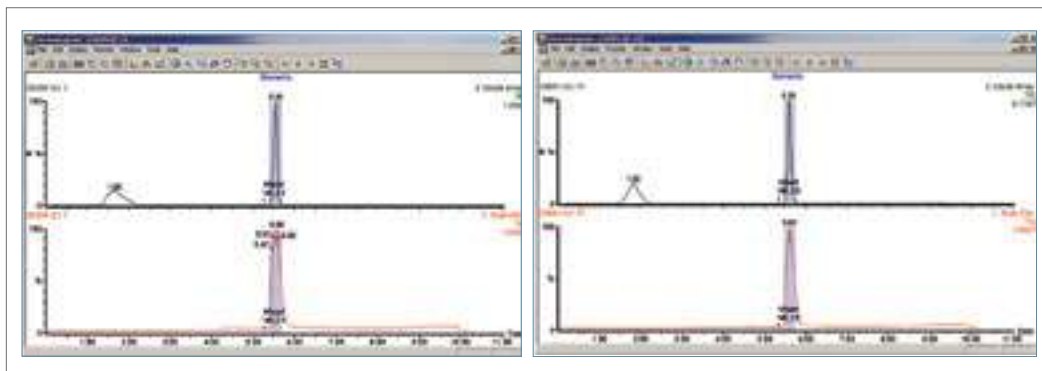


*The OBD Preparative Column design and packing process results in predictable, uniform density profiles throughout the column. During the final capping process, our established procedures do not over compress or disrupt in any non-uniform way, eliminating the potential for voids.*

## COLUMN STABILITY AND RELIABILITY—LONG, PREDICTABLE LIFETIMES

The demand for rapid, high-purity, compound isolation assumes confidence in the integrity and stability of preparative columns. Complex, sparingly-soluble starting materials are often dissolved in strong solvents, such as DMSO. The combination of poor solubility and pressure shocks associated with large injection volumes of pure organic solvent are the primary contributors to early column failure and chromatographic bed collapse. The OBD design exhibits exceptional resistance to mechanical chromatographic bed failure and delivers consistent column-to-column performance, reducing cost by extending lifetimes.

### Data From a High-Throughput Drug Discovery Laboratory



Data from a high-throughput drug discovery laboratory shows excellent peak shape after 7000 injections on an XBridge BEH C<sub>18</sub> OBD Prep Column, 130 Å, 5 μm, 19 × 50 mm.

## HOW TO CHOOSE THE RIGHT OBD PREPARATIVE COLUMN

### STEP 1

Once the analytical separation has been optimized, a loading study on the analytical column is performed to determine the capacity of the particular packing material. The large-scale separation should be identical to the small-scale separation, therefore the maximum sample load will be dependent upon the complexity of the analytical separation.

### STEP 2

Determine how much mass you need to purify or isolate.

### STEP 3

Use these simple equations to determine the required column size for purification.

*Note: Preparative HPLC system maximum flow rate and backpressure need to be considered and can limit column size.*

#### Scale-Up Factor

$$\text{Scale-up factor} = \frac{(\text{Diameter preparative})^2 \times \text{Length preparative}}{(\text{Diameter analytical})^2 \times \text{Length analytical}}$$

Example: Scaling up from a 4.6 × 150 mm column to a 19 × 150 mm column:

$$\text{Scale-up factor} = \frac{(19)^2 \times 150}{(4.6)^2 \times 150} = 17.1$$

Applying the scale-up factor, you can predict that an approximate range of 17 to 135 mg of sample could be applied to the larger (19 × 150 mm) column (packed with the same material as the analytical column). This range is based on an analytical column (4.6 mm I.D.) mass load of 1 to 8 mg.

#### Flow Rate

$$\text{Flow rate (prep)} = \text{Flow rate (analytical)} \times \frac{(\text{Diameter preparative})^2}{(\text{Diameter analytical})^2} \times \frac{\text{Particle size (analytical)}}{\text{Particle size (preparative)}}$$

The calculated flow rate may be used for the larger column to ensure the same linear velocity of the mobile phases as used in the analytical run. However, reasonable rates are based on column diameters. Systems will be limited by increasing backpressure with increasing column length and decreasing particle size.

#### Gradient Duration (GD)

$$\text{GD (prep)} = \frac{(\text{GD analytical}) \times (\text{Length preparative})}{(\text{Length analytical})} \times \frac{(\text{Diameter preparative})^2}{(\text{Diameter analytical})^2} \times \frac{(\text{Flow rate analytical})}{(\text{Flow rate preparative})}$$

## MASS LOADING

Many factors affect the mass capacity of preparative columns. The listed capacities represent an "average" estimate of the total amount of mass per injection to be loaded on to the column.

Approximate Peptide Mass Loading Capacities (mg) for OBD Preparative Columns (Gradient Mode)

Length (mm)	Diameter (mm)				
	4.6	10	19	30	50
50	0.3–0.6 mg	1.5–3.0 mg	4–9 mg	11–22 mg	31–62 mg
100	0.5–1.0 mg	2.5–5.0 mg	9–18 mg	22–45 mg	62–125 mg
150	0.8–1.6 mg	4.0–8.0 mg	13–27 mg	34–68 mg	93–186 mg
250	1.3–2.6 mg	6.0–12.0 mg	22–45 mg	56–112 mg	155–310 mg
Reasonable flow rate (mL/min)	0.9–1.8	4.5–9.0	16–32	40–80	111–222 mg
Reasonable injection volume (μL)	20	100	350	880	2450

Capacity is:

- Higher for strongly retained material
- Higher for simple mixtures
- Lower where higher resolution is required
- Very strongly dependent on loading conditions
  - Limited by loading volume
  - Limited by diluent solvent strength

Approximate Small Molecule Mass Loading Capacities (mg) for OBD Preparative Columns (Gradient Mode)

Length (mm)	Diameter (mm)				
	4.6	10	19	30	50
50	3 mg	15 mg	45 mg	110 mg	310 mg
75	–	–	–	165 mg	–
100	5 mg	25 mg	90 mg	225 mg	620 mg
150	8 mg	40 mg	135 mg	335 mg	930 mg
250	13 mg	60 mg	225 mg	560 mg	1550 mg
Reasonable flow rate (mL/min)	1.4	6.6	24	60	164
Reasonable injection volume (μL)	20	100	350	880	2450

Reasonable flow rates are based on column diameter. Systems will be limited by increasing backpressure with increasing column length and decreasing particle size.

Reasonable injection volumes are based on column diameter at a length of 50 mm with relatively strong solvents. Increased length is compatible with larger injections, but not proportionately so. Weaker solvents significantly increase injection volume.


Mass loading capacities for peptides and purifications depend strongly on the sequence and may be estimated at 5–20% of listed values.

Estimates for peptide mass load are broad because capacity depends on the solubility of the peptide in the mobile phase.

### Waters OBD Preparative Columns Calculator

This convenient online scale-up tool provides:

- Mass load scaling
- Gradient scaling with appropriate flow rate scale-up and predicting volume consumption
- Calculations for split flow ratios for those using mass spectrometer driven chromatography
- Focused gradient UPLC, UHPLC, or analytical HPLC to preparative-scale method transfer

 To try this tool, visit [waters.com/prepcalculator](https://www.waters.com/prepcalculator)



[ OBD PREPARATIVE COLUMNS ]

## Increase Your Productivity Through Higher Recoveries and Longer Column Lifetimes

With Optimum Bed Density (OBD™) Preparative Columns you have the ability to:

- Achieve fast, efficient, lab-scale separations for greater throughput
- Directly scale from UPLC,™ UHPLC, or HPLC screening to lab-scale purification
- Select robust chromatographic particles designed for purification

## Waters OBD Preparative Columns Calculator

This convenient scale-up tool provides:

- Mass load scaling
- Gradient scaling with appropriate flow rate scale-up and predicting volume consumption
- Calculations for split flow ratios for those using mass spectrometer driven chromatography
- Focused gradient UPLC or UHPLC to preparative method transfer



Learn more on [pages 250-251](#) or to try this tool, visit [waters.com/prepcalculator](http://waters.com/prepcalculator)

## XBridge OBD Preparative Columns



### THE BENCHMARK FOR RUGGEDNESS AND LONGEVITY IN LC METHODS

XBridge HPLC Columns include 10 general and application-specific sorbents that cover a wide range of particle sizes for analytical and preparative HPLC applications. With these versatile columns, you can use mobile phases over a wide pH range to quickly develop robust methods. In doing so, you benefit from high pH and temperature stability for increased mass loading of basic compounds.

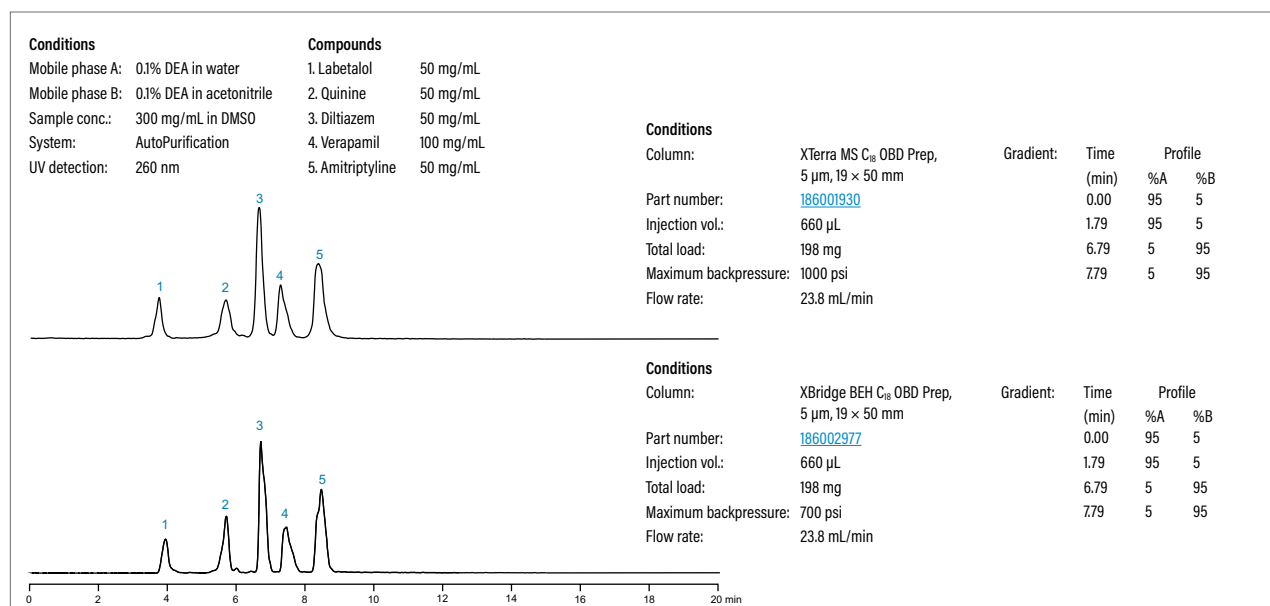
XBridge OBD Preparative Columns offer:

- BEH C<sub>18</sub>, BEH C<sub>8</sub>, BEH Shield RP18, BEH Phenyl, BEH HILIC, and BEH Amide column chemistries
- Improved pH stability and increased column lifetimes
- Proven mechanical stability of OBD Column Technology
- Wide range of selectivity for both reversed-phase LC and HILIC separations
- Scalability from analytical to preparative applications

Columns for biomolecule purifications:

- XBridge Peptide BEH C<sub>18</sub>, 130 Å and 300 Å Preparative Columns are QC tested for demanding peptide applications
- XBridge Protein BEH C<sub>4</sub>, 300 Å Preparative Columns are QC tested for protein applications
- XBridge Oligonucleotide BEH C<sub>18</sub>, 130 Å, 2.5 µm Preparative Columns are QC tested for excellent resolution of oligonucleotides

### Maximum Efficiency/30% Lower Backpressure



XBridge OBD Preparative Columns deliver the same high loading capacity and reliability expected of our XTerra preparative products, with a significantly reduced column backpressure.

For more information on XBridge HPLC Columns, refer to [page 142](#) for 2.5 µm and [page 181](#) for 3–5 µm column offerings.

XBridge Columns

BEH C <sub>18</sub>	ANALYTICAL COLUMNS						
	Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
	2.1 × 30 mm <i>XP</i>	<a href="#">186006028</a>	<a href="#">176002546</a>	2.1 × 20 mm <i>JS</i>	<a href="#">186003019</a>	2.1 × 20 mm <i>JS</i>	<a href="#">186003107</a>
	2.1 × 50 mm <i>XP</i>	<a href="#">186006029</a>	<a href="#">176002547</a>	2.1 × 30 mm	<a href="#">186003020</a>	2.1 × 30 mm	<a href="#">186003129</a>
	2.1 × 75 mm <i>XP</i>	<a href="#">186006030</a>	<a href="#">176002548</a>	2.1 × 50 mm	<a href="#">186003021</a>	2.1 × 50 mm	<a href="#">186003108</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006031</a>	<a href="#">176002549</a>	2.1 × 100 mm	<a href="#">186003022</a>	2.1 × 100 mm	<a href="#">186003109</a>
	2.1 × 150 mm <i>XP</i>	<a href="#">186006709</a>	<a href="#">176002879</a>	2.1 × 150 mm	<a href="#">186003023</a>	2.1 × 150 mm	<a href="#">186003110</a>
	3.0 × 30 mm <i>XP</i>	<a href="#">186006032</a>	<a href="#">176002550</a>	3.0 × 30 mm	<a href="#">186003025</a>	3.0 × 30 mm	<a href="#">186003111</a>
	3.0 × 50 mm <i>XP</i>	<a href="#">186006033</a>	<a href="#">176002551</a>	3.0 × 50 mm	<a href="#">186003026</a>	3.0 × 50 mm	<a href="#">186003131</a>
	3.0 × 75 mm <i>XP</i>	<a href="#">186006034</a>	<a href="#">176002552</a>	3.0 × 100 mm	<a href="#">186003027</a>	3.0 × 100 mm	<a href="#">186003132</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006035</a>	<a href="#">176002553</a>	3.0 × 150 mm	<a href="#">186003028</a>	3.0 × 150 mm	<a href="#">186003112</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006710</a>	<a href="#">176002880</a>	4.6 × 30 mm	<a href="#">186003030</a>	3.0 × 250 mm	<a href="#">186003133</a>
	4.6 × 30 mm <i>XP</i>	<a href="#">186006036</a>	—	4.6 × 50 mm	<a href="#">186003031</a>	4.6 × 30 mm	<a href="#">186003135</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006037</a>	—	4.6 × 75 mm	<a href="#">186003032</a>	4.6 × 50 mm	<a href="#">186003113</a>
	4.6 × 75 mm <i>XP</i>	<a href="#">186006038</a>	—	4.6 × 100 mm	<a href="#">186003033</a>	4.6 × 75 mm	<a href="#">186003114</a>
	4.6 × 100 mm <i>XP</i>	<a href="#">186006039</a>	—	4.6 × 150 mm	<a href="#">186003034</a>	4.6 × 100 mm	<a href="#">186003115</a>
	4.6 × 150 mm <i>XP</i>	<a href="#">186006711</a>	—	4.6 × 250 mm	<a href="#">186003943</a>	4.6 × 150 mm	<a href="#">186003116</a>
						4.6 × 250 mm	<a href="#">186003117</a>

PREPARATIVE COLUMNS						
Particle Size: 5 µm			Particle Size: 10 µm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
10 × 10 mm	Guard Cartridge	<a href="#">186002972</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186003889</a> <sup>1</sup>	
10 × 50 mm	OBD Column	<a href="#">186008164</a>	19 × 10 mm	Guard Cartridge	<a href="#">186003892</a> <sup>2</sup>	
10 × 100 mm	OBD Column	<a href="#">186008165</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006893</a> <sup>3</sup>	
10 × 150 mm	OBD Column	<a href="#">186008166</a>	10 × 150 mm	OBD Column	<a href="#">186008210</a>	
10 × 250 mm	OBD Column	<a href="#">186008167</a>	10 × 250 mm	OBD Column	<a href="#">186008211</a>	
19 × 10 mm	Guard Cartridge	<a href="#">186002975</a> <sup>2</sup>	19 × 50 mm	OBD Column	<a href="#">186003893</a>	
19 × 50 mm	OBD Column	<a href="#">186002977</a>	19 × 100 mm	OBD Column	<a href="#">186003901</a>	
19 × 100 mm	OBD Column	<a href="#">186002978</a>	19 × 150 mm	OBD Column	<a href="#">186003894</a>	
19 × 150 mm	OBD Column	<a href="#">186002979</a>	19 × 250 mm	OBD Column	<a href="#">186003895</a>	
19 × 250 mm	OBD Column	<a href="#">186004021</a>	30 × 75 mm	OBD Column	<a href="#">186004711</a>	
30 × 10 mm	Guard Cartridge	<a href="#">186006893</a> <sup>3</sup>	30 × 100 mm	OBD Column	<a href="#">186003930</a>	
30 × 50 mm	OBD Column	<a href="#">186002980</a>	30 × 150 mm	OBD Column	<a href="#">186003896</a>	
30 × 75 mm	OBD Column	<a href="#">186002981</a>	30 × 250 mm	OBD Column	<a href="#">186003897</a>	
30 × 100 mm	OBD Column	<a href="#">186002982</a>	50 × 50 mm	OBD Column	<a href="#">186003898</a>	
30 × 150 mm	OBD Column	<a href="#">186003284</a>	50 × 100 mm	OBD Column	<a href="#">186003902</a>	
30 × 250 mm	OBD Column	<a href="#">186004025</a>	50 × 150 mm	OBD Column	<a href="#">186003899</a>	
50 × 50 mm	OBD Column	<a href="#">186003933</a>	50 × 250 mm	OBD Column	<a href="#">186003900</a>	
50 × 100 mm	OBD Column	<a href="#">186003937</a>				
50 × 150 mm	OBD Column	<a href="#">186003929</a>				
50 × 250 mm	OBD Column	<a href="#">186004107</a>				

<sup>1</sup> Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19 × 10 mm Cartridge Holder, p/n: [186008745](#).

<sup>3</sup> Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

XBridge Columns *Continued*

BEH C <sub>8</sub>						
ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006040</a>	<a href="#">176002554</a>	2.1 × 30 mm	<a href="#">186003046</a>	2.1 × 30 mm	<a href="#">186003187</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006041</a>	<a href="#">176002555</a>	2.1 × 50 mm	<a href="#">186003047</a>	2.1 × 50 mm	<a href="#">186003011</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006042</a>	<a href="#">176002556</a>	2.1 × 100 mm	<a href="#">186003048</a>	2.1 × 100 mm	<a href="#">186003012</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006043</a>	<a href="#">176002557</a>	2.1 × 150 mm	<a href="#">186003049</a>	2.1 × 150 mm	<a href="#">186003013</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006712</a>	<a href="#">176002881</a>	3.0 × 30 mm	<a href="#">186003182</a>	3.0 × 30 mm	<a href="#">186003189</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006044</a>	<a href="#">176002558</a>	3.0 × 50 mm	<a href="#">186003050</a>	3.0 × 50 mm	<a href="#">186003190</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006045</a>	<a href="#">176002559</a>	3.0 × 100 mm	<a href="#">186003051</a>	3.0 × 100 mm	<a href="#">186003191</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006046</a>	<a href="#">176002560</a>	3.0 × 150 mm	<a href="#">186003052</a>	3.0 × 150 mm	<a href="#">186003014</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006047</a>	<a href="#">176002561</a>	4.6 × 30 mm	<a href="#">186003184</a>	3.0 × 250 mm	<a href="#">186003192</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006713</a>	<a href="#">176002882</a>	4.6 × 50 mm	<a href="#">186003053</a>	4.6 × 30 mm	<a href="#">186003194</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006048</a>	—	4.6 × 75 mm	<a href="#">186003185</a>	4.6 × 50 mm	<a href="#">186003015</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006049</a>	—	4.6 × 100 mm	<a href="#">186003054</a>	4.6 × 75 mm	<a href="#">186003195</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006050</a>	—	4.6 × 150 mm	<a href="#">186003055</a>	4.6 × 100 mm	<a href="#">186003016</a>
4.6 × 100 mm <i>XP</i>	<a href="#">186006051</a>	—	4.6 × 250 mm	<a href="#">186003963</a>	4.6 × 150 mm	<a href="#">186003017</a>
4.6 × 150 mm <i>XP</i>	<a href="#">186006714</a>	—			4.6 × 250 mm	<a href="#">186003018</a>

PREPARATIVE COLUMNS						
Particle Size: 5 µm			Particle Size: 10 µm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
10 × 10 mm	Guard Cartridge	<a href="#">186002991</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186004003</a> <sup>1</sup>	
10 × 50 mm	OBD Column	<a href="#">186008172</a>	19 × 10 mm	Guard Cartridge	<a href="#">186004006</a> <sup>2</sup>	
10 × 100 mm	OBD Column	<a href="#">186008173</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006894</a> <sup>3</sup>	
10 × 150 mm	OBD Column	<a href="#">186008174</a>	10 × 150 mm	OBD Column	<a href="#">186008215</a>	
10 × 250 mm	OBD Column	<a href="#">186008175</a>	10 × 250 mm	OBD Column	<a href="#">186008216</a>	
19 × 10 mm	Guard Cartridge	<a href="#">186002992</a> <sup>2</sup>	19 × 50 mm	OBD Column	<a href="#">186004007</a>	
19 × 50 mm	OBD Column	<a href="#">186002993</a>	19 × 100 mm	OBD Column	<a href="#">186004008</a>	
19 × 100 mm	OBD Column	<a href="#">186002994</a>	19 × 150 mm	OBD Column	<a href="#">186004009</a>	
19 × 150 mm	OBD Column	<a href="#">186002995</a>	19 × 250 mm	OBD Column	<a href="#">186004010</a>	
19 × 250 mm	OBD Column	<a href="#">186004023</a>	30 × 150 mm	OBD Column	<a href="#">186004011</a>	
30 × 10 mm	Guard Cartridge	<a href="#">186006895</a> <sup>3</sup>	30 × 250 mm	OBD Column	<a href="#">186004012</a>	
30 × 50 mm	OBD Column	<a href="#">186002996</a>	50 × 50 mm	OBD Column	<a href="#">186004013</a>	
30 × 75 mm	OBD Column	<a href="#">186003269</a>	50 × 100 mm	OBD Column	<a href="#">186004014</a>	
30 × 100 mm	OBD Column	<a href="#">186002997</a>	50 × 150 mm	OBD Column	<a href="#">186004015</a>	
30 × 150 mm	OBD Column	<a href="#">186003083</a>	50 × 250 mm	OBD Column	<a href="#">186004016</a>	
50 × 50 mm	OBD Column	<a href="#">186003934</a>				
50 × 100 mm	OBD Column	<a href="#">186003938</a>				

<sup>1</sup> Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).  
<sup>2</sup> Requires 19 × 10 mm Cartridge Holder, p/n: [186008745](#).  
<sup>3</sup> Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).



BEH Shield RP18 ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006052</a>	<a href="#">176002562</a>	2.1 × 30 mm	<a href="#">186003035</a>	2.1 × 30 mm	<a href="#">186003157</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006053</a>	<a href="#">176002563</a>	2.1 × 50 mm	<a href="#">186003036</a>	2.1 × 50 mm	<a href="#">186002999</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006054</a>	<a href="#">176002564</a>	2.1 × 100 mm	<a href="#">186003037</a>	2.1 × 100 mm	<a href="#">186003002</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006055</a>	<a href="#">176002565</a>	2.1 × 150 mm	<a href="#">186003038</a>	2.1 × 150 mm	<a href="#">186003003</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006715</a>	<a href="#">176002883</a>	3.0 × 30 mm	<a href="#">186003153</a>	3.0 × 50 mm	<a href="#">186003160</a>
3.0 × 20 mm <i>IS*</i>	<a href="#">186003140</a>	—	3.0 × 50 mm	<a href="#">186003039</a>	3.0 × 100 mm	<a href="#">186003004</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006056</a>	<a href="#">176002566</a>	3.0 × 100 mm	<a href="#">186003040</a>	3.0 × 150 mm	<a href="#">186003005</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006057</a>	<a href="#">176002567</a>	3.0 × 150 mm	<a href="#">186003041</a>	3.0 × 250 mm	<a href="#">186003161</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006058</a>	<a href="#">176002568</a>	4.6 × 30 mm	<a href="#">186003155</a>	4.6 × 50 mm	<a href="#">186003006</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006059</a>	<a href="#">176002569</a>	4.6 × 50 mm	<a href="#">186003042</a>	4.6 × 75 mm	<a href="#">186003007</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006716</a>	<a href="#">176002884</a>	4.6 × 75 mm	<a href="#">186003043</a>	4.6 × 100 mm	<a href="#">186003008</a>
4.6 × 20 mm <i>IS*</i>	<a href="#">186003144</a>	—	4.6 × 100 mm	<a href="#">186003044</a>	4.6 × 150 mm	<a href="#">186003009</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006060</a>	—	4.6 × 150 mm	<a href="#">186003045</a>	4.6 × 250 mm	<a href="#">186003010</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006061</a>	—	4.6 × 250 mm	<a href="#">186003964</a>		
4.6 × 75 mm <i>XP</i>	<a href="#">186006062</a>	—				
4.6 × 100 mm <i>XP</i>	<a href="#">186006063</a>	—				
4.6 × 150 mm <i>XP</i>	<a href="#">186006717</a>	—				

PREPARATIVE COLUMNS						
Particle Size: 5 µm			Particle Size: 10 µm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
10 × 10 mm	Guard Cartridge	<a href="#">186002983</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186003988</a> <sup>1</sup>	
10 × 50 mm	OBD Column	<a href="#">186008168</a>	19 × 10 mm	Guard Cartridge	<a href="#">186003991</a> <sup>2</sup>	
10 × 100 mm	OBD Column	<a href="#">186008169</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006897</a> <sup>3</sup>	
10 × 150 mm	OBD Column	<a href="#">186008170</a>	10 × 150 mm	OBD Column	<a href="#">186008213</a>	
10 × 250 mm	OBD Column	<a href="#">186008171</a>	10 × 250 mm	OBD Column	<a href="#">186008214</a>	
19 × 10 mm	Guard Cartridge	<a href="#">186002984</a> <sup>2</sup>	19 × 50 mm	OBD Column	<a href="#">186003992</a>	
19 × 50 mm	OBD Column	<a href="#">186002985</a>	19 × 100 mm	OBD Column	<a href="#">186003993</a>	
19 × 100 mm	OBD Column	<a href="#">186002986</a>	19 × 150 mm	OBD Column	<a href="#">186003994</a>	
19 × 150 mm	OBD Column	<a href="#">186002987</a>	19 × 250 mm	OBD Column	<a href="#">186003995</a>	
19 × 250 mm	OBD Column	<a href="#">186004022</a>	30 × 150 mm	OBD Column	<a href="#">186003996</a>	
30 × 10 mm	Guard Cartridge	<a href="#">186006898</a> <sup>3</sup>	30 × 250 mm	OBD Column	<a href="#">186003997</a>	
30 × 50 mm	OBD Column	<a href="#">186002988</a>	50 × 50 mm	OBD Column	<a href="#">186003998</a>	
30 × 75 mm	OBD Column	<a href="#">186003262</a>	50 × 100 mm	OBD Column	<a href="#">186003999</a>	
30 × 100 mm	OBD Column	<a href="#">186002989</a>	50 × 150 mm	OBD Column	<a href="#">186004001</a>	
30 × 150 mm	OBD Column	<a href="#">186002990</a>	50 × 250 mm	OBD Column	<a href="#">186004002</a>	
50 × 50 mm	OBD Column	<a href="#">186003935</a>				
50 × 100 mm	OBD Column	<a href="#">186003939</a>				

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).  
<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186008745](#).  
<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

XBridge Columns *Continued*

BEH Phenyl						
ANALYTICAL COLUMNS						
Particle Size: 2.5 $\mu\text{m}$			Particle Size: 3.5 $\mu\text{m}$		Particle Size: 5 $\mu\text{m}$	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 $\times$ 30 mm <i>XP</i>	<a href="#">186006064</a>	<a href="#">176002570</a>	2.1 $\times$ 30 mm	<a href="#">186003321</a>	2.1 $\times$ 50 mm	<a href="#">186003338</a>
2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006065</a>	<a href="#">176002571</a>	2.1 $\times$ 50 mm	<a href="#">186003322</a>	2.1 $\times$ 100 mm	<a href="#">186003339</a>
2.1 $\times$ 75 mm <i>XP</i>	<a href="#">186006066</a>	<a href="#">176002572</a>	2.1 $\times$ 100 mm	<a href="#">186003323</a>	2.1 $\times$ 150 mm	<a href="#">186003340</a>
2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006067</a>	<a href="#">176002573</a>	2.1 $\times$ 150 mm	<a href="#">186003324</a>	3.0 $\times$ 50 mm	<a href="#">186003343</a>
2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006718</a>	<a href="#">176002885</a>	3.0 $\times$ 50 mm	<a href="#">186003327</a>	3.0 $\times$ 100 mm	<a href="#">186003344</a>
3.0 $\times$ 30 mm <i>XP</i>	<a href="#">186006068</a>	<a href="#">176002574</a>	3.0 $\times$ 100 mm	<a href="#">186003328</a>	3.0 $\times$ 150 mm	<a href="#">186003345</a>
3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006069</a>	<a href="#">176002575</a>	3.0 $\times$ 150 mm	<a href="#">186003329</a>	3.0 $\times$ 250 mm	<a href="#">186003346</a>
3.0 $\times$ 75 mm <i>XP</i>	<a href="#">186006070</a>	<a href="#">176002576</a>	4.6 $\times$ 30 mm	<a href="#">186003331</a>	4.6 $\times$ 50 mm	<a href="#">186003349</a>
3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006071</a>	<a href="#">176002577</a>	4.6 $\times$ 50 mm	<a href="#">186003332</a>	4.6 $\times$ 75 mm	<a href="#">186003350</a>
3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006719</a>	<a href="#">176002886</a>	4.6 $\times$ 75 mm	<a href="#">186003333</a>	4.6 $\times$ 100 mm	<a href="#">186003351</a>
4.6 $\times$ 30 mm <i>XP</i>	<a href="#">186006072</a>	—	4.6 $\times$ 100 mm	<a href="#">186003334</a>	4.6 $\times$ 150 mm	<a href="#">186003352</a>
4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006073</a>	—	4.6 $\times$ 150 mm	<a href="#">186003335</a>	4.6 $\times$ 250 mm	<a href="#">186003353</a>
4.6 $\times$ 75 mm <i>XP</i>	<a href="#">186006074</a>	—	4.6 $\times$ 250 mm	<a href="#">186003965</a>		
4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006075</a>	—				
4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006720</a>	—				
PREPARATIVE COLUMNS						
Particle Size: 5 $\mu\text{m}$						
Dimension	Type	P/N (1/pk)				
10 $\times$ 10 mm	Guard Cartridge	<a href="#">186003354</a> <sup>1</sup>				
10 $\times$ 50 mm	OBD Column	<a href="#">186008176</a>				
10 $\times$ 100 mm	OBD Column	<a href="#">186008177</a>				
10 $\times$ 150 mm	OBD Column	<a href="#">186008178</a>				
10 $\times$ 250 mm	OBD Column	<a href="#">186008179</a>				
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186003355</a> <sup>2</sup>				
19 $\times$ 50 mm	OBD Column	<a href="#">186003356</a>				
19 $\times$ 100 mm	OBD Column	<a href="#">186003357</a>				
19 $\times$ 150 mm	OBD Column	<a href="#">186003358</a>				
19 $\times$ 250 mm	OBD Column	<a href="#">186004024</a>				
30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006891</a> <sup>3</sup>				
30 $\times$ 50 mm	OBD Column	<a href="#">186003277</a>				
30 $\times$ 75 mm	OBD Column	<a href="#">186003278</a>				
30 $\times$ 100 mm	OBD Column	<a href="#">186003279</a>				
30 $\times$ 150 mm	OBD Column	<a href="#">186003276</a>				
50 $\times$ 50 mm	OBD Column	<a href="#">186003936</a>				
50 $\times$ 100 mm	OBD Column	<a href="#">186003940</a>				

<sup>1</sup> Requires 10  $\times$  10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186008745](#).

<sup>3</sup> Requires 30  $\times$  10 mm Prep Guard Holder, p/n: [186006912](#).

BEH HILIC						
ANALYTICAL COLUMNS						
Particle Size: 2.5 $\mu\text{m}$			Particle Size: 3.5 $\mu\text{m}$		Particle Size: 5 $\mu\text{m}$	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 $\times$ 30 mm <i>XP</i>	<a href="#">186006076</a>	<a href="#">176002578</a>	2.1 $\times$ 50 mm	<a href="#">186004432</a>	2.1 $\times$ 50 mm	<a href="#">186004444</a>
2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006077</a>	<a href="#">176002579</a>	2.1 $\times$ 100 mm	<a href="#">186004433</a>	2.1 $\times$ 100 mm	<a href="#">186004445</a>
2.1 $\times$ 75 mm <i>XP</i>	<a href="#">186006078</a>	<a href="#">176002580</a>	2.1 $\times$ 150 mm	<a href="#">186004434</a>	2.1 $\times$ 150 mm	<a href="#">186004446</a>
2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006079</a>	<a href="#">176002581</a>	3.0 $\times$ 100 mm	<a href="#">186004436</a>	3.0 $\times$ 100 mm	<a href="#">186004448</a>
2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006721</a>	<a href="#">176002887</a>	4.6 $\times$ 50 mm	<a href="#">186004439</a>	4.6 $\times$ 50 mm	<a href="#">186004451</a>
3.0 $\times$ 30 mm <i>XP</i>	<a href="#">186006080</a>	<a href="#">176002582</a>	4.6 $\times$ 100 mm	<a href="#">186004440</a>	4.6 $\times$ 100 mm	<a href="#">186004452</a>
3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006081</a>	<a href="#">176002583</a>	4.6 $\times$ 150 mm	<a href="#">186004441</a>	4.6 $\times$ 150 mm	<a href="#">186004453</a>
3.0 $\times$ 75 mm <i>XP</i>	<a href="#">186006082</a>	<a href="#">176002584</a>			4.6 $\times$ 250 mm	<a href="#">186004454</a>
3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006083</a>	<a href="#">176002585</a>				
3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006722</a>	<a href="#">176002888</a>				
4.6 $\times$ 30 mm <i>XP</i>	<a href="#">186006084</a>	—				
4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006085</a>	—				
4.6 $\times$ 75 mm <i>XP</i>	<a href="#">186006086</a>	—				
4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006087</a>	—				
4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006723</a>	—				
PREPARATIVE COLUMNS						
Particle Size: 5 $\mu\text{m}$						
Dimension	Type	P/N (1/pk)				
10 $\times$ 10 mm	Guard Cartridge	<a href="#">186004720</a> <sup>1</sup>				
10 $\times$ 50 mm	OBD Column	<a href="#">186008217</a>				
10 $\times$ 100 mm	OBD Column	<a href="#">186008218</a>				
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186004723</a> <sup>2</sup>				
19 $\times$ 50 mm	OBD Column	<a href="#">186004724</a>				
19 $\times$ 100 mm	OBD Column	<a href="#">186004725</a>				
19 $\times$ 150 mm	OBD Column	<a href="#">186004726</a>				
19 $\times$ 250 mm	OBD Column	<a href="#">186004730</a>				
30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006896</a> <sup>3</sup>				
30 $\times$ 50 mm	OBD Column	<a href="#">186004727</a>				
30 $\times$ 100 mm	OBD Column	<a href="#">186004728</a>				
30 $\times$ 150 mm	OBD Column	<a href="#">186004729</a>				
30 $\times$ 250 mm	OBD Column	<a href="#">186004731</a>				
50 $\times$ 50 mm	OBD Column	<a href="#">186004732</a>				
50 $\times$ 100 mm	OBD Column	<a href="#">186004733</a>				
50 $\times$ 150 mm	OBD Column	<a href="#">186004734</a>				
50 $\times$ 250 mm	OBD Column	<a href="#">186004735</a>				

<sup>1</sup> Requires 10  $\times$  10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186008745](#).

<sup>3</sup> Requires 30  $\times$  10 mm Prep Guard Holder, p/n: [186006912](#).

XBridge Columns *Continued*

BEH Amide

ANALYTICAL COLUMNS						
Particle Size: 2.5 $\mu$ m			Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 $\times$ 30 mm <i>XP</i>	<a href="#">186006088</a>	<a href="#">176002586</a>	2.1 $\times$ 30 mm	<a href="#">186004858</a>	2.1 $\times$ 30 mm	<a href="#">186006587</a>
2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006089</a>	<a href="#">176002587</a>	2.1 $\times$ 50 mm	<a href="#">186004859</a>	2.1 $\times$ 50 mm	<a href="#">186006588</a>
2.1 $\times$ 75 mm <i>XP</i>	<a href="#">186006090</a>	<a href="#">176002588</a>	2.1 $\times$ 100 mm	<a href="#">186004860</a>	2.1 $\times$ 100 mm	<a href="#">186006589</a>
2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006091</a>	<a href="#">176002589</a>	2.1 $\times$ 150 mm	<a href="#">186004861</a>	2.1 $\times$ 150 mm	<a href="#">186006590</a>
2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006724</a>	<a href="#">176002889</a>	3.0 $\times$ 50 mm	<a href="#">186004863</a>	3.0 $\times$ 50 mm	<a href="#">186006591</a>
3.0 $\times$ 30 mm <i>XP</i>	<a href="#">186006092</a>	<a href="#">176002590</a>	3.0 $\times$ 100 mm	<a href="#">186004864</a>	3.0 $\times$ 100 mm	<a href="#">186006592</a>
3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006093</a>	<a href="#">176002591</a>	4.6 $\times$ 50 mm	<a href="#">186004867</a>	4.6 $\times$ 50 mm	<a href="#">186006593</a>
3.0 $\times$ 75 mm <i>XP</i>	<a href="#">186006094</a>	<a href="#">176002592</a>	4.6 $\times$ 100 mm	<a href="#">186004868</a>	4.6 $\times$ 100 mm	<a href="#">186006594</a>
3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006095</a>	<a href="#">176002593</a>	4.6 $\times$ 150 mm	<a href="#">186004869</a>	4.6 $\times$ 150 mm	<a href="#">186006595</a>
3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006725</a>	<a href="#">176002890</a>	4.6 $\times$ 250 mm	<a href="#">186004870</a>	4.6 $\times$ 250 mm	<a href="#">186006596</a>
4.6 $\times$ 30 mm <i>XP</i>	<a href="#">186006096</a>	—				
4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006097</a>	—				
4.6 $\times$ 75 mm <i>XP</i>	<a href="#">186006098</a>	—				
4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006099</a>	—				
4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006726</a>	—				

PREPARATIVE COLUMNS		
Particle Size: 5 $\mu$ m		
Dimension	Type	P/N (1/pk)
10 $\times$ 10 mm	Guard Cartridge	<a href="#">186006597</a> <sup>1</sup>
10 $\times$ 50 mm	OBD Column	<a href="#">186008260</a>
10 $\times$ 100 mm	OBD Column	<a href="#">186008261</a>
10 $\times$ 150 mm	OBD Column	<a href="#">186008262</a>
10 $\times$ 250 mm	OBD Column	<a href="#">186008263</a>
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186006598</a> <sup>2</sup>
19 $\times$ 50 mm	OBD Column	<a href="#">186006603</a>
19 $\times$ 100 mm	OBD Column	<a href="#">186006604</a>
19 $\times$ 150 mm	OBD Column	<a href="#">186006605</a>
19 $\times$ 250 mm	OBD Column	<a href="#">186006606</a>
30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006890</a> <sup>3</sup>
30 $\times$ 50 mm	OBD Column	<a href="#">186006607</a>
30 $\times$ 75 mm	OBD Column	<a href="#">186006608</a>
30 $\times$ 100 mm	OBD Column	<a href="#">186006609</a>
30 $\times$ 150 mm	OBD Column	<a href="#">186006610</a>
30 $\times$ 250 mm	OBD Column	<a href="#">186006611</a>

<sup>1</sup>Requires 10  $\times$  10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186008745](#).

<sup>3</sup>Requires 30  $\times$  10 mm Prep Guard Holder, p/n: [186006912](#).

XBridge Columns *Continued*

Glycan BEH Amide, 130 Å	ANALYTICAL COLUMNS			
	Particle Size: 2.5 µm		Particle Size: 3.5 µm	
	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
	2.1 × 50 mm <i>XP</i>	<a href="#">186007263</a>	2.1 × 50 mm	<a href="#">186007502</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186007264</a>	2.1 × 100 mm	<a href="#">186007503</a>
	2.1 × 150 mm <i>XP</i>	<a href="#">186007265</a>	2.1 × 150 mm	<a href="#">186007504</a>
	3.0 × 30 mm <i>XP</i>	<a href="#">186008038</a>	4.6 × 50 mm	<a href="#">186007273</a>
	3.0 × 75 mm <i>XP</i>	<a href="#">186008039</a>	4.6 × 100 mm	<a href="#">186007274</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186008040</a>	4.6 × 150 mm	<a href="#">186007275</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186007268</a>	4.6 × 250 mm	<a href="#">186007276</a>
	4.6 × 100 mm <i>XP</i>	<a href="#">186007269</a>		
	4.6 × 150 mm <i>XP</i>	<a href="#">186007270</a>		

Peptide BEH C <sub>18</sub> , 130 Å	ANALYTICAL COLUMNS				PREPARATIVE COLUMNS					
	Particle Size: 3.5 µm		Particle Size: 5 µm		Particle Size: 5 µm			Particle Size: 10 µm		
	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)	Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
	1.0 × 50 mm	<a href="#">186003560</a>	1.0 × 50 mm	<a href="#">186003571</a>	10 × 10 mm	Guard Cartridge	<a href="#">186004469</a> <sup>1</sup>	4.6 × 50 mm	OBD Column	<a href="#">186003648</a>
	1.0 × 100 mm	<a href="#">186003561</a>	1.0 × 100 mm	<a href="#">186003572</a>	10 × 50 mm	OBD Column	<a href="#">186008186</a>	4.6 × 100 mm	OBD Column	<a href="#">186003649</a>
	1.0 × 150 mm	<a href="#">186003562</a>	1.0 × 150 mm	<a href="#">186003573</a>	10 × 100 mm	OBD Column	<a href="#">186008187</a>	4.6 × 150 mm	OBD Column	<a href="#">186003650</a>
	2.1 × 50 mm	<a href="#">186003563</a>	2.1 × 50 mm	<a href="#">186003574</a>	10 × 150 mm	OBD Column	<a href="#">186008188</a>	4.6 × 250 mm	OBD Column	<a href="#">186003651</a>
	2.1 × 100 mm	<a href="#">186003564</a>	2.1 × 100 mm	<a href="#">186003575</a>	10 × 250 mm	OBD Column	<a href="#">186008189</a>	10 × 10 mm	Guard Cartridge	<a href="#">186004465</a> <sup>1</sup>
	2.1 × 150 mm	<a href="#">186003565</a>	2.1 × 150 mm	<a href="#">186003576</a>	19 × 10 mm	Guard Cartridge	<a href="#">186004468</a> <sup>2</sup>	10 × 50 mm	OBD Column	<a href="#">186008194</a>
	2.1 × 250 mm	<a href="#">186003566</a>	2.1 × 250 mm	<a href="#">186003577</a>	19 × 50 mm	OBD Column	<a href="#">186003586</a>	10 × 100 mm	OBD Column	<a href="#">186008195</a>
	4.6 × 50 mm	<a href="#">186003567</a>	4.6 × 50 mm	<a href="#">186003578</a>	19 × 100 mm	OBD Column	<a href="#">186003587</a>	10 × 150 mm	OBD Column	<a href="#">186008196</a>
	4.6 × 100 mm	<a href="#">186003568</a>	4.6 × 100 mm	<a href="#">186003579</a>	19 × 150 mm	OBD Column	<a href="#">186003945</a>	10 × 250 mm	OBD Column	<a href="#">186008197</a>
	4.6 × 150 mm	<a href="#">186003569</a>	4.6 × 150 mm	<a href="#">186003580</a>				19 × 10 mm	Guard Cartridge	<a href="#">186004464</a> <sup>2</sup>
	4.6 × 250 mm	<a href="#">186003570</a>	4.6 × 250 mm	<a href="#">186003581</a>				19 × 50 mm	OBD Column	<a href="#">186003656</a>
								19 × 150 mm	OBD Column	<a href="#">186003657</a>
								19 × 250 mm	OBD Column	<a href="#">186003658</a>
								30 × 50 mm	OBD Column	<a href="#">186003659</a>
								30 × 100 mm	OBD Column	<a href="#">186003660</a>
								30 × 150 mm	OBD Column	<a href="#">186003661</a>
								30 × 250 mm	OBD Column	<a href="#">186003662</a>

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186008745](#).



**APPLICATION AREA:** Analyze Natural Product Secondary Metabolites from Bacterial Extracts

"For the purpose of our application (natural products metabolites dereliction and isolation) the XBridge OBD prep column showed reproducible results from batch-to-batch runs as well as reliable comparison with the analytical run of the same sample so it is a very reliable and easy to use column."

**REVIEWER:** Arlene Sy-Cordero

**ORGANIZATION:** Lodo Therapeutics

XBridge Columns *Continued*

Peptide BEH C<sub>18</sub>,  
300 Å

ANALYTICAL COLUMNS					
Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006028</a>	1.0 × 50 mm	<a href="#">186003604</a>	1.0 × 50 mm	<a href="#">186003615</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006029</a>	1.0 × 100 mm	<a href="#">186003605</a>	1.0 × 100 mm	<a href="#">186003616</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006030</a>	1.0 × 150 mm	<a href="#">186003606</a>	1.0 × 150 mm	<a href="#">186003617</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006031</a>	2.1 × 50 mm	<a href="#">186003607</a>	2.1 × 50 mm	<a href="#">186003618</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006709</a>	2.1 × 100 mm	<a href="#">186003608</a>	2.1 × 100 mm	<a href="#">186003619</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006032</a>	2.1 × 150 mm	<a href="#">186003609</a>	2.1 × 150 mm	<a href="#">186003620</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006033</a>	2.1 × 250 mm	<a href="#">186003610</a>	2.1 × 250 mm	<a href="#">186003621</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006034</a>	4.6 × 50 mm	<a href="#">186003611</a>	4.6 × 50 mm	<a href="#">186003622</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006035</a>	4.6 × 100 mm	<a href="#">186003612</a>	4.6 × 100 mm	<a href="#">186003623</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006710</a>	4.6 × 150 mm	<a href="#">186003613</a>	4.6 × 150 mm	<a href="#">186003624</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006036</a>	4.6 × 250 mm	<a href="#">186003614</a>	4.6 × 250 mm	<a href="#">186003625</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006037</a>				
4.6 × 75 mm <i>XP</i>	<a href="#">186006038</a>				
4.6 × 100 mm <i>XP</i>	<a href="#">186006039</a>				
4.6 × 150 mm <i>XP</i>	<a href="#">186006711</a>				

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186004471</a> <sup>1</sup>	4.6 × 50 mm	OBD Column	<a href="#">186003663</a>
10 × 50 mm	OBD Column	<a href="#">186008190</a>	4.6 × 100 mm	OBD Column	<a href="#">186003664</a>
10 × 100 mm	OBD Column	<a href="#">186008191</a>	4.6 × 150 mm	OBD Column	<a href="#">186003665</a>
10 × 150 mm	OBD Column	<a href="#">186008192</a>	4.6 × 250 mm	OBD Column	<a href="#">186003666</a>
10 × 250 mm	OBD Column	<a href="#">186008193</a>	10 × 10 mm	Guard Cartridge	<a href="#">186004467</a> <sup>1</sup>
19 × 10 mm	Guard Cartridge	<a href="#">186004470</a> <sup>2</sup>	10 × 50 mm	OBD Column	<a href="#">186008198</a>
19 × 50 mm	OBD Column	<a href="#">186003630</a>	10 × 100 mm	OBD Column	<a href="#">186008199</a>
19 × 100 mm	OBD Column	<a href="#">186003631</a>	10 × 150 mm	OBD Column	<a href="#">186008200</a>
19 × 150 mm	OBD Column	<a href="#">186003946</a>	10 × 250 mm	OBD Column	<a href="#">186008201</a>
			19 × 10 mm	Guard Cartridge	<a href="#">186004466</a> <sup>2</sup>
			19 × 50 mm	OBD Column	<a href="#">186003671</a>
			19 × 150 mm	OBD Column	<a href="#">186003672</a>
			19 × 250 mm	OBD Column	<a href="#">186003673</a>
			30 × 10 mm	Guard Cartridge	<a href="#">186006882</a> <sup>3</sup>
			30 × 50 mm	OBD Column	<a href="#">186003674</a>
			30 × 100 mm	OBD Column	<a href="#">186003675</a>
			30 × 150 mm	OBD Column	<a href="#">186003676</a>
			30 × 250 mm	OBD Column	<a href="#">186003677</a>

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Cartridge Holder, p/n: [186006912](#).

Protein BEH C <sub>4</sub> , 300 Å	ANALYTICAL COLUMNS		PREPARATIVE COLUMNS				
	Particle Size: 3.5 µm		Particle Size: 5 µm			Particle Size: 10 µm	
	Dimension	P/N (1/pk)	Dimension	Type	P/N (1/pk)	Dimension	Type
2.1 × 50 mm	<a href="#">186004498</a>	10 × 10 mm	Guard Cartridge	<a href="#">186007305</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186007325</a> <sup>1</sup>
2.1 × 100 mm	<a href="#">186004499</a>	10 × 50 mm	OBD Column	<a href="#">186008272</a>	10 × 50 mm	OBD Column	<a href="#">186008276</a>
2.1 × 150 mm	<a href="#">186004500</a>	10 × 100 mm	OBD Column	<a href="#">186008273</a>	10 × 100 mm	OBD Column	<a href="#">186008277</a>
2.1 × 250 mm	<a href="#">186004501</a>	10 × 150 mm	OBD Column	<a href="#">186008274</a>	10 × 150 mm	OBD Column	<a href="#">186008278</a>
4.6 × 50 mm	<a href="#">186004502</a>	10 × 250 mm	OBD Column	<a href="#">186008275</a>	10 × 250 mm	OBD Column	<a href="#">186008279</a>
4.6 × 100 mm	<a href="#">186004503</a>	19 × 10 mm	Guard Cartridge	<a href="#">186007310</a> <sup>2</sup>	19 × 10 mm	Guard Cartridge	<a href="#">186007330</a> <sup>2</sup>
4.6 × 150 mm	<a href="#">186004504</a>	19 × 50 mm	OBD Column	<a href="#">186007311</a>	19 × 50 mm	OBD Column	<a href="#">186007331</a>
4.6 × 250 mm	<a href="#">186004505</a>	19 × 100 mm	OBD Column	<a href="#">186007312</a>	19 × 100 mm	OBD Column	<a href="#">186007332</a>
		19 × 150 mm	OBD Column	<a href="#">186007313</a>	19 × 150 mm	OBD Column	<a href="#">186007333</a>
		19 × 250 mm	OBD Column	<a href="#">186007314</a>	19 × 250 mm	OBD Column	<a href="#">186007334</a>
		30 × 10 mm	Guard Cartridge	<a href="#">186007315</a> <sup>3</sup>	30 × 10 mm	Guard Cartridge	<a href="#">186007335</a> <sup>3</sup>
		30 × 50 mm	OBD Column	<a href="#">186007316</a>	30 × 50 mm	OBD Column	<a href="#">186007336</a>
		30 × 75 mm	OBD Column	<a href="#">186007317</a>	30 × 75 mm	OBD Column	<a href="#">186007337</a>
		30 × 100 mm	OBD Column	<a href="#">186007318</a>	30 × 100 mm	OBD Column	<a href="#">186007338</a>
		30 × 150 mm	OBD Column	<a href="#">186007319</a>	30 × 150 mm	OBD Column	<a href="#">186007339</a>
		30 × 250 mm	OBD Column	<a href="#">186007320</a>	30 × 250 mm	OBD Column	<a href="#">186007340</a>

Oligonucleotide BEH C <sub>8</sub> , 130 Å	PREPARATIVE COLUMNS		
	Particle Size: 2.5 µm		
	Dimension	Type	P/N (1/pk)
10 × 50 mm	OBD Column	<a href="#">186008212</a>	
19 × 50 mm	OBD Column	<a href="#">186008962</a>	
30 × 50 mm	OBD Column	<a href="#">186008963</a>	
50 × 50 mm	OBD Column	<a href="#">186008964</a>	

Column (mm)	30	50
2.1 × 50	0.04	0.2
4.6 × 50	0.20	1.0
10.0 × 50	1.00	4.5
19.0 × 50	4.00	16.0
30.0 × 50	9.00	40.0
50.0 × 50	25.00	110.0

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).  
<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).  
<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).



**APPLICATION AREA:** Small Molecule Purification

"These are excellent columns. They come in a variety of sizes to meet every need, we use mostly the 19 × 100 mm. These columns are great and meet our routine purification needs and give excellent efficiency and resolution for those more challenging ones. We find that the columns are very robust, ours can last years and many injections, in some cases, a good flush is all that is needed to get them back to optimal. Highly recommended."

**REVIEWER:** Romulo Romero

**ORGANIZATION:** AstraZeneca

XBridge Columns Method Validation Kits\*

	Particle Size: 2.5 $\mu$ m		Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>BEH C<sub>18</sub></b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006197</a>	2.1 $\times$ 100 mm	<a href="#">186003766</a>	2.1 $\times$ 150 mm	<a href="#">186003771</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006198</a>	3.0 $\times$ 100 mm	<a href="#">186003767</a>	3.0 $\times$ 100 mm	<a href="#">186003772</a>
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006757</a>	3.0 $\times$ 150 mm	<a href="#">186003768</a>	3.0 $\times$ 150 mm	<a href="#">186003773</a>
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006199</a>	4.6 $\times$ 100 mm	<a href="#">186003769</a>	4.6 $\times$ 100 mm	<a href="#">186003774</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006200</a>	4.6 $\times$ 150 mm	<a href="#">186003770</a>	4.6 $\times$ 150 mm	<a href="#">186003775</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006758</a>			4.6 $\times$ 250 mm	<a href="#">186003776</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006201</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006202</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006759</a>				
<b>BEH C<sub>8</sub></b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006203</a>	2.1 $\times$ 100 mm	<a href="#">186003777</a>	2.1 $\times$ 150 mm	<a href="#">186003782</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006204</a>	3.0 $\times$ 100 mm	<a href="#">186003778</a>	3.0 $\times$ 100 mm	<a href="#">186003783</a>
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006760</a>	3.0 $\times$ 150 mm	<a href="#">186003779</a>	3.0 $\times$ 150 mm	186003784
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006205</a>	4.6 $\times$ 100 mm	<a href="#">186003780</a>	4.6 $\times$ 100 mm	<a href="#">186003785</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006206</a>	4.6 $\times$ 150 mm	<a href="#">186003781</a>	4.6 $\times$ 150 mm	<a href="#">186003786</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006761</a>			4.6 $\times$ 250 mm	<a href="#">186003787</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006207</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006208</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006762</a>				
<b>BEH Shield RP18</b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006209</a>	2.1 $\times$ 100 mm	<a href="#">186003788</a>	2.1 $\times$ 150 mm	<a href="#">186003793</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006210</a>	3.0 $\times$ 100 mm	<a href="#">186003789</a>	3.0 $\times$ 100 mm	186003794
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006763</a>	3.0 $\times$ 150 mm	<a href="#">186003790</a>	3.0 $\times$ 150 mm	<a href="#">186003795</a>
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006211</a>	4.6 $\times$ 100 mm	<a href="#">186003791</a>	4.6 $\times$ 100 mm	<a href="#">186003796</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006212</a>	4.6 $\times$ 150 mm	<a href="#">186003792</a>	4.6 $\times$ 150 mm	<a href="#">186003797</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006774</a>			4.6 $\times$ 250 mm	<a href="#">186003798</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006213</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006214</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006775</a>				
<b>BEH Phenyl</b>	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006215</a>	2.1 $\times$ 100 mm	<a href="#">186003799</a>	2.1 $\times$ 150 mm	<a href="#">186003804</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006216</a>	3.0 $\times$ 100 mm	<a href="#">186003800</a>	3.0 $\times$ 100 mm	<a href="#">186003805</a>
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006776</a>	3.0 $\times$ 150 mm	<a href="#">186003801</a>	3.0 $\times$ 150 mm	186003806
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006217</a>	4.6 $\times$ 100 mm	<a href="#">186003802</a>	4.6 $\times$ 100 mm	<a href="#">186003807</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006218</a>	4.6 $\times$ 150 mm	<a href="#">186003803</a>	4.6 $\times$ 150 mm	<a href="#">186003808</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006777</a>			4.6 $\times$ 250 mm	<a href="#">186003809</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006219</a>				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006220</a>				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006778</a>				
<b>Oligonucleotide BEH C<sub>18</sub>, 130 Å</b>	4.6 $\times$ 50 mm	<a href="#">186004906</a>				

\*Each Method Validation Kit contains 3 columns, each from a different batch.



XBridge Columns Method Validation Kits\* *Continued*

Particle Size: 2.5 µm		
	Dimension	P/N (3/pk)
<b>HILIC</b>	2.1 × 50 mm <i>XP</i>	<a href="#">186006221</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006222</a>
	2.1 × 150 mm <i>XP</i>	<a href="#">186006779</a>
	3.0 × 50 mm <i>XP</i>	<a href="#">186006223</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006224</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006780</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006225</a>
	4.6 × 100 mm <i>XP</i>	<a href="#">186006226</a>
	4.6 × 150 mm <i>XP</i>	<a href="#">186006781</a>
<b>Amide</b>	2.1 × 50 mm <i>XP</i>	<a href="#">186006227</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006228</a>
	2.1 × 150 mm <i>XP</i>	<a href="#">186006782</a>
	3.0 × 50 mm <i>XP</i>	<a href="#">186006229</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006230</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006783</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006231</a>
	4.6 × 100 mm <i>XP</i>	<a href="#">186006232</a>
	4.6 × 150 mm <i>XP</i>	<a href="#">186006784</a>
<b>Glycan BEH Amide, 130 Å</b>	2.1 × 150 mm <i>XP</i>	<a href="#">186007266</a>
	4.6 × 150 mm <i>XP</i>	<a href="#">186007271</a>

\*Each Method Validation Kit contains 3 columns, each from a different batch.



**APPLICATION AREA:** Purification of Small Molecules and Peptides

"XBridge columns are easy to install and basic method development gives high resolution. They are robust, long-lasting and easily cleaned. Even when sample is highly concentrated, and material is overloaded, column resolution remains high."

**REVIEWER:** Daniel Sheik

**ORGANIZATION:** Purdue Institute for Drug Discovery

## XBridge VanGuard Cartridges

	Particle Size: 2.5 $\mu$ m		Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
BEH C <sub>18</sub>	2.1 $\times$ 5 mm <i>XP</i>	<a href="#">186007772</a>	2.1 $\times$ 5 mm	<a href="#">186007766</a>	2.1 $\times$ 5 mm	<a href="#">186007769</a>
	3.9 $\times$ 5 mm <i>XP</i>	<a href="#">186007774</a>	3.9 $\times$ 5 mm	<a href="#">186007768</a>	3.9 $\times$ 5 mm	<a href="#">186007771</a>
BEH C <sub>8</sub>	2.1 $\times$ 5 mm <i>XP</i>	<a href="#">186007781</a>	2.1 $\times$ 5 mm	<a href="#">186007775</a>	2.1 $\times$ 5 mm	<a href="#">186007778</a>
	3.9 $\times$ 5 mm <i>XP</i>	<a href="#">186007783</a>	3.9 $\times$ 5 mm	<a href="#">186007777</a>	3.9 $\times$ 5 mm	<a href="#">186007780</a>
BEH Shield RP18	2.1 $\times$ 5 mm <i>XP</i>	<a href="#">186007808</a>	2.1 $\times$ 5 mm	<a href="#">186007802</a>	2.1 $\times$ 5 mm	<a href="#">186007805</a>
	3.9 $\times$ 5 mm <i>XP</i>	<a href="#">186007810</a>	3.9 $\times$ 5 mm	<a href="#">186007804</a>	3.9 $\times$ 5 mm	<a href="#">186007807</a>
BEH Phenyl	2.1 $\times$ 5 mm <i>XP</i>	<a href="#">186007799</a>	2.1 $\times$ 5 mm	<a href="#">186007793</a>	2.1 $\times$ 5 mm	<a href="#">186007796</a>
	3.9 $\times$ 5 mm <i>XP</i>	<a href="#">186007801</a>	3.9 $\times$ 5 mm	<a href="#">186007795</a>	3.9 $\times$ 5 mm	<a href="#">186007798</a>
BEH HILIC	2.1 $\times$ 5 mm <i>XP</i>	<a href="#">186007790</a>	2.1 $\times$ 5 mm	<a href="#">186007784</a>	2.1 $\times$ 5 mm	<a href="#">186007787</a>
	3.9 $\times$ 5 mm <i>XP</i>	<a href="#">186007792</a>	3.9 $\times$ 5 mm	<a href="#">186007786</a>	3.9 $\times$ 5 mm	<a href="#">186007789</a>
BEH Amide	2.1 $\times$ 5 mm <i>XP</i>	<a href="#">186007763</a>	2.1 $\times$ 5 mm	<a href="#">186007757</a>	2.1 $\times$ 5 mm	<a href="#">186007760</a>
	3.9 $\times$ 5 mm <i>XP</i>	<a href="#">186007765</a>	3.9 $\times$ 5 mm	<a href="#">186007759</a>	3.9 $\times$ 5 mm	<a href="#">186007762</a>

## Universal VanGuard Cartridge Holder

Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>



### APPLICATION AREA: Preparative LC Fraction Collection

"Waters application specialists help us to select the correct dimension of the (XBridge) column based on our application. On the receipt of the column, the application specialist was on site and helped us install and share his experience working with prep column. I am using this column almost every day and made more than 2000 injections with 10 mg/mL sample concentration and still, it works well for my application. I highly recommend this column and I am very happy with Waters products, their after sale support. The one thing that makes stand above all is their 90 days guarantee."

**REVIEWER:** Jignesh Desai

**ORGANIZATION:** Alvogen

## VERSATILITY AND SELECTIVITY

XSelect HPLC Columns offer the opportunity to scale separations from analytical to preparative, taking advantage of alternative selectivity through different column chemistries and methods specifying different pH scales.

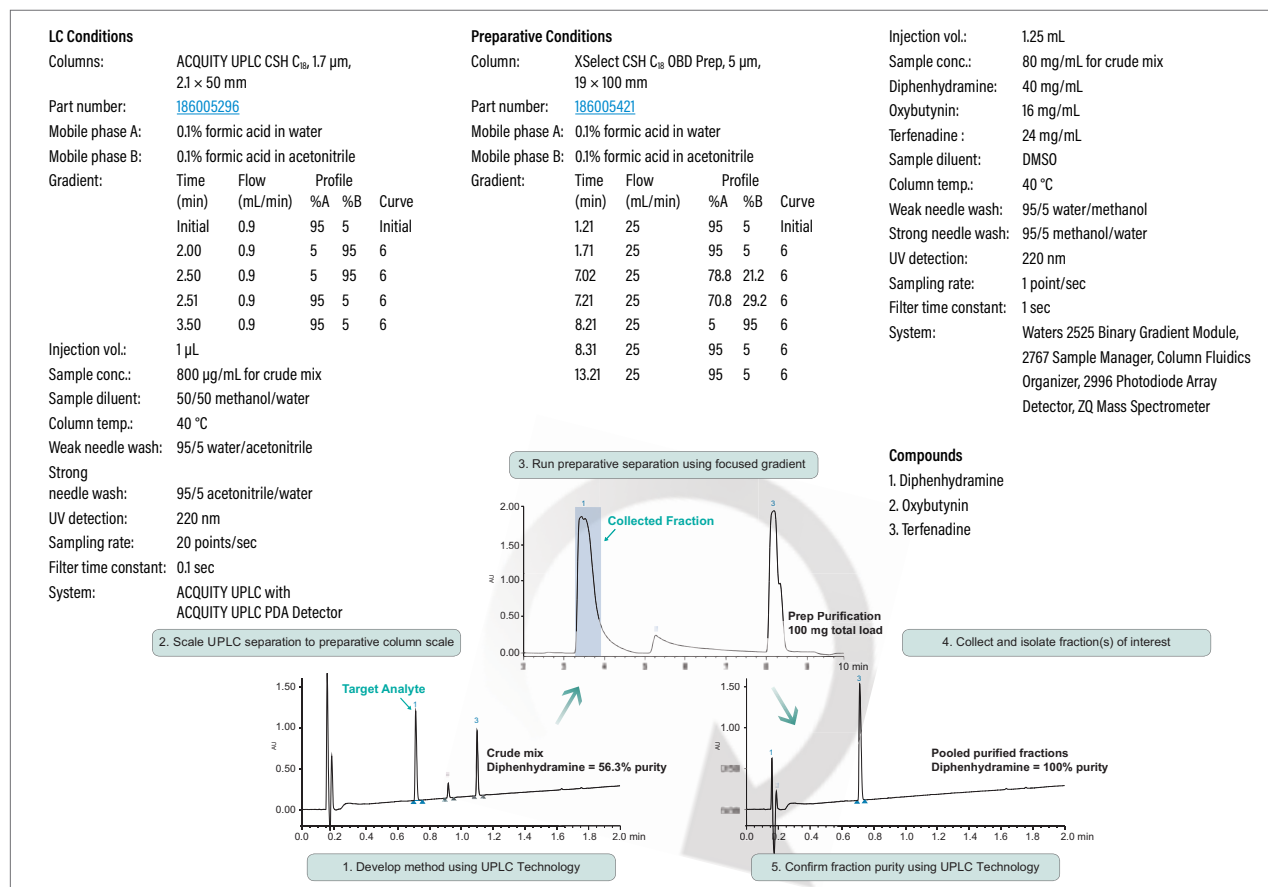
XSelect OBD Preparative Columns are:

- Available as CSH C<sub>18</sub>, CSH Fluoro-Phenyl, CSH Phenyl-Hexyl, HSS C<sub>18</sub>, HSS C<sub>18</sub> SB, and HSS T3 column chemistries
- Designed for selectivity, improving the separation of closely eluting peaks
- Intended for isolation and purification, improving throughput with high-mass loading
- Ideal for rapid method development, reducing the time and cost required to develop screening methods

Columns for peptide purifications:

- Improve peak shape and mass loading using the QC-tested XSelect Peptide CSH C<sub>18</sub> Columns

## Columns Designed for Isolation and Purification



Using CSH Technology throughout the entire process, methods can be developed quickly with ACQUITY UPLC CSH Columns and UPLC Technology and then transferred to preparative-scale XSelect OBD Preparative Columns for isolation and purification. The purity of the isolated fraction(s) can then be measured/confirmed using ACQUITY UPLC CSH Columns and UPLC Technology.

## Ordering Information

### XSelect Columns

ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006100</a>	<a href="#">176002594</a>	1.0 × 50 mm	<a href="#">186005249</a>	2.1 × 50 mm	<a href="#">186005274</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006101</a>	<a href="#">176002595</a>	1.0 × 150 mm	<a href="#">186005251</a>	2.1 × 100 mm	<a href="#">186005275</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006102</a>	<a href="#">176002596</a>	2.1 × 30 mm	<a href="#">186005254</a>	2.1 × 150 mm	<a href="#">186005276</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006103</a>	<a href="#">176002597</a>	2.1 × 50 mm	<a href="#">186005255</a>	3.0 × 30 mm	<a href="#">186005279</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006727</a>	<a href="#">176002891</a>	2.1 × 75 mm	<a href="#">186005644</a>	3.0 × 50 mm	<a href="#">186005280</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006104</a>	<a href="#">176002598</a>	2.1 × 100 mm	<a href="#">186005256</a>	3.0 × 100 mm	<a href="#">186005281</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006105</a>	<a href="#">176002599</a>	2.1 × 150 mm	<a href="#">186005257</a>	3.0 × 150 mm	<a href="#">186005282</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006106</a>	<a href="#">176002600</a>	3.0 × 30 mm	<a href="#">186005260</a>	3.0 × 250 mm	<a href="#">186005283</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006107</a>	<a href="#">176002601</a>	3.0 × 50 mm	<a href="#">186005261</a>	4.6 × 50 mm	<a href="#">186005287</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006728</a>	<a href="#">176002892</a>	3.0 × 75 mm	<a href="#">186005647</a>	4.6 × 100 mm	<a href="#">186005289</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006108</a>	—	3.0 × 100 mm	<a href="#">186005262</a>	4.6 × 150 mm	<a href="#">186005290</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006109</a>	—	3.0 × 150 mm	<a href="#">186005263</a>	4.6 × 250 mm	<a href="#">186005291</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006110</a>	—	4.6 × 50 mm	<a href="#">186005267</a>		
4.6 × 100 mm <i>XP</i>	<a href="#">186006111</a>	—	4.6 × 75 mm	<a href="#">186005268</a>		
4.6 × 150 mm <i>XP</i>	<a href="#">186006729</a>	—	4.6 × 100 mm	<a href="#">186005269</a>		
			4.6 × 150 mm	<a href="#">186005270</a>		

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186005491</a> <sup>1</sup>	Guard Cartridge	10 × 10 mm	<a href="#">186007285</a>
10 × 50 mm	OBD Column	<a href="#">186008236</a>	OBD Column	10 × 50 mm	<a href="#">186008268</a>
10 × 100 mm	OBD Column	<a href="#">186008237</a>	OBD Column	10 × 100 mm	<a href="#">186008269</a>
10 × 150 mm	OBD Column	<a href="#">186008238</a>	OBD Column	10 × 150 mm	<a href="#">186008270</a>
10 × 250 mm	OBD Column	<a href="#">186008239</a>	OBD Column	10 × 250 mm	<a href="#">186008271</a>
19 × 10 mm	Guard Cartridge	<a href="#">186005418</a> <sup>2</sup>	Guard Cartridge	19 × 10 mm	<a href="#">186007290</a>
19 × 50 mm	OBD Column	<a href="#">186005420</a>	OBD Column	19 × 50 mm	<a href="#">186007291</a>
19 × 100 mm	OBD Column	<a href="#">186005421</a>	OBD Column	19 × 100 mm	<a href="#">186007292</a>
19 × 150 mm	OBD Column	<a href="#">186005422</a>	OBD Column	19 × 150 mm	<a href="#">186007293</a>
19 × 250 mm	OBD Column	<a href="#">186005492</a>	OBD Column	19 × 250 mm	<a href="#">186007294</a>
30 × 10 mm	Guard Cartridge	<a href="#">186006899</a> <sup>3</sup>	Guard Cartridge	30 × 10 mm	<a href="#">186007295</a>
30 × 50 mm	OBD Column	<a href="#">186005423</a>	OBD Column	30 × 50 mm	<a href="#">186007296</a>
30 × 75 mm	OBD Column	<a href="#">186005424</a>	OBD Column	30 × 75 mm	<a href="#">186007297</a>
30 × 100 mm	OBD Column	<a href="#">186005425</a>	OBD Column	30 × 100 mm	<a href="#">186007298</a>
30 × 150 mm	OBD Column	<a href="#">186005426</a>	OBD Column	30 × 150 mm	<a href="#">186007299</a>
30 × 250 mm	OBD Column	<a href="#">186005493</a>	OBD Column	30 × 250 mm	<a href="#">186007300</a>
50 × 50 mm	OBD Column	<a href="#">186005494</a>	OBD Column	50 × 50 mm	<a href="#">186007301</a>
50 × 100 mm	OBD Column	<a href="#">186005495</a>	OBD Column	50 × 100 mm	<a href="#">186007302</a>
50 × 150 mm	OBD Column	<a href="#">186005496</a>	OBD Column	50 × 150 mm	<a href="#">186007303</a>
50 × 250 mm	OBD Column	<a href="#">186005497</a>	OBD Column	50 × 250 mm	<a href="#">186007304</a>

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

XSelect Columns *Continued*

CSH Fluoro-Phenyl	ANALYTICAL COLUMNS						
	Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
	2.1 × 30 mm <i>XP</i>	<a href="#">186006112</a>	<a href="#">176002602</a>	2.1 × 50 mm	<a href="#">186005310</a>	2.1 × 50 mm	<a href="#">186005329</a>
	2.1 × 50 mm <i>XP</i>	<a href="#">186006113</a>	<a href="#">176002603</a>	2.1 × 75 mm	<a href="#">186005646</a>	2.1 × 100 mm	<a href="#">186005330</a>
	2.1 × 75 mm <i>XP</i>	<a href="#">186006114</a>	<a href="#">176002604</a>	2.1 × 100 mm	<a href="#">186005311</a>	2.1 × 150 mm	<a href="#">186005331</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006115</a>	<a href="#">176002605</a>	2.1 × 150 mm	<a href="#">186005312</a>	3.0 × 50 mm	<a href="#">186005335</a>
	2.1 × 150 mm <i>XP</i>	<a href="#">186006730</a>	<a href="#">176002893</a>	3.0 × 50 mm	<a href="#">186005316</a>	3.0 × 100 mm	<a href="#">186005336</a>
	3.0 × 30 mm <i>XP</i>	<a href="#">186006116</a>	<a href="#">176002606</a>	3.0 × 75 mm	<a href="#">186005649</a>	3.0 × 150 mm	<a href="#">186005337</a>
	3.0 × 50 mm <i>XP</i>	<a href="#">186006117</a>	<a href="#">176002607</a>	3.0 × 100 mm	<a href="#">186005317</a>	3.0 × 250 mm	<a href="#">186005338</a>
	3.0 × 75 mm <i>XP</i>	<a href="#">186006118</a>	<a href="#">176002608</a>	3.0 × 150 mm	<a href="#">186005318</a>	4.6 × 50 mm	<a href="#">186005342</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006119</a>	<a href="#">176002609</a>	4.6 × 50 mm	<a href="#">186005322</a>	4.6 × 75 mm	<a href="#">186005343</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006731</a>	<a href="#">176002894</a>	4.6 × 75 mm	<a href="#">186005323</a>	4.6 × 100 mm	<a href="#">186005344</a>
	4.6 × 30 mm <i>XP</i>	<a href="#">186006120</a>	—	4.6 × 100 mm	<a href="#">186005324</a>	4.6 × 150 mm	<a href="#">186005345</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006121</a>	—	4.6 × 150 mm	<a href="#">186005325</a>	4.6 × 250 mm	<a href="#">186005346</a>
	4.6 × 75 mm <i>XP</i>	<a href="#">186006122</a>	—				
	4.6 × 100 mm <i>XP</i>	<a href="#">186006123</a>	—				
	4.6 × 150 mm <i>XP</i>	<a href="#">186006732</a>	—				
PREPARATIVE COLUMNS							
Particle Size: 5 µm							
Dimension	Type	P/N (1/pk)					
10 × 10 mm	Guard Cartridge	<a href="#">186005498</a> <sup>1</sup>					
10 × 50 mm	OBD Column	<a href="#">186008240</a>					
10 × 100 mm	OBD Column	<a href="#">186008241</a>					
10 × 150 mm	OBD Column	<a href="#">186008242</a>					
10 × 250 mm	OBD Column	<a href="#">186008243</a>					
19 × 10 mm	Guard Cartridge	<a href="#">186005431</a> <sup>2</sup>					
19 × 50 mm	OBD Column	<a href="#">186005433</a>					
19 × 100 mm	OBD Column	<a href="#">186005434</a>					
19 × 150 mm	OBD Column	<a href="#">186005435</a>					
19 × 250 mm	OBD Column	<a href="#">186005499</a>					
30 × 10 mm	Guard Cartridge	<a href="#">186006900</a> <sup>3</sup>					
30 × 50 mm	OBD Column	<a href="#">186005436</a>					
30 × 75 mm	OBD Column	<a href="#">186005437</a>					
30 × 100 mm	OBD Column	<a href="#">186005438</a>					
30 × 150 mm	OBD Column	<a href="#">186005439</a>					
30 × 250 mm	OBD Column	<a href="#">186005500</a>					
50 × 50 mm	OBD Column	<a href="#">186005501</a>					
50 × 100 mm	OBD Column	<a href="#">186005502</a>					
50 × 150 mm	OBD Column	<a href="#">186005503</a>					
50 × 250 mm	OBD Column	<a href="#">186005504</a>					

<sup>1</sup> Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup> Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

XSelect Columns *Continued*

CSH Phenyl-Hexyl	ANALYTICAL COLUMNS						
	Particle Size: 2.5 $\mu\text{m}$			Particle Size: 3.5 $\mu\text{m}$		Particle Size: 5 $\mu\text{m}$	
	Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
	2.1 $\times$ 30 mm <i>XP</i>	<a href="#">186006124</a>	<a href="#">176002610</a>	2.1 $\times$ 50 mm	<a href="#">186005365</a>	2.1 $\times$ 50 mm	<a href="#">186005384</a>
	2.1 $\times$ 50 mm <i>XP</i>	<a href="#">186006125</a>	<a href="#">176002611</a>	2.1 $\times$ 75 mm	<a href="#">186005645</a>	2.1 $\times$ 100 mm	<a href="#">186005385</a>
	2.1 $\times$ 75 mm <i>XP</i>	<a href="#">186006126</a>	<a href="#">176002612</a>	2.1 $\times$ 100 mm	<a href="#">186005366</a>	2.1 $\times$ 150 mm	<a href="#">186005386</a>
	2.1 $\times$ 100 mm <i>XP</i>	<a href="#">186006127</a>	<a href="#">176002613</a>	2.1 $\times$ 150 mm	<a href="#">186005367</a>	3.0 $\times$ 50 mm	<a href="#">186005390</a>
	2.1 $\times$ 150 mm <i>XP</i>	<a href="#">186006733</a>	<a href="#">176002895</a>	3.0 $\times$ 50 mm	<a href="#">186005371</a>	3.0 $\times$ 100 mm	<a href="#">186005391</a>
	3.0 $\times$ 30 mm <i>XP</i>	<a href="#">186006128</a>	<a href="#">176002614</a>	3.0 $\times$ 75 mm	<a href="#">186005648</a>	3.0 $\times$ 150 mm	<a href="#">186005392</a>
	3.0 $\times$ 50 mm <i>XP</i>	<a href="#">186006129</a>	<a href="#">176002615</a>	3.0 $\times$ 100 mm	<a href="#">186005372</a>	3.0 $\times$ 250 mm	<a href="#">186005393</a>
	3.0 $\times$ 75 mm <i>XP</i>	<a href="#">186006130</a>	<a href="#">176002616</a>	3.0 $\times$ 150 mm	<a href="#">186005373</a>	4.6 $\times$ 50 mm	<a href="#">186005397</a>
	3.0 $\times$ 100 mm <i>XP</i>	<a href="#">186006131</a>	<a href="#">176002617</a>	4.6 $\times$ 50 mm	<a href="#">186005377</a>	4.6 $\times$ 75 mm	<a href="#">186005398</a>
	3.0 $\times$ 150 mm <i>XP</i>	<a href="#">186006734</a>	<a href="#">176002896</a>	4.6 $\times$ 75 mm	<a href="#">186005378</a>	4.6 $\times$ 100 mm	<a href="#">186005399</a>
	4.6 $\times$ 30 mm <i>XP</i>	<a href="#">186006132</a>	—	4.6 $\times$ 100 mm	<a href="#">186005379</a>	4.6 $\times$ 150 mm	<a href="#">186005400</a>
	4.6 $\times$ 50 mm <i>XP</i>	<a href="#">186006133</a>	—	4.6 $\times$ 150 mm	<a href="#">186005380</a>	4.6 $\times$ 250 mm	<a href="#">186005401</a>
	4.6 $\times$ 75 mm <i>XP</i>	<a href="#">186006134</a>	—				
	4.6 $\times$ 100 mm <i>XP</i>	<a href="#">186006135</a>	—				
	4.6 $\times$ 150 mm <i>XP</i>	<a href="#">186006735</a>	—				

PREPARATIVE COLUMNS		
Particle Size: 5 $\mu\text{m}$		
Dimension	Type	P/N (1/pk)
10 $\times$ 10 mm	Guard Cartridge	<a href="#">186005505</a> <sup>1</sup>
10 $\times$ 50 mm	OBD Column	<a href="#">186008244</a>
10 $\times$ 100 mm	OBD Column	<a href="#">186008245</a>
10 $\times$ 150 mm	OBD Column	<a href="#">186008246</a>
10 $\times$ 250 mm	OBD Column	<a href="#">186008247</a>
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186005444</a> <sup>2</sup>
19 $\times$ 50 mm	OBD Column	<a href="#">186005446</a>
19 $\times$ 100 mm	OBD Column	<a href="#">186005447</a>
19 $\times$ 150 mm	OBD Column	<a href="#">186005448</a>
19 $\times$ 250 mm	OBD Column	<a href="#">186005506</a>
30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006901</a> <sup>3</sup>
30 $\times$ 50 mm	OBD Column	<a href="#">186005520</a>
30 $\times$ 75 mm	OBD Column	<a href="#">186005450</a>
30 $\times$ 100 mm	OBD Column	<a href="#">186005451</a>
30 $\times$ 150 mm	OBD Column	<a href="#">186005452</a>
30 $\times$ 250 mm	OBD Column	<a href="#">186005507</a>
50 $\times$ 50 mm	OBD Column	<a href="#">186005508</a>
50 $\times$ 100 mm	OBD Column	<a href="#">186005509</a>
50 $\times$ 150 mm	OBD Column	<a href="#">186005510</a>
50 $\times$ 250 mm	OBD Column	<a href="#">186005511</a>

<sup>1</sup> Requires 10  $\times$  10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup> Requires 30  $\times$  10 mm Prep Guard Holder, p/n: [186006912](#).

XSelect Columns *Continued*

HSS C <sub>18</sub>						
ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006136</a>	<a href="#">176002618</a>	2.1 × 30 mm	<a href="#">186006380</a>	2.1 × 50 mm	<a href="#">186006391</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006137</a>	<a href="#">176002619</a>	2.1 × 50 mm	<a href="#">186006381</a>	2.1 × 100 mm	<a href="#">186006392</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006138</a>	<a href="#">176002620</a>	2.1 × 75 mm	<a href="#">186006382</a>	2.1 × 150 mm	<a href="#">186006393</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006139</a>	<a href="#">176002621</a>	2.1 × 100 mm	<a href="#">186006383</a>	3.0 × 50 mm	<a href="#">186006396</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006736</a>	<a href="#">176002897</a>	2.1 × 150 mm	<a href="#">186006384</a>	3.0 × 100 mm	<a href="#">186006397</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006140</a>	<a href="#">176002622</a>	3.0 × 30 mm	<a href="#">186004765</a>	3.0 × 150 mm	<a href="#">186006398</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006141</a>	<a href="#">176002623</a>	3.0 × 50 mm	<a href="#">186004766</a>	3.0 × 250 mm	<a href="#">186006399</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006142</a>	<a href="#">176002624</a>	3.0 × 75 mm	<a href="#">186005642</a>	4.6 × 50 mm	<a href="#">186004852</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006143</a>	<a href="#">176002625</a>	3.0 × 100 mm	<a href="#">186004762</a>	4.6 × 75 mm	<a href="#">186006402</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006737</a>	<a href="#">176002898</a>	3.0 × 150 mm	<a href="#">186004763</a>	4.6 × 100 mm	<a href="#">186006403</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006144</a>	—	4.6 × 50 mm	<a href="#">186004772</a>	4.6 × 150 mm	<a href="#">186004773</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006145</a>	—	4.6 × 75 mm	<a href="#">186006387</a>	4.6 × 250 mm	<a href="#">186004775</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006146</a>	—	4.6 × 100 mm	<a href="#">186004767</a>		
4.6 × 100 mm <i>XP</i>	<a href="#">186006147</a>	—	4.6 × 150 mm	<a href="#">186004768</a>		
4.6 × 150 mm <i>XP</i>	<a href="#">186006738</a>	—	4.6 × 250 mm	<a href="#">186004770</a>		

PREPARATIVE COLUMNS						
Particle Size: 5 µm			Particle Size: 5 µm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
10 × 10 mm	Guard Cartridge	<a href="#">186004776</a> <sup>1</sup>	10 × 100 mm	OBD Column	<a href="#">186008223</a>	
10 × 50 mm	OBD Column	<a href="#">186008222</a>	10 × 150 mm	OBD Column	<a href="#">186008224</a>	

HSS C <sub>18</sub> SB						
ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006160</a>	<a href="#">176002634</a>	2.1 × 50 mm	<a href="#">186006422</a>	2.1 × 50 mm	<a href="#">186006432</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006161</a>	<a href="#">176002635</a>	2.1 × 75 mm	<a href="#">186006423</a>	2.1 × 100 mm	<a href="#">186006433</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006162</a>	<a href="#">176002636</a>	2.1 × 100 mm	<a href="#">186006424</a>	2.1 × 150 mm	<a href="#">186006434</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006163</a>	<a href="#">176002637</a>	2.1 × 150 mm	<a href="#">186006425</a>	3.0 × 50 mm	<a href="#">186006437</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006742</a>	<a href="#">176002901</a>	3.0 × 50 mm	<a href="#">186004747</a>	3.0 × 100 mm	<a href="#">186006438</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006164</a>	<a href="#">176002638</a>	3.0 × 75 mm	186005643	3.0 × 150 mm	<a href="#">186006439</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006165</a>	<a href="#">176002639</a>	3.0 × 100 mm	<a href="#">186004743</a>	3.0 × 250 mm	<a href="#">186006440</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006166</a>	<a href="#">176002640</a>	3.0 × 150 mm	<a href="#">186004744</a>	4.6 × 50 mm	<a href="#">186004757</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006167</a>	<a href="#">176002641</a>	4.6 × 50 mm	<a href="#">186004753</a>	4.6 × 75 mm	<a href="#">186006443</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006743</a>	<a href="#">176002902</a>	4.6 × 75 mm	<a href="#">186006428</a>	4.6 × 100 mm	<a href="#">186006444</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006168</a>	—	4.6 × 100 mm	<a href="#">186004748</a>	4.6 × 150 mm	<a href="#">186004754</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006169</a>	—	4.6 × 150 mm	<a href="#">186004749</a>	4.6 × 250 mm	<a href="#">186004756</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006170</a>	—	4.6 × 250 mm	<a href="#">186004751</a>		
4.6 × 100 mm <i>XP</i>	<a href="#">186006171</a>	—				
4.6 × 150 mm <i>XP</i>	<a href="#">186006744</a>	—				

PREPARATIVE COLUMNS						
Particle Size: 5 µm			Particle Size: 5 µm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
10 × 10 mm	Guard Cartridge	<a href="#">186004758</a> <sup>1</sup>	10 × 100 mm	OBD Column	<a href="#">186008220</a>	
10 × 50 mm	OBD Column	<a href="#">186008219</a>	10 × 150 mm	OBD Column	<a href="#">186008221</a>	

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).  
<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).  
<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

XSelect Columns *Continued*

HSS T3						
ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006148</a>	<a href="#">176002626</a>	1.0 × 100 mm	<a href="#">186006459</a>	2.1 × 50 mm	<a href="#">186006473</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006149</a>	<a href="#">176002627</a>	1.0 × 150 mm	<a href="#">186006460</a>	2.1 × 100 mm	<a href="#">186006474</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006150</a>	<a href="#">176002628</a>	2.1 × 30 mm	<a href="#">186006462</a>	2.1 × 150 mm	<a href="#">186006475</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006151</a>	<a href="#">176002629</a>	2.1 × 50 mm	<a href="#">186006463</a>	3.0 × 50 mm	<a href="#">186006478</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006739</a>	<a href="#">176002899</a>	2.1 × 75 mm	<a href="#">186006464</a>	3.0 × 100 mm	<a href="#">186006479</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006152</a>	<a href="#">176002630</a>	2.1 × 100 mm	<a href="#">186006465</a>	3.0 × 150 mm	<a href="#">186006480</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006153</a>	<a href="#">176002631</a>	2.1 × 150 mm	<a href="#">186006466</a>	3.0 × 250 mm	<a href="#">186006481</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006154</a>	<a href="#">176002632</a>	3.0 × 30 mm	<a href="#">186004783</a>	4.6 × 50 mm	<a href="#">186004794</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006155</a>	<a href="#">176002633</a>	3.0 × 50 mm	<a href="#">186004784</a>	4.6 × 75 mm	<a href="#">186006484</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006740</a>	<a href="#">176002900</a>	3.0 × 75 mm	<a href="#">186005641</a>	4.6 × 100 mm	<a href="#">186006485</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006156</a>	—	3.0 × 100 mm	<a href="#">186004780</a>	4.6 × 150 mm	<a href="#">186004791</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006157</a>	—	3.0 × 150 mm	<a href="#">186004781</a>	4.6 × 250 mm	<a href="#">186004793</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006158</a>	—	4.6 × 50 mm	<a href="#">186004790</a>		
4.6 × 100 mm <i>XP</i>	<a href="#">186006159</a>	—	4.6 × 75 mm	<a href="#">186006469</a>		
4.6 × 150 mm <i>XP</i>	<a href="#">186006741</a>	—	4.6 × 100 mm	<a href="#">186004785</a>		
			4.6 × 150 mm	<a href="#">186004786</a>		
			4.6 × 250 mm	<a href="#">186004788</a>		
PREPARATIVE COLUMNS						
Particle Size: 5 µm			Particle Size: 5 µm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
10 × 10 mm	Guard Cartridge	<a href="#">186004795</a> <sup>1</sup>	10 × 150 mm	OBD Column	<a href="#">186008227</a>	
10 × 50 mm	OBD Column	<a href="#">186008225</a>	10 × 250 mm	OBD Column	<a href="#">186008280</a>	
10 × 100 mm	OBD Column	<a href="#">186008226</a>				

HSS PFP						
ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006172</a>	<a href="#">176002642</a>	2.1 × 50 mm	<a href="#">186005847</a>	2.1 × 50 mm	<a href="#">186005869</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006173</a>	<a href="#">176002643</a>	2.1 × 75 mm	<a href="#">186005848</a>	2.1 × 100 mm	<a href="#">186005871</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006174</a>	<a href="#">176002644</a>	2.1 × 100 mm	<a href="#">186005849</a>	2.1 × 150 mm	<a href="#">186005872</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006175</a>	<a href="#">176002645</a>	2.1 × 150 mm	<a href="#">186005850</a>	3.0 × 50 mm	<a href="#">186005875</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006745</a>	<a href="#">176002903</a>	3.0 × 30 mm	<a href="#">186005852</a>	3.0 × 100 mm	<a href="#">186005877</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006176</a>	<a href="#">176002646</a>	3.0 × 50 mm	<a href="#">186005853</a>	3.0 × 150 mm	<a href="#">186005878</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006177</a>	<a href="#">176002647</a>	3.0 × 75 mm	<a href="#">186005854</a>	3.0 × 250 mm	186005879
3.0 × 75 mm <i>XP</i>	<a href="#">186006178</a>	<a href="#">176002648</a>	3.0 × 100 mm	<a href="#">186005855</a>	4.6 × 50 mm	<a href="#">186005882</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006179</a>	<a href="#">176002649</a>	3.0 × 150 mm	<a href="#">186005856</a>	4.6 × 75 mm	186005883
3.0 × 150 mm <i>XP</i>	<a href="#">186006746</a>	<a href="#">176002904</a>	4.6 × 50 mm	<a href="#">186005859</a>	4.6 × 100 mm	<a href="#">186005884</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006180</a>	—	4.6 × 75 mm	<a href="#">186005860</a>	4.6 × 150 mm	<a href="#">186005885</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006181</a>	—	4.6 × 100 mm	<a href="#">186005861</a>	4.6 × 250 mm	<a href="#">186005886</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006182</a>	—	4.6 × 150 mm	<a href="#">186005862</a>		
4.6 × 100 mm <i>XP</i>	<a href="#">186006183</a>	—	4.6 × 250 mm	<a href="#">186005863</a>		
4.6 × 150 mm <i>XP</i>	<a href="#">186006747</a>	—				

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).



XSelect Columns *Continued*

HSS CN ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	P/N (3/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm <i>XP</i>	<a href="#">186006184</a>	<a href="#">176002650</a>	2.1 × 50 mm	<a href="#">186005907</a>	2.1 × 50 mm	<a href="#">186005929</a>
2.1 × 50 mm <i>XP</i>	<a href="#">186006185</a>	<a href="#">176002651</a>	2.1 × 75 mm	<a href="#">186005908</a>	2.1 × 100 mm	<a href="#">186005931</a>
2.1 × 75 mm <i>XP</i>	<a href="#">186006186</a>	<a href="#">176002652</a>	2.1 × 100 mm	<a href="#">186005909</a>	2.1 × 150 mm	<a href="#">186005932</a>
2.1 × 100 mm <i>XP</i>	<a href="#">186006187</a>	<a href="#">176002653</a>	2.1 × 150 mm	<a href="#">186005910</a>	3.0 × 50 mm	<a href="#">186005935</a>
2.1 × 150 mm <i>XP</i>	<a href="#">186006748</a>	<a href="#">176002905</a>	3.0 × 50 mm	<a href="#">186005913</a>	3.0 × 100 mm	<a href="#">186005937</a>
3.0 × 30 mm <i>XP</i>	<a href="#">186006188</a>	<a href="#">176002654</a>	3.0 × 75 mm	<a href="#">186005914</a>	3.0 × 150 mm	<a href="#">186005938</a>
3.0 × 50 mm <i>XP</i>	<a href="#">186006189</a>	<a href="#">176002655</a>	3.0 × 100 mm	<a href="#">186005915</a>	3.0 × 250 mm	<a href="#">186005939</a>
3.0 × 75 mm <i>XP</i>	<a href="#">186006190</a>	<a href="#">176002656</a>	3.0 × 150 mm	<a href="#">186005916</a>	4.6 × 50 mm	<a href="#">186005942</a>
3.0 × 100 mm <i>XP</i>	<a href="#">186006191</a>	<a href="#">176002657</a>	4.6 × 50 mm	<a href="#">186005919</a>	4.6 × 75 mm	<a href="#">186005943</a>
3.0 × 150 mm <i>XP</i>	<a href="#">186006749</a>	<a href="#">176002906</a>	4.6 × 75 mm	<a href="#">186005920</a>	4.6 × 100 mm	<a href="#">186005944</a>
4.6 × 30 mm <i>XP</i>	<a href="#">186006192</a>	—	4.6 × 100 mm	<a href="#">186005921</a>	4.6 × 150 mm	<a href="#">186005945</a>
4.6 × 50 mm <i>XP</i>	<a href="#">186006193</a>	—	4.6 × 150 mm	<a href="#">186005922</a>	4.6 × 250 mm	<a href="#">186005946</a>
4.6 × 75 mm <i>XP</i>	<a href="#">186006194</a>	—	4.6 × 250 mm	<a href="#">186005923</a>		
4.6 × 100 mm <i>XP</i>	<a href="#">186006195</a>	—				
4.6 × 150 mm <i>XP</i>	<a href="#">186006750</a>	—				

Peptide CSH C <sub>18</sub> , 130 Å ANALYTICAL COLUMNS						
Particle Size: 2.5 µm			Particle Size: 3.5 µm			
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)		
2.1 × 50 mm <i>XP</i>	<a href="#">186006941</a>		2.1 × 50 mm	<a href="#">186006950</a>		
2.1 × 100 mm <i>XP</i>	<a href="#">186006942</a>		2.1 × 100 mm	<a href="#">186006951</a>		
2.1 × 150 mm <i>XP</i>	<a href="#">186006943</a>		2.1 × 150 mm	<a href="#">186006952</a>		
4.6 × 50 mm <i>XP</i>	<a href="#">186006946</a>		4.6 × 50 mm	<a href="#">186006955</a>		
4.6 × 100 mm <i>XP</i>	<a href="#">186006947</a>		4.6 × 100 mm	<a href="#">186006956</a>		
4.6 × 150 mm <i>XP</i>	<a href="#">186007038</a>		4.6 × 150 mm	<a href="#">186006957</a>		

PREPARATIVE COLUMNS						
Particle Size: 5 µm			Particle Size: 5 µm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
4.6 × 50 mm	Column	<a href="#">186007076</a> <sup>4</sup>	19 × 250 mm	OBD Column	<a href="#">186007031</a>	
4.6 × 100 mm	Column	<a href="#">186007077</a> <sup>4</sup>	30 × 50 mm	OBD Column	<a href="#">186007026</a>	
4.6 × 150 mm	Column	<a href="#">186007078</a> <sup>4</sup>	30 × 100 mm	OBD Column	<a href="#">186007025</a>	
10 × 10 mm	Guard	<a href="#">186007015</a> <sup>1</sup>	30 × 150 mm	OBD Column	<a href="#">186007023</a>	
10 × 50 mm	OBD Column	<a href="#">186008264</a>	30 × 250 mm	OBD Column	<a href="#">186007024</a>	
10 × 100 mm	OBD Column	<a href="#">186008265</a>	50 × 50 mm	OBD Column	<a href="#">186007030</a>	
10 × 150 mm	OBD Column	<a href="#">186008266</a>	50 × 100 mm	OBD Column	<a href="#">186007027</a>	
10 × 250 mm	OBD Column	<a href="#">186008267</a>	50 × 150 mm	OBD Column	<a href="#">186007028</a>	
19 × 10 mm	Guard	<a href="#">186007019</a> <sup>3</sup>	50 × 250 mm	OBD Column	<a href="#">186007029</a>	
19 × 50 mm	OBD Column	<a href="#">186007022</a>				
19 × 100 mm	OBD Column	<a href="#">186007020</a>				
19 × 150 mm	OBD Column	<a href="#">186007021</a>				

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>3</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>4</sup>For use in developing lab-scale preparative chromatography.

XSelect Columns Method Validation Kits\*

	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>CSH C<sub>18</sub></b>	2.1 × 50 mm <i>XP</i>	<a href="#">186006233</a>	2.1 × 100 mm	<a href="#">186005538</a>	2.1 × 150 mm	<a href="#">186005543</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006234</a>	3.0 × 100 mm	<a href="#">186005539</a>	3.0 × 100 mm	186005544
	2.1 × 150 mm <i>XP</i>	<a href="#">186006785</a>	3.0 × 150 mm	<a href="#">186005540</a>	3.0 × 150 mm	<a href="#">186005545</a>
	3.0 × 50 mm <i>XP</i>	<a href="#">186006235</a>	4.6 × 100 mm	<a href="#">186005541</a>	4.6 × 100 mm	<a href="#">186005546</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006236</a>	4.6 × 150 mm	<a href="#">186005542</a>	4.6 × 150 mm	<a href="#">186005547</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006786</a>			4.6 × 250 mm	<a href="#">186005548</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006237</a>				
	4.6 × 100 mm <i>XP</i>	<a href="#">186006238</a>				
	4.6 × 150 mm <i>XP</i>	<a href="#">186006787</a>				
<b>CSH Fluoro-Phenyl</b>	2.1 × 50 mm <i>XP</i>	<a href="#">186006239</a>	2.1 × 100 mm	<a href="#">186005549</a>	2.1 × 150 mm	<a href="#">186005554</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006240</a>	3.0 × 100 mm	186005550	3.0 × 100 mm	186005555
	2.1 × 150 mm <i>XP</i>	<a href="#">186006788</a>	3.0 × 150 mm	186005551	3.0 × 150 mm	<a href="#">186005556</a>
	3.0 × 50 mm <i>XP</i>	<a href="#">186006241</a>	4.6 × 100 mm	<a href="#">186005552</a>	4.6 × 100 mm	<a href="#">186005557</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006242</a>	4.6 × 150 mm	<a href="#">186005553</a>	4.6 × 150 mm	<a href="#">186005558</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006789</a>			4.6 × 250 mm	<a href="#">186005559</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006243</a>				
	4.6 × 100 mm <i>XP</i>	<a href="#">186006244</a>				
	4.6 × 150 mm <i>XP</i>	<a href="#">186006790</a>				
<b>CSH Phenyl-Hexyl</b>	2.1 × 50 mm <i>XP</i>	<a href="#">186006245</a>	2.1 × 100 mm	<a href="#">186005560</a>	2.1 × 150 mm	<a href="#">186005565</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006246</a>	3.0 × 100 mm	<a href="#">186005561</a>	3.0 × 100 mm	186005566
	2.1 × 150 mm <i>XP</i>	<a href="#">186006791</a>	3.0 × 150 mm	<a href="#">186005562</a>	3.0 × 150 mm	186005567
	3.0 × 50 mm <i>XP</i>	<a href="#">186006247</a>	4.6 × 100 mm	<a href="#">186005563</a>	4.6 × 100 mm	<a href="#">186005568</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006248</a>	4.6 × 150 mm	<a href="#">186005564</a>	4.6 × 150 mm	<a href="#">186005569</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006792</a>			4.6 × 250 mm	<a href="#">186005570</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006249</a>				
	4.6 × 100 mm <i>XP</i>	<a href="#">186006250</a>				
	4.6 × 150 mm <i>XP</i>	<a href="#">186006793</a>				

\*Each Method Validation Kit contains 3 columns, each from a different batch.



**APPLICATION AREA:** Peptide Purification from Biological Samples

"The Waters XSelect line of columns are easily some of the best columns I have used for separations of peptides. The columns give reproducible results, can be effectively used under a wide range of conditions, and effectively separate almost everything I've attempted. The service by Waters and by the sales team was also top notch - they worked with me efficiently and were helpful in finding me the best column for my application. Thanks, Waters!"

**REVIEWER:** James Checco

**ORGANIZATION:** University of Illinois at Urbana-Champaign

XSelect Columns Method Validation Kits\* *Continued*

	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>HSS C<sub>18</sub></b>	2.1 × 50 mm <i>XP</i>	<a href="#">186006251</a>	2.1 × 100 mm	<a href="#">186006406</a>	2.1 × 150 mm	<a href="#">186006411</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006252</a>	3.0 × 100 mm	186006407	3.0 × 100 mm	186006412
	2.1 × 150 mm <i>XP</i>	<a href="#">186006794</a>	3.0 × 150 mm	186006408	3.0 × 150 mm	186006413
	3.0 × 50 mm <i>XP</i>	<a href="#">186006253</a>	4.6 × 100 mm	<a href="#">186006409</a>	4.6 × 100 mm	<a href="#">186006414</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006254</a>	4.6 × 150 mm	<a href="#">186006410</a>	4.6 × 150 mm	<a href="#">186006415</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006795</a>			4.6 × 250 mm	<a href="#">186006416</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006255</a>				
	4.6 × 100 mm <i>XP</i>	<a href="#">186006256</a>				
	4.6 × 150 mm <i>XP</i>	<a href="#">186006796</a>				
<b>HSS C<sub>18</sub> SB</b>	2.1 × 50 mm <i>XP</i>	<a href="#">186006263</a>	2.1 × 100 mm	<a href="#">186006447</a>	2.1 × 150 mm	<a href="#">186006452</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006264</a>	3.0 × 100 mm	186006448	3.0 × 100 mm	186006453
	2.1 × 150 mm <i>XP</i>	<a href="#">186006800</a>	3.0 × 150 mm	<a href="#">186006449</a>	3.0 × 150 mm	186006454
	3.0 × 50 mm <i>XP</i>	<a href="#">186006265</a>	4.6 × 100 mm	<a href="#">186006450</a>	4.6 × 100 mm	<a href="#">186006455</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006266</a>	4.6 × 150 mm	<a href="#">186006451</a>	4.6 × 150 mm	<a href="#">186006456</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006801</a>			4.6 × 250 mm	<a href="#">186006457</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006267</a>				
	4.6 × 100 mm <i>XP</i>	<a href="#">186006268</a>				
	4.6 × 150 mm <i>XP</i>	<a href="#">186006802</a>				
<b>HSS T3</b>	2.1 × 50 mm <i>XP</i>	<a href="#">186006257</a>	2.1 × 100 mm	<a href="#">186006488</a>	2.1 × 150 mm	<a href="#">186006493</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006258</a>	3.0 × 100 mm	<a href="#">186006489</a>	3.0 × 100 mm	186006494
	2.1 × 150 mm <i>XP</i>	<a href="#">186006797</a>	3.0 × 150 mm	<a href="#">186006490</a>	3.0 × 150 mm	186006495
	3.0 × 50 mm <i>XP</i>	<a href="#">186006259</a>	4.6 × 100 mm	<a href="#">186006491</a>	4.6 × 100 mm	<a href="#">186006496</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006260</a>	4.6 × 150 mm	<a href="#">186006492</a>	4.6 × 150 mm	<a href="#">186006497</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006798</a>			4.6 × 250 mm	<a href="#">186006498</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006261</a>				
	4.6 × 100 mm <i>XP</i>	<a href="#">186006262</a>				
	4.6 × 150 mm <i>XP</i>	<a href="#">186006799</a>				
<b>HSS PFP</b>	2.1 × 50 mm <i>XP</i>	<a href="#">186006815</a>	2.1 × 100 mm	<a href="#">186005890</a>	2.1 × 150 mm	186005895
	2.1 × 100 mm <i>XP</i>	<a href="#">186006816</a>	3.0 × 100 mm	186005891	3.0 × 100 mm	186005896
	2.1 × 150 mm <i>XP</i>	<a href="#">186006803</a>	3.0 × 150 mm	186005892	3.0 × 150 mm	186005897
	3.0 × 50 mm <i>XP</i>	<a href="#">186006817</a>	4.6 × 100 mm	186005893	4.6 × 100 mm	<a href="#">186005898</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006818</a>	4.6 × 150 mm	<a href="#">186005894</a>	4.6 × 150 mm	<a href="#">186005899</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006804</a>			4.6 × 250 mm	<a href="#">186005900</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006273</a>				
	4.6 × 100 mm <i>XP</i>	<a href="#">186006274</a>				
		4.6 × 150 mm <i>XP</i>	<a href="#">186006805</a>			
<b>Peptide CSH C<sub>18</sub></b>	2.1 × 100 mm <i>XP</i>	<a href="#">186006945</a>	2.1 × 100 mm	<a href="#">186006953</a>		
	4.6 × 100 mm <i>XP</i>	<a href="#">186006966</a>	4.6 × 100 mm	<a href="#">186006959</a>		

\*Each Method Validation Kit contains 3 columns, each from a different batch.

XSelect Columns Method Validation Kits\* *Continued*

	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>HSS CN</b>	2.1 × 50 mm <i>XP</i>	<a href="#">186006275</a>	2.1 × 100 mm	<a href="#">186005950</a>	2.1 × 150 mm	<a href="#">186005955</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006276</a>	3.0 × 100 mm	186005951	3.0 × 100 mm	<a href="#">186005956</a>
	2.1 × 150 mm <i>XP</i>	<a href="#">186006806</a>	3.0 × 150 mm	<a href="#">186005952</a>	3.0 × 150 mm	186005957
	3.0 × 50 mm <i>XP</i>	<a href="#">186006277</a>	4.6 × 100 mm	<a href="#">186005953</a>	4.6 × 100 mm	<a href="#">186005958</a>
	3.0 × 100 mm <i>XP</i>	<a href="#">186006278</a>	4.6 × 150 mm	<a href="#">186005954</a>	4.6 × 150 mm	<a href="#">186005959</a>
	3.0 × 150 mm <i>XP</i>	<a href="#">186006807</a>			4.6 × 250 mm	<a href="#">186005960</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006279</a>				
	4.6 × 100 mm <i>XP</i>	<a href="#">186006280</a>				
	4.6 × 150 mm <i>XP</i>	<a href="#">186006808</a>				

\*Each Method Validation Kit contains 3 columns, each from a different batch.

XSelect VanGuard Cartridges

	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>CSH C<sub>18</sub></b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007817</a>	2.1 × 5 mm	<a href="#">186007811</a>	2.1 × 5 mm	<a href="#">186007814</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007819</a>	3.9 × 5 mm	<a href="#">186007813</a>	3.9 × 5 mm	<a href="#">186007816</a>
<b>CSH Fluoro-Phenyl</b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007827</a>	2.1 × 5 mm	<a href="#">186007820</a>	2.1 × 5 mm	<a href="#">186007824</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007829</a>	3.9 × 5 mm	<a href="#">186007822</a>	3.9 × 5 mm	<a href="#">186007826</a>
<b>CSH Phenyl-Hexyl</b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007839</a>	2.1 × 5 mm	<a href="#">186007830</a>	2.1 × 5 mm	<a href="#">186007836</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007841</a>	3.9 × 5 mm	<a href="#">186007832</a>	3.9 × 5 mm	<a href="#">186007838</a>
<b>HSS C<sub>18</sub></b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007857</a>	2.1 × 5 mm	<a href="#">186007851</a>	2.1 × 5 mm	<a href="#">186007854</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007859</a>	3.9 × 5 mm	<a href="#">186007853</a>	3.9 × 5 mm	<a href="#">186007856</a>
<b>HSS C<sub>18</sub> SB</b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007848</a>	2.1 × 5 mm	<a href="#">186007842</a>	2.1 × 5 mm	<a href="#">186007845</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007850</a>	3.9 × 5 mm	<a href="#">186007844</a>	3.9 × 5 mm	<a href="#">186007847</a>
<b>HSS T3</b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007884</a>	2.1 × 5 mm	<a href="#">186007878</a>	2.1 × 5 mm	<a href="#">186007881</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007886</a>	3.9 × 5 mm	<a href="#">186007880</a>	3.9 × 5 mm	<a href="#">186007883</a>
<b>HSS PFP</b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007875</a>	2.1 × 5 mm	<a href="#">186007869</a>	2.1 × 5 mm	<a href="#">186007872</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007877</a>	3.9 × 5 mm	<a href="#">186007871</a>	3.9 × 5 mm	<a href="#">186007874</a>
<b>HSS CN</b>	2.1 × 5 mm <i>XP</i>	<a href="#">186007866</a>	2.1 × 5 mm	<a href="#">186007860</a>	2.1 × 5 mm	<a href="#">186007863</a>
	3.9 × 5 mm <i>XP</i>	<a href="#">186007868</a>	3.9 × 5 mm	<a href="#">186007862</a>	3.9 × 5 mm	<a href="#">186007865</a>

Universal VanGuard Cartridge Holder

Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>

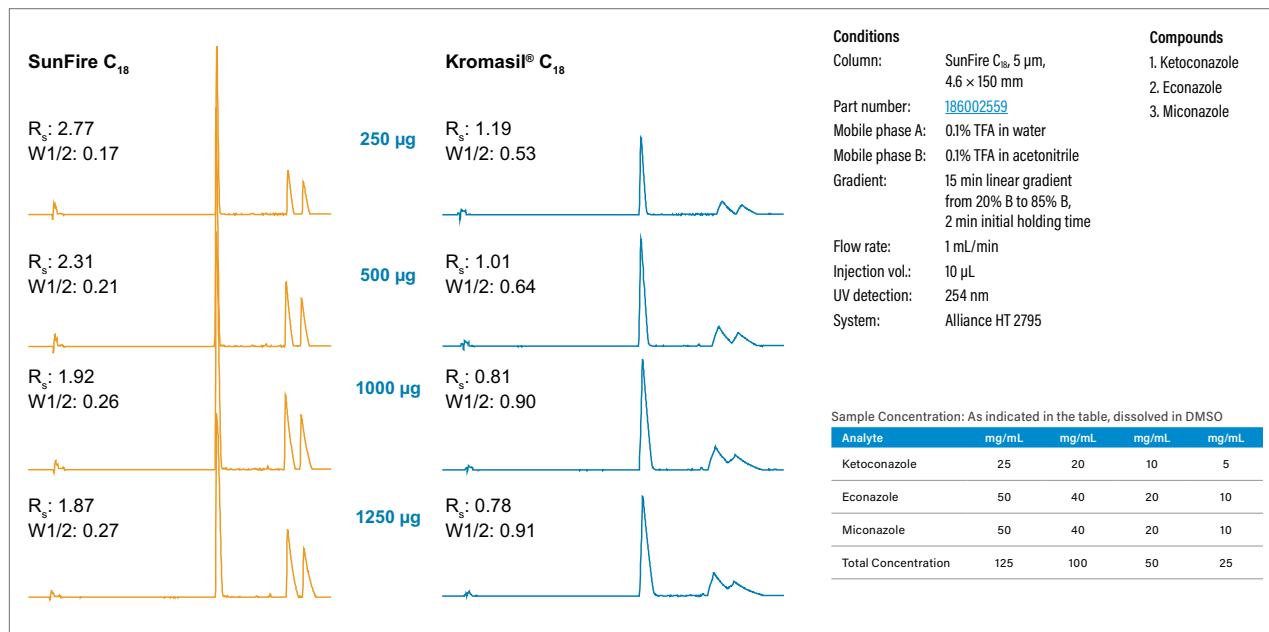
## HIGH-MASS LOADING

SunFire C<sub>18</sub>, C<sub>8</sub>, and Silica Columns provide significant mass-loading capacity. The OBD design ensures the column's excellent performance, scalability, and serviceable life.

SunFire OBD Preparative Columns offer:

- Easy scale-up from analytical to preparative chromatography
- High-mass loading
- Low-pH stability
- Excellent column life and stability
- Superior peak shapes

### High Mass Loading of SunFire Sorbents Enables the Use of Smaller Preparative Column Dimensions



For more information on SunFire Columns, refer to [page 169](#) for 2.5 µm and [page 211](#) for 3–5 µm column offerings.

## Ordering Information

### SunFire Columns

ANALYTICAL COLUMNS						
Particle Size: 2.5 µm*			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm	<a href="#">186003399</a>		2.1 × 50 mm	<a href="#">186002533</a>	2.1 × 50 mm	<a href="#">186002539</a>
2.1 × 50 mm	<a href="#">186003401</a>		2.1 × 100 mm	<a href="#">186002534</a>	2.1 × 100 mm	<a href="#">186002540</a>
2.1 × 75 mm	<a href="#">186005634</a>		2.1 × 150 mm	<a href="#">186002535</a>	2.1 × 150 mm	<a href="#">186002541</a>
3.0 × 30 mm	<a href="#">186003407</a>		3.0 × 50 mm	<a href="#">186002542</a>	3.0 × 50 mm	<a href="#">186002545</a>
3.0 × 50 mm	<a href="#">186003409</a>		3.0 × 100 mm	<a href="#">186002543</a>	3.0 × 100 mm	<a href="#">186002546</a>
3.0 × 75 mm	<a href="#">186005636</a>		3.0 × 150 mm	<a href="#">186002544</a>	3.0 × 150 mm	<a href="#">186002547</a>
4.6 × 50 mm	<a href="#">186003417</a>		4.6 × 20 mm /S	<a href="#">186002549</a>	3.0 × 250 mm	<a href="#">186002548</a>
			4.6 × 50 mm	<a href="#">186002551</a>	4.6 × 30 mm	<a href="#">186002556</a>
			4.6 × 75 mm	<a href="#">186002552</a>	4.6 × 50 mm	<a href="#">186002557</a>
			4.6 × 100 mm	<a href="#">186002553</a>	4.6 × 100 mm	<a href="#">186002558</a>
			4.6 × 150 mm	<a href="#">186002554</a>	4.6 × 150 mm	<a href="#">186002559</a>
					4.6 × 250 mm	<a href="#">186002560</a>

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186002565</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186002663</a> <sup>1</sup>
10 × 50 mm	OBD Column	<a href="#">186008152</a>	10 × 50 mm	OBD Column	<a href="#">186008208</a>
10 × 100 mm	OBD Column	<a href="#">186008153</a>	10 × 150 mm	OBD Column	<a href="#">186008156</a>
10 × 150 mm	OBD Column	<a href="#">186008154</a>	10 × 250 mm	OBD Column	<a href="#">186008157</a>
10 × 250 mm	OBD Column	<a href="#">186008155</a>	19 × 10 mm	Guard Cartridge	<a href="#">186002666</a> <sup>2</sup>
19 × 10 mm	Guard Cartridge	<a href="#">186002569</a> <sup>2</sup>	19 × 50 mm	OBD Column	<a href="#">186002667</a>
19 × 50 mm	OBD Column	<a href="#">186002566</a>	19 × 150 mm	OBD Column	<a href="#">186002668</a>
19 × 100 mm	OBD Column	<a href="#">186002567</a>	19 × 250 mm	OBD Column	<a href="#">186002669</a>
19 × 150 mm	OBD Column	<a href="#">186002568</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006884</a> <sup>3</sup>
19 × 250 mm	OBD Column	<a href="#">186004027</a>	30 × 50 mm	OBD Column	<a href="#">186003854</a>
30 × 10 mm	Guard Cartridge	<a href="#">186006885</a> <sup>3</sup>	30 × 100 mm	OBD Column	<a href="#">186003971</a>
30 × 50 mm	OBD Column	<a href="#">186002570</a>	30 × 150 mm	OBD Column	<a href="#">186002670</a>
30 × 75 mm	OBD Column	<a href="#">186002571</a>	30 × 250 mm	OBD Column	<a href="#">186002671</a>
30 × 100 mm	OBD Column	<a href="#">186002572</a>	50 × 50 mm	OBD Column	<a href="#">186002871</a>
30 × 150 mm	OBD Column	<a href="#">186002797</a>	50 × 100 mm	OBD Column	<a href="#">186003972</a>
30 × 250 mm	OBD Column	<a href="#">186003969</a>	50 × 150 mm	OBD Column	<a href="#">186002672</a>
50 × 50 mm	OBD Column	<a href="#">186002867</a>	50 × 250 mm	OBD Column	<a href="#">186002673</a>
50 × 100 mm	OBD Column	<a href="#">186002869</a>			
50 × 150 mm	OBD Column	<a href="#">186003941</a>			
50 × 250 mm	OBD Column	<a href="#">186003970</a>			

\*Recommended maximum pressure of 6000 psi (400 bar).

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

C<sub>8</sub>

ANALYTICAL COLUMNS					
Particle Size: 2.5 µm*		Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
3.0 × 50 mm	<a href="#">186003410</a>	2.1 × 50 mm	<a href="#">186002710</a>	2.1 × 50 mm	<a href="#">186002715</a>
		2.1 × 100 mm	<a href="#">186002711</a>	2.1 × 100 mm	<a href="#">186002716</a>
		2.1 × 150 mm	<a href="#">186002712</a>	2.1 × 150 mm	<a href="#">186002717</a>
		3.0 × 50 mm	<a href="#">186002719</a>	3.0 × 50 mm	<a href="#">186002723</a>
		3.0 × 100 mm	<a href="#">186002720</a>	3.0 × 100 mm	<a href="#">186002724</a>
		3.0 × 150 mm	<a href="#">186002721</a>	3.0 × 150 mm	<a href="#">186002725</a>
		4.6 × 50 mm	<a href="#">186002729</a>	4.6 × 30 mm	<a href="#">186002734</a>
		4.6 × 75 mm	<a href="#">186002730</a>	4.6 × 50 mm	<a href="#">186002735</a>
		4.6 × 100 mm	<a href="#">186002731</a>	4.6 × 100 mm	<a href="#">186002736</a>
		4.6 × 150 mm	<a href="#">186002732</a>	4.6 × 150 mm	<a href="#">186002737</a>
				4.6 × 250 mm	<a href="#">186002738</a>

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186002750</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186002758</a> <sup>1</sup>
10 × 50 mm	OBD Column	<a href="#">186008158</a>	10 × 50 mm	OBD Column	<a href="#">186008209</a>
10 × 100 mm	OBD Column	<a href="#">186008159</a>	10 × 150 mm	OBD Column	<a href="#">186008162</a>
10 × 150 mm	OBD Column	<a href="#">186008160</a>	10 × 250 mm	OBD Column	<a href="#">186008163</a>
10 × 250 mm	OBD Column	<a href="#">186008161</a>	19 × 10 mm	Guard Cartridge	<a href="#">186002761</a> <sup>2</sup>
19 × 10 mm	Guard Cartridge	<a href="#">186002754</a> <sup>2</sup>	19 × 150 mm	OBD Column	<a href="#">186002763</a>
19 × 50 mm	OBD Column	<a href="#">186002751</a>	19 × 250 mm	OBD Column	<a href="#">186002764</a>
19 × 100 mm	OBD Column	<a href="#">186002752</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006886</a> <sup>3</sup>
19 × 150 mm	OBD Column	<a href="#">186002753</a>	30 × 50 mm	OBD Column	<a href="#">186003853</a>
19 × 250 mm	OBD Column	<a href="#">186004028</a>	30 × 150 mm	OBD Column	<a href="#">186002765</a>
30 × 10 mm	Guard Cartridge	<a href="#">186006887</a> <sup>3</sup>	30 × 250 mm	OBD Column	<a href="#">186002766</a>
30 × 50 mm	OBD Column	<a href="#">186002755</a>	50 × 50 mm	OBD Column	<a href="#">186002872</a>
30 × 75 mm	OBD Column	<a href="#">186002756</a>	50 × 150 mm	OBD Column	<a href="#">186002767</a>
30 × 100 mm	OBD Column	<a href="#">186002757</a>	50 × 250 mm	OBD Column	<a href="#">186002768</a>
30 × 150 mm	OBD Column	<a href="#">186002795</a>			
50 × 50 mm	OBD Column	<a href="#">186002868</a>			
50 × 100 mm	OBD Column	<a href="#">186002870</a>			

\*Recommended maximum pressure of 6000 psi (400 bar).

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

SunFire Columns *Continued*

ANALYTICAL COLUMNS						
Particle Size: 3.5 µm			Particle Size: 5 µm			
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)		
4.6 × 150 mm	<a href="#">186003453</a>		4.6 × 150 mm	<a href="#">186003467</a>		
4.6 × 250 mm	<a href="#">186003454</a>		4.6 × 250 mm	<a href="#">186003468</a>		
PREPARATIVE COLUMNS						
Particle Size: 5 µm			Particle Size: 10 µm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
10 × 10 mm	Guard Cartridge	<a href="#">186003429</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186003441</a> <sup>1</sup>	
10 × 50 mm	OBD Column	<a href="#">186008180</a>	10 × 150 mm	OBD Column	<a href="#">186008184</a>	
10 × 100 mm	OBD Column	<a href="#">186008181</a>	10 × 250 mm	OBD Column	<a href="#">186008185</a>	
10 × 150 mm	OBD Column	<a href="#">186008182</a>	19 × 10 mm	Guard Cartridge	<a href="#">186003444</a> <sup>2</sup>	
10 × 250 mm	OBD Column	<a href="#">186008183</a>	19 × 50 mm	OBD Column	<a href="#">186003445</a>	
19 × 10 mm	Guard Cartridge	<a href="#">186003434</a> <sup>2</sup>	19 × 150 mm	OBD Column	<a href="#">186003446</a>	
19 × 50 mm	OBD Column	<a href="#">186003431</a>	19 × 250 mm	OBD Column	<a href="#">186003447</a>	
19 × 100 mm	OBD Column	<a href="#">186003432</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006888</a> <sup>3</sup>	
19 × 150 mm	OBD Column	<a href="#">186003433</a>	30 × 50 mm	OBD Column	186003855	
19 × 250 mm	OBD Column	<a href="#">186004029</a>	30 × 150 mm	OBD Column	<a href="#">186003448</a>	
30 × 10 mm	Guard Cartridge	<a href="#">186006889</a> <sup>3</sup>	30 × 250 mm	OBD Column	<a href="#">186003449</a>	
30 × 50 mm	OBD Column	<a href="#">186003435</a>	50 × 50 mm	OBD Column	<a href="#">186003450</a>	
30 × 75 mm	OBD Column	<a href="#">186003436</a>	50 × 150 mm	OBD Column	<a href="#">186003451</a>	
30 × 100 mm	OBD Column	<a href="#">186003437</a>	50 × 250 mm	OBD Column	<a href="#">186003452</a>	
30 × 150 mm	OBD Column	<a href="#">186003438</a>				
50 × 50 mm	OBD Column	<a href="#">186003439</a>				
50 × 100 mm	OBD Column	<a href="#">186003440</a>				

<sup>1</sup> Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup> Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

SunFire Preparative Scouting Columns

C <sub>18</sub>	PREPARATIVE COLUMNS					
	Particle Size: 10 µm					
	Dimension	P/N (1/pk)				
	4.6 × 150 mm	<a href="#">186003390</a>				
	4.6 × 250 mm	<a href="#">186003391</a>				
Silica	Particle Size: 5 µm			Particle Size: 10 µm		
	Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
		4.6 × 150 mm	<a href="#">186003453</a>		4.6 × 150 mm	<a href="#">186003467</a>
	4.6 × 250 mm	<a href="#">186003454</a>		4.6 × 250 mm	<a href="#">186003468</a>	



## SunFire Columns Method Validation Kits\*

	Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>C<sub>18</sub></b>	4.6 $\times$ 100 mm	<a href="#">186002675</a>	4.6 $\times$ 150 mm	<a href="#">186002679</a>
	4.6 $\times$ 150 mm	<a href="#">186002676</a>	4.6 $\times$ 250 mm	<a href="#">186002680</a>
<b>C<sub>8</sub></b>	4.6 $\times$ 100 mm	<a href="#">186002740</a>	4.6 $\times$ 150 mm	<a href="#">186002744</a>
	4.6 $\times$ 150 mm	<a href="#">186002741</a>	4.6 $\times$ 250 mm	<a href="#">186002745</a>

\*Each Method Validation Kit contains 3 columns, each from a different batch.

## SunFire VanGuard Cartridges

	Particle Size: 2.5 $\mu$ m		Particle Size: 3.5 $\mu$ m		Particle Size: 5 $\mu$ m	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>C<sub>18</sub></b>	2.1 $\times$ 5 mm	<a href="#">186007691</a>	2.1 $\times$ 5 mm	<a href="#">186007694</a>	2.1 $\times$ 5 mm	<a href="#">186007697</a>
	3.9 $\times$ 5 mm	<a href="#">186007693</a>	3.9 $\times$ 5 mm	<a href="#">186007696</a>	3.9 $\times$ 5 mm	<a href="#">186007699</a>
<b>C<sub>8</sub></b>	2.1 $\times$ 5 mm	<a href="#">186007700</a>	2.1 $\times$ 5 mm	<a href="#">186007703</a>	2.1 $\times$ 5 mm	<a href="#">186007706</a>
	3.9 $\times$ 5 mm	<a href="#">186007702</a>	3.9 $\times$ 5 mm	<a href="#">186007705</a>	3.9 $\times$ 5 mm	<a href="#">186007708</a>

## Universal VanGuard Cartridge Holder

Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>



**APPLICATION AREA:** Small Molecule Prep-Scale Purification with Fraction Collector

"The SunFire OBD C<sub>18</sub> prep-LC column made transitioning from my analytical method to a focused-gradient prep scale method fast and easy. Product gave reproducible results which was critical for impurity isolation and identification."

**REVIEWER:** Doug Vaughan

**ORGANIZATION:** BioVectra Inc.

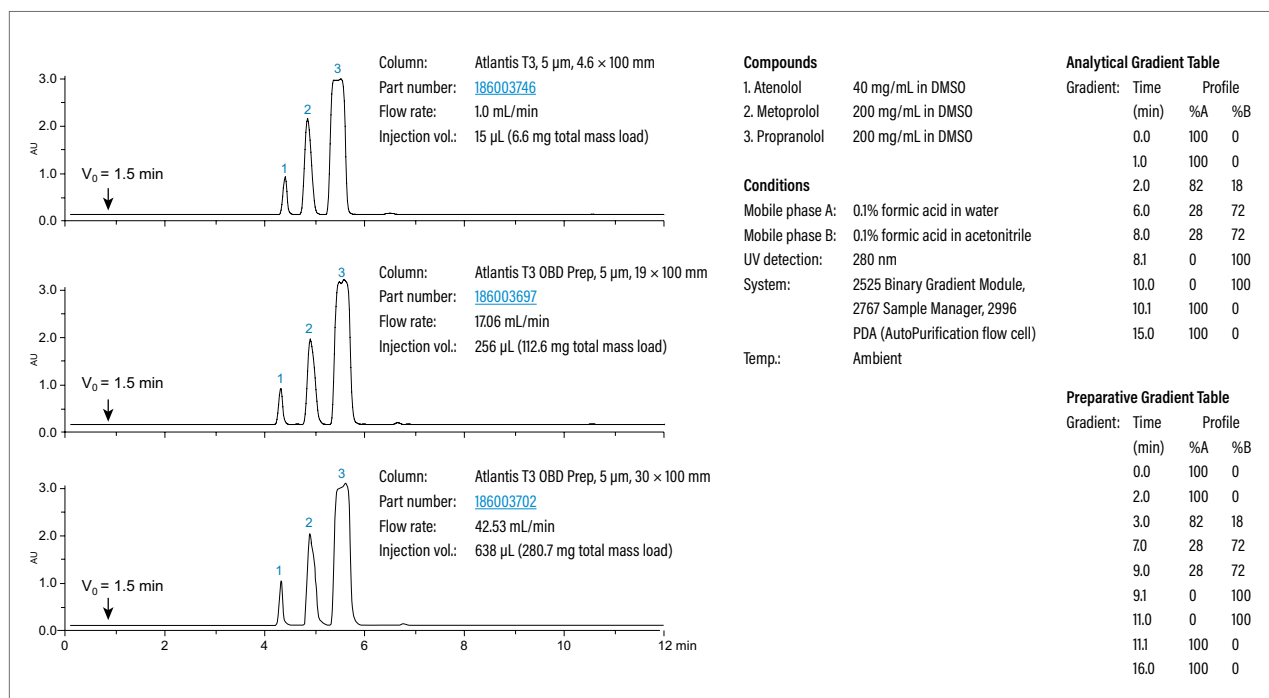
## RETENTION OF POLAR COMPOUNDS

Atlantis HPLC Columns provide balanced retention for broad analyte mixtures and exceptional performance, versatility, and retention for polar compounds.

Atlantis OBD Preparative Columns offer:

- T3, HILIC, and dC<sub>18</sub> column chemistries
- Compatibility with 100% aqueous mobile phases
- Long column life when used with mobile phases of low pH
- Polar-compound retention without ion-pairing reagents

### Beta Blockers



## Atlantis Columns

T3 ANALYTICAL COLUMNS					
Particle Size: 3.5 $\mu$ m			Particle Size: 5 $\mu$ m		
Dimension		P/N (1/pk)	Dimension		P/N (1/pk)
1.0 $\times$ 50 mm		<a href="#">186003713</a>	2.1 $\times$ 30 mm		<a href="#">186003733</a>
1.0 $\times$ 150 mm		<a href="#">186003714</a>	2.1 $\times$ 50 mm		<a href="#">186003734</a>
2.1 $\times$ 20 mm /S		<a href="#">186003715</a>	2.1 $\times$ 100 mm		<a href="#">186003735</a>
2.1 $\times$ 30 mm		<a href="#">186003716</a>	2.1 $\times$ 150 mm		<a href="#">186003736</a>
2.1 $\times$ 50 mm		<a href="#">186003717</a>	3.0 $\times$ 50 mm		<a href="#">186003738</a>
2.1 $\times$ 75 mm		<a href="#">186005652</a>	3.0 $\times$ 100 mm		<a href="#">186003739</a>
2.1 $\times$ 100 mm		<a href="#">186003718</a>	3.0 $\times$ 150 mm		<a href="#">186003740</a>
2.1 $\times$ 150 mm		<a href="#">186003719</a>	3.0 $\times$ 250 mm		<a href="#">186003741</a>
3.0 $\times$ 50 mm		<a href="#">186003721</a>	4.6 $\times$ 50 mm		<a href="#">186003744</a>
3.0 $\times$ 75 mm		<a href="#">186005653</a>	4.6 $\times$ 75 mm		<a href="#">186003745</a>
3.0 $\times$ 100 mm		<a href="#">186003722</a>	4.6 $\times$ 100 mm		<a href="#">186003746</a>
3.0 $\times$ 150 mm		<a href="#">186003723</a>	4.6 $\times$ 150 mm		<a href="#">186003747</a>
4.6 $\times$ 50 mm		<a href="#">186003726</a>	4.6 $\times$ 250 mm		<a href="#">186003748</a>
4.6 $\times$ 75 mm		<a href="#">186003727</a>			
4.6 $\times$ 100 mm		<a href="#">186003728</a>			
4.6 $\times$ 150 mm		<a href="#">186003729</a>			

PREPARATIVE COLUMNS					
Particle Size: 5 $\mu$ m			Particle Size: 10 $\mu$ m		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 $\times$ 10 mm	Guard Cartridge	<a href="#">186003695</a> <sup>1</sup>	10 $\times$ 10 mm	Guard Cartridge	<a href="#">186003706</a> <sup>1</sup>
10 $\times$ 50 mm	OBD Column	<a href="#">186008202</a>	10 $\times$ 150 mm	OBD Column	<a href="#">186008206</a>
10 $\times$ 100 mm	OBD Column	<a href="#">186008203</a>	10 $\times$ 250 mm	OBD Column	<a href="#">186008207</a>
10 $\times$ 150 mm	OBD Column	<a href="#">186008204</a>	19 $\times$ 10 mm	Guard Cartridge	<a href="#">186003710</a> <sup>2</sup>
10 $\times$ 250 mm	OBD Column	<a href="#">186008205</a>	19 $\times$ 50 mm	OBD Column	<a href="#">186003707</a>
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186003699</a> <sup>2</sup>	19 $\times$ 150 mm	OBD Column	<a href="#">186003708</a>
19 $\times$ 50 mm	OBD Column	<a href="#">186003696</a>	19 $\times$ 250 mm	OBD Column	<a href="#">186003709</a>
19 $\times$ 100 mm	OBD Column	<a href="#">186003697</a>	30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006878</a> <sup>3</sup>
19 $\times$ 150 mm	OBD Column	<a href="#">186003698</a>	30 $\times$ 75 mm	OBD Column	<a href="#">186004712</a>
19 $\times$ 250 mm	OBD Column	<a href="#">186004026</a>	30 $\times$ 150 mm	OBD Column	<a href="#">186003711</a>
30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006879</a> <sup>3</sup>	30 $\times$ 250 mm	OBD Column	<a href="#">186003712</a>
30 $\times$ 50 mm	OBD Column	<a href="#">186003700</a>	50 $\times$ 50 mm	OBD Column	<a href="#">186004083</a>
30 $\times$ 75 mm	OBD Column	<a href="#">186003701</a>	50 $\times$ 100 mm	OBD Column	<a href="#">186004084</a>
30 $\times$ 100 mm	OBD Column	<a href="#">186003702</a>	50 $\times$ 150 mm	OBD Column	<a href="#">186004085</a>
30 $\times$ 150 mm	OBD Column	<a href="#">186003703</a>	50 $\times$ 250 mm	OBD Column	<a href="#">186004086</a>
50 $\times$ 50 mm	OBD Column	<a href="#">186004080</a>			
50 $\times$ 100 mm	OBD Column	<a href="#">186004081</a>			
50 $\times$ 150 mm	OBD Column	<a href="#">186004082</a>			

<sup>1</sup> Requires 10  $\times$  10 mm Cartridge Holder, p/n: [289000779](#).<sup>2</sup> Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186000709](#).<sup>3</sup> Requires 30  $\times$  10 mm Prep Guard Holder, p/n: [186006912](#).

Atlantis Columns *Continued*

dC <sub>18</sub>					
ANALYTICAL COLUMNS					
Particle Size: 3.5 µm			Particle Size: 5 µm		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
2.1 × 30 mm	<a href="#">186001287</a>		2.1 × 50 mm	<a href="#">186001293</a>	
2.1 × 50 mm	<a href="#">186001291</a>		2.1 × 100 mm	<a href="#">186001297</a>	
2.1 × 100 mm	<a href="#">186001295</a>		2.1 × 150 mm	<a href="#">186001301</a>	
2.1 × 150 mm	<a href="#">186001299</a>		3.0 × 100 mm	<a href="#">186001305</a>	
3.0 × 50 mm	<a href="#">186001389</a>		3.0 × 150 mm	<a href="#">186001309</a>	
3.0 × 100 mm	<a href="#">186001303</a>		3.0 × 250 mm	<a href="#">186001311</a>	
3.0 × 150 mm	<a href="#">186001307</a>		3.9 × 150 mm	<a href="#">186001319</a>	
3.9 × 100 mm	<a href="#">186001393</a>		4.6 × 50 mm	<a href="#">186001331</a>	
3.9 × 150 mm	<a href="#">186001317</a>		4.6 × 75 mm	<a href="#">186001335</a>	
4.6 × 50 mm	<a href="#">186001329</a>		4.6 × 100 mm	<a href="#">186001340</a>	
4.6 × 75 mm	<a href="#">186001333</a>		4.6 × 150 mm	<a href="#">186001344</a>	
4.6 × 100 mm	<a href="#">186001337</a>		4.6 × 250 mm	<a href="#">186001346</a>	
4.6 × 150 mm	<a href="#">186001342</a>				

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 10 mm	Guard Cartridge	<a href="#">186002300</a> <sup>1</sup>	10 × 10 mm	Guard Cartridge	<a href="#">186002452</a> <sup>1</sup>
10 × 50 mm	OBD Column	<a href="#">186008146</a>	10 × 150 mm	OBD Column	<a href="#">186008149</a>
10 × 100 mm	OBD Column	<a href="#">186008148</a>	10 × 250 mm	OBD Column	<a href="#">186008151</a>
19 × 10 mm	Guard Cartridge	<a href="#">186001361</a> <sup>2</sup>	19 × 10 mm	Guard Cartridge	<a href="#">186001363</a> <sup>2</sup>
19 × 50 mm	OBD Column	<a href="#">186001365</a>	19 × 150 mm	OBD Column	<a href="#">186001369</a>
19 × 100 mm	OBD Column	<a href="#">186001367</a>	19 × 250 mm	OBD Column	<a href="#">186001371</a>
19 × 150 mm	OBD Column	<a href="#">186002800</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006875</a> <sup>3</sup>
19 × 250 mm	OBD Column	<a href="#">186004030</a>	30 × 250 mm	OBD Column	<a href="#">186002418</a>
30 × 10 mm	Guard Cartridge	<a href="#">186006876</a> <sup>3</sup>			
30 × 50 mm	OBD Column	<a href="#">186001373</a>			
30 × 75 mm	OBD Column	<a href="#">186002455</a>			
30 × 150 mm	OBD Column	<a href="#">186002801</a>			

<sup>1</sup> Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup> Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

## Atlantis Columns *Continued*

HILIC Silica					
ANALYTICAL COLUMNS					
Particle Size: 3.5 $\mu\text{m}$			Particle Size: 5 $\mu\text{m}$		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
2.1 $\times$ 15 mm Direct Connect	<a href="#">186002007</a>		2.1 $\times$ 50 mm	<a href="#">186002012</a>	
2.1 $\times$ 30 mm	<a href="#">186002009</a>		2.1 $\times$ 100 mm	<a href="#">186002014</a>	
2.1 $\times$ 50 mm	<a href="#">186002011</a>		2.1 $\times$ 150 mm	<a href="#">186002016</a>	
2.1 $\times$ 100 mm	<a href="#">186002013</a>		3.0 $\times$ 50 mm	<a href="#">186002018</a>	
2.1 $\times$ 150 mm	<a href="#">186002015</a>		4.6 $\times$ 50 mm	<a href="#">186002028</a>	
3.0 $\times$ 50 mm	<a href="#">186002017</a>		4.6 $\times$ 100 mm	<a href="#">186002030</a>	
3.0 $\times$ 100 mm	<a href="#">186002019</a>		4.6 $\times$ 150 mm	<a href="#">186002032</a>	
4.6 $\times$ 50 mm	<a href="#">186002027</a>		4.6 $\times$ 250 mm	<a href="#">186002033</a>	
4.6 $\times$ 100 mm	<a href="#">186002029</a>				
4.6 $\times$ 150 mm	<a href="#">186002031</a>				

PREPARATIVE COLUMNS					
Particle Size: 5 $\mu\text{m}$			Particle Size: 10 $\mu\text{m}$		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
19 $\times$ 10 mm	Guard Cartridge	<a href="#">186003956</a> <sup>2</sup>	10 $\times$ 10 mm	Guard Cartridge	<a href="#">186002452</a> <sup>1</sup>
19 $\times$ 50 mm	OBD Column	<a href="#">186003957</a>	10 $\times$ 150 mm	OBD Column	<a href="#">186008149</a>
19 $\times$ 100 mm	OBD Column	<a href="#">186003958</a>	10 $\times$ 250 mm	OBD Column	<a href="#">186008151</a>
19 $\times$ 150 mm	OBD Column	<a href="#">186003959</a>	19 $\times$ 10 mm	Guard Cartridge	<a href="#">186001363</a> <sup>2</sup>
30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006877</a> <sup>3</sup>	19 $\times$ 150 mm	OBD Column	<a href="#">186001369</a>
30 $\times$ 50 mm	OBD Column	<a href="#">186003960</a>	19 $\times$ 250 mm	OBD Column	<a href="#">186001371</a>
30 $\times$ 100 mm	OBD Column	<a href="#">186003961</a>	30 $\times$ 10 mm	Guard Cartridge	<a href="#">186006875</a> <sup>3</sup>
30 $\times$ 150 mm	OBD Column	<a href="#">186003962</a>	30 $\times$ 250 mm	OBD Column	<a href="#">186002418</a>

<sup>1</sup>Requires 10  $\times$  10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19  $\times$  10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30  $\times$  10 mm Prep Guard Holder, p/n: [186006912](#).

### Atlantis Columns Method Validation Kits\*

	Particle Size: 3 $\mu\text{m}$		Particle Size: 5 $\mu\text{m}$	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>T3</b>	4.6 $\times$ 150 mm	<a href="#">186003751</a>	4.6 $\times$ 150 mm	<a href="#">186003754</a>
			4.6 $\times$ 250 mm	<a href="#">186003755</a>

HILIC Silica	Particle Size: 3 $\mu\text{m}$		Particle Size: 5 $\mu\text{m}$	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
	4.6 $\times$ 150 mm	<a href="#">186002315</a>	4.6 $\times$ 150 mm	<a href="#">186002314</a>
			4.6 $\times$ 250 mm	<a href="#">186002316</a>

\*Each Method Validation Kit contains 3 columns, each from a different batch.

### Atlantis VanGuard Cartridges

	Particle Size: 3 $\mu\text{m}$		Particle Size: 5 $\mu\text{m}$	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>T3</b>	2.1 $\times$ 5 mm	<a href="#">186007674</a>	2.1 $\times$ 5 mm	<a href="#">186007678</a>
	3.9 $\times$ 5 mm	<a href="#">186007676</a>	3.9 $\times$ 5 mm	<a href="#">186007680</a>

dC <sub>18</sub>	Particle Size: 3 $\mu\text{m}$		Particle Size: 5 $\mu\text{m}$	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
	2.1 $\times$ 5 mm	<a href="#">186007658</a>	2.1 $\times$ 5 mm	<a href="#">186007662</a>
	3.9 $\times$ 5 mm	<a href="#">186007660</a>	3.9 $\times$ 5 mm	<a href="#">186007664</a>

HILIC Silica	Particle Size: 3 $\mu\text{m}$		Particle Size: 5 $\mu\text{m}$	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
	2.1 $\times$ 5 mm	<a href="#">186007666</a>	2.1 $\times$ 5 mm	<a href="#">186007670</a>
	3.9 $\times$ 5 mm	<a href="#">186007668</a>	3.9 $\times$ 5 mm	<a href="#">186007672</a>

### Universal VanGuard Cartridge Holder

Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>

## XTerra OBD Preparative Columns



XTerra HPLC Columns offer a rugged material of high mechanical strength and high efficiency. They provide excellent peak shape for bases and easy scale-up from analytical to preparative chromatography.

XTerra OBD Preparative Columns offer:

- MS C<sub>18</sub>, MS C<sub>8</sub>, Shield RP18, and Shield RP8 column chemistries
- High mechanical strength
- Excellent chemical stability for both low- and high-pH purifications
- Excellent peak shape for bases

# BioAdvisor

Discover the best chemistry solutions for your application with this tool.



BioAdvisor enables you to select an appropriate UPLC/UHPLC or HPLC column and/or chemistry consumable for a desired application, all organized by molecule type.

For more information, visit [waters.com/BioAdvisor](http://waters.com/BioAdvisor)

## Ordering Information

### XTerra Columns

ANALYTICAL COLUMNS						
Particle Size: 2.5 µm*			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
2.1 × 30 mm	<a href="#">186000592</a>		2.1 × 30 mm	<a href="#">186000398</a>	2.1 × 20 mm JS	<a href="#">186001979</a>
4.6 × 20 mm JS	<a href="#">186001889</a>		2.1 × 50 mm	<a href="#">186000400</a>	2.1 × 50 mm	<a href="#">186000446</a>
4.6 × 30 mm	<a href="#">186000600</a>		2.1 × 100 mm	<a href="#">186000404</a>	2.1 × 100 mm	<a href="#">186000450</a>
4.6 × 50 mm	<a href="#">186000602</a>		2.1 × 150 mm	<a href="#">186000408</a>	2.1 × 150 mm	<a href="#">186000454</a>
4.6 × 75 mm	<a href="#">186000981</a>		3.0 × 50 mm	<a href="#">186000414</a>	2.1 × 250 mm	<a href="#">186000458</a>
			3.0 × 100 mm	<a href="#">186000418</a>	3.0 × 50 mm	<a href="#">186000462</a>
			3.0 × 150 mm	<a href="#">186000422</a>	3.0 × 100 mm	<a href="#">186000466</a>
			3.9 × 100 mm	<a href="#">186000426</a>	3.0 × 150 mm	<a href="#">186000470</a>
			4.6 × 30 mm	<a href="#">186000430</a>	3.0 × 250 mm	<a href="#">186000474</a>
			4.6 × 50 mm	<a href="#">186000432</a>	3.9 × 150 mm	<a href="#">186000478</a>
			4.6 × 100 mm	<a href="#">186000436</a>	4.6 × 50 mm	<a href="#">186000482</a>
			4.6 × 150 mm	<a href="#">186000440</a>	4.6 × 100 mm	<a href="#">186000486</a>
			4.6 × 250 mm	<a href="#">186001470</a>	4.6 × 150 mm	<a href="#">186000490</a>
					4.6 × 250 mm	<a href="#">186000494</a>

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
7.8 × 10 mm	Guard Cartridge	<a href="#">186001168</a> <sup>5</sup>	7.8 × 10 mm	Guard Cartridge	<a href="#">186001172</a> <sup>5</sup>
7.8 × 50 mm	Column	<a href="#">186001152</a>	7.8 × 150 mm	Column	<a href="#">186001160</a>
7.8 × 100 mm	Column	<a href="#">186001156</a>	7.8 × 300 mm	Column	<a href="#">186001164</a>
7.8 × 150 mm	Column	<a href="#">186001475</a>	10 × 10 mm	Guard Cartridge	<a href="#">186001002</a> <sup>1</sup>
10 × 10 mm	Guard Cartridge	<a href="#">186001001</a> <sup>1</sup>	10 × 150 mm	OBD Column	<a href="#">186008129</a>
10 × 50 mm	OBD Column	<a href="#">186008103</a>	10 × 250 mm	OBD Column	<a href="#">186008133</a>
10 × 100 mm	OBD Column	<a href="#">186008107</a>	10 × 300 mm	OBD Column	<a href="#">186008137</a>
10 × 150 mm	OBD Column	<a href="#">186008141</a>	19 × 10 mm	Guard Cartridge	<a href="#">186001034</a> <sup>2</sup>
19 × 10 mm	Guard Cartridge	<a href="#">186001104</a> <sup>2</sup>	19 × 50 mm	OBD Column	<a href="#">186002254</a>
19 × 50 mm	OBD Column	<a href="#">186001930</a>	19 × 150 mm	OBD Column	<a href="#">186002255</a>
19 × 100 mm	OBD Column	<a href="#">186001934</a>	19 × 250 mm	OBD Column	<a href="#">186002259</a>
19 × 150 mm	OBD Column	<a href="#">186002379</a>	19 × 300 mm	OBD Column	<a href="#">186002263</a>
30 × 10 mm	Guard Cartridge	<a href="#">186006903</a> <sup>3</sup>	30 × 10 mm	Guard Cartridge	<a href="#">186006902</a> <sup>3</sup>
30 × 50 mm	OBD Column	<a href="#">186001938</a>	30 × 150 mm	OBD Column	<a href="#">186002267</a>
30 × 100 mm	OBD Column	<a href="#">186001942</a>	30 × 250 mm	OBD Column	<a href="#">186002271</a>
50 × 50 mm	OBD Column	<a href="#">186002218</a>	30 × 300 mm	OBD Column	<a href="#">186002275</a>
50 × 100 mm	OBD Column	<a href="#">186002222</a>	50 × 50 mm	OBD Column	<a href="#">186002279</a>
			50 × 150 mm	OBD Column	<a href="#">186002843</a>
			50 × 250 mm	OBD Column	<a href="#">186002847</a>

\*Recommended maximum pressure of 6000 psi (400 bar).

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

<sup>5</sup>Requires 7.8 × 10 mm Cartridge Holder, p/n: [186000708](#).

 For more information on XTerra Columns, refer to [page 174](#) for 2.5 µm and [page 221](#) for 3–5 µm column offerings.

XTerra Columns *Continued*

MS C <sub>8</sub>						
ANALYTICAL COLUMNS						
Particle Size: 2.5 µm*			Particle Size: 3.5 µm		Particle Size: 5 µm	
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
4.6 × 50 mm	<a href="#">186000603</a>		2.1 × 50 mm	<a href="#">186000401</a>	2.1 × 50 mm	<a href="#">186000447</a>
			2.1 × 100 mm	<a href="#">186000405</a>	2.1 × 100 mm	<a href="#">186000451</a>
			2.1 × 150 mm	<a href="#">186000409</a>	2.1 × 150 mm	<a href="#">186000455</a>
			3.9 × 100 mm	<a href="#">186000427</a>	2.1 × 250 mm	<a href="#">186000459</a>
			4.6 × 50 mm	<a href="#">186000433</a>	3.9 × 150 mm	<a href="#">186000479</a>
			4.6 × 100 mm	<a href="#">186000437</a>	4.6 × 50 mm	<a href="#">186000483</a>
			4.6 × 150 mm	<a href="#">186000441</a>	4.6 × 100 mm	<a href="#">186000487</a>
			4.6 × 250 mm	<a href="#">186001471</a>	4.6 × 150 mm	<a href="#">186000491</a>
					4.6 × 250 mm	<a href="#">186000495</a>

PREPARATIVE COLUMNS						
Particle Size: 5 µm			Particle Size: 10 µm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
7.8 × 10 mm	Guard Cartridge	<a href="#">186001169</a> <sup>5</sup>	7.8 × 10 mm	Guard Cartridge	<a href="#">186001173</a> <sup>5</sup>	
7.8 × 50 mm	Column	<a href="#">186001153</a>	7.8 × 150 mm	Column	<a href="#">186001161</a>	
7.8 × 100 mm	Column	<a href="#">186001157</a>	7.8 × 300 mm	Column	<a href="#">186001165</a>	
7.8 × 150 mm	Column	<a href="#">186001476</a>	10 × 150 mm	OBD Column	<a href="#">186008130</a>	
10 × 50 mm	OBD Column	<a href="#">186008104</a>	10 × 250 mm	OBD Column	<a href="#">186008134</a>	
10 × 150 mm	OBD Column	<a href="#">186008142</a>	10 × 300 mm	OBD Column	<a href="#">186008138</a>	
19 × 10 mm	Guard Cartridge	<a href="#">186001105</a> <sup>2</sup>	19 × 10 mm	Guard Cartridge	<a href="#">186001035</a> <sup>2</sup>	
19 × 50 mm	OBD Column	<a href="#">186001931</a>	19 × 150 mm	OBD Column	<a href="#">186002256</a>	
19 × 100 mm	OBD Column	<a href="#">186001935</a>	19 × 250 mm	OBD Column	<a href="#">186002260</a>	
19 × 150 mm	OBD Column	<a href="#">186002380</a>	19 × 300 mm	OBD Column	<a href="#">186002264</a>	
30 × 10 mm	Guard Cartridge	<a href="#">186006904</a> <sup>3</sup>	30 × 150 mm	OBD Column	<a href="#">186002268</a>	
30 × 75 mm	OBD Column	<a href="#">186002388</a>	30 × 250 mm	OBD Column	<a href="#">186002272</a>	
30 × 100 mm	OBD Column	<a href="#">186001943</a>	30 × 300 mm	OBD Column	<a href="#">186002276</a>	
50 × 50 mm	OBD Column	<a href="#">186002219</a>	50 × 50 mm	OBD Column	<a href="#">186002280</a>	
50 × 100 mm	OBD Column	<a href="#">186002223</a>	50 × 150 mm	OBD Column	<a href="#">186002844</a>	

\*Recommended maximum pressure of 6000 psi (400 bar).

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

<sup>5</sup>Requires 7.8 × 10 mm Cartridge Holder, p/n: [186000708](#).



Shield RP18					
ANALYTICAL COLUMNS					
Particle Size: 3.5 µm			Particle Size: 5 µm		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
2.1 × 20 mm /S	<a href="#">186001925</a>		2.1 × 50 mm	<a href="#">186000448</a>	
2.1 × 50 mm	<a href="#">186000402</a>		2.1 × 100 mm	<a href="#">186000452</a>	
2.1 × 100 mm	<a href="#">186000406</a>		2.1 × 150 mm	<a href="#">186000456</a>	
2.1 × 150 mm	<a href="#">186000410</a>		2.1 × 250 mm	<a href="#">186000460</a>	
3.0 × 50 mm	<a href="#">186000416</a>		3.0 × 50 mm	<a href="#">186000464</a>	
3.0 × 100 mm	<a href="#">186000420</a>		3.0 × 100 mm	<a href="#">186000468</a>	
3.0 × 150 mm	<a href="#">186000424</a>		3.0 × 150 mm	<a href="#">186000472</a>	
3.9 × 100 mm	<a href="#">186000428</a>		3.0 × 250 mm	<a href="#">186000476</a>	
4.6 × 50 mm	<a href="#">186000434</a>		3.9 × 150 mm	<a href="#">186000480</a>	
4.6 × 100 mm	<a href="#">186000438</a>		4.6 × 50 mm	<a href="#">186000484</a>	
4.6 × 150 mm	<a href="#">186000442</a>		4.6 × 100 mm	<a href="#">186000488</a>	
4.6 × 250 mm	<a href="#">186001472</a>		4.6 × 150 mm	<a href="#">186000492</a>	
			4.6 × 250 mm	<a href="#">186000496</a>	

PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
7.8 × 10 mm	Guard Cartridge	<a href="#">186001170</a> <sup>5</sup>	7.8 × 10 mm	Guard Cartridge	<a href="#">186001174</a> <sup>5</sup>
7.8 × 50 mm	Column	<a href="#">186001154</a>	7.8 × 150 mm	Column	<a href="#">186001162</a>
7.8 × 100 mm	Column	<a href="#">186001158</a>	7.8 × 300 mm	Column	<a href="#">186001166</a>
7.8 × 150 mm	Column	<a href="#">186001477</a>	10 × 10 mm	Guard Cartridge	<a href="#">186001007</a> <sup>1</sup>
10 × 10 mm	Guard Cartridge	<a href="#">186001006</a> <sup>1</sup>	10 × 150 mm	OBD Column	<a href="#">186008131</a>
10 × 50 mm	OBD Column	<a href="#">186008105</a>	10 × 250 mm	OBD Column	<a href="#">186008135</a>
10 × 100 mm	OBD Column	<a href="#">186008128</a>	10 × 300 mm	OBD Column	<a href="#">186008139</a>
10 × 150 mm	OBD Column	<a href="#">186008143</a>	19 × 10 mm	Guard Cartridge	<a href="#">186001036</a> <sup>2</sup>
19 × 10 mm	Guard Cartridge	<a href="#">186001106</a> <sup>2</sup>	19 × 150 mm	OBD Column	<a href="#">186002257</a>
19 × 50 mm	OBD Column	<a href="#">186001932</a>	19 × 250 mm	OBD Column	<a href="#">186002261</a>
19 × 100 mm	OBD Column	<a href="#">186001936</a>	19 × 300 mm	OBD Column	<a href="#">186002265</a>
19 × 150 mm	OBD Column	<a href="#">186002381</a>	30 × 10 mm	Guard Cartridge	<a href="#">186006905</a> <sup>3</sup>
30 × 10 mm	Guard Cartridge	<a href="#">186006906</a> <sup>3</sup>	30 × 150 mm	OBD Column	<a href="#">186002269</a>
30 × 50 mm	OBD Column	<a href="#">186001940</a>	30 × 250 mm	OBD Column	<a href="#">186002273</a>
30 × 75 mm	OBD Column	<a href="#">186002389</a>	30 × 300 mm	OBD Column	<a href="#">186002277</a>
30 × 100 mm	OBD Column	<a href="#">186001944</a>	50 × 50 mm	OBD Column	<a href="#">186002281</a>
50 × 50 mm	OBD Column	<a href="#">186002220</a>	50 × 250 mm	OBD Column	<a href="#">186002849</a>
50 × 100 mm	OBD Column	<a href="#">186002224</a>			

<sup>1</sup>Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

<sup>5</sup>Requires 7.8 × 10 mm Cartridge Holder, p/n: [186000708](#).

XTerra Columns *Continued*

Shield RP8					
ANALYTICAL COLUMNS					
Particle Size: 3.5 µm			Particle Size: 5 µm		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
3.0 × 50 mm	<a href="#">186000417</a>		2.1 × 150 mm	<a href="#">186000457</a>	
3.0 × 100 mm	<a href="#">186000421</a>		3.0 × 100 mm	<a href="#">186000469</a>	
3.0 × 150 mm	<a href="#">186000425</a>		3.0 × 150 mm	<a href="#">186000473</a>	
3.9 × 100 mm	<a href="#">186000429</a>		3.9 × 150 mm	<a href="#">186000481</a>	
4.6 × 50 mm	<a href="#">186000435</a>		4.6 × 50 mm	<a href="#">186000485</a>	
4.6 × 100 mm	<a href="#">186000439</a>		4.6 × 100 mm	<a href="#">186000489</a>	
4.6 × 150 mm	<a href="#">186000443</a>		4.6 × 150 mm	<a href="#">186000493</a>	
4.6 × 250 mm	<a href="#">186001473</a>		4.6 × 250 mm	<a href="#">186000497</a>	
PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
7.8 × 10 mm	Guard Cartridge	<a href="#">186001171</a> <sup>5</sup>	7.8 × 10 mm	Guard Cartridge	<a href="#">186001175</a> <sup>5</sup>
7.8 × 50 mm	Column	<a href="#">186001155</a>	7.8 × 150 mm	Column	<a href="#">186001163</a>
7.8 × 100 mm	Column	<a href="#">186001159</a>	7.8 × 300 mm	Column	<a href="#">186001167</a>
7.8 × 150 mm	Column	<a href="#">186001478</a>	10 × 10 mm	Guard Cartridge	<a href="#">186001009</a> <sup>1</sup>
10 × 10 mm	Guard Cartridge	<a href="#">186001008</a> <sup>1</sup>	10 × 150 mm	OBD Column	<a href="#">186008132</a>
10 × 50 mm	OBD Column	<a href="#">186008106</a>	10 × 250 mm	OBD Column	<a href="#">186008136</a>
10 × 150 mm	OBD Column	<a href="#">186008144</a>	10 × 300 mm	OBD Column	<a href="#">186008140</a>
19 × 10 mm	Guard Cartridge	<a href="#">186001107</a> <sup>2</sup>	19 × 10 mm	Guard Cartridge	<a href="#">186001037</a> <sup>2</sup>
19 × 100 mm	OBD Column	<a href="#">186001937</a>	19 × 150 mm	OBD Column	<a href="#">186002258</a>
19 × 150 mm	OBD Column	<a href="#">186002382</a>	19 × 250 mm	OBD Column	<a href="#">186002262</a>
30 × 50 mm	OBD Column	<a href="#">186001941</a>	19 × 300 mm	OBD Column	<a href="#">186002266</a>
30 × 75 mm	OBD Column	<a href="#">186002390</a>	30 × 150 mm	OBD Column	<a href="#">186002270</a>
30 × 100 mm	OBD Column	<a href="#">186001945</a>	30 × 250 mm	OBD Column	<a href="#">186002274</a>
50 × 50 mm	OBD Column	<a href="#">186002221</a>	30 × 300 mm	OBD Column	<a href="#">186002278</a>
50 × 100 mm	OBD Column	<a href="#">186002225</a>	50 × 50 mm	OBD Column	<a href="#">186002282</a>
			50 × 150 mm	OBD Column	<a href="#">186002846</a>
			50 × 250 mm	OBD Column	<a href="#">186002850</a>

<sup>1</sup> Requires 10 × 10 mm Cartridge Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>5</sup> Requires 7.8 × 10 mm Cartridge Holder, p/n: [186000708](#).

## XTerra Columns *Continued*

Phenyl	ANALYTICAL COLUMNS			
	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
	2.1 × 50 mm	<a href="#">186001179</a>	3.9 × 150 mm	<a href="#">186001184</a>
	2.1 × 100 mm	<a href="#">186001180</a>	4.6 × 50 mm	<a href="#">186001144</a>
	2.1 × 150 mm	<a href="#">186001181</a>	4.6 × 100 mm	<a href="#">186001145</a>
	3.0 × 100 mm	<a href="#">186001142</a>	4.6 × 150 mm	<a href="#">186001146</a>
	3.0 × 150 mm	<a href="#">186001143</a>	4.6 × 250 mm	<a href="#">186001147</a>
	3.9 × 150 mm	<a href="#">186001178</a>		
	4.6 × 50 mm	186001138		
	4.6 × 100 mm	<a href="#">186001139</a>		
	4.6 × 150 mm	<a href="#">186001140</a>		
	4.6 × 250 mm	<a href="#">186001474</a>		

## XTerra Columns Method Validation Kits\*

	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>MS C<sub>18</sub></b>	4.6 × 150 mm	<a href="#">186000826</a>	4.6 × 150 mm	<a href="#">186000829</a>
			4.6 × 250 mm	<a href="#">186000830</a>
<b>Shield RP18</b>	4.6 × 150 mm	<a href="#">186000861</a>	4.6 × 150 mm	<a href="#">186000862</a>
			4.6 × 250 mm	<a href="#">186000863</a>

\*Each Method Validation Kit contains 3 columns, each from a different batch.

## XTerra VanGuard Cartridges

	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
<b>MS C<sub>18</sub></b>	2.1 × 5 mm	<a href="#">186007887</a>	2.1 × 5 mm	<a href="#">186007892</a>	2.1 × 5 mm	<a href="#">186007896</a>
	3.9 × 5 mm	<a href="#">186007889</a>	3.9 × 5 mm	<a href="#">186007894</a>	3.9 × 5 mm	<a href="#">186007899</a>
<b>MS C<sub>8</sub></b>	2.1 × 5 mm	<a href="#">186007901</a>	2.1 × 5 mm	<a href="#">186007905</a>	2.1 × 5 mm	<a href="#">186007909</a>
	3.9 × 5 mm	<a href="#">186007903</a>	3.9 × 5 mm	<a href="#">186007735</a>	3.9 × 5 mm	<a href="#">186007739</a>
<b>Shield RP18</b>			2.1 × 5 mm	<a href="#">186007929</a>	2.1 × 5 mm	<a href="#">186007933</a>
			3.9 × 5 mm	<a href="#">186007931</a>	3.9 × 5 mm	<a href="#">186007935</a>
<b>Shield RP8</b>			2.1 × 5 mm	<a href="#">186007941</a>	3.9 × 5 mm	<a href="#">186007947</a>
			3.9 × 5 mm	<a href="#">186007943</a>		
<b>Phenyl</b>			2.1 × 5 mm	<a href="#">186007917</a>	2.1 × 5 mm	<a href="#">186007921</a>
			3.9 × 5 mm	<a href="#">186007919</a>	3.9 × 5 mm	<a href="#">186007923</a>

## Universal VanGuard Cartridge Holder

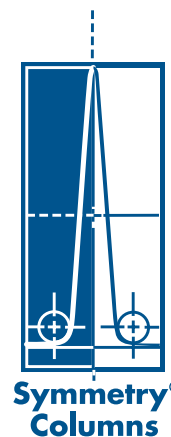
Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>

## Symmetry Preparative Columns

Symmetry Columns provide a high standard of reproducibility and total confidence in the long-term compliance of your HPLC methods. The SymmetryPrep family includes SymmetryPrep (C<sub>18</sub> and C<sub>8</sub>), SymmetryShield (RP18 and RP8), and Symmetry300 (C<sub>18</sub>) Columns.

Symmetry Preparative Columns offer:

- High capacity
- High efficiency
- The ability to scale-up methods from Symmetry analytical columns with particles of 3.5 and 5 μm



### Ordering Information

Symmetry, SymmetryShield, and Symmetry300 Columns

Symmetry C <sub>18</sub>	ANALYTICAL COLUMNS					
	Particle Size: 3.5 μm			Particle Size: 5 μm		
	Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
	2.1 × 30 mm	<a href="#">WAT058973</a>		2.1 × 50 mm	<a href="#">186000206</a>	
	2.1 × 50 mm	<a href="#">WAT200650</a>		2.1 × 100 mm	<a href="#">186002608</a>	
	2.1 × 100 mm	<a href="#">WAT058965</a>		2.1 × 150 mm	<a href="#">WAT056975</a>	
	2.1 × 150 mm	<a href="#">WAT106005</a>		3.0 × 150 mm	<a href="#">WAT054200</a>	
	3.0 × 50 mm	<a href="#">186002612</a>		3.0 × 250 mm	<a href="#">186000690</a>	
	3.0 × 100 mm	<a href="#">186000696</a>		3.9 × 20 mm /S	<a href="#">186002086</a>	
	3.0 × 150 mm	<a href="#">186000695</a>		3.9 × 150 mm	<a href="#">WAT046980</a>	
	3.9 × 20 mm /S	<a href="#">186002082</a>		4.6 × 20 mm /S	<a href="#">186002094</a>	
	4.6 × 30 mm	<a href="#">186000271</a>		4.6 × 50 mm	<a href="#">186000207</a>	
	4.6 × 50 mm	<a href="#">WAT200625</a>		4.6 × 100 mm	<a href="#">186002616</a>	
	4.6 × 75 mm	<a href="#">WAT066224</a>		4.6 × 150 mm	<a href="#">WAT045905</a>	
	4.6 × 100 mm	<a href="#">WAT066220</a>		4.6 × 250 mm	<a href="#">WAT054275</a>	
	4.6 × 150 mm	<a href="#">WAT200632</a>				
	4.6 × 250 mm	<a href="#">186005794</a>				
PREPARATIVE COLUMNS						
Particle Size: 5 μm			Particle Size: 7 μm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
7.8 × 10 mm	Guard Cartridge	<a href="#">186000711</a> <sup>5</sup>	7.8 × 10 mm	Guard Cartridge	<a href="#">186000713</a> <sup>5</sup>	
7.8 × 50 mm	Column	<a href="#">186000208</a>	7.8 × 150 mm	Column	<a href="#">WAT066288</a>	
7.8 × 100 mm	Column	<a href="#">186000209</a>	7.8 × 300 mm	Column	<a href="#">WAT066235</a>	
19 × 10 mm	Guard Cartridge	<a href="#">186000715</a> <sup>2</sup>	19 × 10 mm	Guard Cartridge	<a href="#">186000717</a> <sup>2</sup>	
19 × 50 mm	Column	<a href="#">186000210</a>	19 × 150 mm	Column	<a href="#">WAT066240</a>	
19 × 100 mm	Column	<a href="#">186000211</a>	19 × 300 mm	Column	<a href="#">WAT066245</a>	
30 × 100 mm	Column	<a href="#">186000236</a>				

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>5</sup>Requires 7.8 × 10 mm Cartridge Holder, p/n: [186000708](#).

Symmetry, SymmetryShield, and Symmetry300 Columns *Continued*

Symmetry C <sub>8</sub>						
ANALYTICAL COLUMNS						
Particle Size: 3.5 µm			Particle Size: 5 µm			
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)		
2.1 × 50 mm	<a href="#">WAT200624</a>		2.1 × 100 mm	<a href="#">186002609</a>		
2.1 × 100 mm	<a href="#">WAT058961</a>		2.1 × 150 mm	<a href="#">WAT056955</a>		
2.1 × 150 mm	<a href="#">WAT106011</a>		3.0 × 150 mm	<a href="#">WAT054230</a>		
3.0 × 100 mm	<a href="#">186000698</a>		3.0 × 250 mm	<a href="#">186000691</a>		
3.0 × 150 mm	<a href="#">186000697</a>		3.9 × 20 mm /S	<a href="#">186002087</a>		
4.6 × 30 mm	<a href="#">186000270</a>		3.9 × 150 mm	<a href="#">WAT046970</a>		
4.6 × 50 mm	<a href="#">WAT200620</a>		4.6 × 50 mm	<a href="#">186000213</a>		
4.6 × 75 mm	<a href="#">WAT066200</a>		4.6 × 100 mm	<a href="#">186002617</a>		
4.6 × 100 mm	<a href="#">WAT066204</a>		4.6 × 150 mm	<a href="#">WAT045995</a>		
4.6 × 150 mm	<a href="#">WAT200630</a>		4.6 × 250 mm	<a href="#">WAT054270</a>		
PREPARATIVE COLUMNS						
Particle Size: 5 µm			Particle Size: 7 µm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
7.8 × 10 mm	Guard Cartridge	<a href="#">186000712<sup>5</sup></a>	7.8 × 10 mm	Guard Cartridge	<a href="#">186000714<sup>5</sup></a>	
7.8 × 50 mm	Column	<a href="#">186000214</a>	7.8 × 150 mm	Column	<a href="#">WAT066285</a>	
7.8 × 100 mm	Column	<a href="#">186000215</a>	7.8 × 300 mm	Column	<a href="#">WAT066225</a>	
19 × 100 mm	Column	<a href="#">186000229</a>	19 × 10 mm	Guard Cartridge	<a href="#">186000718<sup>2</sup></a>	
30 × 50 mm	Column	<a href="#">186000237</a>	19 × 150 mm	Column	<a href="#">WAT066228</a>	
30 × 100 mm	Column	<a href="#">186000238</a>	19 × 300 mm	Column	<a href="#">WAT066230</a>	
30 × 100 mm	Column	<a href="#">186000236</a>				

Symmetry Shield RP18						
ANALYTICAL COLUMNS						
Particle Size: 3.5 µm			Particle Size: 5 µm			
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)		
2.1 × 50 mm	<a href="#">186000172</a>		2.1 × 50 mm	<a href="#">186000217</a>		
2.1 × 100 mm	<a href="#">186000173</a>		2.1 × 100 mm	<a href="#">186000998</a>		
2.1 × 150 mm	<a href="#">186000174</a>		2.1 × 150 mm	<a href="#">186000111</a>		
3.0 × 100 mm	<a href="#">186000700</a>		3.0 × 150 mm	<a href="#">186000692</a>		
3.0 × 150 mm	<a href="#">186000699</a>		3.0 × 250 mm	<a href="#">186000693</a>		
3.9 × 20 mm /S	<a href="#">186002084</a>		3.9 × 150 mm	<a href="#">186000108</a>		
4.6 × 50 mm	<a href="#">186000177</a>		4.6 × 50 mm	<a href="#">186000218</a>		
4.6 × 75 mm	<a href="#">186000178</a>		4.6 × 100 mm	<a href="#">186002618</a>		
4.6 × 100 mm	<a href="#">186000179</a>		4.6 × 150 mm	<a href="#">186000109</a>		
4.6 × 150 mm	<a href="#">186000180</a>		4.6 × 250 mm	<a href="#">186000112</a>		
PREPARATIVE COLUMNS						
Particle Size: 5 µm			Particle Size: 7 µm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
19 × 10 mm	Guard Cartridge	<a href="#">186001835<sup>2</sup></a>	19 × 150 mm	Column	<a href="#">186001839</a>	
19 × 50 mm	Column	<a href="#">186001836</a>	19 × 300 mm	Column	<a href="#">186001840</a>	
19 × 100 mm	Column	<a href="#">186001837</a>				
19 × 150 mm	Column	<a href="#">186001838</a>				

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).<sup>5</sup>Requires 7.8 × 10 mm Cartridge Holder, p/n: [186000708](#).

Symmetry, SymmetryShield, and Symmetry300 Columns *Continued*

Symmetry Shield RP8	ANALYTICAL COLUMNS					
	Particle Size: 3.5 µm			Particle Size: 5 µm		
	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)		
	2.1 × 50 mm	<a href="#">WAT094257</a>	2.1 × 150 mm	<a href="#">WAT094245</a>		
	2.1 × 100 mm	<a href="#">WAT058969</a>	3.0 × 150 mm	<a href="#">WAT094243</a>		
	2.1 × 150 mm	<a href="#">WAT106008</a>	3.9 × 20 mm JS	<a href="#">186002089</a>		
	4.6 × 50 mm	<a href="#">WAT094260</a>	3.9 × 150 mm	<a href="#">WAT200655</a>		
	4.6 × 75 mm	<a href="#">WAT094263</a>	4.6 × 50 mm	<a href="#">186000224</a>		
	4.6 × 100 mm	<a href="#">WAT094266</a>	4.6 × 100 mm	<a href="#">186002619</a>		
	4.6 × 150 mm	<a href="#">WAT094269</a>	4.6 × 150 mm	<a href="#">WAT200662</a>		
			4.6 × 250 mm	<a href="#">WAT200670</a>		
PREPARATIVE COLUMNS						
Particle Size: 5 µm			Particle Size: 7 µm			
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)	
19 × 10 mm	Guard Cartridge	<a href="#">186001841</a> <sup>2</sup>	19 × 150 mm	Column	<a href="#">186001845</a>	
19 × 50 mm	Column	<a href="#">186001842</a>	19 × 300 mm	Column	<a href="#">186001846</a>	
19 × 100 mm	Column	<a href="#">186001843</a>				
19 × 150 mm	Column	<a href="#">186001844</a>				

Symmetry300 C <sub>18</sub>	ANALYTICAL COLUMNS					
	Particle Size: 3.5 µm			Particle Size: 5 µm		
	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)		
	2.1 × 50 mm	<a href="#">186000187</a>	2.1 × 150 mm	<a href="#">WAT106172</a>		
	2.1 × 100 mm	<a href="#">186000188</a>	4.6 × 50 mm	<a href="#">WAT106209</a>		
	2.1 × 150 mm	<a href="#">186000200</a>	4.6 × 150 mm	<a href="#">WAT106157</a>		
	4.6 × 50 mm	<a href="#">186000201</a>	4.6 × 250 mm	<a href="#">WAT106151</a>		
	4.6 × 75 mm	<a href="#">186000189</a>				
	4.6 × 100 mm	<a href="#">186000190</a>				
	4.6 × 150 mm	<a href="#">186000197</a>				
PREPARATIVE COLUMNS						
Particle Size: 5 µm						
Dimension	Type	P/N (1/pk)				
19 × 10 mm	Guard Cartridge	<a href="#">186001847</a> <sup>2</sup>				
19 × 50 mm	Column	<a href="#">186001848</a>				
19 × 100 mm	Column	<a href="#">186001849</a>				
19 × 150 mm	Column	<a href="#">186001850</a>				

<sup>2</sup>Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>3</sup>Requires 7.8 × 10 mm Cartridge Holder, p/n: [186000708](#).

Symmetry, SymmetryShield, and Symmetry300 Columns *Continued*

Symmetry300 C <sub>4</sub>	ANALYTICAL COLUMNS			
	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (1/pk)	Dimension	P/N (1/pk)
	2.1 × 50 mm	<a href="#">186000277</a>	2.1 × 150 mm	<a href="#">186000285</a>
	2.1 × 100 mm	<a href="#">186000278</a>	3.9 × 150 mm	<a href="#">186000286</a>
	2.1 × 150 mm	<a href="#">186000279</a>	4.6 × 50 mm	<a href="#">186000287</a>
	4.6 × 50 mm	<a href="#">186000280</a>	4.6 × 150 mm	<a href="#">186000288</a>
	4.6 × 75 mm	<a href="#">186000281</a>	4.6 × 250 mm	<a href="#">186000289</a>
	4.6 × 100 mm	<a href="#">186000282</a>		
	4.6 × 150 mm	<a href="#">186000283</a>		

Symmetry, SymmetryShield, and Symmetry300 Method Validation Kits\*

	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
Symmetry C <sub>8</sub>	4.6 × 150 mm	<a href="#">WAT094240</a>	3.9 × 150 mm	<a href="#">WAT047210</a>
			4.6 × 150 mm	<a href="#">WAT054448</a>
			4.6 × 250 mm	<a href="#">WAT054450</a>
Symmetry C <sub>6</sub>	4.6 × 150 mm	<a href="#">WAT094237</a>	3.9 × 150 mm	<a href="#">WAT046955</a>
			4.6 × 150 mm	<a href="#">WAT054435</a>
			4.6 × 250 mm	<a href="#">WAT054438</a>
SymmetryShield RP18	4.6 × 150 mm	<a href="#">186000181</a>	4.6 × 150 mm	<a href="#">186000103</a>
			4.6 × 250 mm	<a href="#">186000102</a>
SymmetryShield RP8	4.6 × 150 mm	<a href="#">WAT094278</a>	4.6 × 250 mm	<a href="#">WAT210591</a>
Symmetry300 C <sub>18</sub>	4.6 × 150 mm	<a href="#">186000195</a>	3.9 × 150 mm	<a href="#">WAT106187</a>
			4.6 × 150 mm	<a href="#">WAT106190</a>
			4.6 × 250 mm	<a href="#">WAT106184</a>
Symmetry300 C <sub>4</sub>	4.6 × 150 mm	<a href="#">186000291</a>	3.9 × 150 mm	<a href="#">186000293</a>
			4.6 × 150 mm	<a href="#">186000294</a>
			4.6 × 250 mm	<a href="#">186000295</a>

\*Each Method Validation Kit contains 3 columns, each from a different batch.

Symmetry VanGuard Cartridges

	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N (3/pk)	Dimension	P/N (3/pk)
Symmetry C <sub>18</sub>	2.1 × 5 mm	<a href="#">186007725</a>	2.1 × 5 mm	<a href="#">186007729</a>
	3.9 × 5 mm	<a href="#">186007727</a>	3.9 × 5 mm	<a href="#">186007731</a>
Symmetry C <sub>6</sub>	2.1 × 5 mm	<a href="#">186007733</a>	2.1 × 5 mm	<a href="#">186007737</a>
	3.9 × 5 mm	<a href="#">186007735</a>	3.9 × 5 mm	<a href="#">186007739</a>
SymmetryShield RP18	2.1 × 5 mm	<a href="#">186007749</a>	2.1 × 5 mm	<a href="#">186007753</a>
	3.9 × 5 mm	<a href="#">186007751</a>	3.9 × 5 mm	<a href="#">186007755</a>
SymmetryShield RP8	2.1 × 5 mm	<a href="#">186007741</a>	2.1 × 5 mm	<a href="#">186007745</a>
	3.9 × 5 mm	<a href="#">186007743</a>	3.9 × 5 mm	<a href="#">186007747</a>
Symmetry300 C <sub>18</sub>	2.1 × 5 mm	<a href="#">186007709</a>	2.1 × 5 mm	<a href="#">186007713</a>
	3.9 × 5 mm	<a href="#">186007711</a>	3.9 × 5 mm	<a href="#">186007715</a>
Symmetry300 C <sub>4</sub>	2.1 × 5 mm	<a href="#">186007717</a>	2.1 × 5 mm	<a href="#">186007721</a>
	3.9 × 5 mm	<a href="#">186007719</a>	3.9 × 5 mm	<a href="#">186007723</a>

Universal VanGuard Cartridge Holder

Description	P/N (1/pk)
Universal VanGuard Cartridge Holder	<a href="#">186007949</a>

## Spherisorb Preparative Columns

Spherisorb Columns are frequently referenced in scientific literature. To date, more than 2000 published abstracts acknowledge the use of Spherisorb Columns. These articles provide a tremendous range of validated methods and applications of significant use in method development.

### Ordering Information

#### Spherisorb Columns

ODS1					
ANALYTICAL COLUMNS					
Particle Size: 3 $\mu$ m			Particle Size: 5 $\mu$ m		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
2.0 $\times$ 100 mm	<a href="#">PSS833422</a>		4.0 $\times$ 125 mm	<a href="#">PSS845541</a>	
4.6 $\times$ 50 mm	<a href="#">PSS833411</a>		4.0 $\times$ 250 mm	<a href="#">PSS845542</a>	
4.6 $\times$ 100 mm	<a href="#">PSS833412</a>		4.6 $\times$ 100 mm	<a href="#">PSS830612</a>	
4.6 $\times$ 150 mm	<a href="#">PSS833413</a>		4.6 $\times$ 150 mm	<a href="#">PSS830613</a>	
			4.6 $\times$ 250 mm	<a href="#">PSS830615</a>	
PREPARATIVE COLUMNS					
Particle Size: 5 $\mu$ m			Particle Size: 10 $\mu$ m		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 $\times$ 250 mm	OBD Column	<a href="#">186008284</a>	10 $\times$ 250 mm	OBD Column	<a href="#">186008285</a>
19 $\times$ 250 mm	OBD Column	<a href="#">186008846</a>	19 $\times$ 250 mm	OBD Column	<a href="#">186008857</a>

ODS2					
ANALYTICAL COLUMNS					
Particle Size: 3 $\mu$ m			Particle Size: 5 $\mu$ m		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
4.6 $\times$ 50 mm	<a href="#">PSS832111</a>		4.0 $\times$ 125 mm	<a href="#">PSS845543</a>	
4.6 $\times$ 100 mm	<a href="#">PSS832112</a>		4.0 $\times$ 250 mm	<a href="#">PSS845277</a>	
4.6 $\times$ 150 mm	<a href="#">PSS832113</a>		4.6 $\times$ 50 mm	<a href="#">PSS831911</a>	
			4.6 $\times$ 100 mm	<a href="#">PSS831912</a>	
			4.6 $\times$ 150 mm	<a href="#">PSS831913</a>	
			4.6 $\times$ 250 mm	<a href="#">PSS831915</a>	
PREPARATIVE COLUMNS					
Particle Size: 5 $\mu$ m			Particle Size: 10 $\mu$ m		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 $\times$ 250 mm	OBD Column	<a href="#">186008292</a>	10 $\times$ 250 mm	OBD Column	<a href="#">186008294</a>
19 $\times$ 250 mm	OBD Column	<a href="#">186008847</a>	19 $\times$ 250 mm	OBD Column	<a href="#">186008858</a>



Spherisorb Columns *Continued*

<b>C<sub>6</sub></b>					
ANALYTICAL COLUMNS					
Particle Size: 3 µm			Particle Size: 5 µm		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
4.6 × 50 mm	<a href="#">PSS832211</a>		4.0 × 125 mm	<a href="#">PSS845280</a>	
4.6 × 100 mm	<a href="#">PSS832212</a>		4.0 × 250 mm	<a href="#">PSS845281</a>	
4.6 × 150 mm	<a href="#">PSS832213</a>		4.6 × 100 mm	<a href="#">PSS831812</a>	
			4.6 × 150 mm	<a href="#">PSS831813</a>	
			4.6 × 250 mm	<a href="#">PSS831815</a>	
PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 250 mm	OBD Column	<a href="#">186008291</a>	10 × 250 mm	OBD Column	<a href="#">186008297</a>
19 × 250 mm	OBD Column	<a href="#">186008848</a>	19 × 250 mm	OBD Column	<a href="#">186008859</a>

<b>C<sub>6</sub></b>					
ANALYTICAL COLUMNS					
Particle Size: 3 µm			Particle Size: 5 µm		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
4.6 × 150 mm	<a href="#">PSS833113</a>		4.0 × 125 mm	<a href="#">PSS845284</a>	
			4.6 × 100 mm	<a href="#">PSS831012</a>	
			4.6 × 250 mm	<a href="#">PSS831015</a>	
PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 250 mm	OBD Column	<a href="#">186008288</a>	19 × 250 mm	OBD Column	<a href="#">186008860</a>
19 × 250 mm	OBD Column	<a href="#">186008849</a>			

<b>C<sub>1</sub></b>					
ANALYTICAL COLUMNS					
Particle Size: 5 µm					
			Dimension	P/N (1/pk)	
			4.6 × 100 mm	<a href="#">PSS832612</a>	
			4.6 × 150 mm	<a href="#">PSS832613</a>	
			4.6 × 250 mm	<a href="#">PSS832615</a>	
PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 250 mm	OBD Column	<a href="#">186008295</a>	19 × 250 mm	OBD Column	<a href="#">186008861</a>
19 × 250 mm	OBD Column	<a href="#">186008850</a>			

Spherisorb Columns *Continued*

NH <sub>2</sub>					
ANALYTICAL COLUMNS					
Particle Size: 3 µm			Particle Size: 5 µm		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
2.0 × 100 mm	<a href="#">PSS832322</a>		4.0 × 250 mm	<a href="#">PSS845301</a>	
4.6 × 50 mm	<a href="#">PSS832311</a>		4.6 × 150 mm	<a href="#">PSS831113</a>	
4.6 × 100 mm	<a href="#">PSS832312</a>		4.6 × 250 mm	<a href="#">PSS831115</a>	
4.6 × 150 mm	<a href="#">PSS832313</a>				
PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 250 mm	OBD Column	<a href="#">186008289</a>	10 × 250 mm	OBD Column	<a href="#">186008299</a>
19 × 250 mm	OBD Column	<a href="#">186008853</a>	19 × 250 mm	OBD Column	<a href="#">186008864</a>

Phenyl					
ANALYTICAL COLUMNS					
Particle Size: 3 µm			Particle Size: 5 µm		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
4.6 × 150 mm	<a href="#">PSS833713</a>		4.0 × 250 mm	<a href="#">PSS845293</a>	
			4.6 × 250 mm	<a href="#">PSS830815</a>	
PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 250 mm	OBD Column	<a href="#">186008286</a>	10 × 250 mm	OBD Column	<a href="#">186008300</a>
19 × 250 mm	OBD Column	<a href="#">186008854</a>	19 × 250 mm	OBD Column	<a href="#">186008865</a>

CN Normal Phase					
ANALYTICAL COLUMNS					
Particle Size: 3 µm			Particle Size: 5 µm		
Dimension	P/N (1/pk)		Dimension	P/N (1/pk)	
4.6 × 150 mm	<a href="#">PSS832413</a>		4.0 × 250 mm	<a href="#">PSS845297</a>	
			4.6 × 100 mm	<a href="#">PSS830912</a>	
			4.6 × 150 mm	<a href="#">PSS830913</a>	
			4.6 × 250 mm	<a href="#">PSS830915</a>	
PREPARATIVE COLUMNS					
Particle Size: 5 µm			Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)	Dimension	Type	P/N (1/pk)
10 × 250 mm	OBD Column	<a href="#">186008287</a>	10 × 250 mm	OBD Column	<a href="#">186008298</a>
19 × 250 mm	OBD Column	<a href="#">186008852</a>	19 × 250 mm	OBD Column	<a href="#">186008863</a>

Spherisorb Columns *Continued*

CN Reversed Phase	ANALYTICAL COLUMNS	
	Particle Size: 5 µm	
	Dimension	P/N (1/pk)
	4.6 × 150 mm	<a href="#">PSS830908</a>
	4.6 × 250 mm	<a href="#">PSS830909</a>

Silica	ANALYTICAL COLUMNS	
	Particle Size: 3 µm	
	Dimension	P/N (1/pk)
	4.6 × 150 mm	<a href="#">PSS832013</a>
	Particle Size: 5 µm	
	Dimension	P/N (1/pk)
	2.0 × 250 mm	<a href="#">PSS830125</a>
	4.0 × 250 mm	<a href="#">PSS845540</a>
	4.6 × 250 mm	<a href="#">PSS830115</a>
	PREPARATIVE COLUMNS	
Particle Size: 5 µm		
Dimension	Type	P/N (1/pk)
10 × 250 mm	OBD Column	<a href="#">186008281</a>
19 × 250 mm	OBD Column	<a href="#">186008851</a>
Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)
10 × 250 mm	OBD Column	<a href="#">186008282</a>
19 × 250 mm	OBD Column	<a href="#">186008862</a>

SAX	ANALYTICAL COLUMNS	
	Particle Size: 5 µm	
	Dimension	P/N (1/pk)
	4.0 × 250 mm	<a href="#">PSS845305</a>
	4.6 × 50 mm	<a href="#">PSS832711</a>
	4.6 × 150 mm	<a href="#">PSS832713</a>
	4.6 × 250 mm	<a href="#">PSS832715</a>
	PREPARATIVE COLUMNS	
	Particle Size: 5 µm	
	Dimension	Type
10 × 250 mm	OBD Column	<a href="#">186008296</a>
19 × 250 mm	OBD Column	<a href="#">186008855</a>
Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)
10 × 250 mm	OBD Column	<a href="#">186008301</a>
19 × 250 mm	OBD Column	<a href="#">186008866</a>

SCX	ANALYTICAL COLUMNS	
	Particle Size: 5 µm	
	Dimension	P/N (1/pk)
	4.0 × 250 mm	<a href="#">PSS845309</a>
	4.6 × 50 mm	<a href="#">PSS837511</a>
	4.6 × 100 mm	<a href="#">PSS837512</a>
	4.6 × 150 mm	<a href="#">PSS837513</a>
	4.6 × 250 mm	<a href="#">PSS837515</a>
	PREPARATIVE COLUMNS	
	Particle Size: 5 µm	
Dimension	Type	P/N (1/pk)
10 × 250 mm	OBD Column	<a href="#">186008302</a>
19 × 250 mm	OBD Column	<a href="#">186008856</a>
Particle Size: 10 µm		
Dimension	Type	P/N (1/pk)
10 × 250 mm	OBD Column	<a href="#">186008303</a>
19 × 250 mm	OBD Column	<a href="#">186008867</a>

OD/CN	ANALYTICAL COLUMNS	
	Particle Size: 5 µm	
	Dimension	P/N (1/pk)
	4.6 × 150 mm	<a href="#">PSS837813</a>
	4.6 × 250 mm	<a href="#">PSS837815</a>

## Nova-Pak Preparative Columns

Nova-Pak HR, 6  $\mu\text{m}$ , ultra-high-efficiency packing materials are available as shorter columns to facilitate separations - making it faster, lowering solvent consumption, and producing fractions of greater concentration. The preparative Nova-Pak HR material provides the same selectivity and retention characteristics as the analytical Nova-Pak 4  $\mu\text{m}$  material. The Nova-Pak HR packing materials for preparative use are ideal for separating a wide range of compounds such as organic synthesis intermediates or natural products.

### Ordering Information

#### Nova-Pak Columns

Nova-Pak C <sub>18</sub>	ANALYTICAL COLUMNS	
	Particle Size: 4 $\mu\text{m}$	
	Dimension	P/N (1/pk)
	2.1 $\times$ 150 mm	<a href="#">WAT023655</a>
	3.9 $\times$ 75 mm	<a href="#">WAT011670</a>
	3.9 $\times$ 150 mm	<a href="#">WAT086344</a>
	3.9 $\times$ 300 mm	<a href="#">WAT011695</a>
	4.6 $\times$ 150 mm	<a href="#">WAT044375</a>
	PREPARATIVE COLUMNS	
	Particle Size: 6 $\mu\text{m}$	
	Dimension	P/N (1/pk)
	3.9 $\times$ 300 mm	<a href="#">WAT038500</a>
	7.8 $\times$ 300 mm	<a href="#">WAT025820</a>
	19 $\times$ 300 mm	<a href="#">WAT025822</a>

Nova-Pak C <sub>8</sub>	Dimension	P/N (1/pk)
	3.9 $\times$ 75 mm	<a href="#">WAT035877</a>
	3.9 $\times$ 150 mm	<a href="#">WAT035876</a>

Nova-Pak Phenyl	ANALYTICAL COLUMNS	
	Particle Size: 4 $\mu\text{m}$	
	Dimension	P/N (1/pk)
	2.1 $\times$ 150 mm	<a href="#">WAT052740</a>
	3.9 $\times$ 75 mm	<a href="#">WAT011675</a>
	3.9 $\times$ 150 mm	<a href="#">WAT010656</a>

Nova-Pak CN-HP	Dimension	P/N (1/pk)
	3.9 $\times$ 75 mm	<a href="#">WAT010270</a>
	3.9 $\times$ 150 mm	<a href="#">WAT044245</a>
	3.9 $\times$ 300 mm	<a href="#">WAT056920</a>

Nova-Pak Silica	ANALYTICAL COLUMNS	
	Particle Size: 4 $\mu\text{m}$	
	Dimension	P/N (1/pk)
	2.1 $\times$ 150 mm	<a href="#">WAT052745</a>
	3.9 $\times$ 150 mm	<a href="#">WAT010025</a>

	PREPARATIVE COLUMNS	
	Particle Size: 6 $\mu\text{m}$	
	Dimension	P/N (1/pk)
	3.9 $\times$ 300 mm	<a href="#">WAT038501</a>
	7.8 $\times$ 300 mm	<a href="#">WAT025821</a>
	19 $\times$ 300 mm	<a href="#">WAT025823</a>

 For more information on Nova-Pak Columns, refer to [page 232](#).

## $\mu$ Bondapak/Bondapak and $\mu$ Porasil/Porasil Columns

The popular  $\mu$ Bondapak C<sub>18</sub> chemistry and  $\mu$ Porasil silica packing materials are offered in 10  $\mu\text{m}$  particle size. Bondapak and Porasil are available in two particle sizes, 15–20  $\mu\text{m}$  and 37–55  $\mu\text{m}$ , providing easy transfer of chromatography methods and the means to optimize resolution, throughput, and cost. Existing 10  $\mu\text{m}$   $\mu$ Bondapak or  $\mu$ Porasil chromatography can serve as a starting point for scale-up separations.

The preparative Bondapak HC<sub>18</sub> HA (high carbon load, high activity silica) is a highly carbon-loaded packing that differs in selectivity from that of the standard Bondapak packing materials. The higher carbon load on the silica surface typically results in a higher loading capability. Bondapak HC<sub>18</sub> HA is available in the 37–55  $\mu\text{m}$  particle size.

The Porasil Silica family of packing materials provides a cost-effective means for scaling up to preparative processes.  $\mu$ Porasil 10  $\mu\text{m}$ , Porasil 15–20  $\mu\text{m}$ , and Porasil 37–55  $\mu\text{m}$  can be scaled up to Prep Silica 55–105  $\mu\text{m}$  columns.

## Ordering Information

### μBondapak/Bondapak

C <sub>18</sub> , 125 Å	
ANALYTICAL COLUMNS	
Particle Size: 10 μm	
Dimension	P/N (1/pk)
3.9 × 150 mm	<a href="#">WAT086684</a>
3.9 × 300 mm	<a href="#">WAT027324</a>
4.6 × 150 mm	<a href="#">WAT044370</a>
4.6 × 300 mm	<a href="#">186000925</a>
PREPARATIVE COLUMNS	
Particle Size: 10 μm	
Dimension	P/N (1/pk)
3.9 × 150 mm	<a href="#">WAT086684</a>
3.9 × 300 mm	<a href="#">WAT027324</a>
4.6 × 150 mm	<a href="#">WAT044370</a>
4.6 × 300 mm	<a href="#">186000925</a>
7.8 × 300 mm	<a href="#">WAT084176</a>
19 × 150 mm	<a href="#">WAT088500</a>
19 × 300 mm	<a href="#">WAT025828</a>
Particle Size: 15–20 μm	
3.9 × 150 mm	<a href="#">WAT025875</a>
7.8 × 300 mm	<a href="#">WAT025832</a>
19 × 300 mm	<a href="#">WAT025834</a>

CN, 125 Å	
ANALYTICAL COLUMNS	
Particle Size: 10 μm	
Dimension	P/N (1/pk)
3.9 × 150 mm	<a href="#">WAT086688</a>
3.9 × 300 mm	<a href="#">WAT084042</a>
PREPARATIVE COLUMNS	
Particle Size: 10 μm	
Dimension	P/N (1/pk)
3.9 × 150 mm	<a href="#">WAT086688</a>
3.9 × 300 mm	<a href="#">WAT084042</a>
7.8 × 300 mm	<a href="#">WAT084177</a>


NH <sub>2</sub> , 125 Å	
ANALYTICAL COLUMNS	
Particle Size: 10 μm	
Dimension	P/N (1/pk)
3.9 × 300 mm	<a href="#">WAT084040</a>
PREPARATIVE COLUMNS	
Particle Size: 10 μm	
Dimension	P/N (1/pk)
3.9 × 300 mm	<a href="#">WAT084040</a>
7.8 × 300 mm	<a href="#">WAT084178</a>

Phenyl, 125 Å	
ANALYTICAL COLUMNS	
Particle Size: 10 μm	
Dimension	P/N (1/pk)
3.9 × 150 mm	<a href="#">WAT086680</a>
3.9 × 300 mm	<a href="#">WAT027198</a>
PREPARATIVE COLUMNS	
Particle Size: 10 μm	
Dimension	P/N (1/pk)
3.9 × 150 mm	<a href="#">WAT086680</a>
3.9 × 300 mm	<a href="#">WAT027198</a>
7.8 × 300 mm	<a href="#">WAT084179</a>

### μPorasil/Porasil

μPorasil, 125 Å	
ANALYTICAL COLUMNS	
Particle Size: 10 μm	
Dimension	P/N (1/pk)
3.9 × 300 mm	<a href="#">WAT027477</a>
PREPARATIVE COLUMNS	
Particle Size: 10 μm	
Dimension	P/N (1/pk)
3.9 × 150 mm	<a href="#">WAT086692</a>
3.9 × 300 mm	<a href="#">WAT027477</a>
7.8 × 300 mm	<a href="#">WAT084175</a>
19 × 150 mm	<a href="#">WAT091648</a>
19 × 300 mm	<a href="#">WAT025829</a>

Porasil, 125 Å	
PREPARATIVE COLUMNS	
Particle Size: 15–20 μm	
Dimension	P/N (1/pk)
3.9 × 300 mm	<a href="#">WAT025874</a>
19 × 300 mm	<a href="#">WAT025835</a>

 For μBondapak/Bondapak and μPorasil/Porasil Preparative Columns, please refer to [pages 235–237](#).

## Delta-Pak Preparative Columns

Delta-Pak packing materials are ideal for separating peptides, proteins, and natural products. Isolating and purifying a peptide is usually a multi-step procedure in which fractions from a first run are re-chromatographed on the same preparative column to obtain pure product. Delta-Pak packing materials are based on a highly stable, bonded, end-capped 5 and 15  $\mu\text{m}$  packing. The 5  $\mu\text{m}$  packing is available in analytical-scale dimensions for preliminary preparative chromatographic studies, peptide mapping, and fraction-purity assays. The chemistry characteristics of the packing materials are independent of the particle size.

### Ordering Information

#### Delta-Pak Columns

Delta-Pak C <sub>18</sub> , 300 Å	ANALYTICAL COLUMNS	
	Particle Size: 5 $\mu\text{m}$	
	Dimension	P/N (1/pk)
	3.9 × 150 mm	<a href="#">WAT011793</a>
	PREPARATIVE COLUMNS	
	Particle Size: 15 $\mu\text{m}$	
	Dimension	P/N (1/pk)
	3.9 × 300 mm	<a href="#">WAT011802</a>
	7.8 × 300 mm	<a href="#">WAT011803</a>
	19 × 300 mm	<a href="#">WAT011804</a>
	30 × 300 mm	<a href="#">WAT011805</a>

Delta-Pak C <sub>4</sub> , 300 Å	ANALYTICAL COLUMNS	
	Particle Size: 5 $\mu\text{m}$	
	Dimension	P/N (1/pk)
	3.9 × 150 mm	<a href="#">WAT011794</a>
	PREPARATIVE COLUMNS	
	Particle Size: 15 $\mu\text{m}$	
	Dimension	P/N (1/pk)
	3.9 × 300 mm	<a href="#">WAT011812</a>
	7.8 × 300 mm	<a href="#">WAT011813</a>
	19 × 300 mm	<a href="#">WAT011814</a>
	30 × 300 mm	<a href="#">WAT011815</a>

Delta-Pak C <sub>18</sub> , 100 Å	PREPARATIVE COLUMNS	
	Particle Size: 15 $\mu\text{m}$	
	Dimension	P/N (1/pk)
	3.9 × 300 mm	<a href="#">WAT011797</a>
	7.8 × 300 mm	<a href="#">WAT011798</a>
	19 × 300 mm	<a href="#">WAT011799</a>
	30 × 300 mm	WAT011800
	50 × 300 mm	<a href="#">WAT011801</a>

Delta-Pak C <sub>4</sub> , 100 Å	PREPARATIVE COLUMNS	
	Particle Size: 15 $\mu\text{m}$	
	Dimension	P/N (1/pk)
	3.9 × 300 mm	<a href="#">WAT011807</a>
	7.8 × 300 mm	<a href="#">WAT011808</a>
	19 × 300 mm	<a href="#">WAT011809</a>
	30 × 300 mm	<a href="#">WAT011810</a>

## Preparative Guard Cartridge Holders

### Ordering Information

#### Purification and Isolation Cartridge Holders

Description	P/N
7.8 × 10 mm Cartridge Holder	<a href="#">186000708</a>
10 × 10 mm Cartridge Holder	<a href="#">289000779</a>
19 × 10 mm Cartridge Holder	<a href="#">186000709</a>
30 × 10 mm Prep Guard Holder	<a href="#">186006912</a>
Replacement O-ring 7.8 mm, 2/pk	<a href="#">700001019</a>
Replacement O-ring 10 mm, 2/pk	<a href="#">700001436</a>
Replacement O-ring 19 mm, 2/pk	<a href="#">700001020</a>
Replacement O-ring 30 mm, 2/pk	<a href="#">186007012</a>

19 × 10 mm and 30 × 10 mm Prep Guard Holder and Cartridge



## Preparative Standards

### HOW DO YOU KNOW YOUR CHROMATOGRAPHIC SYSTEM IS IN PROPER WORKING ORDER?

Quality Control Reference Materials (QC Reference Materials) contain mixtures of standards specifically chosen to provide an easy and reliable way to monitor the performance of any chromatographic system. Using a QC Reference Material, you can be assured that your column and system are ready to analyze your samples. Regular use of QC Reference Materials also provides an opportunity to benchmark your chromatographic systems and trend performance over time, making it easier to proactively identify problems and resolve them faster.

#### Literature References


Title	Literature Code
Quality Control Reference Material and Benchmarking Instrument Performance white paper	<a href="#">720004535EN</a>
Troubleshooting Common System Problems Using Waters Neutrals Quality Control Reference Material application note	<a href="#">720004635EN</a>

Chromatographic analyses are inherently complex. Variables such as mobile-phase composition, column type, and detection method influence their outcome. Waters has formulated specific QC Reference Material mixtures that account for these variables while testing the performance of chromatographic columns and systems.

#### Ordering Information

##### Quality Control Reference Materials

Product Name	Intended Use	Chromatographic Mode	Systems	Contents	P/N
Preparative Chromatography Mix Standard	Provides chromatographic performance information inclusive of mobile-phase pH using one void marker, one acidic, one basic, and one neutral probes.	Reversed-phase	All Purification Systems	<b>5 mg/mL each:</b> Diclofenac sodium salt, diphenhydramine hydrochloride, flavone in a 1 mL solution of DMSO. Store at room temperature.	<a href="#">186006703</a>
AutoPurification System Standard	Tests the performance of fraction collectors, both UV and MS directed, using three dyes.	Reversed-phase	All Purification Systems with Fraction Collectors	<b>3 ampoules of test mix containing:</b> 2500 µg/mL thionin, 3000 µg/mL thioflavin, 2500 µg/mL crystal violet in a 10 mL solution of 25/75 water/methanol. Store at room temperature.	<a href="#">716000765</a>

 For details about standards specific to calibration, qualification, and the tuning of instruments (as well as a more comprehensive listing of standards and reagents), consult the Analytical Standards and Reagents e-Catalog at [asr.waters.com](http://asr.waters.com).

## Preparative Bulk Material

Waters offers various kinds of bulk packing materials for lab-to-process-scale purifications. All are manufactured in accordance with our ISO 9001-certified manufacturing processes, ensuring long-term reproducible material.

Bulk materials are available packaged in quantities of 100 g to 25 kg. For larger quantity purchases, inquire about pricing and availability.

### Ordering Information

#### Reversed-Phase Bulk Packings

	Particle Size: 10 µm	
	Qty.	P/N
<b>XBridge BEH C<sub>18</sub>, 130 Å</b>	1 kg	186008658

<b>SunFire C<sub>18</sub>, 100 Å</b>	1 kg	186007650
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	Particle Size: 15–20 µm	
<b>Bondapak C<sub>18</sub>, 125 Å</b>	100 g	WAT020739
	1 kg	WAT020740
	5 kg	WAT020741
	Particle Size: 37–55 µm	
	100 g	WAT030632
	1 kg	WAT030633
	5 kg	WAT030634

	Particle Size: 37–55 µm	
<b>Bondapak HC<sub>18</sub> HA, 125 Å</b>	100 g	<a href="#">WAT035672</a>
	1 kg	WAT035674
	5 kg	WAT035676

	Particle Size: 55–105 µm	
<b>Prep C<sub>18</sub>, 125 Å</b>	100 g	WAT020594
	1 kg	<a href="#">WAT010001</a>
	5 kg	WAT020595
	25 kg	WAT020596

#### Normal-Phase Bulk Packings

	Particle Size: 10 µm	
	Qty.	P/N
<b>µPorasil Silica, 125 Å</b>	5 kg	186005791

	Particle Size: 15–20 µm	
<b>Porasil Silica, 125 Å</b>	100 g	WAT020731
	1 kg	WAT020732
	5 kg	WAT020733
	25 kg	WAT020734

	Particle Size: 37–55 µm	
	100 g	WAT020721
	1 kg	WAT020722
	5 kg	WAT020723
	25 kg	WAT020724

	Particle Size: 55–105 µm	
<b>Prep Silica, 125 Å</b>	100 g	WAT020587
	1 kg	WAT010004
	5 kg	WAT020588
	25 kg	WAT020589



## Gas Chromatography Packings

Versatile PoraPak gas chromatography column packing materials simplify the analysis of many complex compounds, from atmospheric gases to organics. Consisting of polymer beads, these unique packings are chemically and physically stable. Consistent particle size, porosity, and surface area ensure analytical reproducibility. The columns also provide unequalled separation capability with high resolution and low, constant retention volumes.

### VERSATILITY FOR SPECIALTY APPLICATIONS

To optimize separation of even the most complex matrices, PoraPak packing materials offer several physical and chemical variations.

Special characteristics of Waters' unique GC packings include:

- Fast analysis, with compounds eluting in distinctive bands with no tailing
- The ability to sustain elevated temperatures, permitting temperature programming without adverse effects to retention, reproducibility, and column life
- The ability to accommodate large sample loads required for preparative and trace analysis while maintaining characteristically high column efficiency

### Ordering Information

#### GC PoraPak Porous Polymer Packing

Type	Polarity	Surface Area (m <sup>2</sup> /g)	Density (g/cm <sup>3</sup> )	Single Temp. Program	Particle Size Mesh	Qty.	P/N
P	Nonpolar	100-200	0.26	250 °C	50-80	20 g	<a href="#">WAT027053</a>
					80-100	20 g	<a href="#">WAT027054</a>
					100-120	20 g	<a href="#">WAT027055</a>
PS	Nonpolar	100-200	0.26	250 °C	50-80	20 g	<a href="#">WAT027083</a>
					80-100	20 g	<a href="#">WAT027084</a>
					100-120	20 g	<a href="#">WAT027085</a>
Q	Slightly nonpolar to moderate	500-600	0.34	250 °C	50-80	26 g	<a href="#">WAT027059</a>
					80-100	26 g	<a href="#">WAT027060</a>
					100-120	26 g	<a href="#">WAT027061</a>
QS	Slightly nonpolar to moderate	500-600	0.34	250 °C	50-80	26 g	<a href="#">WAT027089</a>
					80-100	26 g	<a href="#">WAT027090</a>
					100-120	26 g	<a href="#">WAT027091</a>
R	Moderate polar monomer: vinyl pyrrolidone	450-600	0.32	250 °C	50-80	24 g	<a href="#">WAT027065</a>
					80-100	24 g	<a href="#">WAT027066</a>
					100-120	24 g	<a href="#">WAT027067</a>
S	Moderate polar monomer: vinyl pyridine	300-450	0.35	250 °C	50-80	26 g	<a href="#">WAT027071</a>
					80-100	26 g	<a href="#">WAT027072</a>
					100-120	26 g	<a href="#">WAT027073</a>
N	Polar monomer: vinyl pyrrolidone	250-350	0.41	190 °C	50-80	29 g	<a href="#">WAT027047</a>
					80-100	29 g	<a href="#">WAT027048</a>
					100-120	29 g	<a href="#">WAT027049</a>
T	Highly polar monomer: ethyleneglycol dimethacrylate	225-350	0.39	190 °C	50-80	31 g	<a href="#">WAT027077</a>
					80-100	31 g	<a href="#">WAT027078</a>
					100-120	31 g	<a href="#">WAT027079</a>

## Radial Compression Module Products

We carry a complete inventory of accessories and spare parts for Waters' patented radial compression modules for use with the 5 mm and 8 mm I.D. Radial-Pak Column segments, the 25 mm and 40 mm I.D. PrepLC Column segments, and the 47 mm I.D. PrepPak Cartridges.

### Ordering Information



8 x 100 Cartridge Holder (p/n: [WAT082887](#)) for 8 x 100 mm and 5 x 100 mm Radial-Pak Column Segments.

#### 8 x 100 Cartridge Holder, Parts, and Accessories

Description	P/N
8 x 100 Cartridge Holder	<a href="#">WAT082887</a>
8 x 100 Extension Kit (Includes one Extension Tube, Union, O-Rings)	<a href="#">WAT038846</a>
Column Segment Union	<a href="#">WAT038849</a>
O-Ring for Extension Tube	<a href="#">WAT038851</a>
Connector Tubing Assembly (Non Metallic)	<a href="#">WAT088919</a>
Connector Assembly (Stainless Steel)	<a href="#">WAT082892</a>
Washer for Connectors, 10/pk	<a href="#">WAT005147</a>
Pressure Relief Plug	WAT088027
Check Valve	<a href="#">WAT082888</a>
O-Ring (Large) for Connector, 10/pk	<a href="#">WAT005130</a>
O-Ring (Small) for Connector (Normal Phase), 4/pk	<a href="#">WAT015797</a>
O-Ring (Small) for Connector (Reversed Phase), 10/pk	<a href="#">WAT005129</a>
O-Ring for Filling Port, 10/pk	<a href="#">WAT005129</a>
O-Ring for Pressure Piston	<a href="#">WAT088494</a>
Gripper Ring Replacement Kit (Includes 10 Gripper Rings, 20 Washers, 10 Ferrules, and Tool)	<a href="#">WAT021908</a>

\*All column segments and cartridges require the appropriate holder/module.



(p/n: [WAT015814](#))

#### PrepLC 25 mm Module, Parts, and Accessories

Description	P/N
PrepLC 25 mm Module	<a href="#">WAT015814</a>
PrepLC 25 mm Extension Kit (Includes one Extension Tube, Union, O-Rings)	<a href="#">WAT022180</a>
Extension Tube	WAT019311
O-Ring for Extension Tube	<a href="#">WAT015831</a>
O-Ring (Large) for Connector	<a href="#">WAT015833</a>
O-Ring (Small) for Connector (Normal Phase)	<a href="#">WAT015848</a>
O-Ring (Small) for Connector (Reversed Phase)	<a href="#">WAT015834</a>
O-Ring for Filling Port, 10/pk	<a href="#">WAT005129</a>
O-Ring for Pressure Piston	<a href="#">WAT015854</a>
Union Coupling Assembly	<a href="#">WAT015860</a>
Union, 1/8" to 1/16" Tubing, 5/pk	<a href="#">WAT005137</a>

\*All column segments and cartridges require the appropriate holder/module.

### PrepLC Assemblies

Description	P/N
PrepLC 40 mm Assembly (Includes PrepLC Universal Base and PrepLC 40 mm Chamber)	<a href="#">WAT022441</a>
PrepLC Universal Base	<a href="#">WAT027577</a>
PrepLC 40 mm Chamber (Includes O-Rings, Spacer, and Union)	<a href="#">WAT027578</a>
PrepLC 40 mm Extension Kit (Includes Extension Tube, Union, and O-Rings)	<a href="#">WAT022365</a>
PrepLC 25 mm Chamber (Includes O-Rings, Spacer, and Union)	<a href="#">WAT033994</a>
PrepLC 25 mm Extension Kit (Includes one Extension Tube, Union, and O-Rings)	<a href="#">WAT022180</a>
PrepLC Scale-Up Kit with Capability for 40 mm or 25 x 300 mm Length	
Includes: One - PrepLC Universal Base Two - PrepLC Chambers (One each of 40 mm and 25 mm) Two - PrepLC 25 mm Extension Kits Two - PrepLC 40 mm Extension Kits	<a href="#">WAT022440</a>

#### PrepLC Assembly 40 x 100 mm



(p/n: [WAT022440](#))

## PrepLC Spare Parts

Description	P/N
<b>PrepLC Universal Base Spare Parts</b>	
O-Ring Removal Tool	<a href="#">WAT082853</a>
O-Ring for Pressure Piston	<a href="#">WAT022281</a>
O-Ring for Filling Port	<a href="#">WAT005129</a>
Filling Port Plug	<a href="#">WAT027509</a>
Ferrules and Compression Fittings (Stainless Steel), 5/pk	<a href="#">WAT025604</a>
<b>PrepLC 40 mm Chamber Spare Parts</b>	
Column Segment Union	<a href="#">WAT033996</a>
Cartridge Spacer	<a href="#">WAT033997</a>
O-Ring, Base Plate (Small)	<a href="#">WAT022453</a>
O-Ring, Base Plate (Large)	<a href="#">WAT022454</a>
O-Ring, Chamber Top	<a href="#">WAT022280</a>
O-Ring (Normal Phase) Cartridge, Top and Bottom, Spacers, and Unions	<a href="#">WAT027519</a>
O-Ring (Reversed Phase) Cartridge, Top and Bottom, Spacers, and Unions	<a href="#">WAT027518</a>
O-Ring (Reversed Phase) Chamber, Bottom	<a href="#">WAT022283</a>
O-Ring (Reversed Phase) Inner Connector, Top and Bottom	<a href="#">WAT015835</a>
O-Ring, Extension Tube	<a href="#">WAT022454</a>
<b>PrepLC 25 mm Chamber Spare Parts</b>	
Column Segment Union	<a href="#">WAT015860</a>
Segment Spacer	<a href="#">WAT015859</a>
O-Ring, Base Plate (Small)	<a href="#">WAT022276</a>
O-Ring, Base Plate (Large)	<a href="#">WAT015831</a>
O-Ring, Chamber Top	<a href="#">WAT015833</a>
O-Ring (Normal Phase) Cartridge Top and Bottom, Spacers, and Unions	<a href="#">WAT015848</a>
O-Ring (Reversed Phase) Cartridge, Top and Bottom, Spacers, and Union	<a href="#">WAT015834</a>
O-Ring (Reversed Phase) Chamber Bottom	<a href="#">WAT022282</a>
O-Ring (Reversed Phase) Inner Connector, Top and Bottom	<a href="#">WAT015835</a>
Tubing Fluid Path Kit* (PEEK) (Includes Inner Connectors, Tubing, Ferrules, and Compression Screws)	<a href="#">WAT022400</a>

\*For applications where a metal-free flow path is needed.

## PrepPak Cartridges\*

Particle Size: 15-20 µm		
	Dimension	P/N
Bondapak C <sub>18</sub> , 125 Å	47 × 300 mm	<a href="#">WAT091784</a>
Bondapak C <sub>18</sub> , 300 Å	47 × 300 mm	<a href="#">WAT038571</a>
Particle Size: 37-55 µm		
Bondapak HC <sub>18</sub> HA, 125 Å	47 × 300 mm	<a href="#">WAT038570</a>
Particle Size: 55-105 µm		
Bondapak NH <sub>2</sub> , 125 Å	47 × 300 mm	<a href="#">WAT091631</a>
Particle Size: 15 µm		
Delta-Pak C <sub>18</sub> , 100 Å	47 × 300 mm	<a href="#">WAT015401</a>
Delta-Pak C <sub>18</sub> , 300 Å	47 × 300 mm	<a href="#">WAT010988</a>
Particle Size: 15 µm		
Delta-Pak C <sub>4</sub> , 100 Å	47 × 300 mm	<a href="#">WAT011633</a>
Delta-Pak C <sub>4</sub> , 300 Å	47 × 300 mm	<a href="#">WAT011669</a>
Particle Size: 55-105 µm		
Prep C <sub>18</sub> , 125 Å	47 × 300 mm	<a href="#">WAT025876</a>
Particle Size: 37-55 µm		
Porasil Silica, 125 Å (1/pk)	47 × 300 mm	<a href="#">WAT025853</a>
Particle Size: 37-55 µm		
Porasil Silica, 125 Å (10/pk)	47 × 300 mm	<a href="#">WAT025877</a>
PrepPak 1000 Module for 47 × 300 mm PrepPak Cartridges		<a href="#">WAT089592</a>

\*All column segments and cartridges require the appropriate holder/module, see [page 305](#).

## Resolve Radial Compression Column Segments and PrepPak Cartridges\*

Particle Size: 5 µm		
	Dimension	P/N
C <sub>18</sub> , 90 Å	8 × 100 mm	<a href="#">WAT0846241</a>
Particle Size: 10 µm		
	5 × 100 mm	<a href="#">WAT084620</a>
	8 × 100 mm	<a href="#">WAT084720</a>
Particle Size: 10 µm		
C <sub>8</sub> , 90 Å	5 × 100 mm	<a href="#">WAT085672</a>
	8 × 100 mm	<a href="#">WAT085670</a>

\*Requires 8 × 100 Cartridge Holder, p/n: [WAT082887](#).

## Delta-Pak Radial Compression Column Segments and PrepPak Cartridges\*



Particle Size: 15 µm			
	Dimension	Type	P/N
Delta-Pak C <sub>18</sub> , 100 Å	8 × 100 mm	Column	<a href="#">WAT025846</a>
	25 × 10 mm	Guard, 2/pk	<a href="#">WAT038520</a>
	25 × 100 mm	Column	<a href="#">WAT038506</a>
	40 × 10 mm	Guard, 2/pk	<a href="#">WAT037842</a>
	40 × 100 mm	Column	<a href="#">WAT037688</a>
Delta-Pak C <sub>18</sub> , 300 Å	8 × 100 mm	Column	<a href="#">WAT025845</a>
	25 × 10 mm	Guard, 2/pk	<a href="#">WAT038522</a>
	25 × 100 mm	Column	<a href="#">WAT038507</a>
	40 × 10 mm	Guard, 2/pk	<a href="#">WAT037845</a>
	40 × 100 mm	Column	<a href="#">WAT037692</a>
Delta-Pak C <sub>4</sub> , 100 Å	8 × 100 mm	Column	<a href="#">WAT025848</a>
	25 × 10 mm	Guard, 2/pk	<a href="#">WAT038524</a>
	25 × 100 mm	Column	<a href="#">WAT038508</a>
	40 × 100 mm	Column	<a href="#">WAT037696</a>
Delta-Pak C <sub>4</sub> , 300 Å	25 × 100 mm	Column	<a href="#">WAT038509</a>
	25 × 10 mm	Guard, 2/pk	<a href="#">WAT038526</a>
	40 × 10 mm	Guard, 2/pk	<a href="#">WAT037851</a>
	40 × 100 mm	Column	<a href="#">WAT037700</a>

\*All column segments and cartridges require the appropriate holder/module, see [page 305](#).

Particle Size: 5 µm		
	Dimension	P/N
Silica, 90 Å	8 × 100 mm	<a href="#">WAT084634</a>
Particle Size: 10 µm		
	5 × 100 mm	<a href="#">WAT084630</a>
	8 × 100 mm	<a href="#">WAT084730</a>
Particle Size: 10 µm		
CN, 90 Å	5 × 100 mm	<a href="#">WAT084626</a>
	8 × 100 mm	<a href="#">WAT084636</a>

## Nova-Pak and Prep Nova-Pak Radial Compression Column Segments and PrepPak Cartridges

Nova-Pak Radial-Pak Column Segments*		Particle Size: 4 µm
	Dimension	P/N
C <sub>18</sub> , 60 Å	5 × 100 mm	<a href="#">WAT080100</a>
	8 × 100 mm	<a href="#">WAT086342</a>
C <sub>8</sub> , 60 Å	5 × 100 mm	<a href="#">WAT035890</a>
	8 × 100 mm	<a href="#">WAT035884</a>
Phenyl, 60 Å	5 × 100 mm	<a href="#">WAT010657</a>
	8 × 100 mm	<a href="#">WAT010658</a>
CN HP, 60 Å	5 × 100 mm	<a href="#">WAT010224</a>
	8 × 100 mm	<a href="#">WAT010223</a>
Silica, 60 Å	5 × 100 mm	<a href="#">WAT010986</a>
	8 × 100 mm	<a href="#">WAT010987</a>

\*Requires 8 × 100 mm Cartridge Holder, p/n: [WAT082887](#).

Prep Nova-Pak HR Radial-Pak Column Segments		Particle Size: 6 µm
C <sub>18</sub> , 60 Å	8 × 100 mm	<a href="#">WAT025843</a>
Silica, 60 Å	8 × 100 mm	<a href="#">WAT025844</a>

Prep Nova-Pak HR PrepLC 25 mm Column Segments		Particle Size: 6 µm
C <sub>18</sub> , 60 Å	25 × 100 mm	<a href="#">WAT038510</a>
Silica, 60 Å	25 × 100 mm	<a href="#">WAT038511</a>

Prep Nova-Pak HR 25 × 10 Guard-Pak Inserts, 2/pk		Particle Size: 6 µm
C <sub>18</sub> , 60 Å	25 × 10 mm	<a href="#">WAT038528</a>
Silica, 60 Å	25 × 10 mm	WAT038530

Prep Nova-Pak HR PrepLC 40 mm Column Segments		Particle Size: 6 µm
C <sub>18</sub> , 60 Å	40 × 100 mm	<a href="#">WAT037704</a>

Prep Nova-Pak HR 40 × 10 Guard-Pak Inserts, 2/pk		Particle Size: 6 µm
C <sub>18</sub> , 60 Å	40 × 10 mm	<a href="#">WAT037854</a>
Silica, 60 Å	40 × 10 mm	<a href="#">WAT037857</a>



# SFC Analytical and Preparative Columns

# Contents

<b>Torus, Trefoil, and Viridis Columns for Achiral and Chiral SFC Separations.....</b>	<b><a href="#">311</a></b>
<b>Torus Columns for Achiral SFC Separations.....</b>	<b><a href="#">312</a></b>
Torus 2-PIC (2-Picolylamine) .....	<a href="#">313</a>
Torus DEA (Diethylamine).....	<a href="#">313</a>
Torus DIOL (High-Density Diol) .....	<a href="#">313</a>
Torus 1-AA (1-Aminoanthracene).....	<a href="#">313</a>
<b>Torus Preparative Achiral SFC Columns .....</b>	<b><a href="#">315</a></b>
<b>ACQUITY UPC2 System: Quality Control Reference Materials .....</b>	<b><a href="#">316</a></b>
How Do You Know Your Chromatographic System is Operating Properly? .....	<a href="#">317</a>
<b>Trefoil Columns for Chiral SFC Separations .....</b>	<b><a href="#">318</a></b>
Transfer Normal-Phase Methods to Convergence Chiral Methods.....	<a href="#">318</a>
<b>Viridis Columns .....</b>	<b><a href="#">320</a></b>
Viridis Hybrid and HSS SFC Columns.....	<a href="#">320</a>
Viridis Silica-Based SFC Columns .....	<a href="#">320</a>

# Supercritical Fluid Chromatography (SFC) Analytical and Preparative Columns

## Torus, Trefoil, and Viridis Columns for Achiral and Chiral SFC Separations

The Torus, Trefoil,™ and Viridis™ Column Chemistries, combined with Waters SFC Instrumentation, will enable separation scientists to better access the alternate selectivity of normal-phase chromatography with the ease and reliability of reversed-phase chromatography. These high quality achiral and chiral SFC column chemistries provide the ability to handle achiral and chiral separations deliver novel selectivity and robustness with unequaled speed and unparalleled confidence.



### Column Characteristics

Column	Particle Shape	Particle Size	Pore Volume	Pore Size	Surface Area	Carbon Load	Chemistry
<b>Torus Analytical and Preparative Achiral SFC Columns</b>							
Torus 2-PIC	Spherical	1.7, 5 μm	0.7 cc/g	130 Å	185 m <sup>2</sup> /g	—	2-Picolylamine
Torus DEA	Spherical	1.7, 5 μm	0.7 cc/g	130 Å	185 m <sup>2</sup> /g	—	Diethylamine
Torus DIOL	Spherical	1.7, 5 μm	0.7 cc/g	130 Å	185 m <sup>2</sup> /g	—	High density diol
Torus 1-AA	Spherical	1.7, 5 μm	0.7 cc/g	130 Å	185 m <sup>2</sup> /g	—	1-Aminoanthracene
<b>Trefoil Analytical Chiral SFC Column</b>							
Trefoil AMY1	Spherical	2.5 μm	—	—	—	—	Amylose tris-(3, 5-dimethylphenylcarbamate)
Trefoil CEL1	Spherical	2.5 μm	—	—	—	—	Cellulose tris-(3, 5-dimethylphenylcarbamate)
Trefoil CEL2	Spherical	2.5 μm	—	—	—	—	Cellulose tris-(3-chloro-4-methylphenylcarbamate)
<b>Viridis Analytical and Preparative Achiral SFC Columns</b>							
Viridis BEH	Spherical	1.7, 3.5, 5 μm	0.7 cc/g	130 Å	185 m <sup>2</sup> /g	N/A	Unbonded
Viridis BEH 2-EP	Spherical	1.7, 3.5, 5 μm	0.7 cc/g	130 Å	185 m <sup>2</sup> /g	9%	2-Ethylpyridine
Viridis CSH Fluoro-Phenyl	Spherical	1.7, 3.5, 5 μm	0.7 cc/g	130 Å	185 m <sup>2</sup> /g	10%	CSH fluoro-phenyl
Viridis HSS C <sub>18</sub> SB	Spherical	1.8, 3.5 μm	0.7 cc/g	100 Å	230 m <sup>2</sup> /g	8.5%	C <sub>18</sub>
Viridis Silica	Spherical	5 μm	0.9 cc/g	100 Å	340 m <sup>2</sup> /g	N/A	Unbonded
Viridis Silica 2-EP	Spherical	5 μm	0.9 cc/g	100 Å	340 m <sup>2</sup> /g	8%	2-Ethylpyridine

The use of compressed liquid CO<sub>2</sub> as the primary mobile phase in convergence chromatography unleashes the powerful orthogonal capability of normal-phase separations. Gradient separations performed across the widest polarity range bring the full detection capabilities of mass spectrometry into everyday use as a mainstream technique. You can now separate most compounds and mixtures soluble in organic solvents and, in addition, separate structural analogs, isomers, and enantiomeric and diastereomeric mixtures—all of which are notoriously difficult to separate by other means.



## Torus Columns for Achiral SFC Separations



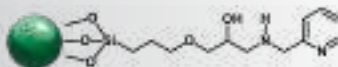
Torus Columns offer:

- Excellent peak shapes
- A wide range of unique selectivities with unique ligands
- Highest efficiency and QC-ready robustness
- Waters OBD Technology

Torus Columns are designed for achiral SFC separations, offer a wide range of selectivity, excellent peak shape, and are ideally suited for method transfer and method scale-up. Torus Columns are offered in 1.7 and 5  $\mu\text{m}$  chemistries in both analytical and preparative column formats.

The Torus Phases are based on patented two-stage functionalization of ethylene bridged hybrid (BEH) particles. The initial bonding provides a hydrophilic surface that controls the retention characteristics of the sorbent, and is responsible for minimizing unwanted surface interactions, which lead to retention and selectivity changes over time. The second step of the functionalization is responsible for the individual selectivity and peak shape characteristics of each of the Torus Chemistries. The results of these steps are a series of stationary phases with broad ranging selectivities, which maintain robust chromatographic performance over the lifetime of the column.

Torus 2-PIC, 1.7 and 5  $\mu\text{m}$  Columns  
2-Picolylamine



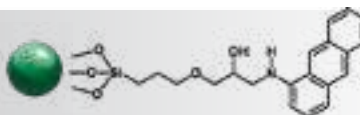
Torus DEA, 1.7 and 5  $\mu\text{m}$  Columns  
Diethylamine



Torus DIOL, 1.7 and 5  $\mu\text{m}$  Columns  
High Density Diol

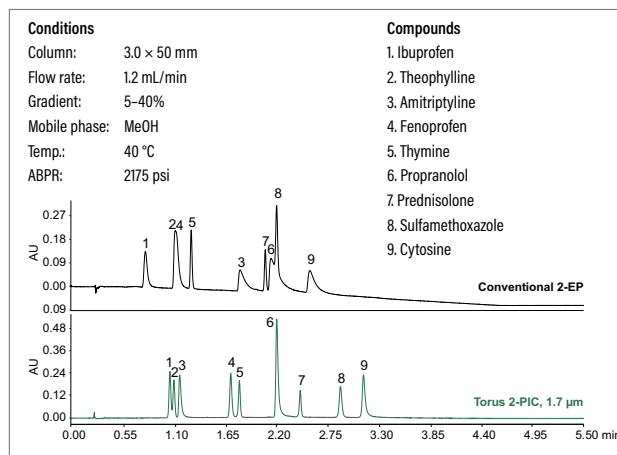


Torus 1-AA, 1.7 and 5  $\mu\text{m}$  Columns  
1-Aminoanthracene



## TORUS 2-PIC (2-PICOLYLAMINE)

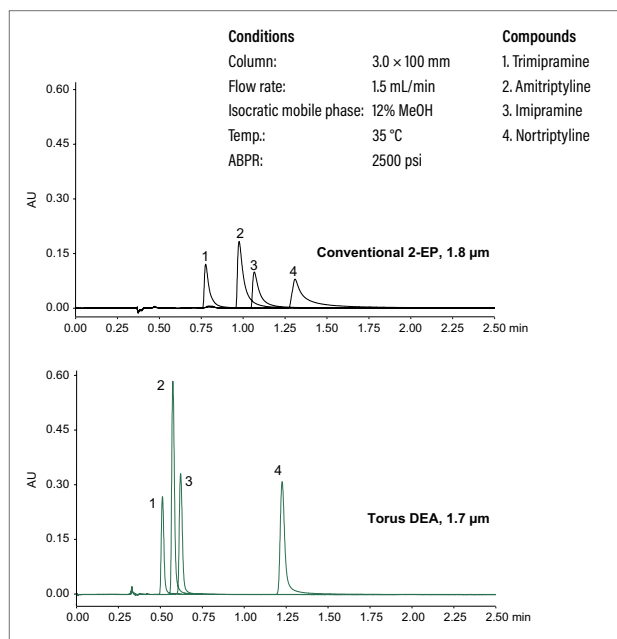
Torus 2-PIC Columns were designed for general use and are the first choice for a wide range of applications with acidic and basic compounds. The Torus 2-PIC phase demonstrates enhanced performance compared to conventional 2-ethylpyridine (2-EP), displaying improved peak shape, added retention, and novel selectivity.



*Torus 2-PIC has excellent peak shape characteristics for wide ranges of acidic and basic compounds.*

## TORUS DEA (DIETHYLAMINE)

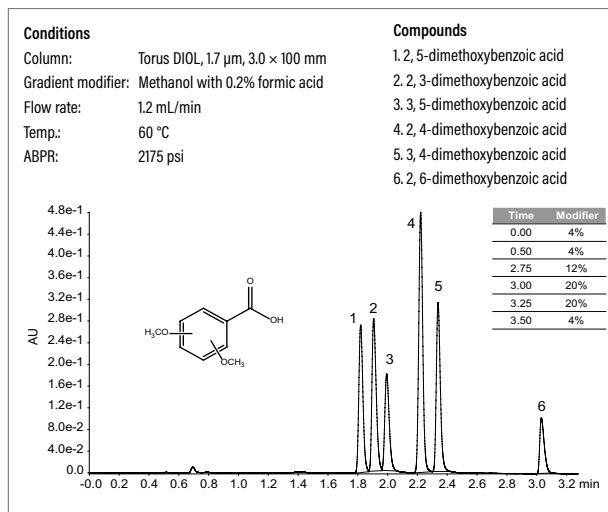
Torus DEA Columns are designed to be orthogonal to the Torus 2-PIC phase. Designed to provide superior peak shape for very strong bases, these columns provide a complementary selectivity to the 2-PIC stationary phase.



*Torus DEA exhibits excellent peak shape for strong basic compounds when compared to a silica 2-EP column.*

## TORUS DIOL (HIGH-DENSITY DIOL)

Torus DIOL Columns were developed to provide additional selectivity choices. High-density diol surface bonding offers chromatography performance similar to that of traditional, unbonded silica phases, and adds overall method robustness when utilized with additives.



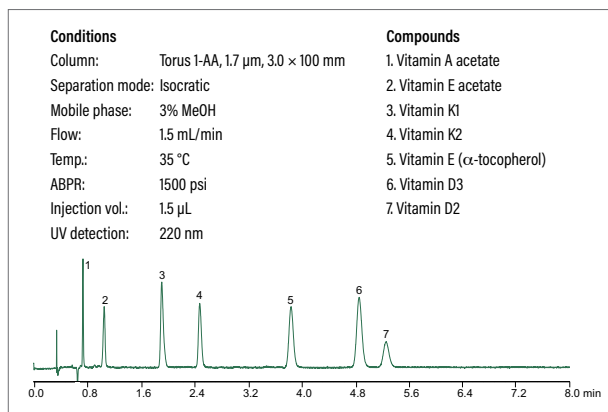
*Torus DIOL Columns show good peak shapes for acidic compounds, as demonstrated by the separation of six isomeric forms of dimethoxybenzoic acid.*

## TORUS 1-AA (1-AMINOANTHRACENE)

Torus 1-AA Columns are designed to be the superior choice for separating neutral compounds such as polar and non-polar steroids, and hydrophobic compounds such as lipids and fat-soluble vitamins. This chemistry also provides an orthogonal selectivity to the 2-PIC phase, making it very useful in method development.

Torus 1-AA Columns are best used for:


- Hydrophobic (lipophilic) compounds
- Free fatty acids
- Fat-soluble vitamins
- Lipids
- Natural products
- Steroids



*Torus 1-AA Column shows good peak shape and resolution of fat-soluble vitamins.*

## Torus Columns for Achiral Method Development

For method development, it is crucial to have a series of columns that have significantly differing selectivities and good retentivity. The Torus Chemistries were specifically chosen to provide a breadth of selectivities for acids, bases, and neutral analytes. For more information on achiral SFC method development, visit [waters.com/torus](https://waters.com/torus) and view the webcast titled "Torus Columns for Achiral Method Development".

 Visit [waters.com/torus](https://waters.com/torus)

### Ordering Information

#### Torus Analytical Columns

Dimension	Particle Size: 1.7 µm			
	P/N	P/N	P/N	P/N
	2-PIC	DEA	DIOL	1-AA
VanGuard Pre-column, 2.1 × 5 mm, 3/pk	<a href="#">186007604</a>	<a href="#">186007622</a>	<a href="#">186007613</a>	<a href="#">186007631</a>
2.1 × 50 mm	<a href="#">186007596</a>	<a href="#">186007614</a>	<a href="#">186007605</a>	<a href="#">186007623</a>
2.1 × 75 mm	<a href="#">186007597</a>	<a href="#">186007615</a>	<a href="#">186007606</a>	<a href="#">186007624</a>
2.1 × 100 mm	<a href="#">186007598</a>	<a href="#">186007616</a>	<a href="#">186007607</a>	<a href="#">186007625</a>
2.1 × 150 mm	<a href="#">186007599</a>	<a href="#">186007617</a>	<a href="#">186007608</a>	<a href="#">186007626</a>
3.0 × 50 mm	<a href="#">186007600</a>	<a href="#">186007618</a>	<a href="#">186007609</a>	<a href="#">186007627</a>
3.0 × 75 mm	<a href="#">186007601</a>	<a href="#">186007619</a>	<a href="#">186007610</a>	<a href="#">186007628</a>
3.0 × 100 mm	<a href="#">186007602</a>	<a href="#">186007620</a>	<a href="#">186007611</a>	<a href="#">186007629</a>
3.0 × 150 mm	<a href="#">186007603</a>	<a href="#">186007621</a>	<a href="#">186007612</a>	<a href="#">186007630</a>

Dimension	Particle Size: 5 µm			
	P/N	P/N	P/N	P/N
2.1 × 150 mm	<a href="#">186008543</a>	<a href="#">186008563</a>	<a href="#">186008554</a>	<a href="#">186008572</a>
3.0 × 50 mm	<a href="#">186008544</a>	<a href="#">186008564</a>	<a href="#">186008555</a>	<a href="#">186008573</a>
3.0 × 100 mm	<a href="#">186008545</a>	<a href="#">186008565</a>	<a href="#">186008556</a>	<a href="#">186008574</a>
3.0 × 150 mm	<a href="#">186008546</a>	<a href="#">186008566</a>	<a href="#">186008557</a>	<a href="#">186008575</a>
3.0 × 250 mm	<a href="#">186008549</a>	<a href="#">186008567</a>	<a href="#">186008558</a>	<a href="#">186008576</a>
4.6 × 50 mm	<a href="#">186008550</a>	<a href="#">186008568</a>	<a href="#">186008559</a>	<a href="#">186008577</a>
4.6 × 100 mm	<a href="#">186008551</a>	<a href="#">186008569</a>	<a href="#">186008560</a>	<a href="#">186008578</a>
4.6 × 150 mm	<a href="#">186008552</a>	<a href="#">186008570</a>	<a href="#">186008561</a>	<a href="#">186008579</a>
4.6 × 250 mm	<a href="#">186008553</a>	<a href="#">186008571</a>	<a href="#">186008562</a>	<a href="#">186008580</a>

#### Torus Column Method Development Kits

Dimension	Particle Size: 1.7 µm
	P/N
Torus Column Screening Kit, 2.1 × 50 mm (2-PIC, DEA, DIOL, 1-AA), 4/pk	<a href="#">176003579</a>
Torus Column Method Development Kit, 3.0 × 100 mm (2-PIC, DEA, DIOL, 1-AA), 4/pk	<a href="#">176003580</a>

## Torus Preparative Achiral SFC Columns

Combining state-of-the-art media manufacturing with industry-leading column technology, Torus Achiral Columns impart a new level of robustness to laboratory-scale purification.

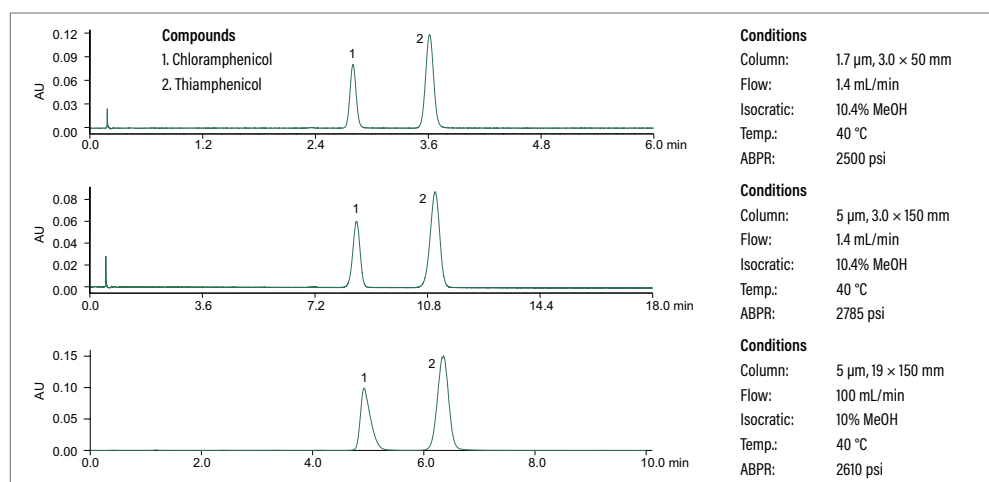
You can base a scale up of screening methods on any of the four Torus analytical column chemistries to perform 5  $\mu$ m Torus Preparative SFC Separations.

Torus 2-PIC 1.7  $\mu$ m Columns → Torus 2-PIC 5  $\mu$ m Preparative Columns

Torus DEA 1.7  $\mu$ m Columns → Torus DEA 5  $\mu$ m Preparative Columns

Torus DIOL 1.7  $\mu$ m Columns → Torus DIOL 5  $\mu$ m Preparative Columns

Torus 1-AA 1.7  $\mu$ m Columns → Torus 1-AA 5  $\mu$ m Preparative Columns



*Scale up of an analytical method from a Torus 2-PIC, 1.7  $\mu$ m Column of two closely related antibiotics, chloramphenicol and thiamphenicol, to a Torus 2-PIC, 5  $\mu$ m, Preparative Column.*

## Ordering Information

### Torus OBD Preparative Columns

Dimension	Particle Size: 5 $\mu$ m			
	P/N 2-PIC	P/N DIOL	P/N DEA	P/N AA
OBD 10 $\times$ 50 mm	<a href="#">186008581</a>	<a href="#">186008598</a>	<a href="#">186008615</a>	<a href="#">186008632</a>
OBD 10 $\times$ 100 mm	<a href="#">186008582</a>	<a href="#">186008599</a>	<a href="#">186008616</a>	<a href="#">186008633</a>
OBD 10 $\times$ 150 mm	<a href="#">186008583</a>	<a href="#">186008600</a>	<a href="#">186008617</a>	<a href="#">186008634</a>
OBD 10 $\times$ 250 mm	<a href="#">186008584</a>	<a href="#">186008601</a>	<a href="#">186008618</a>	<a href="#">186008635</a>
19 $\times$ 10 mm Guard Cartridge*	<a href="#">186008741</a>	<a href="#">186008742</a>	<a href="#">186008743</a>	<a href="#">186008744</a>
OBD 19 $\times$ 50 mm	<a href="#">186008585</a>	<a href="#">186008602</a>	<a href="#">186008619</a>	<a href="#">186008636</a>
OBD 19 $\times$ 100 mm	<a href="#">186008586</a>	<a href="#">186008603</a>	<a href="#">186008620</a>	<a href="#">186008637</a>
OBD 19 $\times$ 150 mm	<a href="#">186008587</a>	<a href="#">186008604</a>	<a href="#">186008621</a>	<a href="#">186008638</a>
OBD 19 $\times$ 250 mm	<a href="#">186008588</a>	<a href="#">186008605</a>	<a href="#">186008622</a>	<a href="#">186008639</a>
30 $\times$ 10 mm Guard Cartridge**	<a href="#">186008650</a>	<a href="#">186008651</a>	<a href="#">186008652</a>	<a href="#">186008653</a>
OBD 30 $\times$ 50 mm	<a href="#">186008589</a>	<a href="#">186008606</a>	<a href="#">186008623</a>	<a href="#">186008640</a>
OBD 30 $\times$ 75 mm	<a href="#">186008590</a>	<a href="#">186008607</a>	<a href="#">186008624</a>	<a href="#">186008641</a>
OBD 30 $\times$ 100 mm	<a href="#">186008591</a>	<a href="#">186008608</a>	<a href="#">186008625</a>	<a href="#">186008642</a>
OBD 30 $\times$ 150 mm	<a href="#">186008592</a>	<a href="#">186008609</a>	<a href="#">186008626</a>	<a href="#">186008643</a>
OBD 30 $\times$ 250 mm	<a href="#">186008593</a>	<a href="#">186008610</a>	<a href="#">186008627</a>	<a href="#">186008644</a>
OBD 50 $\times$ 50 mm	<a href="#">186008594</a>	<a href="#">186008611</a>	<a href="#">186008628</a>	<a href="#">186008645</a>
OBD 50 $\times$ 100 mm	<a href="#">186008595</a>	<a href="#">186008612</a>	<a href="#">186008629</a>	<a href="#">186008646</a>
OBD 50 $\times$ 150 mm	<a href="#">186008596</a>	<a href="#">186008613</a>	<a href="#">186008630</a>	<a href="#">186008648</a>
OBD 50 $\times$ 250 mm	<a href="#">186008597</a>	<a href="#">186008614</a>	<a href="#">186008631</a>	<a href="#">186008649</a>

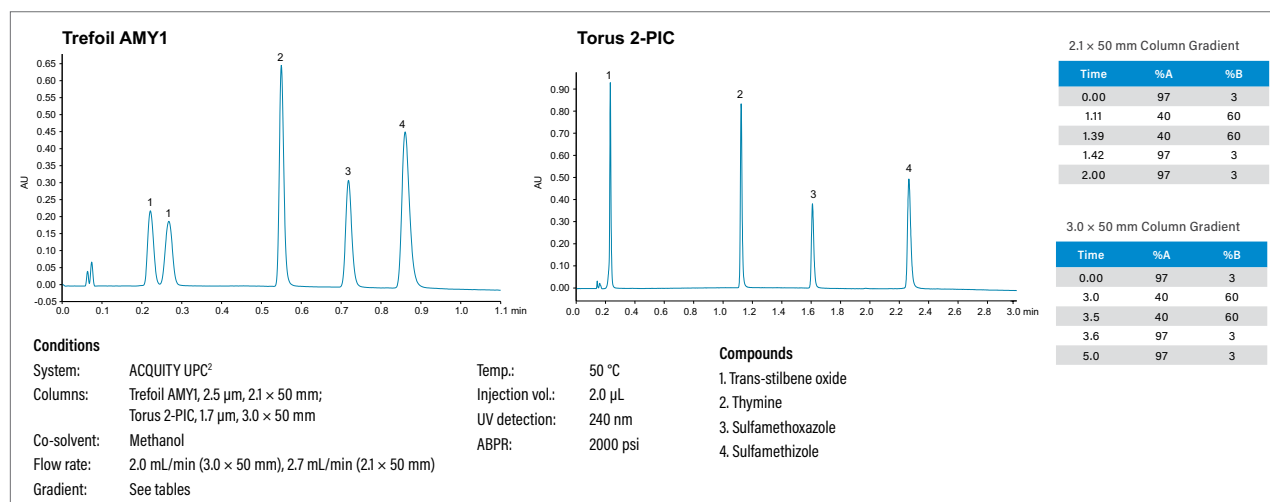
\* Requires 19 mm I.D. Prep Guard Holder, p/n: [186008745](#).

\*\* Requires 30 mm I.D. Prep Guard Holder, p/n: [186006912](#).

## ACQUITY UPC<sup>2</sup> System: Quality Control Reference Materials

The Quality Control Reference Materials (QC Reference Materials) for the ACQUITY UPC<sup>2</sup>™ System provide a simple, reliable way to monitor a system's performance. Prepared for use with Trefoil and Torus Columns, this four-component mixture is optimized to ensure these key aspects of performance:

- The efficacy of chiral separation (by means of a chiral compound included in the mixture)
- The performance of mass spectrometry (by means of an ionizing compound included in the mixture)
- The well-separated nature of compounds in a wide elution range
- The detectability of all compounds by UV



Single QC Reference Material for Trefoil and Torus Columns on an ACQUITY UPC<sup>2</sup> System.

## HOW DO YOU KNOW YOUR CHROMATOGRAPHIC SYSTEM IS OPERATING PROPERLY?

QC Reference Materials contain mixtures of standards chosen to provide an easy and reliable way to monitor the performance of any chromatographic system. They assure you that your column and system are ready to analyze samples. Regular use of QC Reference Materials also provides an opportunity to benchmark chromatographic systems and note their performance over time, making it easier to proactively identify problems and correct them sooner.

### Ordering Information

#### Quality Control Reference Materials

Product Name	Intended Use	Chromatographic Mode	System	Contents	P/N
UPC <sup>2</sup> QC Reference Material	Provides chromatographic performance information inclusive of mobile-phase pH for both chiral and achiral modes.	Convergence Chromatography, SFC <ul style="list-style-type: none"> <li>■ chiral</li> <li>■ achiral</li> </ul>	ACQUITY UPC <sup>2</sup>	1. 0.50 mg/mL (+/-) trans-stilbene oxide 2. 0.50 mg/mL thymine 3. 0.50 mg/mL sulfamethoxazole 4. 0.50 mg/mL sulfamethizole  In a 1 mL solution of 75:25 ACN:MeOH Store refrigerated 2-5 °C	<a href="#">186007950</a>

#### Standards for SFC and ACQUITY UPC<sup>2</sup> Systems

Description	P/N
Waters Prep 15/30 SFC System Test Mix and Internal Standard	<a href="#">700005675</a>
Waters Prep 100 SFC System Test Mix and Internal Standard	<a href="#">700005674</a>

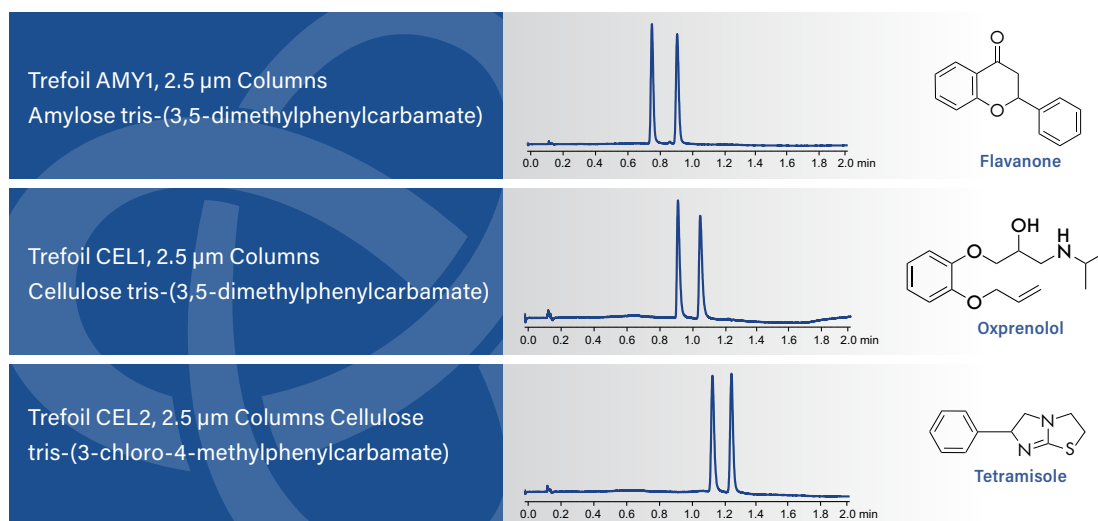
#### Standards for ACQUITY UPC<sup>2</sup> Systems

Description	Contents	P/N
UPC <sup>2</sup> Standard Mix	2 mg/mL each: 3-benzoylpyridine, cortisone, 4-nitroaniline, 4,4'-biphenol in methanol, 1 mL	<a href="#">186006372</a>
UPC <sup>2</sup> Gradient Standard	1 mg/mL coumarin, 1 mg/mL flavone, 2 mg/mL caffeine, 1 mg/mL thymine, 2 mg/mL prednisone in 2-propanol, 1 mL	<a href="#">186006551</a>
UPC <sup>2</sup> Caffeine Standard	1.0 mg/mL caffeine in 2-propanol, 2 mL	<a href="#">186006614</a>
UPC <sup>2</sup> Standards Kit	1.0 mg/mL caffeine in 2-propanol, 2 mL 1 mg/mL coumarin, 1 mg/mL flavone, 2 mg/mL caffeine, 1 mg/mL thymine, 2 mg/mL prednisone in 2-propanol, 1 mL	<a href="#">176002811</a>
UPC <sup>2</sup> Flavone Standard	1 mg/mL in 2-propanol, 2 mL	<a href="#">186006523</a>
UPC <sup>2</sup> Flurbiprofen Standard	1 mg/mL in 2-propanol, 2 mL	<a href="#">186006524</a>
UPC <sup>2</sup> Ibuprofen Standard	1 mg/mL in 2-propanol, 2 mL	<a href="#">186006521</a>
UPC <sup>2</sup> Ketoprofen Standard	1 mg/mL in 2-propanol, 2 mL	<a href="#">186006522</a>

Trefoil Columns offer:

- Optimized particle size, column dimensions, and flow rates for the ACQUITY UPC<sup>2</sup> System
- The full advantage of mass-spectrometry detection
- Faster results when following method-development protocols
- High quality, consistent, and reproducible columns

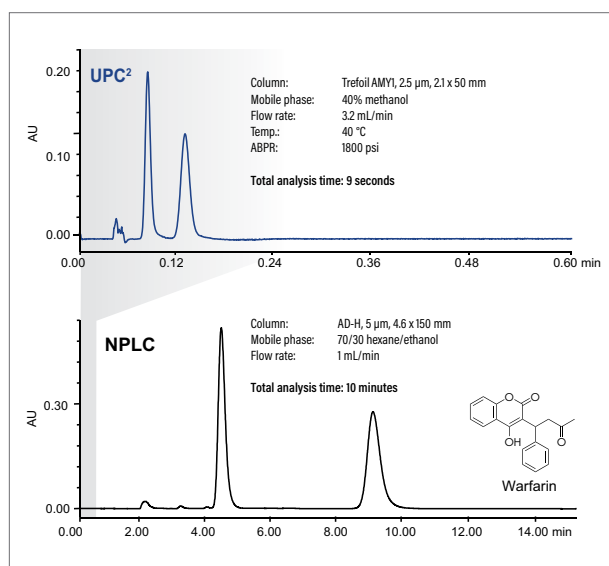
Trefoil modified polysaccharide-based stationary phases provide broad spectrum chiral selectivity. Trefoil AMY1, Trefoil CEL1, and Trefoil CEL2 Column Chemistries are complementary to each other and independently offer different retention characteristics for separating chiral compounds. Selectivity can be further enhanced by blends of modifiers and additives that most favorably modulate chiral recognition. These columns are designed to separate enantiomers and their stereoisomers, metabolites, degradants, and impurities with greater resolution and speed.



Chiral separations were all run using the two-minute screening method.

## TRANSFER NORMAL-PHASE METHODS TO CONVERGENCE CHIRAL METHODS

Legacy normal-phase chiral methods can be easily transferred to the ACQUITY UPC<sup>2</sup> System using Trefoil Columns. Many of these old methods have undesirable characteristics such as long run times and often use chlorinated solvents in combination with THF or hexane which are costly to purchase and dispose. With simple redevelopment, new, cost-effective methods can be obtained using inexpensive and non-toxic compressed liquid CO<sub>2</sub> as the primary mobile phase and can be coupled to mass spectrometers for greater information.

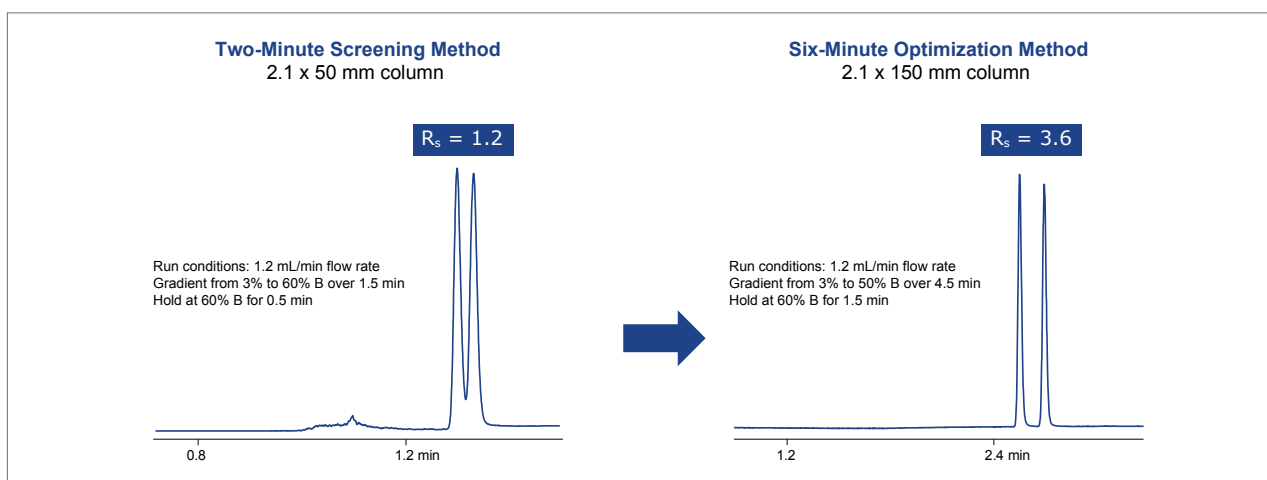


ACQUITY UPC<sup>2</sup> System with Trefoil Columns can be more than 30 times faster, use 75 times less solvent per run, and cost 100 times less per analysis.

## DID YOU KNOW...

### CHIRAL METHODS USING TREFOIL COLUMNS

Faster method development is possible when taking advantage of the dependable, high performance, low dispersion analytical ACQUITY UPC<sup>2</sup> System when used together with the Trefoil chiral stationary phases. Using short, narrow-bore columns with a small number of well selected co-solvents and mass spectrometry compatible additives enables this holistic combination to achieve routine gradient screening runs in two minutes. To view a webcast on the Trefoil Columns Method Development Strategy, please visit [waters.com/trefoil](http://waters.com/trefoil)



An example of the increased resolution expected when you transition from the two-minute screening method to the six-minute optimization method.

## Ordering Information

### Trefoil Columns

Dimension	Particle Size: 2.5 $\mu$ m		
	P/N	P/N	P/N
	<b>Trefoil AMY1</b>	<b>Trefoil CEL1</b>	<b>Trefoil CEL2</b>
2.1 x 50 mm	<a href="#">186007457</a>	<a href="#">186007461</a>	<a href="#">186007654</a>
2.1 x 150 mm	<a href="#">186007458</a>	<a href="#">186007462</a>	<a href="#">186007655</a>
3.0 x 50 mm	<a href="#">186007459</a>	<a href="#">186007463</a>	<a href="#">186007656</a>
3.0 x 150 mm	<a href="#">186007460</a>	<a href="#">186007464</a>	<a href="#">186007657</a>

### Trefoil Column Method Development Kits

Description	Particle Size: 2.5 $\mu$ m
	P/N
Trefoil Column Screening Kit, 2.1 x 50 mm (AMY1, CEL1, CEL2), 3/pk	<a href="#">176003577</a>
Trefoil Column Optimization Kit, 3.0 x 150 mm (AMY1, CEL1, CEL2), 3/pk	<a href="#">176003578</a>



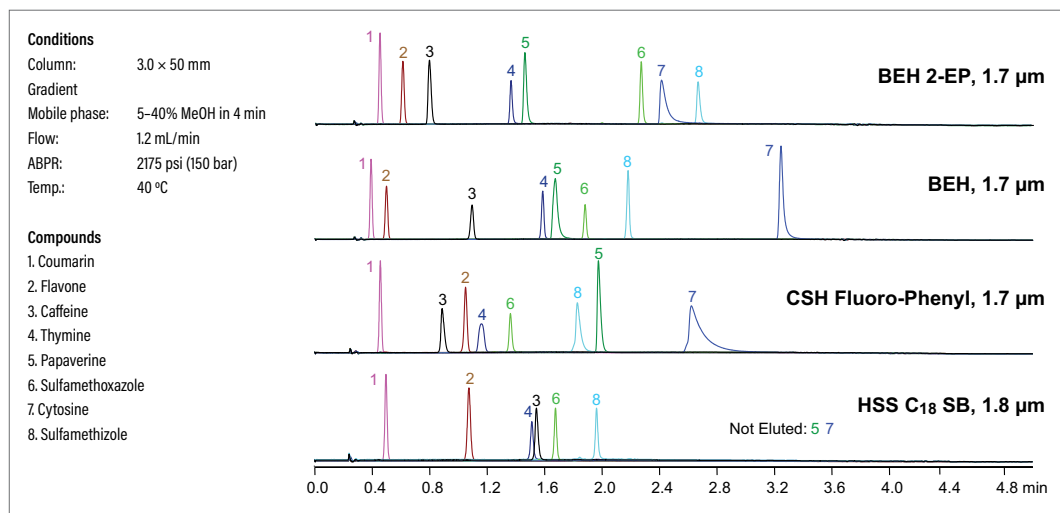
## VIRIDIS HYBRID AND HSS SFC COLUMNS

Viridis Columns offer an added range of achiral SFC selectivities.

These columns are based on the patented Ethylene Bridged Hybrid (BEH) particle technology, Charged Surface Hybrid (CSH) particle technology, and High-Strength Silica (HSS) particle technology. The reduction and control of surface silanol activity on Viridis particles delivers, under SFC conditions, excellent peak shapes—even for well-retained basic achiral compounds.



Viridis BEH 2-EP, 1.7, 3.5, and 5 µm Columns	
Viridis BEH, 1.7, 3.5, and 5 µm Columns	
Viridis CSH Fluoro-Phenyl, 1.7, 3.5, and 5 µm Columns	
Viridis HSS C <sub>18</sub> SB, 1.7 and 3.5 µm Columns	



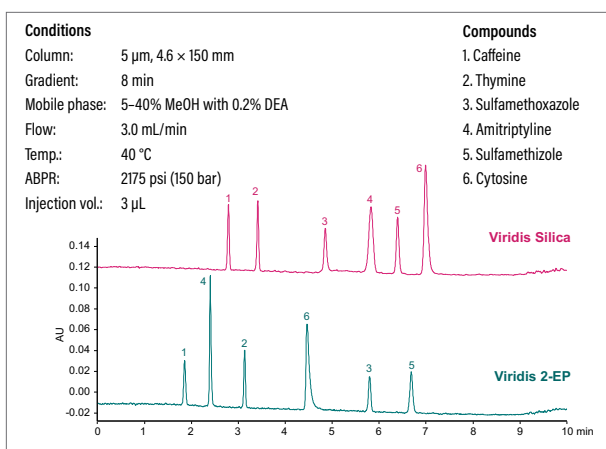
*Viridis Analytical Columns provide multiple selectivities.*

## VIRIDIS SILICA-BASED SFC COLUMNS

Based on Waters long history producing superior grades of chromatographic silica production, the Viridis Silica Columns are designed to be highly reproducible and predictable based on tight product specifications and very low metal content. They are available for both analytical screening and in preparative column dimensions for purification. Separation methods can be optimized and scaled up to Viridis Preparative OBD Columns.

Viridis Silica 2-EP, 5 µm Columns	
Viridis Silica, 5 µm Columns	

Widely used in achiral SFC purifications, Viridis Preparative Columns exhibit good retention, peak shape, and selectivity properties both with and without the use of additives. These prep columns are rugged and deliver reliable separation performance for complex mixtures time and time again."



Viridis SFC Preparative Columns.

## Ordering Information

### Viridis BEH, CSH, and HSS 1.7 and 1.8 $\mu$ m Columns

Dimension	Particle Size: 1.7 $\mu$ m			Particle Size: 1.8 $\mu$ m
	P/N	P/N	P/N	P/N
	BEH 2-EP	BEH	CSH Fluoro-Phenyl	HSS C <sub>18</sub> SB
2.1 $\times$ 50 mm	<a href="#">186006576</a>	<a href="#">186006558</a>	<a href="#">186006567</a>	<a href="#">186006617</a>
2.1 $\times$ 75 mm	<a href="#">186006577</a>	<a href="#">186006559</a>	<a href="#">186006568</a>	<a href="#">186006618</a>
2.1 $\times$ 100 mm	<a href="#">186006578</a>	<a href="#">186006560</a>	<a href="#">186006569</a>	<a href="#">186006619</a>
2.1 $\times$ 150 mm	<a href="#">186006579</a>	<a href="#">186006561</a>	<a href="#">186006570</a>	<a href="#">186006620</a>
3.0 $\times$ 50 mm	<a href="#">186006580</a>	<a href="#">186006562</a>	<a href="#">186006571</a>	<a href="#">186006621</a>
3.0 $\times$ 75 mm	<a href="#">186006581</a>	<a href="#">186006563</a>	<a href="#">186006572</a>	<a href="#">186006622</a>
3.0 $\times$ 100 mm	<a href="#">186006582</a>	<a href="#">186006564</a>	<a href="#">186006573</a>	<a href="#">186006623</a>
3.0 $\times$ 150 mm	<a href="#">186006688</a>	<a href="#">186006686</a>	<a href="#">186006687</a>	<a href="#">186006685</a>
VanGuard Pre-column, 2.1 $\times$ 5 mm, 3/pk	<a href="#">186006575</a>	<a href="#">186006557</a>	<a href="#">186006566</a>	<a href="#">186006616</a>

### Viridis BEH, CSH, and HSS 3.5 $\mu$ m Columns

Dimension	Particle Size: 3.5 $\mu$ m			
	P/N	P/N	P/N	P/N
	BEH 2-EP	BEH	CSH Fluoro-Phenyl	HSS C <sub>18</sub> SB
2.1 $\times$ 50 mm	<a href="#">186006652</a>	<a href="#">186006634</a>	<a href="#">186006643</a>	<a href="#">186006625</a>
2.1 $\times$ 75 mm	<a href="#">186006653</a>	<a href="#">186006635</a>	<a href="#">186006644</a>	<a href="#">186006626</a>
2.1 $\times$ 100 mm	<a href="#">186006654</a>	<a href="#">186006636</a>	<a href="#">186006645</a>	<a href="#">186006627</a>
2.1 $\times$ 150 mm	<a href="#">186006655</a>	<a href="#">186006637</a>	<a href="#">186006646</a>	<a href="#">186006628</a>
3.0 $\times$ 50 mm	<a href="#">186006656</a>	<a href="#">186006638</a>	<a href="#">186006647</a>	<a href="#">186006629</a>
3.0 $\times$ 75 mm	<a href="#">186006657</a>	<a href="#">186006639</a>	<a href="#">186006648</a>	<a href="#">186006630</a>
3.0 $\times$ 100 mm	<a href="#">186006658</a>	<a href="#">186006640</a>	<a href="#">186006649</a>	<a href="#">186006631</a>
3.0 $\times$ 150 mm	<a href="#">186006659</a>	<a href="#">186006641</a>	<a href="#">186006650</a>	<a href="#">186006632</a>
VanGuard Pre-column, 2.1 $\times$ 5 mm, 3/pk	<a href="#">186006651</a>	<a href="#">186006633</a>	<a href="#">186006642</a>	<a href="#">186006624</a>

### Viridis 5 $\mu$ m Analytical SFC Columns

Dimension	Particle Size: 5 $\mu$ m				
	P/N	P/N	P/N	P/N	P/N
	BEH 2-EP	BEH	CSH Fluoro-Phenyl	Silica 2-EP	Silica
2.1 $\times$ 150 mm	<a href="#">186006545</a>	<a href="#">186006544</a>	<a href="#">186006543</a>	<a href="#">186006542</a>	<a href="#">186006541</a>
3.0 $\times$ 50 mm	<a href="#">186005750</a>	<a href="#">186005719</a>	<a href="#">186005688</a>	<a href="#">186005800</a>	<a href="#">186005804</a>
3.0 $\times$ 100 mm	<a href="#">186005751</a>	<a href="#">186005720</a>	<a href="#">186005689</a>	<a href="#">186005801</a>	<a href="#">186005805</a>
3.0 $\times$ 150 mm	<a href="#">186005752</a>	<a href="#">186005721</a>	<a href="#">186005690</a>	<a href="#">186005802</a>	<a href="#">186005806</a>
3.0 $\times$ 250 mm	<a href="#">186005753</a>	<a href="#">186005722</a>	<a href="#">186005691</a>	<a href="#">186005803</a>	<a href="#">186005807</a>
4.6 $\times$ 50 mm	<a href="#">186005754</a>	<a href="#">186005723</a>	<a href="#">186005692</a>	<a href="#">186004935</a>	<a href="#">186004908</a>
4.6 $\times$ 100 mm	<a href="#">186005755</a>	<a href="#">186005724</a>	<a href="#">186005693</a>	<a href="#">186004936</a>	<a href="#">186004909</a>
4.6 $\times$ 150 mm	<a href="#">186005756</a>	<a href="#">186005725</a>	<a href="#">186005694</a>	<a href="#">186004937</a>	<a href="#">186004910</a>
4.6 $\times$ 250 mm	<a href="#">186005757</a>	<a href="#">186005726</a>	<a href="#">186005695</a>	<a href="#">186004938</a>	<a href="#">186004911</a>

## Viridis 5 µm Preparative SFC Columns

Dimension	Particle Size: 5 µm				
	P/N	P/N	P/N	P/N	P/N
	BEH 2-EP	BEH	CSH Fluoro-Phenyl	Silica 2-EP	Silica
OBD 10 × 50 mm	<a href="#">186008256</a>	<a href="#">186008252</a>	<a href="#">186008248</a>	<a href="#">186008232</a>	<a href="#">186008228</a>
OBD 10 × 100 mm	<a href="#">186008257</a>	<a href="#">186008253</a>	<a href="#">186008249</a>	<a href="#">186008233</a>	<a href="#">186008229</a>
OBD 10 × 150 mm	<a href="#">186008258</a>	<a href="#">186008254</a>	<a href="#">186008250</a>	<a href="#">186008234</a>	<a href="#">186008230</a>
OBD 10 × 250 mm	<a href="#">186008259</a>	<a href="#">186008255</a>	<a href="#">186008251</a>	<a href="#">186008235</a>	<a href="#">186008231</a>
OBD 19 × 50 mm	<a href="#">186005762</a>	<a href="#">186005731</a>	<a href="#">186005700</a>	<a href="#">186004943</a>	<a href="#">186004916</a>
OBD 19 × 100 mm	<a href="#">186005763</a>	<a href="#">186005732</a>	<a href="#">186005701</a>	<a href="#">186004944</a>	<a href="#">186004917</a>
OBD 19 × 150 mm	<a href="#">186005764</a>	<a href="#">186005733</a>	<a href="#">186005702</a>	<a href="#">186004945</a>	<a href="#">186004918</a>
OBD 19 × 250 mm	<a href="#">186005765</a>	<a href="#">186005734</a>	<a href="#">186005703</a>	<a href="#">186004946</a>	<a href="#">186004919</a>
30 × 10 mm Guard Cartridge*	<a href="#">186006909</a>	<a href="#">186006910</a>	<a href="#">186006911</a>	<a href="#">186006908</a>	<a href="#">186006907</a>
OBD 30 × 50 mm	<a href="#">186005766</a>	<a href="#">186005735</a>	<a href="#">186005704</a>	<a href="#">186004947</a>	<a href="#">186004920</a>
OBD 30 × 75 mm	<a href="#">186005767</a>	<a href="#">186005736</a>	<a href="#">186005705</a>	<a href="#">186004948</a>	<a href="#">186004921</a>
OBD 30 × 100 mm	<a href="#">186005768</a>	<a href="#">186005737</a>	<a href="#">186005706</a>	<a href="#">186004949</a>	<a href="#">186004922</a>
OBD 30 × 150 mm	<a href="#">186005769</a>	<a href="#">186005738</a>	<a href="#">186005707</a>	<a href="#">186004950</a>	<a href="#">186004923</a>
OBD 30 × 250 mm	<a href="#">186005770</a>	<a href="#">186005739</a>	<a href="#">186005708</a>	<a href="#">186004951</a>	<a href="#">186004924</a>
OBD 50 × 50 mm	<a href="#">186005771</a>	<a href="#">186005740</a>	<a href="#">186005709</a>	<a href="#">186004952</a>	<a href="#">186004925</a>
OBD 50 × 100 mm	<a href="#">186005772</a>	<a href="#">186005741</a>	<a href="#">186005710</a>	<a href="#">186004953</a>	<a href="#">186004926</a>
OBD 50 × 150 mm	<a href="#">186005773</a>	<a href="#">186005742</a>	<a href="#">186005711</a>	<a href="#">186004954</a>	<a href="#">186004927</a>
OBD 50 × 250 mm	<a href="#">186005774</a>	<a href="#">186005743</a>	<a href="#">186005712</a>	<a href="#">186004955</a>	<a href="#">186004928</a>

\*Requires 30 mm I.D. Prep Guard Holder, p/n: [186006912](#).

## Viridis Method Development Kits

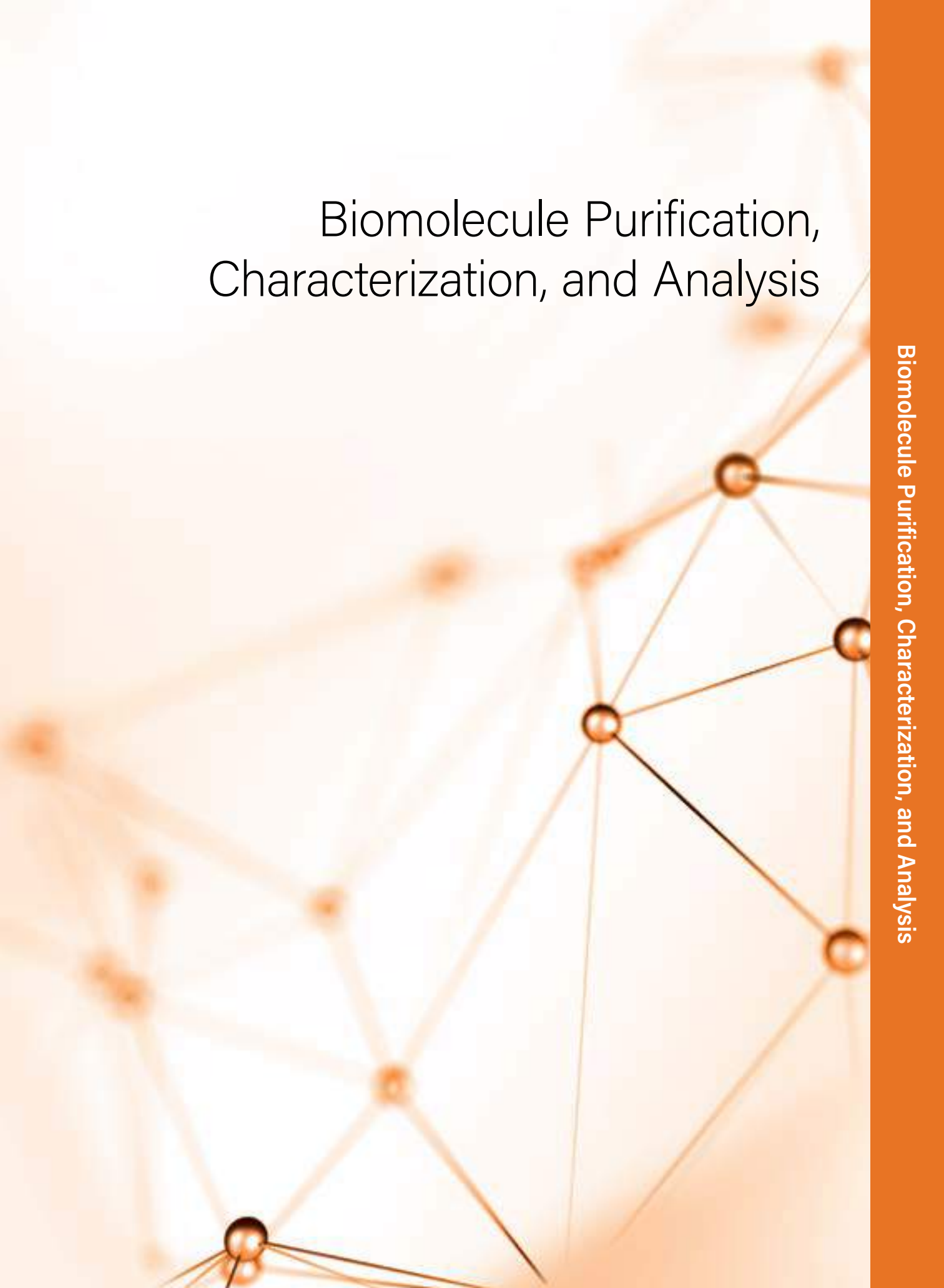
Description	P/N
Viridis Method Development Kit, 3.0 × 100 mm (BEH 2-EP, BEH, CSH Fluoro-Phenyl, HSS C <sub>18</sub> SB), 4/pk	<a href="#">176003050</a>
Viridis Column Screening Kit, 2.1 × 50 mm (BEH 2-EP, BEH, CSH Fluoro-Phenyl, HSS C <sub>18</sub> SB), 4/pk	<a href="#">176003091</a>

## Quality Control Reference Materials

Product Name	Intended Use	Chromatographic Mode	System	Contents	P/N
UPC <sup>2</sup> QC Reference Material	Provides chromatographic performance information inclusive of mobile-phase pH for both chiral and achiral modes	Convergence Chromatography, SFC <ul style="list-style-type: none"> <li>■ chiral</li> <li>■ achiral</li> </ul>	ACQUITY UPC <sup>2</sup>	1. 0.50 mg/mL (+/-) trans-stilbene oxide 2. 0.50 mg/mL thymine 3. 0.50 mg/mL sulfamethoxazole 4. 0.50 mg/mL sulfamethizole  In a 1 mL solution of 75:25 ACN:MeOH Store refrigerated 2–5 °C	<a href="#">186007950</a>

## Standards

Description	Contents	P/N
Waters Prep 15/30 SFC System Test Mix and Internal Standard		<a href="#">700005675</a>
Waters Prep 100 SFC System Test Mix and Internal Standard		<a href="#">700005674</a>
UPC <sup>2</sup> Standard Mix	2 mg/mL each: 3-benzoylpyridine, cortisone, 4-nitroaniline, 4, 4'-biphenol in methanol, 1 mL	<a href="#">186006372</a>
UPC <sup>2</sup> Gradient Standard	1 mg/mL coumarin, 1 mg/mL flavone, 2 mg/mL caffeine, 1 mg/mL thymine, 2 mg/mL prednisone in 2-propanol, 1 mL	<a href="#">186006551</a>
UPC <sup>2</sup> Caffeine Standard	1 mg/mL caffeine in 2-propanol, 2 mL	<a href="#">186006614</a>
UPC <sup>2</sup> Standards Kit	1 mg/mL caffeine in 2-propanol, 2 mL 1 mg/mL coumarin, 1 mg/mL flavone, 2 mg/mL caffeine, 1 mg/mL thymine, 2 mg/mL prednisone in 2-propanol, 1 mL	<a href="#">176002811</a>
UPC <sup>2</sup> Flavone Standard	1 mg/mL in 2-propanol, 2 mL	<a href="#">186006523</a>
UPC <sup>2</sup> Flurbiprofen Standard	1 mg/mL in 2-propanol, 2 mL	<a href="#">186006524</a>
UPC <sup>2</sup> Ibuprofen Standard	1 mg/mL in 2-propanol, 2 mL	<a href="#">186006521</a>
UPC <sup>2</sup> Ketoprofen Standard	1 mg/mL in 2-propanol, 2 mL	<a href="#">186006522</a>



# Biomolecule Purification, Characterization, and Analysis

# Contents

**Innovative Technologies from the Leader in Separation Science and Analytical Biochemistry** ..... [325](#)

**Factors to Consider when Investing and Using HPLC, UHPLC, or UPLC Columns for Bioseparations** ..... [327](#)

- Column Selection and Installation ..... [327](#)
- BioSeparation Method Development ..... [330](#)

**Application-Specific Column Selections** ..... [334](#)

- Peptide Analysis ..... [334](#)
- Protein Aggregate, Monomer, and Fragment Analysis ..... [334](#)
- Oligonucleotide Analysis ..... [334](#)
- Glycan Analysis ..... [334](#)
- Intact and Subunit Protein Analysis ..... [334](#)

**Amino Acid** ..... [340](#)

- Accurate Amino Acid Analyses from Varied Sample Matrices ..... [341](#)
- UPLC: AccQ-Tag Ultra C<sub>18</sub> Amino Acid Analysis Solution ..... [342](#)
- UHPLC and HPLC: AccQ-Tag Ultra C<sub>18</sub> Amino Acid Analysis ..... [343](#)
- AccQ-Tag Ultra C<sub>18</sub> HPLC Chemistry ..... [344](#)
- HPLC: AccQ-Tag Amino Acid Analysis Solution ..... [349](#)
- HPLC: Pico-Tag Method ..... [350](#)

**Glycan and Glycoprotein Analysis** ..... [353](#)

- Consolidating Complementary Techniques to Streamline Glycan Analysis ..... [353](#)
- Intact Glycoprotein Analysis ..... [354](#)
- Glycoprotein Subunit Analysis ..... [356](#)
- Glycopeptide Analysis ..... [358](#)
- Glycoprotein Performance Test Standard ..... [360](#)
- Released N-Glycan Analysis ..... [361](#)
- GlycoWorks RapiFluor-aMS Released N-Glycan Sample Preparation ..... [363](#)
- Automation of Released N-Glycan Analysis ..... [364](#)
- Phosphoglycan SPE Buffer Improves Recover ..... [364](#)
- Glycan Performance Test Standards and Dextran Calibration Ladders ..... [366](#)
- Glycan Columns ..... [366](#)
- Monosaccharide and Sialic Acid Analysis from Glycoproteins ..... [372](#)

**Nucleic Acid Separations** ..... [375](#)

- Exceptional Resolution of Exceptional Resolution of Oligonucleotide Mixtures ..... [376](#)
- Columns for Large DNA/RNA Species ..... [380](#)
- Anion-Exchange HPLC of Nucleic Acids ..... [381](#)
- Hydrophilic Interaction Chromatography (HILIC) of Nucleic Acids ..... [382](#)
- MassPREP Oligonucleotide Standard ..... [384](#)
- Oligonucleotide Desalting by Solid-Phase Extraction ..... [384](#)

**Peptide Analysis** ..... [385](#)

- A Wide Range of Chemistries for Reversed-Phase Peptide Separations ..... [385](#)
- MaxPeak Premier Peptide Columns ..... [387](#)
- Peptide BEH C<sub>18</sub>, 130 Å and 300 Å Column ..... [388](#)
- Peptide CSH C<sub>18</sub>, 130 Å Columns ..... [389](#)
- Peptide HSS T3 Columns ..... [390](#)
- Therapeutic Peptide Method Development Kit ..... [397](#)
- Cation-Exchange Peptide and Polypeptide Separations ..... [397](#)
- BioSuite Cation-Exchange HPLC Columns ..... [398](#)
- BioSuite HPLC and UHPLC Peptide Analysis Columns ..... [399](#)
- Symmetry HPLC and UHPLC Columns ..... [400](#)
- Delta-Pak HPLC and UHPLC Columns ..... [401](#)
- Peptide Standards and Reagents ..... [402](#)
- Cytochrome c Digestion Standard ..... [402](#)
- MassPREP Peptide Standard ..... [403](#)

**Protein Analysis** ..... [406](#)

- Intact Protein and mAb Subunit Analysis ..... [406](#)
- BioResolve RP mAb mAb Subunit Standard ..... [409](#)
- Analysis of Adenoviral Vector Proteins using BioResolve RP mAb Polyphenyl ..... [410](#)
- MaxPeak Premier and Protein BEH C<sub>4</sub>, 300 Å Colum ..... [412](#)
- MassPREP Protein Standard Mix ..... [415](#)
- Protein-Pak Hi Res HIC Columns and HIC Protein Standard ..... [417](#)
- BioSuite Hydrophobic-Interaction Chromatography (HIC) HPLC Columns ..... [418](#)

- ACQUITY UPLC Glycoprotein BEH Amide, 300 Å Columns ..... [419](#)
- Protein SEC Columns ..... [421](#)
- SEC Aggregate Analysis ..... [422](#)
- ACQUITY and XBridge Premier Protein SEC Offerings For SEC Platform Method Applications ..... [424](#)
- BioResolve SEC mAb offerings For mAb Aggregate, Monomer, and Fragment Analyses ..... [426](#)
- ACQUITY Protein SEC Offerings For High Throughput SEC Applications ..... [427](#)
- XBridge BEH SEC Offerings ..... [428](#)
- SEC Analysis of Insulin ..... [429](#)
- mAb Size Variant Standard ..... [429](#)
- Protein Standards ..... [429](#)
- SEC Column Connectors and Connector Kits ..... [430](#)
- BioSuite Size-Exclusion (SEC) HPLC Columns ..... [431](#)
- Protein-Pak and Shodex Size-Exclusion HPLC Columns ..... [433](#)
- Charge Variant and Ion-Exchange Analysis ..... [435](#)
- BioResolve SCX mAb Columns ..... [435](#)
- mAb Charge Variant Standard ..... [437](#)
- VanGuard FIT Cartridge ..... [437](#)
- BioResolve CX pH Buffers ..... [438](#)
- LC-MS Analysis with IonHance CX-MS pH Buffer ..... [439](#)
- Protein-Pak Hi Res Ion-Exchange (IEX) Columns for ACQUITY UPLC Applications ..... [442](#)
- Ion-Exchange Standards ..... [443](#)
- BioSuite Ion-Exchange HPLC Columns ..... [445](#)
- Protein-Pak PW Series Columns ..... [446](#)
- Protein-Pak High Resolution (HR) Ion-Exchange Glass Columns ..... [447](#)
- Advanced Purification (AP) Glass Columns ..... [448](#)
- AccellPlus Ion-Exchange Packings ..... [450](#)
- AccellPlus Sep-Pak Cartridges ..... [450](#)
- AccellPlus PrepPak Cartridges (47 × 300 mm) ..... [450](#)
- AccellPlus Ion-Exchange Bulk Packings ..... [451](#)
- BioSuite pC<sub>18</sub> and pPhenyl Reversed-Phase Chromatography (RPC) HPLC Columns ..... [452](#)

# Biomolecule Purification, Characterization, and Analysis

## Innovative Technologies in Separation Science and Analytical Biochemistry

Advances in the areas of genomics, proteomics, metabolomics, and molecular and system biology continue to revolutionize the diagnosis and treatment of diseases and increase our fundamental understanding of biological processes.

Beginning with a keen understanding of today's biomolecule-related challenges, Waters scientists and engineers continuously seek purposeful innovations that help deliver impactful solutions in applications ranging from proteomics and biomarker discovery through the commercialization of advanced biopharmaceuticals.

Waters comprehensive chemistry consumables family includes:

- BioResolve™ line of application specific columns that help streamline analytical challenges associated with mAb characterizations and associated biotherapeutic drug separations
- Scalable peptide columns for nano, capillary, analytical, and preparative applications
- Protein size-exclusion, ion-exchange, hydrophobic-interaction, hydrophilic-interaction, and reversed-phase columns for analytical HPLC, UHPLC, UPLC, and lab-scale purification applications
- AccQ•Tag™ Ultra Chemistry specific for Waters UPLC Amino Acid Analysis Solution, as well as Pico•Tag™ and AccQ•Tag for HPLC-based amino acid analyses
- Oligonucleotide columns for synthetic oligonucleotide and DNA/RNA fragment isolations and analyses
- GlycoWorks™ RapiFluor-MS™ sample preparation kits, columns and standards, and HILIC and Mixed-Mode Glycan Columns for the analysis of released glycans
- MaxPeak™ Premier High Performance Surface Technology available with many of the biomolecule chemistries reducing the need for long conditioning and significantly reducing non-specific binding and analyte loss
- IonHance™ LC-MS grade mobile phases and additives help deliver high-quality data
- Automation for many of the complex sample preparation workflows with the Biopharma Andrew+™ Pipetting Robot and scripts for Hamilton and Tecan.

In addition, several of our biomolecule separation offerings (e.g. ACQUITY™ Premier Protein SEC 250 Å, ACQUITY UPLC Glycoprotein BEH Amide, 300 Å offering, and Waters UPLC Amino Acid Analysis Solution) were developed for use on ACQUITY UPLC-based Systems to help obtain accurate, precise, and highly resolving quantitative analysis of various therapeutics.

Designed and QC tested with relevant biomolecules to help ensure reliable, high performing column-to-column consistency.

Bioseparations Columns

[waters.com/biosep](https://www.waters.com/biosep)

Bioseparations Analytical Standards and Reagents

[waters.com/biostds](https://www.waters.com/biostds)





# BioAdvisor

Discover the best chemistry solutions for your application with this tool.



BioAdvisor enables you to select an appropriate UPLC/UHPLC or HPLC column and/or chemistry consumable for a desired application, all organized by molecule type.

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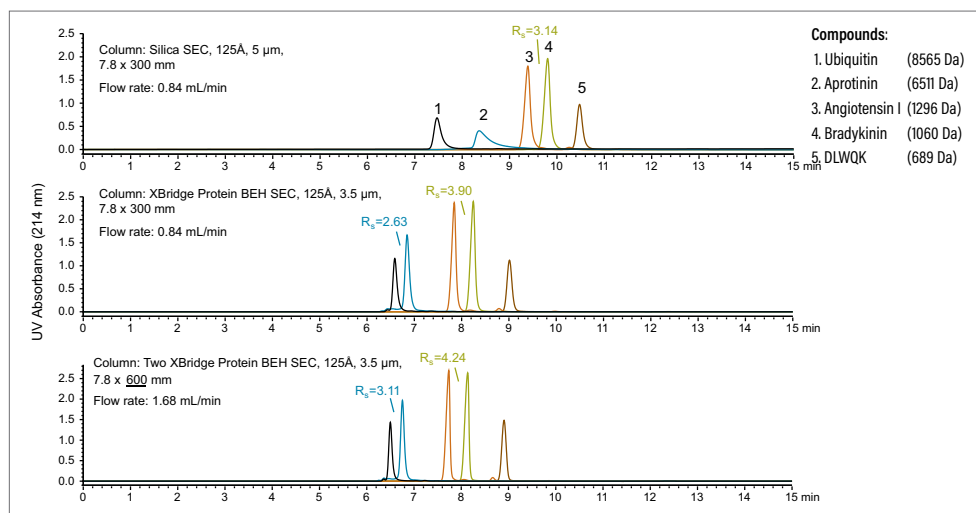
# Factors to Consider when Investing and Using HPLC, UHPLC, or UPLC Columns for Bioseparations

Many factors can affect the quality of data obtained from LC-based separations of peptides, proteins, and other biomolecules. The following pages list just a few of the important factors to consider when selecting an appropriate HPLC, UHPLC, or UPLC column for analytical or lab-scale applications. Once an appropriate column is selected, time must be invested in developing a satisfactory separation, so we have also included a few useful method development “tips and tricks”. We hope that these few examples will help chromatographers select a column and develop a method that matches their specific instrumentation and application needs.

## PART 1: COLUMN SELECTION AND INSTALLATION

### Effect of Particle Composition on SEC Peptide Separations

- Particle composition (e.g., silica, polymer, hybrid) influences desired LC separations
- These non-desired secondary interactions (i.e., ionic or hydrophobic) can be beneficial or detrimental
- Particle composition can also influence column life (e.g., silica-based at pH >7)

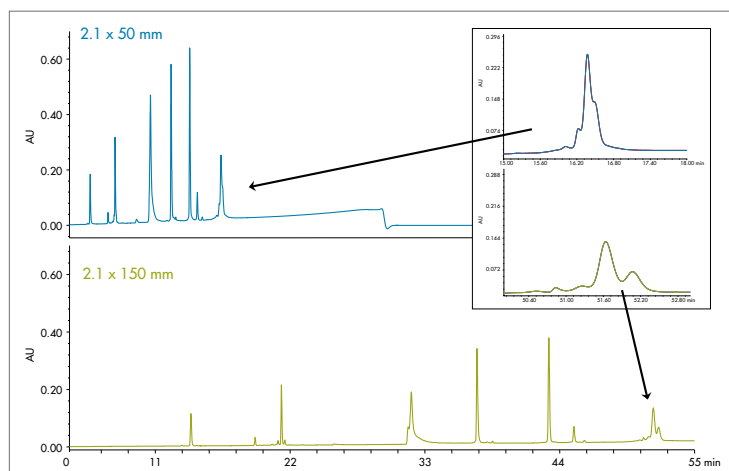


*In the size-exclusion chromatographic (SEC) separation shown, a series of synthetic peptides are separated on a column containing 100% silica-based, diol-coated particles (top) vs. Waters diol-coated, bridged-ethylene hybrid (BEH Technology™) particles that have less-undesired-free silanols. Consequently, and as shown in this example, use of SEC columns that contain BEH particles results in comparatively less undesired secondary ionic interactions between the ubiquitin and aprotinin peaks and less peak tailing making quantitation of these peptides more reliable.*

**i** For more information, reference application note [720005369EN](#).

### Effect of Column Length on Reversed-Phase Protein Separations

- Use of longer LC columns can translate into improved component resolution
- Analysis time increases as column length increases
- Separated peak volume increases as column length increases



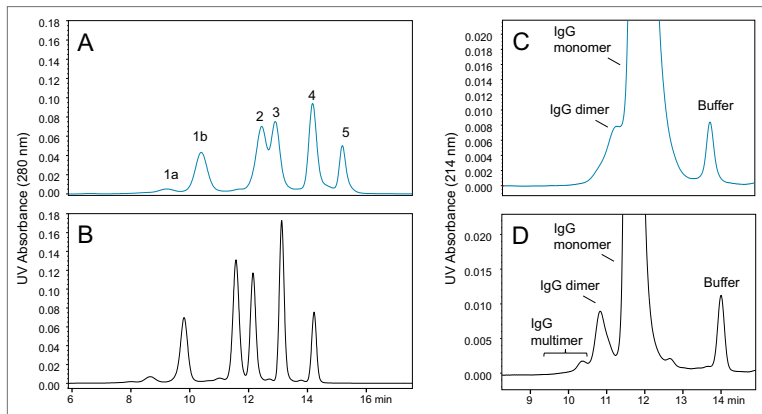
*Increasing the length of the column will increase the resolving power for a separation. This is shown with the separation of a protein mixture. The additional small peaks surrounding the Phosphorylase b can be seen more readily on the longer column, as seen in the inset, but it comes at the cost of a 3-fold increase in run time and ~40% loss of sensitivity. Depending on the application objective, this may be a useful parameter to improve resolution.*

**i** For more information, reference application note [720003875EN](#).



## Effect of Particle Size on SEC Protein Separations

- Well-packed columns containing small particles can improve a separation
- System back pressure will increase as particle size decreases
- Consequently, LC instrumentation can limit potential column use



A comparison of separations of Waters BEH450 SEC Protein Standard Mix (p/n: [186006842](#)) and Intact mAb Mass Check Standard (p/n: [186006552](#), diluted to 1 mg/mL) on 450 Å, silica-based 8 μm (Frames A and C) and 450 Å, BEH 3.5 μm (Frames B and D) SEC columns. Both columns were the same dimensions (7.8 × 300 mm) and separations were performed with the same flow rate (0.84 mL/min) and with the same sample loads. Peak identities for chromatograms A and B are: 1a) thyroglobulin dimer (1.3 MDa), 1b) thyroglobulin (669 KDa), 2) IgG (150 KDa), 3) BSA (67 KDa), 4) myoglobin (14 KDa), and uracil (112 Da). For the chromatograms in frames C and D the molecular weights of the IgG monomer, dimer, and multimer are approximately 150 KDa, 300 KDa, and ≥450 KDa, respectively.

For more information, reference application note [720005202EN](#).

## Choosing an Analytical Column that Best Matches LC-based Instrumentation

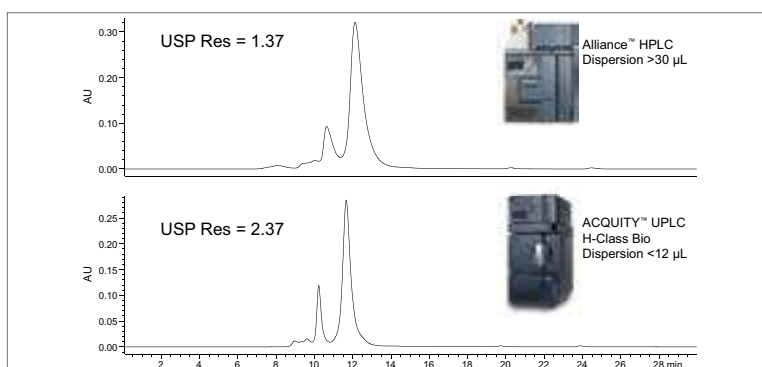
- Standard methods can be performed to measure system dispersion (band broadening)
- Different LC systems have different dispersion values (e.g., band broadening)
- Optimal chromatographic separations are obtained when the appropriate column (e.g., column I.D., particle size) and separation conditions (e.g., flow rate, temperature, gradient) are selected based on LC system design

HPLC	UHPLC	UPLC
Dispersion >30 μL	Dispersion 12–30 μL	Dispersion <12 μL
Columns: 3.0–4.6 mm I.D.; 3–10 μm particles	Columns: 2.1–4.6 mm I.D.; 1.7–5 μm particles	Columns: 1.0–4.6 mm I.D.; 1.6–5 μm particles
Recommended column: 4.6 mm I.D., 5 μm particles	Recommended column: 3.0 mm I.D., 2.5 μm particles	Recommended column: 2.1 mm I.D., 1.7 μm particles
Typical operating pressure: <6000 PSI	Typical operating pressure: <10,000 PSI	Typical operating pressure: <15,000 PSI

*Dispersion - n. Broadening of an analyte band due to both on-column effects (diffusion and mass transfer kinetics which are both dependent on particle size and linear velocity) and system effects (tubing internal diameter [I.D.] and length, connections, detector flow cell volumes, etc.) True separation performance is governed by the system dispersion paired with a flow rate range that yields the highest possible efficiency for a given analytical column. Due to these dispersion levels, we can appropriately match the right type of column size (volume) with the system dispersion. UPLC, having a very low dispersion volume, provides the greatest flexibility in terms of the columns that can be run on the system.*

## Effect of LC System Dispersion on SEC Monoclonal Protein Separations

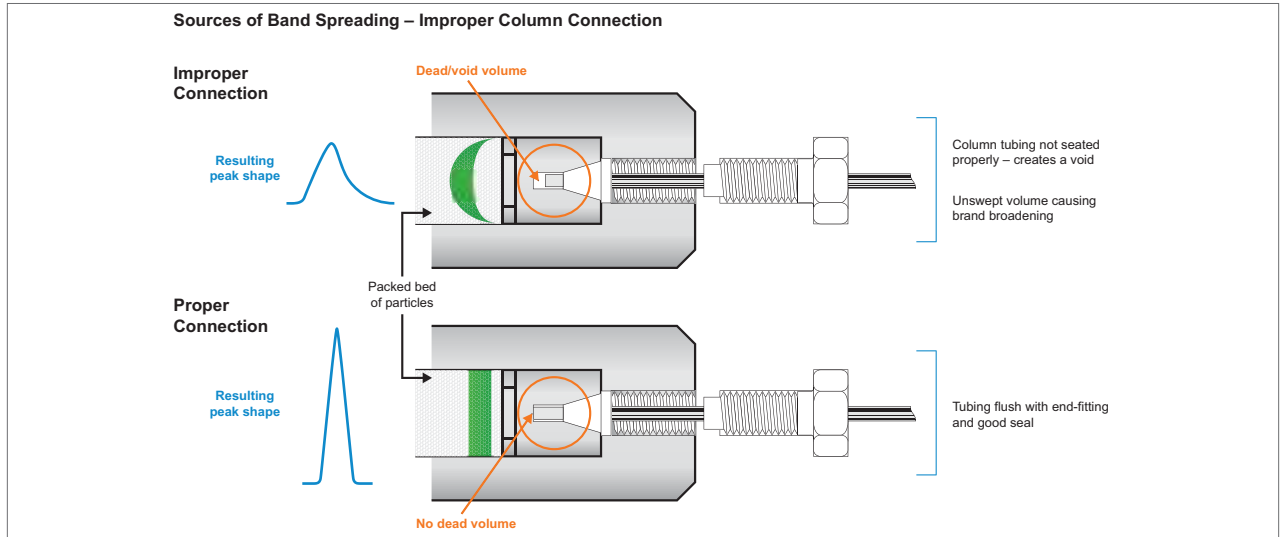
- LC Systems with lower system volumes better maintain column generated separations
- Isocratic-based SEC separations are most sensitive to deleterious band broadening effects



*The extra system volume of the traditional HPLC System (top) caused the column separated peaks to “partially remix” resulting in a USP resolution factor of 1.37 vs. the superior 2.37 value obtained when the separation was performed on an ACQUITY UPLC System. This slide shows how the LC system’s “band broadening” can adversely affect the quality of the mAb separation generated with the same XBridge™ Protein BEH SEC, 200 Å, 2.5 μm Column, SEC eluent, and sample.*

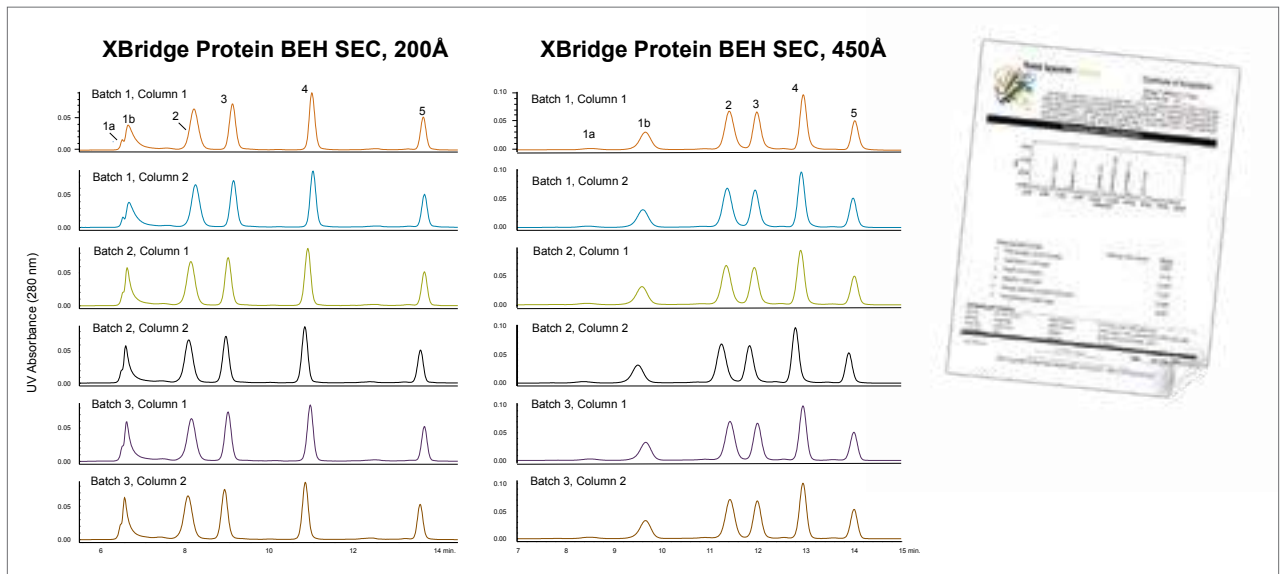
## Importance of Making Good Connections from Column to LC System

- Poor column-to-instrument connections can degrade a chromatographic separation
- Perceived column leaking can also be caused by a poor connection



## Importance of Batch-to-Batch and Column-to-Column Reproducibility

- Column reproducibility is a key attribute when selecting a column
- QC testing with relevant biological standards can help ensure consistency

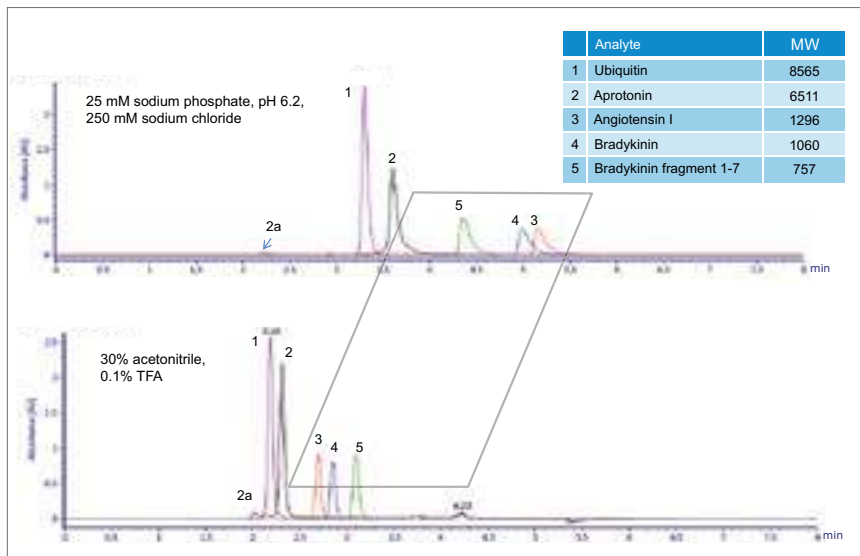


Shown are overlays of the separations of Waters BEH200 SEC Molecular Weight Standard (p/n: [186006518](#)) on 200 Å and 450 Å BEH 3.5 µm SEC columns. Two columns (300 mm length × 7.8 mm I.D.) were packed from three individual manufactured batches of particles to evaluate both batch-to-batch and column-to-column reproducibility. Peak identities are: 1a) thyroglobulin dimer (1.34 MDa), 1b) thyroglobulin (669 KDa), 2) IgG (150 KDa), 3) BSA (67 KDa), 4) myoglobin (14 KDa), and 5) uracil (112 Da). Separations were performed on an ACQUITY UPLC H-Class Bio System.


## PART 2: BIOSEPARATION METHOD DEVELOPMENT

### Eluent Effect on SEC Peptide Separations

- Non-desired, secondary interactions can compromise LC separations
- Use of an appropriate LC eluent can minimize secondary interactions

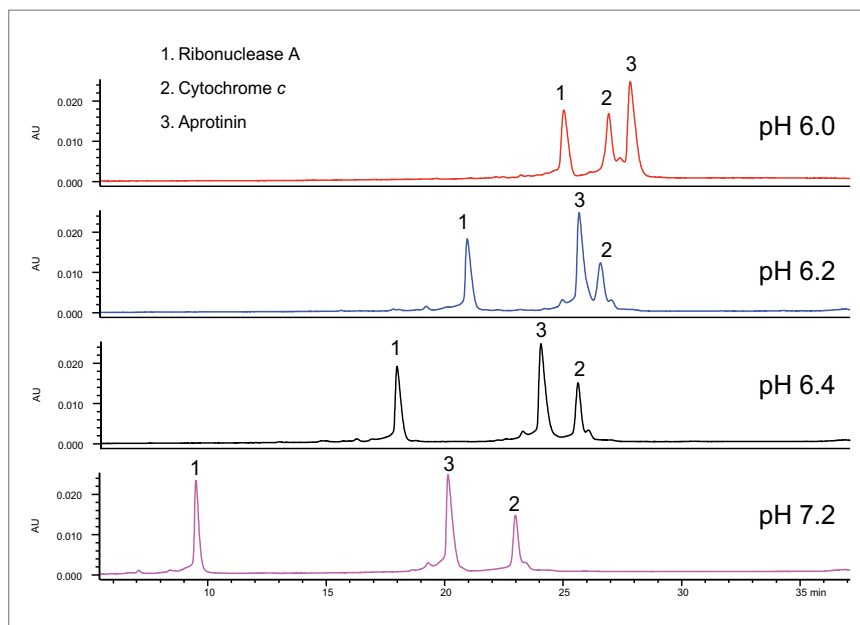


Method development experiments evaluated the effect of mobile-phase pH and salt concentration. The results showed minimal effect of salt concentrations (150–350 mM) and mobile-phase pH (6.2–7.4) on retention time (data not shown). All of the aqueous mobile phases resulted in later than expected elution for most small peptides and proteins (<17,000 Da) as well as elution order that did not correspond to published molecular weight values. For example, bradykinin fragment 1–7 (MW 757) eluted before greater molecular weight peptides such as angiotensin I (MW 1296) and bradykinin (MW 1060). These results also suggest the non-ideal interactions of the tested peptides with the media is not solely due to an “ion-exchange” mechanism since increasing salt concentration had no significant impact on retention time.

 For more information, reference application note [720004412EN](https://www.waters.com/content/dam/waters/technical-content/application-notes/20004412EN.pdf).

### Effect of pH on Ion-Exchange Protein Separations

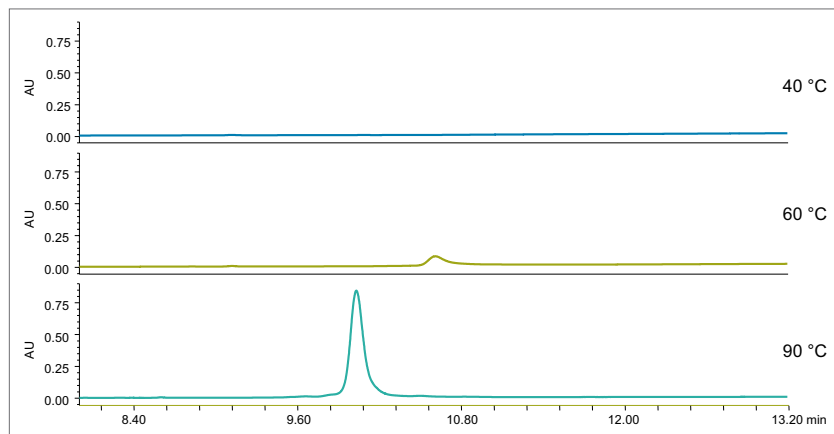
- pH has a significant influence on IEX separations
- Optimal pH for a separation is sample dependent



To illustrate the effect of buffer pH, a mixture of proteins was separated using weak cation-exchange chromatography at various pH values. At a pH of 6, different selectivity was observed for the most basic proteins vs. the separation at pH 6.2 and greater. At pH 6, ribonuclease A elutes before cytochrome c; this elution order is reversed when the separation was performed at pH 6.2 or greater, as shown in the figure. Sample: bovine,  $\alpha$ -chymotrypsinogen, bovine ribonuclease A, equine cytochrome c. Column: Protein-Pak Hi Res CM 7  $\mu$ m, 4.6  $\times$  100 mm. Conditions: 20 mM buffer (MES or sodium phosphate) pH 6 to 7.2, 1 mL/min, 0 to 0.2 M NaCl in 34 minutes at 30  $^{\circ}$ C.

## Temperature Effect on Reversed-Phase Protein Separations

- Use of “room temperature” is NOT always the ideal separation temperature
- Use of a column heater is strongly recommended for reproducible analyses

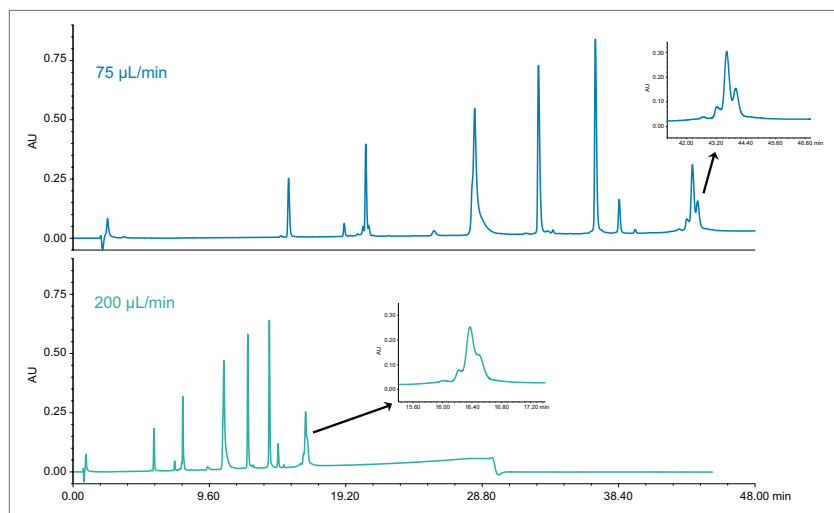


The intact IgG sample gave no observable peak at 40 °C, but recovery for the IgG sample improves with increasing temperature. There is not a measurable increase in recovery or improvement in peak shape above 80 °C. Column temperature has a large effect on reversed-phase separation of molecules. Changes in recovery and selectivity are not uncommon with small molecule separations. While increasing the temperature for proteins can significantly improve recovery, particularly for intact monoclonal antibodies, it doesn't generally affect the selectivity of the separation. However, not all proteins require higher temperatures for improved recovery. In fact, some protein separations have more desirable results with lower separation temperatures. Therefore, it is recommended that an evaluation of temperature be included in any method development strategy for new samples.

**i** For more information, reference application note [720003875EN](#).

## Effect of Flow Rate on Reversed-Phase Protein Separations

- Use of lower flows can translate into improved component resolution
- Analysis time will increase as flow rate increases
- Sample complexity can influence selected separation flow rate

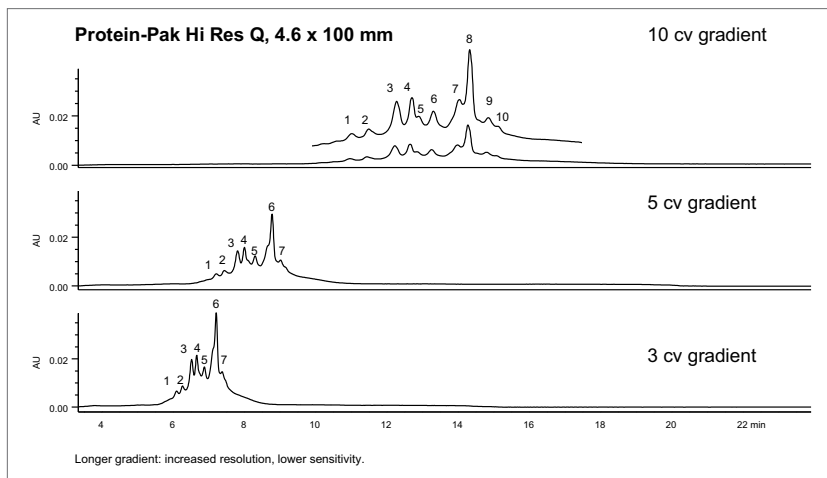


Decreasing the flow rate provides increased resolution without a compromise in the sensitivity, as seen in this separation of the protein mixture at 40 °C. The improved separation of the phosphorylase b sub-units can be seen (inset) at the lower flow rate. The run time of the analysis is increased proportionally to preserve the same gradient slope in both separations. Flow rate is seldom treated as an important parameter in method development except as an indirect modification of gradient slope. The impact of this variable is, however, more significant for larger molecules.

**i** For more information, reference application note [720003875EN](#).

## Effect of Gradient Duration on an IEX Protein Separation

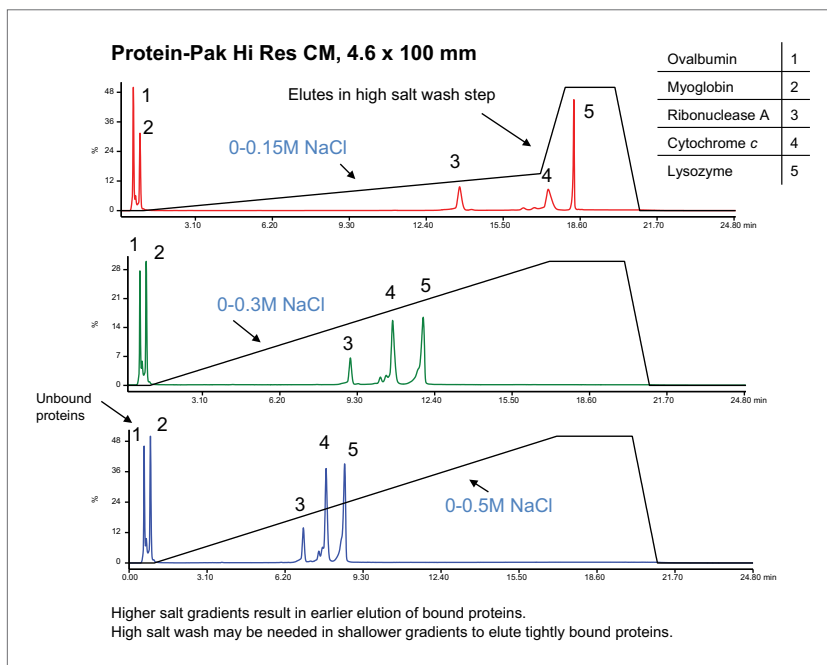
- Use of longer gradient time can translate into improved component resolution
- Analysis time will increase using longer gradients as will peak volume
- Sample complexity can influence selected gradient duration



The use of salt gradients can also be used to analyze variants of a single protein. In this example, chicken albumin was analyzed by anion-exchange chromatography. Three different gradient slopes were employed to analyze the variants of albumin formed by post-translational modifications, such as methylation, phosphorylation, and glycosylation. As can be observed in the chromatograms, the gradient slope can affect the number of variants detected, with shallower gradients reducing sensitivity but allowing for resolution of additional variants. Note: All gradients were performed at same flow rate from 0 to 0.5 M NaCl at same buffer pH.

## Effect of Gradient Slope on an IEX Protein Separation

- Gradients of differing salt concentration affect IEX protein separations
- Selected start and final salt concentration based on sample composition
- Analysis time and component resolution increases using increasingly shallow gradients

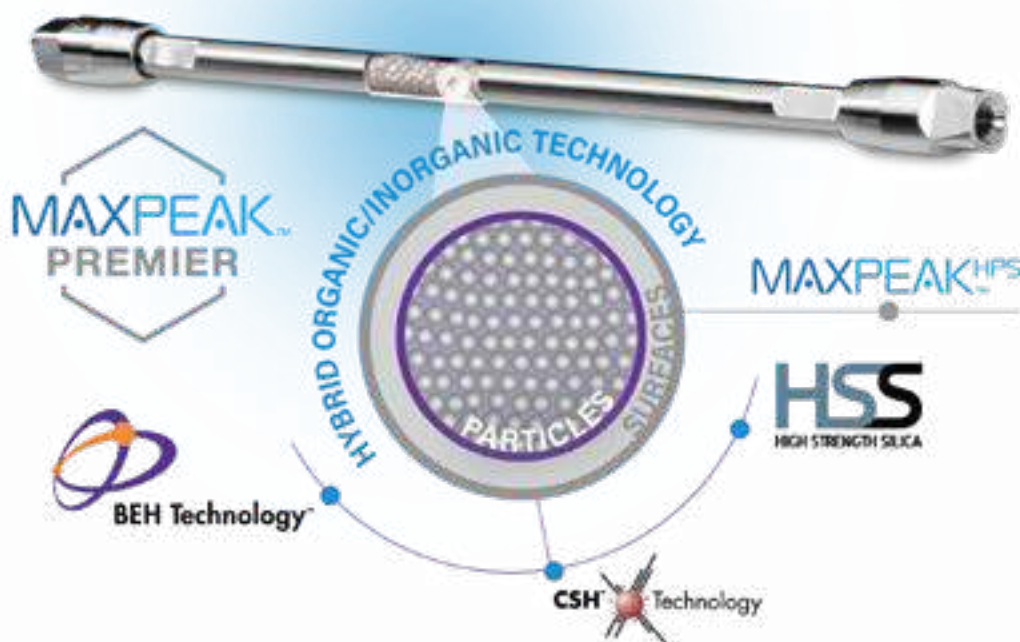


Gradients of differing salt concentration are frequently used in IEX protein separations to optimize retention time, component resolution, and overall analysis time. In this example, a protein mix was analyzed using three different salt gradients but keeping the run time identical. The higher salt gradient shown on the bottom of the chromatogram increases the salt concentration from 0-0.5 M NaCl, while the top chromatogram has a gradient which ends at 0.15 M NaCl, with the middle chromatogram ending at 0.3 M NaCl — note effect gradient has on separation. Flow rates same for all separations.

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MaxPeak Premier Columns provide:

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Available with particle technologies and quality manufacturing you can trust for small molecule, protein, peptide, oligonucleotide, and glycan separations in both reversed-phase and HILIC separation modes.

## Application-Specific Column Selections

### PEPTIDE ANALYSIS

#### ACQUITY™ Premier BEH and XBridge™ Premier Particle Technology

- Outstanding peak capacity and superior peak shape in TFA, DFA, and FA
- Two pore sizes (130 Å and 300 Å) to provide different separation selectivities

#### ACQUITY Premier CSH C<sub>18</sub>+ and XSelect™ CSH C<sub>18</sub>+ Premier Particle Technology

- Accepts greater peptide mass loads for improved low-level detection of impurities
- Excellent performance with TFA for optical applications, FA for MS, and DFA for dual detection

#### ACQUITY Premier HSS T3 and XSelect HSS T3 Premier Particle Technology

- Ideal choice for the separation of small, polar peptides with greater retentivity than hybrid (BEH, CSH) particle technology columns

### PROTEIN AGGREGATE, MONOMER, AND FRAGMENT ANALYSIS ANALYSIS

#### ACQUITY Premier Protein SEC and XBridge Premier Protein SEC 250 Å, 1.7 µm and 2.5 µm Particle Technology

- Efficiently separate protein size variants from simple to complex biotherapeutics (e.g., mAb, ADCs, bi-specifics, fusion proteins) that range from approximately 10,000 to 650,000 Daltons in a single SEC analysis for reliable component quantitation
- Minimize method development by using a single SEC buffer formulation without the need for co-solvents/additives for a variety of samples without sacrificing resolution
- Reduce the cost per analysis using MaxPeak Premier SEC 250 Å Guards that will not degrade the quality of challenging applications

### OLIGONUCLEOTIDE ANALYSIS

#### ACQUITY Premier BEH C<sub>18</sub> and XBridge Premier BEH C<sub>18</sub> Particle Technology

- Outstanding peak capacity and superior peak shape and lifetime in HFIP, HAA, and TEA
- Two pore sizes (130 Å and 300 Å) to provide different separation selectivities

### GLYCAN ANALYSIS

#### ACQUITY Premier BEH Amide and XBridge Premier BEH Amide Particle Technology

- Best suited for the analysis of released, N-labeled glycans using pre-column labeling with 2-AB, 2-AA, or Waters innovative and enabling *RapiFluor-MS™* reagent
- Two pore sizes (130 Å and 300 Å) to provide different selectivities from released glycans to large glycans, glycopeptides, and glycoproteins

#### ACQUITY Premier BEH C<sub>18</sub> AX and XBridge Premier BEH C<sub>18</sub> AX Particle Technology

- Charge-based separation of neutral-to-highly acidic released N-glycans
- Improved resolution and recovery for sialylated and phosphorylated glycans

### INTACT AND SUBUNIT PROTEIN ANALYSIS

#### ACQUITY Premier Protein BEH C<sub>4</sub> and XBridge Premier Protein BEH C<sub>4</sub>, 300 Å, 1.7 µm and 2.5 µm Particle Technology

- Separates proteins of various sizes, hydrophobicities, and isoelectric points
- tolerates extreme pH and temperature, and provides minimal secondary interactions
- Improves sensitivity for phosphorylated proteins and low-level intact and subunit mAb analysis

## Ordering Information

### ACQUITY Premier Columns

BEH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009452</a>
	2.1 × 100 mm	<a href="#">186009453</a>
	2.1 × 150 mm	<a href="#">186009454</a>

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BEH C <sub>18</sub> , 130 Å, VanGuard FIT	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009497</a>
	2.1 × 100 mm	<a href="#">186009457</a>
	2.1 × 150 mm	<a href="#">186009458</a>

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BEH Shield RP18, 130 Å	Particle Size: 1.8 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009490</a>
	2.1 × 100 mm	<a href="#">186009498</a>
	2.1 × 150 mm	<a href="#">186009499</a>

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BEH Shield RP18, 130 Å, VanGuard FIT	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009500</a>
	2.1 × 100 mm	<a href="#">186009501</a>
	2.1 × 150 mm	<a href="#">186009502</a>

---

BEH Amide, 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009504</a>
	2.1 × 100 mm	<a href="#">186009505</a>
	2.1 × 150 mm	<a href="#">186009506</a>

---

BEH Amide, 130 Å, VanGuard FIT	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009507</a>
	2.1 × 100 mm	<a href="#">186009508</a>
	2.1 × 150 mm	<a href="#">186009509</a>

### ACQUITY Premier Van Guard FIT Cartridges

BEH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009459</a>

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BEH Shield RP18, 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009503</a>

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BEH Amide, 130 Å	Particle Size: 1.8 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009510</a>

CSH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009460</a>
	2.1 × 100 mm	<a href="#">186009461</a>
	2.1 × 150 mm	<a href="#">186009462</a>

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CSH C <sub>18</sub> , 130 Å, VanGuard FIT	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009463</a>
	2.1 × 100 mm	<a href="#">186009464</a>
	2.1 × 150 mm	<a href="#">186009465</a>

---

CSH Phenyl Hexyl, 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009474</a>
	2.1 × 100 mm	<a href="#">186009475</a>
	2.1 × 150 mm	<a href="#">186009476</a>

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CSH Phenyl Hexyl, 130 Å, VanGuard FIT	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009477</a>
	2.1 × 100 mm	<a href="#">186009478</a>
	2.1 × 150 mm	<a href="#">186009479</a>

---

HSS T3, 100 Å	Particle Size: 1.8 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009467</a>
	2.1 × 100 mm	<a href="#">186009468</a>
	2.1 × 150 mm	<a href="#">186009469</a>

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HSS T3, 100 Å, VanGuard FIT	Particle Size: 1.8 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009470</a>
	2.1 × 100 mm	<a href="#">186009471</a>
	2.1 × 150 mm	<a href="#">186009472</a>

CSH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009466</a>

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CSH Phenyl Hexyl, 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009480</a>

---

HSS T3, 100 Å	Particle Size: 1.8 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009473</a>



## ACQUITY Premier 1.7 µm Columns for Bioseparations

Glycan BEH C <sub>18</sub> AX, 95 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009758</a>
	2.1 × 100 mm	<a href="#">186009759</a>
	2.1 × 150 mm	<a href="#">186009760</a>

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Glycan BEH C <sub>18</sub> AX, 95 Å, VanGuard FIT	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009970</a>
	2.1 × 100 mm	<a href="#">186009971</a>
	2.1 × 150 mm	<a href="#">186009972</a>

---

Glycan BEH Amide, 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009522</a>
	2.1 × 100 mm	<a href="#">186009523</a>
	2.1 × 150 mm	<a href="#">186009524</a>

---

Glycan BEH Amide, 130 Å, VanGuard FIT	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009974</a>
	2.1 × 100 mm	<a href="#">186009975</a>
	2.1 × 150 mm	<a href="#">186009976</a>

---

Glycoprotein BEH Amide, 300 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009547</a>
	2.1 × 100 mm	<a href="#">186009548</a>
	2.1 × 150 mm	<a href="#">186009549</a>

---

Oligonucleotide BEH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009484</a>
	2.1 × 100 mm	<a href="#">186009485</a>
	2.1 × 150 mm	<a href="#">186009486</a>

---

Peptide BEH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009481</a>
	2.1 × 100 mm	<a href="#">186009482</a>
	2.1 × 150 mm	<a href="#">186009483</a>

## ACQUITY Premier 1.7 µm Van Guard FIT Cartridges

Glycan BEH C <sub>18</sub> AX, 95 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009973</a>

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Glycan BEH Amide, 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009977</a>

Peptide BEH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009493*</a>
	2.1 × 100 mm	<a href="#">186009494*</a>
	2.1 × 150 mm	<a href="#">186009495*</a>

---

Peptide CSH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009487</a>
	2.1 × 100 mm	<a href="#">186009488</a>
	2.1 × 150 mm	<a href="#">186009489</a>

---

Peptide HSS T3, 100 Å	Particle Size: 1.8 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009490</a>
	2.1 × 100 mm	<a href="#">186009491</a>
	2.1 × 150 mm	<a href="#">186009492</a>

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Protein BEH C <sub>4</sub> , 300 Å Column and Standard	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">176005107**</a>
	2.1 × 100 mm	<a href="#">176005108**</a>
	2.1 × 150 mm	<a href="#">176005109**</a>

---

Protein SEC, 250 Å Column and Standard	Particle Size: 1.7 µm	
	Dimension	P/N
	4.6 × 150 mm	<a href="#">176005071***</a>
	4.6 × 300 mm	<a href="#">176005072***</a>

---

Protein SEC, 250 Å Column, Standard, and Guard	Particle Size: 1.7 µm	
	Dimension	P/N
	4.6 × 150 mm	<a href="#">176004794***</a>
	4.6 × 300 mm	<a href="#">176004795***</a>

\*Peptide BEH 300 Å columns may also be used for oligonucleotide analyses requiring wider pore sizes.

\*\*MassPREP Protein Mix Standard p/n: [186004900](#)

\*\*\*mAb Size Variant Standard p/n: [186009429](#); MaxPeak Premier Protein SEC 250 Å, 2.5 µm, 4.6 × 30 mm Guard p/n: [186009969](#)

MaxPeak Premier 2.5 µm Columns

XBridge Premier BEH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009827</a>
	2.1 × 100 mm	<a href="#">186009828</a>
	2.1 × 150 mm	<a href="#">186009829</a>
	4.6 × 50 mm	<a href="#">186009847</a>
	4.6 × 100 mm	<a href="#">186009848</a>
	4.6 × 150 mm	<a href="#">186009849</a>

XBridge Premier BEH C <sub>18</sub> , 130 Å, VanGuard FIT	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009843</a>
	2.1 × 100 mm	<a href="#">186009844</a>
	2.1 × 150 mm	<a href="#">186009845</a>
	4.6 × 50 mm	<a href="#">186009850</a>
	4.6 × 100 mm	<a href="#">186009851</a>
	4.6 × 150 mm	<a href="#">186009852</a>

XBridge Premier BEH Amide, 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009928</a>
	2.1 × 100 mm	<a href="#">186009929</a>
	2.1 × 150 mm	<a href="#">186009930</a>
	4.6 × 50 mm	<a href="#">186009935</a>
	4.6 × 100 mm	<a href="#">186009936</a>
	4.6 × 150 mm	<a href="#">186009937</a>

XBridge Premier BEH Amide, 130 Å, VanGuard FIT	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009931</a>
	2.1 × 100 mm	<a href="#">186009932</a>
	2.1 × 150 mm	<a href="#">186009933</a>
	4.6 × 50 mm	<a href="#">186009938</a>
	4.6 × 100 mm	<a href="#">186009939</a>
	4.6 × 150 mm	<a href="#">186009940</a>

XBridge Premier BEH Shield RP18, 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009914</a>
	2.1 × 100 mm	<a href="#">186009915</a>
	2.1 × 150 mm	<a href="#">186009916</a>
	4.6 × 50 mm	<a href="#">186009921</a>
	4.6 × 100 mm	<a href="#">186009922</a>
	4.6 × 150 mm	<a href="#">186009923</a>

XBridge Premier BEH Shield RP18, 130 Å, VanGuard FIT	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009917</a>
	2.1 × 100 mm	<a href="#">186009918</a>
	2.1 × 150 mm	<a href="#">186009919</a>
	4.6 × 50 mm	<a href="#">186009924</a>
	4.6 × 100 mm	<a href="#">186009925</a>
	4.6 × 150 mm	<a href="#">186009926</a>

XSelect Premier CSH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009865</a>
	2.1 × 100 mm	<a href="#">186009866</a>
	2.1 × 150 mm	<a href="#">186009867</a>
	4.6 × 50 mm	<a href="#">186009872</a>
	4.6 × 100 mm	<a href="#">186009873</a>
	4.6 × 150 mm	<a href="#">186009874</a>

XSelect Premier CSH C <sub>18</sub> , 130 Å, VanGuard FIT	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009868</a>
	2.1 × 100 mm	<a href="#">186009869</a>
	2.1 × 150 mm	<a href="#">186009870</a>
	4.6 × 50 mm	<a href="#">186009875</a>
	4.6 × 100 mm	<a href="#">186009876</a>
	4.6 × 150 mm	<a href="#">186009877</a>

XSelect Premier CSH Phenyl Hexyl, 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009879</a>
	2.1 × 100 mm	<a href="#">186009880</a>
	2.1 × 150 mm	<a href="#">186009881</a>
	4.6 × 50 mm	<a href="#">186009886</a>
	4.6 × 100 mm	<a href="#">186009887</a>
	4.6 × 150 mm	<a href="#">186009888</a>

XSelect Premier CSH Phenyl Hexyl, 130 Å, VanGuard FIT	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009882</a>
	2.1 × 100 mm	<a href="#">186009883</a>
	2.1 × 150 mm	<a href="#">186009884</a>
	4.6 × 50 mm	<a href="#">186009889</a>
	4.6 × 100 mm	<a href="#">186009890</a>
	4.6 × 150 mm	<a href="#">186009891</a>

XSelect Premier HSS T3, 100 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009830</a>
	2.1 × 100 mm	<a href="#">186009831</a>
	2.1 × 150 mm	<a href="#">186009832</a>
	4.6 × 50 mm	<a href="#">186009858</a>
	4.6 × 100 mm	<a href="#">186009859</a>
	4.6 × 150 mm	<a href="#">186009860</a>

XSelect Premier HSS T3, 100 Å, VanGuard FIT	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009854</a>
	2.1 × 100 mm	<a href="#">186009855</a>
	2.1 × 150 mm	<a href="#">186009856</a>
	4.6 × 50 mm	<a href="#">186009861</a>
	4.6 × 100 mm	<a href="#">186009862</a>
	4.6 × 150 mm	<a href="#">186009863</a>

## MaxPeak Premier 2.5 µm Van Guard FIT Cartridges

XBridge BEH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009842</a>
3.9 × 5 mm	<a href="#">186009846</a>	

XBridge BEH Amide, 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009927</a>
3.9 × 5 mm	<a href="#">186009934</a>	

XBridge BEH Shield RP18, 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009913</a>
3.9 × 5 mm	<a href="#">186009920</a>	

XSelect CSH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009864</a>
3.9 × 5 mm	<a href="#">186009871</a>	

XSelect CSH Phenyl Hexyl, 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009878</a>
3.9 × 5 mm	<a href="#">186009885</a>	

XSelect HSS T3, 100 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009853</a>
3.9 × 5 mm	<a href="#">186009857</a>	

## MaxPeak Premier 2.5 µm Columns for Bioseparations

XBridge Premier Glycan BEH C <sub>18</sub> AX, 95 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009947</a>
	2.1 × 100 mm	<a href="#">186009948</a>
	2.1 × 150 mm	<a href="#">186009949</a>
	4.6 × 50 mm	<a href="#">186009950</a>
	4.6 × 100 mm	<a href="#">186009951</a>
	4.6 × 150 mm	<a href="#">186009952</a>

XBridge Premier Glycan BEH Amide, 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009941</a>
	2.1 × 100 mm	<a href="#">186009942</a>
	2.1 × 150 mm	<a href="#">186009943</a>
	4.6 × 50 mm	<a href="#">186009944</a>
	4.6 × 100 mm	<a href="#">186009945</a>
4.6 × 150 mm	<a href="#">186009946</a>	

XBridge Premier Oligonucleotide BEH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009836</a>
	2.1 × 100 mm	<a href="#">186009837</a>
	2.1 × 150 mm	<a href="#">186009838</a>
	4.6 × 50 mm	<a href="#">186009901</a>
	4.6 × 100 mm	<a href="#">186009902</a>
4.6 × 150 mm	<a href="#">186009903</a>	

XBridge Premier Peptide BEH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009733</a>
	2.1 × 100 mm	<a href="#">186009734</a>
	2.1 × 150 mm	<a href="#">186009835</a>
	4.6 × 50 mm	<a href="#">186009898</a>
4.6 × 100 mm	<a href="#">186009899</a>	
4.6 × 150 mm	<a href="#">186009900</a>	

XBridge Premier Peptide BEH C <sub>18</sub> , 300 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009892*</a>
	2.1 × 100 mm	<a href="#">186009893*</a>
	2.1 × 150 mm	<a href="#">186009894*</a>
	4.6 × 50 mm	<a href="#">186009895*</a>
4.6 × 100 mm	<a href="#">186009896*</a>	
4.6 × 150 mm	<a href="#">186009897*</a>	

XBridge Premier Protein BEH C <sub>4</sub> , 300 Å Column and Standard	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">176005110**</a>
	2.1 × 100 mm	<a href="#">176005111**</a>
	2.1 × 150 mm	<a href="#">176005112**</a>
	4.6 × 50 mm	<a href="#">176005113**</a>
4.6 × 100 mm	<a href="#">176005114**</a>	
4.6 × 150 mm	<a href="#">176005115**</a>	

XSelect Premier Peptide HSS T3, 100 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009839</a>
	2.1 × 100 mm	<a href="#">186009840</a>
	2.1 × 150 mm	<a href="#">186009841</a>
	4.6 × 50 mm	<a href="#">186009910</a>
4.6 × 100 mm	<a href="#">186009911</a>	
4.6 × 150 mm	<a href="#">186009912</a>	

XBridge Premier Protein SEC 250 Å, Column and Standard	Particle Size: 2.5 µm	
	Dimension	P/N
	4.6 × 150 mm	<a href="#">176005067***</a>
	4.6 × 300 mm	<a href="#">176005068***</a>
7.8 × 150 mm	<a href="#">176005069***</a>	
7.8 × 150 mm	<a href="#">176005070***</a>	

XBridge Premier Protein SEC 250 Å, Column, Standard, and Guard	Particle Size: 2.5 µm	
	Dimension	P/N
	4.6 × 150 mm	<a href="#">176004790***</a>
	4.6 × 300 mm	<a href="#">176004791***</a>
	7.8 × 150 mm	<a href="#">176004792***</a>
7.8 × 150 mm	<a href="#">176004793***</a>	

\*XBridge Premier Peptide BEH 300 Å Columns may also be used for oligonucleotide analyses requiring wider pore sizes.

\*\*MassPREP Protein Mix Standard p/n: [186004900](#)

\*\*\*mAb Size Variant Standard p/n: [186009429](#); MaxPeak Premier Protein SEC 250 Å, 2.5 µm, 4.6 × 30 mm Guard p/n: [186009969](#)

## Atlantis Premier Columns

	Particle Size: 1.7 µm		Particle Size: 2.5 µm		Particle Size: 5 µm		
	Dimension	P/N	Dimension	P/N	Dimension	P/N	
<b>BEH C<sub>18</sub> AX, 95 Å</b>	2.1 × 30 mm	<a href="#">186009365</a>	2.1 × 30 mm	<a href="#">186009389</a>	2.1 × 50 mm	<a href="#">186009407</a>	
	2.1 × 50 mm	<a href="#">186009366</a>	2.1 × 50 mm	<a href="#">186009390</a>	2.1 × 100 mm	<a href="#">186009408</a>	
	2.1 × 75 mm	<a href="#">186009367</a>	2.1 × 75 mm	<a href="#">186009391</a>	2.1 × 150 mm	<a href="#">186009409</a>	
	2.1 × 100 mm	<a href="#">186009368</a>	2.1 × 100 mm	<a href="#">186009392</a>	4.6 × 50 mm	<a href="#">186009427</a>	
	2.1 × 150 mm	<a href="#">186009369</a>	2.1 × 150 mm	<a href="#">186009393</a>	4.6 × 100 mm	<a href="#">186009416</a>	
			4.6 × 50 mm	<a href="#">186009426</a>	4.6 × 150 mm	<a href="#">186009417</a>	
			4.6 × 100 mm	<a href="#">186009397</a>	4.6 × 250 mm	<a href="#">186009418</a>	
			4.6 × 150 mm	<a href="#">186009398</a>			
	<b>BEH C<sub>18</sub> AX, 95 Å, VanGuard FIT</b>	2.1 × 30 mm	<a href="#">186009357</a>	2.1 × 30 mm	<a href="#">186009374</a>	2.1 × 50 mm	<a href="#">186009404</a>
		2.1 × 50 mm	<a href="#">186009358</a>	2.1 × 50 mm	<a href="#">186009375</a>	2.1 × 100 mm	<a href="#">186009405</a>
2.1 × 75 mm		<a href="#">186009359</a>	2.1 × 75 mm	<a href="#">186009376</a>	2.1 × 150 mm	<a href="#">186009406</a>	
2.1 × 100 mm		<a href="#">186009360</a>	2.1 × 100 mm	<a href="#">186009378</a>	4.6 × 50 mm	<a href="#">186009410</a>	
2.1 × 150 mm		<a href="#">186009361</a>	2.1 × 150 mm	<a href="#">186009379</a>	4.6 × 100 mm	<a href="#">186009411</a>	
			4.6 × 50 mm	<a href="#">186009383</a>	4.6 × 150 mm	<a href="#">186009412</a>	
			4.6 × 100 mm	<a href="#">186009384</a>	4.6 × 250 mm	<a href="#">186009413</a>	
			4.6 × 150 mm	<a href="#">186009385</a>			
<b>BEH Z-HILIC, 95 Å</b>		2.1 × 50 mm	<a href="#">186009978</a>	2.1 × 50 mm	<a href="#">186009985</a>	2.1 × 50 mm	<a href="#">186009999</a>
		2.1 × 100 mm	<a href="#">186009979</a>	2.1 × 100 mm	<a href="#">186009986</a>	2.1 × 100 mm	<a href="#">186010000</a>
	2.1 × 150 mm	<a href="#">186009980</a>	2.1 × 150 mm	<a href="#">186009987</a>	2.1 × 150 mm	<a href="#">186010001</a>	
			4.6 × 50 mm	<a href="#">186009992</a>	4.6 × 50 mm	<a href="#">186010006</a>	
			4.6 × 100 mm	<a href="#">186009993</a>	4.6 × 100 mm	<a href="#">186010007</a>	
			4.6 × 150 mm	<a href="#">186009994</a>	4.6 × 150 mm	<a href="#">186010008</a>	
					4.6 × 250 mm	<a href="#">186010009</a>	
<b>BEH Z-HILIC, 95 Å, VanGuard FIT</b>	2.1 × 50 mm	<a href="#">186009981</a>	2.1 × 50 mm	<a href="#">186009988</a>	2.1 × 50 mm	<a href="#">186010002</a>	
	2.1 × 100 mm	<a href="#">186009982</a>	2.1 × 100 mm	<a href="#">186009989</a>	2.1 × 100 mm	<a href="#">186010003</a>	
	2.1 × 150 mm	<a href="#">186009983</a>	2.1 × 150 mm	<a href="#">186009990</a>	2.1 × 150 mm	<a href="#">186010004</a>	
			4.6 × 50 mm	<a href="#">186009995</a>	4.6 × 50 mm	<a href="#">186010010</a>	
			4.6 × 100 mm	<a href="#">186009996</a>	4.6 × 100 mm	<a href="#">186010011</a>	
			4.6 × 150 mm	<a href="#">186009997</a>	4.6 × 150 mm	<a href="#">186010012</a>	
					4.6 × 250 mm	<a href="#">186010013</a>	

## Atlantis Premier Van Guard FIT Cartridges

	Particle Size: 1.7 µm		Particle Size: 2.5 µm		Particle Size: 5 µm	
	Dimension	P/N	Dimension	P/N	Dimension	P/N
<b>BEH C<sub>18</sub> AX, 95 Å</b>	2.1 × 5 mm	<a href="#">186009373</a>	2.1 × 5 mm	<a href="#">186009402</a>	2.1 × 5 mm	<a href="#">186009421</a>
			3.9 × 5 mm	<a href="#">186009403</a>	3.9 × 5 mm	<a href="#">186009422</a>
<b>BEH Z-HILIC, 95 Å</b>	2.1 × 5 mm	<a href="#">186009984</a>	2.1 × 5 mm	<a href="#">186009991</a>	2.1 × 5 mm	<a href="#">186010005</a>
			3.9 × 5 mm	<a href="#">186009998</a>	3.9 × 5 mm	<a href="#">186010014</a>

## Amino Acid Analysis

Amino acids are the constituents of proteins and are the intermediates in many metabolic pathways. Qualitative and quantitative Amino Acid Analysis (AAA) is used to determine the concentration of proteins, identify proteins, and detect structural variants. Amino acid composition is a critical component of the nutritional value of foods and feeds. The same analytical tools are used to monitor cell culture and fermentation processes. AAA is also used as a clinical diagnostic tool for assessing inborn errors of metabolism and nutritional status. For LC-MS based physiological amino acid analysis solution, please refer to Kairos in Application Specific Columns, Kits, and Spare Parts chapter.

The accurate identification and quantification of amino acids in biological research and in the development and commercialization of food, beverage, and biotherapeutic products is challenging. This set of analytes covers a wide range of chemical properties (e.g., acidic, basic, neutral), yet resolution of individual pairs having only minor structural differences is required. Analysis is further complicated by the absence of common chromophores, necessitating use of a derivatization chemistry to enable analyte detection.

Reversed-phase chromatography provides good selectivity for separating amino acids. The most common approach to reversed-phase AAA includes pre-column derivatization. The derivatized amino acids retain better on the reversed-phase column and can be more easily separated. Most common derivatization reagents react with the amines. Some reagents react only with primary amines, but the most useful ones also react with secondary amines such that proline and hydroxyproline are also measured. In addition to improving chromatography, derivatization can make the amino acids readily detectable by UV absorbance or fluorescence.

For more than 50 years, Waters has provided reversed-phase chromatographic solutions that have successfully addressed a variety of organic compound analytical needs, including amino acid analysis. Hundreds of published papers have positively testified to the successful application of one of Waters pre-column amino acid derivatization chemistries that are used prior to the reversed-phase separation with on-line detection of resolved peaks using either UV absorbance or fluorescence. Waters offers three distinct methods that utilize pre-column derivatization and reversed-phase chromatography for accurate identification and quantitation of free or bound amino acids: Pico-Tag, AccQ-Tag, and AccQ-Tag Ultra C<sub>18</sub>.

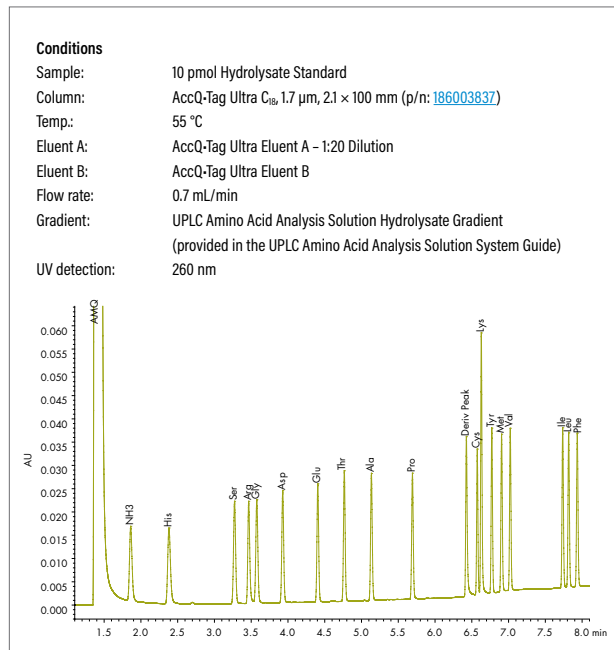


Pico-Tag Method	AccQ-Tag Method	AccQ-Tag Ultra C <sub>18</sub> Chemistry Package
1980's	1990's	2006
<ul style="list-style-type: none"> <li>Designed for use with HPLC systems</li> <li>Applicable to any sample including protein hydrolysates, physiologic fluids, feeds, foods, and pharmaceutical preparations</li> <li>Based on the coupling reaction of the well known Edman Degradation, the reaction of phenylisothiocyanate (PITC) with both primary and secondary amino acids to form phenylthiocarbamyl (PTC) derivatives</li> <li>QC tested for use on HPLC with UV detection</li> </ul>	<ul style="list-style-type: none"> <li>Designed for use with HPLC systems</li> <li>Suitable for protein and peptide identification and quantitation, monitoring cell culture media and nutritional content of food and feed</li> <li>Based on AccQ-Tag derivatization of primary and secondary amino acids in aqueous conditions</li> <li>QC tested for use on HPLC with fluorescence detection</li> </ul>	<ul style="list-style-type: none"> <li>Designed specifically for use with the UPLC Amino Acid Analysis Solution</li> <li>AccQ-Tag Ultra C<sub>18</sub> Chemistry Package is part of a complete solution that includes instrument, software, and support for amino acid analysis of protein hydrolysates, cell culture media, foods, and feeds</li> <li>Based on AccQ-Tag derivatization of primary and secondary amino acids in aqueous conditions</li> <li>Reagents, columns, and eluents QC tested with an amino acid separation</li> </ul>

## ACCURATE AMINO ACID ANALYSES FROM VARIED SAMPLE MATRICES

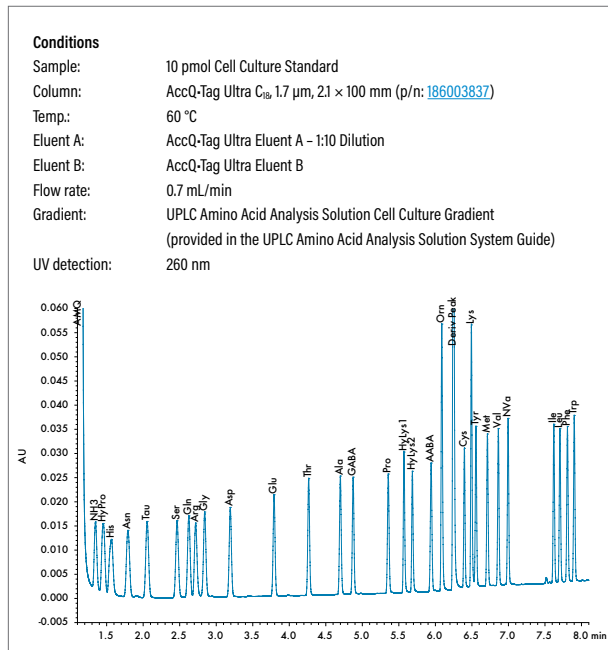
The UPLC Amino Acid Analysis Solution includes two complete methods using the same instrumentation and chemistries. The first is suitable for the amino acids derived from protein hydrolysates. The second is suitable for the larger number of free amino acids found in process samples such as cell culture or fermentation broths. The methods differ in the dilution of the AccQ-Tag Ultra Eluent A and the separation column temperature. There are no user adjustments of pH or modifications of composition for either Eluent A or Eluent B.

### Hydrolysate Standard 10 pmol/μL



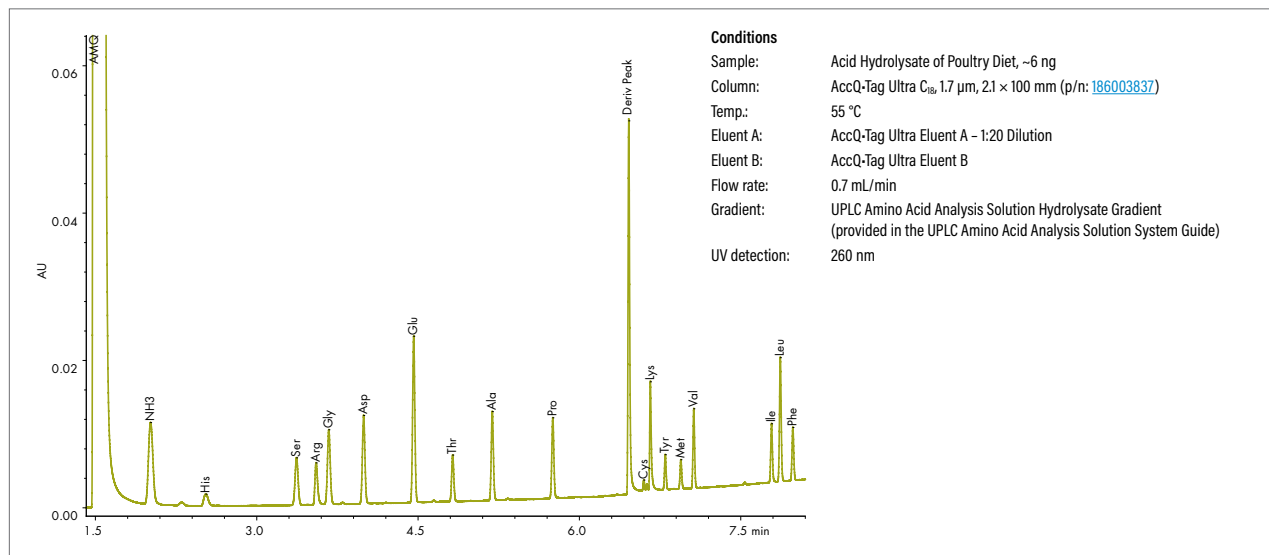
Separation of standard amino acids using the UPLC Amino Acid Analysis Solution Hydrolysate Method.

### Cell Culture Standard 10 pmol/μL



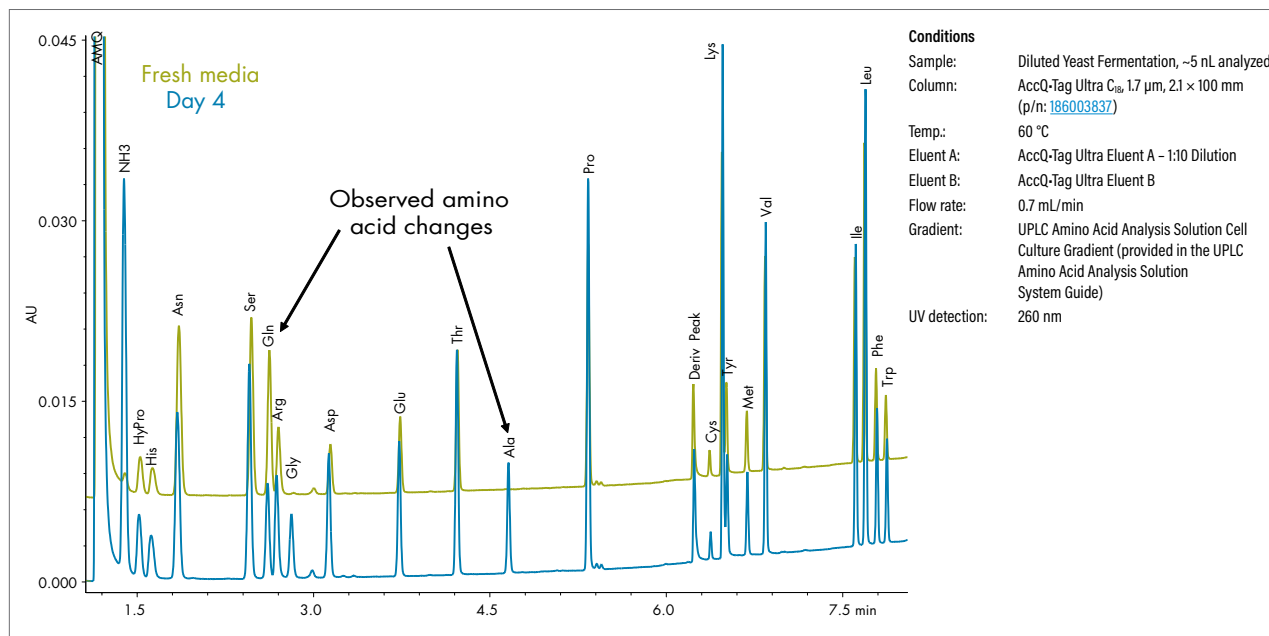
Separation of the larger set of standard amino acids using the UPLC Amino Acid Analysis Solution Cell Culture Method. No modification of the mobile phase pH or composition is required.

### Amino Acid Analysis of Hydrolyzed Poultry Diet



The 75 replicate analyses of a poultry diet mixed feed gives reproducible measurements of the weight percentage of the growth-limiting amino acids, typically 1% or better. The high sensitivity of the method ensures that only a very small aliquot of sample is required, thereby minimizing interferences.

## Amino Acid Analysis of Cell Culture Media



Amino acid levels in a growing cell culture change over a relatively short period shown here as a decrease in glutamine accompanied by an increase in alanine. The supplied methods were used without modification and no sample prep beyond dilution was required.

### UPLC: AccQ-Tag ULTRA C<sub>18</sub> AMINO ACID ANALYSIS SOLUTION

Waters' UPLC Amino Acid Analysis Application Solution is the product of over 25 years of experience in amino acid analysis, highlighted by the development and industry-wide acceptance of the innovative and proven Pico-Tag and AccQ-Tag pre-column derivatization chemistries. The UPLC Amino Acid Analysis Solution is holistically designed to offer a total application solution that is optimized for accurate, reliable, and reproducible analysis of amino acids. The solution leverages Waters experience in separation science, derivatization chemistries, and information management to ensure accurate and precise qualitative and quantitative results. Our solution also provides performance-qualified methodologies that are designed to be rugged and reliable, assuring reproducible results day-to-day, instrument-to-instrument, lab-to-lab, around the world—with the expert support that scientists have come to expect from Waters. Users can feel confident with assured performance in the areas of protein characterization, cell culture monitoring, and nutritional analysis of foods and feeds.

The UPLC Amino Acid Analysis Solution consists of:

- ACQUITY UPLC H-Class (quaternary\*) System with a tunable UV detector for enhanced chromatographic resolution and maximum-sensitivity detection
- AccQ-Tag Ultra C<sub>18</sub> derivatization chemistries including quality-controlled 1.7 µm columns, reagents, and eluents
- Empower™ 3 pre-configured projects, methods, and report templates
- Installation and application training and support
- Connections INSIGHT™ ISDP instrument diagnostics to ensure continuous, consistent, and reliable operation
- Standards and kits to validate and troubleshoot

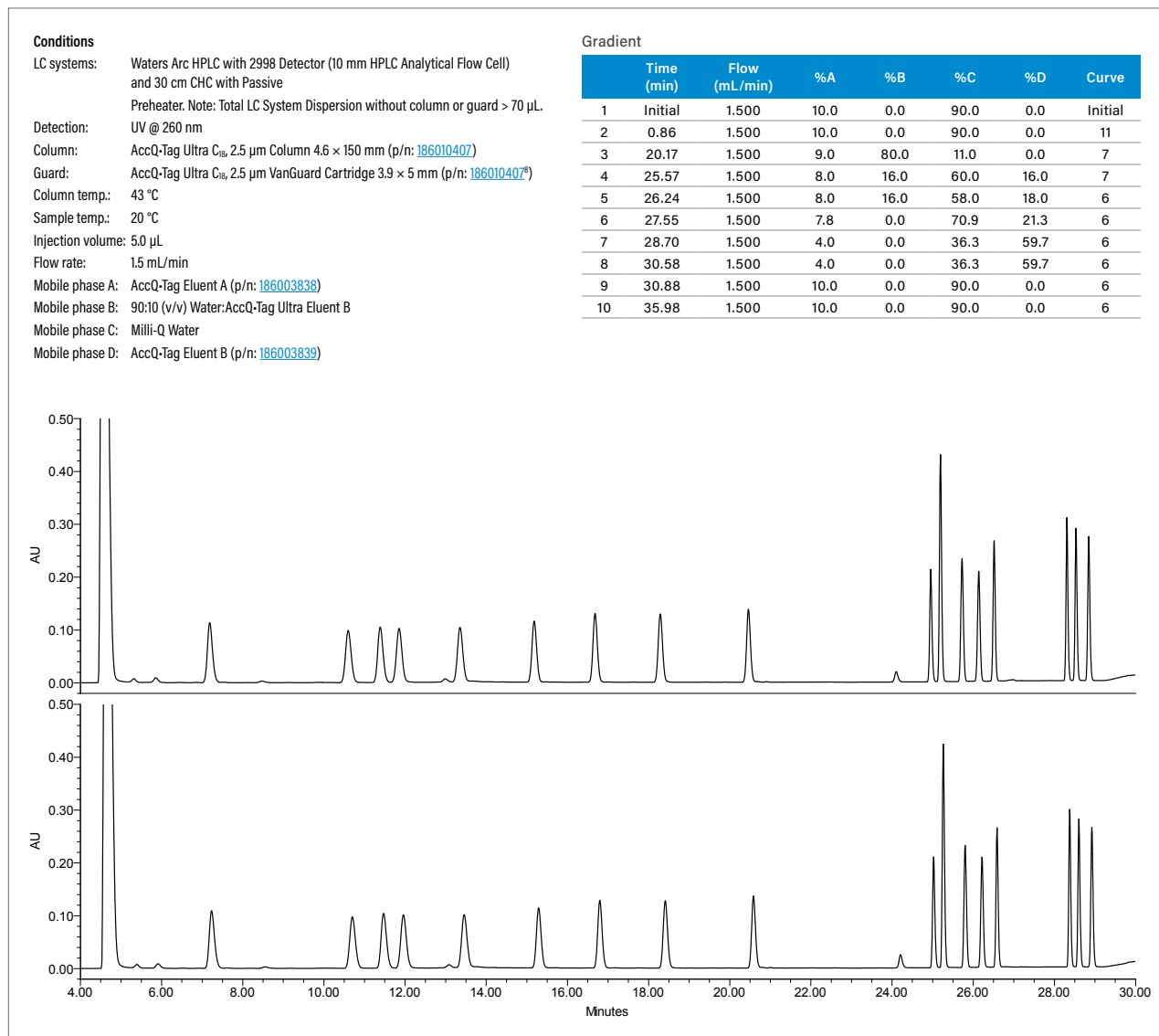
\*Amino acid analysis can be performed on other systems such as ACQUITY UPLC H-Class PLUS Binary and ACQUITY Premier Binary systems. These are not considered as a total solution.

## UHPLC AND HPLC: AccQ-Tag ULTRA C<sub>18</sub> AMINO ACID ANALYSIS

In 2022, Waters expanded its Amino Acid Analysis offerings with the introduction of the same BEH-based, C<sub>18</sub> columns (as used in UPLC-based applications) but using 2.5 µm particles all amino analysis batch tested to work on UHPLC and HPLC systems with <70 µl dispersion with UV detection. These columns combined with the AccQ-Tag Ultra C<sub>18</sub> pre-column derivatization kit for 250 analyses, completes this flexible portfolio to help scientists quickly and accurately obtain accurate quantitative data in half the time compared to use of legacy HPLC methods with FLR detection. Samples can now be successfully analyzed in under an hour.

*\* This is not a full system solution but a detailed care and use manual is available to help successfully use this offering on appropriate LC Systems.*

### Hydrolysate Standard (500 µm) Chromatographic Comparison



Analysis of Protein Hydrolysate standard on the AccQ-Tag Ultra C<sub>18</sub>, 2.5 µm 4.6 × 150 mm Column with (top) and without AccQ-Tag Ultra C<sub>18</sub>, 2.5 µm VanGuard Cartridge 3.9 × 5 mm (bottom) installed on a Waters Arc HPLC with 2898 Detector. 1) AMQ, 2) His, 3) Ser, 4) Arg, 5) Gly, 6) Asp, 7) Glu, 8) Thr, 9) Ala, 10) Pro, 11) Derivatization peak, 12) Cys, 13) Lys, 15) Tyr, 15) Met, 16) Val, 17) Ile, 18) Leu, 19) Phe.



## ACCQ-TAG ULTRA C<sub>18</sub> HPLC CHEMISTRY

The AccQ•Tag Ultra C<sub>18</sub> Chemistry is an integral component of the Waters UPLC Amino Acid Analysis Application Solution. This application solution is an integrated combination of instrumentation, derivatization chemistry, separation column and eluents, methods and software. Analysts are assured of accurate and precise amino acid analyses with the complete application solution. The use of the AccQ•Tag Ultra C<sub>18</sub> Chemistry without the rest of the application solution is not supported as an Amino Acid Analysis method.

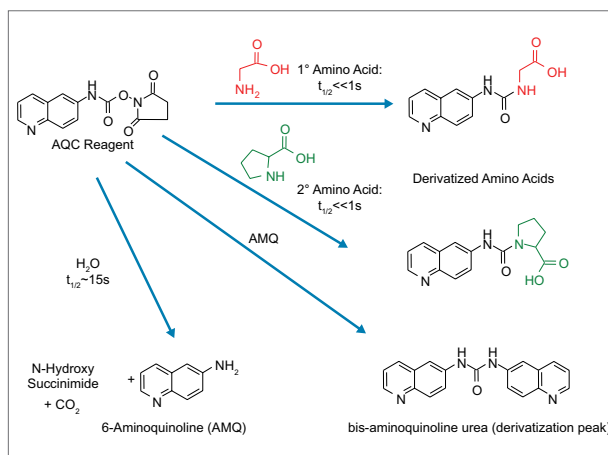
AccQ•Tag Ultra C<sub>18</sub> Chemistry is different from the AccQ•Tag HPLC method, that uses an HPLC Column containing 100% Silica-based C<sub>18</sub>, 4 µm particles, described later in this chapter. Although the components of the two derivatization kits are the same, the QC tests are based on the specific separation and detection protocols. Both methods begin with the same derivatization chemistry but differ in all the other details such that components cannot be interchanged. Most importantly, the AccQ•Tag Ultra C<sub>18</sub> 1.7 µm and 2.5 µm Guard and Columns have a completely different chemistry from the AccQ•Tag HPLC Column. The AccQ•Tag Ultra C<sub>18</sub> Columns leverage Waters 1.7 µm and 2.5 µm hybrid-silica BEH Technology particles that deliver excellent column efficiency and resolution. The AccQ•Tag Ultra C<sub>18</sub> 1.7 µm Column is designed for use on Waters ACQUITY™ UPLC Systems and include use of Waters eCord™ Intelligent Chip Technology that is permanently attached to the column to easily track use history. The mobile phases used in the AccQ•Tag Ultra C<sub>18</sub> method is different from that used for the AccQ•Tag HPLC method, each being optimized for the specific column and detection technique.

Compared to traditional HPLC methods, Waters UPLC Amino Acid Analysis Solution, that uses the AccQ•Tag Ultra C<sub>18</sub>, 1.7 µm Column, results in peaks that are much sharper and better resolved. This improved resolution results in a rugged method where there is no ambiguity in peak identification and it simplifies quantitation. The better resolution provides a precise, reliable method. The dramatically higher throughput (3 to 5 times faster) with UPLC Technology enables users to make more informed decisions faster and to perform more analyses per day.

### AccQ•Tag Derivatization Reaction

- Utilizes AccQ•Tag Ultra C<sub>18</sub> Reagent Powder
  - 6-aminoquinolyl-N-hydroxysuccinimidyl carbamate (AQC)
  - US Patent #5,296,599 and European Patent #EP 0 533 200 B1
- AQC reacts rapidly with both primary and secondary amines
- Excess reagent reacts more slowly with water to form 6-aminoquinoline (AMQ)
- AMQ reacts slowly with excess AQC reagent to form a bisurea
- Derivatized amino acids are separated chromatographically from the byproducts
- Requires no vacuum drying, sample prep, or extraction

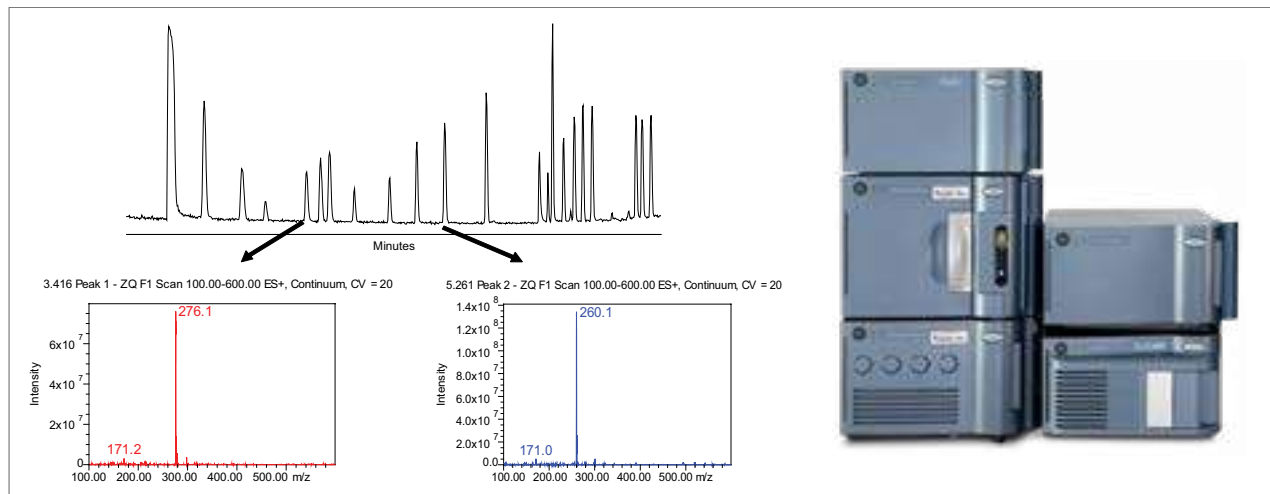
### Chemistry of the AccQ•Tag Derivatization Reaction



## MS Compatible

The UPLC Amino Acid Analysis Application Solution is directly compatible with electrospray mass spectrometry. No adjustment is required to have an MS TIC that exactly matches the UV trace. MS is extremely useful for any samples that may have an extra, unknown, or unexpected peak, since the identification of amino acids can be confirmed by their molecular weight. Although MS is not required for routine peak identification and does not provide additional useful sensitivity, the use of MS-compatible mobile phases makes using MS detection simple.

### Direct Flow into Source at 700 $\mu\text{L}/\text{min}$



The UPLC Amino Acid Analysis Application Solution is directly compatible with electrospray mass spectrometry.

## Amino Acid Analysis Standard

Amino acid analysis is required in many applications in pharmaceutical and food and feed industries. A variety of standards containing free amino acids are offered for qualitative and quantitative determination of amino acids, method development, and troubleshooting of the AccQ•Tag™ Ultra C<sub>18</sub> or AccQ•Tag HPLC methods.

## Ordering Information

### Amino Acid Standard

Description	P/N
Amino Acid Standard 10 × 1 mL ampules of unlabeled amino acid standards	<a href="#">WAT088122</a>
Amino Acid Cell Culture Standard Kit Kit contains: 2 vials contain 17 amino acids 8 vials contain 9 cell culture supplemental amino acids	<a href="#">186009300</a>
Amino Acid Food and Feed Standard Kit Kit contains: 2 vials contain 17 amino acids 8 vials contain 4 food and feed supplemental amino acids	<a href="#">186009299</a>
Amino Acid Internal Standard - Norvaline 1 vial	<a href="#">186009301</a>

List of Amino Acids in Each Amino Acid Standard Amino Acid Standard

Amino Acid	Amino Acid Standard p/n: <a href="#">WAT088122</a>	Cell Culture Standard Kit p/n: <a href="#">186009300</a>	Food and Feed Standard Kit p/n: <a href="#">186009299</a>	Internal Standard p/n: <a href="#">186009301</a>
Alanine	■	■	■	—
Arginine	■	■	■	—
Aspartic acid	■	■	■	—
Cystine	■	■	■	—
Glutamic acid	■	■	■	—
Glycine	■	■	■	—
Histidine	■	■	■	—
Isoleucine	■	■	■	—
Leucine	■	■	■	—
Lysine	■	■	■	—
Methionine	■	■	■	—
Phenylalanine	■	■	■	—
Proline	■	■	■	—
Serine	■	■	■	—
Threonine	■	■	■	—
Tyrosine	■	■	■	—
Valine	■	■	■	—
Taurine	—	■	■	—
HydroxyProline	—	■	—	—
Asparagine	—	■	—	—
Glutamine	—	■	—	—
GABA ( $\gamma$ -Aminobutyric acid)	—	■	—	—
Tryptophan	—	■	—	—
Ornithine	—	■	—	—
AABA ( $\alpha$ -Aminobutyric acid)	—	■	■	—
HydroxyLysine	—	■	—	—
Methionine Sulfone	—	—	■	—
Cysteic Acid	—	—	■	—
Norvaline	—	—	—	■

## Ordering Information

UPLC: AccQ-Tag Ultra C<sub>18</sub> Amino Acid Analysis Kits and Accessories designed for use on a Waters, low dispersion, ACQUITY UPLCs

Description	Qty.	P/N
UPLC AAA H-Class Applications Kit		<a href="#">176002983</a>
This kit is intended to enable existing ACQUITY UPLC H-Class Systems for AAA applications.		
Kit contains:		
AccQ-Tag Ultra Derivatization Kit, 250 analyses		
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, 2.1 × 100 mm Column		
AccQ-Tag Ultra Eluent A, concentrate	1 L	
AccQ-Tag Ultra Eluent B	1 L	
Amino acid standard, hydrolysate	10 × 1 mL	
Total recovery vials	3 × 100/pk	
Tube inlet 0.0025 I.D. PEEK nut PDA assembly		
Column In-line filter kit		
UPLC AAA H-Class solution information set		
AAA application and familiarization service		
AccQ-Tag Ultra Chemistry Kit		<a href="#">176001235</a>
The refill kit is intended to recharge the AccQ-Tag Ultra chemistries that are part of the application kit. This kit should be purchased by those that have already purchased the AccQ-Tag Ultra Application Solution. This kit is applicable to both ACQUITY UPLC and ACQUITY UPLC H-Class AAA Application Solutions, and should not be purchased as part of an initial system.		
Kit contains:		
AccQ-Tag Ultra Derivatization Kit, 250 analyses		
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, 2.1 × 100 mm Column		
AccQ-Tag Ultra Eluent A, concentrate	1 L	
AccQ-Tag Ultra Eluent B	1 L	
Amino acid standard, hydrolysate	10 × 1 mL	
Sample tubes	4 × 72/pk	
Total recovery vials with caps	3 × 100/pk	
AccQ-Tag Ultra Derivatization Kit, 250 Analyses		<a href="#">186003836</a>
AccQ-Tag Ultra Borate Buffer	5 × 6 mL	
AccQ-Tag Ultra Derivatization Reagent Powder	5 × 3 mg	
AccQ-Tag Ultra Reagent Diluent	5 × 4 mL	
AccQTag Ultra Borate Buffer - 10 mL		<a href="#">186009283</a>
Amino Acid Standard, Hydrolysate (AccQ-Tag, Pico-Tag, AccQ-Tag Ultra)	10 × 1 mL	<a href="#">WAT088122</a>
A standard mixture containing 18 amino acids (17 hydrolysate amino acids each at 2.5 mM and cystine at 1.25 mM)		
Sample Tubes	4 × 72/pk	<a href="#">WAT007571</a>
Total Recovery Vials with Caps	3 × 100/pk	<a href="#">186000384C</a>
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, 2.1 × 100 mm Column		<a href="#">186003837</a>
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, 2.1 × 50 mm Column, 1/pk		<a href="#">186009953</a>
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, 2.1 × 150 mm Column, 1/pk		<a href="#">186009954</a>
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, VanGuard Pre-Column, 2.1 × 5 mm, 3/Pk		<a href="#">186009955</a>
AccQ-Tag Ultra Eluent A, concentrate	1 L	<a href="#">186003838</a>
AccQ-Tag Ultra Eluent B	1 L	<a href="#">186003839</a>
Hydrolysis Primer, Amino Acid Analysis		<a href="#">715006455</a>

UHPLC and HPLC: AccQ-Tag Ultra C<sub>18</sub> Amino Acid Analysis Kit

Description	Qty.	P/N
UHPLC and HPLC: AccQ-Tag Ultra C <sub>18</sub> Amino Acid Analysis Kit		<a href="#">176005152</a>
The kit is intended to provide all the materials needed in order to get started running the AccQ-Tag Ultra chemistries on a UHPLC and HPLC system.		
Kit contains:		
AccQ-Tag Ultra Derivatization Kit, 250 analyses		
AccQ-Tag Ultra C <sub>18</sub> , 2.5 µm, 4.6 × 150 mm Column		
AccQ-Tag Ultra Eluent A, concentrate	1 L	
AccQ-Tag Ultra Eluent B	1 L	
Amino acid standard, hydrolysate	10 × 1 mL	
Total recovery vials	3 × 100/pk	

### UPLC-based Amino Acid Analysis

Description	P/N
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, 2.1 × 50 mm Column	<a href="#">186009953</a>
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, 2.1 × 100 mm Column	<a href="#">186003837</a>
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, 2.1 × 150 mm Column	<a href="#">186009954</a>
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, 2.1 × 5 mm VanGuard Pre-Column	<a href="#">186009955</a>

### UHPLC and HPLC-based Amino Acid Analysis

Description	P/N
AccQ-Tag Ultra C <sub>18</sub> , 2.5 µm, 4.6 × 50 mm Column	<a href="#">186010405</a>
AccQ-Tag Ultra C <sub>18</sub> , 2.5 µm, 4.6 × 100 mm Column	<a href="#">186010406</a>
AccQ-Tag Ultra C <sub>18</sub> , 2.5 µm, 4.6 × 150 mm Column	<a href="#">186010406</a>
AccQ-Tag Ultra C <sub>18</sub> , 2.5 µm, 4.6 × 5 mm VanGuard Cartridge*, 3/pk	<a href="#">186010408</a>

\* Requires use of VanGuard 3.9 mm ID Cartridge Holder: p/n [186007949](#)

### Amino Acid Primer

Description	P/N
Hydrolysis Primer, Amino Acid	<a href="#">715006455</a>



## Amino Acid Analysis Automation

Automation increases efficiency, repeatability and avoids contamination and human errors. Amino acid analysis automation is enabled through the automation derivatization kit and verified automation scripts on Andrew+, Tecan, or Hamilton automation platforms. The automation derivatization kit is system agnostic and designed in a 32 × 3 format for up to 96 sample preparation. It has a larger volume per sample than the manual derivatization kit to accommodate the residual volumes required by automation workflow. The script includes barcode scanning, linearity calibration, sample dilution, derivatization, heating, shaking functions, which allow analysts to walk away during sample preparations, and 96 samples are prepared in less than an hour.

### Ordering Information

Automation: AccQ-Tag Ultra C<sub>18</sub> Amino Acid Analysis Kits and Accessories

Description	P/N
AccQ-Tag Ultra C <sub>18</sub> Derivatization Kit – Automation, 96 analyses	<a href="#">186009232</a>
AccQ-Tag Borate Buffer – 10 mL	<a href="#">186009283</a>
96-Well Sample Collection Plate, 800 µL Round Well, 50/pk	<a href="#">186002481</a>
Cap Mat, 5/pk	<a href="#">186006332</a>
AccQ-Tag Ultra Cell Culture Chemistry Kit – Automation	<a href="#">176004534</a>
AccQ-Tag Ultra Food and Feed Chemistry Kit – Automation	<a href="#">176004533</a>
AccQ-Tag Ultra Hydrolysates Chemistry Kit – Automation	<a href="#">176004542</a>
AccQ-Tag Ultra Cell Culture Tecan Script Starter Kit – CD	<a href="#">176004543</a>
AccQ-Tag Ultra Cell Culture Tecan Script Starter Kit – USB	<a href="#">176004544</a>
AccQ-Tag Ultra Cell Culture Hamilton Script Starter Kit – CD	<a href="#">176004545</a>
AccQ-Tag Ultra Cell Culture Hamilton Script Starter Kit – USB	<a href="#">176004546</a>



AccQ-Tag Ultra C<sub>18</sub> Derivatization Automation Kit

## AccQ-Tag Ultra Amino Acid Analysis Automation Kits for Andrew+

Description	P/N
Andrew+ Pipetting Robot Andrew+ Pipetting Robot, waste base, waste container, power supply, cables, and 1 × each single and multi-channel pipette adaptors	176004567
Andrew+ Startup Kit Intended for all new Andrew+ systems and includes Dominos, pipette adaptors, and lab kit with consumables for system installation	176004568
Pipette Kit for AccQ-Tag Includes 3× Andrew Alliance Pipettes	176004583
Domino Kit for AccQ-Tag Includes additional dominos and connected devices for Amino Acid OneLab protocol with Andrew+ automation	176004582
AccQ-Tag Ultra Derivatization Kit – Automation Provides simplified tools to enhance high throughput amino acid automation, enabling processing of up to 96 samples in 3 × 32 sample batches	<a href="#">186009232</a>
Roller for Cap mats Helps to smooth out the cap mat before putting it on system for injection	<a href="#">186002633</a>

## AccQ-Tag Ultra Amino Acid Analysis Optional Accessories for Andrew+

Description	P/N
Amino Acid Cell Culture Standard Kit Contains 26 amino acids monitored in cell culture media or other matrices. The standard is designed for both ID and quantitative amino acid analysis	<a href="#">186009300</a>
Amino Acid Food and Feed Standard Kit Contains 21 amino acids analyzed in food and feed matrix. The standard is designed for both ID and quantitative amino acid analysis	<a href="#">186009299</a>
Amino Acid Internal Standard – Norvaline Compensates for the variability generated in sample hydrolysis and amino acid analysis	<a href="#">186009301</a>
AccQ-Tag Ultra 1.7 µm, 2.1 × 100 mm Column Separates the amino acid derivatives produced in the reaction with Waters AccQ-Tag Ultra Derivatization Reagent	<a href="#">186003837</a>
AccQ-Tag Ultra Eluent A Mobile phase eluents for reversed phase separation of amino acid derivatives	<a href="#">186003838</a>
AccQ-Tag Ultra Eluent B Mobile-phase eluents for reversed phase separation of amino acid derivatives	<a href="#">186003839</a>

## HPLC: AccQ-Tag AMINO ACID ANALYSIS SOLUTION

The HPLC-based AccQ-Tag Method utilizes the same pre-column derivatization step as used for the AccQ-Tag Ultra C<sub>18</sub> Method but uses a 100% silica-based, C<sub>18</sub>, 4 µm column resulting in a 60 min analysis time using fluorescent detection. The AccQ-Fluor™ Reagent, 6-aminoquinolyl-N-hydroxysuccinimidyl carbamate (AQC), derivatizes primary and secondary amines in a simple, single-step reaction to yield highly stable, fluorescent adducts. We offer the AccQ-Tag Method as a system package consisting of pre-packaged reagents and extensive documentation.

The AccQ-Tag chemistry package contains the items you need for up to 250 analyses of protein and peptide hydrolysate amino acids.

### AccQ-Tag Derivatization Kit

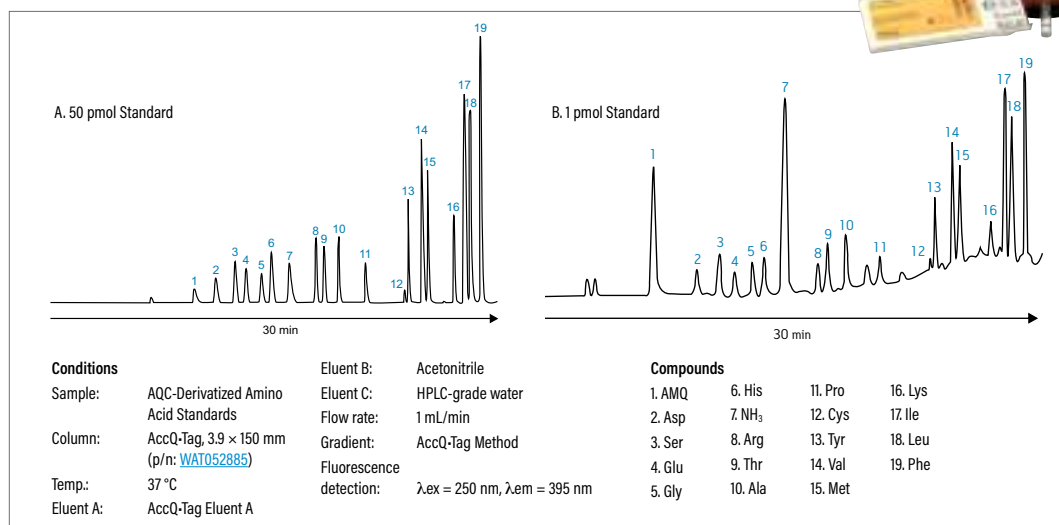
The AccQ-Tag Derivatization Kit contains five sets of the derivatizing reagents. Each set of reagents includes one vial each of:

- AccQ-Fluor Borate Buffer – The buffer is added to the samples to ensure the optimum pH for derivatization.
- AccQ-Fluor Reagent Powder – The reagent powder is the 6-aminoquinolyl-N-hydroxysuccinimidyl carbamate (AQC) derivatizing reagent. It is shipped dry for maximum stability.
- AccQ-Fluor Reagent Diluent – This diluent, acetonitrile, is used to reconstitute the reagent for derivatization.

### AccQ-Tag Amino Acid Analysis Column

The AccQ-Tag Column is a high-efficiency HPLC column specifically certified for use with the AccQ-Tag Method. This column separates the amino acid derivatives produced by the AccQ-Fluor derivatization reaction.

### AccQ-Tag Analysis of Hydrolysate Amino Acids



*Application of the AccQ-Tag Method to the analysis of hydrolysate amino acids is illustrated. The high purity reagents provided in the AccQ-Tag chemistry package enable high sensitivity analysis by minimizing background amino acid content. AMQ (6-aminoquinoline).*

## Ordering Information

### AccQ-Tag Amino Acid Analysis Kits and Accessories for HPLC and UHPLC AAA Analysis

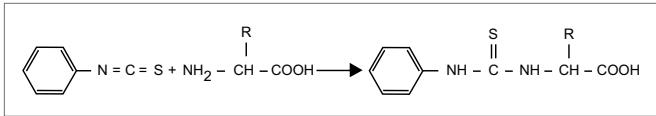
Description	Qty.	P/N
AccQ-Tag Chemistry Kit		<a href="#">WAT052875</a>
Kit is for up to 250 analyses and contains:		
AccQ-Fluor Reagent 1	5 × 6 mL	
AccQ-Fluor Reagent 2A	5 × 3 mg	
AccQ-Fluor Reagent 2B	5 × 3 mL	
AccQ-Tag Column, 3.9 × 150 mm		
AccQ-Tag Eluent A, concentrate	2 × 1 L	
Sample tubes	4 × 72/pk	
Amino acid standard, hydrolysate	10 × 1 mL	
AccQ-Tag User Guide		
Amino Acid Standard, Hydrolysate	10 × 1 mL	<a href="#">WAT088122</a>
A standard mixture containing 18 amino acids (17 hydrolysate amino acids each at 2.5 mM and cystine at 1.25 mM).		
AccQ-Tag Eluent A Concentrate	1 L	<a href="#">WAT052890</a>
AccQ-Tag Eluent B	1 L	<a href="#">WAT052895</a>
AccQ-Fluor Reagent Kit		<a href="#">WAT052880</a>
Kit contains:		
AccQ-Fluor Reagent 1	5 × 6 mL	
AccQ-Fluor Reagent 2A	5 × 3 mg	
AccQ-Fluor Reagent 2B	5 × 4 mL	
The components of this kit are not available separately		
AccQ-Tag Column, 3.9 × 150 mm		<a href="#">WAT052885</a>
AccQ-Tag User Guide		<a href="#">WAT052874</a>



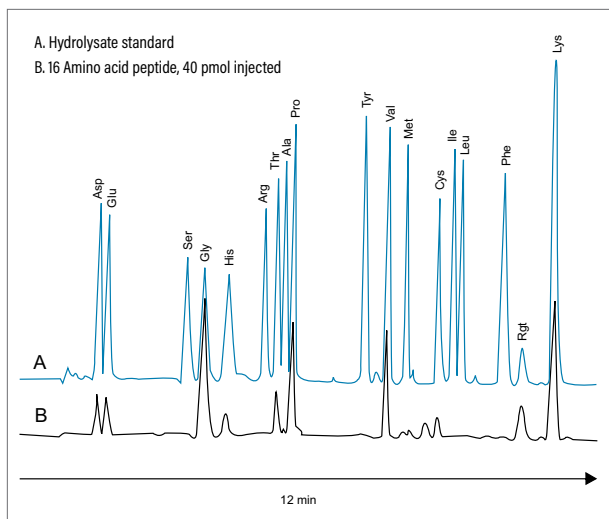
## HPLC: Pico-Tag METHOD

Waters Pico-Tag Method is a widely-used technique for HPLC amino acid analysis. This method is applicable to any sample including protein hydrolysates, physiologic fluids, feeds, foods, and pharmaceutical preparations. Pre-column derivatization relies on the coupling reaction of the well-known Edman Degradation, the reaction of phenylisothiocyanate (PITC) with both primary and secondary amino acids to form phenylthiocarbamyl (PTC) derivatives. The PTC-amino acid adducts are stable and easily separated by reversed-phase HPLC. A single product is formed for each amino acid. Most reaction by-products and all derivatization reagents are volatile, so they may be removed from the sample by vacuum drying.

### Pico-Tag Derivatization Reaction

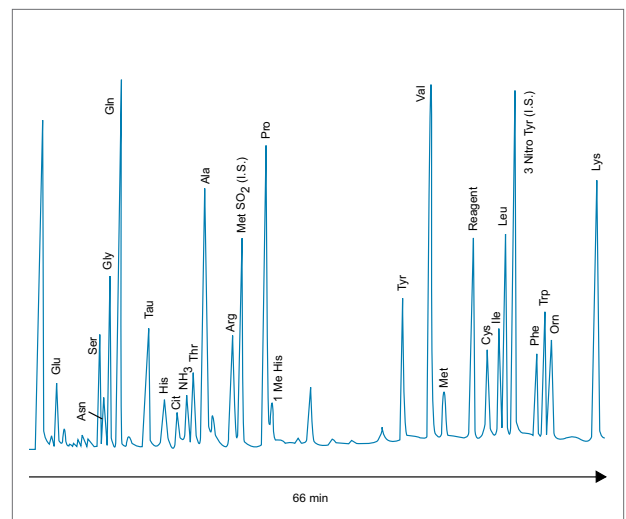


### Peptide Hydrolysate Amino Acid Analysis Using the Pico-Tag Method



*This 12-minute analysis using Waters Pico-Tag Amino Acid Analysis Method provides identification and accurate quantitation of the amino acid composition.*

### Plasma Amino Acid Profile Using the Pico-Tag Method



*Reproducible and reliable plasma amino acid profiles are obtained in 66 minutes using Waters Pico-Tag Method. In this analysis, 100  $\mu\text{L}$  plasma was diluted with an internal standard, deproteinized by centrifugal ultrafiltration, and derivatized. The methionine sulfone (internal standard) peak represents 25 picomoles. Courtesy of A.S. Feste, R.W. Drummond, and S.J. Dudrich, Nutritional Support Service, St. Luke Episcopal Hospital, Houston, Texas.*

## Ordering Information

### Pico-Tag Amino Acid Analysis of Physiologic Amino Acids

Description	Qty.	P/N
Chemistry Package for Amino Acid Analysis of Physiologic Amino Acids		<a href="#">WAT091681</a>
Kit contains:		
Free Amino Acid Analysis Column, 3.9 × 300 mm		
Pico-Tag Reagent Kit		
Pico-Tag Eluent 1	4 × 1 L	
Pico-Tag Eluent 2	4 × 1 L	
Pico-Tag Diluent	100 mL	
Manual, column heater inserts, and sample tubes		
Pico-Tag Reagent Kit (PITC, TEA, and standards A/N and B)		<a href="#">WAT010947</a>
Amino Acid Analysis Column, 3.9 × 300 mm		<a href="#">WAT010950</a>
Pico-Tag Eluent 1	4 × 1 L	<a href="#">WAT010960</a>
Pico-Tag Eluent 2	4 × 1 L	<a href="#">WAT010965</a>
Pico-Tag Diluent	100 mL	<a href="#">WAT088119</a>
Pico-Tag Eluent 2	1 L	<a href="#">WAT010985</a>

### Pico-Tag Amino Acid Analysis for Protein Hydrolysates

Description	Qty.	P/N
Chemistry Package for Amino Acid Analysis of Protein Hydrolysates		<a href="#">WAT007360</a>
Kit contains:		
Pico-Tag Column, 3.9 × 150 mm		
Pico-Tag Reagent Kit (includes PITC, TEA, and standards)		
Pico-Tag Eluent A	4 × 1 L	
Pico-Tag Eluent B	4 × 1 L	
Pico-Tag Diluent	100 mL	
Manual, column heater inserts, and sample tubes		
Pico-Tag Column, 3.9 × 150 mm		<a href="#">WAT088131</a>
Pico-Tag Reagent Kit (PITC, TEA, and standards)		<a href="#">WAT088123</a>
Pico-Tag Eluent A	4 × 1 L	<a href="#">WAT088108</a>
Pico-Tag Eluent B	4 × 1 L	<a href="#">WAT088112</a>
Pico-Tag Diluent	100 mL	<a href="#">WAT088119</a>
Pico-Tag Eluent B	1 L	<a href="#">WAT010983</a>



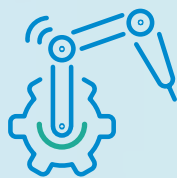
# Need an hand in your lab?



## EFFORTLESS WORKFLOWS

Effortlessly transition from laborious manual pipetting procedures and sample preparation to error-free workflows – without any knowledge of programming, laboratory robotics, or automation engineering.

- Method design wizards and OneLab cloud protocol library with the Andrew+ Pipetting Robot
- Serial dilution , standard curve prep, plate reformatting and concentration normalization
- Automate protocols with Connected Devices, Tools, and Dominos
- Achieve high-quality sample preparation and extraction with the programmed pressure profiles on the Otto SPEcialist Positive Pressure Manifold.



**SIMPLE  
AUTOMATION**



**QUICK,  
FLEXIBLE, AND  
EASY TO USE**



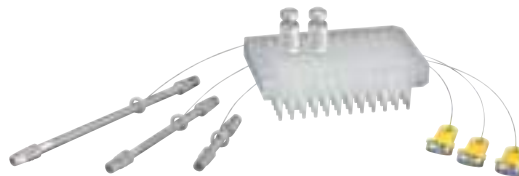
**TRULY  
ACCESSIBLE  
SOLUTION**

**Welcome  
to the  
connected  
lab!**

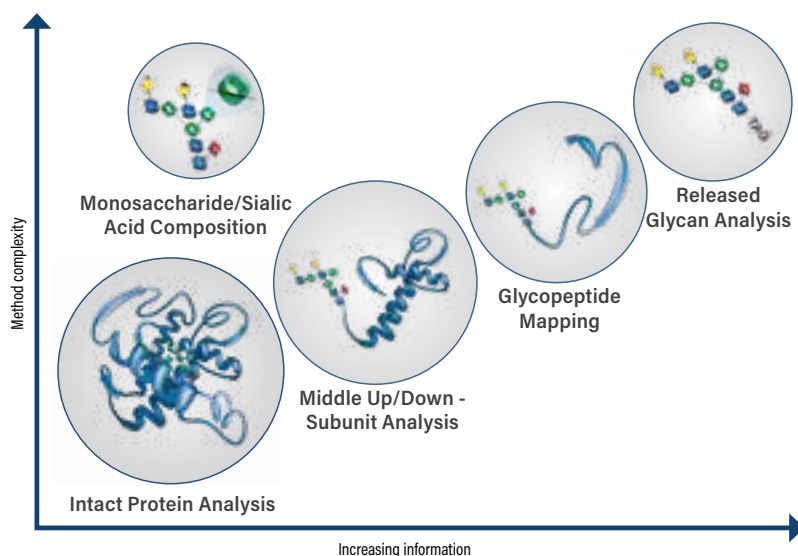
Learn more on [pages 45-50](#) or visit [waters.com/automate](https://www.waters.com/automate)

## Glycan and Glycoprotein Analysis

More than two thirds of recombinant biopharmaceutical products on the market are glycoproteins, and nearly every stage of their manufacture is carefully monitored and regulated to ensure consistency in quality, safety, and effectiveness. Consequently, international regulatory agencies require use of state-of-the-art glycan analyses methods to help ensure the successful development and commercialization of effective and safe glycosylated biotherapeutics. To address this need, Waters offers a variety of robust, reproducible, complementary, information-rich analytical methods for this application.



### CONSOLIDATING COMPLEMENTARY TECHNIQUES TO STREAMLINE GLYCAN ANALYSIS



For analyzing all structural levels of glycoproteins, we offer complete approaches according to workflow:

- Intact glycoprotein profiling (e.g., glycan occupancy determination)
- Middle up/down - subunit analysis
- Glycopeptide mapping
- Released and labeled glycan analysis
- Monosaccharide/sialic acid composition

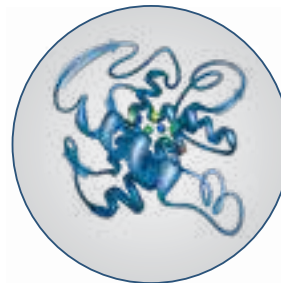
### Glycoprotein and Glycopeptide Analysis

Intact glycoprotein profiling, subunit analysis, and glycopeptide mapping are means of characterizing protein glycosylation and are valuable orthogonal methods that provide accurate mass confirmation, glycan identification, and elucidate sites of glycan occupancy. Waters ACQUITY UPLC Glycoprotein BEH Amide, 300 Å, 1.7 µm Column is a powerful, single column chemistry that can run multiple complementary, glycoprotein analyses methods.

- Optimized, large-pore, HILIC stationary phase for resolving the glycoforms of intact and digested glycoproteins
- Unprecedented separation selectivity and orthogonality to reversed phase
- High resolution glycopeptide mapping without limitations due to peptide/glycan size or composition
- Improved resolution in separations of large, released N-glycans (EPO, Factor IX)
- MaxPeak Premier column format reduces sample adsorption onto metal surfaces and delivers the representative performance from the first injection.

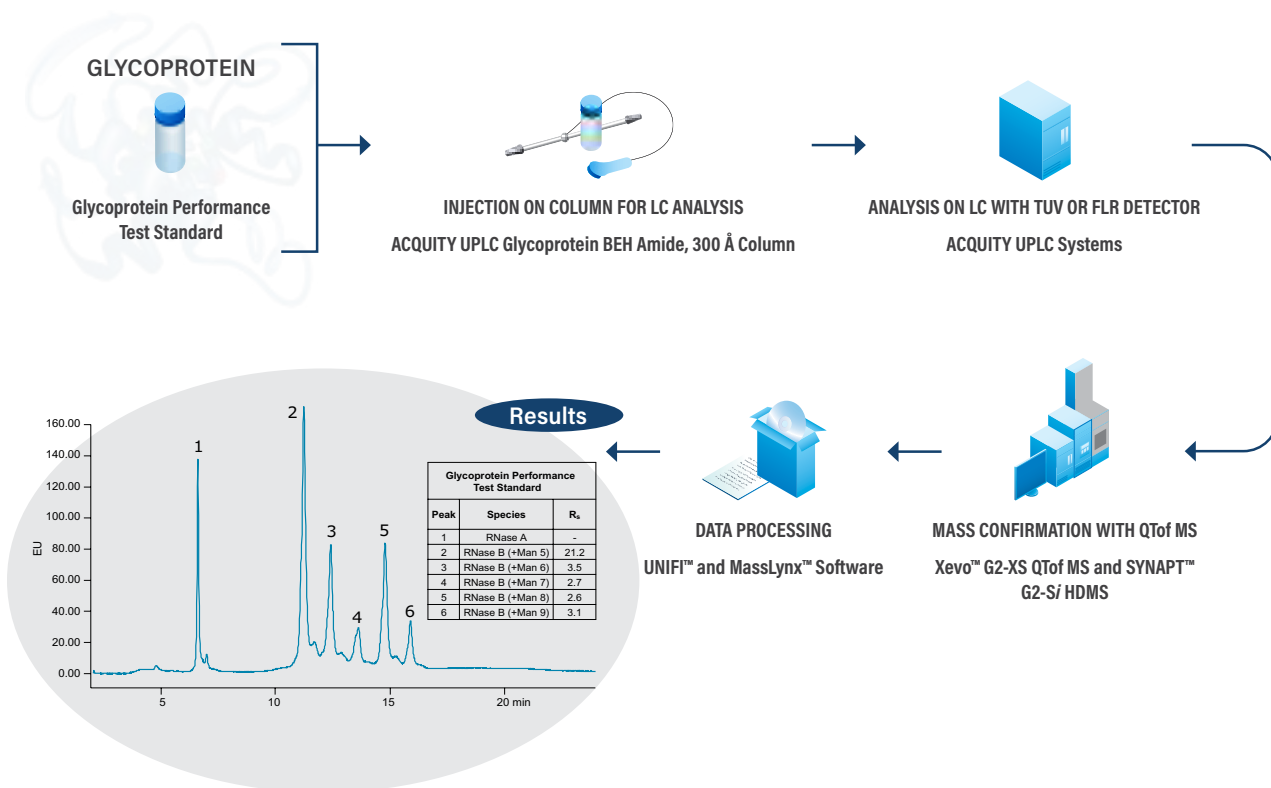
## INTACT GLYCOPROTEIN ANALYSIS

Waters ACQUITY UPLC Glycoprotein BEH Amide, 300 Å, 1.7 µm Column separates individual intact protein glycoforms as well as delivers information about glycan occupancy. Using elevated 80 °C column temperature, TFA ion pairing, and an HFIP mobile-phase additive, one is able to successfully enhance the solubility of 150,000 Dalton, Intact IgGs for this HILIC-based separation that uses an initial high organic solvent concentration. The figure on the [next page](#) shows the HILIC fluorescence chromatograms resulting from a separation of a native Intact mAb Mass Check Standard (a murine IgG1 mAb) and its partially as well as completely deglycosylated isoforms.

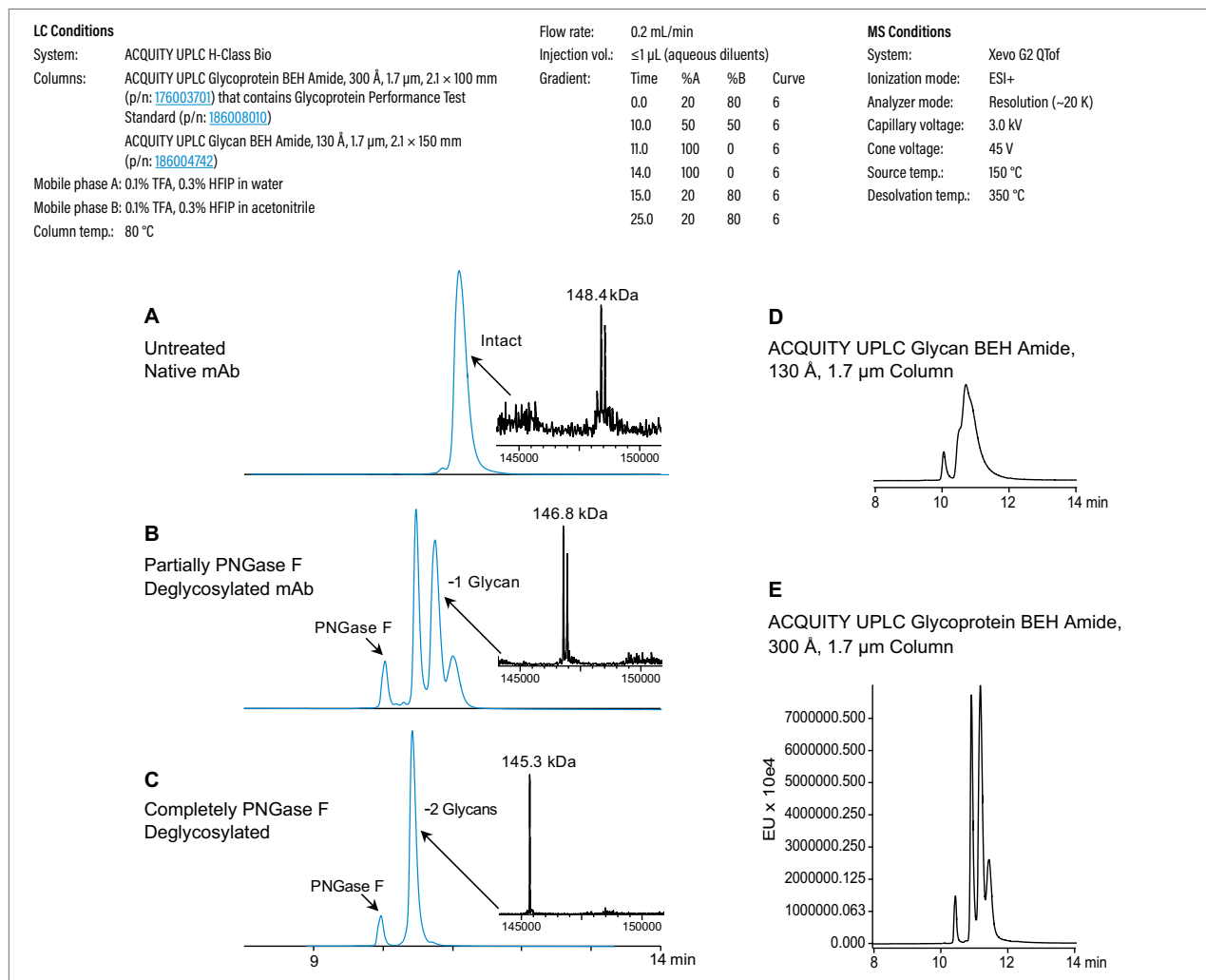


- Measure glycan occupancy of an intact therapeutic mAb
- Relative abundance of aglycosylated forms (-2 and -1 N glycans moieties) can be monitored by fluorescence
- Wide-pore phase facilitates the development of previously unimagined separations that includes an orthogonal separation of mAb fragments compared to well-established, reversed-phase chromatography

### Intact Protein Analysis Workflow



## ACQUITY UPLC Glycan vs. Glycoprotein BEH Amide Analyses of Intact mAb vs. Partially- and Fully-Deglycosylated Species



Glycoprotein BEH Amide, 300 Å, 1.7 µm Column analyses of Waters mAb Mass Check Standard showing native (A), partially deglycosylated (B), and completely deglycosylated (C) samples. Also showing HILIC fluorescence profiles of partially deglycosylated Intact mAb Mass Check Standard using two ACQUITY UPLC Glycan BEH Amide, 130 Å, 1.7 µm, 2.1 × 150 mm Columns in series (D) versus two ACQUITY UPLC Glycoprotein BEH Amide, 300 Å, 1.7 µm, 2.1 × 150 mm Columns in series (E).

## Ordering Information

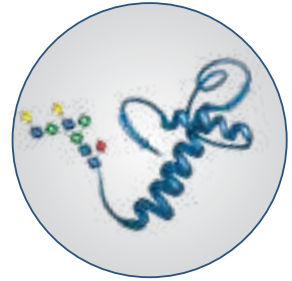
### ACQUITY UPLC Glycoprotein BEH Amide Columns, Kits, and Standards

Description	P/N
ACQUITY UPLC Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 50 mm, 1/pk with Standard	<a href="#">176003700</a>
ACQUITY UPLC Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 100 mm, 1/pk with Standard	<a href="#">176003701</a>
ACQUITY UPLC Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 150 mm, 1/pk with Standard	<a href="#">176003702</a>
ACQUITY UPLC Glycoprotein BEH Amide VanGuard Pre-Column, 300 Å, 1.7 µm, 2.1 × 5 mm, 3/pk with Standard	<a href="#">176003699</a>
ACQUITY UPLC Glycoprotein BEH Amide Method Validation Kit, 300 Å, 1.7 µm, 2.1 × 100 mm, 3/pk with Standard	<a href="#">176003703</a>
Glycoprotein Performance Test Standard	<a href="#">186008010</a>
Intact mAb Mass Check Standard	<a href="#">186006552</a>
ACQUITY Premier Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 50 mm, 1/pk	<a href="#">186009547</a>
ACQUITY Premier Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 100 mm, 1/pk	<a href="#">186009548</a>
ACQUITY Premier Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 150 mm, 1/pk	<a href="#">186009549</a>
ACQUITY Premier Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 50 mm, 1/pk with Glycoprotein Performance Test Standard	<a href="#">176004866</a>
ACQUITY Premier Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 100 mm, 1/pk with Glycoprotein Performance Test Standard	<a href="#">176004867</a>
ACQUITY Premier Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 150 mm, 1/pk with Glycoprotein Performance Test Standard	<a href="#">176004868</a>

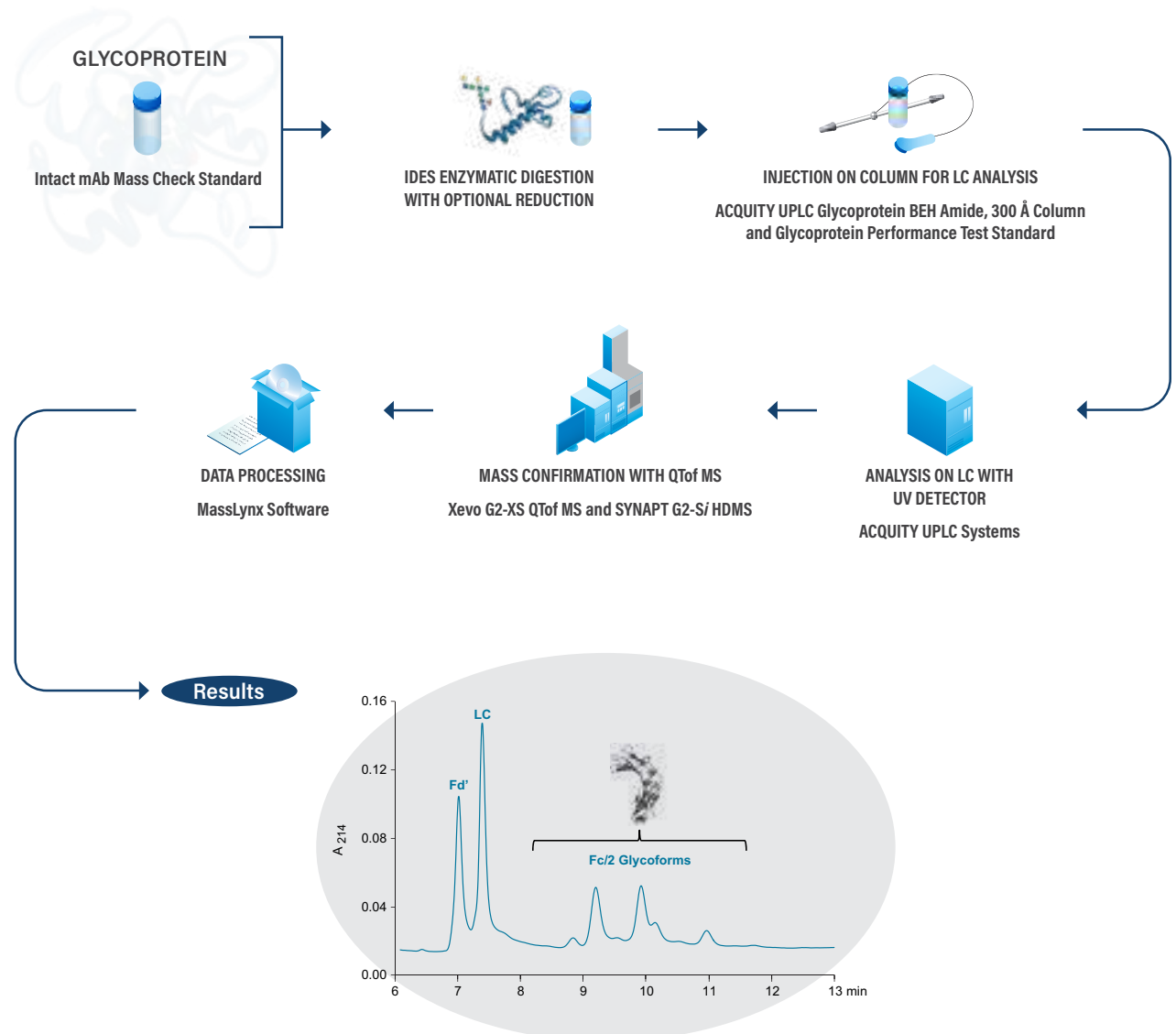
## GLYCOPROTEIN SUBUNIT ANALYSIS

Reversed-phase chromatography is a well-established and commonly used technique to analyze intact protein or protein subunits generated from digestions with enzymes such as FabRICATOR (IdeS protease) that generates a site cleavage at the hinge region of a monoclonal antibody generating Fc and F(ab')<sub>2</sub> fragments ([genovis.com](http://genovis.com)).

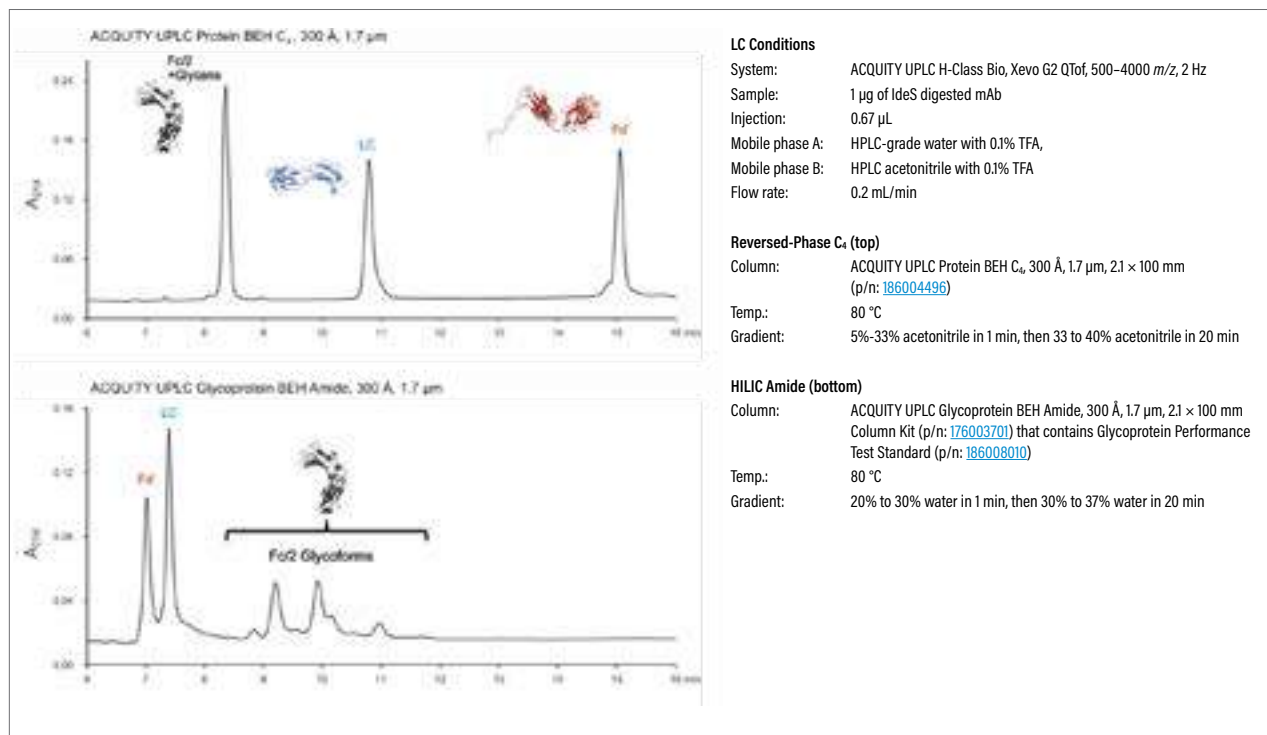
- Provides orthogonal and complementary results, compared to C<sub>4</sub>-based reversed-phase separations for glycoprotein subunits



### Subunit Analysis Workflow



## HILIC Amide Offers an Orthogonal, Complementary, and Information-Rich Approach to IgG Subunit Analyses



*Trastuzumab subunit separations. Top: 1 µg of reduced IdeS digest separated using an ACQUITY UPLC Protein BEH C<sub>4</sub>, 300 Å, 1.7 µm Column (0.7 µL aqueous injection). Bottom: 1 µg of reduced IdeS digest separated using an ACQUITY UPLC Glycoprotein BEH Amide, 300 Å, 1.7 µm Column (0.7 µL aqueous injection).*

## Ordering Information

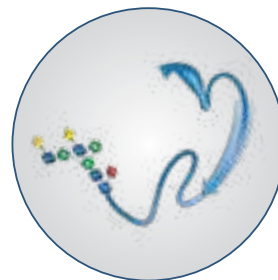
### ACQUITY UPLC Glycoprotein BEH Amide Columns, Kits, and Standards

Description	P/N
ACQUITY UPLC Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 50 mm, 1/pk with Standard	<a href="#">176003700</a>
ACQUITY UPLC Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 100 mm, 1/pk with Standard	<a href="#">176003701</a>
ACQUITY UPLC Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 150 mm, 1/pk with Standard	<a href="#">176003702</a>
ACQUITY UPLC Glycoprotein BEH Amide VanGuard Pre-Column, 300 Å, 1.7 µm, 2.1 × 5 mm, 3/pk with Standard	<a href="#">176003699</a>
ACQUITY UPLC Glycoprotein BEH Amide Method Validation Kit, 300 Å, 1.7 µm, 2.1 × 100 mm, 3/pk with Standard	<a href="#">176003703</a>
Glycoprotein Performance Test Standard	<a href="#">186008010</a>
Intact mAb Mass Check Standard	<a href="#">186006552</a>
ACQUITY Premier Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 50 mm, 1/pk	<a href="#">186009547</a>
ACQUITY Premier Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 100 mm, 1/pk	<a href="#">186009548</a>
ACQUITY Premier Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 150 mm, 1/pk	<a href="#">186009549</a>
ACQUITY Premier Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 50 mm, 1/pk with Glycoprotein Performance Test Standard	<a href="#">176004866</a>
ACQUITY Premier Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 100 mm, 1/pk with Glycoprotein Performance Test Standard	<a href="#">176004867</a>
ACQUITY Premier Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 150 mm, 1/pk with Glycoprotein Performance Test Standard	<a href="#">176004868</a>

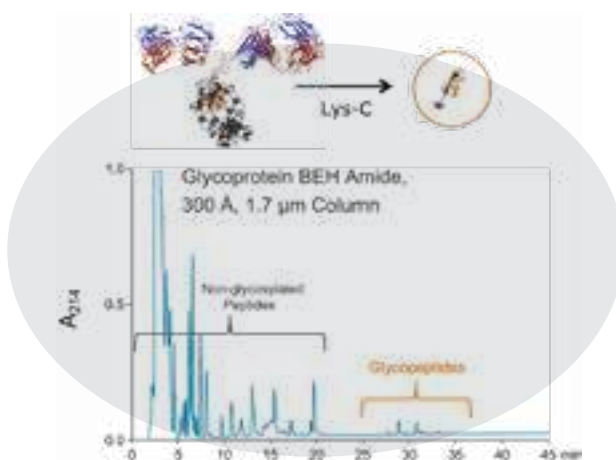
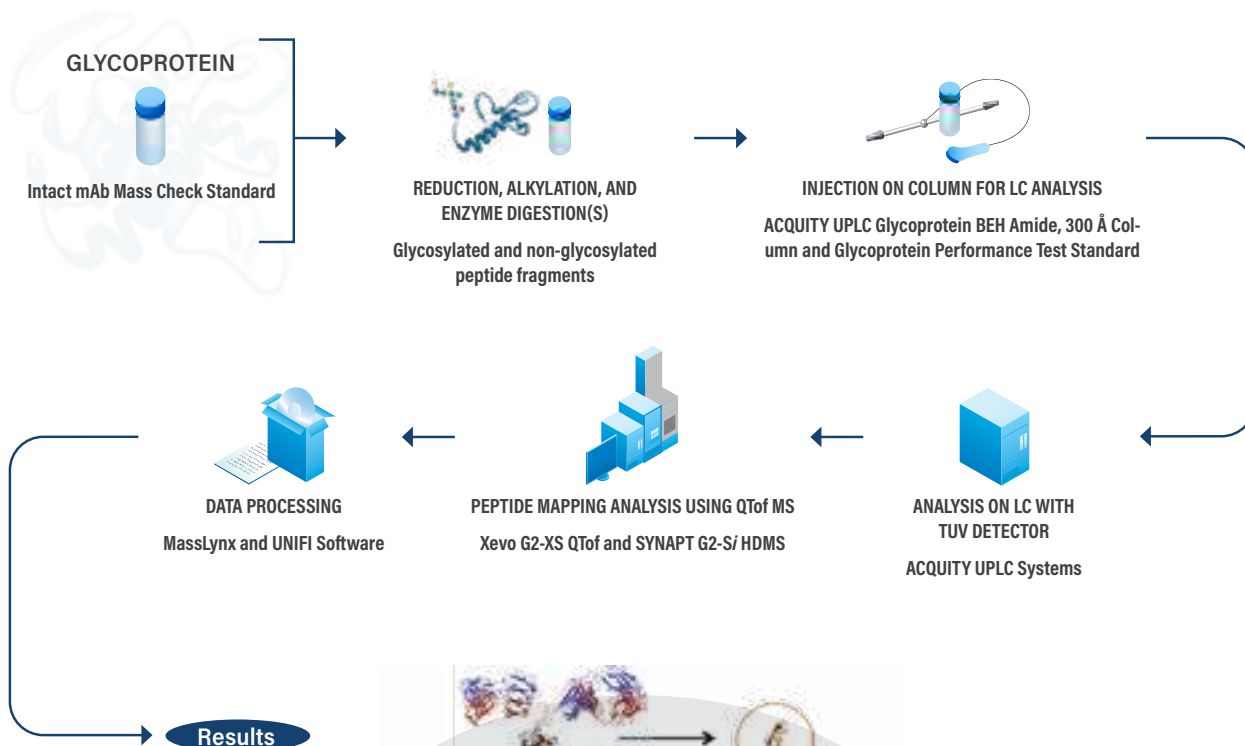
## GLYCOPEPTIDE ANALYSIS

While reversed-phase, UPLC-based separations can resolve glycosylated peptides into their glycoforms, the complete resolution of glycopeptide micro-heterogeneity (same peptide sequence, various glycoforms) remains difficult. This is because retention in RP-LC is mainly due to peptide hydrophobicity, and is less affected by the presence of hydrophilic glycans. The separation is further complicated by the presence of non-glycosylated peptides in the sample that often elute in the vicinity of the glycopeptides of interest. HILIC-based glycopeptide separation provides the following benefits:

- Effectively generate data related to glycan heterogeneity and site occupancy of a trypsin digest N-linked glycoprotein
- Useful for the characterization of O-linked glycans because of the lack of specific and efficient enzymes for their release and characterization of O-linked glycoproteins



### Glycopeptide Mapping Workflow



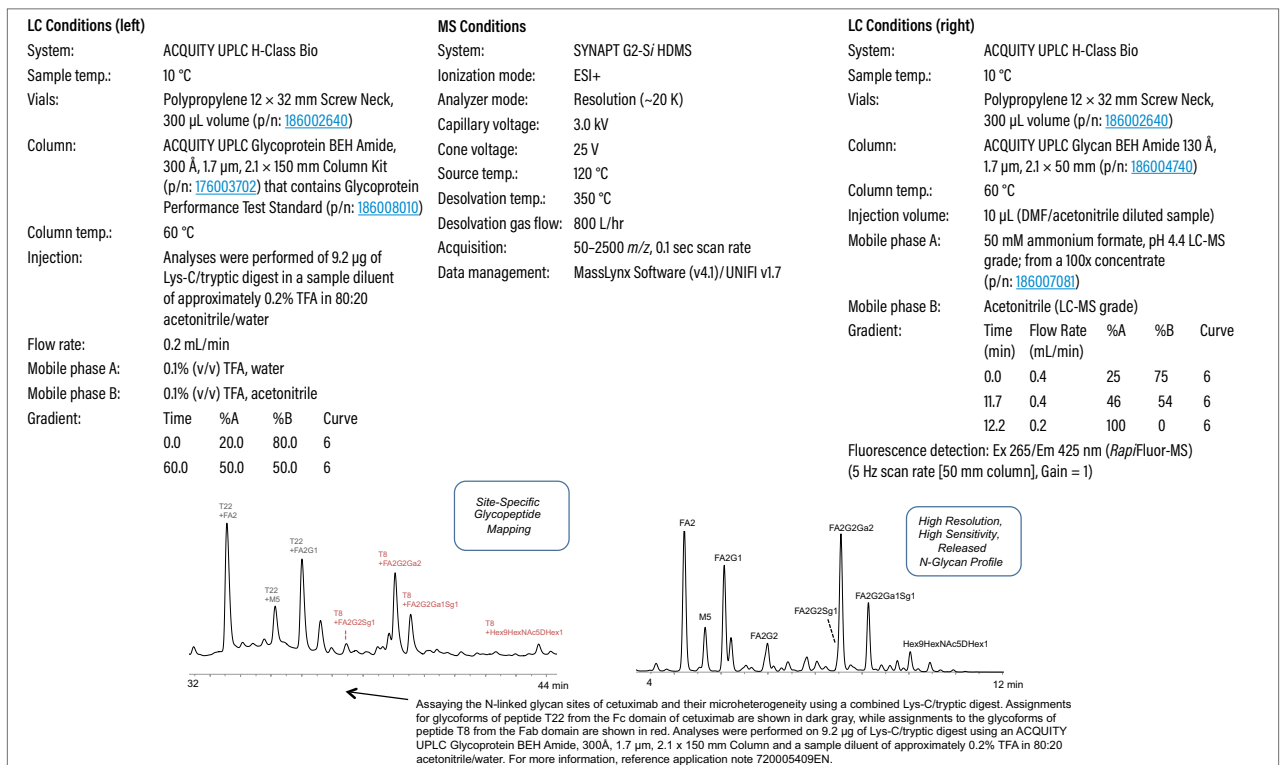
## Reversed-Phase vs. HILIC-Based Analyses of a Lys-C Digest of Trastuzumab



A traditional reversed-phase separation of the Lys-C digest using an ACQUITY UPLC Peptide BEH C<sub>18</sub>, 300 Å, 1.7 µm, 2.1 × 150 mm Column (top) vs. a HILIC separation of the Lys-C digest using an ACQUITY UPLC Glycoprotein BEH Amide, 300 Å, 1.7 µm, 2.1 × 150 mm Column (bottom). In each analysis, 9.2 µg of the Lys-C digest was separated using the same gradient slope and injecting sample from a diluent comprised of either approximately 0.2% TFA in 80:20 acetonitrile/water (HILIC) or 100% water (reversed phase).

**i** For more information, reference application note [720005409EN](#).

## Two Parallel Strategies for Glycoprotein Analyses: Glycopeptide Mapping vs. Released Glycan Analysis



HILIC Profiling of cetuximab glycosylation. HILIC-fluorescence chromatograms of RapiFluor-MS labeled N-glycans from cetuximab obtained using an ACQUITY UPLC Glycan BEH Amide, 300 Å, 1.7 µm, 2.1 × 50 mm Column. Mass spectral data supporting the assignments of the RapiFluor-MS labeled N-glycans are provided.

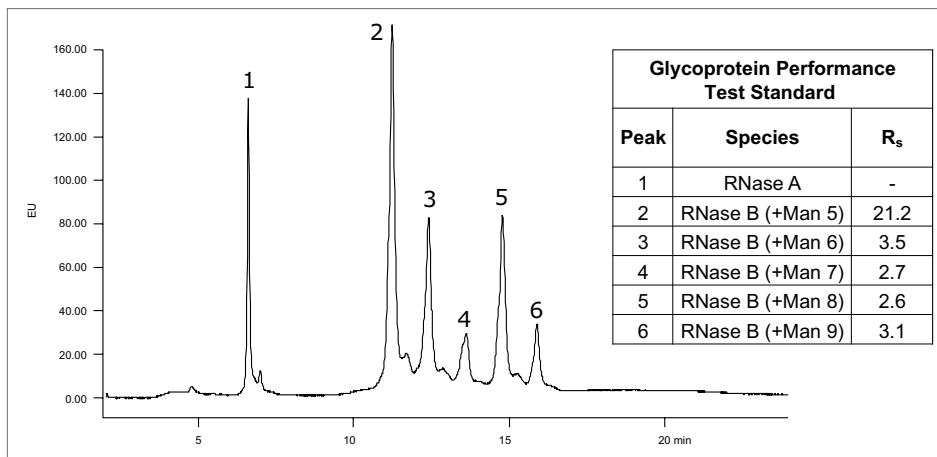
**i** For more information, reference application note [720005385EN](#).



## GLYCOPROTEIN PERFORMANCE TEST STANDARD

### Benchmarking, Method Development, and Troubleshooting

Glycoprotein Performance Test Standard is a mix of ribonuclease B from bovine pancreas at 90 µg/vial with ribonuclease A from bovine pancreas at 10 µg/vial used to quality control the ACQUITY UPLC Glycoprotein BEH Amide, 300 Å, 1.7 µm Column, and is recommended to be used on a regular basis for benchmarking and monitoring column and system performance and lifetime.



Separation of the Glycoprotein Performance Test Standard (RNase A + RNase B glycoforms) using an ACQUITY UPLC Glycoprotein BEH Amide, 300 Å, 1.7 µm, 2.1 × 150 mm Column. Fluorescence detection at Ex 280 nm and Em 320 nm and a column temperature of 45 °C were employed in this example.

### Ordering Information

#### ACQUITY UPLC Glycoprotein BEH Amide Columns, Kits, and Standards

Description	P/N
ACQUITY UPLC Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 50 mm, 1/pk with Standard	<a href="#">176003700</a>
ACQUITY UPLC Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 100 mm, 1/pk with Standard	<a href="#">176003701</a>
ACQUITY UPLC Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 150 mm, 1/pk with Standard	<a href="#">176003702</a>
ACQUITY UPLC Glycoprotein BEH Amide VanGuard Pre-Column, 300 Å, 1.7 µm, 2.1 × 5 mm, 3/pk with Standard	<a href="#">176003699</a>
ACQUITY UPLC Glycoprotein BEH Amide Method Validation Kit, 300 Å, 1.7 µm, 2.1 × 100 mm, 3/pk with Standard	<a href="#">176003703</a>
Glycoprotein Performance Test Standard	<a href="#">186008010</a>
Intact mAb Mass Check Standard	<a href="#">186006552</a>
ACQUITY Premier Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 50 mm, 1/pk	<a href="#">186009547</a>
ACQUITY Premier Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 100 mm, 1/pk	<a href="#">186009548</a>
ACQUITY Premier Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 150 mm, 1/pk	<a href="#">186009549</a>
ACQUITY Premier Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 50 mm, 1/pk with Glycoprotein Performance Test Standard	<a href="#">176004866</a>
ACQUITY Premier Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 100 mm, 1/pk with Glycoprotein Performance Test Standard	<a href="#">176004867</a>
ACQUITY Premier Glycoprotein BEH Amide Column, 300 Å, 1.7 µm, 2.1 × 150 mm, 1/pk with Glycoprotein Performance Test Standard	<a href="#">176004868</a>

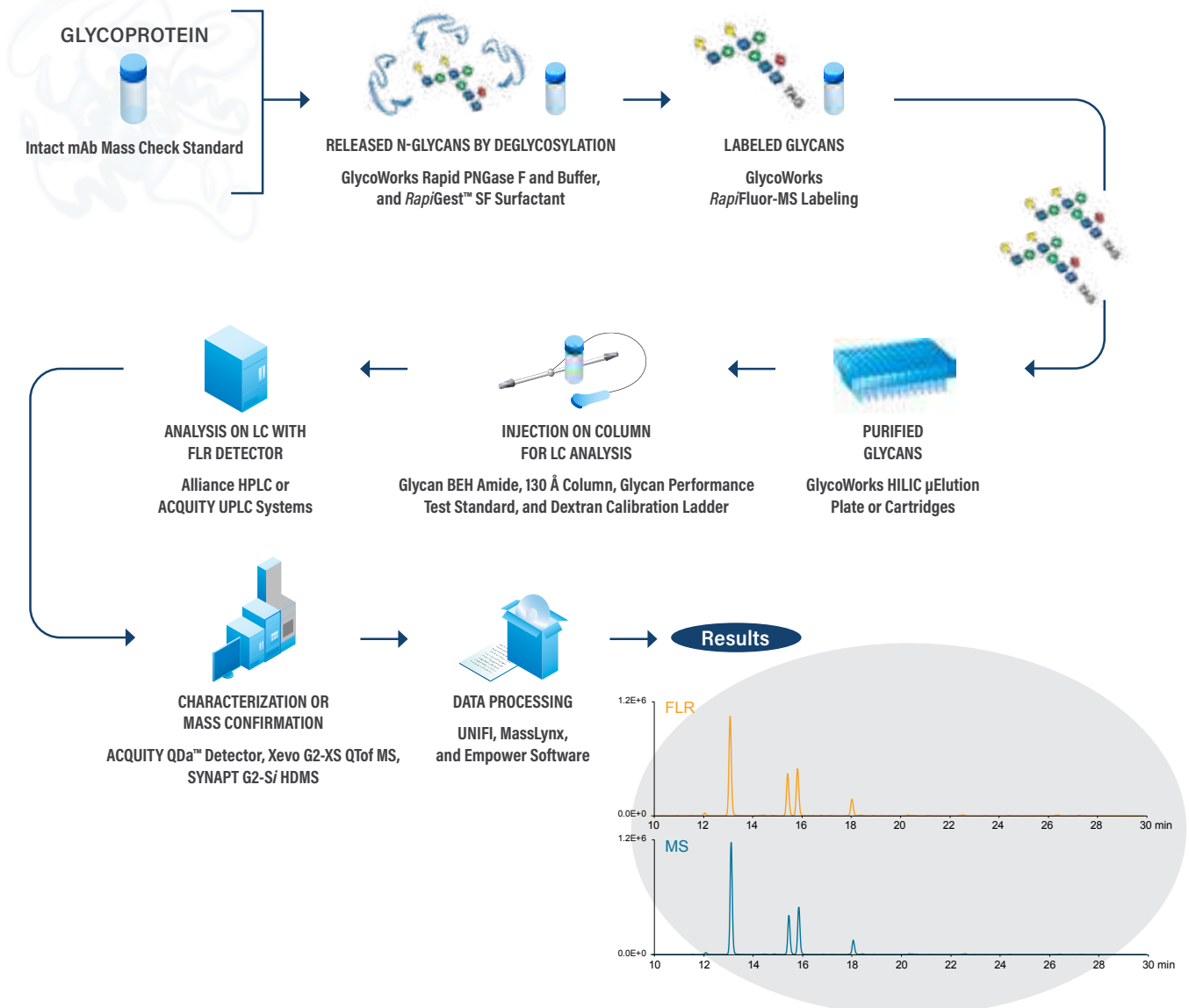
## RELEASED N-GLYCAN ANALYSIS

Waters GlycoWorks Sample Preparation Kits and Standards, along with the ACQUITY UPLC and HPLC Glycan Columns, were designed cohesively to provide a seamless and efficient workflow from bench to analysis.

- Fast and simplified sample preparation with the GlycoWorks *RapiFluor*-MS N-Glycan Kit
- Automation-enabled sample preparations with verified scripts
- Alternative selectivity with either HILIC or Mixed-mode separations
- MaxPeak Premier column format reduces sample adsorption onto metal surfaces and delivers the representative performance from the first injection
- Glycan standards for benchmarking chromatographic performance, calibration and quantification, and complex profiling



### Released N-Glycan Workflow



# GlycoWorks *RapiFluor*-MS N-Glycan Kits

Reduce complicated, time consuming sample preparation

- Increased fluorescence quantification and supreme mass spectral response
- One label that provides valuable information from characterization to routine monitoring
- Simple to follow protocols with detailed tips and tricks provided for adaptation
- The ability to easily train non-glycan experts
- An experimentally derived library to help with data analysis



[waters.com/glycans](http://waters.com/glycans)

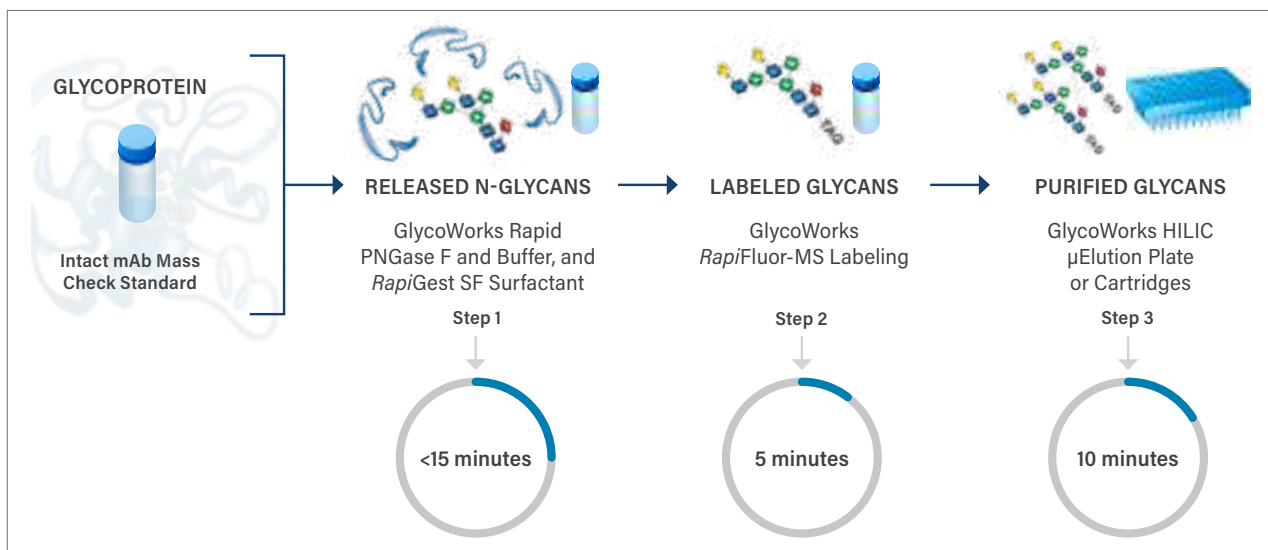
See [page 361](#) for more information.

## GLYCOWORKS RAPIFLUOR-MS RELEASED N-GLYCANS SAMPLE PREPARATION

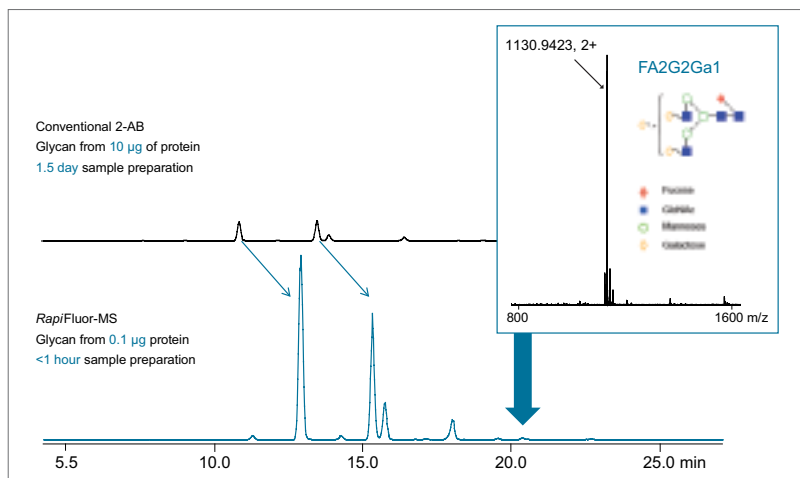
Waters GlycoWorks Consumables offer a more convenient, comprehensive, and effective sample-preparation solution for glycan analysis.

- The GlycoWorks RapiFluor-MS N-Glycan Kit ensures easy, quick preparation of released-labeled, N-glycan samples
- Streamline standard protocols ([720005470EN](#), [720005343EN](#)) for mAbs and a variety of glycoproteins; Optimized reducing protocols ([720006992EN](#), [720006991EN](#)) for complex proteins with multiple disulfide bonds
- Greatly improved FLR and MS signal intensities help easily identify low-abundance N-linked glycans
- Complete modules for processing 96 samples with flexibility of processing between 8, 24, and 48 samples at a time depending on laboratory demands with automation scripts available
- Support easy training of analysts and the transferring of methods throughout an organization

Three Steps, as little as 30 minutes



## Glycan Characterization by UPLC FLR with Xevo G2-XS QToF Mass Spectrometer



Un-ionized form of acids and bases give most retention. Retention of neutral analytes not affected by pH.

Learn more about Waters latest Glycan Solutions.

Visit [waters.com/glycans](https://waters.com/glycans)



## AUTOMATION OF RELEASED N-GLYCAN ANALYSIS

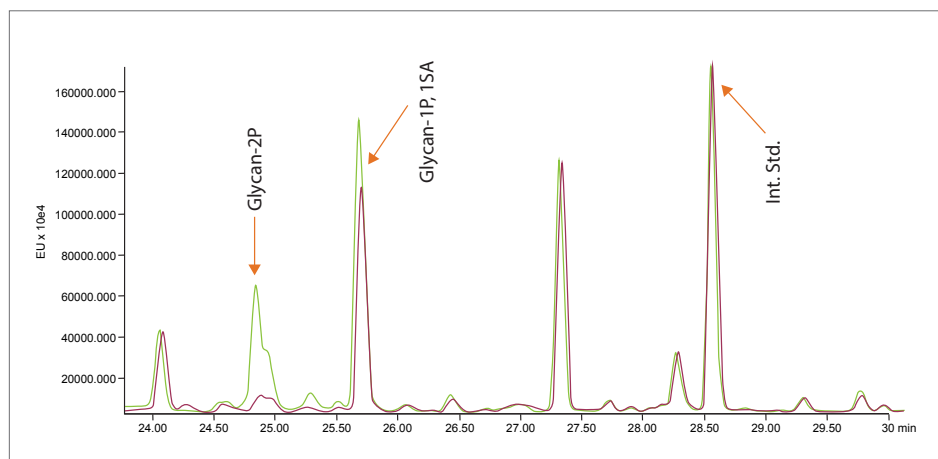
Waters GlycoWorks Consumables offer a more convenient, comprehensive, and effective sample-preparation solution for Released N-glycan analysis. The sample preparation procedures involve multiple steps including enzymatic deglycosylation, labeling, and SPE clean up. Due to this complexity, Waters has developed an application-specific configuration of the Andrew+ Pipetting Robot for released N-glycan analysis. Additionally, verified scripts for the GlycoWorks *RapiFluor*-MS method are available for our partner platforms. We provide you with the information needed, no matter the platform, to ensure that you can start achieving your automation results faster.



*GlycoWorks RapiFluor MS N-Glycan Kit*

## PHOSPHOGLYCAN SPE BUFFER IMPROVES RECOVERY

The loss of labeled acidic glycans, especially phosphorylated glycan species, during SPE purification has been considered a challenge to accurately monitor the glycosylation of biotherapeutics. The GlycoWorks Phosphoglycan SPE Elution Buffer, optimized with citrate additive, facilitates the elution and recovery of phosphorylated glycans and achieves maximum yield.



*Improved recovery of phosphorylated glycans using citrate containing SPE eluent*

## Ordering Information

### GlycoWorks *Rapi*Fluor-MS Released N-Glycan Sample Preparation Kits

Description	P/N
GlycoWorks <i>Rapi</i> Fluor-MS N-Glycan Starter Kit—96 Sample Kit contains: GlycoWorks Deglycosylation Module, GlycoWorks Labeling Module, GlycoWorks Cleanup Module, GlycoWorks Sample Collection Module, ACQUITY UPLC Glycan BEH Amide, 1.7 µm, 2.1 × 150 Column, Ammonium Formate Solution – Glycan Analysis, Glycan <i>Rapi</i> Fluor-MS performance Test std, Intact mAb Mass Check Standard	<a href="#">176003635</a>
GlycoWorks <i>Rapi</i> Fluor-MS N-Glycan Kit—96 Sample Kit contains: GlycoWorks Deglycosylation Module, GlycoWorks Labeling Module, GlycoWorks Cleanup Module, GlycoWorks Sample Collection Module, Intact mAb Mass Check Standard	<a href="#">176003606</a>
GlycoWorks <i>Rapi</i> Fluor-MS N-Glycan Starter Kit—24 sample Kit contains: GlycoWorks Deglycosylation Module, GlycoWorks Labeling Module, GlycoWorks Cleanup Module, GlycoWorks Sample Collection Module, ACQUITY UPLC Glycan BEH Amide, 1.7 µm, 2.1 × 150 mm Column, Ammonium Formate Solution – Glycan Analysis, Glycan <i>Rapi</i> Fluor-MS performance Test std, Intact mAb Mass Check Standard	<a href="#">176003712</a>
GlycoWorks <i>Rapi</i> Fluor-MS N-Glycan Kit—24 sample Kit contains: GlycoWorks Deglycosylation Module, GlycoWorks Labeling Module, GlycoWorks Cleanup Module, GlycoWorks Sample Collection Module, Intact mAb Mass Check Standard	<a href="#">176003713</a>
GlycoWorks <i>Rapi</i> Fluor-MS N-Glycan Refill Kit—24 sample Kit contains one of each: GlycoWorks Deglycosylation Module and the GlycoWorks Labeling Module	<a href="#">176003714</a>
GlycoWorks Rapid Deglycosylation 1 × 24 Kit contains: one vial of GlycoWorks Rapid PNGaseF Enzyme and Buffer; and, one vial of 10-mg <i>Rapi</i> Gest SF Surfactant	<a href="#">186008939</a>
GlycoWorks Rapid Deglycosylation 3 × 8	<a href="#">186008841</a>
GlycoWorks Rapid Deglycosylation Kit 2 × 48	<a href="#">186004579</a>
GlycoWorks Rapid Deglycosylation kit 4 × 24	<a href="#">186008840</a>
GlycoWorks <i>Rapi</i> Fluor -MS Labeling Kits—24 Sample	<a href="#">186008091</a>
GlycoWorks <i>Rapi</i> Fluor -MS Labeling Kits—96 Sample	<a href="#">186007989</a>
GlycoWorks SPE Reagents	<a href="#">186007992</a>
GlycoWorks Phosphoglycan SPE Reagents HILIC	<a href="#">186010209</a>
GlycoWorks Phosphoglycan SPE Elution Buffer, 4/pk	<a href="#">186009763</a>
GlycoWorks HILIC uElution Plate	<a href="#">186002780</a>
GlycoWorks Sample Collection Module	<a href="#">186007988</a>

### GlycoWorks *Rapi*Fluor-MS N-Glycan Automation Kits

Description	P/N
GlycoWorks <i>Rapi</i> Fluor-MS N-Glycan Script Starter Kit – Automation Kit contains: GlycoWorks Automation Script Pack-CD; Intact mAb Mass Check Standard (unlabeled); <i>Rapi</i> Fluor-MS Intact mAb Mass Check Standard (deglycosylated, labeled, and purified); GlycoWorks Rapid Deglycosylation Kit – 2 × 48; GlycoWorks <i>Rapi</i> Fluor-MS Labeling Module – Automation; GlycoWorks HILIC µElution Plate; GlycoWorks SPE Reagents – Automation; GlycoWorks Sample Collection Module – Automation; ACQUITY UPLC Glycan BEH Amide, 130 Å, 1.7 µm, 2.1 × 150 mm Column; Mobile phase concentrate: ammonium formate	<a href="#">176004151</a>
GlycoWorks <i>Rapi</i> Fluor-MS N-Glycan Starter Kit – Automation Kit contains: Intact mAb Mass Check Standard (unlabeled); <i>Rapi</i> Fluor-MS Intact mAb Mass Check Standard (deglycosylated, labeled, and purified); GlycoWorks Rapid Deglycosylation Kit – 2 × 48; GlycoWorks <i>Rapi</i> Fluor-MS Labeling Module – Automation; GlycoWorks HILIC µElution Plate; GlycoWorks SPE Reagents – Automation; GlycoWorks Sample Collection Module – Automation; ACQUITY UPLC Glycan BEH Amide, 130 Å, 1.7 µm, 2.1 × 150 mm Column; Mobile phase concentrate: ammonium formate	<a href="#">176004152</a>
GlycoWorks <i>Rapi</i> Fluor-MS N-Glycan Kit - Automation Kit contains: GlycoWorks Rapid Deglycosylation Kit – 2 × 48, GlycoWorks <i>Rapi</i> Fluor-MS Labeling Module – Automation, GlycoWorks HILIC µElution Plate, GlycoWorks SPE Reagents – Automation and GlycoWorks Sample Collection Module – Automation	<a href="#">176004153</a>
GlycoWorks <i>Rapi</i> Fluor-MS N-Glycan Basic Kit - Automation Kit contains: GlycoWorks Rapid Deglycosylation Kit – 2 × 48, GlycoWorks <i>Rapi</i> Fluor-MS Labeling Module – Automation, GlycoWorks HILIC µElution Plate, and GlycoWorks SPE Reagents – Automation	<a href="#">176004154</a>
Andrew+ 24 Sample GlycoWorks Application Kit contains: GlycoWorks Rapid Deglyco Module 24-sample, GlycoWorks <i>Rapi</i> Fluor-MS Labeling—24 sample, GlycoWorks HILIC uElution Plate, GlycoWorks SPE Reagents – Automation, Intact mAb Mass Check Standard	176003349
Andrew+ 96 Sample GlycoWorks Application Kit contains: GlycoWorks Rapid Deglyco Module 96-sample, GlycoWorks <i>Rapi</i> Fluor-MS Labeling—96 sample, GlycoWorks HILIC uElution Plate, GlycoWorks SPE Reagents – Automation, Intact mAb Mass Check Standard	17600335
Andrew+ 96 Sample GlycoWorks Application Kit contains: GlycoWorks Rapid Deglyco Module 2 × 48, GlycoWorks <i>Rapi</i> Fluor-MS Labeling – Automation, GlycoWorks HILIC µElution Plate, GlycoWorks SPE Reagents – Automation, Intact mAb Mass Check Standard	176003351

## GLYCAN PERFORMANCE TEST STANDARDS AND DEXTRAN CALIBRATION LADDERS

### Benchmarking, Method Development, and Troubleshooting

Waters purified glycan library standards are used as qualitative/quantitative standards for LC/FLR and LC/MS. These standards come pre-labeled, lyophilized for long term storage in Waters Certified Vials for ease of solubilization and injection.

### Chromatographic Performance

To ensure that the system and chromatographic method is working, it is highly recommended to use a pre-labeled standard to access observed retention time by monitoring the major peaks for performance of the method.

### Calibration and Quantitation

When using LC optical detection, it is important to have standards to assist in profiling glycans under HILIC conditions to ensure reproducible chromatographic assignment providing confidence in data generation.

### Complex Profiling

These performance test standards are helpful when looking for specific glycans monitored in manufacturing and are useful to check retention time of major peaks in LC/FLR, accurate mass or to assess sample preparation efficiency.

## Ordering Information

### RapiFluor-MS Released N-Glycan Standards and Accessories

Description	P/N	Description	P/N
RapiFluor-MS Dextran Calibration Ladder 50 µg/vial	<a href="#">186007982</a>	RapiGest SF 3 mg vial	<a href="#">186008090</a>
RapiFluor-MS Glycan Performance Test Standard 400 pmol total/vial	<a href="#">186007983</a>	RapiGest SF 10 mg vial	<a href="#">186002123</a>
RapiFluor-MS High Mannose Standard	<a href="#">186008317</a>	96-Well Plate Extraction Manifold	<a href="#">186001831</a>
RapiFluor-MS Intact mAb Standard	<a href="#">186008843</a>	Vacuum Manifold Shims,** 3/set	<a href="#">186007986</a>
RapiFluor-MS Quantitative Glycan Standard	<a href="#">186008791</a>	Positive Pressure Manifold Spacer for the GlycoWorks RapiFluor-MS N-Glycan Kit* 1/pk	<a href="#">186007987</a>
RapiFluor-MS Sialylated Glycan Performance Test Standard	<a href="#">186008660</a>	Vacuum Pump 220 v/240 v 50 Hz	<a href="#">725000604</a>
Intact mAb Mass Check Standard*	<a href="#">186006552</a>	Positive Pressure Manifold	<a href="#">186006961</a>
2-AB Glycan Performance Test Standard	<a href="#">186006349</a>	Modular Heat Block for 1 mL tubes/96 wells	<a href="#">186007985</a>
2-AB Dextran Calibration Ladder	<a href="#">186006841</a>	GlycoWorks Rapid Buffer—5 mL	<a href="#">186008100</a>

\* Controls Standard included in kit.

\*\* Essential for kit use.

## GLYCAN COLUMNS

Choose the most appropriate LC-based technology to address your specific glycan analysis needs and laboratory instrumentation

### HILIC for Released Glycans

ACQUITY UPLC and XBridge Glycan BEH Amide 130 Å Columns are best suited for the analysis of released, N-labeled glycans using pre-column labeling with 2-AB, 2-AA, or Waters innovative and enabling RapiFluor-MS reagent. ACQUITY Premier Glycan BEH Amide Columns with MaxPeak High Performance Surfaces (HPS) Technology, that reduces sample loss caused by non-specific adsorption on metal surfaces, deliver the representative performance of Glycan BEH Amide chemistry from the first injection.

### Mixed Mode for Released Glycans

Glycan BEH C<sub>18</sub> AX Columns are packed with a mixed-mode, reversed-phase/anion-exchange chemistry that provides charge-based separations and extra resolution for acidic glycans. With the mixed-mode separation, glycans are grouped by different charged states, and retention is increased with analyte net charge. Additional resolution of isomeric glycan species within the same charged group can be achieved due to the RP properties of the stationary phase. The ACQUITY Premier Glycan BEH C<sub>18</sub> AX Columns are integrated with an easy-to-use, MS-grade mobile-phase concentrate and the RapiFluor-MS Sialylated Glycan Performance Test Standard, providing a complete charge-based separation solution.



## Application Example 1

### LC Conditions

System: ACQUITY UPLC H-Class Bio  
 Data Acquisition: MassLynx v4.1  
 Column: ACQUITY Premier Glycan BEH C<sub>18</sub> AX, 1.7 μm, 2.1 × 150 mm (p/n: [186009760](#))  
 Sample Temp.: 8 °C  
 Sample Injection Volume: 1 μL  
 FLR Wavelengths: 265 Ex/425 Em (RFMS-labeled glycans) 3  
 30 Ex/420 Em (2-AB-labeled glycans)  
 Column Temp.: 60 °C  
 Seal Wash: 330% ACN/70% 18.2 MΩ water v/v (seal wash interval set to 5 min)  
 Mobile Phase A: 18.2 MΩ water  
 Mobile Phase B: 10% IonHance Glycan C<sub>18</sub> AX1 M ammonium formate concentrate in 40%/60% water/acetonitrile (v/v)  
 Active Preheater: Enabled  
 Scan Rate: 10 points/sec  
 Filter Time Constant: Normal  
 Autozero on Inject Start: Yes  
 Autozero on Wavelength: Maintain baseline

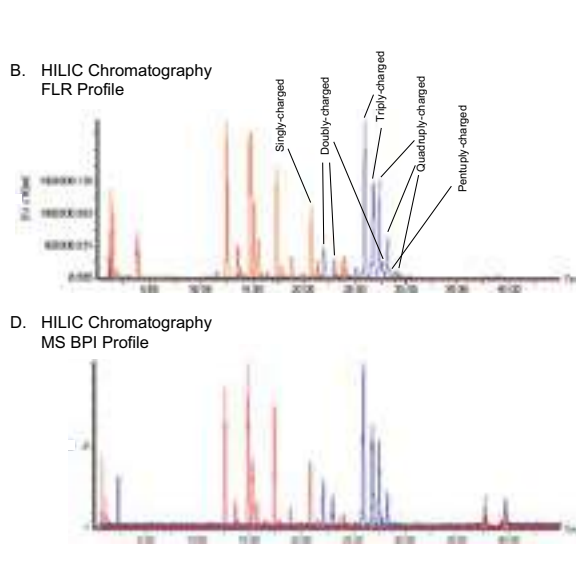
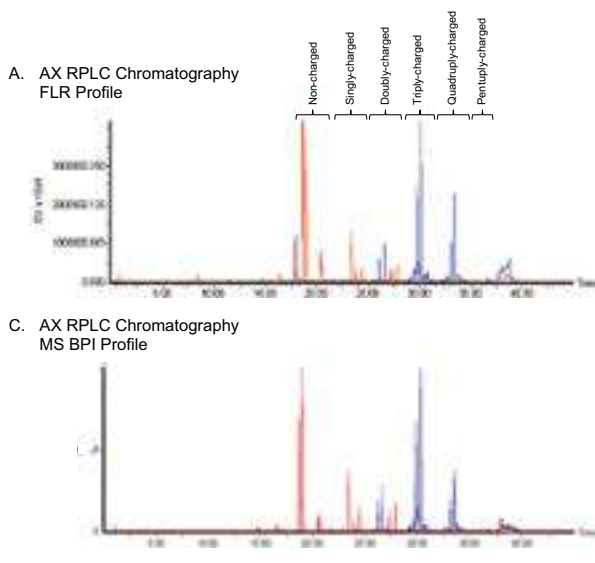
1. The water only mobile phase can be susceptible to bacterial growth. It is recommended to replace the mobile phase frequently (every 3 days) and periodically flush solvent line with 90/10 acetonitrile/water mixture.
2. Mobile Phase B is prepared by diluting 100 mL of IonHance Glycan C<sub>18</sub> AX1 M Ammonium Formate concentrate with 320 mL of MilliQ water and 580 mL of acetonitrile. It is recommended to replace this mobile phase B frequently (every 3 days) to avoid any potential performance change caused by acetonitrile evaporation.

### MS Conditions

System: Xevo G2-XS QToF  
 Ionization Mode: ESI, Positive  
 Acquisition Range: 700–3000 Da  
 Capillary Voltage: 2.2 kV  
 Source Offset: 50 V  
 Collision Energy: Off  
 Cone Voltage: 75 V  
 Desolvation Gas: 600 L/hr  
 Source Temp.: 120 °C  
 Desolvation Temp.: 500 °C  
 Scan Rate: 2 Hz

### Gradient - RapiFluor-MS Labeled Glycans

Time (min)	Flow (mL/min)	%A	%B	Curve
0.0	0.4	100	0	Initial
36.0	0.4	78	22	6
36.3	0.4	0	100	6
37.3	0.4	0	100	6
38.0	0.4	100	0	6
45.0	0.4	100	0	6



FLR Chromatograms of RFMS-labeled glycans from human IgG (red) and Fetuin (blue) using different LC chromatography. Stainless hardware with High Performance Surface were used to pack all columns. Figure 1 A, C: FLR profiling (A) and MS BPI profiling (C) using an anion exchange reversed phase liquid chromatography (AX RPLC) mixed mode separation with BEH C<sub>18</sub> AX stationary phase. Figure 1 B, D: FLR profiling (B) and MS BPI profiling (D) using HILIC separation achieved with amide bonded BEH stationary phase.

For more information, reference application note [720007038EN](#).



## Application Example 2

### LC Conditions Standard Configuration

System: ACQUITY UPLC I-Class PLUS  
 Detection: ACQUITY FLR Detector  
 ( $\lambda$ .excitation=265 nm,  $\lambda$ .emission=425 nm, 2 Hz)  
 Columns: ACQUITY Glycan BEH Amide Column, 1.7  $\mu$ m, 130 Å, 2.1  $\times$  150 mm  
 (p/n: [186004742](#))  
 Vials: QuanRecovery with MaxPeak HPS 300  $\mu$ L Vials (p/n: [186009186](#))  
 Column Temp.: 60 °C  
 Sample Temp.: 6 °C  
 Injection Amount: 1  $\mu$ L  
 Seal Wash: 20% acetonitrile in water  
 Mobile Phase A: H<sub>2</sub>O with 50 mM NH<sub>4</sub>HCO<sub>2</sub>  
 Mobile Phase B: Acetonitrile

### MS Conditions

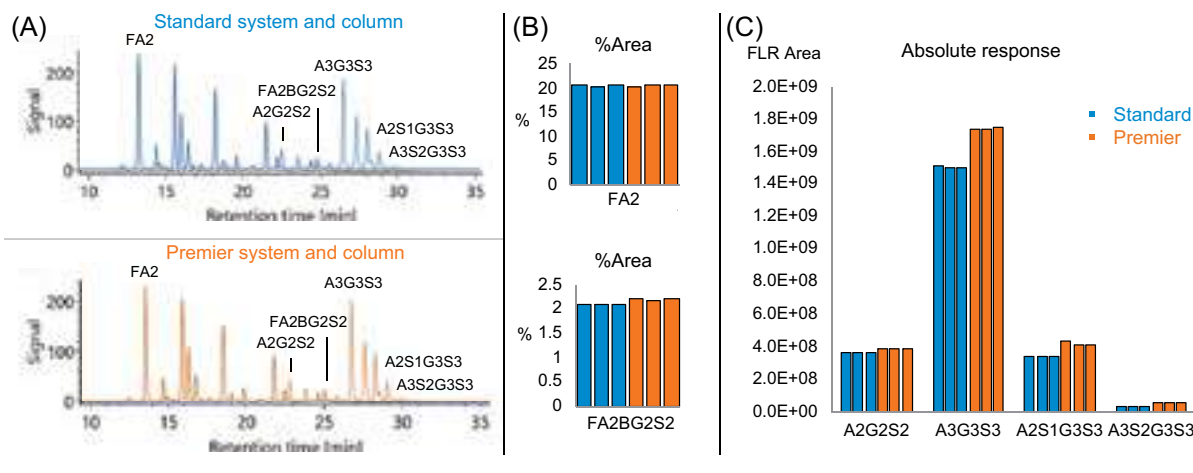
System: ACQUITY RDa Mass Detector  
 Ionization Mode: ESI, Positive  
 Acquisition Range: 50–2,000 *m/z*  
 Capillary Voltage: 1.5 kV  
 Source Offset: 50 V  
 Cone Voltage: 45 V  
 Fragmentation CV: 70–90 V

### LC Conditions AQUITY Premier Solution

System: ACQUITY Premier (BSM) UPLC  
 Detection: ACQUITY Premier FLR Detector  
 ( $\lambda$ .excitation=265 nm,  $\lambda$ .emission=425 nm, 2 Hz)  
 Columns: ACQUITY Premier Glycan BEH Amide Column, 1.7  $\mu$ m, 130 Å, 2.1  $\times$  150 mm  
 (p/n: [186009524](#))  
 Vials: QuanRecovery with MaxPeak HPS 300  $\mu$ L Vials (p/n: [186009186](#))  
 Column Temp.: 60 °C  
 Sample Temp.: 6 °C  
 Injection Amount: 1  $\mu$ L  
 Seal Wash: 20% acetonitrile in water  
 Mobile Phase A: H<sub>2</sub>O with 50 mM NH<sub>4</sub>HCO<sub>2</sub>  
 Mobile Phase B: Acetonitrile

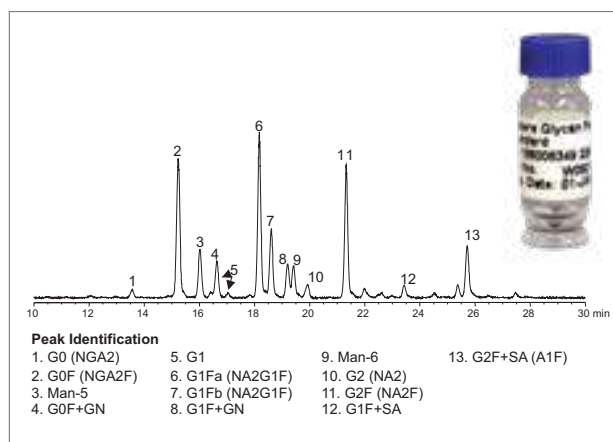
### Gradient

Time (min)	Flow (mL/min)	%A	%B	Curve
0.00	0.4	25	75	6
35.00	0.4	46	54	6
36.50	0.2	80	20	6
39.50	0.2	80	20	6
43.10	0.2	25	75	6
47.60	0.4	25	75	6
55.00	0.4	25	75	6



The recovery of sialylated glycans are slightly better using the BioAccord System with ACQUITY Premier LC and Column. (A) overlaid chromatograms of the separation of neutral and sialylated RFMS labeled glycan performance test standards (GPTS) on Standard vs. ACQUITY Premier System and Column. (B) Comparison of relative abundances of a neutral glycan, FA2, vs. a sialylated glycan, FA2BG2S2 in the neutral GPTS. (C) Comparison of the absolute response of the representative glycans in the sialylated GPTS.

**i** For more information, reference application note [720007261EN](#).

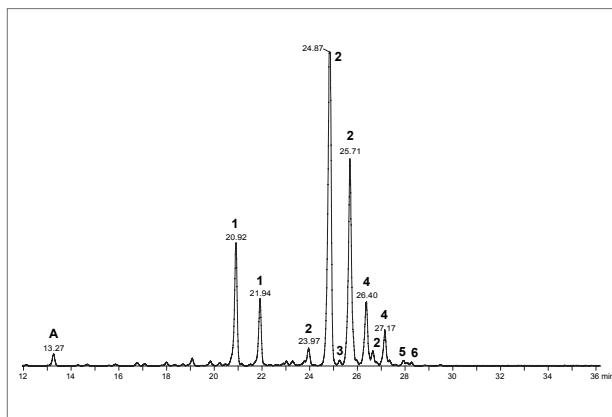


### ACQUITY UPLC Glycan BEH Amide Columns and Method Validation Kits

Description	P/N
ACQUITY UPLC Glycan BEH Amide, 130 Å, 1.7 $\mu$ m, 2.1 $\times$ 50 mm Column	<a href="#">186004740</a>
ACQUITY UPLC Glycan BEH Amide, 130 Å, 1.7 $\mu$ m, 2.1 $\times$ 100 mm Column	<a href="#">186004741</a>
ACQUITY UPLC Glycan BEH Amide, 130 Å, 1.7 $\mu$ m, 2.1 $\times$ 5 mm VanGuard Column, 3/pk	<a href="#">186004739</a>
ACQUITY UPLC Glycan BEH Amide, 130 Å, 1.7 $\mu$ m, 2.1 $\times$ 100 mm Column Method Validation Kit <sup>1</sup>	<a href="#">186004907</a>
ACQUITY UPLC Glycan BEH Amide, 130 Å, 1.7 $\mu$ m, 2.1 $\times$ 150 mm Column	<a href="#">186004742</a>

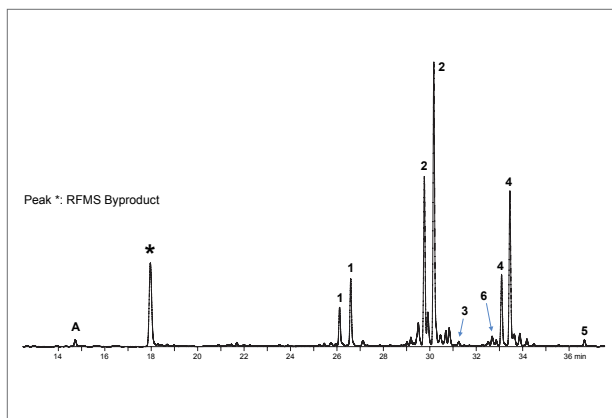
Note: ACQUITY UPLC Glycan BEH Amide, 1.7  $\mu$ m Columns are designed for use with the ACQUITY UPLC System. The benefits of the small particle packing in ACQUITY UPLC Glycan BEH Amide, 1.7  $\mu$ m Columns are only realized with the low system volume and low detector dispersion of an ACQUITY UPLC System.  
<sup>1</sup>Three columns from three different batches of BEH Amide, 130 Å material.

## HILIC Separation



Chromatographic profile of the RapiFluor-MS™ Sialylated Glycan Performance Test Standard.

## Mixed-mode Separation



Chromatographic Profile of the RapiFluor-MS Sialylated Glycan Performance Test Standard.

Peak	Name	RapiFluor-MS Labeled Glycan Composition	M <sub>r</sub> (Da)
1	A2G2S2	C101H159N11O63	2533.9576
2	A3G3S3	C126H199N13O81	3190.1852
3	FA3G3S3	C132H209N13O85	3336.2431
4	A3S1G3S3	C137H216N14O89	3481.2806
5	A3S2G3S3	C148H233N15O97	3772.3761
6	A4G4S4	C151H239N15O99	3846.4128
A	M5	C63H99N7O37	1545.6080

## Ordering Information

### ACQUITY Premier Glycan BEH Amide columns and Eluent

Description	P/N
ACQUITY Premier Glycan BEH Amide, 130 Å, 1.7 µm, 2.1 × 50 mm Column	<a href="#">186009522</a>
ACQUITY Premier Glycan BEH Amide, 130 Å, 1.7 µm, 2.1 × 100 mm Column	<a href="#">186009523</a>
ACQUITY Premier Glycan BEH Amide, 130 Å, 1.7 µm, 2.1 × 150 mm Column	<a href="#">186009524</a>
ACQUITY Premier Glycan BEH Amide, 130 Å, 1.7 µm, 2.1 × 50 mm VanGuard FIT Column	<a href="#">186009974</a>
ACQUITY Premier Glycan BEH Amide, 130 Å, 1.7 µm, 2.1 × 100 mm VanGuard FIT Column	<a href="#">186009975</a>
ACQUITY Premier Glycan BEH Amide, 130 Å, 1.7 µm, 2.1 × 150 mm VanGuard FIT Column	<a href="#">186009976</a>
ACQUITY Premier Glycan BEH Amide, 130 Å, 1.7 µm, 2.1 × 5 mm (Guard) VanGuard FIT Column	<a href="#">186009977</a>
Ammonium Formate Solution -Glycan Analysis	<a href="#">186007081</a>

### ACQUITY Premier Glycan BEH C<sub>18</sub> AX columns and Eluent

Description	P/N
ACQUITY Premier Glycan BEH C <sub>18</sub> AX, 1.7 µm, 2.1 × 50 mm Column	<a href="#">186009758</a>
ACQUITY Premier Glycan BEH C <sub>18</sub> AX, 1.7 µm, 2.1 × 100 mm Column	<a href="#">186009759</a>
ACQUITY Premier Glycan BEH C <sub>18</sub> AX, 1.7 µm, 2.1 × 150 mm Column	<a href="#">186009760</a>
ACQUITY Premier Glycan BEH C <sub>18</sub> AX, 1.7 µm, 2.1 × 50 mm VanGuard FIT Column	<a href="#">186009970</a>
ACQUITY Premier Glycan BEH C <sub>18</sub> AX, 1.7 µm, 2.1 × 100 mm VanGuard FIT Column	<a href="#">186009971</a>
ACQUITY Premier Glycan BEH C <sub>18</sub> AX, 1.7 µm, 2.1 × 150 mm VanGuard FIT Column	<a href="#">186009972</a>
ACQUITY Premier Glycan BEH C <sub>18</sub> AX, 1.7 µm, 2.1 × 5 mm (Guard) VanGuard FIT Column	<a href="#">186009973</a>
ACQUITY C <sub>18</sub> AX Charge Based Glycan Kit (Standard Mobile Phase Concentrate, and 1.7 µm, 2.1 × 50 mm Column)	<a href="#">186004732</a>
ACQUITY C <sub>18</sub> AX Charge Based Glycan Kit (Standard Mobile Phase Concentrate, and 1.7 µm, 2.1 × 100 mm Column)	<a href="#">186004733</a>
ACQUITY C <sub>18</sub> AX Charge Based Glycan Kit (Standard Mobile Phase Concentrate, and 1.7 µm, 2.1 × 150 mm Column)	<a href="#">186004734</a>
IonHance Glycan C <sub>18</sub> AX Ammonium Formate Concentrate	<a href="#">186009762</a>

## XBridge Glycan BEH Amide HPLC and UHPLC Columns and Method Validation Kits

Description	P/N
XBridge Glycan BEH Amide, 130 Å, 2.5 µm, 2.1 × 5 mm VanGuard Column, 3/pk	<a href="#">186007262</a>
XBridge Glycan BEH Amide, 130 Å, 2.5 µm, 2.1 × 50 mm <i>XP</i> Column	<a href="#">186007263</a>
XBridge Glycan BEH Amide, 130 Å, 2.5 µm, 2.1 × 100 mm <i>XP</i> Column	<a href="#">186007264</a>
XBridge Glycan BEH Amide, 130 Å, 2.5 µm, 2.1 × 150 mm <i>XP</i> Column	<a href="#">186007265</a>
XBridge Glycan BEH Amide, 130 Å, 2.5 µm, 2.1 × 150 mm <i>XP</i> Column Method Validation Kit <sup>1</sup>	<a href="#">186007266</a>
XBridge Glycan BEH Amide, 130 Å, 2.5 µm, 3.0 × 30 mm <i>XP</i> Column	<a href="#">186008038</a>
XBridge Glycan BEH Amide, 130 Å, 2.5 µm, 3.0 × 75 mm <i>XP</i> Column	<a href="#">186008039</a>
XBridge Glycan BEH Amide, 130 Å, 2.5 µm, 3.0 × 150 mm <i>XP</i> Column	<a href="#">186008040</a>
XBridge Glycan BEH Amide, 130 Å, 2.5 µm, 4.6 × 20 mm Guard Column, 2/pk <sup>3</sup>	<a href="#">186007267</a>
XBridge Glycan BEH Amide, 130 Å, 2.5 µm, 4.6 × 50 mm <i>XP</i> Column	<a href="#">186007268</a>
XBridge Glycan BEH Amide, 130 Å, 2.5 µm, 4.6 × 100 mm <i>XP</i> Column	<a href="#">186007269</a>
XBridge Glycan BEH Amide, 130 Å, 2.5 µm, 4.6 × 150 mm <i>XP</i> Column	<a href="#">186007270</a>
XBridge Glycan BEH Amide, 130 Å, 2.5 µm, 4.6 × 150 mm <i>XP</i> Column Method Validation Kit <sup>1</sup>	<a href="#">186007271</a>
XBridge Glycan BEH Amide, 130 Å, 3.5 µm, 2.1 × 10 mm Sentry Guard Cartridge, 2/pk <sup>2</sup>	<a href="#">186007505</a>
XBridge Glycan BEH Amide, 130 Å, 3.5 µm, 2.1 × 50 mm Column	<a href="#">186007502</a>
XBridge Glycan BEH Amide, 130 Å, 3.5 µm, 2.1 × 100 mm Column	<a href="#">186007503</a>
XBridge Glycan BEH Amide, 130 Å, 3.5 µm, 2.1 × 150 mm Column	<a href="#">186007504</a>
XBridge Glycan BEH Amide, 130 Å, 3.5 µm, 4.6 × 20 mm Sentry Guard Cartridge, 2/pk <sup>3</sup>	<a href="#">186007272</a>
XBridge Glycan BEH Amide, 130 Å, 3.5 µm, 4.6 × 50 mm Column	<a href="#">186007273</a>
XBridge Glycan BEH Amide, 130 Å, 3.5 µm, 4.6 × 100 mm Column	<a href="#">186007274</a>
XBridge Glycan BEH Amide, 130 Å, 3.5 µm, 4.6 × 150 mm Column	<a href="#">186007275</a>
XBridge Glycan BEH Amide, 130 Å, 3.5 µm, 4.6 × 150 mm Column Method Validation Kit <sup>1</sup>	<a href="#">186007277</a>
XBridge Glycan BEH Amide, 130 Å, 3.5 µm, 4.6 × 250 mm Column	<a href="#">186007276</a>
XBridge Premier Glycan BEH Amide, 130 Å, 2.5 µm, 2.1 × 50 mm Column	<a href="#">186009941</a>
XBridge Premier Glycan BEH Amide, 130 Å, 2.5 µm, 2.1 × 100 mm Column	<a href="#">186009942</a>
XBridge Premier Glycan BEH Amide, 130 Å, 2.5 µm, 2.1 × 150 mm Column	<a href="#">186009943</a>
XBridge Premier Glycan BEH Amide, 130 Å, 2.5 µm, 4.6 × 50 mm Column	<a href="#">186009944</a>
XBridge Premier Glycan BEH Amide, 130 Å, 2.5 µm, 4.6 × 100 mm Column	<a href="#">186009945</a>
XBridge Premier Glycan BEH Amide, 130 Å, 2.5 µm, 4.6 × 150 mm Column	<a href="#">186009946</a>
XBridge Premier Glycan BEH C <sub>18</sub> AX, 2.5 µm, 2.1 × 50 mm Column	<a href="#">186009947</a>
XBridge Premier Glycan BEH C <sub>18</sub> AX, 2.5 µm, 2.1 × 100 mm Column	<a href="#">186009948</a>
XBridge Premier Glycan BEH C <sub>18</sub> AX, 2.5 µm, 2.1 × 150 mm Column	<a href="#">186009949</a>
XBridge Premier Glycan BEH C <sub>18</sub> AX, 2.5 µm, 4.6 × 50 mm Column	<a href="#">186009950</a>
XBridge Premier Glycan BEH C <sub>18</sub> AX, 2.5 µm, 4.6 × 100 mm Column	<a href="#">186009951</a>
XBridge Premier Glycan BEH C <sub>18</sub> AX, 2.5 µm, 4.6 × 150 mm Column	<a href="#">186009952</a>

<sup>1</sup> Three columns from three different batches of BEH Amide, 130 Å material.

<sup>2</sup> Requires 2.1 × 10 mm Universal Sentry Guard Holder, p/n: [WAT097958](#).

<sup>3</sup> Requires 4.6 × 20 mm Universal Sentry Guard Holder, p/n: [WAT046910](#).

## Reductive Amination Glycan Sample Preparation Kits and Standards

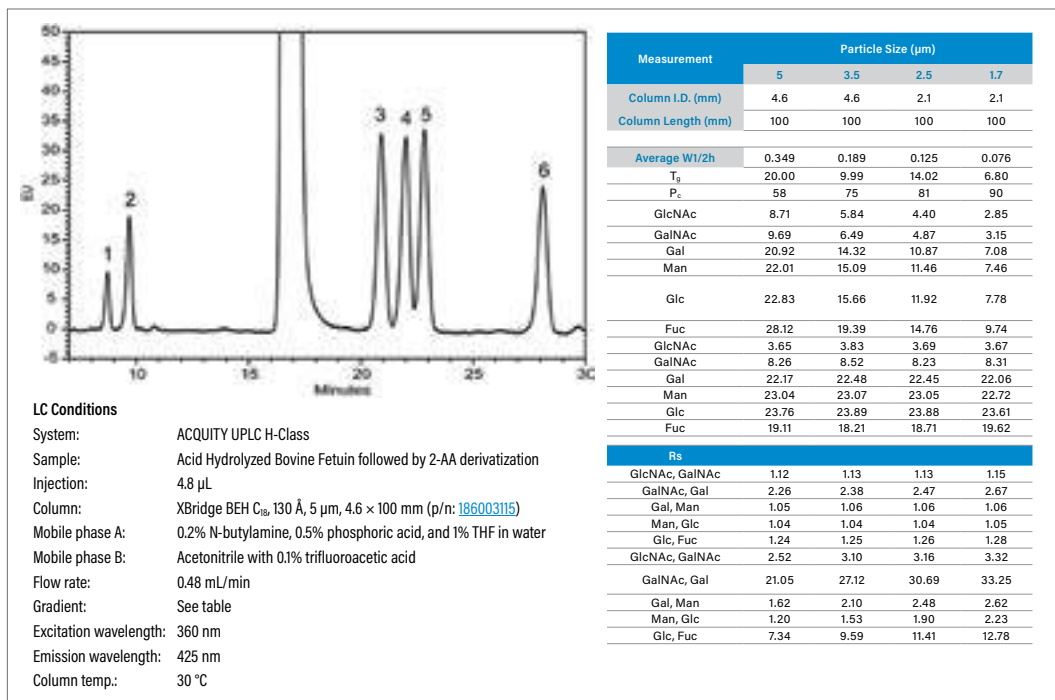
Description	P/N
GlycoWorks Reductive Amination High-Throughput Prep Kit	
Kit contains: GlycoWorks HILIC µElution 96-Well Plate, <i>RapiGest</i> SF 1 mg Vial, GlycoWorks Reagent Kit, Manifold Waste Tray	<a href="#">176003090</a>
GlycoWorks HILIC µElution 96-Well Plate	<a href="#">186002780</a>
<i>RapiGest</i> SF 1 mg Vial	<a href="#">186001860</a>
GlycoWorks Reagent Kit	<a href="#">186007034</a>
Manifold Waste Tray	<a href="#">600001282</a>
GlycoWorks Reductive Amination Single-Use Prep Kit	
Kit contains: GlycoWorks HILIC 1 cc Cartridge (20/pk), <i>RapiGest</i> SF 1 mg Vial, GlycoWorks Reagent Kit	<a href="#">176003119</a>
GlycoWorks HILIC 1 cc Cartridge (20/pk)	<a href="#">186007080</a>
<i>RapiGest</i> SF 1 mg Vial	<a href="#">186001860</a>
GlycoWorks Reagent Kit	<a href="#">186007034</a>
2-AB Glycan Performance Test Standard	
The Glycan Performance Test Standard is a 2-AB labeled human IgG-like standard that is QC verified to contain the components needed to benchmark and evaluate ACQUITY UPLC Glycan BEH, 1.7 µm Columns	<a href="#">186006349</a>
2-AB Dextran Calibration Ladder	
The 2-AB labeled, Dextran Calibration Ladder is used to calibrate the HILIC column from retention time to GU values. This calibration ladder provides good peak shape and reliable identification from 2 to 30 glucose units.	<a href="#">186006841</a>
GlycoWorks HILIC 1 cc Cartridge, 20/pk	<a href="#">186007080</a>
GlycoWorks HILIC 1 cc Flangeless Cartridge	<a href="#">186007239</a>
GlycoWorks HILIC µElution Plate	<a href="#">186002780</a>
GlycoWorks Reagent Kit	<a href="#">186007034</a>
GlycoWorks SPE Reagents	<a href="#">186007992</a>
Ammonium Formate Solution – Glycan Analysis	<a href="#">186007081</a>

## MONOSACCHARIDE AND SIALIC ACID ANALYSIS FROM GLYCOPROTEINS

### Monosaccharide Analyses

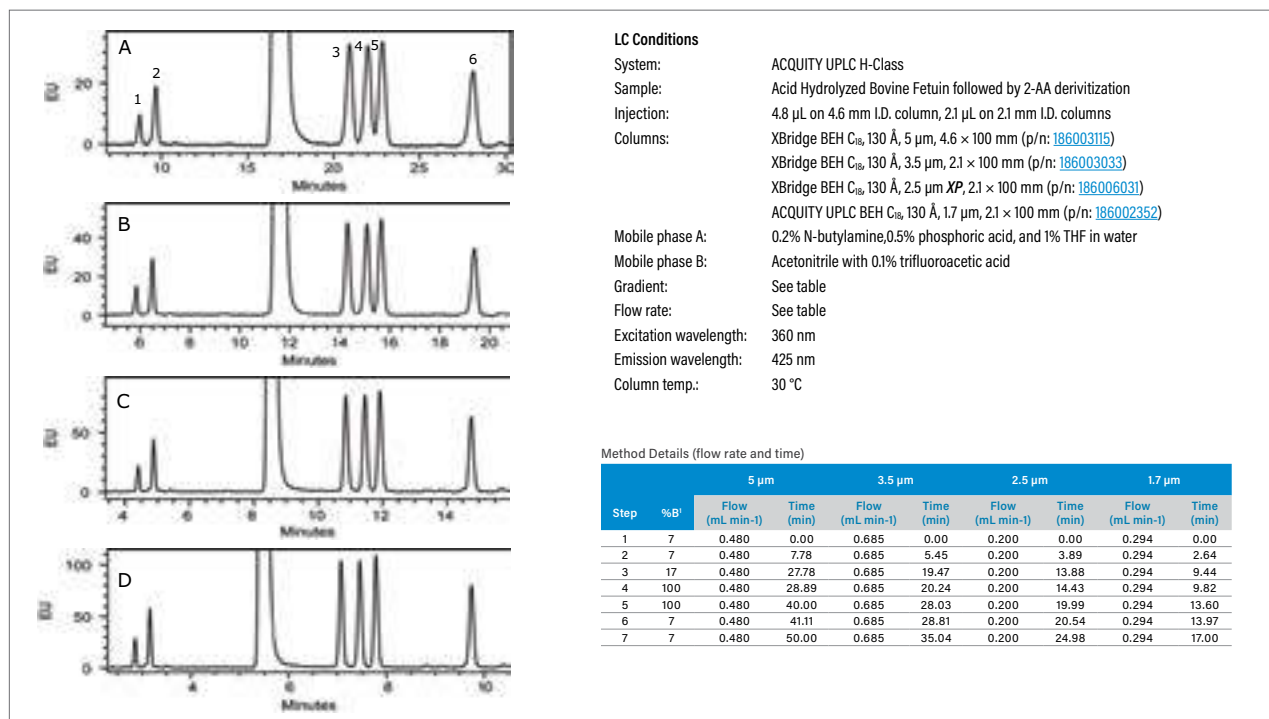
Apart from charged sialic acid species, the primary monosaccharides found in N-linked and O-linked glycans are the neutral monosaccharides N-acetylglucosamine (GlcNAc), N-acetylgalactosamine (GalNAc), galactose (Gal), glucose (Glc), mannose (Man), and fucose (Fuc). Analyses of non-charged monosaccharides frequently begins by acid hydrolysis of the glycan by incubation with trifluoroacetic acid or hydrochloric acid. Usually, a three-hour incubation at 100 °C with 2 M trifluoroacetic acid releases all of the monosaccharides; however, during hydrolysis, the N-acetyl groups on GlcNAc and GalNAc are hydrolyzed to glucosamine (GlcN) and galactosamine (GalN). Following hydrolysis, the released monosaccharides are derivatized using 2-aminobenzoic acid (2-AA), as detailed in the Waters application note "Future Proofing the Biopharmaceutical QC Laboratory: Chromatographic Scaling of HPLC Monosaccharide Analyses Using the ACQUITY UPLC H-Class Bio System" ([720005255EN](#)). As the application note explains, this method can reliably generate sensitive, high resolution, and quantitative monosaccharide analyses independent of a laboratory's available LC instrumentation.

### HPLC-Based Analyses of 2-AA Labeled Monosaccharides from Acid Hydrolyzed Bovine Fetuin



HPLC analysis of monosaccharides. A separation performed with a Waters XBridge BEH C<sub>18</sub>, 130 Å, 5 µm Column as detailed in Waters Applications Note: [720005255EN](#). Monosaccharides are identified as follows: (1) N-acetylglucosamine (GlcNAc), (2) N-acetylgalactosamine (GalNAc), (3) Galactose (Gal), (4) Mannose (Man), (5) Glucose (Glc), and (6) Fucose (Fuc).

## Effect of Particle Size on the Analyses of 2-AA Labeled Monosaccharides from Acid Hydrolyzed Bovine Fetuin

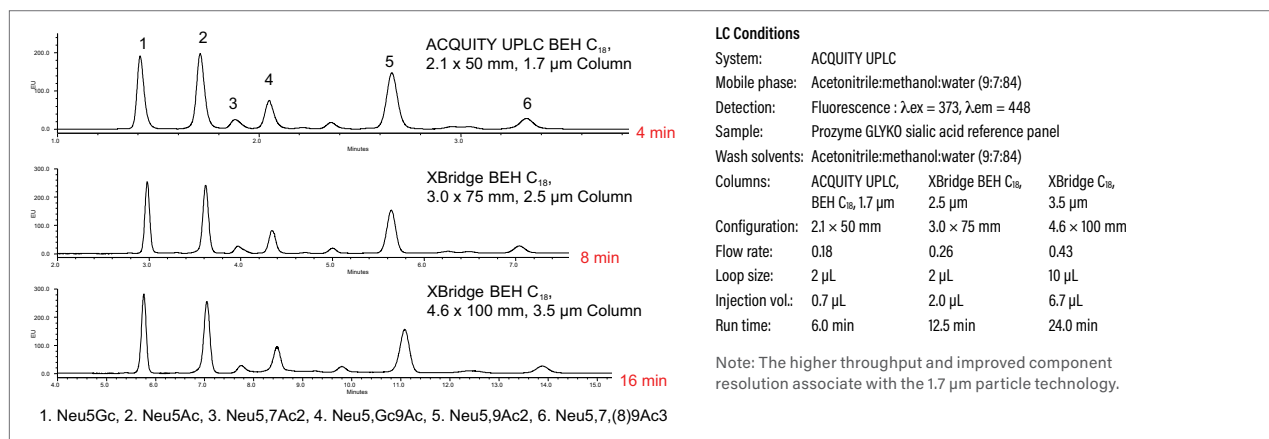


Geometric scaling of a monosaccharide separation on XBridge BEH C<sub>18</sub>, 130 Å, (A) 5  $\mu$ m particle, (B) 3.5  $\mu$ m particle, (C) 2.5  $\mu$ m particle, and (D) 1.7  $\mu$ m particle noting higher throughput and improved component Rs via use of 1.7  $\mu$ m particle technology.

## Sialic Acid Analyses

A diverse range of sialic acids are found in nature, but the two major sialic acids species found on N- and O-linked glycans contained in biopharmaceuticals are N-acetyl-neuraminic acid (Neu5Ac) and N-glycolyl-neuraminic acid (Neu5Gc). Since sialylation can enhance serum half-life as well as affect biological activity, it is important to accurately monitor both the quantitative levels and types of sialic acids during all stages of the product life cycle. Many LC-based methods begin with the release of the targeted sialic acids under milder acid hydrolysis conditions (e.g., 2 M acetic acid for two hours at 80 °C). The released sialic acids can be then derivatized with 1, 2-diamino-4, 5-methylenedioxybenzene-2HCl (DMB) dye. Of particular importance is the fact that DMB- labeled sialic acids are light sensitive and liable to degradation and should be analyzed within 24 hours of labeling. This can become a significant problem if a large number of samples need to be analyzed using traditional HPLC-based techniques that can take more than 30 minutes per sample analysis.

### UPLC vs. HPLC-Based Analyses of DMB-Labeled, Sialic Acid Test Mix



Geometric scaling of DMB-labeled sialic acid standards on XBridge BEH C<sub>18</sub>, 130 Å, 3.5  $\mu$ m particle (bottom), 2.5  $\mu$ m particle (middle), and ACQUITY UPLC BEH C<sub>18</sub>, 130 Å, 1.7  $\mu$ m particle (top).

## Ordering Information

### ACQUITY UPLC BEH C<sub>18</sub>, 130 Å and XBridge BEH C<sub>18</sub>, 130 Å HPLC and UHPLC Columns

ACQUITY UPLC BEH C <sub>18</sub> , 130 Å	Particle Size: 1.7 $\mu$ m	
	Dimension	P/N (1/pk)
	2.1 $\times$ 50 mm	<a href="#">186002350</a>
	2.1 $\times$ 100 mm	<a href="#">186002352</a>
2.1 $\times$ 150 mm	<a href="#">186004742</a>	
XBridge BEH C <sub>18</sub> , 130 Å, XP	Particle Size: 2.5 $\mu$ m	
	Dimension	P/N (1/pk)
	2.1 $\times$ 100 mm	<a href="#">186006031</a>
	3 $\times$ 100 mm	<a href="#">186006035</a>
3 $\times$ 150 mm	<a href="#">186006710</a>	
XBridge BEH C <sub>18</sub> , 130 Å	Particle Size: 3.5 $\mu$ m	
	Dimension	P/N (1/pk)
	2.1 $\times$ 100 mm	<a href="#">186003033</a>
	Particle Size: 5 $\mu$ m	
Dimension	P/N (1/pk)	
4.6 $\times$ 100 mm	<a href="#">186003115</a>	

# Is NSA Sabotaging Your Lab's Productivity?

## The Hidden Impacts of Non-Specific Adsorption (NSA)



- Did you know that NSA can negatively impact your chromatographic peak shapes, sensitivity and reproducibility?
- Did you believe the only solutions include the use of additives or lengthy passivation procedures?

Waters MaxPeak Premier Columns dramatically reduce NSA with MaxPeak High Performance Surfaces, innovative technologies to reduce analyte loss due to analyte/surface interactions.



## Nucleic Acid Separations

For more than 30 years, Waters has pioneered LC-based separations for nucleic acids from HPLC to UPLC. The ACQUITY and XBridge Premier Oligonucleotide BEH C<sub>18</sub> Columns utilize MaxPeak™ High Performance Surfaces which is our latest innovation designed to increase analyte recovery, sensitivity, and reproducibility by minimizing analyte/surface interactions that can lead to sample losses.

Waters Oligonucleotide Columns whether it is in Premier hardware or stainless steel hardware contain second-generation hybrid silica BEH Technology particles functionalized with C<sub>18</sub>. The separation of detritylated synthetic oligonucleotide samples is based on the well-established method of ion-pair, reversed-phase chromatography.

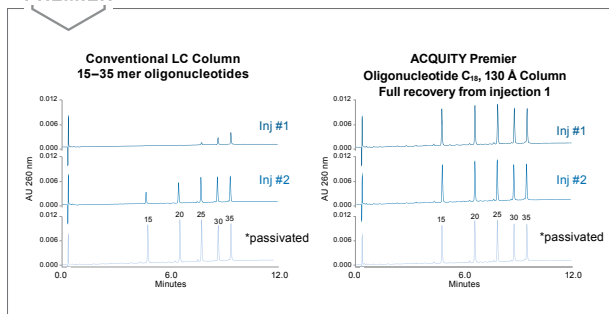
The availability of 1.7 µm UPLC particles or 2.5 µm HPLC particles in various column dimensions provides flexibility to meet various lab-scale isolation or analysis needs, and delivers exceptional sample resolution and superior column life. In addition, Waters manufacturing and quality control testing procedures help ensure consistent batch-to-batch and column-to-column performance regardless of application demands.

- Synthetic oligonucleotide separations efficiencies equivalent to or exceeding those of PAGE, CGE, or ion-exchange HPLC methods
- The ability to distinguish/separate failure sequences from detritylated full-length products
- Column scalability for laboratory-scale isolation needs
- Exceptional column life for reduced cost per analysis
- QC tested with MassPREP Oligonucleotide Standard (p/n: [186004135](#)) to help ensure performance consistency



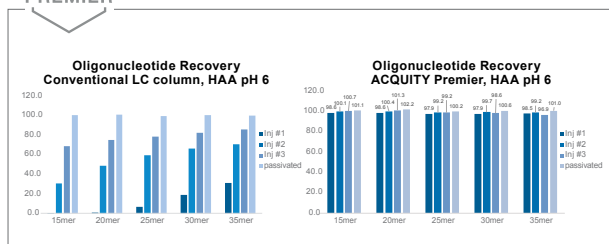
Have confidence that the methods you develop today will have the same repeatable results tomorrow. Quality is at the heart of everything we do, whether it is column particles, reliable quality manufacturing, customer support, or supply chain.

### MAXPEAK PREMIER Out-of-the-box Performance



*Injection of 2 µL of standard diluted in water, 10 pmol of each oligonucleotide injected on column. \*\*Passivation\*\* with 500 pmol injection of 35 mer, followed by "post passivation" injection of 10 pmol of standard.*

### MAXPEAK PREMIER High Recovery and Repeatability



*Injection of 2 µL of standard diluted in water, 10 pmol of each oligonucleotide injected on column. \*\*Passivation\*\* with 500 pmol injection of 35 mer, followed by "post passivation" injection of 10 pmol of standard.*



## EXCEPTIONAL RESOLUTION OF OLIGONUCLEOTIDE MIXTURES

ACQUITY UPLC Oligonucleotide BEH C<sub>18</sub>, 1.7 μm (designed for use with an ACQUITY UPLC System) and XBridge Oligonucleotide BEH C<sub>18</sub>, 2.5 μm Columns are well suited for the analysis of detritylated oligonucleotides using ion-pair, reversed-phase chromatography. As indicated (see figure on right), separations are comparable to those obtained by capillary gel electrophoresis (CGE) in terms of component resolution, yet analysis times are significantly decreased using Waters UPLC Technology. The ability to resolve large oligonucleotide sequences (e.g., N from N-1) is possible due to the enhanced resolving power obtained using sub-3-μm, BEH Technology particles. In addition, quantitation with molecular weight characterization of the separated target oligonucleotide product from failure sequences is possible using Waters Oligonucleotide Columns with hyphenated-mass spectrometry methods and MS-friendly eluents.

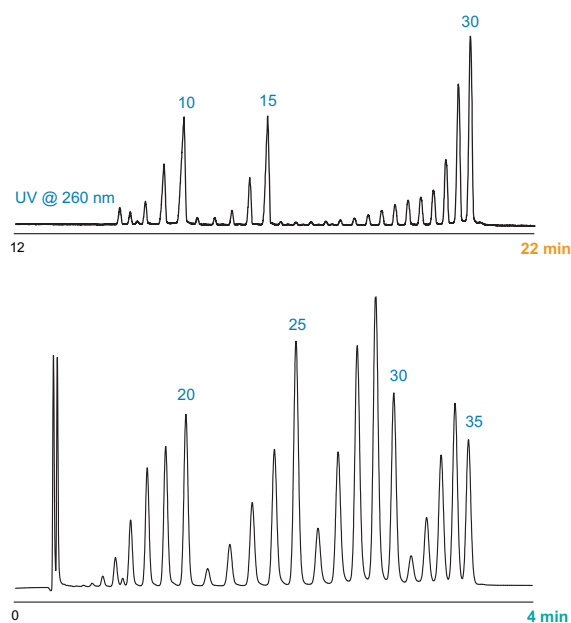
## Separation of Detritylated Oligodeoxythymidine Ladders by Capillary Gel Electrophoresis (CGE) vs. Ion-Pair, Reversed-Phase Chromatography

### CGE Conditions

System: Capillary Gel Electrophoresis  
Column: PEG sieving matrix (BioCap 75 μm × 275 [to detector]/ 34.5 cm [total length])  
Injection: 45 injection at 5 kV  
Running: 15 kV  
Column temp.: 30 °C

### LC Conditions

System: ACQUITY UPLC  
Column: ACQUITY UPLC Oligonucleotide BEH C<sub>18</sub>, 1.7 μm, 21 × 50 mm (p/n: [186003949](#))  
Mobile phase A: 15 mM TEA, 400 mM hexafluoroisopropanol, pH 7.9  
Mobile phase B: 50% A, 50% methanol  
Flow rate: 0.4 mL/min  
Column temp.: 60 °C  
Gradient: 40 to 48% B in 4 min (20–24% methanol)  
UV detection: 260 nm



## Ordering Information

### ACQUITY Premier Columns for Oligonucleotide Analysis

Oligonucleotide BEH C <sub>18</sub> , 130 Å, 1.7 µm	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009484</a>
	2.1 × 100 mm	<a href="#">186009485</a>
	2.1 × 150 mm	<a href="#">186009486</a>
<hr/>		
Peptide BEH C <sub>18</sub> , 300 Å, 1.7 µm*	2.1 × 50 mm	<a href="#">186009493</a>
	2.1 × 100 mm	<a href="#">186009494</a>
	2.1 × 150 mm	<a href="#">186009495</a>

\*Quality control tested for peptides; large pore size that is well suited for oligonucleotide separations.

### XBridge™ Premier Columns for Oligonucleotide Analysis

Oligonucleotide BEH C <sub>18</sub> , 130 Å, 2.5 µm	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009836</a>
	2.1 × 100 mm	<a href="#">186009837</a>
	2.1 × 150 mm	<a href="#">186009838</a>
	4.6 × 50 mm	<a href="#">186009901</a>
	4.6 × 100 mm	<a href="#">186009902</a>
	4.6 × 150 mm	<a href="#">186009903</a>
<hr/>		
Peptide BEH C <sub>18</sub> , 300 Å, 2.5 µm*	2.1 × 50 mm	<a href="#">186009892</a>
	2.1 × 100 mm	<a href="#">186009893</a>
	2.1 × 150 mm	<a href="#">186009894</a>
	4.6 × 50 mm	<a href="#">186009895</a>
	4.6 × 100 mm	<a href="#">186009896</a>
	4.6 × 150 mm	<a href="#">186009897</a>

\*Quality control tested for peptides; large pore size that is well suited for oligonucleotide separations.

### ACQUITY UPLC Oligonucleotide BEH C<sub>18</sub> Columns and Method Validation Kits

BEH C <sub>18</sub> , 130 Å*	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186003949</a>
	2.1 × 100 mm	<a href="#">186003950</a>
	2.1 × 150 mm	<a href="#">186005516</a>
<hr/>		
BEH C <sub>18</sub> , 130 Å Method Validation Kit**	2.1 × 100 mm	<a href="#">186004898</a>

\* For use on Waters ACQUITY UPLC Systems.

\*\*Three Columns from three different batches of material.

### XBridge Oligonucleotide BEH C<sub>18</sub> HPLC and UHPLC Columns and Method Validation Kits

BEH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186003952</a>
	4.6 × 50 mm	<a href="#">186003953</a>
<hr/>		
BEH C <sub>18</sub> , 130 Å OBD Prep	10 × 50 mm	<a href="#">186008212</a>
	19 × 50 mm	<a href="#">186008962</a>
	30 × 50 mm	<a href="#">186008963</a>
	50 × 50 mm	<a href="#">186008964</a>
<hr/>		
BEH C <sub>18</sub> , 130 Å Method Validation Kit**	4.6 × 50 mm	<a href="#">186004906</a>

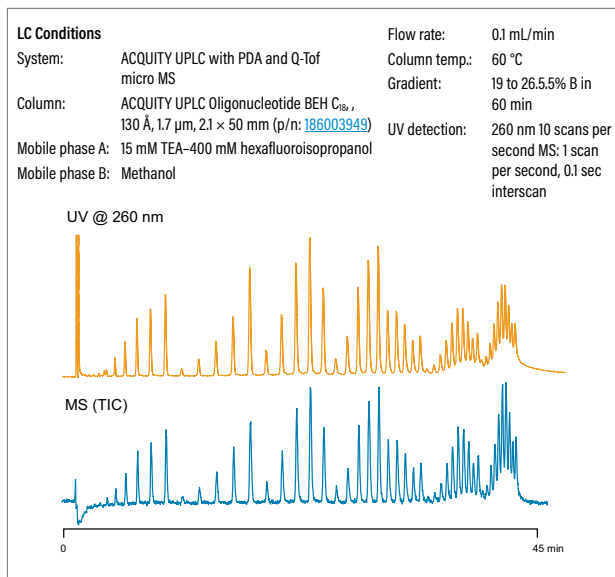
\*\*Three Columns from three different batches of material.



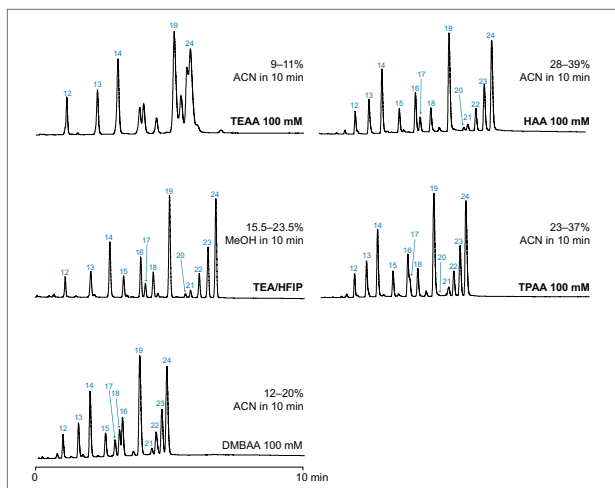
"The Waters ACQUITY™ Premier Peptide BEH C<sub>18</sub> 300 Å Column shows an excellent degree of specificity and selectivity in denaturing and non-denaturing analysis of synthetic oligonucleotides, due to the absence of non-specific binding properties of this new column hardware in combination with great stationary phase performance. The Waters ACQUITY Premier Column is a highly valuable addition to our test package for the future development of synthetic oligonucleotides analytical methods."

**ORGANIZATION:** Janssen

## Separation of a 15–60 mer Detritylated Oligodeoxythymidine Ladder



## Impact of Different Ion-Pairing Agents on Varying Oligonucleotide Sequence Separations



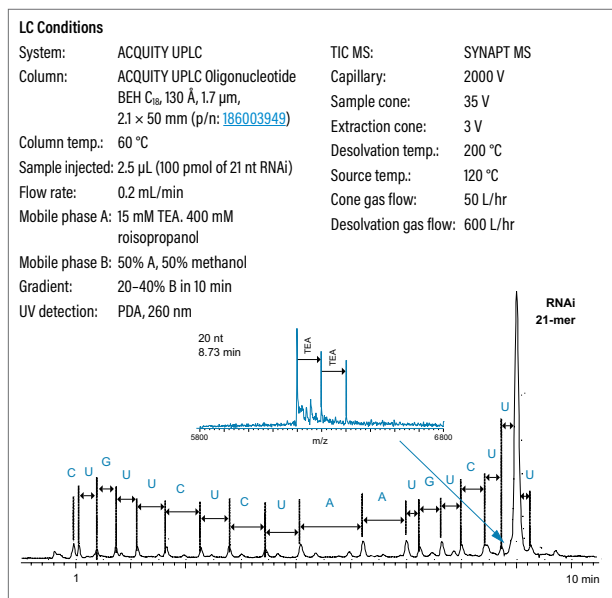
Improved oligonucleotide separations can be achieved using alternative IP agents compared to use of traditional TEAA.

## UPLC-MS Analysis of Interfering RNA Oligonucleotides

Discovery of the RNA interference (RNAi) mechanism now broadly used for silencing of target gene expression has prompted a need for the analysis of small interfering RNAs (siRNA) molecules. To satisfy the need for a robust, fast, and sensitive analysis of 20–25 nucleotides of small interfering RNA (siRNA), a UPLC-MS method has been developed utilizing UPLC Oligonucleotide Columns and SYNAPT HDMS™ Mass Spectrometer.

The acquisition of the accurate masses allowed for an assignment of the peaks of 5'-truncated oligomers (failed sequences generated during oligonucleotide synthesis), as well as some other impurities. The mass of each peak in the MS chromatogram was deconvoluted using MaxEnt 1 Software. The tentative 5'-end failure products are assigned in the below figure. Nearly the entire sequence of the parent oligonucleotide was elucidated. MS analysis also revealed a presence of an extra uridine mononucleotide added to the target 21-mer RNAi sequence.

## LC-MS Analysis of RNA (21 mer)



## Outstanding Column Life

Waters Oligonucleotide Columns packed with BEH Technology particles have shown remarkable column longevity, under these demanding separation conditions, while maintaining outstanding separation performance. By comparison, significantly reduced column life results when traditional silica-based columns are used under these same demanding separation conditions.

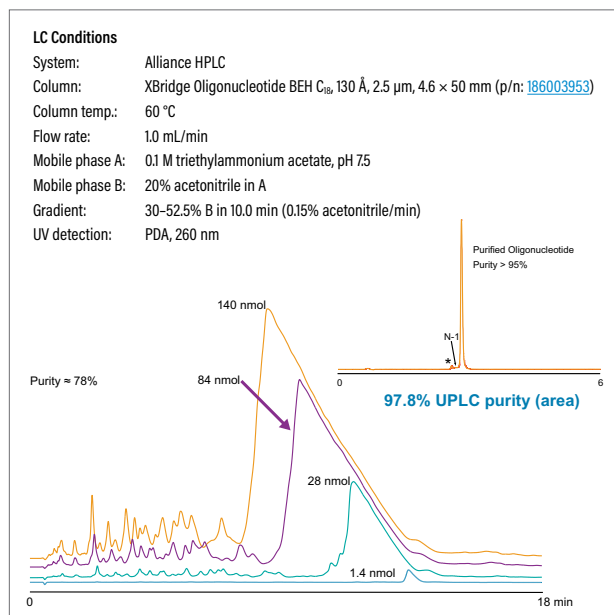
## Scalable DNA and RNAi Separations with Good Product Recovery

XBridge Oligonucleotide BEH C<sub>18</sub>, 130 Å Columns are the preferred offering for detritylated oligonucleotide purifications due to the availability of column sizes designed to meet lab-scale isolation requirements. The choice of XBridge Oligonucleotide C<sub>18</sub> Column dimension and operating flow rate depends primarily on the scale of the synthesis reaction mixture. For example, a 4.6 × 50 mm column containing XBridge Oligonucleotide BEH C<sub>18</sub>, 130 Å, 2.5 µm material is an excellent selection when oligonucleotide mass loads are less than or equal to 0.2 µmol. Selection of the appropriate column size for the amount of oligonucleotide sample loaded is recommended to maximize component resolution and recovery of the target product from non-desired failure sequences.

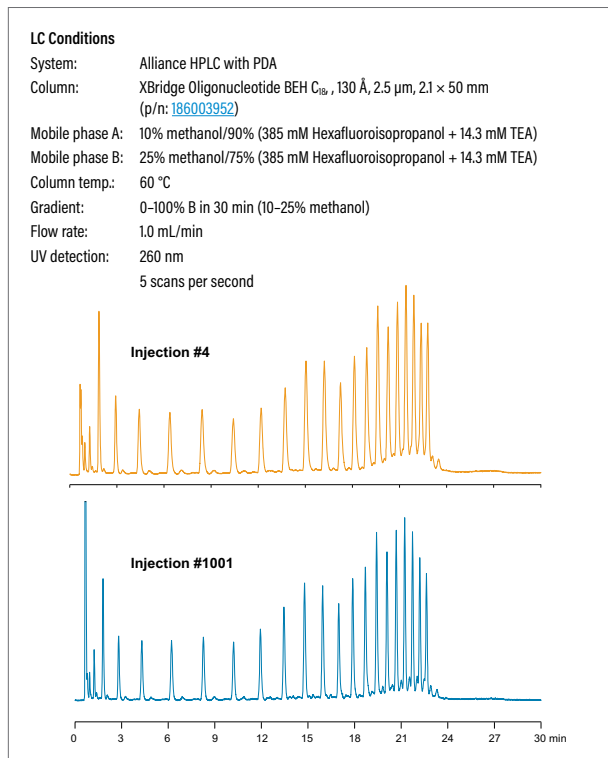
For researchers involved in gene silencing it is often necessary to work with RNA of high purity. Crude synthetic oligonucleotides used for gene knockout are typically purified. The figure below illustrates a lab-scale purification of 21 mer RNA at various column loads. Using an Oligonucleotide column chemistry and an Alliance System, large quantities of crude single stranded RNA can be successfully purified yielding material of high purity, approximately 95%, with an estimated yield of 55% based on collected peak area to the total peak area of the sample.

In addition, XBridge Oligonucleotide Columns are well suited for the analysis and purification of siRNA. As shown in the figure below, siRNA is well resolved from single stranded RNA and truncated duplexes.

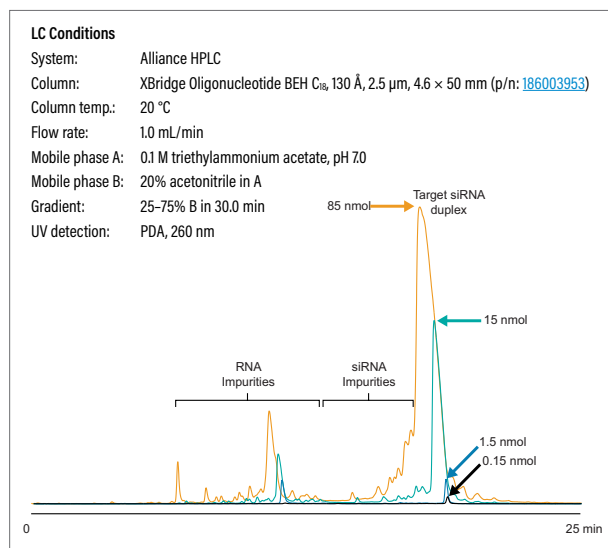
### Purification of Single Stranded RNA



### Separation of 5–25 mer Detritylated Oligodeoxythymidine Ladder



### Purification of siRNA Duplex from Impurities



Dimension	Approx Mass Load**	Yield***	Flow Rate
2.1 × 50 mm	0.04 µmol	0.2 mg	0.2 mL/min
4.6 × 50 mm	0.20 µmol	1.0 mg	1.0 mL/min
10 × 50 mm	1.00 µmol	4.5 mg	4.5 mL/min
19 × 50 mm*	4.00 µmol	16.0 mg	16.0 mL/min
30 × 50 mm*	9.00 µmol	40.0 mg	40.0 mL/min
50 × 50 mm*	25.00 µmol	110.0 mg	110.0 mL/min

\* Oligonucleotide custom column.

\*\* Values are only approximates and vary depending on oligonucleotide length, base composition, and “heart-cutting” fraction collection method used.

\*\*\* Estimated for average oligonucleotide MW and synthesis yield.

## COLUMNS FOR LARGE DNA/RNA SPECIES

In general, molecular biology methods for manipulation of DNA rely on restriction enzymes, polymerase-chain reaction (PCR), and sequencing techniques. Using these methods, genomic DNA is typically converted into shorter double stranded (ds)DNA sequences, typically 100–1000 base pairs (bp) in length. The shorter dsDNA molecules are often analyzed or isolated by methods such as slab gel or capillary electrophoresis. Use of Waters ACQUITY UPLC and ACQUITY Premier Peptide BEH C<sub>18</sub>, 300 Å Reversed-Phase, Protein-Pak Hi Res Q or Gen-Pak FAX Anion-Exchange Columns offer alternatives to more traditional electrophoretic methods and are particularly well suited for various analytical and small-scale purification applications

siRNA duplex analysis was performed on ACQUITY Premier Peptide BEH C<sub>18</sub>, 300 Å Column as shown on right with more details available in the following application: "Analysis of siRNA Drugs at Denaturing UPLC Conditions Using MaxPeak Premier Column Technology" Waters Application Note [720007362](#).

### Ordering Information

ACQUITY Premier Peptide BEH C<sub>18</sub>, 300 Å Columns for DNA/RNA Fragments

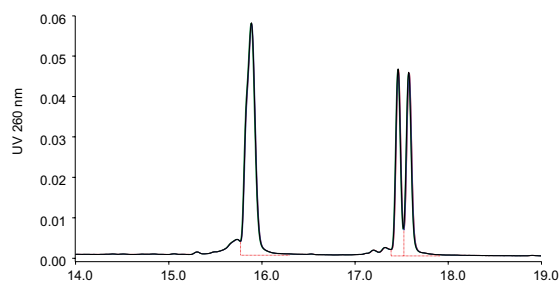
Peptide BEH C <sub>18</sub> , 300 Å, 1.7 μm	Particle Size: 1.7 μm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009493</a>
	2.1 × 100 mm	<a href="#">186009494</a>
	2.1 × 150 mm	<a href="#">186009495</a>

## siRNA Duplex Analysis on ACQUITY Premier Peptide BEH C<sub>18</sub> 300 Å Column

### Method Conditions

Column: ACQUITY Premier Peptide BEH C<sub>18</sub>, 300 Å, 1.7 μm, 2.1 × 150 mm (p/n: [186009495](#))  
 Mobile phase 1: 0.07% (v/v) TEA and 0.60% v/v HFIP solution in Milli-Q water (5 mM TEA, 60 mM HFIP aqueous solution)  
 Mobile phase 2: 70/30% v/v Methanol/acetonitrile  
 Mobile phase 3: 85/15% (v/v) Mixture of mobile phase 1 and 2  
 Mobile phase 4: 30/70% (v/v) Mixture of mobile phase 1 and 2  
 Column temp.: 75 °C  
 UV detection: 260 nm PDA, titanium 5 mm detector cell  
 Injection volume: 3 μL

Time (min)	Flow (mL/min)	A (% vol)	C (% vol)	D (% vol)	Curve
0	0.30	100	0	0	Initial
20	0.30	0	100	0	6
25	0.30	0	0	100	6
26	0.30	0	0	100	6
28	0.30	100	0	0	6
34	0.30	100	0	0	6



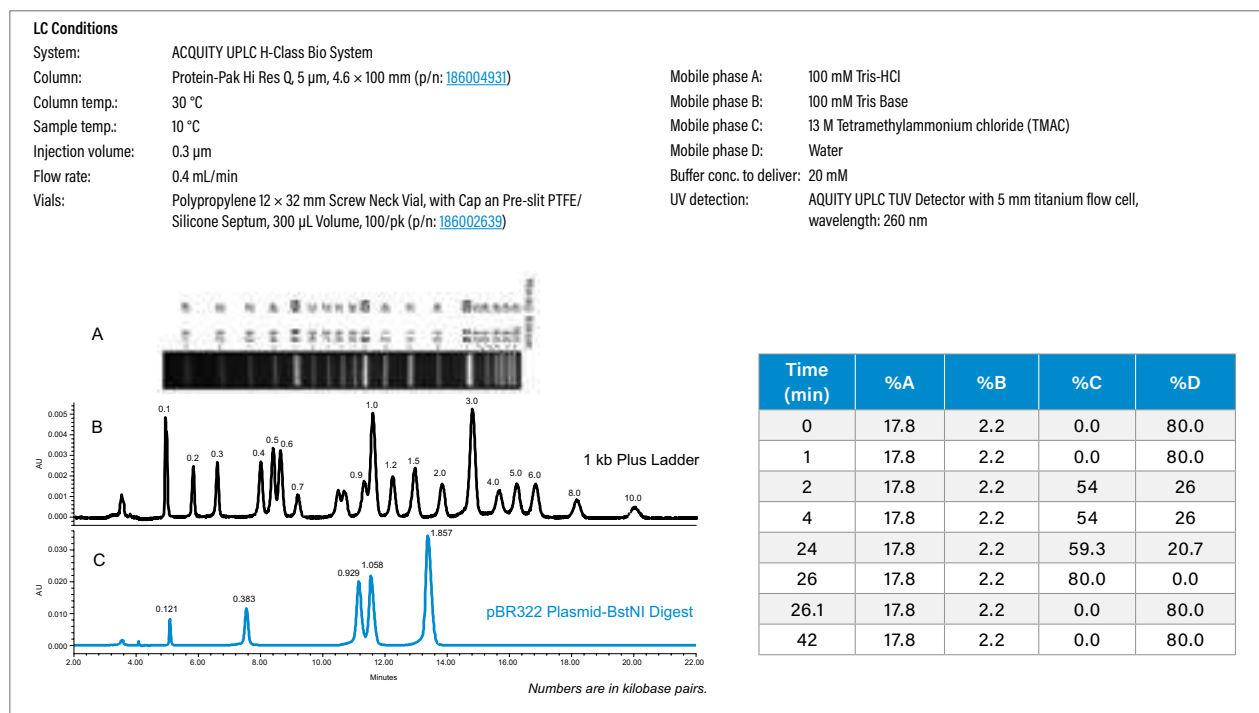
Four consecutive injections of 3 μL of Duplex C (0.40 mg/mL) using the ACQUITY Premier Peptide BEH C<sub>18</sub> 300 Å Column.

## ANION-EXCHANGE HPLC OF NUCLEIC ACIDS

### Protein-Pak Hi Res Q Anion Exchange Columns

Waters Protein-Pak Hi Res Q columns although commercially developed for protein applications, more recently over the last few years have been used in nucleic acid applications for separations of empty/full capsids of adeno-associated viruses (AAVs), plasmid isoforms, mRNA and dsDNA fragment separation and size assessment of up to 10 kilobase pairs (kbp). The non-porous particle is functionalized with a quaternary ammonium ligand which is a strong anion exchanger that provides excellent separations for negatively charged species such as nucleic acids. The chromatogram below is a 1 kb plus DNA Ladder and a pBR322 Plasmid-BstNI Digest separated on the Protein-Pak Hi Res Q column and more details can be found in the application: "Separation and Size Assessment of dsDNA Fragments by Anion-Exchange Chromatography" Waters Application Note [720007321](#).

### Separation and Size Assessment of dsDNA Fragments by Anion Exchange Chromatography



### Ordering Information

#### Protein-Pak Hi Res Q, 5 $\mu$ m Column

Description	Dimension	P/N
Protein-Pak Hi Res Q, 5 $\mu$ m	4.6 $\times$ 100 mm	<a href="#">186004931</a>

### Gen-Pak FAX Anion-Exchange Columns

Waters Gen-Pak FAX Columns offer the highest resolution available for anion-exchange HPLC of nucleic acids. The Gen-Pak FAX Column contains a weak anion exchanger based on DEAE functionalized non-porous resin. It contains 2.5  $\mu$ m particles and is well suited for analytical and micro-preparative applications.

### Ordering Information

#### Gen-Pak FAX HPLC Column

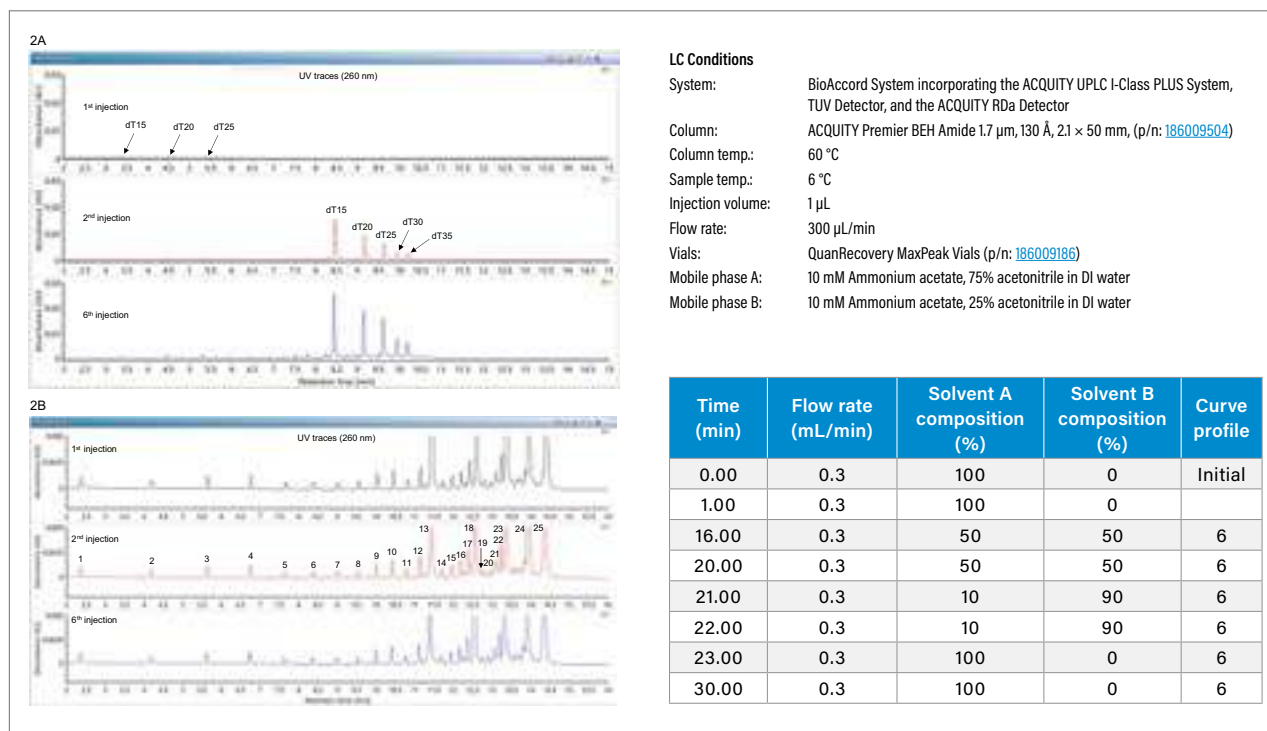
Description	Dimension	P/N
Gen-Pak FAX Column	4.6 $\times$ 100 mm	<a href="#">WAT015490</a>
Gen-Pak FAX Replacement Inlet Filter	—	WAT015715

## HYDROPHILIC INTERACTION CHROMATOGRAPHY (HILIC) OF NUCLEIC ACIDS

### ACQUITY Premier BEH Amide Columns

HILIC separation of oligonucleotides offers three main advantages in terms of mobile phase considerations when compared with the traditional ion-pair reversed phase (IP-RP) separations: at least 10x reduction in mobile phase cost, significantly reduced toxicity and at least 10x improvement in mobile phase stability (up to two weeks) for LC-MS operation. The ACQUITY Premier BEH Amide Column with MaxPeak High Performance Surfaces resulted in no column conditioning as compared with the traditional ACQUITY BEH Amide Column in stainless-steel hardware, saving time in column passivation right out of the box as shown below in the chromatograms. For more details, refer to application: "HILIC as an Alternative Separation Mode for Intact Mass Confirmation of Oligonucleotides on the BioAccord System" Waters Application Note [720007395](#).

### HILIC as an Alternative Separation Mode for Intact Mass Confirmation of Oligonucleotides on the BioAccord System



TUV chromatograms showing the first consecutive injections of the OST mixture performed on 2.1  $\times$  50 mm columns: (A) conventional stainless-steel ACQUITY UPLC BEH Amide Column (p/n: [186000480](#)); (B) ACQUITY Premier BEH Amide Column (p/n: [186009504](#)). The conventional column required extensive conditioning before a stable UV signal could be produced, while the ACQUITY Premier Column does not require any conditioning. Reproducible chromatographic separations can be obtained even for low-level impurities on the ACQUITY Premier Column without any need for column conditioning/passivation. The oligonucleotides separated in Figure 2B correspond to the following failure sequences of deoxythiamidates: Peak 1-dT3, 2-dT4, 3-dT5, 4-dT6, 5-dT7, 6-dT8, 7-dT9, 8-dT10, 9-dT11, 10-dT12, 11-dT13, 12-dT14, 13-dT15 (major component), 14-dT16, 15-dT17, 16-dT18, 17-dT19, 18-dT20 (major component), peaks 19-22 correspond to dT21-24 according to their elution order, and peaks 23-25 belong to the major components dT25, dT30, and dT35.

## Ordering Information

### ACQUITY and XBridge Premier BEH Amide Columns for HILIC Separations of Nucleic Acids

ACQUITY Premier BEH Amide, 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N (1/pk)
	2.1 × 50 mm	<a href="#">186009504</a>
	2.1 × 100 mm	<a href="#">186009505</a>
	2.1 × 150 mm	<a href="#">186009506</a>
ACQUITY Premier BEH Amide, 130 Å, VanGuard FIT	Particle Size: 1.7 µm	
	2.1 × 50 mm	<a href="#">186009507</a>
	2.1 × 100 mm	<a href="#">186009508</a>
	2.1 × 150 mm	<a href="#">186009509</a>
XBridge Premier BEH Amide, 130 Å	Particle Size: 2.5 µm	
	2.1 × 50 mm	<a href="#">186009928</a>
	2.1 × 100 mm	<a href="#">186009929</a>
	2.1 × 150 mm	<a href="#">186009930</a>
	4.6 × 50 mm	<a href="#">186009935</a>
	4.6 × 100 mm	<a href="#">186009936</a>
	4.6 × 150 mm	<a href="#">186009937</a>
XBridge Premier BEH Amide, 130 Å, VanGuard FIT	Particle Size: 2.5 µm	
	2.1 × 50 mm	<a href="#">186009931</a>
	2.1 × 100 mm	<a href="#">186009932</a>
	2.1 × 150 mm	<a href="#">186009933</a>
	4.6 × 50 mm	<a href="#">186009938</a>
	4.6 × 100 mm	<a href="#">186009939</a>
	4.6 × 150 mm	<a href="#">186009940</a>
VanGuard FIT Cartridges	Particle Size: 1.7 µm	
	2.1 × 5 mm	<a href="#">186009510</a>
	Particle Size: 2.5 µm	
	2.1 × 5 mm	<a href="#">186009927</a>
	3.9 × 5 mm	<a href="#">186009934</a>



## MassPREP OLIGONUCLEOTIDE STANDARD

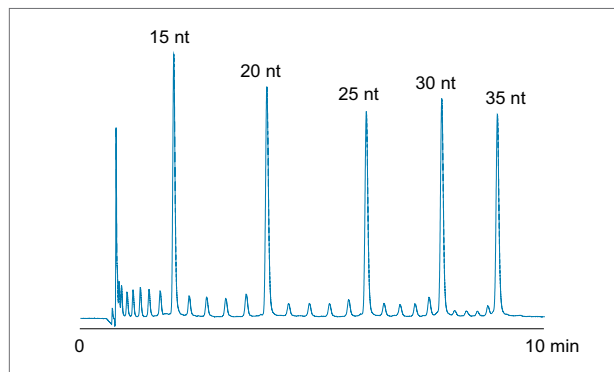
### Benchmarking, Method Development, and Troubleshooting

- Contains a carefully defined mixture of synthesized oligodeoxythymidine fragments
- Useful in testing and confirming HPLC/UPLC, LC-MS, and column performance for oligonucleotide applications
- Each is QC tested and shipped with a certificate of analysis



The pre-packaged MassPREP Oligonucleotide Standard is designed for verification of HPLC/UPLC instrument and column performance for analysis of synthetic oligonucleotides. Approximate equimolar amounts of 15, 20, 25, 30, and 35 nucleotide (nt) long oligodeoxythymidines are lyophilized and packaged in 1.5 mL LC vials. These vials are vacuum-sealed in foil pouches to reduce degradation that can occur by excessive exposure to light and air. Approximately 1 nmole of each oligonucleotide is present in the vial.

### Separation of MassPREP Oligonucleotide Standard on ACQUITY UPLC Oligonucleotide C<sub>18</sub>, 130 Å, 1.7 µm Column



Waters ACQUITY UPLC analysis of MassPREP Oligonucleotide Standard on an ACQUITY UPLC Oligonucleotide C<sub>18</sub>, 130 Å, 1.7 µm Column. The main components are labeled. Small peaks eluting between labeled oligonucleotides are N-1, N-2, etc. failure sequences generated during the oligonucleotide syntheses. The ACQUITY UPLC System is equipped with 50 µL standard mixer and PDA detector (260 nm).

## Ordering Information

### MassPREP Oligonucleotide Standard

Description	Qty.	P/N
MassPREP Oligonucleotide Standard	1/pk	<a href="#">186004135</a>

## OLIGONUCLEOTIDE DESALTING BY SOLID-PHASE EXTRACTION

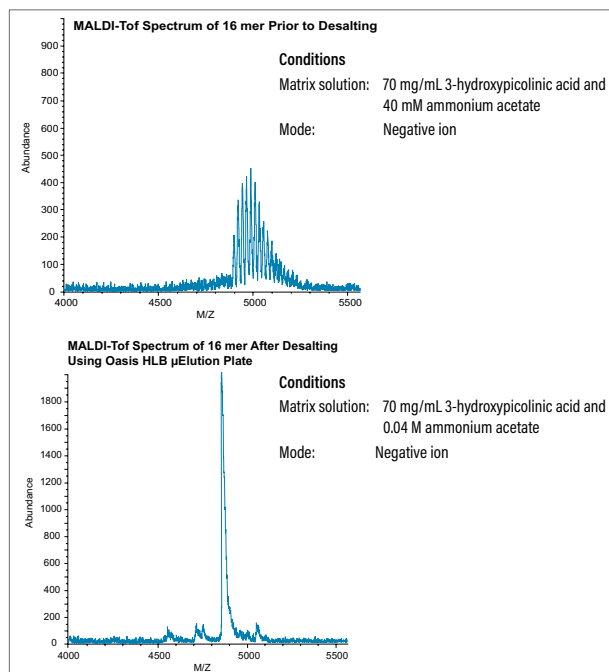


### Oasis µElution Plates

- Removes salt prior to MS analysis
- Low elution volumes
- High sensitivity
- Sample concentrating
- High throughput

Desalting of synthetic oligonucleotides is essential for MS analysis (QC, genotyping applications and SNP analysis). Waters Oasis µElution Plate is an excellent choice for high-throughput analysis with minimal amount of sample. The Oasis µElution Plate combines patented plate design, proven chemistries, and generic protocols enabling elution volumes as low as 25 µL. You can perform SPE cleanup and concentration of very small sample volumes. The Oasis Hydrophilic-Lipophilic-Balanced (HLB) Sample Extraction Products incorporate a patented copolymer made from a balanced ratio of two monomers; the lipophilic divinylbenzene and the hydrophilic N-vinylpyrrolidone that is ideally suited for this application.

### Effective Use of Oasis HLB for Oligonucleotide Desalting Prior to MALDI-ToF MS



## Ordering Information

### Oasis HLB µElution Plate (for Oligonucleotides)

Description	P/N
Oasis HLB µElution Plate (for Oligonucleotides)	<a href="#">186001828BA</a>

## Peptide Analysis



Separating, quantifying, and identifying peptides in biotherapeutic characterization and proteomics applications is challenging.

To address these challenges, reversed-phase chromatography using ion-pairing reagents such as TFA and formic acid can deliver highly resolved separations of complex peptide mixtures, (e.g., tryptic protein digests or lengthy synthetic peptide sequences) whose sequences may differ by a single amino acid. In general, the hydrophobicity of the peptide determines the elution order, with the least hydrophobic peptides eluting first.

Factors such as particle composition (silica vs hybrids), pore size (130 Å vs 300 Å), ligand density, as well as separation conditions (e.g., gradient duration, separation temperature, flow rate) all play an important role in obtaining a separation that meets application requirements.

As with other bioseparations, when using smaller particle sizes, UPLC/UHPLC column offerings provide superior component resolution and in less time compared to HPLC-based columns for this demanding application.

### A WIDE RANGE OF CHEMISTRIES FOR REVERSED-PHASE PEPTIDE SEPARATIONS

A peptide column needs to adapt to a wide range of peptides: hydrophobic, hydrophilic, small, and large. See the options below to choose the right column for your analysis.

#### Hybrid Particles



#### BEH (Ethylene-Bridged Hybrid)

Trifunctional C<sub>18</sub> ligand, fully end-capped, and bonded to the Ethylene-Bridged Hybrid (BEH) particles.

- Ideally suited for separation of a wide range of peptides: large and small, acidic and basic, hydrophilic and hydrophobic
- Stable across a wide pH range (pH 1–11) so neutral or alkaline pH eluents can be used to alter peptide separation selectivities
- High temperature stability (up to 80 °C) expands method development capabilities
- Outstanding peak capacity and superior peak shape in trifluoroacetic acid (TFA) or formic acid (FA) ion pair eluents when compared to use of 100% silica based C<sub>18</sub> columns
- Two pore sizes (130 Å and 300 Å) provide different separation selectivities for a wide range of peptides and small proteins



#### CSH (Charged Surface Hybrid)

Trifunctional C<sub>18</sub> ligand, fully end-capped, bonded to Charged Surface Hybrid (CSH) particles.

- Outstanding peak capacities with formic acid for LC-MS based applications
- Excellent performance with TFA for optical based applications
- Accepts greater peptide mass loads than many competitive technologies for detection of low-level impurities
- Offers unique selectivity when compared to Waters Peptide BEH C<sub>18</sub> Columns
- Optimal for separations from pH 1–5
- The 130 Å pore size is best suited for compounds less than 10,000 Daltons

#### Silica Particles



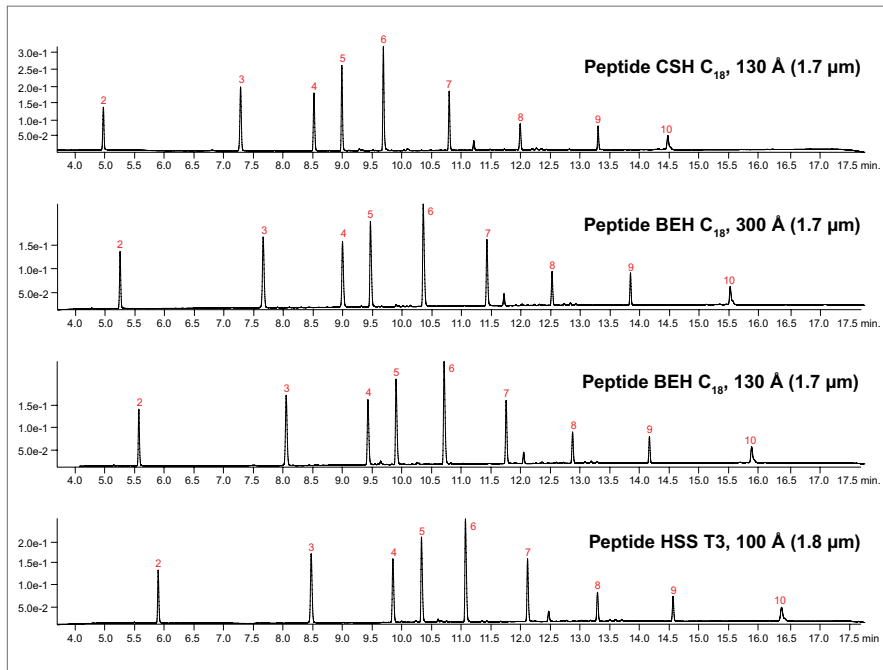
#### HSS (High Strength Silica)

Trifunctional C<sub>18</sub> ligand, fully end-capped, bonded to High Strength Silica (HSS) particles.

- Viable option when either the hybrid-based, Peptide BEH C<sub>18</sub> or Peptide CSH C<sub>18</sub> do not meet a specific peptide application need
- Ideal choice for the separation of small, hydrophilic peptides since retentivity is greater than that obtained using Waters hybrid-based peptide separation columns

## Three Outstanding Peptide Column Chemistries that Address Varied Peptide Separations

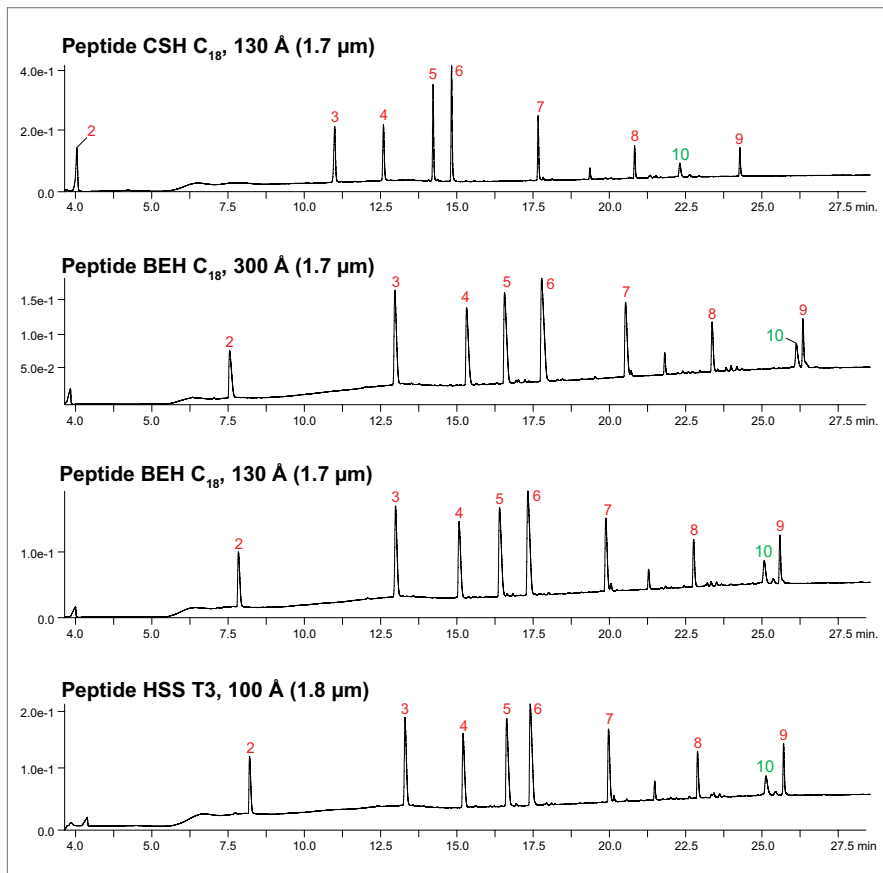
### Separation of Peptide Standards Using 0.1% TFA Ion Pairing on Waters Peptide Separation Columns



Peptides contained in Waters MassPREP Peptide Standard Mixture, p/n: [186002337](#), were separated on 2.1 × 150 mm columns containing Waters Peptide CSH C<sub>18</sub> 130 Å (1.7 µm), Peptide BEH C<sub>18</sub> 300 Å (1.7 µm), Peptide BEH C<sub>18</sub> 130 Å (1.7 µm), or Peptide HSS T3 100 Å (1.8 µm) UPLC-based particles on a Waters ACQUITY UPLC H-Class Bio System using a gradient of increasing acetonitrile concentration with 0.1% TFA ion-pairing. Flow at 0.4 mL/min.

The MassPREP Peptide Standard Mixture contains allantoin (a void volume marker) and nine carefully selected peptides with a broad range of polarities and isoelectric points. 1 = Allantoin 158 Da (not shown in figure since elutes at column void volume), 2 = RASG-1: 1,000 Da, 3 = Angiotensin frag.1-7: 898 Da, 4 = Bradykinin: 1060 Da, 5 = Angiotensin II: 1046 Da, 6 = Angiotensin I: 1296 Da, 7 = Renin: 1758 Da, 8 = Enolase T35: 1872 Da, 9 = Enolase T37: 2827 Da, 10 = Melittin: 2846

### Separation of Peptide Standards Using 0.1% FA Ion Pairing on Waters Peptide Separation Columns



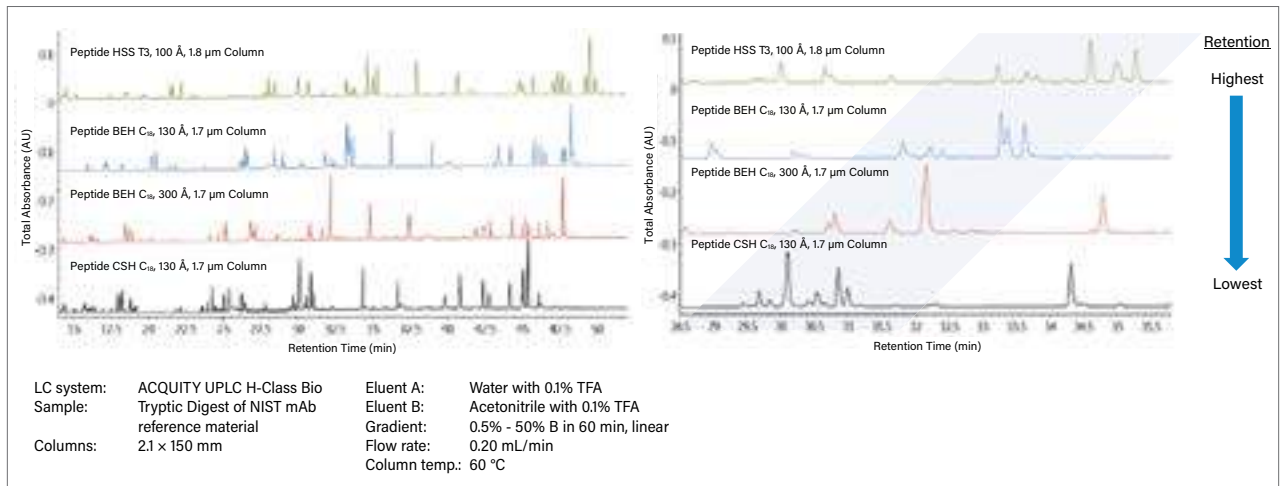
Peptides contained in Waters MassPREP Peptide Standard Mixture, p/n: [186002337](#), were separated on 2.1 × 150 mm columns containing Waters Peptide CSH C<sub>18</sub> 130 Å (1.7 µm), Peptide BEH C<sub>18</sub> 300 Å (1.7 µm), Peptide BEH C<sub>18</sub> 130 Å (1.7 µm), or Peptide HSS T3, 100 Å (1.8 µm) UPLC-based particles on a Waters ACQUITY UPLC H-Class Bio System using a gradient of increasing acetonitrile concentration with 0.1% FA ion-pairing. Flow at 0.2 mL/min.

Sample as above.

Note: Different peptide separation selectivities and comparative retention time differences among the tested columns.

Elution order of peaks 9 and 10 switch when run in 0.1 FA vs. 0.1% TFA.

## Separation of Tryptic Digest of Reduced Alkylated NIST mAb on Waters Peptide Separation Columns



Waters UPLC (shown) and HPLC-based Peptide Separation Columns deliver different peptide selectivities and high peak capacities for the separation of complex peptide mixtures. In addition, each batch of material is specifically QC tested and qualified with a tryptic digest of cytochrome c to help ensure column-to-column consistency when used in validated methods.

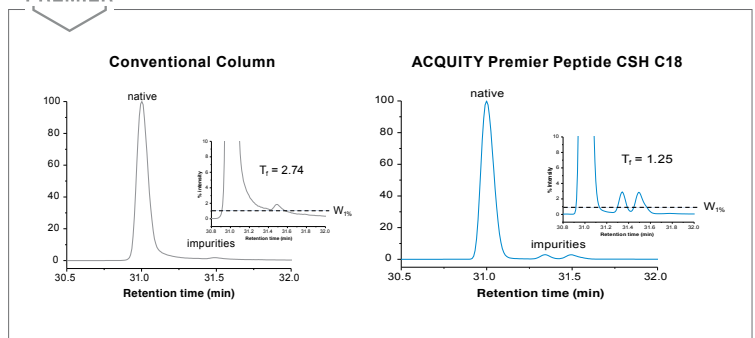
### MAXPEAK PREMIER PEPTIDE COLUMNS

In addition, Waters offers versions of each of the three peptide chemistries as MaxPeak Premier columns. Waters MaxPeak Premier Columns represent the latest innovative technologies and provide the highest level of chromatographic performance, flexibility, and assurance to enhance the capabilities of scientific laboratories around the world. Available in 1.7 μm (ACQUITY Premier Columns) and 2.5 μm (XBridge Premier Columns, XSelect Premier Columns) particle sizes.

Utilizing MaxPeak High Performance Surfaces (HPS) technology in the column hardware design, MaxPeak Premier Columns provide significant improvements in reproducibility, peak shape, and recovery by minimizing analyte/surface interactions.

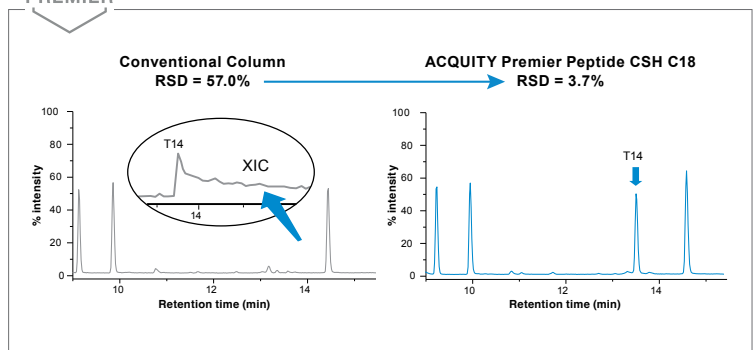
MaxPeak Premier columns also reduce the need for time-consuming passivation procedures or complex additive use that is typically required to achieve optimal performance with traditional stainless-steel columns.

### MAXPEAK PREMIER Reduced Tailing



54% reduction in tailing.

### MAXPEAK PREMIER Increased Sensitivity and Repeatability



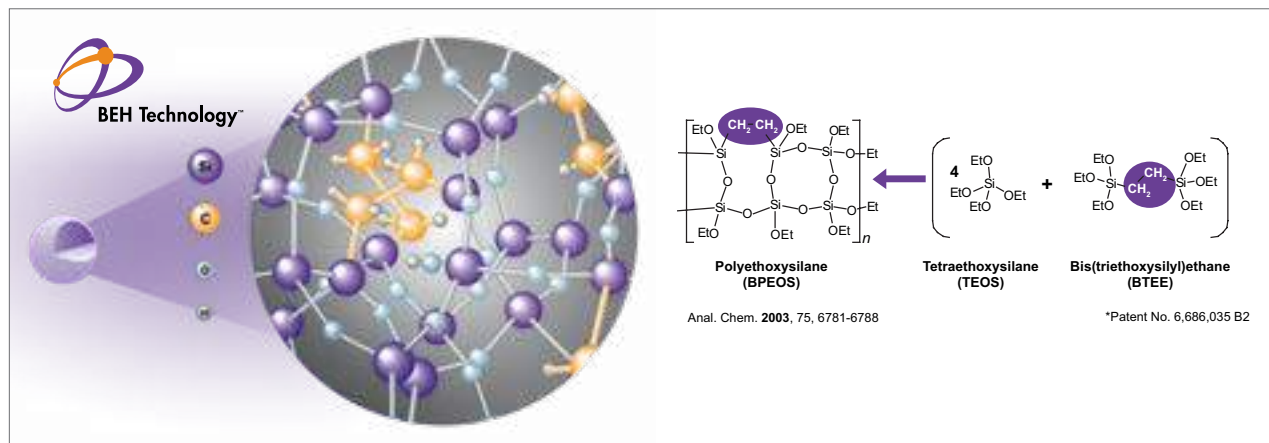
35-fold increase in sensitivity.

## PEPTIDE BEH C<sub>18</sub>, 130 Å AND 300 Å COLUMNS

### Hybrid-Based Particles for Reversed-Phase Peptide Separations

In 1999, Waters first demonstrated how organic/inorganic Hybrid Particle Technology columns successfully addressed limitations (e.g., pH stability) that exist using 100% silica-based, reversed-phase columns for biocompound separations. In 2009, we advanced LC-based peptide separation capabilities by commercializing our Peptide BEH C<sub>18</sub>, 130 Å, and BEH C<sub>18</sub>, 300 Å HPLC- and UPLC-based columns both based on the second-generation BEH particles. In addition, we added an additional quality control test using a tryptic digest of cytochrome c to help ensure consistent column-to-column performance. To date, hundreds of referenced journal citations provide data that support the effective use of this column chemistry for a variety of separations in various diverse application areas.

### The BEH Particle: First Key Chemistry Enabler of Waters UPLC Technology



Ethylene Bridged Hybrid (BEH) Technology synthesis creates particles that ensure extreme column performance and long column lifetime under harsh operating conditions.

### CSH Technology Particles for Peptide Separations

Waters innovative Peptide CSH C<sub>18</sub>, 130 Å offerings expands on the already successful and well-recognized Peptide BEH C<sub>18</sub>, 130 Å and BEH C<sub>18</sub>, 300 Å columns. Based on comparative peptide separations, Peptide CSH C<sub>18</sub>, 130 Å Columns exhibit improved load ability, greater peak capacities, and unique selectivity compared to Peptide BEH C<sub>18</sub>, 130 Å. Its performance is also significantly less dependent on TFA ion pairing, making it ideal for MS applications where high sensitivity is desired. The use of the well-controlled, charged surface hybrid properties of Peptide CSH C<sub>18</sub>, 130 Å holds significant promise for facilitating either challenging LC and/or LC-MS peptide separations.

### The CSH Particle: Expands Upon BEH Technology



Charged Surface Hybrid (CSH) Technology improves selectivity and offers the highest possible performance for basic compounds in the acidic, low-ionic strength mobile phases commonly used in LC-MS laboratories.

## PEPTIDE CSH C<sub>18</sub>, 130 Å COLUMNS

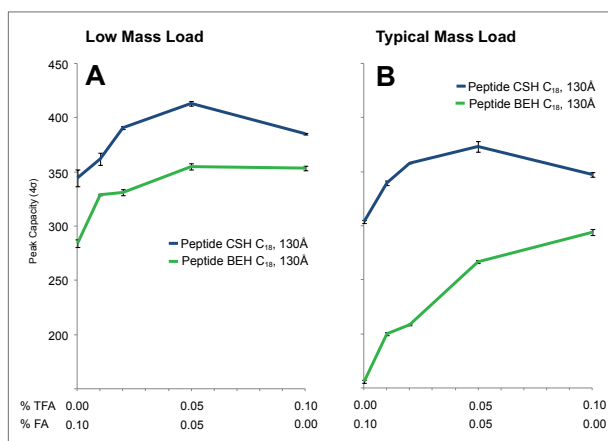
### Charged Surface Hybrid Particles Deliver Superior Peptide Separations in LC and LC-MS Applications

Waters patented synthesis process for its Charged Surface Hybrid (CSH) Technology particles imparts a low-level, positive charge to the surface of each particle. For that reason, when using our Peptide CSH C<sub>18</sub>, 130 Å Columns, you must ensure a mobile-phase pH of less than 5 to enable peptide/CSH surface-charge interactions. CSH Technology allows the columns to be successfully used with standard eluents containing trifluoroacetic acid or a weaker acid modifier, such as formic acid. You do not need to compromise between selecting a reversed-phase eluent that delivers sharp, symmetrically separated peaks (e.g., 0.1% trifluoroacetic acid) and one that minimizes reduction of MS signal (e.g., 0.1% formic acid). Additionally, the ability of the CSH C<sub>18</sub>, 130 Å Column chemistry to accept greater peptide mass loads than many other columns enhances the ability to detect potentially important low-level constituents of the major components of interest.

### Excellent Mass Loading of Complex Peptide Samples

One of the inherent performance advantages of our CSH Technology is improved sample-mass loadability, the quantity of analyte that you can load onto a column before peak shape deteriorates. At typical mass loads, Peptide CSH C<sub>18</sub>, 130 Å delivers a remarkably better performance than many existing C<sub>18</sub> offerings. When loading 10× less sample, the difference in performance was less pronounced. Improved peptide-mass loadability is an excellent column asset for challenging separations, particularly for those that involve mixtures that comprise species present at vastly different concentrations.

Comparative Averaged Peptide Peak Capacities on Peptide CSH C<sub>18</sub>, 130 Å vs. Peptide BEH C<sub>18</sub>, 130 Å Based Columns (2.1 × 150 mm) at Two Peptide Mass Loads and Differing Concentrations of Formic Acid and Trifluoroacetic Acid



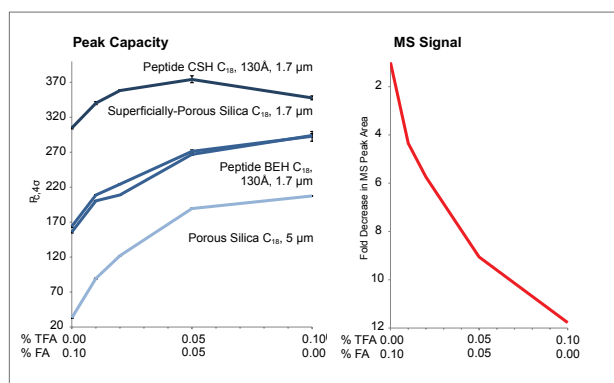
Effect of column mass load on separated peptide peak capacity in formic acid, trifluoroacetic acid, and eluent blends of formic acid and trifluoroacetic acid. (A) approximate sample load of 0.06 µg peptide mixture. (B) approx. 0.6 µg peptide mixture. Values were derived from two replicates. Waters MassPREP Peptide Standard Mixture (p/n: 186002337) was used in the study.

A need persists for columns compatible with LC instrumentation. We recommend the use of low-dispersion LC instrumentation to extract full performance from a well-packed column containing 1.7 µm particles. Waters' eXtended Performance (XP) Columns packed with 2.5 µm XP particles improves the productivity of existing HPLC instrumentation. You can scale high peak capacity peptide separations performed using a Peptide CSH C<sub>18</sub>, 130 Å, 1.7 µm Column to a Peptide CSH C<sub>18</sub>, 130 Å, 2.5 µm XP Column simply by altering flow rate and gradient time. You can readily employ CSH Technology for high peak capacity peptide separations using either HPLC, UHPLC, or UPLC instrumentation.

## Superior Performance in Eluents Containing Formic Acid or Trifluoroacetic Acid

Waters' Peptide CSH C<sub>18</sub>, 130 Å particles contain a low and carefully defined concentration of positive charges that yield comparatively excellent peak shape for peptide separations that rely on mobile phases that contain formic acid or trifluoroacetic acid. The fact that the performance of a Peptide CSH C<sub>18</sub>, 130 Å Column exhibits little dependence on strong ion-pairing agents makes it ideal for LC or LC-MS applications.

### Comparative Averaged Peptide Peak Capacities on Selected Reversed-Phase Columns with Differing Concentrations of Formic Acid and Trifluoroacetic Acid



Effect of trifluoroacetic acid on peak capacity and MS signal. (A) Peak capacity as a function of acid modifier. Values were derived from two replicates. (B) Fold decrease in MS peak area as a function of acid modifier. Waters MassPREP Peptide Standard Mixture (p/n: [186002337](#)) was used in study.

## PEPTIDE HSS T3 COLUMNS


High pore volume HPLC particles do not possess the mechanical stability necessary to withstand the high pressures inherent in UPLC separations. Waters' material scientists addressed this challenge by developing a silica particle designed for high mechanical stability with the appropriate morphology to provide long UPLC column lifetimes and high UPLC efficiencies at high pressures. The 1.8 µm High Strength Silica (HSS) particle is the first and only 100% silica particle designed, tested, and intended for use in applications up to 15,000 psi (1034 bar).

The HSS particle technology is available in ACQUITY UPLC Peptide HSS T3, 100 Å, 1.8 µm as well as XSelect Peptide HSS T3, 100 Å, XP 2.5 µm and 5 µm for UHPLC and HPLC-based separations for seamless transfer between UPLC and HPLC/UHPLC instrument platforms.

## Simplifying Column Choice for Peptide Purifications

Our peptide columns are versatile. Often, a single C<sub>18</sub>-based chemistry can separate a wide range of peptides, requiring little time and expense to obtain satisfactory results. We offer peptide packings in many particle sizes and column dimensions. (See the "Peptide Preparative Column Selection Guide" below.)

### Increased Assurance with Waters Peptide Columns



Waters rigorously tests each batch of our synthesized Peptide BEH C<sub>18</sub>, 130 Å; Peptide BEH C<sub>18</sub>, 300 Å; Peptide CSH C<sub>18</sub>, 130 Å; and Peptide HSS T3, 100 Å particles used in our manufactured columns. To pass, each batch of material must satisfactorily separate a complex protein digest using a gradient separation with well-defined pass/fail criteria. In addition, each and every manufactured column is tested and must exceed established packed column efficiency values before accepted for customer purchase. In combination, these tests (results available in Certificate of Analysis documentation) help ensure consistent batch-to-batch and column-to-column performance.

Certificate of analysis information includes a labeled chromatogram of the gradient separation of a tryptic digest of bovine cytochrome c (p/n: [186006371](#)) using eluents that contain 0.1% formic acid. You can purchase the same protein digest test mixture to ensure the proper performance of your Peptide CSH C<sub>18</sub>, 130 Å Column.

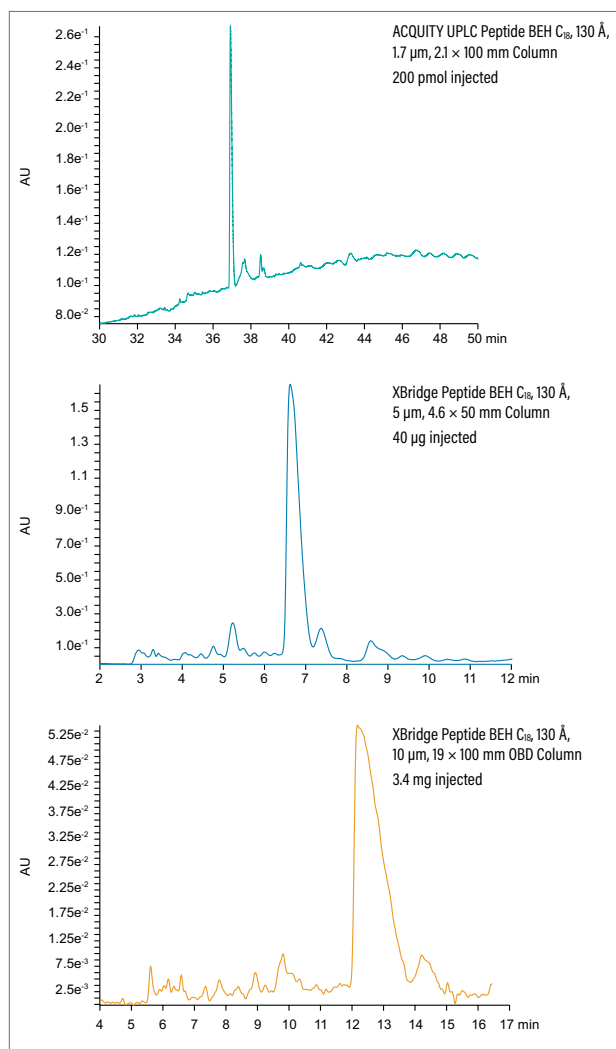
**HSS**  
HIGH STRENGTH SILICA



## Peptide Packing Material in OBD Columns for Maximum Chemical and Physical Stability

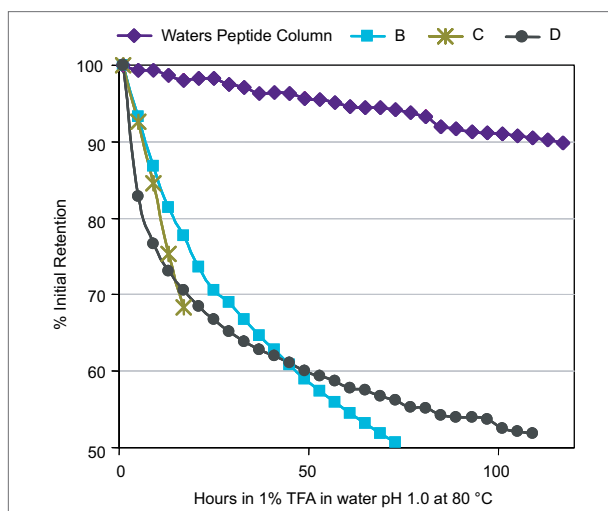
When columns fail, they do so both physically and chemically. For columns used with low-pH mobile phases, the usual cause of abbreviated column life is hydrolysis of the bonded phase, which manifests itself as significant changes in peptide retention. Our BEH Technology Columns incorporate proprietary procedures for bonding and end-capping that yield stable bonded phases. In low-pH stability tests, BEH C<sub>18</sub> columns showed only minimal retention loss. Our patented Optimum Bed Density (OBD) Technology, developed to create packed beds that are the most stable of any available, regardless of manufacturer, ensures the physical stability of these columns. Visit [waters.com/OBD](http://waters.com/OBD) for details about OBD Technology.

### Separation of 13 Residue Peptides at Various Sample Loads



Offered in many particle sizes and column configurations, our peptide columns are well-suited for various laboratory-scale purification needs.

### Long-Term Stability



We tested several peptide columns to observe how they performed when injections were repeated, comparing them with the performance columns B, C, and D made by other manufacturers. (Retention was monitored to determine column lifetime.)

### Peptide Preparative Column Selection Guide

OBD Prep Columns, 5 and 10 μm				
130 Å and 300 Å				
I.D. (mm)	Length (mm)	μmol of a Single Peptide	Weight of a Single Peptide (mg)	Typical Flow Rate (mL/min)
10	50	0.25–5	0.5–10	4.5–9
10	100	0.25–5	0.5–10	4.5–9
10	150	0.25–5	0.5–10	4.5–9
10	250	0.25–5	0.5–10	4.5–9
19	50	1–18	2.0–36	16–32
19	100	1–18	2.0–36	16–32
19	150	1–18	2.0–36	16–32
19	250	1–18	2.0–36	16–32

OBD Prep Columns, 10 μm				
130 Å and 300 Å				
I.D. (mm)	Length (mm)	μmol of a Single Peptide	Weight of a Single Peptide (mg)	Typical Flow Rate (mL/min)
30	50	2.5–25	5–100	40–80
30	100	2.5–25	5–100	40–80
30	150	2.5–25	5–100	40–80
30	250	2.5–25	5–100	40–80



## Ordering Information

### ACQUITY Premier Peptide Columns

BEH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009481</a>
	2.1 × 100 mm	<a href="#">186009482</a>
	2.1 × 150 mm	<a href="#">186009483</a>

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CSH C <sub>18</sub> , 300 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009487</a>
	2.1 × 100 mm	<a href="#">186009488</a>
	2.1 × 150 mm	<a href="#">186009489</a>

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HSS T3, 100 Å	Particle Size: 1.8 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009490</a>
	2.1 × 100 mm	<a href="#">186009491</a>
	2.1 × 150 mm	<a href="#">186009492</a>

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BEH C <sub>18</sub> , 300 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009493</a>
	2.1 × 100 mm	<a href="#">186009494</a>
	2.1 × 150 mm	<a href="#">186009495</a>

### ACQUITY UPLC Peptide BEH C<sub>18</sub> Guards and Columns

BEH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186003975*</a>
	2.1 × 50 mm	<a href="#">186003554</a>
	2.1 × 100 mm	<a href="#">186003555</a>
	2.1 × 150 mm	<a href="#">186003556</a>

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BEH C <sub>18</sub> , 300 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	1.0 × 50 mm	<a href="#">186005592</a>
	1.0 × 100 mm	<a href="#">186005593</a>
	1.0 × 150 mm	<a href="#">186005594</a>
	2.1 × 5 mm	<a href="#">186004629*</a>
	2.1 × 50 mm	<a href="#">186003685</a>
	2.1 × 100 mm	<a href="#">186003686</a>
	2.1 × 150 mm	<a href="#">186003687</a>

\*VanGuard Pre-column, 3/pk.

### ACQUITY UPLC Peptide BEH C<sub>18</sub> Method Validation Kits\*

BEH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 100 mm	<a href="#">186004896</a>
	2.1 × 150 mm	<a href="#">186006516</a>

---

BEH C <sub>18</sub> , 300 Å	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 100 mm	<a href="#">186004897</a>
	2.1 × 150 mm	<a href="#">186006517</a>

\*Each Method Validation Kit contains 3 columns, each from a different batch.

### XBridge Premier Peptide Columns

BEH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009733</a>
	2.1 × 100 mm	<a href="#">186009734</a>
	2.1 × 150 mm	<a href="#">186009735</a>
	4.6 × 50 mm	<a href="#">186009898</a>
	4.6 × 100 mm	<a href="#">186009899</a>
	4.6 × 150 mm	<a href="#">186009900</a>

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BEH C <sub>18</sub> , 300 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009892</a>
	2.1 × 100 mm	<a href="#">186009893</a>
	2.1 × 150 mm	<a href="#">186009894</a>
	4.6 × 50 mm	<a href="#">186009895</a>
	4.6 × 100 mm	<a href="#">186009896</a>
	4.6 × 150 mm	<a href="#">186009897</a>

### XSelect Premier Peptide Columns

CSH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009904</a>
	2.1 × 100 mm	<a href="#">186009905</a>
	2.1 × 150 mm	<a href="#">186009906</a>
	4.6 × 50 mm	<a href="#">186009907</a>
	4.6 × 100 mm	<a href="#">186009908</a>
	4.6 × 150 mm	<a href="#">186009909</a>

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HSS T3, 100 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009839</a>
	2.1 × 100 mm	<a href="#">186009840</a>
	2.1 × 150 mm	<a href="#">186009841</a>
	4.6 × 50 mm	<a href="#">186009910</a>
	4.6 × 100 mm	<a href="#">186009911</a>
	4.6 × 150 mm	<a href="#">186009912</a>

XBridge Peptide BEH C<sub>18</sub> Method Validation Kits\*

BEH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N	Dimension	P/N	Dimension	P/N
	2.1 × 150 mm	<a href="#">186009002</a>	4.6 × 100 mm	<a href="#">186004904</a>	4.6 × 100 mm	<a href="#">186005463</a>
	3 × 150 mm	<a href="#">186009003</a>				
	4.6 × 150 mm	<a href="#">186009004</a>				

BEH C <sub>18</sub> , 300 Å	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N	Dimension	P/N	Dimension	P/N
	2.1 × 150 mm	<a href="#">186009079</a>	4. × 100 mm	<a href="#">186004905</a>	4.6 × 100 mm	<a href="#">186005464</a>
	3 × 150 mm	<a href="#">186009080</a>				
	4.6 × 150 mm	<a href="#">186009081</a>				

\*Each Method Validation Kit contains 3 columns, each from a different batch.


XBridge Peptide BEH C<sub>18</sub> VanGuard Cartridges, 3/pk

BEH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186008988</a>
	3.9 × 5 mm	<a href="#">186008989</a>

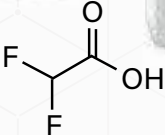
BEH C <sub>18</sub> , 300 Å	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009077</a>
	3.9 × 5 mm	<a href="#">186009078</a>

[ IONHANCE DIFLUOROACETIC ACID ]



# IonHance™ DFA

The first available MS-Grade DFA



## Why IonHance™ Difluoroacetic Acid?

...and why should MS-grade be a necessity?

- Improved MS signal over TFA
- Improved optical peak shape and retention over FA
- MS-grade offers high purity and low salt

Find out more at [waters.com/ionhance](http://waters.com/ionhance)

XBridge Peptide BEH C<sub>18</sub> Guards and Columns

BEH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm		Particle Size: 10 µm	
	Dimension	P/N	Dimension	P/N	Dimension	P/N	Dimension	P/N
	2.1 × 50 mm	<a href="#">186008979</a>	1.0 × 50 mm	<a href="#">186003560</a>	1.0 × 50 mm	<a href="#">186003571</a>	4.6 × 50 mm	<a href="#">186003648</a>
	2.1 × 100 mm	<a href="#">186008980</a>	1.0 × 100 mm	<a href="#">186003561</a>	1.0 × 100 mm	<a href="#">186003572</a>	4.6 × 100 mm	<a href="#">186003649</a>
	2.1 × 150 mm	<a href="#">186008981</a>	1.0 × 150 mm	<a href="#">186003562</a>	1.0 × 150 mm	<a href="#">186003573</a>	4.6 × 150 mm	<a href="#">186003650</a>
	3 × 50 mm	<a href="#">186008982</a>	2.1 × 50 mm	<a href="#">186003563</a>	2.1 × 50 mm	<a href="#">186003574</a>	4.6 × 250 mm	<a href="#">186003651</a>
	3 × 100 mm	<a href="#">186008983</a>	2.1 × 100 mm	<a href="#">186003564</a>	2.1 × 100 mm	<a href="#">186003575</a>	10 × 10 mm	<a href="#">186004465</a> <sup>*1</sup>
	3 × 150 mm	<a href="#">186008984</a>	2.1 × 150 mm	<a href="#">186003565</a>	2.1 × 150 mm	<a href="#">186003576</a>	10 × 50 mm	<a href="#">186008194</a>
	4.6 × 50 mm	<a href="#">186008985</a>	2.1 × 250 mm	<a href="#">186003566</a>	2.1 × 250 mm	<a href="#">186003577</a>	10 × 100 mm	<a href="#">186008195</a>
	4.6 × 100 mm	<a href="#">186008986</a>	4.6 × 50 mm	<a href="#">186003567</a>	4.6 × 50 mm	<a href="#">186003578</a>	10 × 150 mm	<a href="#">186008196</a>
	4.6 × 150 mm	<a href="#">186008987</a>	4.6 × 100 mm	<a href="#">186003568</a>	4.6 × 100 mm	<a href="#">186003579</a>	10 × 250 mm	<a href="#">186008197</a>
			4.6 × 150 mm	<a href="#">186003569</a>	4.6 × 150 mm	<a href="#">186003580</a>	19 × 10 mm	<a href="#">186004464</a> <sup>*2</sup>
			4.6 × 250 mm	<a href="#">186003570</a>	4.6 × 250 mm	<a href="#">186003581</a>	19 × 50 mm	<a href="#">186003656</a>
					10 × 10 mm	<a href="#">186004469</a> <sup>*1</sup>	19 × 150 mm	<a href="#">186003657</a>
					10 × 50 mm	<a href="#">186008186</a>	19 × 250 mm	<a href="#">186003658</a>
					10 × 100 mm	<a href="#">186008187</a>	30 × 10 mm	<a href="#">186006880</a> <sup>*3</sup>
					10 × 150 mm	<a href="#">186008188</a>	30 × 50 mm	<a href="#">186003659</a>
					10 × 250 mm	<a href="#">186008189</a>	30 × 100 mm	<a href="#">186003660</a>
					19 × 10 mm	<a href="#">186004468</a> <sup>*2</sup>	30 × 150 mm	<a href="#">186003661</a>
					19 × 50 mm	<a href="#">186003586</a>	30 × 250 mm	<a href="#">186003662</a>
					19 × 100 mm	<a href="#">186003587</a>		
					19 × 150 mm	<a href="#">186003945</a>		

BEH C <sub>18</sub> , 300 Å	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm		Particle Size: 10 µm	
	Dimension	P/N	Dimension	P/N	Dimension	P/N	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009077</a>	1.0 × 50 mm	<a href="#">186003604</a>	1.0 × 50 mm	<a href="#">186003615</a>	4.6 × 50 mm	<a href="#">186003663</a>
	2.1 × 50 mm	<a href="#">186009068</a>	1.0 × 100 mm	<a href="#">186003605</a>	1.0 × 100 mm	<a href="#">186003616</a>	4.6 × 100 mm	<a href="#">186003664</a>
	2.1 × 100 mm	<a href="#">186009069</a>	1.0 × 150 mm	<a href="#">186003606</a>	1.0 × 150 mm	<a href="#">186003617</a>	4.6 × 150 mm	<a href="#">186003665</a>
	2.1 × 150 mm	<a href="#">186009070</a>	2.1 × 50 mm	<a href="#">186003607</a>	2.1 × 50 mm	<a href="#">186003618</a>	4.6 × 250 mm	<a href="#">186003666</a>
	3.0 × 50 mm	<a href="#">186009071</a>	2.1 × 100 mm	<a href="#">186003608</a>	2.1 × 100 mm	<a href="#">186003619</a>	10 × 10 mm	<a href="#">186004467</a> <sup>*1</sup>
	3.0 × 100 mm	<a href="#">186009072</a>	2.1 × 150 mm	<a href="#">186003609</a>	2.1 × 150 mm	<a href="#">186003620</a>	10 × 50 mm	<a href="#">186008198</a>
	3.0 × 150 mm	<a href="#">186009073</a>	2.1 × 250 mm	<a href="#">186003610</a>	2.1 × 250 mm	<a href="#">186003621</a>	10 × 100 mm	<a href="#">186008199</a>
	4.6 × 50 mm	<a href="#">186009074</a>	4.6 × 50 mm	<a href="#">186003611</a>	4.6 × 50 mm	<a href="#">186003622</a>	10 × 150 mm	<a href="#">186008200</a>
	4.6 × 100 mm	<a href="#">186009075</a>	4.6 × 100 mm	<a href="#">186003612</a>	4.6 × 100 mm	<a href="#">186003623</a>	10 × 250 mm	<a href="#">186008201</a>
	4.6 × 150 mm	<a href="#">186009076</a>	4.6 × 150 mm	<a href="#">186003613</a>	4.6 × 150 mm	<a href="#">186003624</a>	19 × 10 mm	<a href="#">186004466</a> <sup>*2</sup>
			4.6 × 250 mm	<a href="#">186003614</a>	4.6 × 250 mm	<a href="#">186003625</a>	19 × 50 mm	<a href="#">186003671</a>
					10 × 10 mm	<a href="#">186004471</a> <sup>*1</sup>	19 × 150 mm	<a href="#">186003672</a>
					10 × 50 mm	<a href="#">186008190</a>	19 × 250 mm	<a href="#">186003673</a>
					10 × 100 mm	<a href="#">186008191</a>	30 × 50 mm	<a href="#">186003674</a>
					10 × 150 mm	<a href="#">186008192</a>	30 × 100 mm	<a href="#">186003675</a>
					10 × 250 mm	<a href="#">186008193</a>	30 × 150 mm	<a href="#">186003676</a>
					19 × 10 mm	<a href="#">186004470</a> <sup>*2</sup>	30 × 250 mm	<a href="#">186003677</a>
					19 × 50 mm	<a href="#">186003630</a>	30 × 10 mm	<a href="#">186006882</a> <sup>*3</sup>
					19 × 100 mm	<a href="#">186003631</a>		
					19 × 150 mm	<a href="#">186003946</a>		

\*Guard Cartridge.

<sup>1</sup> Requires 10 × 10 mm Prep Guard Holder, p/n: [289000779](#).

<sup>2</sup> Requires 19 × 10 mm Prep Guard Holder, p/n: [186000709](#).

<sup>3</sup> Requires 30 × 10 mm Prep Guard Holder, p/n: [186006912](#).

## ACQUITY UPLC Peptide CSH C<sub>18</sub> Columns and Kits

CSH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm		
	Dimension	Column P/N	Kit P/N <sup>1</sup>
	1.0 × 50 mm	<a href="#">186006933</a>	<a href="#">176003061</a>
	1.0 × 100 mm	<a href="#">186006934</a>	<a href="#">176003062</a>
	1.0 × 150 mm	<a href="#">186006935</a>	<a href="#">176003063</a>
	2.1 × 50 mm	<a href="#">186006936</a>	<a href="#">176003064</a>
	2.1 × 100 mm	<a href="#">186006937</a>	<a href="#">176003065</a>
	2.1 × 150 mm	<a href="#">186006938</a>	<a href="#">176003066</a>

<sup>1</sup>Kit contains Peptide CSH C<sub>18</sub>, 130 Å Column plus one vial of Cytochrome c Digestion Standard, p/n: [186006371](#).

## ACQUITY UPLC Peptide CSH C<sub>18</sub> VanGuard Pre-Column, 3/pk

CSH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm		
	Dimension	Column P/N	Kit P/N <sup>1</sup>
	2.1 × 5 mm	<a href="#">186006939</a>	<a href="#">176003067</a>

<sup>1</sup>Kit contains Peptide CSH C<sub>18</sub>, 130 Å Column plus one vial of Cytochrome c Digestion Standard, p/n: [186006371](#).

## ACQUITY UPLC Peptide CSH C<sub>18</sub> Method Validation Kits\*

CSH C <sub>18</sub> , 130 Å	Particle Size: 1.7 µm		
	Dimension	Column P/N	Kit P/N <sup>1</sup>
	2.1 × 150 mm	<a href="#">186006940</a>	<a href="#">176003068</a>

\*Kit contains 3 columns, each from a different batch.

<sup>1</sup>Kit contains Peptide CSH C<sub>18</sub>, 130 Å Column plus one vial of Cytochrome c Digestion Standard, p/n: [186006371](#).

## XSelect Peptide CSH C<sub>18</sub> Guards, Columns, and Kits

CSH, C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm			Particle Size: 3.5 µm			Particle Size: 5 µm	
	Dimension	Column P/N	Kit P/N <sup>1</sup>	Dimension	Column P/N	Kit P/N <sup>1</sup>	Dimension	Column P/N (1/pk)
	2.1 × 50 mm <i>XP</i>	<a href="#">186006941</a>	<a href="#">176003069</a>	2.1 × 10 mm <sup>2,4</sup>	<a href="#">186006954</a>	<a href="#">176003081</a>	4.6 × 50 mm	<a href="#">186007076</a>
	2.1 × 100 mm <i>XP</i>	<a href="#">186006942</a>	<a href="#">176003070</a>	2.1 × 50 mm	<a href="#">186006950</a>	<a href="#">176003077</a>	4.6 × 100 mm	<a href="#">186007077</a>
	2.1 × 150 mm <i>XP</i>	<a href="#">186006943</a>	<a href="#">176003071</a>	2.1 × 100 mm	<a href="#">186006951</a>	<a href="#">176003078</a>	4.6 × 150 mm	<a href="#">186007078</a>
	4.6 × 50 mm <i>XP</i>	<a href="#">186006946</a>	<a href="#">176003074</a>	2.1 × 150 mm	<a href="#">186006952</a>	<a href="#">176003079</a>	10 × 10 mm*	<a href="#">186007015</a>
	4.6 × 100 mm <i>XP</i>	<a href="#">186006947</a>	<a href="#">176003075</a>	4.6 × 20 mm <sup>3,4</sup>	<a href="#">186006958</a>	<a href="#">176003085</a>	10 × 50 mm*	<a href="#">186008264</a>
	4.6 × 150 mm <i>XP</i>	<a href="#">186007038</a>	<a href="#">176003093</a>	4.6 × 50 mm	<a href="#">186006955</a>	<a href="#">176003082</a>	10 × 100 mm*	<a href="#">186008265</a>
				4.6 × 100 mm	<a href="#">186006956</a>	<a href="#">176003083</a>	10 × 150 mm*	<a href="#">186008266</a>
				4.6 × 150 mm	<a href="#">186006957</a>	<a href="#">176003084</a>	10 × 250 mm*	<a href="#">186008267</a>
							19 × 10 mm*	<a href="#">186007019**</a>
							19 × 50 mm*	<a href="#">186007022</a>
							19 × 100 mm*	<a href="#">186007020</a>
							19 × 150 mm*	<a href="#">186007021</a>
							19 × 250 mm*	<a href="#">186007031</a>
							30 × 50 mm*	<a href="#">186007026</a>
							30 × 100 mm*	<a href="#">186007025</a>
							30 × 150 mm*	<a href="#">186007023</a>
							30 × 250 mm*	<a href="#">186007024</a>
							50 × 50 mm*	<a href="#">186007030</a>
							50 × 100 mm*	<a href="#">186007027</a>
							50 × 150 mm*	<a href="#">186007028</a>
							50 × 250 mm*	<a href="#">186007029</a>

\* OBD Column.

\*\*Requires 19 × 10 mm Cartridge Holder, p/n: [186000709](#).

<sup>1</sup> Kit contains Peptide CSH C<sub>18</sub>, 130 Å Column plus one vial of Cytochrome c Digestion Standard, p/n: [186006371](#).

<sup>2</sup> Requires 2.1 × 10 mm Universal Sentry Guard Holder, p/n: [WAT097958](#).

<sup>3</sup> Requires 4.6 × 20 mm Universal Sentry Guard Holder, p/n: [WAT046910](#).

<sup>4</sup> 2/pkg.

## XSelect Peptide CSH C<sub>18</sub> Columns and Method Validation Kits\*

CSH C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm			Particle Size: 3.5 µm		
	Dimension	Column P/N	Kit P/N <sup>1</sup>	Dimension	Column P/N	Kit P/N <sup>1</sup>
	2.1 × 100 mm	<a href="#">186006945</a>	<a href="#">176003073</a>	2.1 × 100 mm	<a href="#">186006953</a>	<a href="#">176003080</a>
4.6 × 100 mm	<a href="#">186006966</a>	<a href="#">176003076</a>	4.6 × 100 mm	<a href="#">186006959</a>	<a href="#">176003086</a>	

\*Each Method Validation Kit contains three columns, each from a different batch.

<sup>1</sup> Kit includes three Peptide CSH C<sub>18</sub>, 130 Å, Columns, each from a different batch; and three vials of Cytochrome c Digestion Standard, p/n: [186006371](#).

## XSelect Peptide CSH C<sub>18</sub> VanGuard Cartridges,\* 3/pk

CSH, C <sub>18</sub> , 130 Å	Particle Size: 2.5 µm		
	Dimension	Column P/N	Kit P/N <sup>1</sup>
2.1 × 5 mm	<a href="#">186006944</a>	<a href="#">176003072</a>	

\*Requires VanGuard Cartridge Universal Holder, p/n: [186007949](#).

<sup>1</sup> Kit includes three Peptide CSH C<sub>18</sub>, 130 Å Guard Columns and one vial of Cytochrome c Digestion Standard, p/n: [186006371](#).

## Purification and Isolation Cartridge Holders and Replacement O-rings

Description	Qty.	P/N
10 × 10 mm Cartridge Holder	1/pk	<a href="#">289000779</a>
19 × 10 mm Cartridge Holder	1/pk	<a href="#">186000709</a>
Replacement O-ring 7.8 mm	2/pk	<a href="#">700001019</a>
Replacement O-ring 10 mm	2/pk	<a href="#">700001436</a>

## ACQUITY UPLC Peptide HSS T3 Columns and Kits

HSS T3, 100 Å	Particle Size: 1.8 µm		
	Dimension	Column P/N	Kit P/N <sup>1</sup>
1.0 × 50 mm	<a href="#">186008751</a>	<a href="#">176003992</a>	
1.0 × 100 mm	<a href="#">186008752</a>	<a href="#">176003993</a>	
1.0 × 150 mm	<a href="#">186008753</a>	<a href="#">176003994</a>	
2.1 × 50 mm	<a href="#">186008754</a>	<a href="#">176003995</a>	
2.1 × 100 mm	<a href="#">186008755</a>	<a href="#">176003996</a>	
2.1 × 150 mm	<a href="#">186008756</a>	<a href="#">176003997</a>	

<sup>1</sup> Kit includes Peptide HSS T3 Column plus one vial of Cytochrome c Digestion Standard, p/n: [186006371](#).

## ACQUITY UPLC Peptide HSS T3 VanGuard Pre-Column, 3/pk

HSS T3, 100 Å	Particle Size: 1.8 µm	
	Dimension	P/N
2.1 × 5 mm	<a href="#">186008757</a>	

## ACQUITY UPLC Peptide HSS T3 Method Validation Kits\*

HSS T3, 100 Å	Particle Size: 1.8 µm	
	Dimension	P/N
2.1 × 150 mm	<a href="#">186008782</a>	

\*Each Method Validation Kit contains 3 columns, each from a different batch.

## XSelect Peptide HSS T3 Columns

HSS T3, 100 Å	Particle Size: 2.5 µm			Particle Size: 5 µm		
	Dimension	Column P/N	Kit P/N <sup>1</sup>	Dimension	Column P/N	Kit P/N <sup>1</sup>
2.1 × 50 mm	<a href="#">186008758</a>	<a href="#">176003998</a>	2.1 × 100 mm	<a href="#">186008775</a>	<a href="#">176004017</a>	
2.1 × 100 mm	<a href="#">186008759</a>	<a href="#">176003999</a>	2.1 × 150 mm	<a href="#">186008776</a>	<a href="#">176004018</a>	
2.1 × 150 mm	<a href="#">186008760</a>	<a href="#">176004006</a>	4.6 × 100 mm	<a href="#">186008779</a>	<a href="#">176004020</a>	
4.6 × 50 mm	<a href="#">186008762</a>	<a href="#">176004007</a>	4.6 × 150 mm	<a href="#">186008780</a>	<a href="#">176004021</a>	
4.6 × 100 mm	<a href="#">186008763</a>	<a href="#">176004008</a>				
4.6 × 150 mm	<a href="#">186008764</a>	<a href="#">176004009</a>				

<sup>1</sup> Kit includes Peptide HSS T3 Column plus one vial of Cytochrome c Digestion Standard, p/n: [186006371](#).

## XSelect Peptide HSS T3 VanGuard Cartridges, 3/pk\*

HSS T3, 100 Å	Particle Size: 2.5 µm		Particle Size: 5 µm	
	Dimension	P/N	Dimension	P/N
2.1 × 5 mm	<a href="#">186008761</a>	2.1 × 5 mm	<a href="#">186008777</a>	
3.9 × 5 mm	<a href="#">186008765</a>	3.9 × 5 mm	<a href="#">186008781</a>	

\*Requires a VanGuard Cartridge Universal Holder, p/n: [186007949](#).

## XSelect Peptide HSS T3 Method Validation Kits\*

HSS T3, 100 Å	Particle Size: 2.5 µm		Particle Size: 5 µm	
	Dimension	P/N	Dimension	P/N
2.1 × 150 mm	<a href="#">186008783</a>	2.1 × 150 mm	<a href="#">186008787</a>	
4.6 × 150 mm	<a href="#">186008784</a>	4.6 × 150 mm	<a href="#">186008788</a>	

\*Each Method Validation Kit contains 3 columns, each from a different batch.

## THERAPEUTIC PEPTIDE METHOD DEVELOPMENT KIT


The Therapeutic Peptide Method Development Kit was developed to simplify the process of sample preparation and LC method development for the analysis of therapeutic peptides in plasma. The kit contains an Oasis Peptide  $\mu$ Elution Method Development Plate, a Peptide BEH C<sub>18</sub>, 300 Å reversed-phase column, and the detailed screening protocol which was used to generate the data shown in this publication.

In addition, a comprehensive method development training seminar has been created which describes all aspects of the method development process from the MS conditions to the final validation of a method for the extraction of the therapeutic peptide desmopressin from human plasma.

Although big progress has been made in sample pretreatment over the last years, there are still considerable limitations when it comes to overcoming complexity and dynamic range problems associated with peptide analyses from biological matrices. We focus on techniques which can be employed prior to liquid chromatography coupled to mass spectrometry for peptide detection and identification.

The peptide columns are specifically QC tested with a cytochrome c tryptic digest that helps ensure batch-to-batch consistency in validated methods ideally suited for separating a wide range of large and small, acidic and basic, hydrophilic and hydrophobic peptides.

The complexity of samples still far exceeds the capacity of currently available analytical systems, and specific sample preparation remains a crucial part of the analysis in a whole.

 For more information, visit [waters.com/pepkit](http://waters.com/pepkit) or contact your local Waters sales office.

## CATION-EXCHANGE PEPTIDE AND POLYPEPTIDE SEPARATIONS

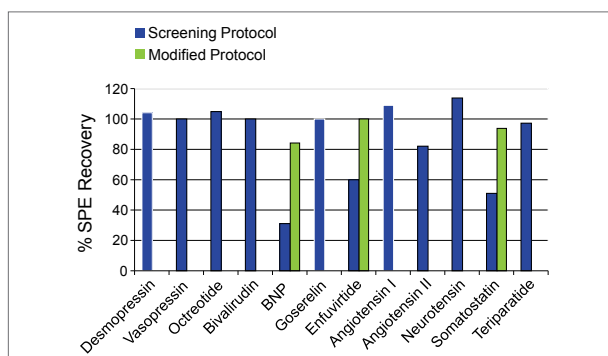
For most analytical and preparative peptide separations, cation-exchange chromatography is used mainly when alternative selectivity is required. In some large-scale purifications, cation exchange can take on a more central role. In these cases, cation exchange is frequently used as the first step in the separation, followed by a secondary purification step using reversed-phase methods.

Waters offers BioSuite packings for cation-exchange separations. These packings are useful both for analytical and preparative work. They are based on rigid, hydrophilic polymethacrylate particles with large 1,000 Å pores. The naturally hydrophilic polymer reduces non-specific adsorption, resulting in better recovery of peptide/polypeptide mass and bioactivity. These packings are stable in the pH range of 2–12.

Protein-Pak SP HR 8 and 15  $\mu$ m packing material is available in pre-packed glass columns.



### High Recovery of Peptides



The innovative Oasis  $\mu$ Elution Plate allows for up to a 15x sample concentration, increasing the possibility of reaching the required sensitivity levels for bioanalytical assays. The low (25  $\mu$ L) elution volume eliminates the need for evaporation and reconstitution significantly reducing the potential analyte loss due to absorption to the walls of the collection plate and/or chemical instability.

## Ordering Information

### Therapeutic Peptide Method Development Kits

Description	Qty/Box	P/N
UPLC Therapeutic Peptide Method Development Kit		<a href="#">176001835</a>
Oasis $\mu$ Elution Method Development Plate	1	<a href="#">186004713</a>
ACQUITY UPLC Peptide BEH C <sub>18</sub> , 300 Å, 1.7 $\mu$ m, 2.1 $\times$ 50 mm Column	1	<a href="#">186003685</a>
96-Well 1 mL Collection Plate and Cap Mat	3	600001043
HPLC Peptide Therapeutic Peptide Method Development Kit		<a href="#">176001836</a>
Oasis $\mu$ Elution Method Development Plate	1	<a href="#">186004713</a>
XBridge Peptide BEH C <sub>18</sub> , 300 Å, 3.5 $\mu$ m, 2.1 $\times$ 50 mm Column	1	<a href="#">186003607</a>
96-Well 1 mL Collection Plate and Cap Mat	3	600001043

### Additional Products (Not Included in Kits)

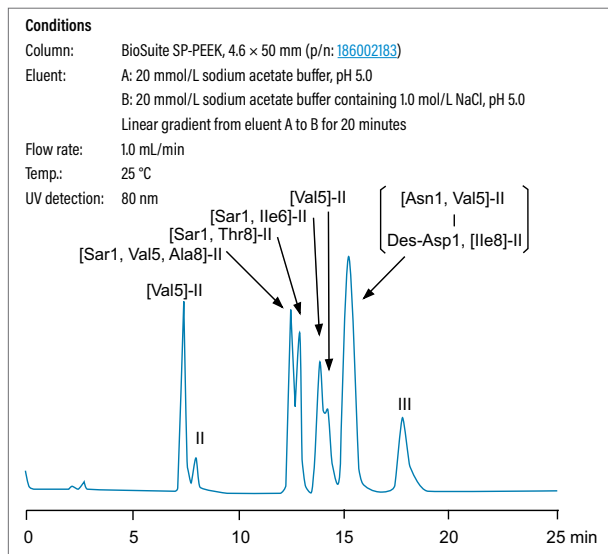
Oasis MAX 96-Well $\mu$ Elution Plate	1	<a href="#">186001829</a>
Oasis WCX 96-Well $\mu$ Elution Plate	1	<a href="#">186002499</a>
96-Well 1 mL Collection Plate	50	<a href="#">186002481</a>
Cap Mats for 1 mL Collection Plate	50	<a href="#">186002483</a>
Disposable Reservoir Tray	25	<a href="#">WAT058942</a>
Extraction Manifold for 96-Well Plates	1	<a href="#">186001831</a>
Vacuum Box Gasket Kit (contains foam top gaskets and orange O-rings)	2	<a href="#">186003522</a>
SPE Vacuum Pump 115 V, 60 Hz	1	725000417
SPE Vacuum Pump 240 V, 50 Hz	1	<a href="#">725000604</a>

## BIOSUITE CATION-EXCHANGE HPLC COLUMNS

BioSuite SP NP, SP-PEEK, and SP cation-exchange chemistries (CXC) consists of the "strong" sulfopropyl ligand bonded to a pH stable (i.e., pH 2–12), methacrylic ester-based polymeric resin. The availability of different pore and particle size materials provides chromatographers with the flexibility required to isolate and or characterize peptides based upon minor charge differences. Non-porous (NP) and porous IEX Columns are also available to meet various separations requirements. Speed and superior chromatographic resolution are possible using the non-porous IEX offerings, while porous BioSuite offerings are available for applications requiring greater peptide binding capacity. In addition, BioSuite SP material is offered in PEEK hardware as well as in 21.5 mm I.D. stainless steel "lab-scale" preparative column dimensions.



## Separation of Angiotensins on BioSuite SP-PEEK Cation-Exchange HPLC Column



Waters BioSuite SP-PEEK Cation-Exchange Column is well suited for the HPLC or UHPLC analyses of a complex peptide mixture using a gradient of increasing salt concentration.

## Ordering Information

### BioSuite Cation-Exchange HPLC Columns

Description	Matrix	Pore Size	Exclusion Limit (Daltons) against Polyethylene Glycol	Inner Diameter	Length	Column Volume (mL)	# Approx Protein Binding Capacity Per Pre-Packed Column	P/N
BioSuite SP-PEEK, 7 µm CXC	Polymer	1300 Å	>4,000,000	4.6 mm	50 mm	0.83	58 mg*	<a href="#">186002182</a>
BioSuite SP, 2.5 µm NP CXC	Polymer	N/A	500	4.6 mm	35 mm	0.58	2.9 mg**	<a href="#">186002183</a>
BioSuite SP, 10 µm CXC	Polymer	1000 Å	1,000,000	7.5 mm	75 mm	3.31	132 mg**	<a href="#">186002184</a>
BioSuite SP, 13 µm CXC	Polymer	1000 Å	1,000,000	21.5 mm	150 mm	54.45	2178 mg**	<a href="#">186002185</a>

For best resolution of complex samples, do not exceed 20% of the column's protein binding capacity.

\* Data generated with gamma globulin.

\*\*Data generated with hemoglobin.

## BioResolve SCX mAb Columns

BioResolve SCX mAb Columns for the LC analysis of mAb charge variants as well as other biopharmaceutical therapeutics.

[waters.com/bioresolve](http://waters.com/bioresolve)

## BIOSUITE HPLC AND UHPLC PEPTIDE ANALYSIS COLUMNS

- Two HPLC and UHPLC column chemistries that provide alternative chemistries for peptide separations
- Designed for maximum resolution of complex digests
- Available in various configurations for LC or LC-MS applications
- Excellent batch-to-batch reproducibility for consistent results
- Uniquely QC tested specifically for peptide mapping using Waters MassPREP Cytochrome c Digestion Standard [p/n: [186006371](#)]

### BioSuite Peptide Analysis Series

BioSuite PA Series consists of two Waters reversed-phase column chemistries specifically optimized for peptide mapping from simple to complicated digests.

#### BioSuite C<sub>18</sub>, 3 μm PA-A

BioSuite C<sub>18</sub>, 3 μm PA-A is a 100 Å, difunctional bonded, low ligand density, silica-based column.

- Specifically designed for excellent retention of polar peptides
- Ideal choice for LC-MS applications using formic acid (FA) that minimizes ion-suppression
- Excellent performance for traditional HPLC separations using low TFA concentrations (e.g., 0.025% TFA)

#### BioSuite C<sub>18</sub>, 3.5 μm PA-B

BioSuite C<sub>18</sub>, 3.5 μm PA-B is a 300 Å, high-ligand density, monofunctional, silica-based column.

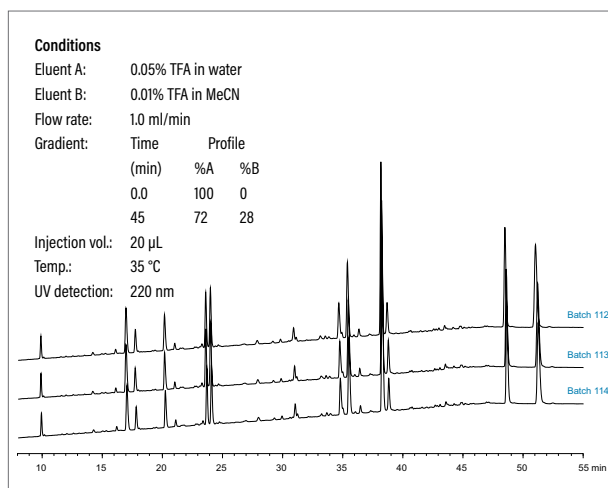
- Outstanding performance when separating complex digests containing hydrophilic, hydrophobic, and basic peptides
- Superior peak shape and capacity for peptide separations using TFA containing eluents (e.g., 0.1% TFA)
- Good choice for the separation of larger peptide fragments generated by some endoproteases (e.g., Lys-C)



### Consistent Results Due to Superior Batch-to-Batch Reproducibility

Waters' batch-release protocol includes a tryptic map of cytochrome c (using Waters MassPREP Cytochrome c Digestion Standard [p/n: [186006371](#)]) which is used to test for reproducibility to retention times and resolution. The three test chromatograms below show the results of the protein digest test for different batches of PA-B material.

#### Cytochrome c Tryptic Map QC Test



Waters BioSuite C<sub>18</sub> PA-A and PA-B Columns are QC tested with tryptic digest of cytochrome c (p/n: [186006371](#)) to help ensure batch-to-batch and column-to-column performance consistency.

### Ordering Information

#### BioSuite Peptide Analysis HPLC and UHPLC Columns

BioSuite C <sub>18</sub>	Inner Diameter	Length	3 μm PA-A	3.5 μm PA-B
			P/N	P/N
	2.1 mm	50 mm	<a href="#">186002425</a>	<a href="#">186002433</a>
	2.1 mm	100 mm	<a href="#">186002426</a>	<a href="#">186002434</a>
	2.1 mm	150 mm	<a href="#">186002427</a>	<a href="#">186002435</a>
	2.1 mm	250 mm	<a href="#">186002428</a>	<a href="#">186002436</a>
	4.6 mm	50 mm	<a href="#">186002429</a>	<a href="#">186002437</a>
	4.6 mm	100 mm	<a href="#">186002430</a>	<a href="#">186002438</a>
	4.6 mm	150 mm	<a href="#">186002431</a>	<a href="#">186002439</a>
	4.6 mm	250 mm	<a href="#">186002432</a>	<a href="#">186002440</a>



## SYMMETRY HPLC AND UHPLC COLUMNS

Waters Symmetry reversed-phase, silica-based particles are synthesized using ultrapure organic reagents, resulting in high purity material with very low silanol activity. When combined with the high surface coverage of the bonded phase, outstanding peptide separations and recoveries are possible.

- Superior manufacturing control for consistent batch-to-batch and column-to-column results
- 100 Å and 300 Å pore size offerings for small or larger size peptides
- SymmetryShield Column chemistry offers complementary selectivity to Symmetry Column offerings
- SymmetryPrep Columns provide direct scale up while maintaining resolution

### Symmetry300 Columns: The First Columns Specifically Engineered for the Discovery and Development of New Biopharmaceuticals

Symmetry300 Columns are 300 Å reversed-phase columns specifically designed to provide maximum batch-to-batch and column-to-column performance consistency and recovery of protein and peptide applications.

Symmetry300 Columns are offered in two particle sizes (3.5 µm and 5 µm) and in two chemistries (C<sub>4</sub> for large peptides and proteins, and C<sub>18</sub> for smaller peptides) to address various needs.

### Ordering Information

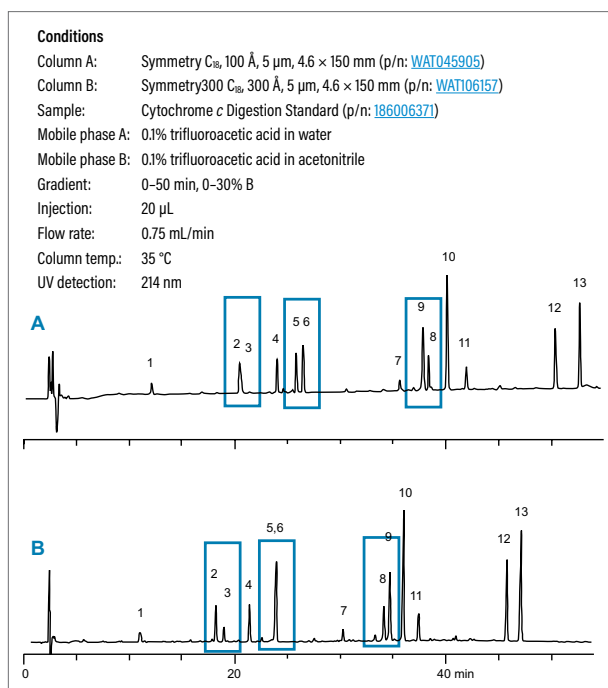
#### Symmetry300 HPLC and UHPLC Columns

C <sub>18</sub>	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N	Dimension	P/N
	1.0 × 150 mm	<a href="#">186000185</a>	2.1 × 150 mm	<a href="#">WAT106172</a>
	2.1 × 50 mm	<a href="#">186000187</a>	3.9 × 150 mm	<a href="#">WAT106154</a>
	2.1 × 100 mm	<a href="#">186000188</a>	4.6 × 50 mm	<a href="#">WAT106209</a>
	2.1 × 150 mm	<a href="#">186000200</a>	4.6 × 150 mm	<a href="#">WAT106157</a>
	4.6 × 50 mm	<a href="#">186000201</a>	4.6 × 250 mm	<a href="#">WAT106151</a>
	4.6 × 75 mm	<a href="#">186000189</a>	19 × 10 mm	<a href="#">186001847</a>
	4.6 × 100 mm	<a href="#">186000190</a>	19 × 50 mm	<a href="#">186001848</a>
	4.6 × 150 mm	<a href="#">186000197</a>	19 × 100 mm	<a href="#">186001849</a>
C <sub>4</sub>	2.1 × 150 mm	<a href="#">186000276</a>	2.1 × 150 mm	<a href="#">186000285</a>
	3.9 × 150 mm	<a href="#">186000277</a>	3.9 × 150 mm	<a href="#">186000286</a>
	4.6 × 50 mm	<a href="#">186000278</a>	4.6 × 50 mm	<a href="#">186000287</a>
	4.6 × 150 mm	<a href="#">186000279</a>	4.6 × 150 mm	<a href="#">186000288</a>
	4.6 × 250 mm	<a href="#">186000280</a>	4.6 × 250 mm	<a href="#">186000289</a>
	19 × 10 mm	<a href="#">186000281</a>		
	19 × 50 mm	<a href="#">186000282</a>		
	19 × 100 mm	<a href="#">186000283</a>		

## High Recoveries of Peptides and Proteins

The heart of the column is high purity-based deactivated silica. Waters dedicated chromatography chemistry manufacturing plant operates under the stringent standards of cGMP and ISO 9001. The silica used in the manufacture of our Symmetry300 Columns is synthesized using ultrapure organic reagents that yields high purity particles with very low silanol activity. These particles when combined with innovative ligand (i.e., C<sub>4</sub> and C<sub>18</sub>) bonding techniques helps produce reversed-phase columns with minimal non-desired secondary interactions between bound ligand and biomolecules.

### Pore Size Effects on Peptide Selectivity: Comparative Results on Symmetry 100 Å vs. Symmetry300 Columns



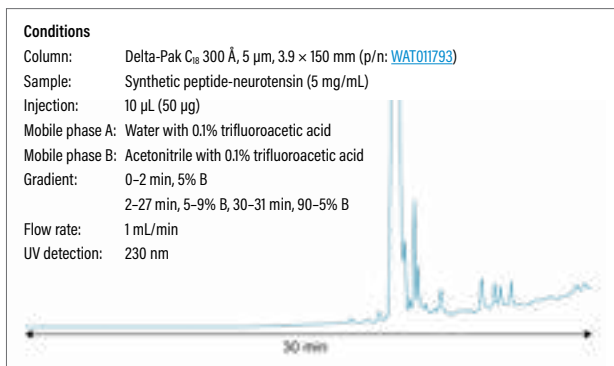
Waters' Symmetry-based C<sub>18</sub> Column consists of a 100% porous silica particle containing a C<sub>18</sub> ligand and endcapping to minimize undesired secondary interactions between the peptide analytes and column chemistry. As indicated by the gradient separation of a cytochrome c tryptic digest, different separation selectivities are obtained on the 100 Å column vs. the 300 Å pore size materials, with Symmetry300 C<sub>18</sub> being preferred for separation on compounds greater than approximately 10,000 Dalton.

The key to a successful separation is the selection of a column that gives the highest chemistry resolution with maximum peak capacity and recovery.

## DELTA-PAK HPLC AND UHPLC COLUMNS

Delta-Pak packings, ideal for the separation of peptides, proteins, and natural products, are based on a highly stable, bonded, endcapped 5 or 15  $\mu\text{m}$  spherical silica. Delta-Pak is available in two different pore size materials (100  $\text{\AA}$  and 300  $\text{\AA}$ ) with a  $C_{18}$  or  $C_4$  bonded phase.

### Synthetic Peptide Separation on Delta-Pak $C_{18}$ HPLC Column



Waters Delta-Pak  $C_{18}$ , 300  $\text{\AA}$  Columns (available in 5 and 15  $\mu\text{m}$  particle sizes) are well suited for the analysis and lab-scale isolation of synthetic peptide mixtures.

## Ordering Information

### Delta-Pak Analytical HPLC and UHPLC Columns and Guards

Delta-Pak $C_{18}$ , 100 $\text{\AA}$	Particle Size: 5 $\mu\text{m}$		
	Dimension	Type	P/N
	3.9 $\times$ 20 mm	Guard, 2/pk	<a href="#">WAT046880</a> <sup>1</sup>
	3.9 $\times$ 20 mm	Guard, 10/pk	<a href="#">WAT036870</a> <sup>1</sup>
	3.9 $\times$ 150 mm	Column	<a href="#">WAT011795</a>
Delta-Pak $C_{18}$ , 300 $\text{\AA}$	2.1 $\times$ 150 mm	Column	<a href="#">WAT023650</a>
	3.9 $\times$ 20 mm	Guard, 2/pk	<a href="#">WAT046890</a> <sup>1</sup>
	3.9 $\times$ 150 mm	Cartridge, 10/pk	<a href="#">WAT036875</a> <sup>2</sup>
	3.9 $\times$ 150 mm	Column	<a href="#">WAT011793</a>
Delta-Pak $C_4$ , 100 $\text{\AA}$	3.9 $\times$ 20 mm	Guard, 2/pk	<a href="#">WAT046875</a> <sup>1</sup>
	3.9 $\times$ 150 mm	Column	<a href="#">WAT011796</a>
Delta-Pak $C_4$ , 300 $\text{\AA}$	3.9 $\times$ 20 mm	Guard, 2/pk	<a href="#">WAT046885</a> <sup>1</sup>
	3.9 $\times$ 150 mm	Cartridge, 10/pk	<a href="#">WAT036865</a> <sup>2</sup>
	3.9 $\times$ 150 mm	Column	<a href="#">WAT011794</a>
Guard-Pak Holder			<a href="#">WAT088141</a>
Guard-Pak In-line Filters, 5/pk			<a href="#">WAT032472</a>

<sup>1</sup> Requires 3.0  $\times$  20 mm/4.6  $\times$  20 mm Universal Sentry Guard Holder, p/n: [WAT046910](#).

<sup>2</sup> Requires Guard-Pak Holder, p/n: [WAT088141](#).

### Delta-Pak Radial Compression Preparative HPLC and UHPLC Column Segments and PrepPak Cartridges\*

Delta-Pak $C_{18}$ , 100 $\text{\AA}$	Particle Size: 15 $\mu\text{m}$		
	Dimension	Type	P/N
	8 $\times$ 100 mm	Column	<a href="#">WAT025846</a>
	25 $\times$ 10 mm	Guard, 2/pk	<a href="#">WAT038520</a>
	25 $\times$ 100 mm	Column	<a href="#">WAT038506</a>
	40 $\times$ 10 mm	Guard, 2/pk	<a href="#">WAT037842</a>
	40 $\times$ 100 mm	Column	<a href="#">WAT037688</a>
Delta-Pak $C_{18}$ , 300 $\text{\AA}$	8 $\times$ 100 mm	Column	<a href="#">WAT025845</a>
	25 $\times$ 10 mm	Guard, 2/pk	<a href="#">WAT038522</a>
	25 $\times$ 100 mm	Column	<a href="#">WAT038507</a>
	40 $\times$ 10 mm	Guard, 2/pk	<a href="#">WAT037845</a>
	40 $\times$ 100 mm	Column	<a href="#">WAT037692</a>
Delta-Pak $C_4$ , 100 $\text{\AA}$	8 $\times$ 100 mm	Column	<a href="#">WAT025848</a>
	25 $\times$ 10 mm	Guard, 2/pk	<a href="#">WAT038524</a>
	25 $\times$ 100 mm	Column	<a href="#">WAT038508</a>
	40 $\times$ 10 mm	Guard, 2/pk	<a href="#">WAT037696</a>
Delta-Pak $C_4$ , 300 $\text{\AA}$	25 $\times$ 10 mm	Guard, 2/pk	<a href="#">WAT038526</a>
	25 $\times$ 100 mm	Column	<a href="#">WAT038509</a>
	40 $\times$ 10 mm	Guard, 2/pk	<a href="#">WAT037851</a>
	40 $\times$ 100 mm	Column	<a href="#">WAT037700</a>

\*All column segments and cartridges require the appropriate holder/module.

### Delta-Pak Preparative HPLC and UHPLC Guard Columns

Delta-Pak $C_{18}$ , 100 $\text{\AA}$	Particle Size: 15 $\mu\text{m}$		
	Dimension	Type	P/N
	3.9 $\times$ 300 mm	Column	<a href="#">WAT011797</a>
	7.8 $\times$ 300 mm	Column	<a href="#">WAT011798</a>
	19 $\times$ 300 mm	Column	<a href="#">WAT011799</a>
	30 $\times$ 300 mm	Column	<a href="#">WAT011800</a>
	50 $\times$ 300 mm	Column	<a href="#">WAT011801</a>
Delta-Pak $C_{18}$ , 300 $\text{\AA}$	3.9 $\times$ 300 mm	Column	<a href="#">WAT011802</a>
	7.8 $\times$ 300 mm	Column	<a href="#">WAT011803</a>
	19 $\times$ 300 mm	Column	<a href="#">WAT011804</a>
	30 $\times$ 300 mm	Column	<a href="#">WAT011805</a>
Delta-Pak $C_4$ , 100 $\text{\AA}$	3.9 $\times$ 300 mm	Column	<a href="#">WAT011807</a>
	7.8 $\times$ 300 mm	Column	<a href="#">WAT011808</a>
	19 $\times$ 300 mm	Column	<a href="#">WAT011809</a>
	30 $\times$ 300 mm	Column	<a href="#">WAT011810</a>
Delta-Pak $C_4$ , 300 $\text{\AA}$	3.9 $\times$ 300 mm	Column	<a href="#">WAT011812</a>
	7.8 $\times$ 300 mm	Column	<a href="#">WAT011813</a>
	19 $\times$ 300 mm	Column	<a href="#">WAT011814</a>
	30 $\times$ 300 mm	Column	<a href="#">WAT011815</a>

## PEPTIDE STANDARDS AND REAGENTS

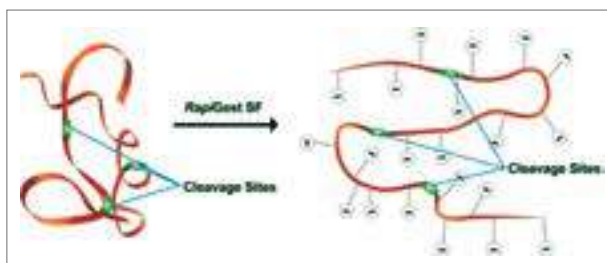
### RapiGest SF Protein Digestion Surfactant

RapiGest SF (surfactant) radically enhances protein enzymatic digestions in terms of speed and percent recovery. RapiGest SF is a patented anionic surfactant that accelerates the production of peptides generated by proteases, such as trypsin, Asp-N, Glu-C, and Lys-C. Many hydrophobic proteins are resistant to proteolysis because their cleavage sites are inaccessible to endoproteases. RapiGest SF, a mild denaturant, helps solubilize and unfold proteins making them more amenable to cleavage without denaturing or inhibiting common proteolytic enzymes.



- Compatible with liquid chromatography (LC) and MS analysis
- Enables same-day digestions and analysis
- Minimal or no post-digestion sample preparation is required
- Improves efficiency and speed of digestion
- Simplifies digestion protocols and improves throughput of analysis
- Does not inhibit enzyme activity, unlike conventional denaturants
- Allows use of lesser amounts of expensive endoproteases because it is not disruptive of endoprotease activity

#### How RapiGest SF Works



#### Ordering Information

##### RapiGest SF Surfactant

Description	P/N
RapiGest SF 1 mg vial	<a href="#">186001860</a>
RapiGest SF 1 mg vial (5/pk)	<a href="#">186001861</a>
RapiGest SF 3 mg vial	<a href="#">186008090</a>
RapiGest SF 10 mg vial	<a href="#">186002123</a>
RapiGest SF 50 mg vial	<a href="#">186002122</a>

## CYTOCHROME c DIGESTION STANDARD

### Benchmarking, Method Development, and Troubleshooting

The Cytochrome c Digestion Standard was prepared by digesting Bovine Heart Cytochrome c (Uniprot #P62894) with sequencing grade trypsin. This standard is recommended for benchmarking system performance and is also used for column QC.

#### Ordering Information

##### Cytochrome c Digestion Standard

Description	P/N
Cytochrome c Digestion Standard	<a href="#">186006371</a>



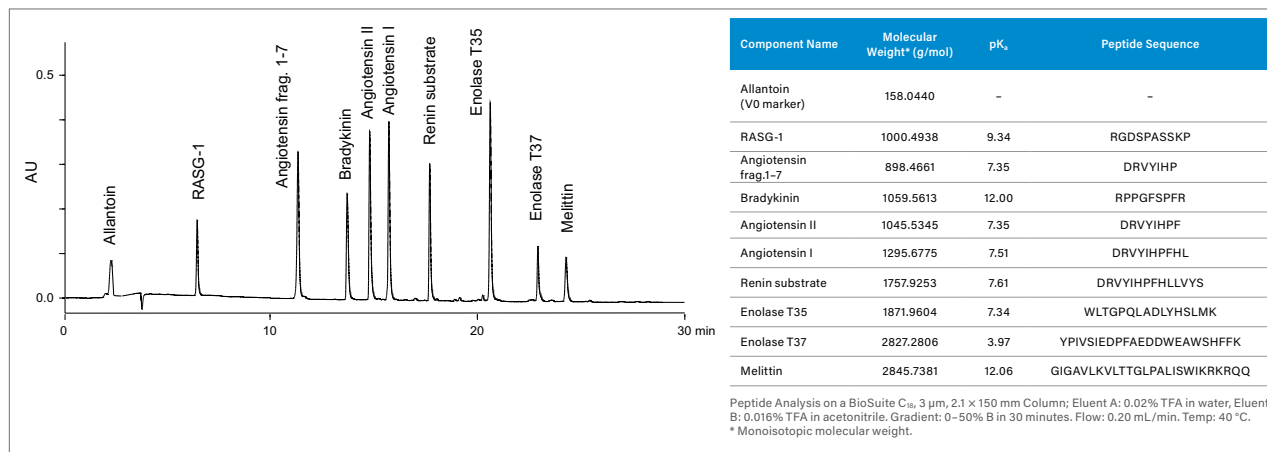
## MassPREP PEPTIDE STANDARD

### Benchmarking, Method Development, and Troubleshooting

The MassPREP Peptide Standard Mixture contains a void volume (VO) column marker and nine carefully selected peptides with a broad range of polarities and isoelectric points. The MassPREP Standard is useful to test LC columns and systems dedicated to peptide separations.



### Baseline HPLC Resolution of Nine Peptides Contained in MassPREP Standard Mixture



Waters offers a variety of carefully formulated and QC-tested peptide standards to help chromatographers confirm the performance of their column and LC system prior to analyses of potentially highly valued samples.

## Ordering Information

### MassPREP Peptide Standards

Description	Volume	P/N
<b>MassPREP Peptide Mixture</b> One vial with approximately 1 nmol of each: Allantoin (Vo Marker); RASG-1, angiotensin frag. 1-7, bradykinin; angiotensin II; angiotensin I, renin substrate, enolase T35, enolase T37, melittin. The peptide standard is useful to test LC columns and systems dedicated to peptide separations.	Solid	<a href="#">186002337</a>
<b>MassPREP Peptide Mixture, 5/pk</b> Each vial contains approximately 1 nmol of each: Allantoin (Vo Marker); RASG-1, angiotensin frag. 1-7, bradykinin, angiotensin II, angiotensin I, renin substrate, enolase T35, enolase T37, melittin. The peptide standard is useful to test LC columns and systems dedicated to peptide separations.	Solid	<a href="#">186002338</a>

## MassPREP Protein Digestion Standards

The MassPREP Protein Digestion Standards are prepared under strict quality control procedures and contain no undigested standard proteins, trypsin, or other hydrophilic components. Test results from each batch of digestion standards are provided on an available Certificate of Analysis report.



## Ordering Information

### MassPREP Digestion Standards

Description	Volume	P/N
Yeast enolase	Solid	<a href="#">186002325</a>
Phosphorylase b	Solid	<a href="#">186002326</a>
Bovine hemoglobin	Solid	<a href="#">186002327</a>
Yeast alcohol dehydrogenase (ADH)	Solid	<a href="#">186002328</a>
Bovine serum albumin (BSA)	Solid	<a href="#">186002329</a>
Cytochrome c		<a href="#">186006371</a>
MassPREP Digestion Standard Kit contains (1) of <a href="#">186002325</a> , <a href="#">186002326</a> , <a href="#">186002327</a> , <a href="#">186002328</a> , <a href="#">186002329</a>		<a href="#">186002330</a>

## NIST Digestion Standards

A line of standards based off the NIST Reference Material 8671 (NIST mAb), a humanized IgG1k expressed from a murine cell line.

## Ordering Information

### NIST Digestion Standards

Description	P/N
mAb Tryptic Digestion Standard	<a href="#">186009126</a>
mAb Subunit Standard	<a href="#">186008927</a>

Note: mAb Charge Variant Standard (p/n: [186009065](#)) is also available and it is based on the same NIST mAb Reference Material 8671.

## Quantitative Peptide Standards

Sets of standards specifically designed, formulated, and quality controlled for quantitative peptide analysis.

- Quantitative peptide retention standard
- Hi3 Phos B and *E. coli* standards
- SILAC Hi3 Phos B and *E. coli* standards

## Ordering Information

### Quantitative Peptide Analysis Standards

Description	P/N
Hi3 Phosphorylase B Standard	<a href="#">186006011</a>
The Hi3 Phos B standard is primarily intended for use with the Hi3 quantification method for MS <sup>E</sup> proteomics data processed with ProteinLynx Global SERVER for samples of microbial origin. It may also be used in the evaluation and benchmarking of proteomic LC-MS systems comprised of nanoACQUITY UPLC and SYNAPT and Xevo time-of-flight mass spectrometers. The Hi3 Phos B standard is intended for samples of microbial origin. It is a quantitative standard comprised of the top six ionizing peptides in the rabbit phosphorylase B protein. Recommended at -20 °C.	
Hi3 <i>E. coli</i> Standard	<a href="#">186006012</a>

The Hi3 *E. coli* standard is primarily intended for use with the Hi3 quantification method for MS<sup>E</sup> proteomics data processed with ProteinLynx Global Server for samples of microbial origin. It may also be used in the evaluation and benchmarking of proteomic LC-MS systems comprised of nanoACQUITY UPLC and SYNAPT and Xevo time-of-flight mass spectrometers. The Hi3 *E. coli* standard is intended for samples of animal origin. It is a quantitative standard comprised of the top six ionizing peptides in the *E. coli* ClpB protein.

SILAC Hi3 Phos B Standard	<a href="#">186007083</a>
The SILAC Hi3 Phos B standard is formulated from the same specialized set of the top six ionizing peptides of the rabbit phosphorylase B protein that is contained in the non-labeled counterpart: Hi3 Phos B standard (p/n: <a href="#">186006011</a> ). The main difference is that this standard is produced to have a heavy labeled reference on the lysine (K) or arginine (R) end of the peptide.	
SILAC Hi3 <i>E. coli</i> Standard	<a href="#">186007084</a>

The SILAC Hi3 *E. coli* standard is formulated from the same specialized set of the top six ionizing peptides of the *E. coli* ClpB protein that is contained in the non-labeled counterpart: Hi3 *E. coli* standard (p/n: [186006012](#)). The main difference is that this standard is produced to have a heavy labeled reference on the lysine (K) or arginine (R) end of the peptide.

Quantitative Peptide Retention Standard	<a href="#">186006555</a>
The Quantitative Peptide Retention Standard is a quantitative standard that is useful during the calibration, development, and troubleshooting of chromatographic separations ensuring confidence in results. This standard is rigorously QC tested for purity and quantitative formulation and is specifically designed with the following features:	
■ Peak retention for chromatographic reproducibility	
■ UV absorptivity for signal reproducibility	
■ Low- to high-mass range for MS	
■ Water solubility	
■ Tryptic-like peptides for peptide mapping studies	

## MassPREP Phosphopeptide Standards

The MassPREP Phosphopeptide Standards give you greater control over sample preparation, with the option to use pure peptides or to define phosphopeptides to unmodified peptide ratios.



### Ordering Information

#### MassPREP Phosphopeptide Standards

Description	Volume	P/N
MassPREP Phosphopeptide Standard Enolase Four yeast enolase derived phosphorylated peptides: T18 1P, T19 1P, T43 1P, T43 2P. Used to optimize phosphopeptide detection in LC-MS, LC/UV, and MALDI-MS.	Solid	<a href="#">186003285</a>
MassPREP Enolase Digest with Phosphopeptides Mix Yeast enolase spiked with four yeast enolase derived phosphorylated peptides: T18 1P, T19 1P, T43 1P, T43 2P. A more complex mixture used to optimize and troubleshoot phosphopeptide detection in LC-MS, LC/UV, and MALDI-MS.	Solid	<a href="#">186003286</a>
MassPREP Phosphopeptide Sample Kit—Enolase Kit allows one to mix and optimize a complex standard per specific applications. Kit contains two vials:		<a href="#">186003287</a>
MassPREP enolase digestion standard	Solid	<a href="#">186002325</a>
MassPREP phosphopeptide standard enolase	Solid	<a href="#">186003285</a>
MassPREP Enhancer (5 vials) Five 500 mg MassPREP Enhancer. A component in the MassPREP Phosphopeptide Enrichment Kit.	Solid	<a href="#">186003863</a>
MassPREP Phosphopeptide Enrichment Kit		<a href="#">186003864</a>
MassPREP phosphopeptide enrichment $\mu$ Elution plate	Solid	<a href="#">186003820</a>
MassPREP enhancer	Solid	<a href="#">186003863</a>
MassPREP enolase digest with phosphopeptides mix		<a href="#">186003286</a>

## Protein Analysis

The development and successful commercialization of protein-based biopharmaceuticals and diagnostic reagents frequently depends on the ability to adequately characterize these complex biomolecules. Waters' columns and methods can help solve your protein separation and characterization challenges. Waters technology utilizes:

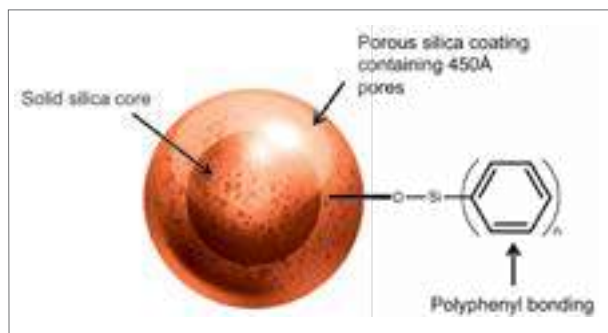
- Reversed-phase
- Hydrophilic-interaction for ADCs
- HILIC for large molecules
- SEC for aggregate, monomer, and fragment analysis
- Ion-exchange for charge variant analysis

These orthogonal separation techniques help provide the critical characterization data and isolated material required to produce the next-generation drugs.

### INTACT PROTEIN AND mAb SUBUNIT ANALYSIS

#### BioResolve RP mAb Polyphenyl Columns

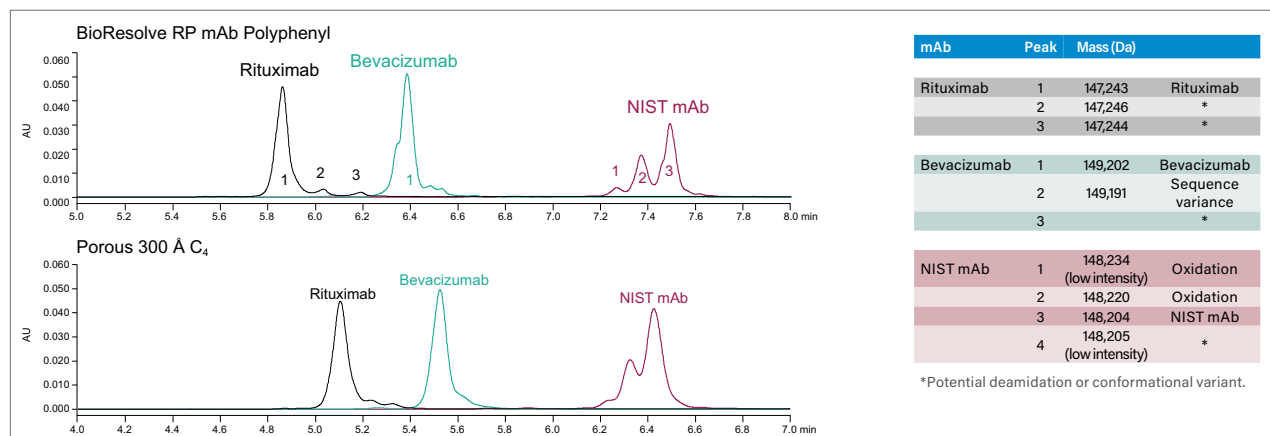
Advances in the LC-MS analysis of biotherapeutic proteins have enabled the analysis at the intact protein and protein subunit level compared to use of peptide mapping protocols. The BioResolve™ RP mAb Columns and VanGuard Cartridges were purposely designed for high quality LC or LC-MS analyses of intact monoclonal antibodies (mAbs), mAb subunits, and antibody drug conjugates (ADCs) using reversed-phase chromatography. This capability was made possible using silica-based, solid core particles containing a well-defined, 450 Å pore coating and polyphenyl ligand bonding.



A schematic representing the particle and bonded phase of a BioResolve RP mAb Polyphenyl, 450 Å, 2.7 µm Column.

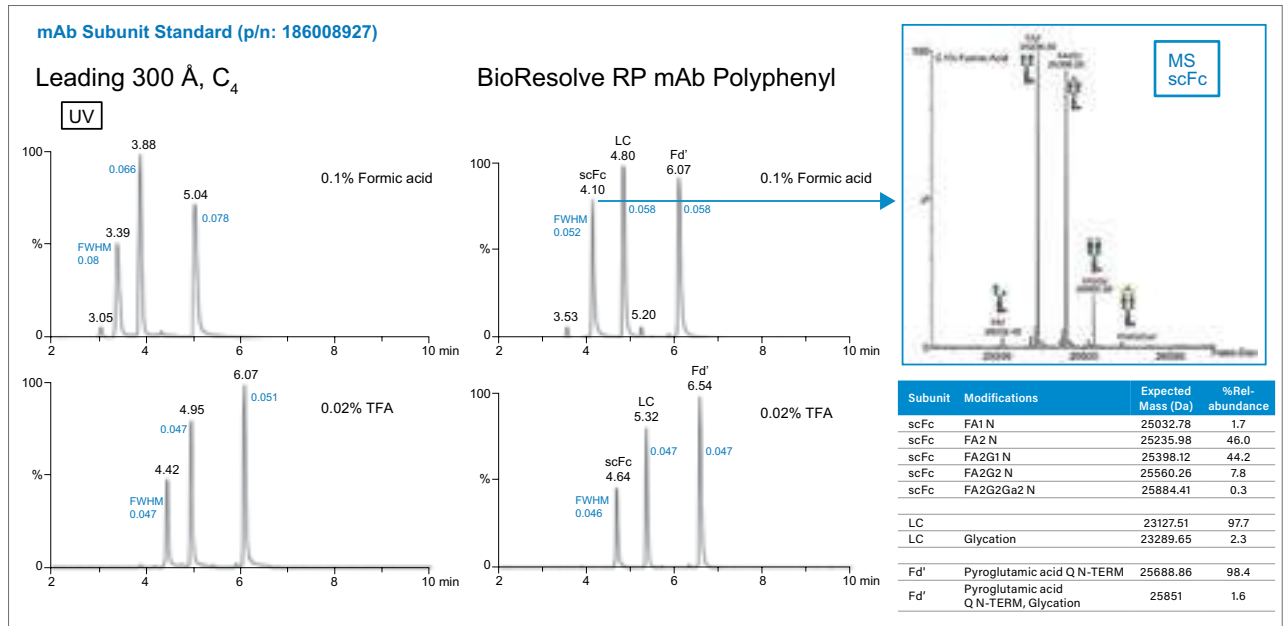
- Improved resolution for increased quantitation accuracy
- Less injection-to-injection carryover for increased confidence
- Lessened dependence on temperature for minimizing protein degradation
- Amenity to HPLC, UHPLC, and UPLC for use across different laboratories
- LC-MS compatibility and lessened ion pairing dependence for higher quality MS data
- Batch-to-batch consistency ensured by QC testing with the mAb Subunit Standard

#### Improved Separation Selectivity, Increased Quantitation Accuracy and Enhanced MS Data



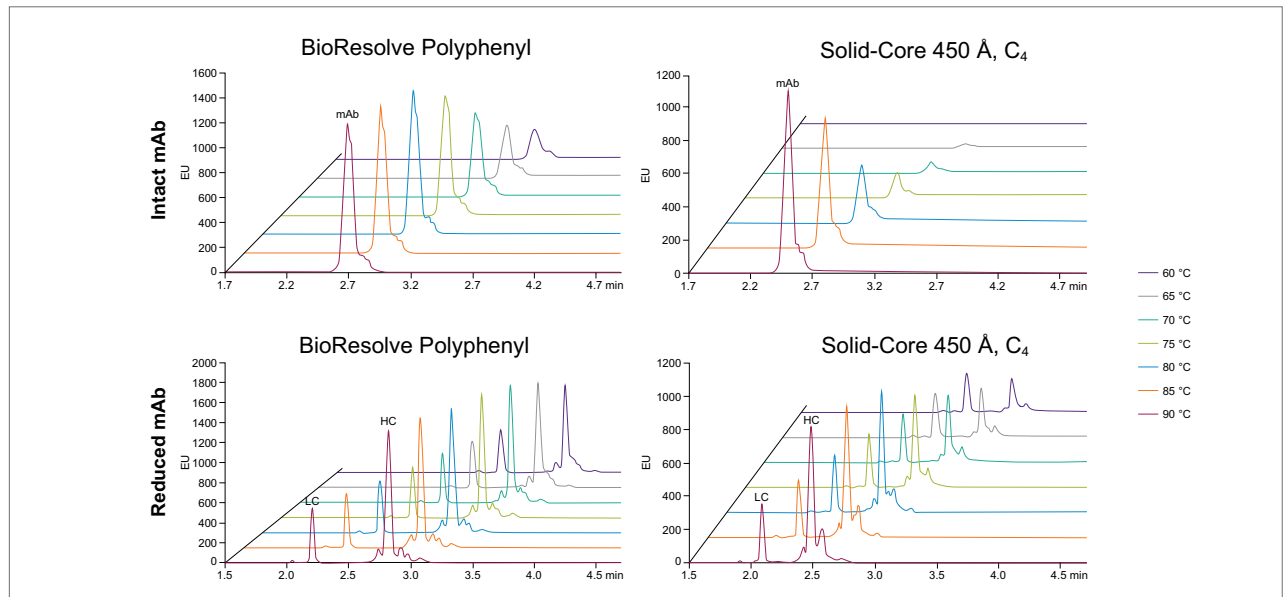
Overlay of reversed-phase gradient separation of three different antibodies. The BioResolve RP mAb Polyphenyl Column provides the highest resolution as compared to a leading C<sub>4</sub>, 300 Å column in these LC-MS analyses. Masses and potential minor peak identifications are shown in the table. Note: The tentative identifications shown were determined solely on the mass differences against the main peak. Additional testing (e.g., MS-MS) is required to confirm identities.

## High-Quality MS Data without Adverse Peak Tailing



The ability to obtain acceptable reversed-phase separations in MS-compatible eluents (e.g., 0.1% FA or 0.02% TFA) is an important performance criteria when selecting an appropriate column for these applications. Different than several tested columns (complete data not shown), acceptable LC-MS gradient separations can be achieved with the BioResolve RP mAb Polyphenyl Column using various mobile phases.

## Native mAb (top) vs. Reduced Panitumumab (bottom) Recoveries at Different Gradient Separation Temperatures

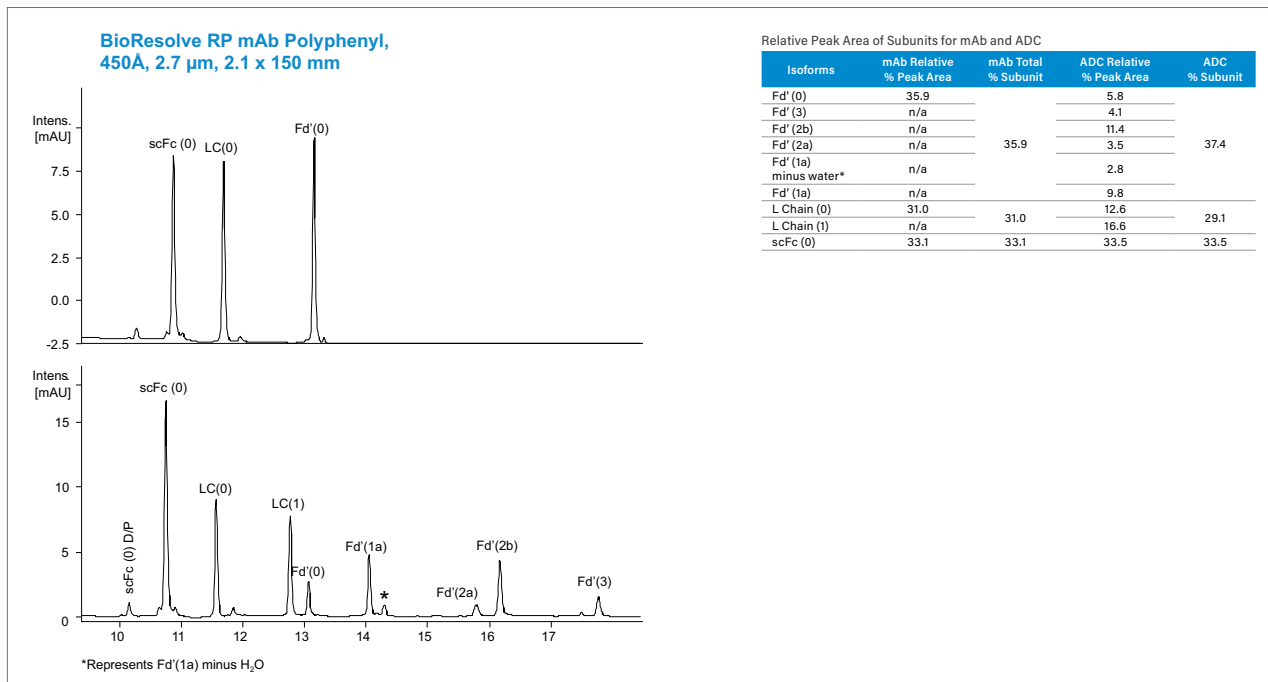


The ability to recover proteins from reversed-phase gradient separations can be affected by the separation temperature. While higher temperatures are frequently required to obtain acceptable recoveries, these same on-column high temperatures can cause sample degradation and potential misinformation. Compared to several tested columns (complete data not shown), acceptable gradient separations are possible using lower temperatures on the BioResolve RP mAb Polyphenyl Column.

Bobály, B.; Lauber, M.; Beck, A.; Guillaume, D.; Fekete, S. Utility of a high coverage phenyl-bonding and wide-pore superficially porous particle for the analysis of monoclonal antibodies and related products. *J. Chromatogr. A*, submitted.



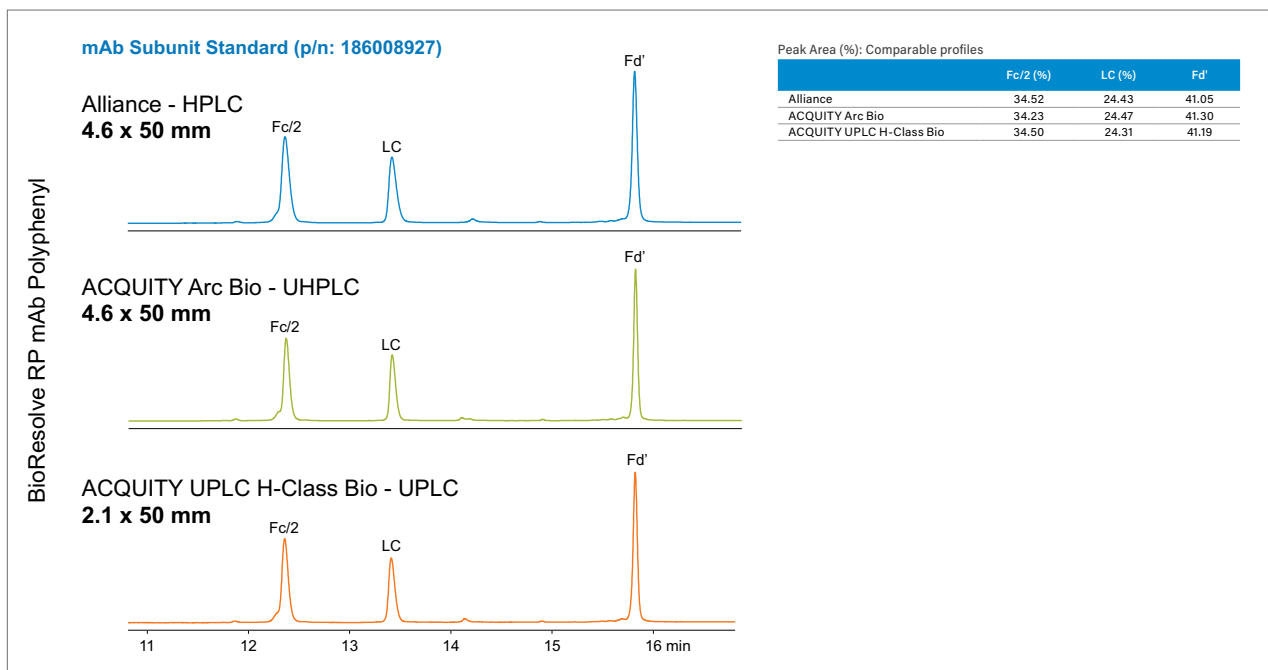
Outstanding Component Resolution and Recovery from IdeS Digested Unconjugated mAbs versus Conjugated (ADC) Species



A comparison of an unconjugated mAb versus an antibody drug conjugate showing full recovery of the Fd', LC, and Fc subunits/domains (with and without conjugation). Similar peak areas are recovered from scFc, LC, and Fd' in the ADC vs. the mAb.

Smith, J.; Friese, O.; Rouse, J.; Lauber, M.; Nguyen, J.; Jayaraman, P. High Resolution Chromatography – Mass Spectrometry with a Novel Phenyl RPLC Column for Heightened Characterization of Hydrophobic Monoclonal Antibodies and Antibody Drug Conjugates. WCBP, Washington, DC, January 30-February 1, 2018.

Separations on HPLC and UPLC Systems Using BioResolve RP mAb Polyphenyl, 450 Å, 2.7 µm Columns



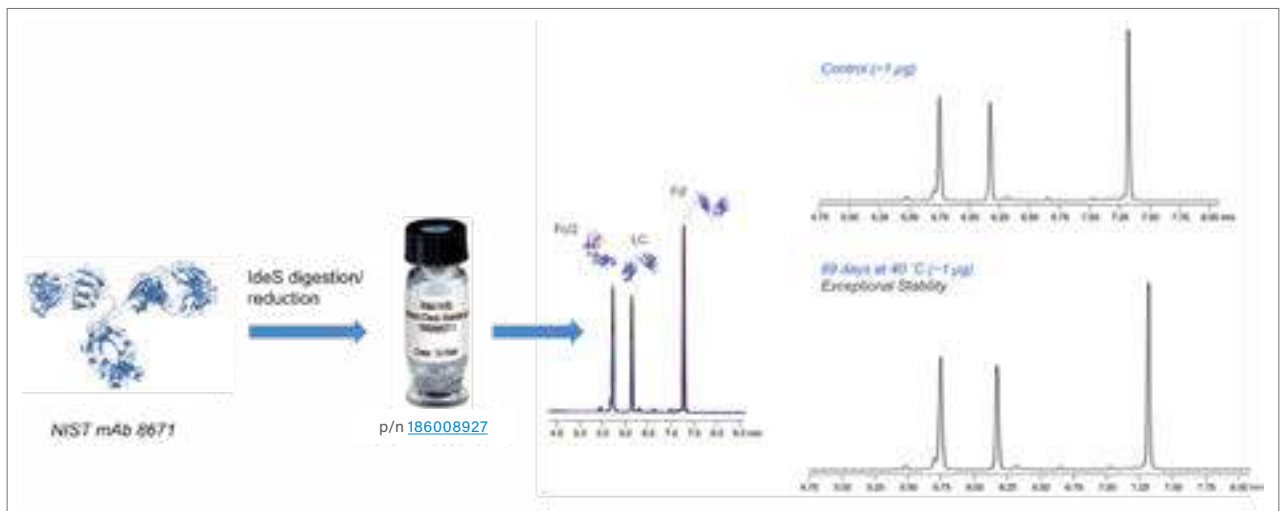
It is possible to use a column containing the exact same material while developing a method during discovery, working through product development, and implementing QC manufacturing controls. This capability can be attributed to the solid-core particle design and innovative polyphenyl ligand bonding of the BioResolve RP mAb Polyphenyl Column. Method transfer concerns can therefore be minimized.

## mAb Subunit Standard

### Benchmarking, Method Development, and Troubleshooting

Waters mAb Subunit Standard can be used in the benchmarking of LC and LC-MS techniques, proficiency testing among different instruments and laboratories, and system suitability. This standard is a filtered and stabilized formulation of reduced, IdeS-digested NIST Reference Material 8671 (NIST mAb), a humanized IgG1 $\kappa$  expressed from a murine cell line.

- 25  $\mu$ g of reduced, IdeS-digested NIST Reference Material 8671
- Desalted, stabilized with excipients, and lyophilized
- Excellent stability
- Used to QC each batch on BioResolve RP mAb Polyphenyl Column



#### APPLICATION AREA: Nanobodies

"We purchased this column to characterize our nanobodies which have a molecular weight of around 14 KDa and it worked really well. Even without expecting it when analyzing them by UPLC-MS with the BioResolve Column we were able to distinguish two separate peaks corresponding to the wild type nanobody and an N-terminal pyroglutamate form of it which only differs on 17 units of mass. With that we can say that this column has a really good resolution and is able to distinguish between two close species which may be really useful when working with antibody's modifications."

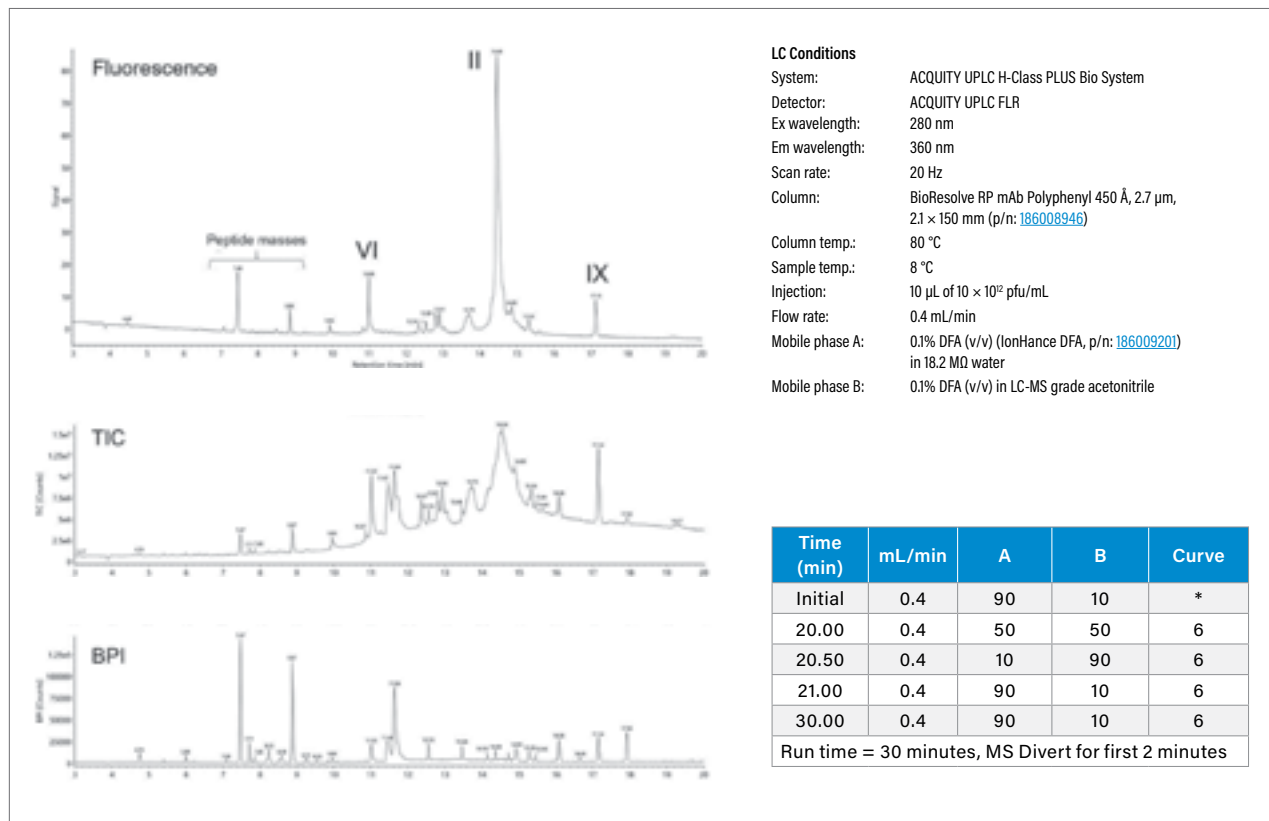
REVIEWER: Sonia Ciudad Fernández

ORGANIZATION: IECB

## Analysis of Adenoviral Vector Proteins using BioResolve RP mAb Polyphenyl

Adenovirus (AdV) is being used as a viral vector for vaccines and gene therapies alike. It is comprised of a relatively complex proteome. The use of IonHance Difluoroacetic Acid (DFA) ion pairing and the BioResolve RP mAb Polyphenyl column quickly separates the AdV proteins while obtaining high sensitivity mass spectra. This is a reversed phase method that facilitates investigating protein copy ratios and measurement of intact protein masses. As such, it should present an excellent starting point for the characterization of current and future AdV based vaccines and gene therapies (refer to Waters Application Note [720007403](#)).

## Analysis of Adenoviral Vector Proteins by RPLC, Native Fluorescence, and Online MS



LC-MS chromatograms of adenoviral vector proteins from HuAdV5 GFP as obtained with 2.1 × 150 mm BioResolve RP mAb Polyphenyl 450 Å 2.7 µm Column and difluoroacetic acid (DFA) modified water/acetonitrile mobile phases. Separations were performed with an ACQUITY UPLC H-Class PLUS Bio System, 10 µL injections of 10 × 10<sup>12</sup> pfu/mL sample, a flow rate of 0.4 mL/min, and a column temperature of 80 °C. Fluorescence detection was performed along with intact mass analysis by ToF mass spectrometry.

## Ordering Information

### BioResolve RP mAb Polyphenyl Columns, Cartridges, Method Validation Kits\*, and Standards

BioResolve RP mAb Polyphenyl Column, 450 Å	Particle Size: 2.7 µm		
	Dimension	P/N (1/pk)	P/N (1/pk with Intact mAb and mAb Subunit Stds)
	1.0 × 50 mm	<a href="#">186009015</a>	-
	1.0 × 100 mm	<a href="#">186009016</a>	-
	1.0 × 150 mm	<a href="#">186009017</a>	-
	2.1 × 50 mm	<a href="#">186008944</a>	<a href="#">176004156</a>
	2.1 × 100 mm	<a href="#">186008945</a>	<a href="#">176004157</a>
	2.1 × 150 mm	<a href="#">186008946</a>	<a href="#">176004158</a>
	3.0 × 50 mm	<a href="#">186008948</a>	-
	3.0 × 100 mm	<a href="#">186008949</a>	-
	3.0 × 150 mm	<a href="#">186008950</a>	-
	4.6 × 50 mm	<a href="#">186008953</a>	<a href="#">176004167</a>
	4.6 × 100 mm	<a href="#">186008954</a>	<a href="#">176004168</a>
	4.6 × 150 mm	<a href="#">186008955</a>	<a href="#">176004169</a>

BioResolve RP mAb Polyphenyl VanGuard Cartridge, 450 Å	Dimension	P/N (3/pk)	P/N (3/pk with VanGuard Holder)
		2.1 × 5 mm	<a href="#">186008943</a>
	3.9 × 5 mm	<a href="#">186008947</a>	<a href="#">176004161</a>

BioResolve RP mAb Polyphenyl Method Validation Kit, 450 Å	Dimension	P/N (3/pk)	P/N (3/pk with Intact mAb and mAb Subunit Stds)
		1.0 × 100 mm	<a href="#">186009018</a>
	1.0 × 150 mm	<a href="#">186009019</a>	-
	2.1 × 100 mm	<a href="#">186008956</a>	<a href="#">176004159</a>
	2.1 × 150 mm	<a href="#">186008957</a>	<a href="#">176004160</a>
	3.0 × 100 mm	<a href="#">186008958</a>	-
	3.0 × 150 mm	<a href="#">186008959</a>	-
	4.6 × 100 mm	<a href="#">186008960</a>	<a href="#">176004170</a>
	4.6 × 150 mm	<a href="#">186008961</a>	<a href="#">176004171</a>

\*Each Method Validation Kit contains three columns, each from a different batch.

#### Standards

Description	P/N
Humanized mAb Standard, 1 vial	<a href="#">186009125</a>
Intact mAb Mass Check Standard, 1 vial	<a href="#">186006552</a>
mAb Subunit Standard, 1 vial	<a href="#">186008927</a>

#### VanGuard Cartridge Universal Holder

Description	P/N
VanGuard Cartridge Universal Holder, 1/pk	<a href="#">186007949</a>

## MaxPeak Premier and Protein BEH C<sub>4</sub>, 300 Å Columns

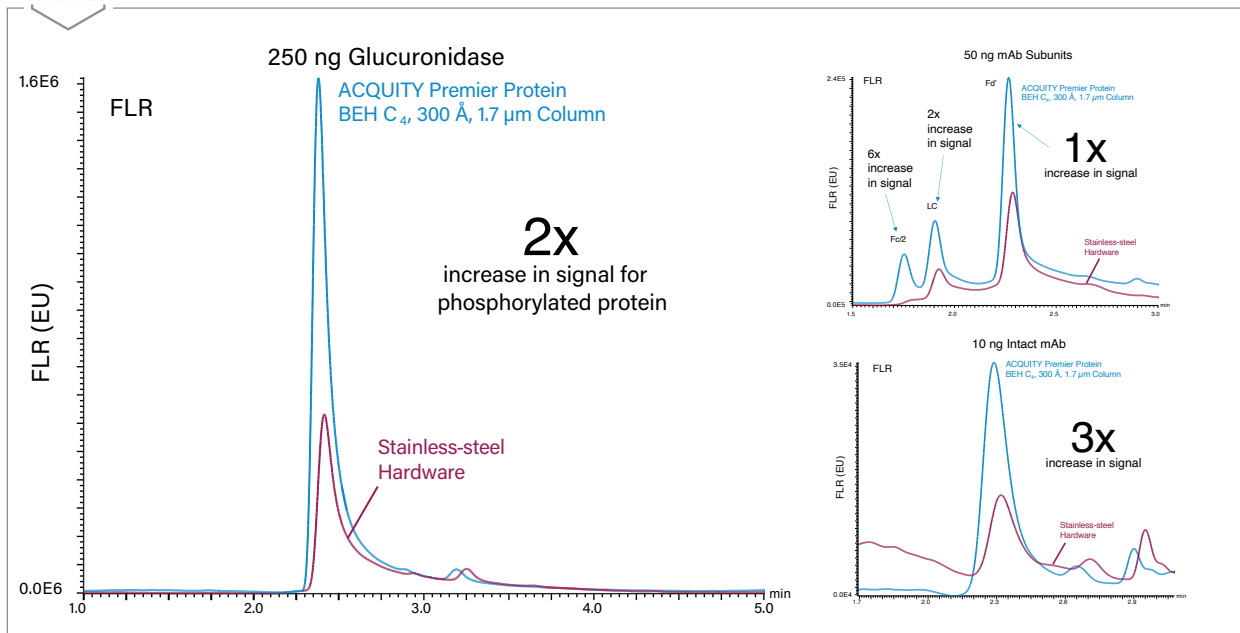
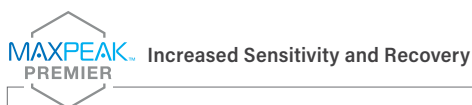
The analysis and characterization of protein samples requires the detection of small chemical differences between large molecules. Most often these analyses have employed an array of analytical techniques, each sensitive to a different property of the protein. Reversed-phase HPLC has not been fully exploited in these tests because the separation of proteins often yields relatively broad and asymmetrical peaks with poor recovery and significant carryover. Waters reversed-phase, ethylene-bridged hybrid (BEH Technology) Protein Separation Technology Columns are specifically designed for the high-resolution analysis of proteins.



The latest innovation to Waters reversed-phase protein columns is our MaxPeak Premier Class of Columns, which deliver the chromatographic performance expected from our particle technologies while increasing reproducibility, peak shape, and recovery for metal-sensitive analytes. The ACQUITY and XBridge Premier Protein BEH C<sub>4</sub>, 300 Å columns contain the same stationary phase as the traditional stainless steel version but utilize MaxPeak High Performance Surface technology hardware which has shown to help minimize ionic interactions of phosphorylated proteins and increase sensitivity for low-level intact and subunit analysis of mAbs.

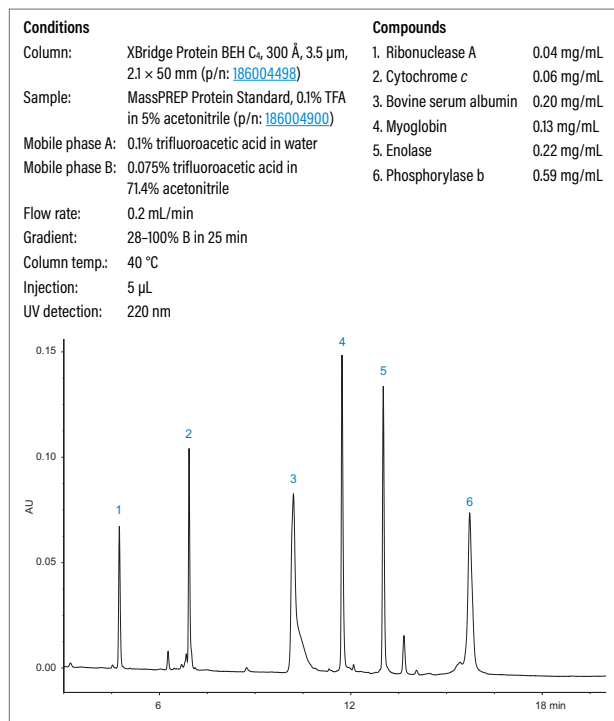
Waters family of Protein BEH C<sub>4</sub>, 300 Å Columns for protein separations:

- Separates proteins of various sizes, hydrophobicities, and isoelectric points
- Tolerates extreme pH and temperature
- HPLC/UHPLC (3.5 μm) and UPLC (1.7 μm) column to address instrumentation and application needs
- Preparative columns available in 5- and 10-μm particle offerings
- Quality-control tested with MassPREP Protein Standard Mix (p/n: [186004900](#))



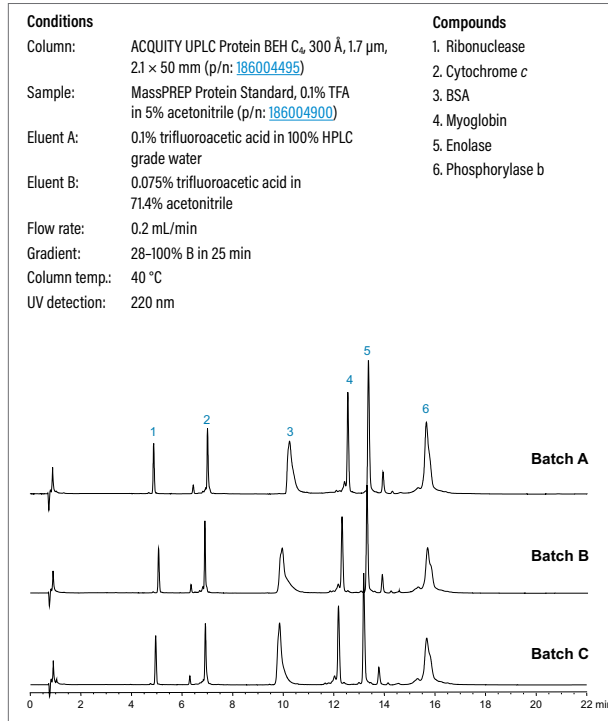
MaxPeak™ Premier Columns utilize MaxPeak High Performance Surfaces that are designed to increase analyte recovery, sensitivity, and reproducibility by minimizing analyte/surface interactions that can lead to sample losses.

## C<sub>4</sub>, 300 Å Columns Developed for Protein Chromatography



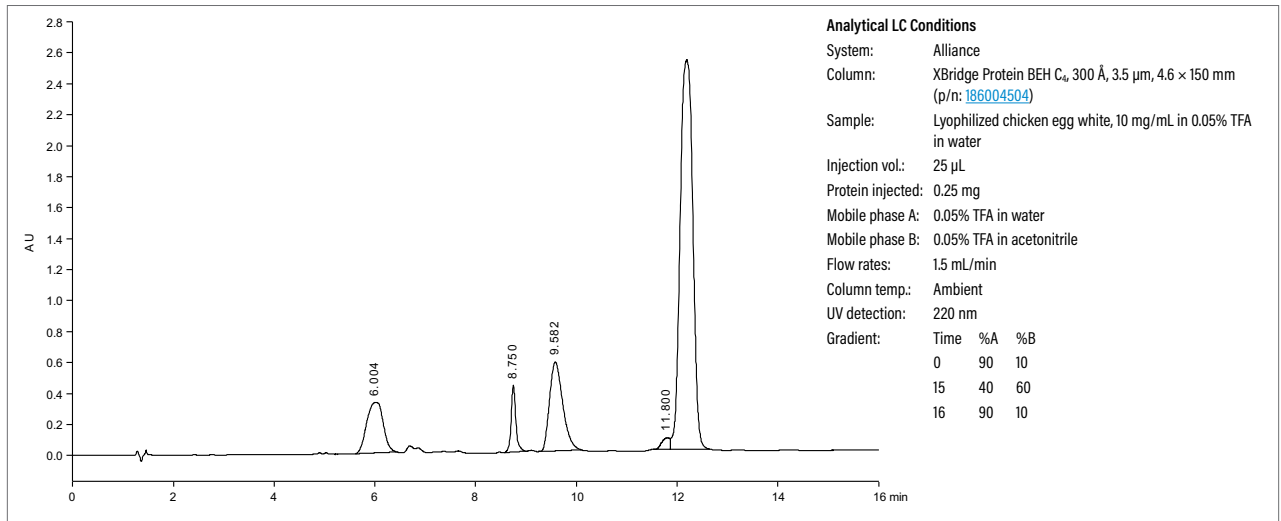
Protein BEH C<sub>4</sub>, 300 Å columns can be used with proteins that have a wide range of properties. This protein mix was chosen to represent a range of isoelectric points, molecular weights, and hydrophobicities.

## Batch-to-Batch Reproducibility



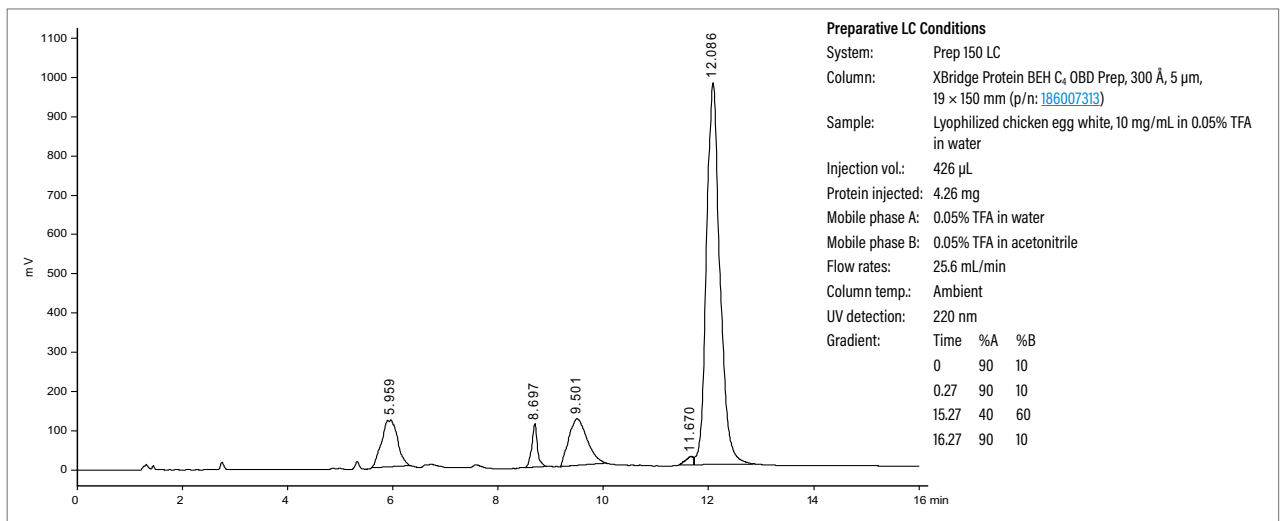
Waters MassPREP Protein Standard Mix is used to critically QC test the ACQUITY UPLC Protein BEH C<sub>4</sub>, 300 Å Columns to help ensure consistent batch-to-batch and column-to-column performance.

### Optimized Analytical Scale Separation on XBridge Protein BEH C<sub>4</sub>, 300 Å, 3.5 μm, 4.6 × 150 mm Column



Analytical scale separation of 250 μg chicken egg white proteins on XBridge Protein BEH C<sub>4</sub>, 300 Å, 3.5 μm, 4.6 × 150 mm Column.

### Successful Scaled Preparative Separation on XBridge Protein BEH C<sub>4</sub>, OBD Prep, 300 Å, 5 μm, 19 × 150 mm Column



Effective method development and scaling of the 250 μm analytical scale separation to the preparative BEH C<sub>4</sub>, 300 Å, 5 μm, 19 × 150 mm column results in chromatography showing an almost identical separation pattern.

## MassPREP Protein Standard Mix

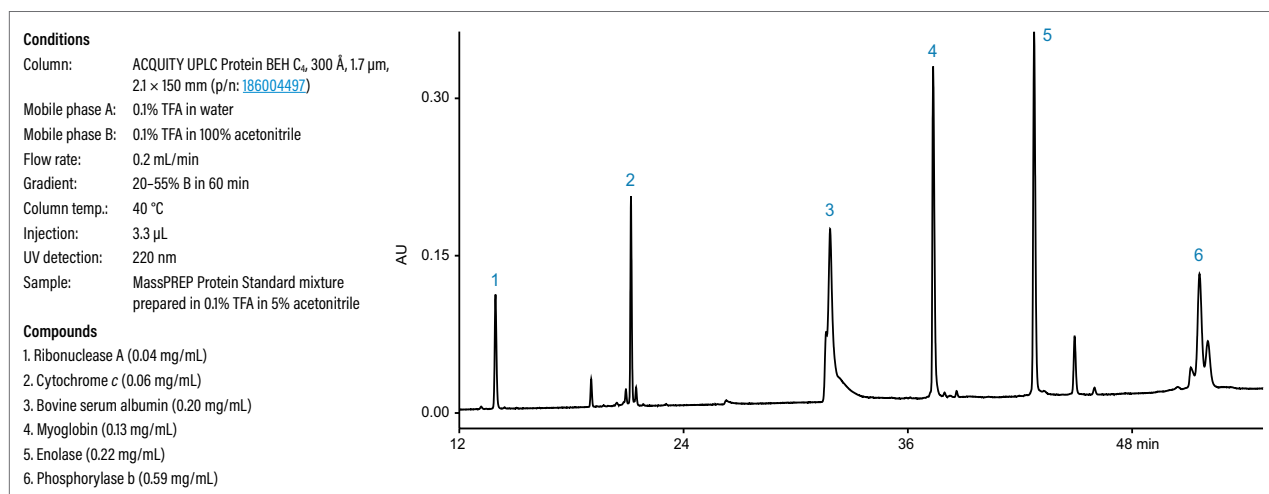
### Benchmarking, Method Development, and Troubleshooting

The MassPREP Protein Standard Mix consists of carefully chosen proteins encompassing a wide range of properties. These mixtures contain proteins that vary in isoelectric points, molecular weights, and hydrophobicities. These characteristics provide the user with an attractive intact protein validation mixture that can be used for a variety of applications. In particular, it is used as a benchmarking standard for ACQUITY UPLC Protein BEH C<sub>4</sub>, 300 Å Columns.



MassPREP Protein Standard Mix		
Protein Sample	Molecular Weight (MW)	Isoelectric Point (pI)
Ribonuclease A, bovine pancreas	13.7 k	9.6
Cytochrome c, horse heart, 96%	12.4 k	10.25
Albumin, bovine serum, 96–99%	66.4 k	5.8
Myoglobin, horse heart >90%	16.7 k	6.53
Enolase from baker's yeast ( <i>S. cerevisiae</i> )	46.7 k	6.53
Phosphorylase b, rabbit muscle	97.0 k	7.18

### MassPREP Protein Standard Mix on an ACQUITY UPLC Protein BEH C<sub>4</sub>, 1.7 µm, 2.1 × 150 mm Column



Use of Waters' carefully formulated and QC tested MassPREP Protein Standard Mix can help chromatographers confirm adequate performance of their reversed-phase column and LC system prior to the analyses of potentially highly valued samples.

### MassPREP Protein Standard Mixture Certificate of Analysis

Waters' Analytical Standards and Reagents come with a Certificate of Analysis that contains relevant, lot-specific information. Many times a chromatogram is attached using data acquired the same way a customer would use the standard.



### Ordering Information

#### Protein Standards

Description	P/N
MassPREP Protein Standard Mix	<a href="#">186004900</a>
Intact mAb Mass Check Standard	<a href="#">186006552</a>



ACQUITY UPLC Protein BEH C<sub>4</sub>, 300 Å Columns and Method Validation Kits

ACQUITY Premier Protein BEH C <sub>4</sub> , 300 Å	Particle Size: 1.7 µm		
	Dimension	P/N	w/Standard
	2.1 × 50 mm	<a href="#">186010326</a>	<a href="#">176005107</a>
	2.1 × 100 mm	<a href="#">186010327</a>	<a href="#">176005108</a>
	2.1 × 150 mm	<a href="#">186010328</a>	<a href="#">176005109</a>

ACQUITY Protein BEH C <sub>4</sub> , 300 Å	Particle Size: 1.7 µm		
	Dimension	P/N	w/Standard
	1.0 × 50 mm	<a href="#">186005589</a>	-
	1.0 × 100 mm	<a href="#">186005590</a>	-
	1.0 × 150 mm	<a href="#">186005591</a>	-
	2.1 × 50 mm	<a href="#">186004495</a>	-
	2.1 × 100 mm	<a href="#">186004496</a>	-
	2.1 × 150 mm	<a href="#">186004497</a>	-

ACQUITY Protein BEH C <sub>4</sub> , 300 Å VanGuard Pre-Column, 3/pk	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186004623</a>

ACQUITY Protein BEH C <sub>4</sub> , 300 Å Method Validation Kit*	Particle Size: 1.7 µm	
	Dimension	P/N
	2.1 × 100 mm	<a href="#">186004899</a>
	2.1 × 150 mm	<a href="#">186006549</a>

XBridge Protein BEH HPLC and UHPLC Columns and Method Validation Kits

XBridge Premier Protein BEH C <sub>4</sub> , 300 Å	Particle Size: 2.5 µm		
	Dimension	P/N	w/Standard
	2.1 × 50 mm	<a href="#">186010329</a>	<a href="#">176005110</a>
	2.1 × 100 mm	<a href="#">186010330</a>	<a href="#">176005111</a>
	2.1 × 150 mm	<a href="#">186010331</a>	<a href="#">176005112</a>
	4.6 × 50 mm	<a href="#">186010332</a>	<a href="#">176005113</a>
	4.6 × 100 mm	<a href="#">186010333</a>	<a href="#">176005114</a>
	4.6 × 150 mm	<a href="#">186010334</a>	<a href="#">176005115</a>

XBridge Protein BEH C <sub>4</sub> , 300 Å VanGuard Pre-column, 3/pk*	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009131</a>
	3.9 × 5 mm	<a href="#">186009140</a>

XBridge Protein BEH C <sub>4</sub> , 300 Å Method Validation Kit*	Particle Size: 2.5 µm	
	Dimension	P/N
	2.1 × 5 mm	<a href="#">186009131</a>
	3 × 150 mm	<a href="#">186009135</a>
	4.6 × 150 mm	<a href="#">186009139</a>

XBridge Protein BEH C <sub>4</sub> , 300 Å	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm		Particle Size: 10 µm	
	Dimension	P/N	Dimension	P/N	Dimension	P/N	Dimension	P/N
	2.1 × 50 mm	<a href="#">186009127</a>	2.1 × 10 mm Guard Cartridge	<a href="#">186007230</a> <sup>1</sup>	10 × 10 mm Guard Cartridge	<a href="#">186007305</a> <sup>3</sup>	10 × 10 mm Guard Cartridge	<a href="#">186007325</a> <sup>3</sup>
	2.1 × 100 mm	<a href="#">186009128</a>	2.1 × 50 mm	<a href="#">186004498</a>	10 × 50 mm	<a href="#">186008272</a>	10 × 50 mm	<a href="#">186008276</a>
	2.1 × 150 mm	<a href="#">186009129</a>	2.1 × 100 mm	<a href="#">186004499</a>	10 × 100 mm	<a href="#">186008273</a>	10 × 100 mm	<a href="#">186008277</a>
	3 × 50 mm	<a href="#">186009132</a>	2.1 × 150 mm	<a href="#">186004500</a>	10 × 150 mm	<a href="#">186008274</a>	10 × 150 mm	<a href="#">186008278</a>
	3 × 100 mm	<a href="#">186009133</a>	2.1 × 250 mm	<a href="#">186004501</a>	10 × 250 mm	<a href="#">186008275</a>	10 × 250 mm	<a href="#">186008279</a>
	3 × 150 mm	<a href="#">186009134</a>	4.6 × 20 mm Guard Cartridge	<a href="#">186007235</a> <sup>2</sup>	19 × 10 mm Guard Cartridge	<a href="#">186007310</a> <sup>4</sup>	19 × 10 mm Guard Cartridge	<a href="#">186007330</a> <sup>4</sup>
	4.6 × 50 mm	<a href="#">186009136</a>	4.6 × 50 mm	<a href="#">186004502</a>	19 × 50 mm	<a href="#">186007311</a>	19 × 50 mm	<a href="#">186007331</a>
	4.6 × 100 mm	<a href="#">186009137</a>	4.6 × 100 mm (MVK)*	<a href="#">186005465</a>	19 × 100 mm	<a href="#">186007312</a>	19 × 100 mm	<a href="#">186007332</a>
	4.6 × 150 mm	<a href="#">186009138</a>	4.6 × 100 mm	<a href="#">186004503</a>	19 × 150 mm	<a href="#">186007313</a>	19 × 150 mm	<a href="#">186007333</a>
			4.6 × 150 mm	<a href="#">186004504</a>	19 × 250 mm	<a href="#">186007314</a>	19 × 250 mm	<a href="#">186007334</a>
			4.6 × 250 mm	<a href="#">186004505</a>	30 × 10 mm Guard Cartridge	<a href="#">186007315</a> <sup>5</sup>	30 × 10 mm Guard Cartridge	<a href="#">186007335</a> <sup>5</sup>
					30 × 50 mm	<a href="#">186007316</a>	30 × 50 mm	<a href="#">186007336</a>
					30 × 75 mm	<a href="#">186007317</a>	30 × 75 mm	<a href="#">186007337</a>
					30 × 100 mm	<a href="#">186007318</a>	30 × 100 mm	<a href="#">186007338</a>
					30 × 150 mm	<a href="#">186007319</a>	30 × 150 mm	<a href="#">186007339</a>
					30 × 250 mm	<a href="#">186007320</a>		

\*Three columns from three different batches of material.

\*\* Requires VanGuard Cartridge Universal Holder, p/n: [186007949](#)

<sup>1</sup>Requires 2.1 × 10 mm Universal Sentry Guard Holder, p/n [WAT097958](#).

<sup>2</sup>Requires 4.6 × 20 mm Universal Sentry Guard Holder, p/n [WAT046910](#).

<sup>3</sup>Requires 10 × 10 mm Cartridge Holder, p/n [289000779](#).

<sup>4</sup>Requires 19 × 10 mm Cartridge Holder, p/n [186000709](#).

<sup>5</sup>Requires 30 × 10 mm Prep Guard Holder, p/n [186006912](#).

## Protein-Pak Hi Res HIC Columns and HIC Protein Standard

Protein-Pak Hi Res HIC (Hydrophobic Interaction Chromatography) columns contain non-porous, polymethacrylate-based particles (2.5 µm) functionalized with a butyl-ligand coating and are well suited for the characterization of proteins and biotherapeutics including monoclonal antibodies (mAb) and antibody drug conjugates (ADC).

While reversed-phase chromatography is a frequently used bioanalytical technique, HIC offers attractive orthogonal separation advantages. In reversed-phase LC, proteins are retained by hydrophobic interaction with alkyl groups (e.g., C<sub>18</sub>) on the packing material. However, the butyl-ligand density on Waters Protein-Pak Hi Res HIC Column is comparatively less resulting in fewer protein-ligand hydrophobic interactions. Consequently, HIC-based elution is possible using gradients of decreasing salt concentration at physiological pH values. Use of denaturing organic solvent eluents (e.g., acetonitrile in 0.1% TFA) thus allowing biotherapeutics (e.g., acid labile, cysteine-linked ADCs) to be analyzed in non-denaturing conditions.

In addition, Waters has developed HIC Protein Standard Test Mix designed for user verification of HPLC/UPLC instrument and Protein-Pak Hi Res HIC Column performance prior to sample analyses. This intact protein validation mix, when used on a regular basis, helps monitor system and column performance and is also highly valuable in method development and/or troubleshooting. The standard contains a carefully chosen set of six proteins that provide good chromatographic representation using a gradient of decreasing salt concentration.

- Ideally suited for hydrophobic-based separations for protein characterization using non-denaturing conditions
- Use of non-porous particles help deliver fast, efficient separations to address high-throughput needs
- Shipped with Waters HIC Protein Test Standard to help test for acceptable instrument and HIC column performance
- Successfully used for the analysis of cysteine-based, antibody drug conjugates

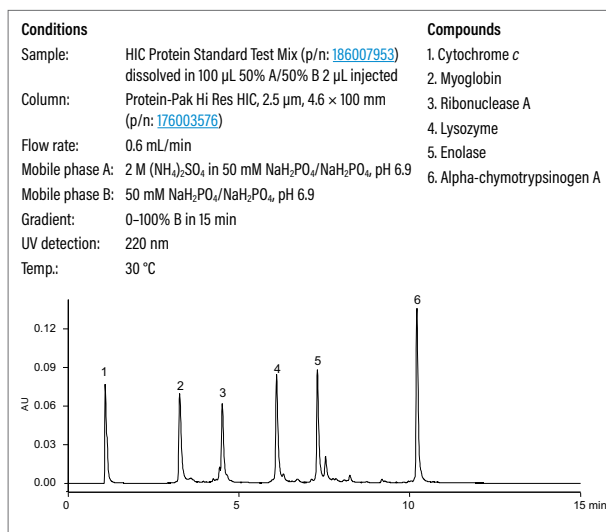
## Ordering Information

### Protein-Pak Hi Res HIC Columns and HIC Protein Standards

Description	Dimension	P/N
Protein-Pak Hi Res HIC, 2.5 µm Column and HIC Protein Standard	4.6 × 35 mm	<a href="#">176003575</a>
Protein-Pak Hi Res HIC, 2.5 µm Column and HIC Protein Standard	4.6 × 100 mm	<a href="#">176003576</a>
HIC Protein Test Standard	—	<a href="#">186007953</a>

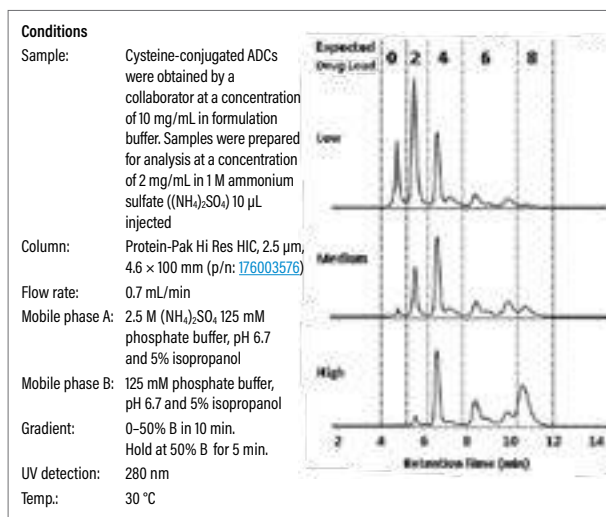


### Protein-Pak Hi Res HIC Column and HIC Protein Standard



Using a gradient of decreasing salt concentration and on-denaturing eluents, Waters Protein-Pak Hi Res HIC Column is well suited for the separation of proteins of various molecular weights and hydrophobic interactions.

### Separation of ADC Samples on Protein-Pak Hi Res HIC Column



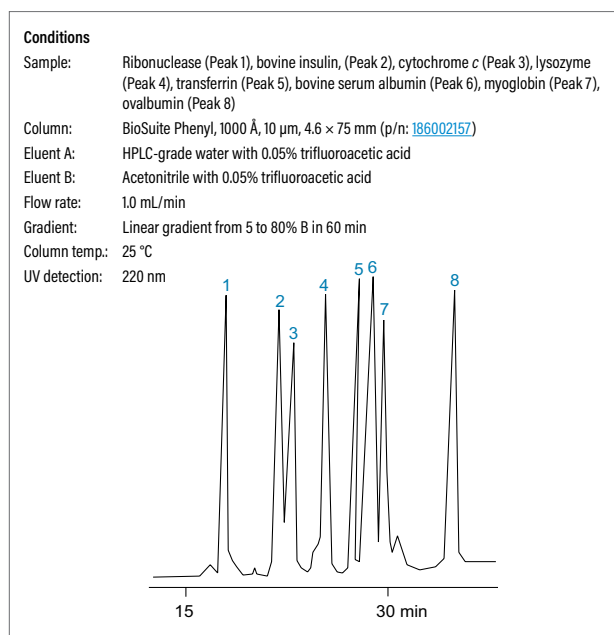
Monitoring drug load variability. Three batches of cysteine-linked ADCs were synthesized, each with a different level of drug conjugation (low, medium, high) and separated using hydrophobic interaction chromatography. The drug load distribution shifted from low-to-high corresponding to an increase in the load of the hydrophobic drug.

## BioSuite Hydrophobic-Interaction Chromatography (HIC) HPLC Columns

The separation of proteins and peptides based upon hydrophobic characteristics is a powerful chromatographic technique. However, some proteins denature at elevated organic solvent concentrations making reversed-phase chromatography (RPC) difficult. BioSuite Phenyl Hydrophobic-interaction Chromatography (HIC) provides a viable separation alternative to RPC. HIC is characterized by the adsorption of compounds to a weakly hydrophobic surface at high salt concentrations, followed by elution with a decreasing salt gradient. HIC combines the non-denaturing characteristics of salt precipitation with the precision of HPLC to yield excellent separation of biologically active material. BioSuite Phenyl, 1000 Å, 10 µm HIC column media consists of a phenyl group bonded to a methacrylic ester-based polymeric resin.

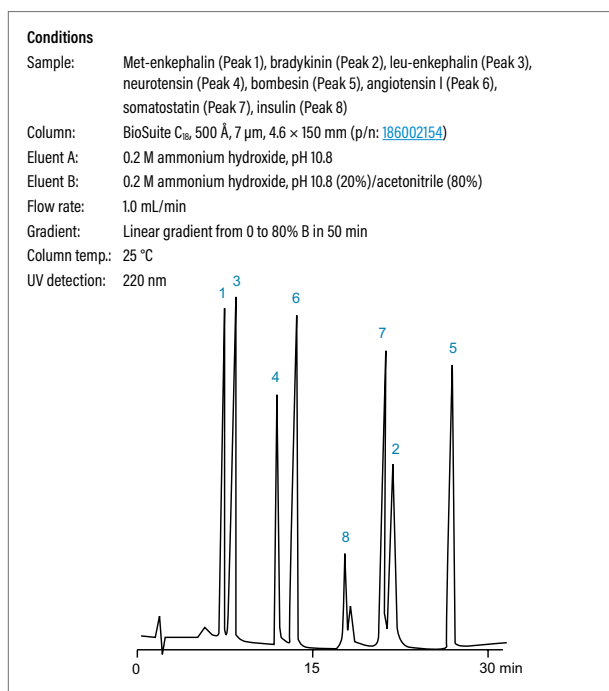
The large 1000 Å pore size accommodates proteins up to 5,000,000 Daltons. A 21.5 × 150 mm column is also available for "lab scale" isolations.

### Hydrophobic Proteins are Well Resolved by Reversed-Phase Chromatography on BioSuite pPhenyl RP Column



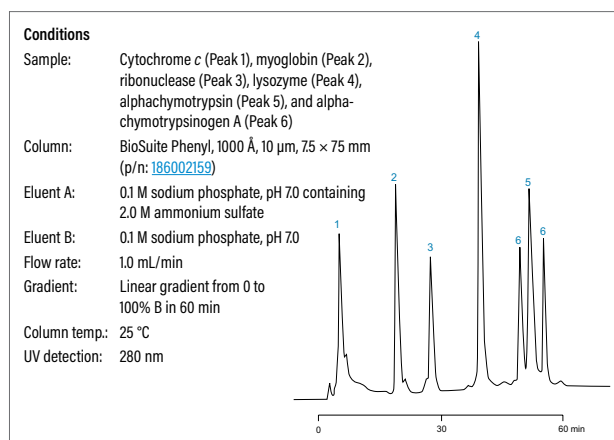
The BioSuite pPhenyl, 1000 Å RPC Columns have a higher ligand density compared to the BioSuite Phenyl, 1000 Å HIC Columns and are not recommended for hydrophobic-interaction separations.

### Reversed-Phase Chromatography at Elevated pH on BioSuite pC<sub>18</sub> RP Column Possible on Polymer Based Material



Use of "pH stable" methacrylate-based particles contained in Waters BioSuite pC<sub>18</sub> Reversed-Phase Columns allow scientists to change separation selectivity by using a pH not possible with 100% silica-based C<sub>18</sub> columns.

### Hydrophobic-Interaction Chromatography on BioSuite Phenyl HIC Column is an Excellent Alternative to Reversed-Phase Methods



The BioSuite Phenyl, 1000 Å HIC Columns have a lower ligand density compared to the BioSuite pPhenyl, 1000 Å RPC Columns and are not recommended for reversed-phase separations.

## Ordering Information

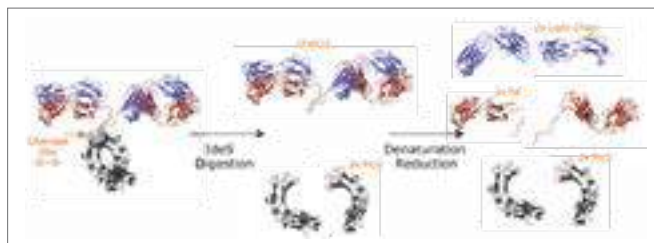
### Hydrophobic-Interaction HPLC and UHPLC Column

Description	Dimension	P/N
Shodex PH-814 Column, 8 µm	8 × 75 mm	WAT035520

## ACQUITY UPLC Glycoprotein BEH Amide, 300 Å Columns

### HILIC for Large Molecules

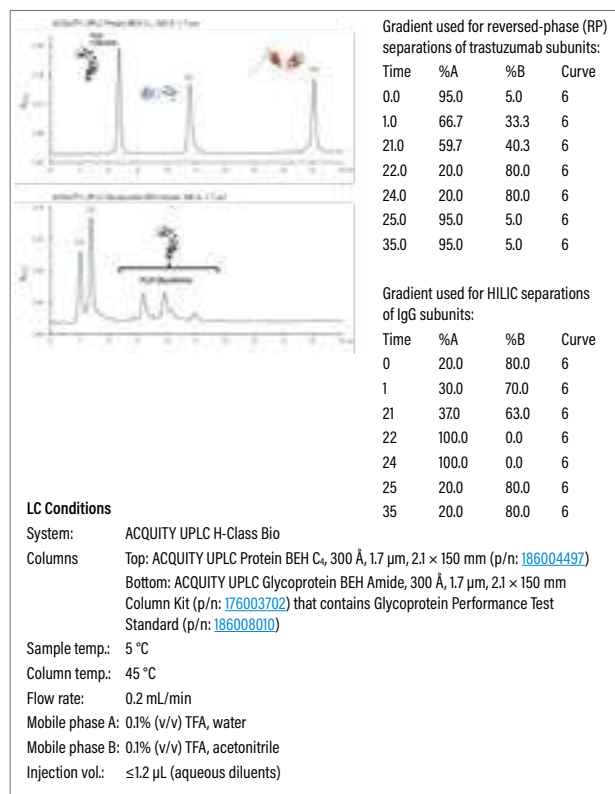
In what is commonly referred to as a middle-up or middle-down analysis, native mAbs can be proteolyzed into subunits to facilitate characterization. One increasingly popular way to produce subunit digests of mAbs is via the IdeS protease (Immunoglobulin Degrading Enzyme of *S. pyogenes*). IdeS cleaves with high fidelity at a conserved sequence motif in the hinge region of humanized mAbs to cleanly produce, upon reduction, three 25 kDa mAb fragments that are amenable to mass spectrometry and useful for localizing different attributes of therapeutic mAbs (below).



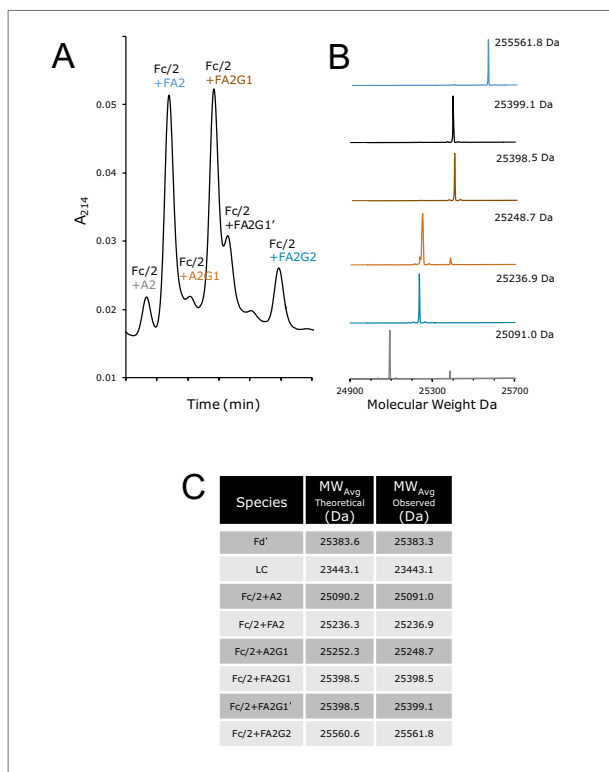
IdeS digestion and reduction scheme for preparing IgG LC, Fd', and Fc/2 subunits.

IdeS digestion combined with reversed-phase (RP) chromatography on Waters ACQUITY UPLC Protein BEH C<sub>4</sub>, 300 Å Column has been successfully used as a simple identity test for mAbs and fusion proteins, because IdeS produced subunits from different drug products will exhibit diagnostic RP retention times. However, it should be kept in mind that many IgG modifications more strongly elicit changes in the hydrophilicity of a mAb along with its capacity for hydrogen bonding.

Compared to the reversed-phase separation of glycoprotein subunits, HILIC-based chromatography on Waters ACQUITY UPLC Glycoprotein BEH Amide, 300 Å, 1.7 µm Columns offers additional information related to a mAb digest as shown in the figures below.



Trastuzumab subunit separations. (A) 1 µg of reduced, IdeS digested separated using an ACQUITY UPLC Protein BEH C<sub>4</sub>, 300 Å, 1.7 µm Column (0.7 µL aqueous injection). (B) 1 µg of reduced, IdeS digested separated using an ACQUITY UPLC Glycoprotein BEH Amide, 300 Å, 1.7 µm Column (0.7 µL aqueous injection).

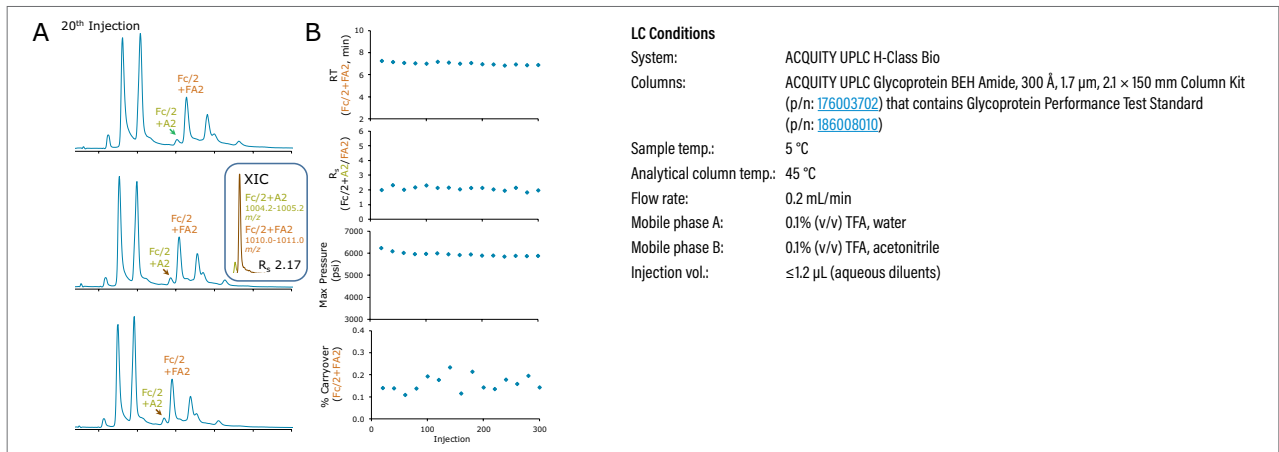


Profiling trastuzumab Fc/2 subunit glycoforms. (A) Retention window corresponding to the glycoform separation space. (B) Deconvoluted ESI mass spectra for the HILIC chromatographic peaks. Chromatographic peaks are labeled with the same color as their corresponding mass spectra. (C) Molecular weights for the observed trastuzumab subunits.

## Lifetime Testing of ACQUITY UPLC Glycoprotein BEH Amide, 300 Å, 1.7 µm Columns for Profiling IgG Subunit Glycoforms

The ability of Waters BEH Amide, 300 Å, 1.7 µm Column to robustly deliver separations over time is shown below by data collected from a series 300 sequential injections of a reduced, IdeS digested trastuzumab sample.

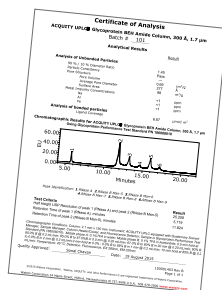
This was a potentially challenging use scenario given that the reduced, IdeS digested mAb sample contains both high concentrations of guanidine denaturant and TCEP reducing agent. Total ion chromatograms corresponding to the 20th, 180th, and 300th injections of this experiment are displayed. In these analyses, particular attention was paid to the half-height resolution of the Fc/2+A2 and Fc/2+FA2 species, which was assessed every 20<sup>th</sup> separation using extracted ion chromatograms (XICs). In this testing, several additional chromatographic parameters were also monitored, including the retention time of the Fc/2+FA2 species, the maximum system pressure observed during the chromatographic run, and the percent (%) carryover of the most abundant glycoform, the Fc/2+FA2 species. Plots of these parameters underscore the consistency of the subunit separation across the lifetime of the column.



Lifetime testing of an ACQUITY UPLC Glycoprotein BEH Amide, 300 Å, 1.7 µm, 2.1 × 150 mm Column for sequential injections of reduced, IdeS digested trastuzumab. (A) Total ion chromatograms (TICs) from the 20<sup>th</sup>, 180<sup>th</sup>, and 300<sup>th</sup> injections. Example extracted ion chromatograms (XICs) for Fc/2+A2 and Fc/2+FA2 that were used to measure resolution. (B) Chromatographic parameters observed across the 300 injection lifetime test. Each panel shows results for each 20<sup>th</sup> injection, including retention time (RT) of the FA2 glycoform,  $R_s$  between A2 and FA2 glycoforms, maximum pressure across the run, and % carryover as measured by a repeat gradient and XICs.

### ACQUITY UPLC Glycoprotein BEH Amide, 300 Å, 1.7 µm Column Consistency

To help ensure batch-to-batch and column-to-column consistency in validated methods, each batch of material selected for use in the ACQUITY UPLC Glycoprotein BEH Amide, 300 Å, 1.7 µm Column offering is specifically QC tested with Waters Glycoprotein Performance Test Standard (p/n [186008010](#)). This same standard is shipped (at no additional cost) with each column to help benchmark method development and/or troubleshoot use of this column and instrumentation.



### ACQUITY Premier Glycoprotein BEH Amide Columns

Utilizing the MaxPeak High Performance Surfaces (HPS) Technology, the ACQUITY Premier Glycoprotein BEH Amide columns reduce sample loss caused by non-specific adsorption onto metal surfaces, deliver the representative performance known of the BEH Amide chemistry from the first injection.

### Ordering Information

#### ACQUITY UPLC Glycoprotein BEH Amide, 300 Å Columns and Standards

BEH Amide, 300 Å	Particle Size: 1.7 µm		
	Dimension	Qty.	P/N
	2.1 × 5 mm	3/pk with standard	<a href="#">176003699</a>
	2.1 × 50 mm	1/pk with standard	<a href="#">176003700</a>
	2.1 × 100 mm	1/pk with standard	<a href="#">176003701</a>
	2.1 × 150 mm	1/pk with standard	<a href="#">176003702</a>
	2.1 × 100 (MVK)	3/pk with standard	<a href="#">176003703</a>
ACQUITY Premier Glycoprotein BEH Amide, 300 Å	2.1 × 50 mm	—	176009547
	2.1 × 100 mm	—	176009548
	2.1 × 150 mm	—	176009549
ACQUITY Premier Glycoprotein BEH Amide, 300 Å	2.1 × 50 mm	1/pk with standard	<a href="#">176004866</a>
	2.1 × 100 mm	1/pk with standard	<a href="#">176004867</a>
	2.1 × 150 mm	1/pk with standard	<a href="#">176004868</a>
Glycoprotein Performance Test Standard			<a href="#">186008010</a>

## PROTEIN SEC COLUMNS

### Size-Exclusion Chromatography

Size-exclusion chromatography (SEC), also known as gel filtration, separates proteins based on their sizes (hydrodynamic radii versus absolute molecular weight) in solution with larger sized species eluting before smaller proteins. The primary driving mechanism for this isocratic based technique is based on the pore size and volume of the SEC particles used in the packed column. As the molecular weight of the proteins of interest increases, SEC columns containing comparatively larger pore size particles are selected.



Why choose BEH-based SEC column technology?

- Less undesired secondary interactions with BEH-Diol and BEH-PEO SEC particles for increased confidence in results and data reproducibility
- Unlike silica-based particles, BEH based particles have enhanced > pH 8.0 stability for method flexibility
- Outstanding column lifetime that includes SEC columns containing 1.7  $\mu\text{m}$ , 2.5  $\mu\text{m}$ , or 3.5  $\mu\text{m}$  particles
- Scalable chemistries for method transfer from drug discovery to manufactured product testing
- Pore size options include 125 Å, 200 Å, 250 Å, and 450 Å depending on application needs
- Comprehensive series BEH-based SEC Care and Use manuals assist users in developing reliable methods
- Synthesized batches are QC tested with relevant samples (e.g., mAb size Variant Std) to help ensure consistency
- Synergistic combination of MaxPeak™ Premier hardware with BEH-PEO particles for use on Platform Methods

### BEH Technology for SEC-based Separations

In 1999, Waters launched the family of XTerra™ HPLC columns featuring patented, first-generation hybrid particle technology (HPT). HPT enabled XTerra Columns to become one of the most successful column products in the history of Waters. In HPT, the best properties of inorganic (silica) and organic (polymeric) packings are combined to produce a material that has superior mechanical strength, efficiency, high-pH stability, and peak shape for basic compounds.

The first-generation methyl-hybrid particles of XTerra Columns did not possess the mechanical strength or efficiency necessary to fully realize the potential speed, sensitivity, and resolution capabilities of UPLC Technology. Therefore, a new pressure-tolerant particle needed to be created. This second-generation hybrid material utilizes an ethylene-bridged hybrid (BEH) structure. Compared to the

first-generation methyl-hybrid particle of XTerra Columns, the BEH particle of ACQUITY™ UPLC BEH Columns exhibits improved efficiency, strength and pH range. BEH Technology is a key enabler of the speed, sensitivity, and resolution of both small and large molecule UPLC separations. Waters SEC columns containing diol-coated, BEH particles were developed to primarily minimize non-desired secondary ionic interaction between the biomolecules and separation media. In 2022, was introduced PEO-coated, BEH particles packed in Waters MaxPeak Premier technology to help address both non-desired secondary ionic and hydrophobic interactions.

## SEC AGGREGATE ANALYSIS

Size-exclusion chromatography (SEC) is the analytical “gold standard” for the separation and accurate quantitation of aggregates contained in biotherapeutic peptides and proteins (e.g., mAbs).

The principle of SEC chromatography involves the ability of an appropriately selected column to separate molecules based on differences in the molecules’ “size in solution” that loosely correlates to their molecular weight.

A partial list of customer-desired benefits using Waters BEH-based SEC columns include:

- Available guards and columns containing 125 Å, 200 Å, 250 Å, or 450 Å pores
- Purposely designed columns containing different particle sizes for UPLC, UHPLC, or HPLC-based applications
- Less ionic interactions using stable diol-coating for higher confidence in obtained data.
- Less non-desired ionic interactions using MaxPeak Premier HPS Guards and Columns
- State-of-the-art column packing technologies for outstanding column life and pH stability from 2–10 for enhanced method development flexibility for challenging samples
- Quality control tested with relevant proteins and peptides to help ensure consistent batch-to-batch and column-to-column performance

The following four factors provide guidance for selecting an appropriate SEC column that matches your application and laboratory needs.

### 1) Molecular weight vs pore size selection

Column pore size and sample molecular weight (MW) go in-hand when selecting an SEC column. The pore size of the column media, generally expressed in angstroms (Å), determines both how quickly a sample will travel through the column and how well the sample will be retained in relation to the sample’s molecular weight. The inclusion of “in relation to your samples molecular weight” is an important distinction to make here. Without it, it might be assumed that smaller pore size equals better results, however, that is not the case. For example, if the pore size is too small, based on the sample’s MW, larger molecules will not move as freely, reducing retention and column efficiency.

Therefore, the MW of the substance being tested would influence, if not determine, what column pore size to choose. A sample with a molecular weight between 1000–8000 Da would be best suited for a 125 Å column. This selection will provide better retention characteristics in separating small compounds compared to a similar column with a pore size of 200 or 450 Å. If the sample’s molecular weight is between 10,000–450,000 Da, then a column pore size of 200 or 450 Å should be chosen. Any sample with a MW over 450,000 Da should be analyzed with a 450 Å column.

### 2) LC system dispersion

LC system dispersion can also significantly affect SEC column choice. In SEC, analytes elute within a single column volume during the isocratic separation. This makes it important to consider the total LC system volume, including the injector, tubing, and detector volumes of the obtained separation. In general, the lower the total LC system dispersion volume relative to the column volume, the narrower the peaks.

Examples of system dispersion specifications for column recommendations:

LC system dispersions <20 µL (UPLC) = 1.7 µm column

LC system dispersions >20 – <35 µL (UHPLC) = 2.5 µm column

LC system dispersions >35 µL (HPLC) = 2.5 or 3.5 µm column

### 3) Resolving multiple species that are less than two-fold different in molecular weight

The ability to adequately resolve compounds that differ by two-fold in molecular weight (e.g., 300 K, mAb IgG dimer from 150 K monomer) can be relatively easy to accomplish when using an appropriate SEC column. However, a far more challenging scenario involves the species separation that differs by less than 2x molecular weight (e.g., 150 K, mAb IgG monomer from 100 K "Clip"). In addition, the ability to obtain reliable quantitation is challenged when the minor components exist at <0.5% compared to the major peak of interest.

### 4) Speed of separation

The final factor to consider when selecting an appropriate SEC column is the desired speed for the separation. Generally, there is a trade-off between resolution and speed when implementing size-exclusion chromatography. However, a balance can be achieved by selecting the appropriate column. When an SEC column containing comparatively smaller particles (e.g., 1.7  $\mu\text{m}$ ) is used on an appropriate LC system, quicker results are obtained which differs from separations performed on larger particle-sized (2.5 or 3.5  $\mu\text{m}$ ) SEC columns. For example, an SEC 1.7  $\mu\text{m}$ , 4.6  $\times$  300 mm column can provide excellent resolution in under nine minutes. Meanwhile a separation on an SEC 2.5  $\mu\text{m}$ , 7.8  $\times$  300 mm column will generally take approximately 12 minutes; and, on an SEC 3.5  $\mu\text{m}$ , 7.8  $\times$  300 mm column it will take 18 minutes.

An appropriate SEC column selection, that is based on the separation needs and the LC system being used, can generate reproducible separations and accurate component quantitation for various protein and peptide samples. To get the best resolution, reproducibility, and speed, keep in mind the four factors outlined above and how they relate to your specific samples. This will help ensure you select the best possible column for your application.

#### Four-Step Guide for Successful SEC Column Selection

What is the molecular weight of what you are trying to separate?			
NEED:	MW 1–8K Da	MW 10–450K / 650K Da	MW 100–1500K Da
Recommended column specifications	125 Å	200 A / 250 A	450 Å

What type of LC system dispersion* are you using?			
NEED:	<20 $\mu\text{L}$ (UPLC)	>20–<35 $\mu\text{L}$ (UHPLC)	>35 $\mu\text{L}$ (HPLC)
Recommended column specifications	1.7 $\mu\text{m}$ or 2.5 $\mu\text{m}$	2.5 $\mu\text{m}$	2.5 $\mu\text{m}$ or 3.5 $\mu\text{m}$

Do you need to resolve something that is less than 2-fold difference in MW?*			
NEED:	2.5 $\mu\text{m}$	2.5 $\mu\text{m}$	2.5 $\mu\text{m}$ or 3.5 $\mu\text{m}$
REC. Recommended column specifications SPEC:	4.6 $\times$ 300 mm or 7.8 $\times$ 300 mm	7.8 $\times$ 300 mm	7.8 $\times$ 300 mm

Do you need maximum speed on a MW greater than two-fold?			
NEED:	<9 min	<12 min	<18 min
REC. Recommended column specifications SPEC:	1.7 $\mu\text{m}$ 4.6 $\times$ 150 mm	2.5 $\mu\text{m}$ 4.6 $\times$ 150 mm	2.5 $\mu\text{m}$ 7.8 $\times$ 150 mm

\*For guidance on measuring system dispersion, download the SEC Optimization Guide (720006067EN) on [waters.com](http://waters.com).

\*\*To understand the "why" behind these recommendations, read the Application Note (720006336EN) on [waters.com](http://waters.com).

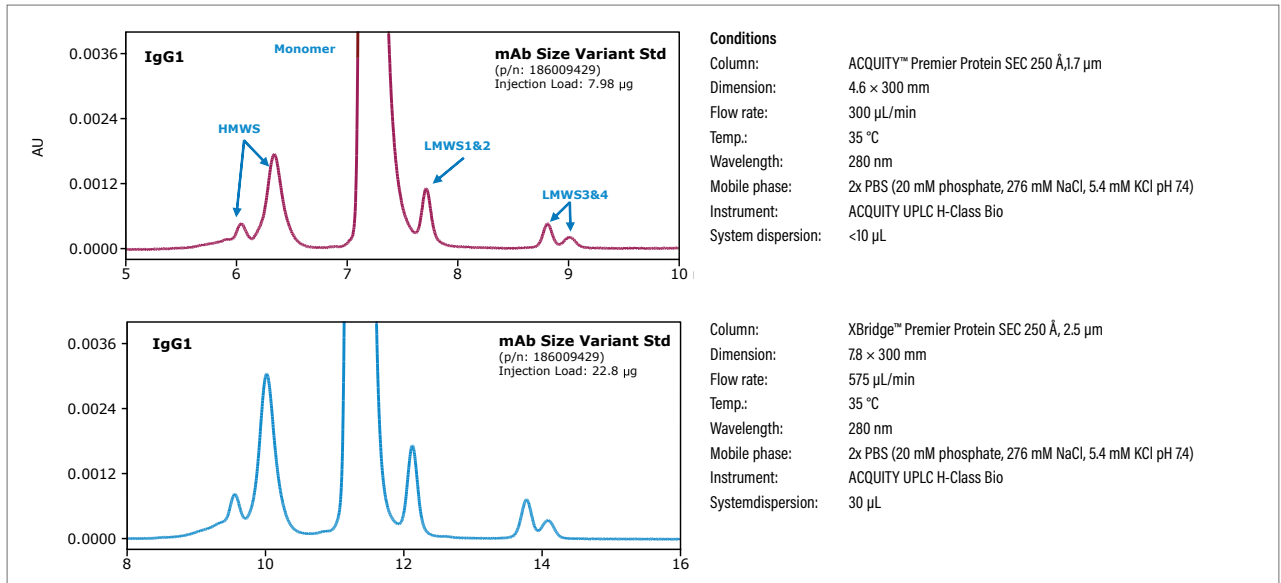


## ACQUITY AND XBRIDGE PREMIER PROTEIN SEC OFFERINGS FOR SEC PLATFORM METHOD APPLICATIONS

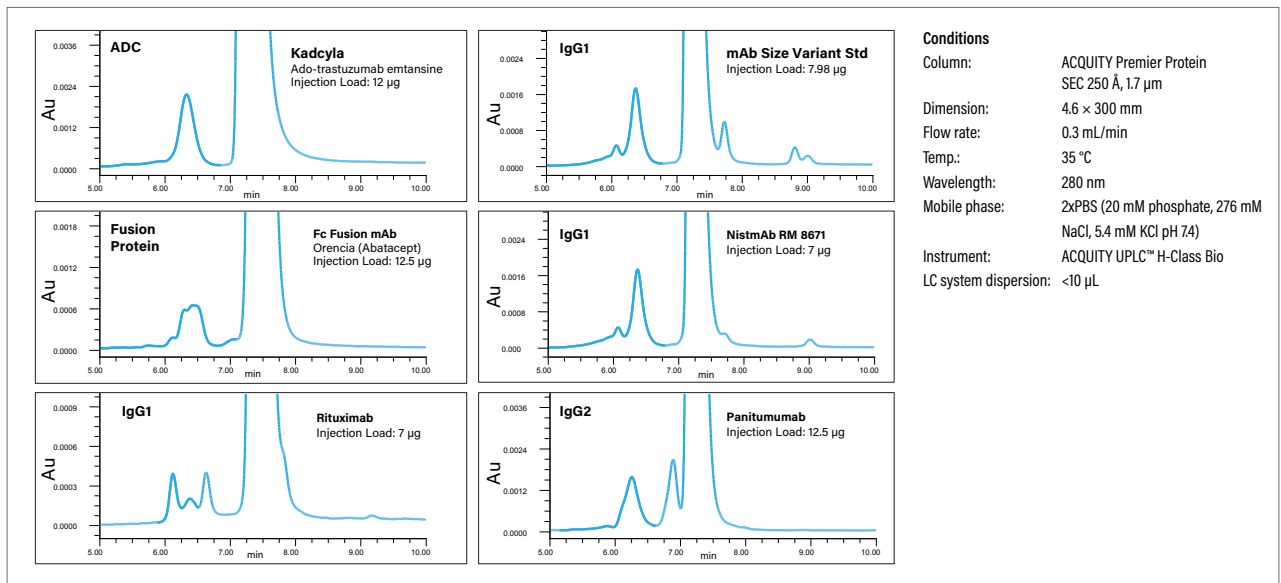
ACQUITY™ and XBridge™ PREMIER Protein SEC 250 Å columns help scientists obtain reliable protein separations as has been made possible through the use of Waters MaxPeak High Performance Surfaces and novel BEH-PEO SEC particle technologies. Advancements in SEC column hardware and particle technology work to minimize secondary ionic or hydrophobic interactions between proteins and the column to allow chromatographers to use a “generic” or “platform-type” method.

Waters XBridge PREMIER Protein SEC 250 Å 2.5 µm guard column is also available, which can provide effective trapping of insoluble particulates and excipients sometimes present in samples and eluents, thereby extending the analytical column’s lifetime.

### Scalable SEC Column Offerings using 2x PBS Mobile Phase

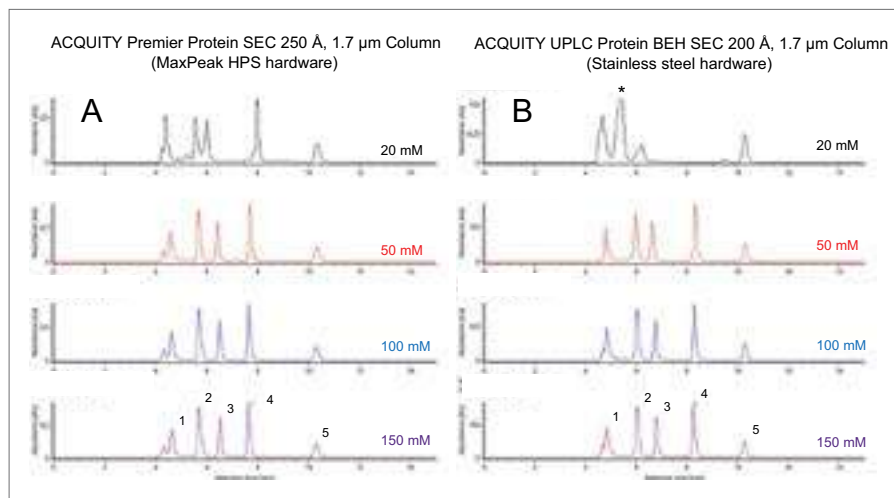


### Classes of therapeutic proteins separated on ACQUITY™ Premier Protein SEC 250 Å, 1.7 µm Column



## MS Compatibility

Native SEC separations can now be readily coupled to MS to facilitate deep characterization of protein therapeutics and the study of non-covalent protein complexes. The inertness of the ACQUITY PREMIER Protein SEC columns improves upon the chromatography that has to date been obtainable with ammonium acetate mobile phases. This can be seen in the form of improved sample recoveries, the preservation of non-covalent protein complexes, and lower limits of detection. Figure W provides a comparison study wherein it was found that a PREMIER Protein SEC 250 Å column was able to yield protein recoveries in ammonium acetate mobile phase at a level significantly lower than that of an alternative state-of-the-art column technology.



*Ammonium Acetate Native SEC Chromatography with 4.6 × 150 mm, 1.7 μm Columns. A sample of BEH200 Protein Standard Mix was used for analysis with an (A) ACQUITY Premier Protein SEC 250 Å or (B) ACQUITY UPLC BEH SEC 200 Å Column. Mobile phases with varying ammonium acetate concentrations were evaluated. Peak 1: Thyroglobulin (pre-peak is thyroglobulin dimer); Peak 2: IgG; Peak 3: Bovine Serum Albumin; Peak 4: Myoglobin; Peak 5: Uracil. The asterisk (\*) denotes a co-elution of IgG and BSA.*

## Ordering Information

### MaxPeak Premier SEC 1.7 and 2.5 μm

Pore Size	MW Range	Particle Size	P/N	P/N	P/N	P/N	P/N	P/N	P/N	P/N	P/N
			4.6 mm ID × Column Length								
			30 mm Guard	150 mm No Standard	300 mm No Standard	150 mm w/Standard	300 mm w/Standard	150 mm w/Guard	300 mm w/Guard	150 mm Guard w/Std	300 mm Guard w/Std
250 Å	10 K-650 K	1.7 μm	—	<a href="#">186009963</a>	<a href="#">186009964</a>	<a href="#">176005071</a>	<a href="#">176005072</a>	<a href="#">176004783</a>	<a href="#">176004784</a>	<a href="#">176004794</a>	<a href="#">176004795</a>
250 Å	10 K-650 K	2.5 μm	<a href="#">186009969</a>	<a href="#">186009959<sup>5</sup></a>	<a href="#">186009960</a>	<a href="#">176005067</a>	<a href="#">176005068</a>	<a href="#">176004779</a>	<a href="#">176004780</a>	<a href="#">176004790</a>	<a href="#">176004791</a>
			7.8 mm ID × Column Length								
			30 mm Guard	150 mm No Standard	300 mm No Standard	150 mm w/Standard	300 mm w/Standard	150 mm Guard w/Std	300 mm Guard w/Std	150 mm Guard w/Std	300 mm Guard w/Std
250 Å	10 K-650 K	1.7 μm	—	—	—	—	—	—	—	—	—
250 Å	10 K-650 K	2.5 μm	—	<a href="#">186009961</a>	<a href="#">186009962</a>	<a href="#">176005069</a>	<a href="#">176005070</a>	<a href="#">176004781</a>	<a href="#">176004782</a>	<a href="#">176004792</a>	<a href="#">176004793</a>
mAb Size Variant Standard, 160 g *											
<a href="#">XBridge™ Premier Protein SEC 250 Å, 2.5 μm, 4.6 × 150 mm Column MVK</a>											
<a href="#">XBridge™ Premier Protein SEC 250 Å, 2.5 μm, 4.6 × 300 mm Column MVK</a>											
<a href="#">XBridge™ Premier Protein SEC 250 Å, 2.5 μm, 7.8 × 150 mm Column MVK</a>											
<a href="#">XBridge™ Premier Protein SEC 250 Å, 2.5 μm, 7.8 × 300 mm Column MVK</a>											
<a href="#">ACQUITY™ Premier Protein SEC 250 Å, 1.7 μm, 4.6 × 150 mm Column MVK</a>											
<a href="#">ACQUITY™ Premier Protein SEC 250 Å, 1.7 μm, 4.6 × 300 mm Column MVK</a>											
<a href="#">Straight Connection Tubing and End-fittings</a>											
<a href="#">U-Bend Connection Tubing and End-fittings</a>											

\*\* Method Validation Kit (MVK) contains three columns from three different batches.

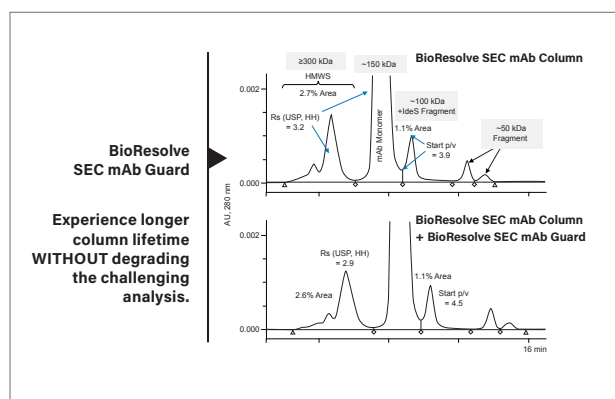
## BIORESOLVE SEC MAB OFFERINGS FOR mAb AGGREGATE, MONOMER, AND FRAGMENT ANALYSES

Waters™ BioResolve™ SEC mAb Columns and BioResolve SEC mAb Guards are specifically manufactured and quality control tested to deliver reproducible, accurate quantitation of monoclonal antibodies (mAbs), associated high molecular weight aggregates ( $\geq 300,000$  Da) and lower molecular weight fragments ( $\leq 100,000$  Da). A range of available column sizes provides flexibility for performance optimization on a variety of chromatographic platforms, ranging from higher dispersion HPLC to lower dispersion UPLC™ systems. A guard column is also available which can provide effective trapping of insoluble particulates and excipients sometimes present in samples and/or eluents, thereby extending analytical column lifetime.

The BioResolve SEC mAb Columns and Guards:

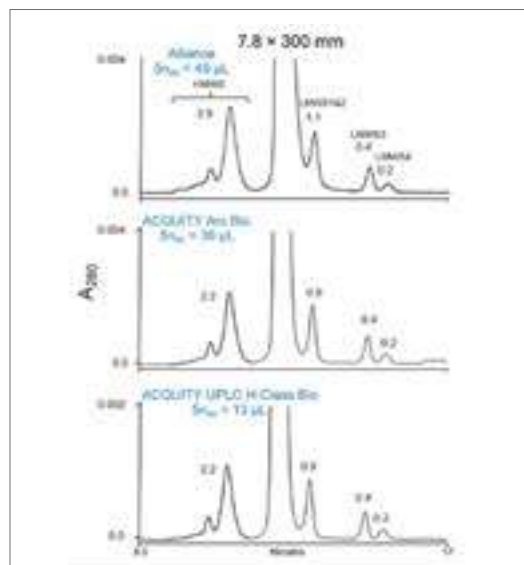
- Provide out-of-the-box performance
- Tested with Waters NIST-based, mAb Size Variant to help ensure consistent column-to-column and batch-to-batch performance, regardless of LC platform

Use of BioResolve SEC mAb Guard can help extend SEC column life without compromising needed component resolution



Separation of Waters mAb Size Variant Standard on BioResolve SEC mAb,

More Than Just a Column



Separation of Waters mAb Size Variant Standard on BioResolve SEC mAb, 7.8 x 300 mm and 7.8 x 150 mm Columns on LC systems with 49  $\mu\text{L}$  (Alliance), 30  $\mu\text{L}$  (ACQUITY Arc), and 10 or 13  $\mu\text{L}$  (ACQUITY UPLC H-Class) system dispersions. Percent areas are reported for each chromatogram. Conditions provided in the experimental section.

## Ordering Information

BioResolve SEC mAb Columns, Guards, and Method Validation Kits

Pore Size	MW Range	Particle Size	4.6 mm ID x Column Length						
			30 mm Guard	150 mm No Standard	300 mm No Standard	150 mm w/Standard	300 mm w/Standard	150 mm Guard w/Std	300 mm Guard w/Standard
200 Å	10 K-450 K	2.5 $\mu\text{m}$	<a href="#">186009443</a>	<a href="#">186009435</a>	<a href="#">186009437</a>	<a href="#">176004592</a>	<a href="#">176004593</a>	<a href="#">176004596</a>	<a href="#">176004597</a>
Pore Size	MW Range	Particle Size	7.8 mm ID x Column Length						
			30 mm Guard	150 mm No Standard	300 mm No Standard	150 mm w/Standard	300 mm w/Standard	150 mm Guard w/Std	300 mm Guard w/Std
200 Å	10 K-450 K	2.5 $\mu\text{m}$	—	<a href="#">186009439</a>	<a href="#">186009441</a>	<a href="#">176004594</a>	<a href="#">176004595</a>	<a href="#">176004598</a>	<a href="#">176004599</a>
BioResolve SEC mAb Method Validation Kit: 200 Å, 2.5 $\mu\text{m}$ , 4.6 x 150 mm Columns**									<a href="#">176004639</a>
BioResolve SEC mAb Method Validation Kit: 200 Å, 2.5 $\mu\text{m}$ , 4.6 x 300 mm Columns**									<a href="#">176004640</a>
BioResolve SEC mAb Method Validation Kit: 200 Å, 2.5 $\mu\text{m}$ , 7.8 x 150 mm Columns**									<a href="#">176004641</a>
BioResolve SEC mAb Method Validation Kit: 200 Å, 2.5 $\mu\text{m}$ , 7.8 x 300 mm Columns**									<a href="#">176004642</a>
mAb Size Variant Standard, 160 g*									<a href="#">186009429</a>
Straight Connection Tubing and End-fittings									<a href="#">WAT022681</a>
U-Bend Connection Tubing and End-fittings									<a href="#">WAT084080</a>

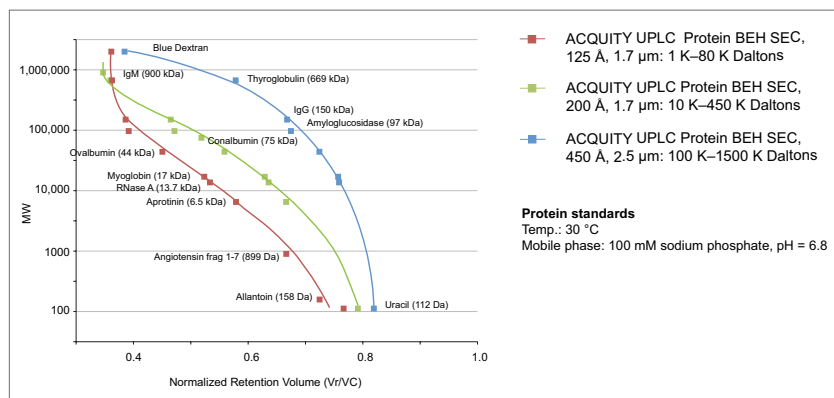
SEC Protein Standards are matched to the pore size of the column.

\*\* Method Validation Kit (MVK) contains three columns from three different batches.

## ACQUITY PROTEIN SEC OFFERINGS FOR HIGH THROUGHPUT SEC APPLICATIONS

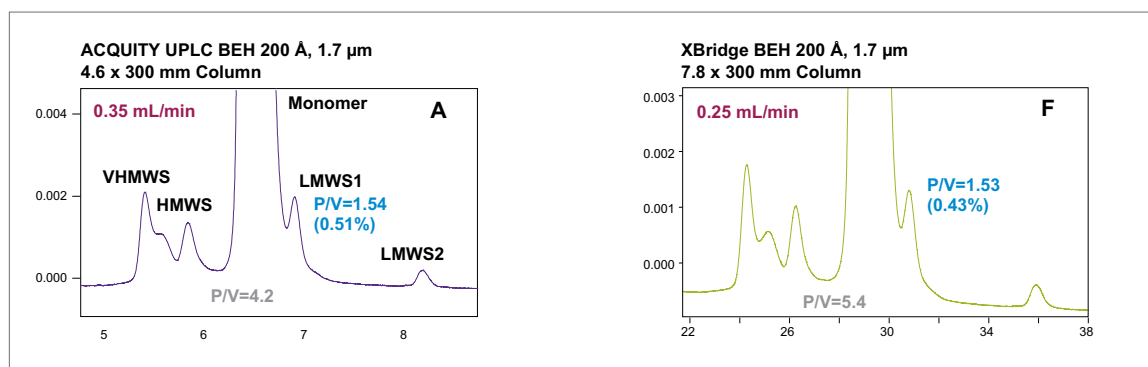
Waters™ ACQUITY™ UPLC™ Protein BEH SEC Guard, Column, and/or Standard Mix that are integral parts of Waters' ACQUITY UPLC SEC System solution. The ACQUITY UPLC Protein BEH SEC 125 Å offering is best suited for the analysis of peptides and proteins in the molecular weight range from 1000–80,000 Daltons that include insulin and its aggregates. The ACQUITY UPLC Protein BEH SEC 200 Å Column was designed to characterize proteins ranging in molecular weight range from 10,000–450,000 Daltons that include monoclonal IgG monomers from aggregates, while our ACQUITY UPLC Protein BEH SEC 450 Å is best suited for the analyses of proteins and conjugates that range from 100,000–1.5 million Daltons

### Calibration Curves on ACQUITY UPLC Protein BEH SEC, 125 Å, 200 Å, and 450 Å Columns



All of these SEC chemistries are based on Waters' Ethylene Bridged Hybrid (BEH)-based particle technology and diol-bonded surface that provide a stable chemistry with minimal non-desired secondary interactions for proteins and peptides.

### When Speed is Critical for SEC - Harnessing the power of UPLC



ACQUITY UPLC Technology allows scientists the ability to exceed what is obtainable using UHPLC or traditional HPLC separations by improving data quality while increasing sample throughput and productivity.

## Ordering Information

### ACQUITY UPLC Protein BEH SEC Columns, 1.7 and 2.5 µm

Pore Size	MW Range	Particle Size	4.6 mm ID × Column Length						2.1 mm ID × CL	
			30 mm Guard*	50 mm No Standard	150 mm No Standard	300 mm No Standard	150 mm w/Standard	300 mm w/Standard	50 mm No Standard	
125 Å	1 K–80 K	1.7 µm	<a href="#">186006504</a>	—	<a href="#">186006505</a>	<a href="#">186006506</a>	<a href="#">176003906</a>	<a href="#">176003907</a>	—	
200 Å	10 K–450 K	1.7 µm	<a href="#">186005793</a>	<a href="#">186009082</a>	<a href="#">186005225</a>	<a href="#">186005226</a>	<a href="#">176003904</a>	<a href="#">176003905</a>	<a href="#">186008471</a>	
450 Å	100 K–1500 k	2.5 µm	<a href="#">186006850</a>	—	<a href="#">186006851</a>	<a href="#">186006852</a>	<a href="#">176002996</a>	<a href="#">176002997</a>	—	

Straight Connection Tubing and End-fittings

[WAT022681](#)

U-Bend Connection Tubing and End-fittings

[WAT084080](#)

SEC Protein Standards are matched to the pore size of the column.

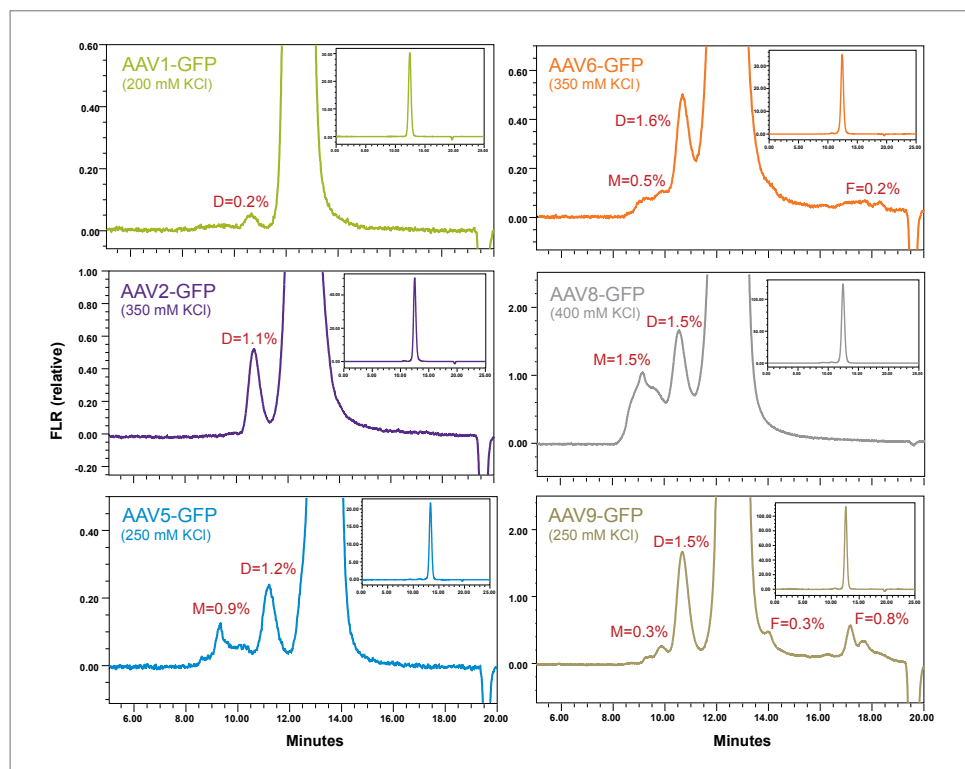
\*Size-exclusion chromatography may require modifications to an existing ACQUITY UPLC System. Please reference "Size-Exclusion and Ion-Exchange Chromatography of Proteins using the ACQUITY UPLC System" (p/n: 715002147) or "Size Exclusion and Ion-Exchange Chromatography of Proteins using the ACQUITY UPLC H-Class System" (p/n: 715002909) for specific recommendations.

\*To connect two UPLC SEC Columns together in series, we recommend using a Waters Sample Loop (p/n: [430001516](#)).

## XBRIDGE BEH SEC OFFERINGS

Waters™ XBridge™ Protein BEH SEC, 125 Å, 200 Å, and 450 Å, 2.5 and 3.5 µm Columns were developed to complement the existing line of UPLC™-based SEC offerings for use where traditional HPLC-based instrumentation and methods are employed for peptide or protein size-exclusion chromatography (SEC). These HPLC/UHPLC-based, SEC chemistries are based on the same Waters Ethylene Bridged Hybrid (BEH)-based particle technology and diol-bonded surface coating as used in our successful line of UPLC-based SEC columns. This process offers chromatographers the option and ability to easily transfer methods based on lab instrumentation and component resolution or sample throughput needs.

### Adeno-Associated Virus (AAV) Analyses



*XBridge BEH SEC 450 Å, 3.5 µm Columns effectively separate and quantitate AAV monomers from their HMW D11/3/2021 dimers, lower valency multimers, and LMW fragments.*

## Ordering Information

### XBridge Protein BEH SEC Columns, 2.5 µm, UHPLC

Pore Size	MW Range	Particle Size	4.6 mm ID × Column Length					
			30 mm Guard	150 mm No Standard	300 mm No Standard	30 mm Guard w/ Std	150 mm w/Standard	300 mm w/Standard
125 Å	1 K-80 K	2.5 µm	<a href="#">186009170</a>	<a href="#">186009171</a>	<a href="#">186009172</a>	<a href="#">176004331</a>	<a href="#">176004332</a>	<a href="#">176004333</a>
200 Å	10 K-450 K	2.5 µm	<a href="#">186009174</a>	<a href="#">186009175</a>	<a href="#">186009176</a>	<a href="#">176004334</a>	<a href="#">176004335</a>	<a href="#">176004336</a>
450 Å	100 K-1500 k	2.5 µm	<a href="#">186006850</a>	<a href="#">186009179</a>	<a href="#">186009180</a>	176002995	<a href="#">176002996</a>	<a href="#">176002997</a>

Pore Size	MW Range	Particle Size	7.8 mm ID × Column Length					
			30 mm Guard No Standard	150 mm No Standard	300 mm No Standard	30 mm Guard w/Std	150 mm w/Standard	300 mm w/Standard
125 Å	1 K-80 K	2.5 µm	<a href="#">186009158</a>	<a href="#">186009159</a>	<a href="#">186009160</a>	<a href="#">176004322</a>	<a href="#">176004323</a>	<a href="#">176004324</a>
200 Å	10 K-450 K	2.5 µm	<a href="#">186009162</a>	<a href="#">186009163</a>	<a href="#">186009164</a>	<a href="#">176004325</a>	<a href="#">176004326</a>	<a href="#">176004327</a>

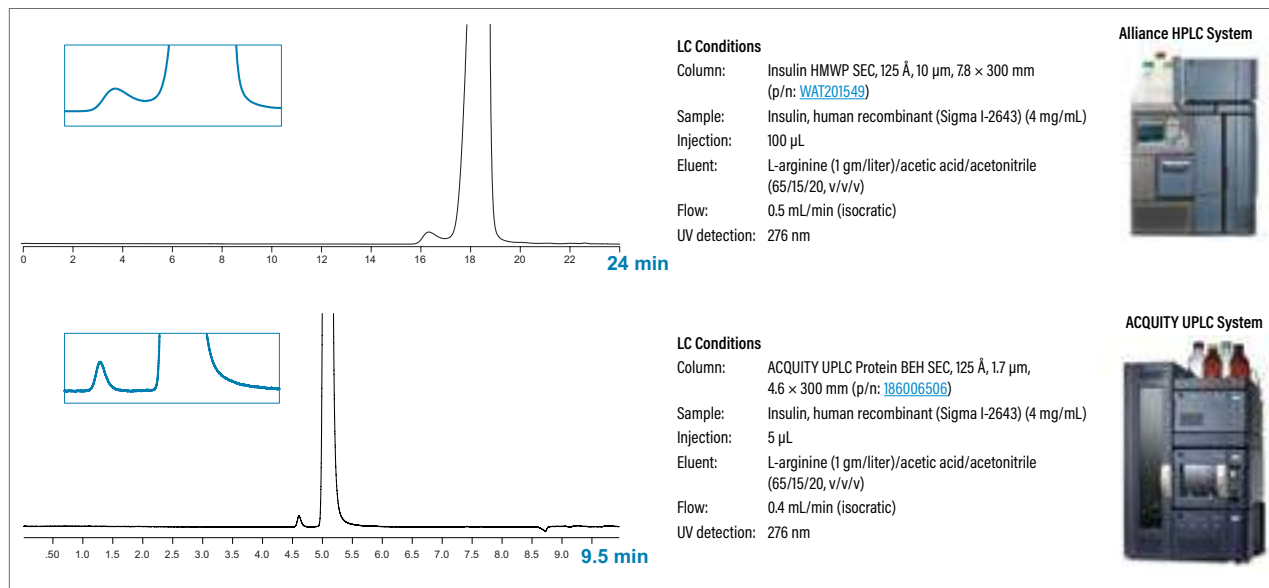
Straight Connection Tubing and End-fittings	<a href="#">WAT022681</a>
U-Bend Connection Tubing and End-fittings	<a href="#">WAT084080</a>

SEC Protein Standards are matched to the pore size of the column.

## SEC ANALYSIS OF INSULIN

Size-exclusion chromatography (SEC) is the USP and EP standard method for the analysis of covalent HMW insulin in therapeutic preparations. Compared to use of traditional HPLC-based SEC methods, significant improvement in insulin component resolution, while reducing analysis time and mobile-phase consumption, is obtained using a Waters Protein BEH SEC, 125 Å, 1.7 µm Column with Waters UltraPerformance LC™ (UPLC) Instrumentation (shown below).

### Insulin Analyses by Traditional HPLC-SEC vs. UPLC-SEC



Compared to use of traditional HPLC-based SEC technology for the analysis of earlier eluting insulin aggregates from desired monomer species, Waters ACQUITY UPLC BEH SEC Technology delivers benefits of improved component resolution and in less time.

## mAb SIZE VARIANT STANDARD

Waters mAb Size Variant Standard (p/n: [186009429](#)) contains the NIST humanized monoclonal antibody (Reference Material 8671) and non-reduced IdeS digested NIST mAb fragments F(ab')<sub>2</sub> (~100,000 Da) and (Fc/2)<sub>2</sub> (~50,000 Da). By aliquoting small, standard amounts of IdeS fragments, Waters mAb size variant standard can be effectively used to test column and LC System ability to separate mAb aggregates, monomer, and fragments/clips via SEC.



### Ordering Information

#### mAb Size Variant Standard

Description	P/N
mAb Size Variant Standard	<a href="#">186009429</a>

## PROTEIN STANDARDS

Each standard contains proteins selected for ACQUITY UPLC and XBridge Protein BEH SEC Columns. Use these standards for purposes of quality control, to test an HPLC or UPLC column, and to monitor column performance over time.



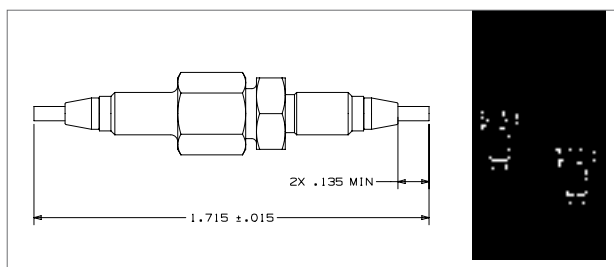
### Ordering Information

#### BEH SEC Column Protein Standards

Description	P/N
<b>BEH125 SEC Protein Standard Mix</b>	<a href="#">186006519</a>
A mix of four proteins: thyroglobulin, ovalbumin, ribonuclease A and uracil	
<b>BEH200 SEC Protein Standard Mix</b>	<a href="#">186006518</a>
A mix of five proteins: thyroglobulin, IgG, BSA, myoglobin, uracil	
<b>BEH450 SEC Protein Standard Mix</b>	<a href="#">186006842</a>
A mix of five proteins: thyroglobulin, IgG, BSA, myoglobin, uracil	

## SEC COLUMN CONNECTORS AND CONNECTOR KITS

Connectors to attach BEH SEC columns in series and/or BEH SEC guards to BEH SEC columns.



### Ordering Information

#### UPLC Column Connectors

Description	P/N
ACQUITY APC CM-S Column Connector, U, .004" I.D.*	<a href="#">700009535</a>
ACQUITY APC CM-S Column Connector, Offset U, .004" I.D.*	<a href="#">700009534</a>
ACQUITY APC CM-S Column Connector Tube, Long, .004" I.D.	<a href="#">700009560</a>
ACQUITY APC CM-S Inline Column Connection, .005" I.D.	<a href="#">700009524</a>
0.005 × 1.75 UPLC SEC Connection Tubing, 2/pk	<a href="#">186006613</a>

\* Ferrules are not staked on tubing upon receipt. The two-piece ferrule is permanently seated upon installation once the fitting is tightened into the column.

#### HPLC Column Connectors

Description	P/N
Column Joining Tube Assembly*	<a href="#">WAT084080</a>
Rigid Connector Package*	<a href="#">WAT022681</a>

\*The ferrules are permanently seated to Waters' depth setting upon receipt.

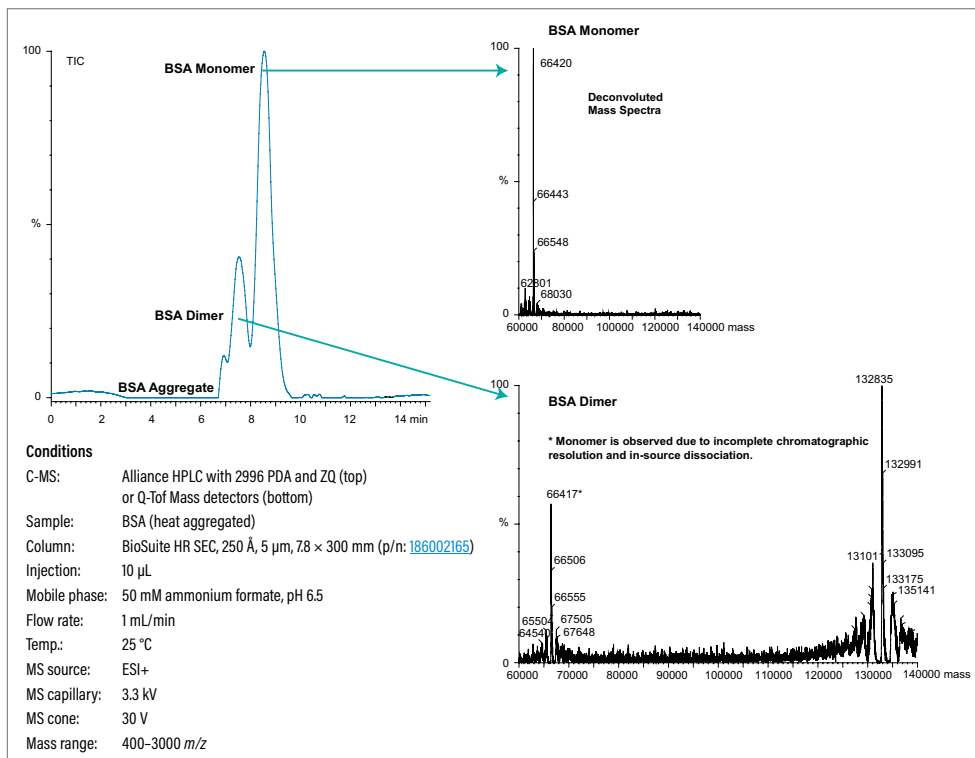
#### Connector Kits

Description	P/N
ACQUITY CM-S 4-Column Bank Connection Kit	<a href="#">205001172</a>
Kit contains:	
Two ACQUITY APC CM-S Inline Column Connector, .005" I.D. (p/n: <a href="#">700009524</a> )	
Two ACQUITY APC CM-S Column Connector, U, .004" I.D. (p/n: <a href="#">700009535</a> )	
One ACQUITY APC CM-S Column Connector, Offset U, .004" I.D. (p/n: <a href="#">700009534</a> )	
ACQUITY CM-S 3-Column Bank Connection Kit	<a href="#">205001171</a>
Kit contains:	
One ACQUITY APC CM-S Inline Column Connector, .005" I.D. (p/n: <a href="#">700009524</a> )	
Two ACQUITY APC CM-S Column Connector, U, .004" I.D. (p/n: <a href="#">700009535</a> )	
ACQUITY CM-S 2-Column Bank Connection Kit	<a href="#">205001169</a>
Kit contains:	
One ACQUITY APC CM-S Inline Column Connector, .005" I.D. (p/n: <a href="#">700009524</a> )	
One ACQUITY APC CM-S Column Connector, U, .004" I.D. (p/n: <a href="#">700009535</a> )	

## BioSuite Size-Exclusion (SEC) HPLC Columns

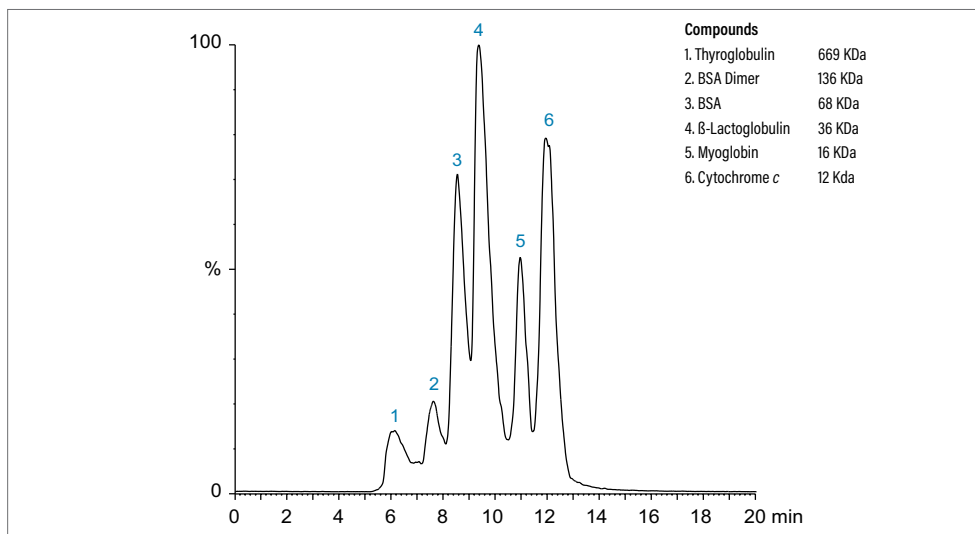
BioSuite ultra-high resolution (UHR), high resolution (HR), and standard size-exclusion column packings use a rigid yet “wetable” silica-based media that is stable from pH 2.5–7.5. As indicated in the calibration curve tables, the exclusion limits of BioSuite SEC packings are determined by the particle and pore size of the silica-based material. Particle size of the SEC packing media as well as column length are important parameters that determine separation efficiency. BioSuite 4 µm particle size, UHR Columns provide maximum separation efficiency, followed by BioSuite HR Columns and BioSuite Standard SEC Columns. To maximize column life of analytical (i.e., 4.6 mm or 7.8 mm I.D.) or preparative (i.e., 21.5 mm I.D.) SEC Columns, use of BioSuite Guard Columns is recommended.

### LC-MS Analysis of BSA Aggregation Using BioSuite HR SEC, 250 Å, 5 µm Column SEC Column



SEC is an effective technique to separate and quantitate higher molecular weight protein aggregates from lower molecular weight monomers using optical detection. Use of MS-compatible SEC eluents provides an additional dimension of useful data by providing real time mass data of the separated protein components.

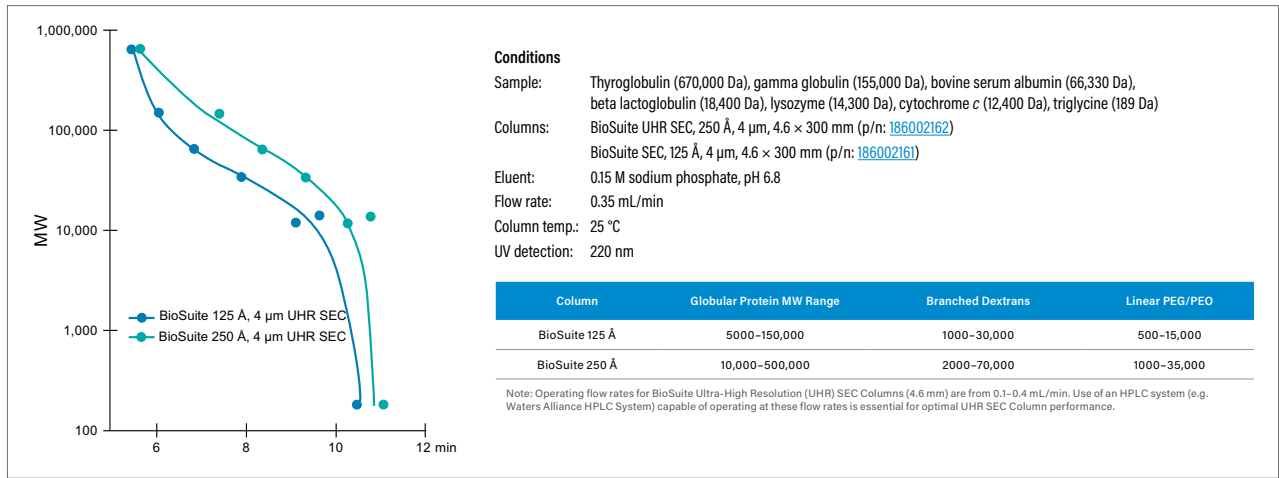
### LC-MS Analysis of Protein Standards Using BioSuite HR SEC, 250 Å, 5 µm Column (LC-MS conditions as above)



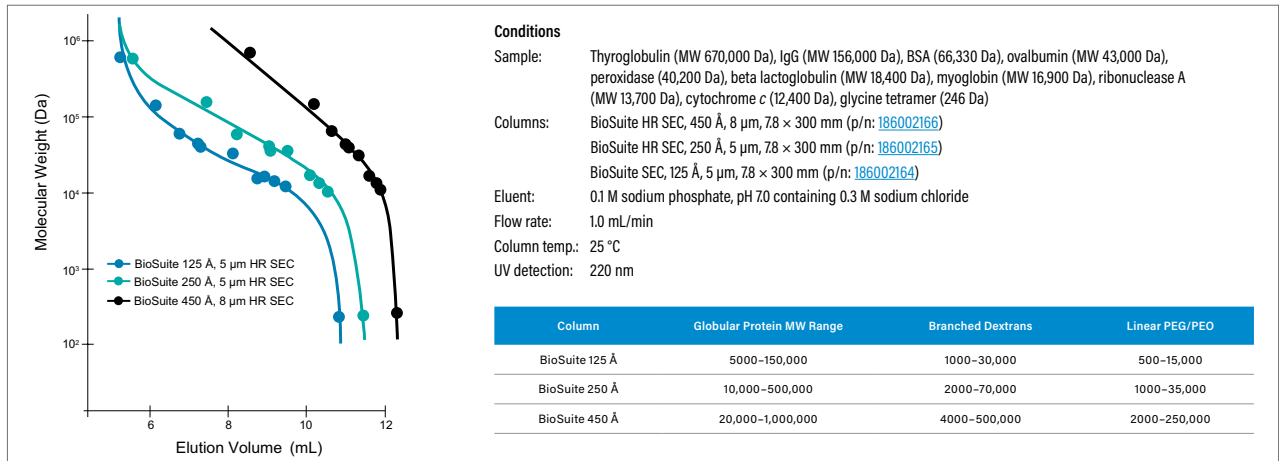
BioSuite SEC Reference: SEC-MS Analysis of Aggregates in Protein Mixtures. Application Book Supplement of LC/GC Europe. Sept. 2003. (Waters Literature Reference: 720000743EN)



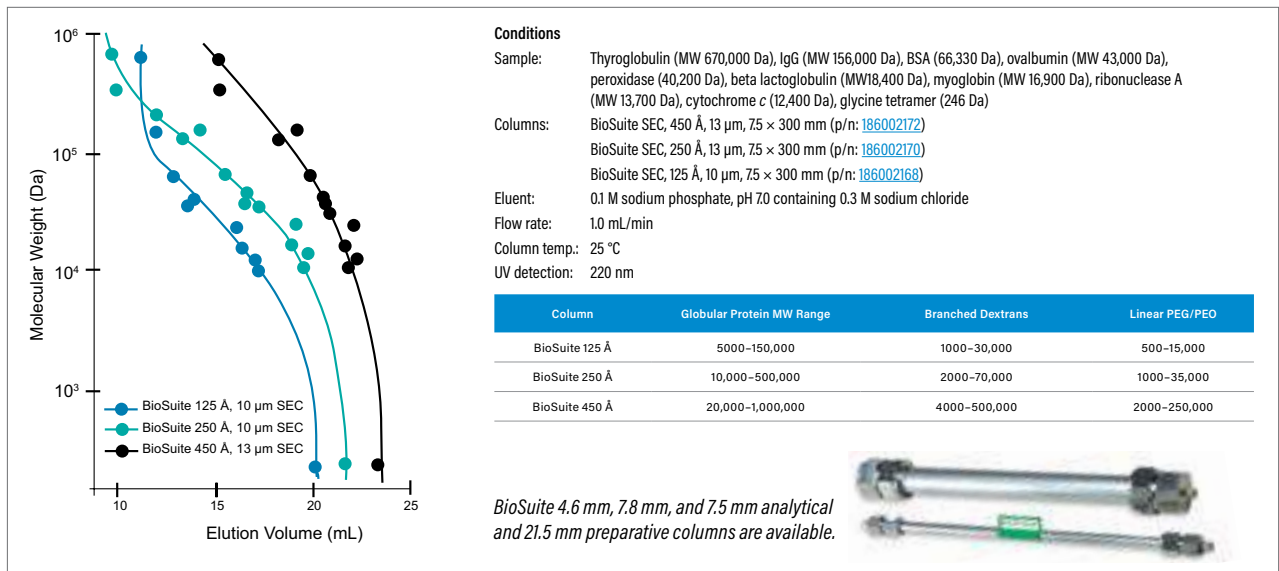
## Protein Calibration Curves for BioSuite Ultra-High Resolution (UHR) SEC Columns



## Protein Calibration Curves for BioSuite High Resolution (HR) SEC Columns



## Protein Calibration Curves for BioSuite Standard SEC Columns



## Ordering Information

### BioSuite SEC HPLC and UHPLC Columns

Description	Matrix	Diameter Width	Diameter Length	Column Volume	Suggested Volume Load for Maximum Multicomponent Resolution*	Multicomponent Resolution**	P/N
BioSuite 125 Å, 4 µm UHR SEC	Silica	4.6 mm	300 mm	4.98 mL	Less than 8 mg/mL	Less than 40 µL	<a href="#">186002161</a>
BioSuite 250 Å, 4 µm UHR SEC	Silica	4.6 mm	300 mm	4.98 mL	Less than 8 mg/mL	Less than 80 µL	<a href="#">186002162</a>
BioSuite UHR Guard SEC	Silica	4.6 mm	35 mm	—	—	—	<a href="#">186002163</a>
BioSuite 125 Å, 5 µm HR SEC	Silica	7.8 mm	300 mm	14.33 mL	Less than 8 mg/mL	Less than 200 µL	<a href="#">186002164</a>
BioSuite 250 Å, 5 µm HR SEC	Silica	7.8 mm	300 mm	14.33 mL	Less than 8 mg/mL	Less than 200 µL	<a href="#">186002165</a>
BioSuite 450 Å, 8 µm HR SEC	Silica	7.8 mm	300 mm	14.33 mL	Less than 8 mg/mL	Less than 200 µL	<a href="#">186002166</a>
BioSuite HR Guard SEC	Silica	6 mm	40 mm	—	—	—	<a href="#">186002167</a>
BioSuite 125 Å, 10 µm SEC	Silica	7.5 mm	300 mm	13.25 mL	Less than 8 mg/mL	Less than 200 µL	<a href="#">186002168</a>
BioSuite 125 Å, 13 µm SEC	Silica	21.5 mm	300 mm	108.9 mL	Less than 8 mg/mL	Less than 1.6 mL	<a href="#">186002169</a>
BioSuite 250 Å, 10 µm SEC	Silica	7.5 mm	300 mm	13.25 mL	Less than 8 mg/mL	Less than 200 µL	<a href="#">186002170</a>
BioSuite 250 Å, 13 µm SEC	Silica	21.5 mm	300 mm	108.9 mL	Less than 8 mg/mL	Less than 1.6 mL	<a href="#">186002171</a>
BioSuite 450 Å, 13 µm SEC	Silica	7.5 mm	300 mm	13.25 mL	Less than 8 mg/mL	Less than 200 µL	<a href="#">186002172</a>
BioSuite 450 Å, 17 µm SEC	Silica	21.5 mm	300 mm	108.9 mL	Less than 8 mg/mL	Less than 1.6 mL	<a href="#">186002173</a>
BioSuite Guard SEC	Silica	7.5 mm	75 mm	—	—	—	<a href="#">186002174</a>
BioSuite Guard SEC	Silica	21.5 mm	75 mm	—	—	—	<a href="#">186002175</a>

\* Using a BSA protein standard in a 50 mM phosphate buffer containing salt (either 0.1 M NaCl or 0.1 M Na<sub>2</sub>SO<sub>4</sub>) eluent. Useful protein mass loads will vary depending upon separation eluent, complexity of sample, and type of proteins contained in mixture. In general, maximum component resolution is obtained by injecting the smallest possible volume of a dilute protein solution.

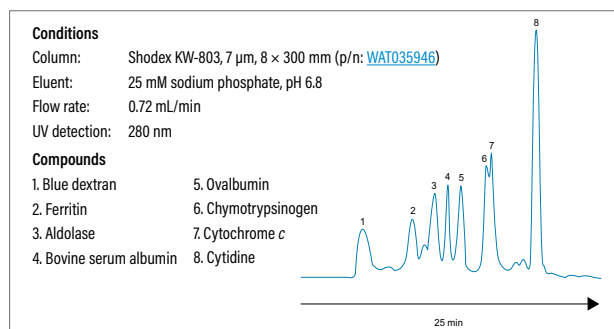
\*\* Operating flow rates for BioSuite Ultra-High Resolution (UHR) SEC Columns (4.6 mm I.D.) are from 0.1–0.4 mL/min. Use of an HPLC system (e.g., Waters Alliance HPLC System) capable of operating at these flows is essential for optimal UHR SEC Column performance.

### Protein-Pak and Shodex Size-Exclusion HPLC Columns

Waters offers two families of packings for size-exclusion chromatography. Protein-Pak packings are based on a 10 µm, diol-bonded silica and are available in a selection of pore sizes and column configurations. In addition, Waters offers a series of Shodex 7 µm, high-resolution, gel filtration packings.

The Protein-Pak Size-exclusion Columns can be expected to resolve proteins that differ in molecular weight by a factor of two and to distinguish proteins differing by as little as 15% in molecular weight. The degree of resolution is more dependent on the sample mass and volume than the interaction between the sample and the stationary phase. Ideally, there should be no interaction between the stationary phase and the sample molecules. Secondary interactions are most often ionic and can, therefore, be reduced by increasing the ionic strength of the mobile phase. Typical, salt concentrations range to 0.2–0.5 M NaCl. It may also be useful in some cases to consider adding 10–20% methanol to eliminate hydrophobic and other hydrogen-bonding interactions.

#### Standard Protein Mix on KW-803 Column



This gel-filtration separation of protein standards demonstrates the ability to separate proteins in a wide range of molecular weights in minutes for high sensitivity analysis or protein isolation up to the milligram scale.

## Ordering Information

### Protein-Pak SEC HPLC Columns and Guards

Steel Column	Dimension	MW Range	P/N
Protein-Pak 60	7.8 × 300 mm	1000–20,000	<a href="#">WAT085250</a>
Protein-Pak 60	19 × 300 mm	1000–20,000	<a href="#">WAT025830</a>
Protein-Pak 125	7.8 × 300 mm	2000–80,000	<a href="#">WAT084601</a>
Protein-Pak 125	19 × 300 mm	2000–80,000	<a href="#">WAT025831</a>
Protein-Pak 300SW	7.5 × 300 mm	10,000–300,000	<a href="#">WAT080013</a>
Protein-Pak 125 Sentry Guard Column, 3.9 × 20 mm, 2/pk (requires holder)			<a href="#">186000926</a>
Sentry Universal Guard Column Holder			<a href="#">WAT046910</a>
Glass Column	Dimension	MW Range	P/N
Protein-Pak 200SW	8 × 300 mm	500–60,000	<a href="#">WAT011786</a>
Protein-Pak 300SW	8 × 300 mm	10,000–300,000	<a href="#">WAT011787</a>

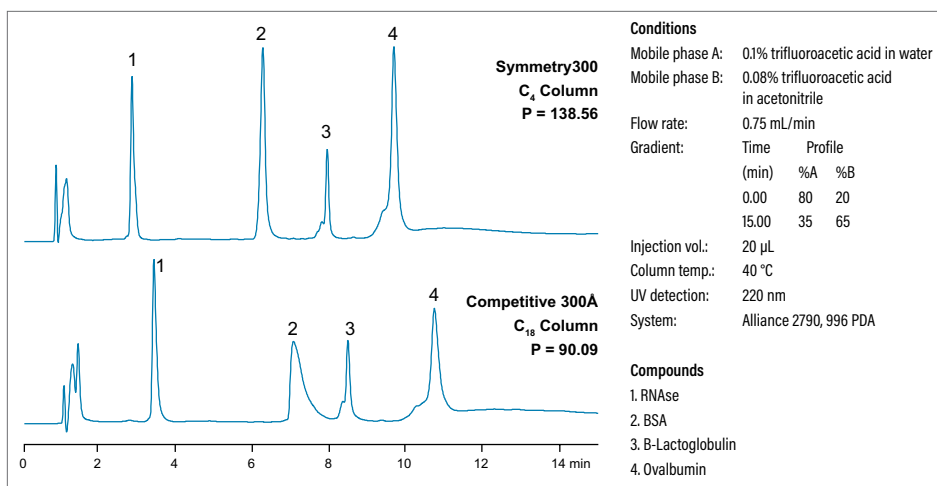
## Shodex Size-Exclusion and Anion-Exchange HPLC and UHPLC Columns

Description	Particle Size	Dimension	MW Range	P/N
Protein KW-802.5	7 µm	8 × 300 mm	100–50,000	<a href="#">WAT035943</a>
Protein KW-803	7 µm	8 × 300 mm	100–150,000	<a href="#">WAT035946</a>
Protein KW-804	7 µm	8 × 300 mm	500–600,000	<a href="#">WAT036613</a>

## Symmetry300 C<sub>4</sub> HPLC and UHPLC Columns

Compared to our Protein BEH C<sub>4</sub>, 300 Å offerings, Symmetry300 C<sub>4</sub> particles are 100% silica-based and are synthesized using ultrapure organic reagents resulting in high-purity material with very low silanol activity for outstanding peptide and protein separations and recoveries.

### Protein: Symmetry300 C<sub>4</sub> vs. Competitors



- 300 Å pore for peptide and protein applications
- Fully endcapped to minimize undesired secondary interactions
- Alternative separation selectivity compared to Waters BEH C<sub>4</sub>, 300 Å hybrid material
- QC tested with peptide samples to help ensure excellent batch-to-batch consistency

*Compared to many competitive 100% silica-based C<sub>18</sub> columns, Waters proprietary bonding and end-capping technologies help deliver improved peak shape with less undesired tailing.*

## Ordering Information

### Symmetry300 HPLC and UHPLC Columns

C <sub>4</sub>	Particle Size: 3.5 µm		Particle Size: 5 µm	
	Dimension	P/N	Dimension	P/N
	2.1 × 150 mm	<a href="#">186000276</a>	2.1 × 150 mm	<a href="#">186000285</a>
	3.9 × 150 mm	<a href="#">186000277</a>	3.9 × 150 mm	<a href="#">186000286</a>
	4.6 × 50 mm	<a href="#">186000278</a>	4.6 × 50 mm	<a href="#">186000287</a>
	4.6 × 150 mm	<a href="#">186000279</a>	4.6 × 150 mm	<a href="#">186000288</a>
	4.6 × 250 mm	<a href="#">186000280</a>	4.6 × 250 mm	<a href="#">186000289</a>
	19 × 10 mm	<a href="#">186000281</a>		
	19 × 50 mm	<a href="#">186000282</a>		
	19 × 100 mm	<a href="#">186000283</a>		

## CHARGE VARIANT AND ION-EXCHANGE ANALYSIS

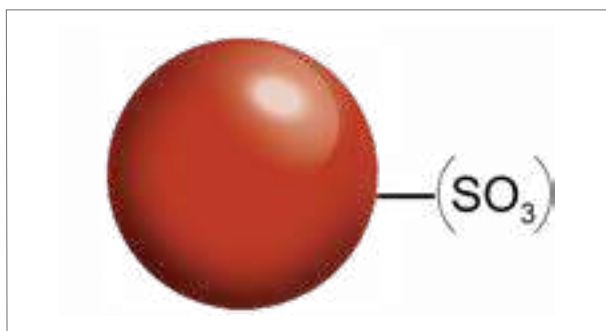
Ion-Exchange (IEX) separations are most commonly performed using gradients of increasing salt, changing pH, or simultaneous salt increases and pH changes with less charged protein species eluting prior to more highly charged molecules. Based on protein type and separation pH, either an anion or cation exchanger is selected for the separation. In addition, gradient duration, buffer composition and pH, flow rate, as well as separation temperature all play an important part in obtaining needed protein separations.

### BioResolve SCX mAb Columns

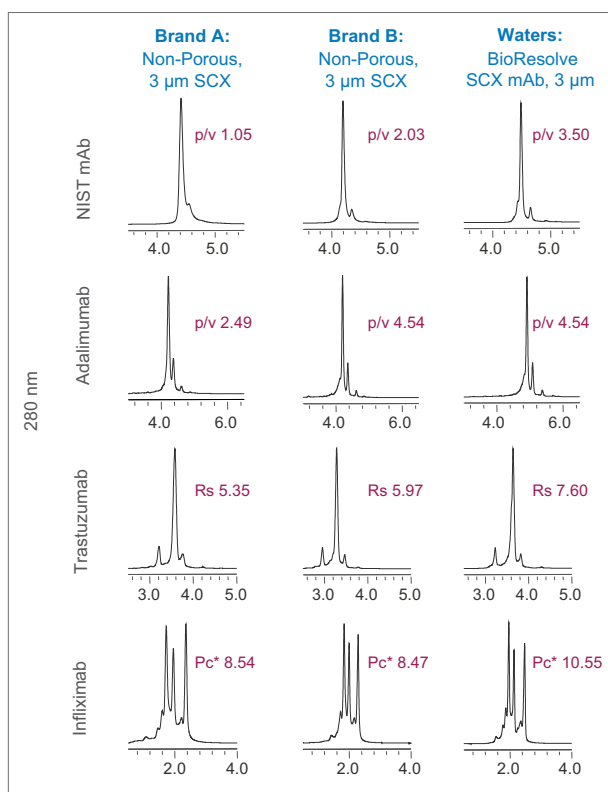
Charge variant profiling is one of several important characterization techniques performed on monoclonal antibody biotherapeutics. To help ensure that reliable results are obtained in these types of analyses, Waters developed corrosion-resistant columns containing BioResolve SCX mAb, non-porous, polymer-based particles grafted with a rigorously-optimized, multi-component network of negatively charged sulfonic acid ligands. This innovative column technology delivers high-resolution, charged-based separations of mAbs in both LC and LC-MS applications using both salt and pH gradient elution.

Benefits include:

- Strong-cation exchanger based on non-porous (NP) polymeric particles that deliver high mechanical strength and chemical tolerance for LC or LC-MS charge based separations
- Developed through extensive prototyping and comprehensive testing with a wide range of mAbs and separations based on both salt and pH-gradient chromatography
- Based on a non-porous, 3  $\mu\text{m}$  particle for optimal diffusion kinetics; high pressure capability; and amenability to HPLC, UHPLC, and UPLC systems
- Quality-control tested with the mAb Charge Variant Standard (derived from NIST mAb Reference Material 8671) to help ensure batch-to-batch column consistency

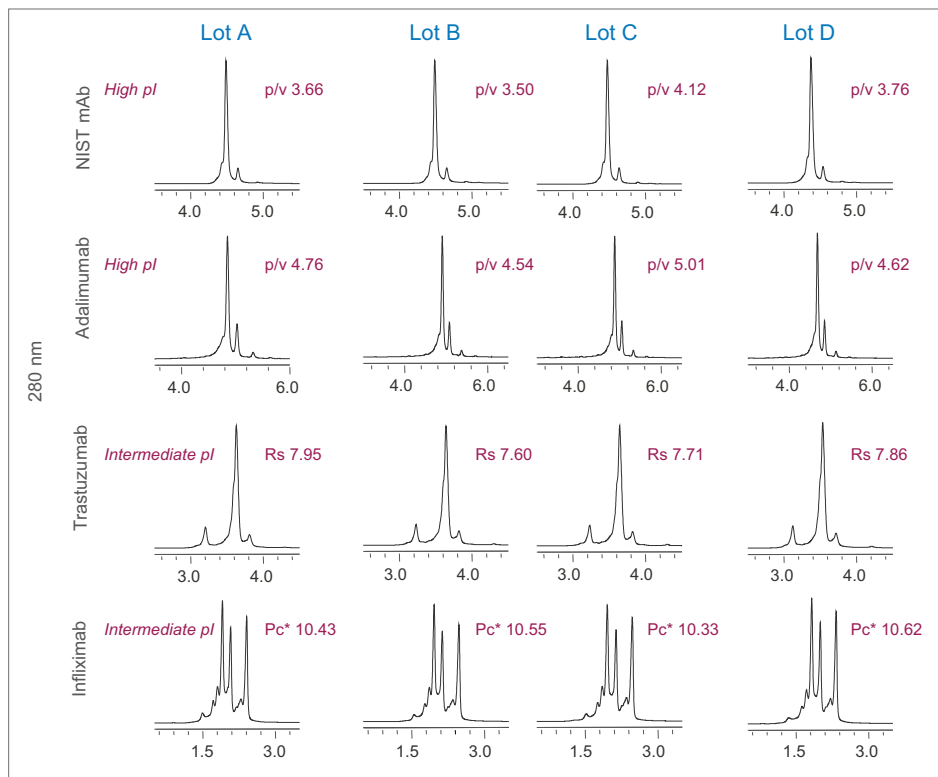


LC Analysis of Monoclonal Antibodies - BioResolve SCX mAb Column vs. Commercially Available, Non-Porous, Cation-Exchange Columns



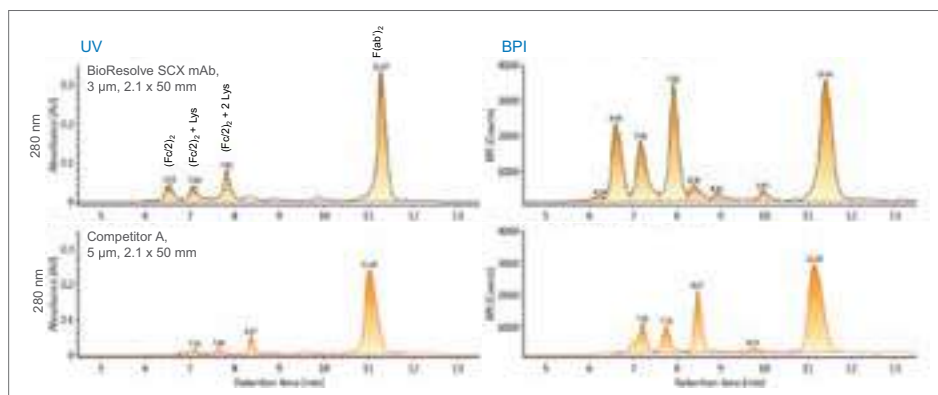
Comparative peak valley (P/V) ratios, component resolution (Rs), and measured peak capacities of four biotherapeutic antibodies separated on Waters vs. commercially available, cation-exchange columns noting higher quality data obtained on a BioResolve SCX mAb, 3  $\mu\text{m}$  Column. All separations were performed at 30  $^{\circ}\text{C}$  on an ACQUITY UPLC H-Class Bio System at the same linear velocity (i.e., 0.72 mL/min for 4.6  $\times$  50 mm and 0.54 mL/min for 4  $\times$  50 mm columns) with appropriately scaled injection volumes using a 10 min linear gradient from 10 mM to 200 mM NaCl contained in 20 mM MES, pH 7 buffer.

**Outstanding Batch-to-Batch Reproducibility of BioResolve SCX mAb Cation-Exchange Columns in the Analysis of Four mAbs**



Comparative peak valley (P/V) ratios, component resolutions (Rs), and measured peak capacities of four monoclonal antibodies on four different manufactured batches of BioResolve SCX mAb, 3  $\mu$ m, 4.6  $\times$  50 mm Columns. All separations were performed at 30 °C on an ACQUITY UPLC H-Class Bio System at 0.72 mL/min using a 10 min linear gradient from 10 mM to 200 mM NaCl contained in 20 mM MES, pH 7 buffer.

**LC-MS Analysis of IdeS Digested Infliximab on a BioResolve SCX mAb Column vs. an Alternative Commercially Available, Non-Porous, Cation-Exchange Column**



Higher resolution and higher recovery separations using volatile, MS-compatible mobile phases and a BioResolve SCX mAb, 3  $\mu$ m, 2.1  $\times$  50 mm Column. Separations were performed at 30 °C on an ACQUITY UPLC I-Class System at 0.11 mL/min using an 18.3 min linear gradient from 15–50% buffer B (buffer A: 50 mM ammonium formate, pH 3.9 and buffer B: 500 mM ammonium acetate, pH 7.4).

## mAb Charge Variant Standard

The mAb Charge Variant Standard is a proficiency and suitability standard used to confirm and monitor column and instrument performance. This standard is formulated as a filtered and stabilized mixture of a void marker (tryptophan), conalbumin from chicken egg white, and NIST Reference Material 8671 (NIST mAb, a humanized IgG1κ expressed from a murine cell line). Every vial contains approximately 0.5 μg of tryptophan, 200 μg of conalbumin, and 100 μg of NIST mAb. Shown on the right is a pH-gradient chromatogram example of the mAb Charge Variant Standard as obtained with BioResolve CX pH Concentrates.

## VanGuard FIT Cartridge

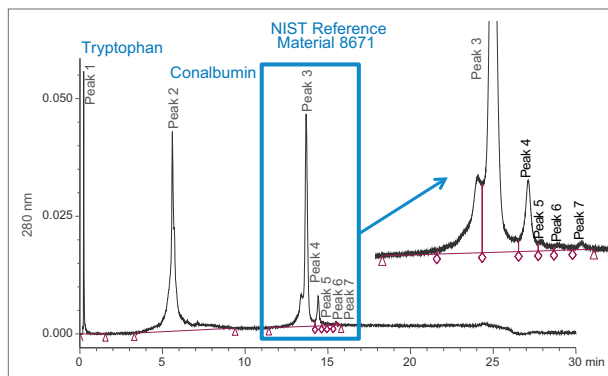
The injection of column fouling excipients (e.g., polysorbate) and particles (e.g., insoluble sample or microbes) is known to cause the premature failure of columns. Careful sample and eluent preparation helps address this concern. Yet experienced chromatographers recognize the value of using a guard column, containing the same material as the analytical column, to further help ensure maximum column life. Traditional guard columns help protect the analytical column. However, they are relatively expensive and introduce compromising levels of additional dispersion.

To address these shortcomings, Waters has enhanced the value of the existing VanGuard Technology by introducing the novel VanGuard Fully Integrated Technology (FIT) Cartridge - a, simplified guard column design that maximizes column life without degrading biomolecule component resolution. Based on customer preference, the BioResolve SCX mAb Column can be purchased with or without a VanGuard FIT Cartridge.<sup>(1,2)</sup>

<sup>1</sup> The VanGuard FIT Cartridge contains the same BioResolve SCX mAb, 3 μm material as used in an analytical BioResolve SCX mAb Column.

<sup>2</sup> Replacement BioResolve SCX mAb, 3 μm VanGuard FIT Cartridges cannot be used on columns that lack the VanGuard FIT Cartridge option.

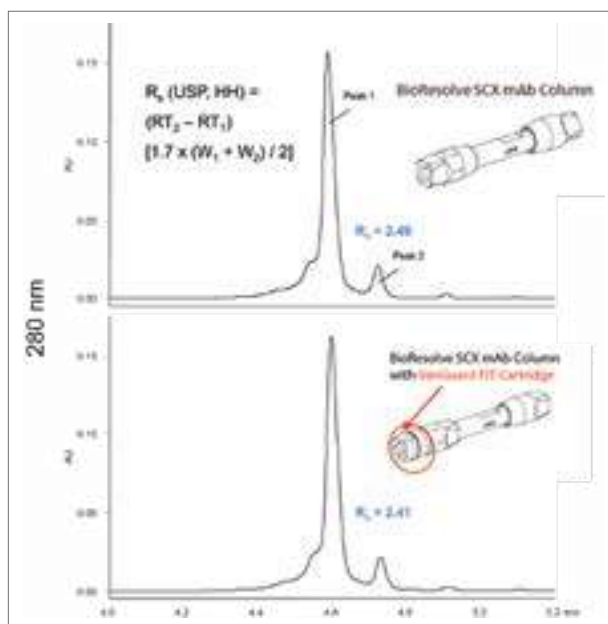
## Separation of Waters mAb Charge Variant Standard on a BioResolve SCX mAb, 3 μm Column



Separation of the mAb Charge Variant Standard on a BioResolve SCX mAb, 3 μm, 4.6 × 50 mm Column with a VanGuard FIT Cartridge showing excellent resolution of various mAb charge variant species. Separation was performed on an ACQUITY UPLC H-Class System at 30 °C and at 1.44 mL/min using a 24 min linear gradient from pH 5 to 10.2.

\*The interpretation of charge variants was extrapolated from BioDrugs, 2016, 30, 321-338.

## No Compromise Column Protection and Extended Lifetimes with VanGuard FIT Enhancement



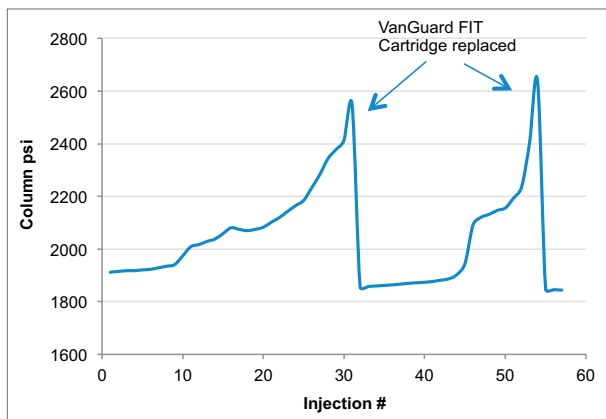
Separation of NIST mAb Reference Material 8671 (12.5 μg injected) on a BioResolve SCX mAb, 3 μm, 4.6 × 50 mm Column with and without an Integrated VanGuard FIT Cartridge. All separations were performed on an ACQUITY UPLC H-Class Bio System at 0.96 mL/min using a 7.5 min linear gradient from 10 mM to 200 mM NaCl contained in 20 mM MES, pH 6 buffer.

When chromatography degrades from unintentional fouling (e.g., injections of particulates originating from a sample, LC system, and/or mobile phase), the VanGuard FIT Cartridge can be easily changed with available replacements to restore column performance and extend the life of the analytical column.

### BioResolve CX pH Buffers

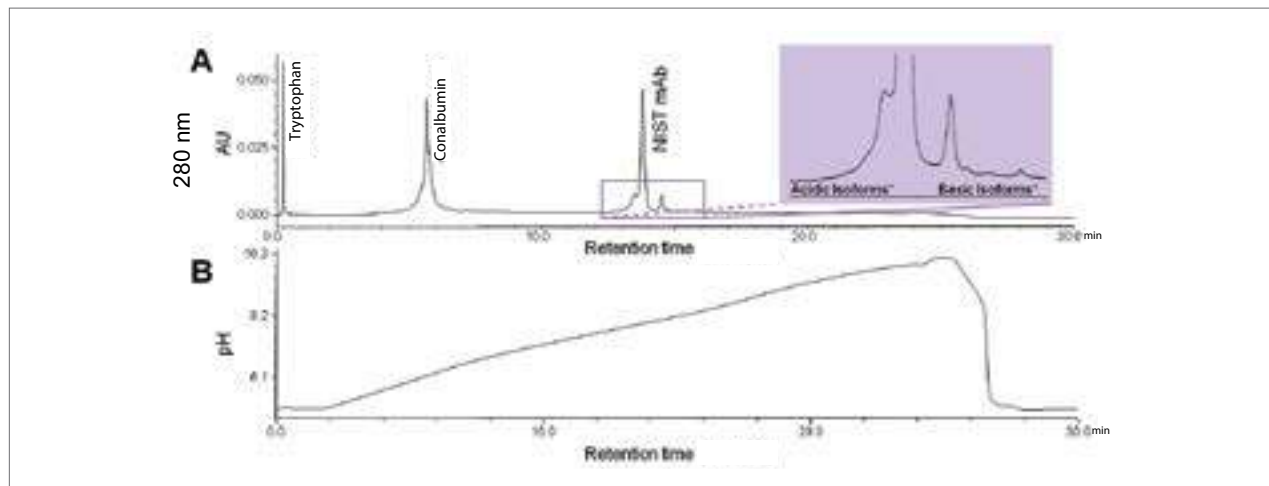
While ion-exchange chromatography using a gradient of increasing salt concentration is commonly used for charge variant profiling of mAb-based therapeutics, it often requires the optimization of methods for each individual sample. By comparison, use of a more universal pH gradient offers the potential of being applicable to many different samples. The BioResolve CX pH Concentrates facilitate obtaining high-resolution separations with BioResolve SCX mAb, 3  $\mu\text{m}$  Columns. Together, the two technologies provide a robust and simple-to-use pH gradient based method for charge variant analysis of different mAb species. Each set of the carefully formulated concentrates was designed so users can quickly prepare mobile phases of controlled pH and ionic strength to yield robust cation-exchange separations. Each concentrate is accurately packaged as a 100 mL volume of a 10x concentrated solution that can be prepared into 1 L of mobile phase by means of a simple 10-fold aqueous dilution. The resulting buffers can be used in a universally applicable binary gradient separation method that runs from pH 5.0 to 10.2.

### Extension of BioResolve SCX mAb Column by Replacement of VanGuard Fit Cartridge on Particulate Fouled Column



Repeated 5  $\mu\text{L}$  injections of 20 mM sodium phosphate, pH 6.8 containing 0.1  $\mu\text{m}$  latex particles onto a BioResolve SCX mAb, 3  $\mu\text{m}$ , 4.6  $\times$  50 mm Column with VanGuard FIT. Testing was performed on an ACQUITY UPLC H-Class System at 0.50 mL/min using 20 mM sodium phosphate, pH 6.8 with injections made every 5 min noting pressure increases that were reduced when the existing VanGuard FIT Cartridge was replaced with a new one at injections #30 and #54. Note: 0.1  $\mu\text{m}$  latex particles were selected due to their size being similar to bacterial cells (0.2 to 10  $\mu\text{m}$ ) that are a potential source of column fouling if present in eluents that lack bacteriostatic agents.

### Separation of mAb Charge Variant Standard on a BioResolve SCX mAb, 3 $\mu\text{m}$ Column Using a Turn-Key pH Gradient Generated Using BioResolve CX pH Concentrates



Representative ion-exchange chromatogram (A) and pH trace (B) for a separation of the mAb Charge Variant Standard (p/n: 186009065) on a BioResolve SCX mAb, 3  $\mu\text{m}$ , 4.6  $\times$  50 mm Column. The data was obtained at 30  $^{\circ}\text{C}$  on an ACQUITY UPLC H-Class Bio System using a 24 min linear pH gradient from pH 5.0 to 10.2 at a flow rate of 1.44 mL/min. Note: the pH trace was obtained with GE Healthcare Life Sciences Monitor pH/C-900.

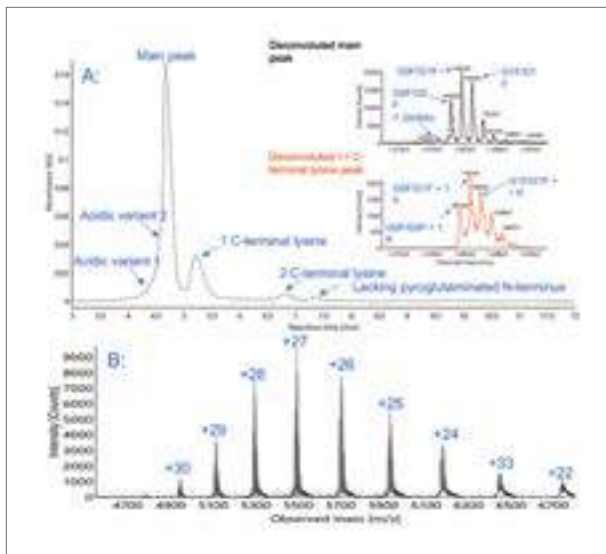
## LC-MS ANALYSIS WITH IONHANCE CX-MS PH BUFFERS

Native protein analysis by cation-exchange chromatography coupled to mass spectrometry (CX-MS) is a robust way to characterize microheterogeneities in biopharmaceuticals, particularly monoclonal antibodies (mAbs), from research through final commercialization. To address this need, Waters developed IonHance CX-MS pH Buffers (Concentrates A and B) for use with the BioResolve SCX mAb, 3  $\mu\text{m}$  Columns.

The IonHance CX-MS pH 10x concentrates were purposely designed to deliver robust, charge-based separations and high-quality MS spectral data. They are shipped as 100 mL aliquots in 1 L trace metal certified low-density polyethylene bottles (confirmed <100 ppb levels of sodium, potassium, and calcium). Concentrate A is formulated to yield a pH 5.0 mobile phase and Concentrate B is formulated to generate a higher ionic strength pH 8.5 mobile phase. Both concentrates are prepared with 20% acetonitrile to minimize bacterial growth.

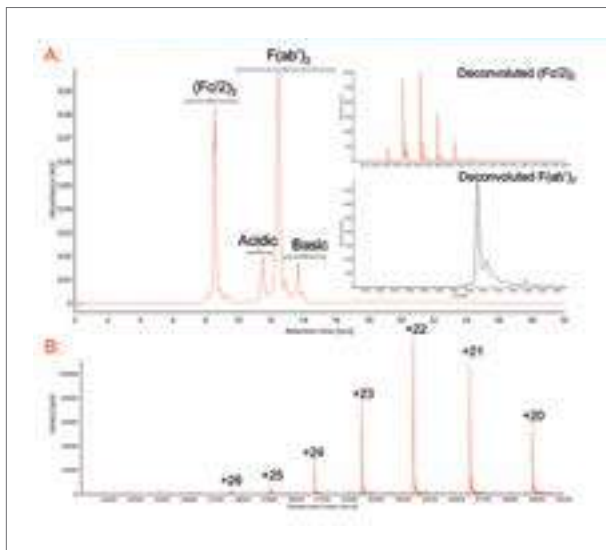
When running IonHance CX-MS buffers, it is recommended to use the Humanized mAb Mass Check Standard (p/n: [186009125](#)) as a system QC and not the mAb Charge Variant Standard (p/n: [186009065](#)). The mAb Charge Variant Standard is a mix of NIST mAb, conalbumin and tryptophan. The conalbumin peak is not well resolved using the IonHance CX-MS buffers.

## LC-MS Analysis of Intact Adalimumab Using a BioResolve SCX mAb Column and IonHance CX-MS pH Buffer



Representative UV chromatogram (280 nm) of adalimumab with deconvolution of base and +1 lysine (K) peak between 147.8–148.8 kDa, as well as mass spectra for base peak with  $m/z$  window of 4600–7000. The data were obtained with a BioAccord System comprised of an ACQUITY UPLC I-Class PLUS System coupled to an ACQUITY TUV Detector that was set to 280 nm, fitted with a  $2.1 \times 50$  mm BioResolve SCX mAb Column. Buffer A = 10 mM ammonium acetate, pH 5.00. Buffer B = 75 mM ammonium acetate, pH 8.38.

## LC-MS Analysis of Non-Reduced IdeS Digested Trastuzumab



(A) Representative UV chromatogram of IdeS digested Trastuzumab with deconvolution of main (Fc/2)<sub>2</sub> peak between 50.1–52.0 kDa and the main F(ab')<sub>2</sub> peak between 97.0–98.0 kDa. (B) Mass spectra for primary F(ab')<sub>2</sub> peak with  $m/z$  window of 3200–5000. The data were obtained with a BioAccord System comprised of an ACQUITY UPLC I-Class PLUS System coupled to an ACQUITY RDa Mass Detector fitted with a BioResolve SCX mAb,  $2.1 \times 50$  mm Column.



## Ordering Information

### BioResolve SCX mAb Columns, Method Validation Kits, Cartridges, and Standards

Column	Particle Size: 3 µm		
	Dimension	P/N (1/pk) with VanGuard FIT and mAb Charge Variant Standard	P/N (1/pk) with mAb Charge Variant Standard
	2.1 × 50 mm	<a href="#">176004341</a>	<a href="#">176004342</a>
	2.1 × 100 mm	<a href="#">176004343</a>	<a href="#">176004344</a>
	4.6 × 50 mm	<a href="#">176004346</a>	<a href="#">176004347</a>
	4.6 × 100 mm	<a href="#">176004348</a>	<a href="#">176004349</a>

Method Validation Kit*	Particle Size: 3 µm		
	Dimension	P/N (3/pk) with VanGuard FIT and mAb Charge Variant Standard	P/N (3/pk) with mAb Charge Variant Standard
	2.1 × 100 mm	<a href="#">176004345</a>	-
	4.6 × 100 mm	-	<a href="#">176004350</a>

Description	P/N
BioResolve SCX mAb VanGuard FIT Cartridge, 3 µm, 3.9 × 5 mm, 3/pk**	<a href="#">186009062</a>
BioResolve SCX mAb VanGuard FIT Replacement Cartridge, 3 µm, 2.1 × 5 mm, 3/pk**	<a href="#">186009061</a>
mAb Charge Variant Standard	<a href="#">186009065</a>
BioResolve CX pH Concentrate A, pH 5 (100 mL bottle of 10x concentrate)	<a href="#">186009063</a>
BioResolve CX pH Concentrate B, pH 10.2 (100 mL bottle of 10x concentrate)	<a href="#">186009064</a>
BioResolve CX pH Concentrate Kit	<a href="#">176004340</a>
Certified LDPE Container, 1000 mL (2/pk)	<a href="#">186009110</a>

\* Method Validation Kit (MVK) contains three columns from three different batches.

\*\*VanGuard FIT Replacement Cartridges can ONLY be used on BioResolve SCX mAb Columns that have VanGuard FIT component.

### BioResolve SCX mAb Startup Kits

Description	P/N
BioResolve SCX mAb, 3 µm, 2.1 × 50 mm Column w/ VanGuard FIT Cartridge; mAb Charge Variant Standard; BioResolve SCX pH Concentrates; and two Certified LDPE Containers	<a href="#">176004351</a>
BioResolve SCX mAb, 3 µm, 2.1 × 50 mm Column; mAb Charge Variant Standard; BioResolve SCX pH Concentrates; and two Certified LDPE Containers	<a href="#">176004355</a>
BioResolve SCX mAb, 3 µm, 2.1 × 100 mm Column w/VanGuard FIT Cartridge; mAb Charge Variant Standard; BioResolve SCX pH Concentrates; and two Certified LDPE Containers	<a href="#">176004352</a>
BioResolve SCX mAb, 3 µm, 2.1 × 100 mm Column; mAb Charge Variant Standard; BioResolve SCX pH Concentrates; and two Certified LDPE Containers	<a href="#">176004356</a>
BioResolve SCX mAb, 3 µm, 4.6 × 50 mm Column w/ VanGuard FIT Cartridge; mAb Charge Variant Standard; BioResolve SCX pH Concentrates; and two Certified LDPE Containers	<a href="#">176004353</a>
BioResolve SCX mAb 3 µm, 4.6 × 50 mm Column; mAb Charge Variant Standard; BioResolve SCX pH Concentrates; and two Certified LDPE Containers	<a href="#">176004357</a>
BioResolve SCX mAb, 3 µm, 4.6 × 100 mm Column w/ VanGuard FIT Cartridge; mAb Charge Variant Standard; BioResolve SCX pH Concentrates; and two Certified LDPE Containers	<a href="#">176004354</a>
BioResolve SCX mAb 3 µm, 4.6 × 100 mm Column; mAb Charge Variant Standard; BioResolve SCX pH Concentrates; and two Certified LDPE Containers	<a href="#">176004358</a>

## Ordering Information

### IonHance CX-MS pH Concentrates

Description	P/N
IonHance CX-MS pH Concentrate A in Certified LDPE Container	<a href="#">186009280</a>
IonHance CX-MS pH Concentrate B in Certified LDPE Container	<a href="#">186009281</a>
IonHance CX-MS pH Concentrates A&B Kit	<a href="#">176004498</a>

### IonHance CX-MS pH Concentrate and BioResolve SCX mAb Startup Kits

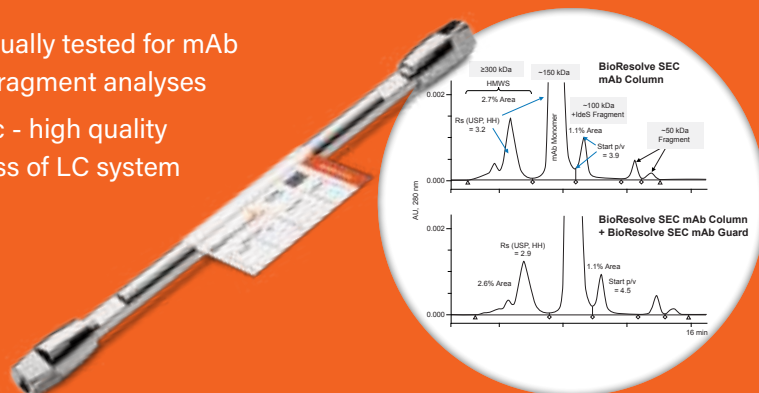
Description	P/N
Kit: IonHance CX-MS pH Concentrates A and B in certified LDPE containers; BioResolve SCX mAb, 3 $\mu$ m, 2.1 $\times$ 50 mm Column with VanGuard FIT; and Humanized mAb Mass Check Standard	<a href="#">176004499</a>
Kit: IonHance CX-MS pH Concentrates A and B in certified LDPE containers; BioResolve SCX mAb, 3 $\mu$ m, 2.1 $\times$ 50 mm Column; and Humanized mAb Mass Check Standard	<a href="#">176004500</a>
Kit: IonHance CX-MS pH Concentrates A and B in certified LDPE containers; BioResolve SCX mAb, 3 $\mu$ m, 2.1 $\times$ 100 mm Column with VanGuard FIT; and Humanized mAb Mass Check Standard	<a href="#">176004501</a>
Kit: IonHance CX-MS pH Concentrates A and B in certified LDPE containers; BioResolve SCX mAb, 3 $\mu$ m, 2.1 $\times$ 100 mm Column; and Humanized mAb Mass Check Standard	<a href="#">176004502</a>



Looking for reliable monoclonal antibody aggregate, monomer, and fragment analysis?

We listened. We learned. We designed.

- Columns individually tested for mAb aggregate and fragment analyses
- System agnostic - high quality results regardless of LC system



For more information, visit [waters.com/BioResolveSEC](https://waters.com/BioResolveSEC)

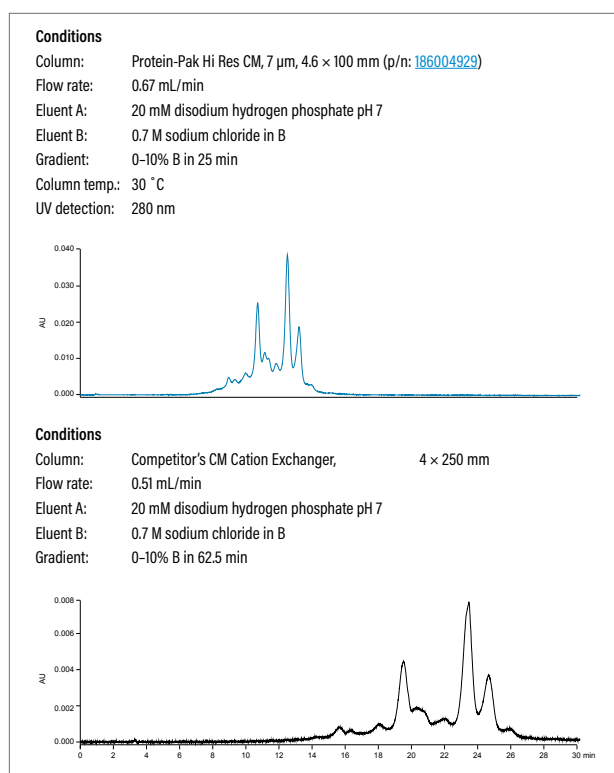
## Protein-Pak Hi Res Ion-Exchange (IEX) Columns for ACQUITY UPLC Applications

Protein-Pak Hi Res Ion-Exchange (IEX) Columns were developed to assist in the characterization of recombinant proteins, monoclonal antibodies, and other biological compounds. The non-porous, high compound binding capacity of these particles yields outstanding resolution of charged species in less time compared to use of many traditional porous IEX offerings. In addition, quality control testing with defined protein standards helps ensure consistent batch-to-batch performance.

- Designed for the characterization of protein charge variants and other biocompounds
- Two cation-exchangers (carboxymethyl and sulfopropyl) and one anion exchanger (quaternary ammonium) that address selectivity needs
- Non-porous, high-capacity stationary phases deliver fast separations that address high-throughput needs
- QC tested with protein standards to ensure batch-to-batch consistency
- eCord enabled to help monitor column use on ACQUITY UPLC Systems

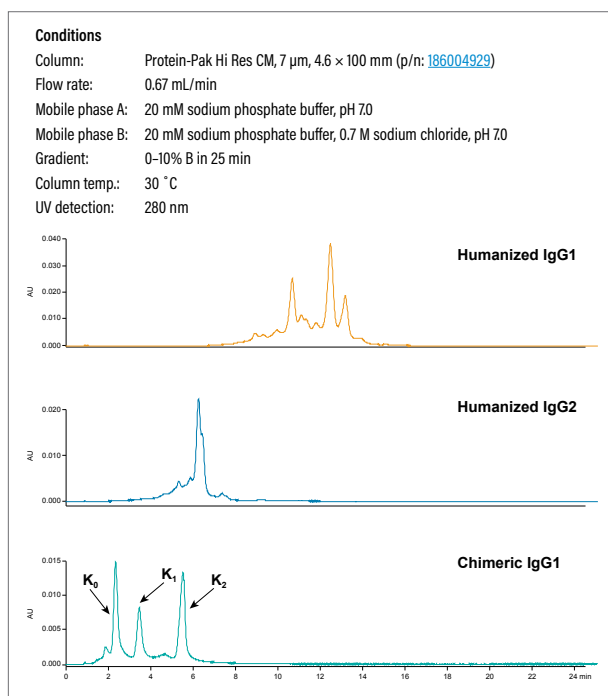


### Resolved Monoclonal Antibody (mAb) Isoform Separation



Cation-exchange chromatography is a useful tool for the characterization and quantitation of mAb or recombinant protein variants. Use of Waters Protein-Pak Hi Res CM Column on an ACQUITY UPLC System increases sample throughput while maintaining resolution between intended product and undesired variants.

### Protein-Pak Hi Res CM Analysis of Three mAbs Containing Different Levels of Variants



Sequence, production, storage, and shipping conditions influence the degree of variants contained in a biotherapeutic protein. Waters Protein-Pak Hi Res CM Column can successfully resolve variations that may involve as little as a single amino acid change (K0 = No terminal lysines, K1 = One terminal lysine, and K2 = Two terminal lysines).

## Ordering Information

### Protein-Pak Hi Res UPLC Columns

Description	Particle Size	Dimension	P/N (1/pkg)
Protein-Pak Hi Res CM	7 $\mu$ m	4.6 $\times$ 100 mm	<a href="#">186004929</a>
Protein-Pak Hi Res SP	7 $\mu$ m	4.6 $\times$ 100 mm	<a href="#">186004930</a>
Protein-Pak Hi Res Q	5 $\mu$ m	4.6 $\times$ 100 mm	<a href="#">186004931</a>

Note: Only when Protein-Pak Hi Res IEX Columns are combined with the ACQUITY UPLC System are the full performance benefits realized. See Waters service notes, p/n: 715002147A for ACQUITY UPLC System configuration guidelines for ion-exchange chromatography.

## Ion-Exchange Standards

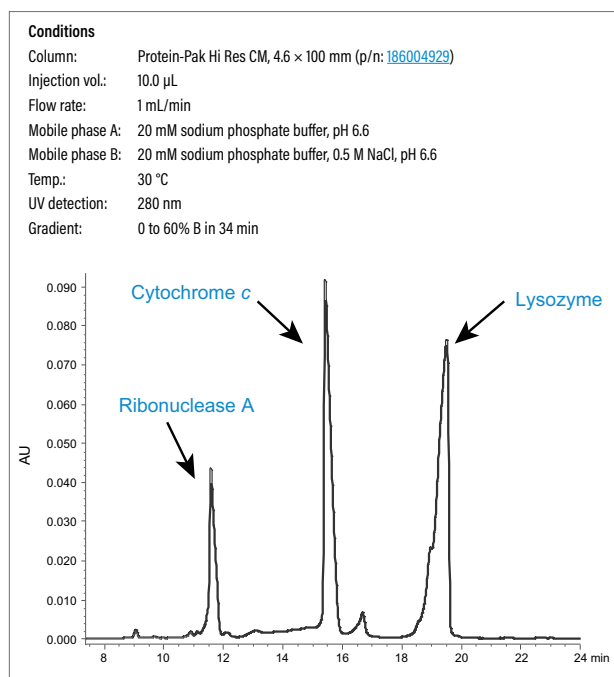
### Benchmarking, Method Development, and Troubleshooting

Ion-Exchange Standards are sets of standards that allow the user to benchmark anion- or cation-exchange columns on a regular basis in order to have confidence in results as well as providing a troubleshooting tool for any issues that may arise.



- IEX Anion Test Standard
- IEX Cation Test Standard

### Protein-Pak Hi Res CM Column using the IEX Cation Test Standard



Waters offers a variety of carefully formulated and QC-tested anion-exchange and cation-exchange protein standards to help chromatographers confirm adequate performance of their IEX column and LC system prior to the analyses of potentially highly valued samples.

## Ordering Information

### IEX Standards

Description	P/N (1/pk)
IEX Anion Test Standard	<a href="#">186006869</a>
IEX Cation Test Standard	<a href="#">186006870</a>

## Application of Waters UPLC Technology for Biotherapeutic Characterization

ACQUITY UPLC allows analytical chemists to reach far beyond conventional LC separations and has proven itself to be an asset to laboratories around the world. UPLC sets new standards in resolution, sensitivity, and throughput by being the first holistically-designed system that maximizes for rapid, high-resolution analyses. It has fueled hundreds of peer-reviewed papers, helps laboratories conserve resources, and has served the needs of regulatory agencies around the globe. ACQUITY UPLC simultaneously makes your laboratory more sustainable and more efficient.

### Manufacturing Consistency for Enhanced Assurance

The ability to obtain the same high-quality separations regardless of column lot is of critical importance to the successful development and commercialization of biotherapeutics. Each batch of Protein-Pak Hi Res IEX material is tested with a relevant mixture of protein standards to help ensure consistent column-to-column performance.



ACQUITY UPLC Technology for biotherapeutic characterization.

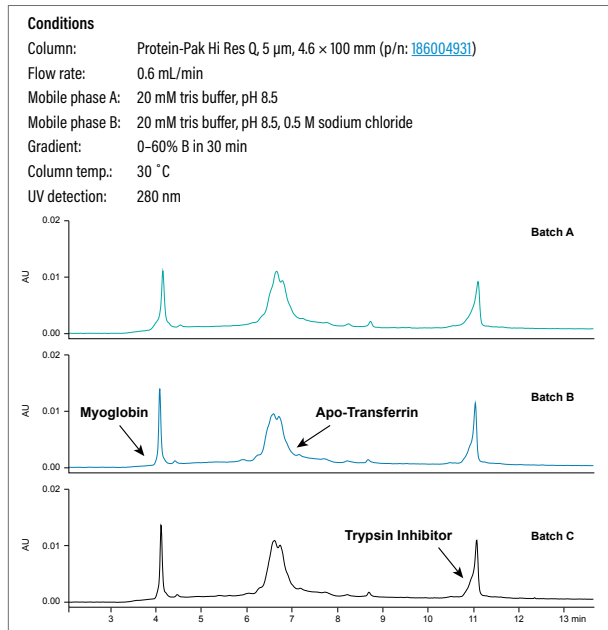
## Novel IEX Particles Ideal for Biomolecule Characterizations

Protein-Pak Hi Res IEX Columns contain non-porous, pH tolerant, hydrophilic particles whose surface consists of a multi-layered network of either anion (5 µm) or cation (7 µm) exchange groups. This innovative particle and bonding chemistry produces particles with greater protein loading capacities than found on many traditional mono-disperse, non-porous resins. This translates into columns that can resolve complex mixtures of biomolecules in comparatively short times compared to use of alternative porous or non-porous IEX Column offerings.

Column	Protein-Pak Hi Res Q	Protein-Pak Hi Res CM	Protein-Pak Hi Res SP
Ion Exchange	Strong Anion	Weak Cation	Strong Cation
Functional group	Quaternary ammonium	Carboxymethyl	Sulfopropyl
Matrix	Hydrophilic polymer	Hydrophilic polymer	Hydrophilic polymer
Particle size	5 µm	7 µm	7 µm
Pore size	Non porous	Non porous	Non porous
I.D. × L	4.6 × 100 mm	4.6 × 100 mm	4.6 × 100 mm
Counter ion	Cl <sup>-</sup>	Na <sup>+</sup>	Na <sup>+</sup>
pH range	3–10	3–10	3–10
Temperature	10–60 °C	10–60 °C	10–60 °C
pK <sub>a</sub>	10.5	4.9	2.3
Flow rates	0.3–0.6 mL/min	0.5–1.4 mL/min	0.5–1.4 mL/min
Approximate protein binding capacity in mgs per column (i.e., BSA for Hi Res Q column, lysozyme for Hi Res CM and Hi Res SP columns)*	58	33	25

\* For optimal resolution of complex samples, do not exceed 20% of the column's protein binding capacity.

## Protein-Pak Hi Res IEX Column Batch-to-Batch Reproducibility

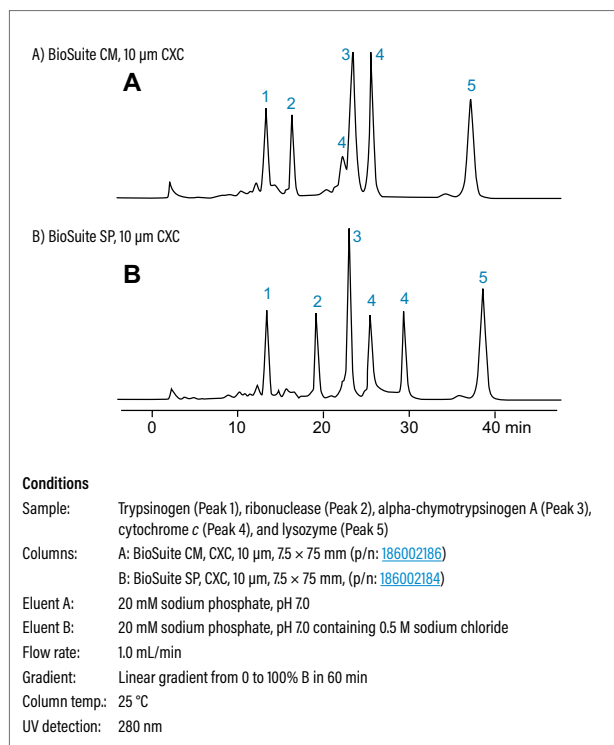


Each batch of Protein-Pak Hi Res SP, CM, and Q Column packing material is chromatography tested using a relevant protein standard mixture to help ensure consistent and predictable performance.

## BioSuite Ion-Exchange HPLC Columns

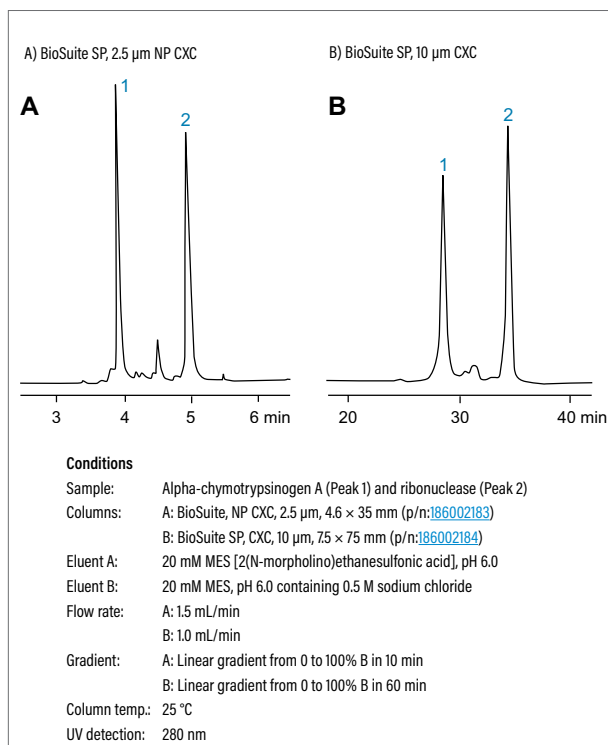
BioSuite Ion-Exchange (IEX) Column offerings include strong and weak cation (CXC) and anion exchangers (AXC) bonded to a pH stable (i.e., pH 2–12), methacrylic ester-based polymeric resin. The availability of four separation chemistries provides chromatographers with the flexibility required to develop methods that separate proteins or peptides based upon minor charge differences. Non-porous (NP) and porous IEX columns are also available. Speed and superior chromatographic resolution are possible using the NP IEX offerings. Waters' porous ion exchangers are available for applications requiring greater protein or peptide binding capacity. In addition, selected BioSuite Ion-Exchange Columns are offered in PEEK hardware as well as in 21.5 mm I.D. preparative column sizes.

### Protein Selectivity Differences Observed by Ion-Exchange Chromatography on BioSuite CM (Weak-Cation Exchange) vs. SP (Strong-Cation Exchange) Columns



*BioSuite strong (SP) and weak (CM) cation-exchange columns deliver different separation selectivities useful when developing a method to adequately separate a complex biocompound mixture.*

### Enhanced Compound Resolution by Ion-Exchange Chromatography on BioSuite SP Non-Porous (NP) vs. Porous CXC Columns



*Use of 2.5 µm, superficially-porous particles, contained in the BioSuite SP NP Columns, can deliver improved peptide component resolution and in less time (left figure) compared to the use of a BioSuite SP, CXC column that contains 10 µm, fully-porous particles (right figure).*

## Ordering Information

### BioSuite pC<sub>18</sub> and pPhenyl HPLC and UHPLC Columns

Description	Matrix	Dimension	P/N (1/pk)
BioSuite pC <sub>18</sub> , 2.5 µm NP RPC	Polymer	4.6 × 35 mm	<a href="#">186002152</a>
BioSuite pC <sub>18</sub> , 500, 7 µm RPC	Polymer	2.0 × 150 mm	<a href="#">186002153</a>
BioSuite pC <sub>18</sub> , 500, 7 µm RPC	Polymer	4.6 × 150 mm	<a href="#">186002154</a>
BioSuite pC <sub>18</sub> , 500, 13 µm RPC	Polymer	21.5 × 150 mm	<a href="#">186002155</a>
BioSuite pPhenyl, 1000, 10 µm RPC	Polymer	2.0 × 75 mm	<a href="#">186002156</a>
BioSuite pPhenyl, 1000, 10 µm RPC	Polymer	4.6 × 75 mm	<a href="#">186002157</a>
BioSuite pPhenyl, 1000, 13 µm RPC	Polymer	21.5 × 150 mm	<a href="#">186002158</a>

## BioSuite IEX HPLC Columns

Description	Matrix	Pore Size	Exclusion Limit (Daltons) Against Polyethylene Glycol	Dimension	Column Volume (mL)	# Approx Protein Binding Capacity Per Pre- Packed Column	P/N
BioSuite Q-PEEK, 10 µm AXC	Polymer	4000 Å	>5,000,000	4.6 × 50 mm	0.83	58 mg <sup>1</sup>	<a href="#">186002176</a>
BioSuite SP-PEEK, 7 µm CXC	Polymer	1300 Å	>4,000,000	4.6 × 50 mm	0.83	58 mg <sup>2</sup>	<a href="#">186002182</a>
BioSuite DEAE, 2.5 µm NP AXC	Polymer	n/a	500	4.6 × 35 mm	0.58	2.9 mg <sup>1</sup>	<a href="#">186002179</a>
BioSuite SP, 2.5 µm NP CXC	Polymer	n/a	500	4.6 × 35 mm	0.58	2.9 mg <sup>3</sup>	<a href="#">186002183</a>
BioSuite Q, 10 µm AXC	Polymer	1000 Å	1,000,000	7.5 × 75 mm	3.31	331 mg <sup>1</sup>	<a href="#">186002177</a>
BioSuite Q, 13 µm AXC	Polymer	1000 Å	1,000,000	21.5 × 150 mm	54.45	5445 mg <sup>1</sup>	<a href="#">186002178</a>
BioSuite DEAE, 10 µm AXC	Polymer	1000 Å	1,000,000	7.5 × 75 mm	3.31	99 mg <sup>1</sup>	<a href="#">186002180</a>
BioSuite DEAE, 13 µm AXC	Polymer	1000 Å	1,000,000	21.5 × 150 mm	54.45	1633 mg <sup>1</sup>	<a href="#">186002181</a>
BioSuite SP, 10 µm CXC	Polymer	1000 Å	1,000,000	7.5 × 75 mm	3.31	132 mg <sup>3</sup>	<a href="#">186002184</a>
BioSuite SP, 13 µm CXC	Polymer	1000 Å	1,000,000	21.5 × 150 mm	54.45	2178 mg <sup>3</sup>	<a href="#">186002185</a>
BioSuite CM, 10 µm CXC	Polymer	1000 Å	1,000,000	7.5 × 75 mm	3.31	149 mg <sup>3</sup>	<a href="#">186002186</a>
BioSuite CM, 13 µm CXC	Polymer	1000 Å	1,000,000	21.5 × 150 mm	54.45	2450 mg <sup>3</sup>	<a href="#">186002187</a>

<sup>1</sup> Data generated with BSA.

<sup>2</sup> Data generated with gamma globulin.

<sup>3</sup> Data generated with hemoglobin.

Note: For best resolution of complex samples, do not exceed 20% of the column's protein binding capacity.

## Protein-Pak PW Series Columns

Waters also offers a line of 10 µm polymer-based ion-exchangers pre-packed in steel or glass columns.

The Protein-Pak 5PW Columns are available as DEAE and SP ion exchangers. These columns can be used on HPLC and FPLC systems in both analytical and preparative configurations.

Dimension	Approximate Protein Binding Capacity per Pre-Packed Column			
	Protein-Pak HR Packing			
	Q	DEAE	SP	CM
5 × 50 mm	60 mg	40 mg	40 mg	25 mg
5 × 100 mm	130 mg	150 mg	80 mg	45 mg
10 × 100 mm	500 mg	300 mg	300 mg	180 mg

## Ordering Information

### Protein-Pak PW HPLC Column Series

Description	Dimension	P/N
Polymeric Weak Anion-Exchanger	7.5 × 75 mm	<a href="#">WAT088044</a>
Protein-Pak DEAE 5PW Glass Column	8 × 75 mm	<a href="#">WAT011783</a>
Protein-Pak DEAE 5PW Steel Column	21.5 × 150 mm	<a href="#">WAT010640</a>
Polymeric Strong Cation Exchanger	7.5 × 75 mm	<a href="#">WAT088043</a>
Protein-Pak SP 5PW Glass Column	8 × 75 mm	<a href="#">WAT011784</a>

## Protein-Pak High Resolution (HR) Ion-Exchange Glass Columns

Waters Protein-Pak HR packing materials are based on rigid, hydrophilic, polymethacrylate particles with large 1000 Å pores. The naturally hydrophilic polymer reduces non-specific adsorption, resulting in quantitative recovery of protein mass and bioactivity. These packings are compatible with buffers in the pH range 2–12, and will withstand exposure to caustic solutions, such as 0.1–1.0 M sodium hydroxide and acetic solutions, such as 20% acetic acid, for cleaning purposes.

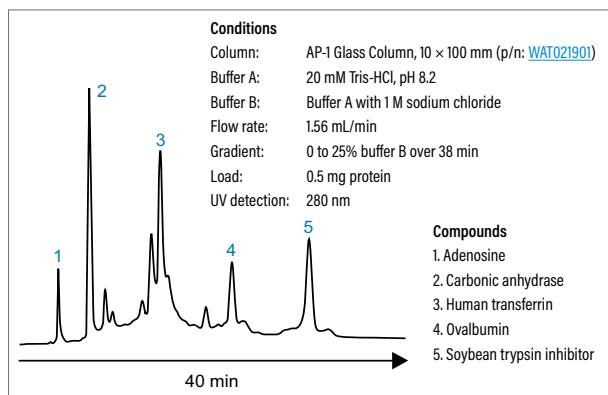
The Protein-Pak HR 8 µm and 15 µm packing materials are available pre-packed in Waters Advanced Purification (AP) Glass Columns in a choice of 5 mm I.D. (mini-column) or 10 mm I.D. by 100 mm in length. The 5 mm I.D. column is also available in a 50 mm length. These columns are compatible with any HPLC and FPLC system with the use of an adapter kit.

Protein-Pak HR ion exchangers are available with a Q functional group, a strong anion exchanger; DEAE, a weak anion exchanger; SP, a strong cation exchanger; and CM, a weak cation exchanger. The principal difference between a weak and strong ion exchanger does not lie in the protein binding capacity, but in the pH range of operation. Weak ion exchangers tend to have a more restricted useful pH range of operation.

Properties of Protein-Pak HR Columns				
	Protein-Pak Q HR1	Protein-Pak DEAE HR2	Protein-Pak CM HR3	Protein-Pak SP HR4
Type of material	Polymer	Polymer	Polymer	Polymer
Protein binding capacity	60 mg/mL	40 mg/mL	25 mg/mL	40 mg/mL
Ion-exchange capacity	200 µeq/mL	250 µeq/mL	175 µeq/mL	225 µeq/mL
Nominal pK	11.7	9.0	5.7	2.2
Typical protein recovery	>95%	>95%	>95%	>95%
Typical recovery of biological activity	>90%	>90%	>90%	>90%
pH stability	2–12	2–12	2–12	2–12

- For best resolution do not exceed 20% of the protein binding capacity.
- Bovine serum albumin in 20 mM Tris/Cl pH 8.2 was used to measure protein binding capacity of Protein-Pak Q and DEAE HR.
- Cytochrome c in 25 mM MES pH 5.0 was used to measure protein binding capacity of Protein-Pak SP and CM HR.
- Same conditions as CM. Protein binding capacity of Protein-Pak SP 40 HR is 20 mg/mL.

## Protein Resolution on Protein-Pak DEAE 15HR Anion-Exchange Column



Waters Advanced Purification (AP) Glass Columns, containing Protein-Pak DEAE 15 µm particles, are well suited for the analysis and/or lab-scale purification of various protein mixtures.

## Ordering Information

### Protein-Pak HR Ion-Exchange Glass Columns

Ion-Exchange Packing	Particle Size	Pore Size	Dimension	Particle Type	P/N
Protein-Pak Q 8HR	8 µm	1000 Å	5 × 50 mm	Polymeric strong anion exchanger	<a href="#">WAT039575</a>
			5 × 100 mm		<a href="#">WAT039630</a>
			10 × 100 mm		<a href="#">WAT035980</a>
Protein-Pak Q 15HR	15 µm	1000 Å	5 × 50 mm	Polymeric strong anion exchanger	<a href="#">WAT039782</a>
			10 × 100 mm		<a href="#">WAT037663</a>
Protein-Pak DEAE 8HR	8 µm	1000 Å	5 × 50 mm	Polymeric weak anion exchanger	<a href="#">WAT039791</a>
			5 × 100 mm		<a href="#">WAT039783</a>
			10 × 100 mm		<a href="#">WAT035650</a>
Protein-Pak DEAE 15HR	15 µm	1000 Å	5 × 50 mm	Polymeric weak anion exchanger	<a href="#">WAT039780</a>
			5 × 100 mm		<a href="#">WAT039786</a>
			10 × 100 mm		<a href="#">WAT038564</a>
Protein-Pak SP 8HR	8 µm	1000 Å	5 × 50 mm	Polymeric strong cation exchanger	<a href="#">WAT039570</a>
			5 × 100 mm		<a href="#">WAT039625</a>
			10 × 100 mm		<a href="#">WAT035655</a>
Protein-Pak SP 15HR	15 µm	1000 Å	10 × 100 mm	Polymeric strong cation exchanger	<a href="#">WAT038567</a>
Protein-Pak CM 8HR	8 µm	1000 Å	5 × 50 mm	Polymeric weak cation exchanger	<a href="#">WAT039790</a>
			5 × 100 mm		<a href="#">WAT039785</a>
			10 × 100 mm		<a href="#">WAT035970</a>
Protein-Pak CM 15HR	15 µm	1000 Å	5 × 50 mm	Polymeric weak cation exchanger	<a href="#">WAT039787</a>



## Advanced Purification (AP) Glass Columns

Waters AP series of glass columns are constructed of biocompatible glass and polymeric materials and can be easily used with silica, polymer, or soft gel packings. To optimize flow and ensure uniform sample distribution onto the packed bed, each column incorporates a distributor. A replaceable filter protects the packing from large particulate contaminants. Empty AP Glass Columns are available in a variety of sizes and utilize the same design to ensure predictable methods transfer among them. AP Glass Columns are compatible with both analytical and preparative HPLC and FPLC systems.



## Ordering Information

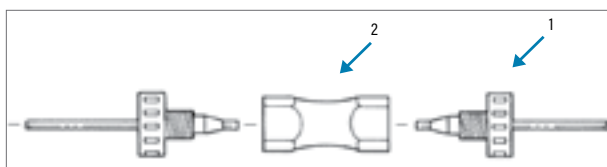
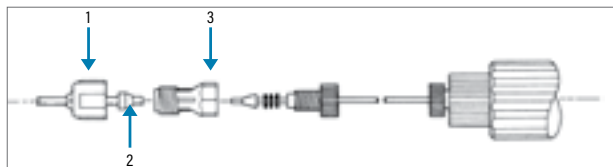
### Advanced Purification (AP) Glass Columns

Dimension	Bed Volume (mL)	Flow Rate (mL/min)	Pressure Rating (psi/MPa)	P/N
5 × 50 mm	0.8-1.2	0-4	1500 psi/10 MPa	<a href="#">WAT064-01</a>
5 × 100 mm	1.8-2.2	0-4	1500 psi/10 MPa	<a href="#">WAT064-02</a>
10 × 100 mm	5-8	0-4	1500 psi/10 MPa	<a href="#">WAT021901</a>
10 × 200 mm	13-16	0-4	1500 psi/10 MPa	<a href="#">WAT021902</a>
10 × 300 mm	21-24	0-4	1500 psi/10 MPa	<a href="#">WAT021903</a>
10 × 600 mm	45-48	0-4	1500 psi/10 MPa	<a href="#">WAT021906</a>
20 × 100 mm	22-31	4-16	1000 psi/6.8 MPa	<a href="#">WAT027501</a>
20 × 200 mm	53-62	4-16	1000 psi/6.8 MPa	<a href="#">WAT027502</a>
20 × 300 mm	85-94	4-16	1000 psi/6.8 MPa	<a href="#">WAT027503</a>
20 × 600 mm	179-188	4-16	1000 psi/6.8 MPa	<a href="#">WAT027506</a>
50 × 100 mm	137-196	16-100	500 psi/3.4 MPa	<a href="#">WAT023321</a>
50 × 200 mm	333-392	16-100	500 psi/3.4 MPa	<a href="#">WAT023332</a>
50 × 300 mm	530-589	16-100	500 psi/3.4 MPa	<a href="#">WAT023323</a>
50 × 600 mm	1118-1177	16-100	500 psi/3.4 MPa	<a href="#">WAT023326</a>

## Advanced Purification (AP) Glass Column Accessories and Spare Parts

Waters AP Glass Columns feature non-metallic construction and adjustable bed height with easy-to-use coarse and fine adjustments. The AP Glass Columns are available in a variety of dimensions.

### Connection of an AP MiniColumn and an AP-1 Column to 1/8" OD Tubing



## Ordering Information

### AP MiniColumn

Description	Qty.	P/N
1. Collet and Nut Assembly (3/8-24)	10/pk	<a href="#">WAT005138</a>
2. Ferrule 1/8" Tube	10/pk	<a href="#">WAT005136</a>
3. Union 3/8-24 × 'Z' Fitting	5/pk	<a href="#">WAT005137</a>

### AP MiniColumn Accessories and Spare Parts

Description	Dimension	P/N
Glass Tube	5 × 50 mm	<a href="#">WAT038802</a>
	5 × 100 mm	<a href="#">WAT038803</a>
Column Jacket	5 × 50 mm	<a href="#">WAT038804</a>
	5 × 100 mm	<a href="#">WAT038805</a>
Filters, 10/pk	—	<a href="#">WAT038806</a>
O-Rings, 13/pk (includes 10 inlet/outlet and 3 funnel)	—	<a href="#">WAT038807</a>
Inlet Connector Assembly	—	<a href="#">WAT038800</a>

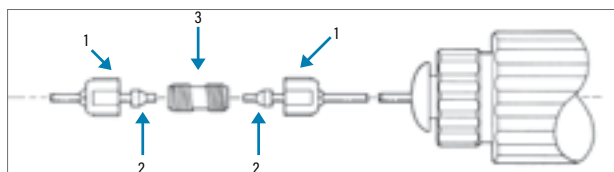
### AP-1 Column

Description	Qty.	P/N
1. Compression Screw and Ferrule 'Z' Fitting, Plastic	1/pk	<a href="#">WAT082708</a>
2. Union 'Z' Fitting, Plastic	1/pk	<a href="#">WAT082745</a>

### AP-1 Column Accessories and Spare Parts

Description	Dimension	P/N
Glass Tube	10 × 100 mm	<a href="#">WAT021992</a>
	10 × 200 mm	<a href="#">WAT022033</a>
	10 × 300 mm	<a href="#">WAT022034</a>
	10 × 600 mm	<a href="#">WAT022035</a>
Plastic Shield	10 × 100 mm	<a href="#">WAT021927</a>
	10 × 200 mm	<a href="#">WAT021945</a>
	10 × 300 mm	<a href="#">WAT021946</a>
O-Rings, 5/pk	10 × 600 mm	<a href="#">WAT021947</a>
	—	<a href="#">WAT021907</a>
Filters, 10/pk	—	<a href="#">WAT021910</a>
Replacement Tubing (Tefzel) (1/16 in. O.D. × 0.009 in. I.D. × 10 feet) (1.6 mm O.D. × 0.23 mm I.D. × 3 m)	—	<a href="#">WAT021950</a>
Inlet Connector Assembly	—	<a href="#">WAT021904</a>

### Connection of an AP-2 and an AP-5 Column to 1/8" O.D. Tubing



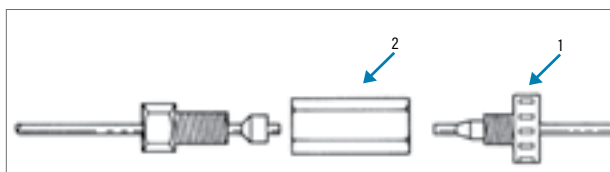
#### AP-2 Column

Description	Qty.	P/N
1. Collet and Nut Assembly (3/8-24)	10/pk	<a href="#">WAT005138</a>
2. Ferrule 1/8" Tube	10/pk	<a href="#">WAT005136</a>
3. Union 3/8-24 x 3/8-24	1/pk	WAT082734

#### AP-2 Column Accessories and Spare Parts

Description	Dimension	P/N
Glass Tube	20 x 100 mm	<a href="#">WAT019891</a>
	20 x 200 mm	<a href="#">WAT019892</a>
	20 x 300 mm	<a href="#">WAT019893</a>
	20 x 100 mm	<a href="#">WAT027542</a>
Plastic Shield	20 x 200 mm	<a href="#">WAT027543</a>
	20 x 300 mm	<a href="#">WAT027544</a>
	—	WAT027528
O-Rings, 5/pk	—	WAT027530
Filters, 2/pk	—	WAT023344
Replacement Tubing (Tefzel) (1/8 in. O.D. x 0.040 in. I.D. x 10 feet) (3.2 mm O.D. x 1.02 mm I.D. x 3 m)	—	WAT027525
Inlet Connector Assembly	—	700004715
Distributors/Inserts, 5/pk	—	

### Connection of Pharmacia Fitting to 1/16" O.D. Tubing



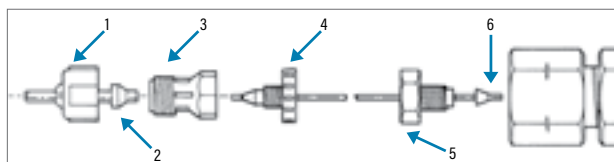
#### AP-5 Column

Description	Qty.	P/N
1. Compression Screw and Ferrule 'Z' Fitting, Plastic	1/pk	<a href="#">WAT082708</a>
2. Union, Plastic	1/pk	<a href="#">WAT021951</a>

#### AP-5 Column Accessories and Spare Parts

Description	Dimension	P/N
Glass Tube	50 x 100 mm	<a href="#">WAT019876</a>
	50 x 200 mm	<a href="#">WAT019877</a>
	50 x 300 mm	<a href="#">WAT019878</a>
Plastic Shield	50 x 100 mm	<a href="#">WAT023370</a>
	50 x 200 mm	<a href="#">WAT023371</a>
	50 x 300 mm	<a href="#">WAT023372</a>
	50 x 600 mm	<a href="#">WAT023373</a>
O-Rings, 5/pk	—	<a href="#">WAT023345</a>
Filter, 2/pk	—	<a href="#">WAT023343</a>
Replacement Tubing (Tefzel) 1/8 in. O.D. x 0.040 in. I.D. x 10 feet) (3.2 mm O.D. x 1.02 mm I.D. x 3 m)	—	WAT023344
Inlet Connector Assembly	—	<a href="#">WAT023349</a>
Outlet Connector Assembly	—	WAT023348
Collet and Nut Assembly	—	<a href="#">WAT023346</a>
Ferrule, 10/pk	—	<a href="#">WAT023347</a>
Funnel Assembly	—	<a href="#">WAT023396</a>

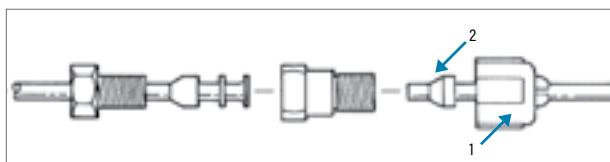
### Connection of a Protein-Pak Steel Column to 1/16" and 1/8" O.D. Tubing



#### Protein-Pak Steel Column

Description	Qty.	P/N
1. Collet and Nut Assembly (3/8-24)	10/pk	<a href="#">WAT005138</a>
2. Ferrule 1/8" Tube	10/pk	<a href="#">WAT005136</a>
3. Union 3/8-24 x 'Z' Fitting	5/pk	<a href="#">WAT005137</a>
4. Compression Screw and Ferrule 'Z' Fitting, Plastic	1/pk	<a href="#">WAT082708</a>
5. Compression Screw 'Z' Fitting, Steel	10/pk	<a href="#">WAT005070</a>
6. Ferrule 1/16" Steel	10/pk	<a href="#">WAT005063</a>

### Connection of 1/8" or 1/16" Flanged Type Fitting to 1/8" O.D. Tubing



#### Flanged Type Fitting

Description	Qty.	P/N
1. Collet and Nut Assembly (3/8-24)	10/pk	<a href="#">WAT005138</a>
2. Ferrule 1/8" Tube	10/pk	<a href="#">WAT005136</a>

## AccellPlus Ion-Exchange Packings

### Solid-Phase Extraction for Protein Sample Preparation

Waters AccellPlus ion-exchange packings are 40 µm, 300 Å polymer-coated, silica-based materials for both lab- and process-scale chromatography. AccellPlus, available as a QMA (strong anion exchanger) or CM (weak cation exchanger), is easy to pack and is excellent for the purification of proteins, enzymes, and immunoglobulins. The rigid silica-based packing material will withstand very high flow rates during cleaning and re-equilibration cycles. Normal flow rates are used during sample loading and elution to obtain the best possible resolution.

AccellPlus bulk material may be packed into our Advanced Purification (AP) Glass Columns.

To estimate packed bed volume for a known amount of AccellPlus: **AccellPlus used (g) × 2 = packed bed volume (mL)**

### AccellPlus Sep-Pak Cartridges

Sep-Pak Plus Cartridges packed with AccellPlus ion exchangers provide a rapid, economical means to clean up heavily contaminated samples that would damage a high resolution column. They can also be used to rapidly screen chromatographic conditions. These are also available in a variety of configurations.

## Ordering Information

### AccellPlus Sep-Pak Cartridges

Description	Ion-Exchange Type	P/N
AccellPlus CM	Weak Cation Exchanger	<a href="#">WAT020550</a>
AccellPlus QMA	Strong Anion Exchanger	<a href="#">WAT020545</a>
AccellPlus QMA Plus	Strong Anion Exchanger	<a href="#">186004540</a>

## AccellPlus PrepPak Cartridges (47 × 300 mm)

Economical, convenient preparative separations in the 500 mg to 10 g range. For a complete listing of Waters products for preparative chromatography, visit [waters.com](#)

Protein Binding Capacity of AccellPlus	
AccellPlus QMA* 200 mg BSA/g packing	AccellPlus CM** 175 mg Cytochrome c/g packing
* Bovine serum albumin in 20 mM Tris/Cl pH 7.0 was used to measure protein binding capacity of AccellPlus QMA.	
** Cytochrome c in 20 mM sodium phosphate pH 6.3 was used to measure protein binding capacity of AccellPlus CM.	
Note: For best resolution do not exceed 20% of the protein binding capacity.	

## Ordering Information

### AccellPlus PrepPak Cartridges (47 × 300 mm)

Description	Particle Size	Pore Size	P/N
AccellPlus CM*	40 µm	300 Å	<a href="#">WAT036545</a>
PrepPak 1000 Module	—	—	<a href="#">WAT089592</a>

\* Requires PrepPak 1000 Module.

## AccellPlus Ion-Exchange Bulk Packings

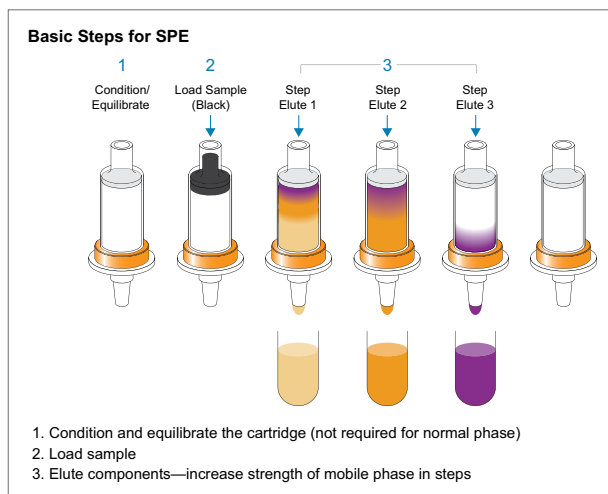
For all preparative isolations based on ionic interactions, particularly proteins, enzymes, and immunoglobulins.

### Ion-Exchange Sample Preparation with Sep-Pak Cartridges

To perform ion-exchange sample preparation with Sep-Pak Cartridges, use a gradient of pH or ionic strength with Accell Plus CM, AccellPlus QMA or NH<sub>2</sub> as a sorbent.

- Condition the cartridge with six to ten hold-up volumes of de-ionized water or weak buffer
- Load the sample dissolved in a solution of deionized water or buffer
- Elute unwanted weakly bound components with a weak buffer
- Elute the first component of interest with a stronger buffer (change the pH or ionic strength)
- Elute other components of interest with progressively stronger buffers
- When you recover all of your components, discard the used cartridge in an appropriate manner

### General Elution Protocol for Ion-Exchange Chromatography on Sep-Pak Cartridges (NH<sub>2</sub>, AccellPlus QMA, AccellPlus CM)



## Ordering Information

### AccellPlus Ion-Exchange Bulk Packings

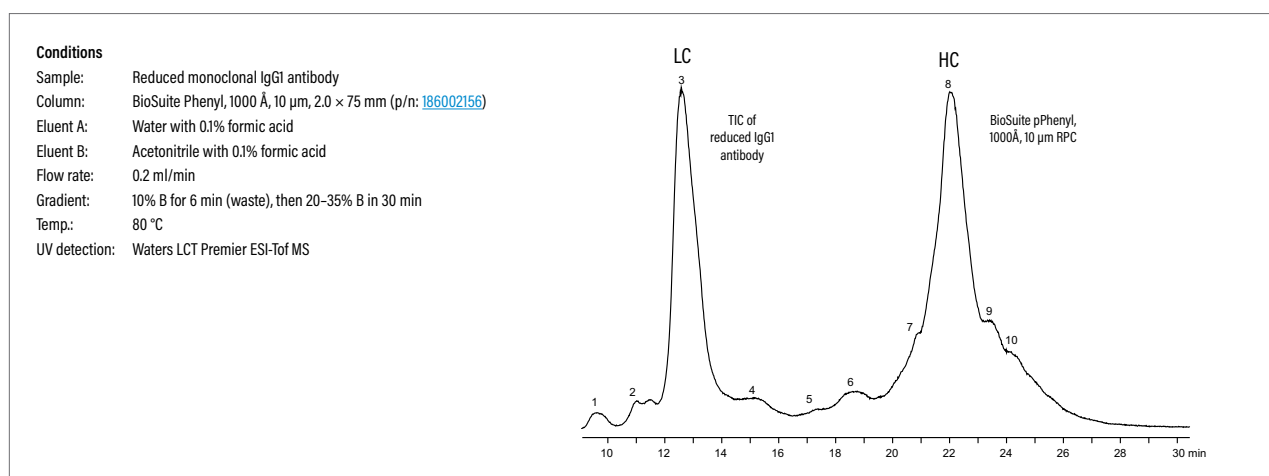
Description	Particle Size	Pore Size	Qty.	P/N
AccellPlus QMA	40 µm	300 Å	100 g	<a href="#">WAT010742</a>
Anion Exchanger	—	—	500 g	<a href="#">WAT010741</a>
AccellPlus CM	40 µm	300 Å	100 g	<a href="#">WAT010740</a>
Cation Exchanger	—	—	500 g	<a href="#">WAT010739</a>

## BioSuite pC<sub>18</sub> and pPhenyl Reversed-Phase Chromatography (RPC) HPLC Columns

Reversed-phase chromatography (RPC) has become a widely accepted tool for the separation of proteins, peptides, synthetic oligonucleotides, and other biomolecules. For many applications, Symmetry and Symmetry300, Atlantis T3, or BEH 130 Å and BEH 300 Å Chemistries can be successfully used for the isolation and analyses of these biocompounds. However for some applications, the large pore size and high chemical stability of BioSuite phenyl C<sub>18</sub> and pPhenyl resin-based packings may be preferred. BioSuite RPC Column offerings include a C<sub>18</sub> (pC<sub>18</sub>) and a phenyl (pPhenyl) chemistry bonded to a pH stable, methacrylic ester-based polymeric resin. The 500 Å pore size of the pC<sub>18</sub> base matrix accommodates proteins up to 2,500,000 Daltons while the 1000 Å pore size of the pPhenyl base matrix accommodates proteins up to 5,000,000 Daltons.

The BioSuite pC<sub>18</sub>, 2.5 µm, NP Column contains a non-porous chemistry that yields superior chromatographic resolution in less time compared to chromatography performed on the porous, pC<sub>18</sub>, 500 Å, 7 µm RPC selection. Waters' porous, pC<sub>18</sub>, 500 Å, 7 µm RPC Column is available for applications requiring greater binding capacity. The pC<sub>18</sub> and pPhenyl RPC chemistries are available in 21.5 × 150 mm columns for "lab-scale" isolations while a 2.0 × 75 mm column is well suited for narrow-bore HPLC and LC-MS applications.

### LC-MS Analysis of a Reduced Monoclonal IgG1 Antibody on a BioSuite pPhenyl RPC Column

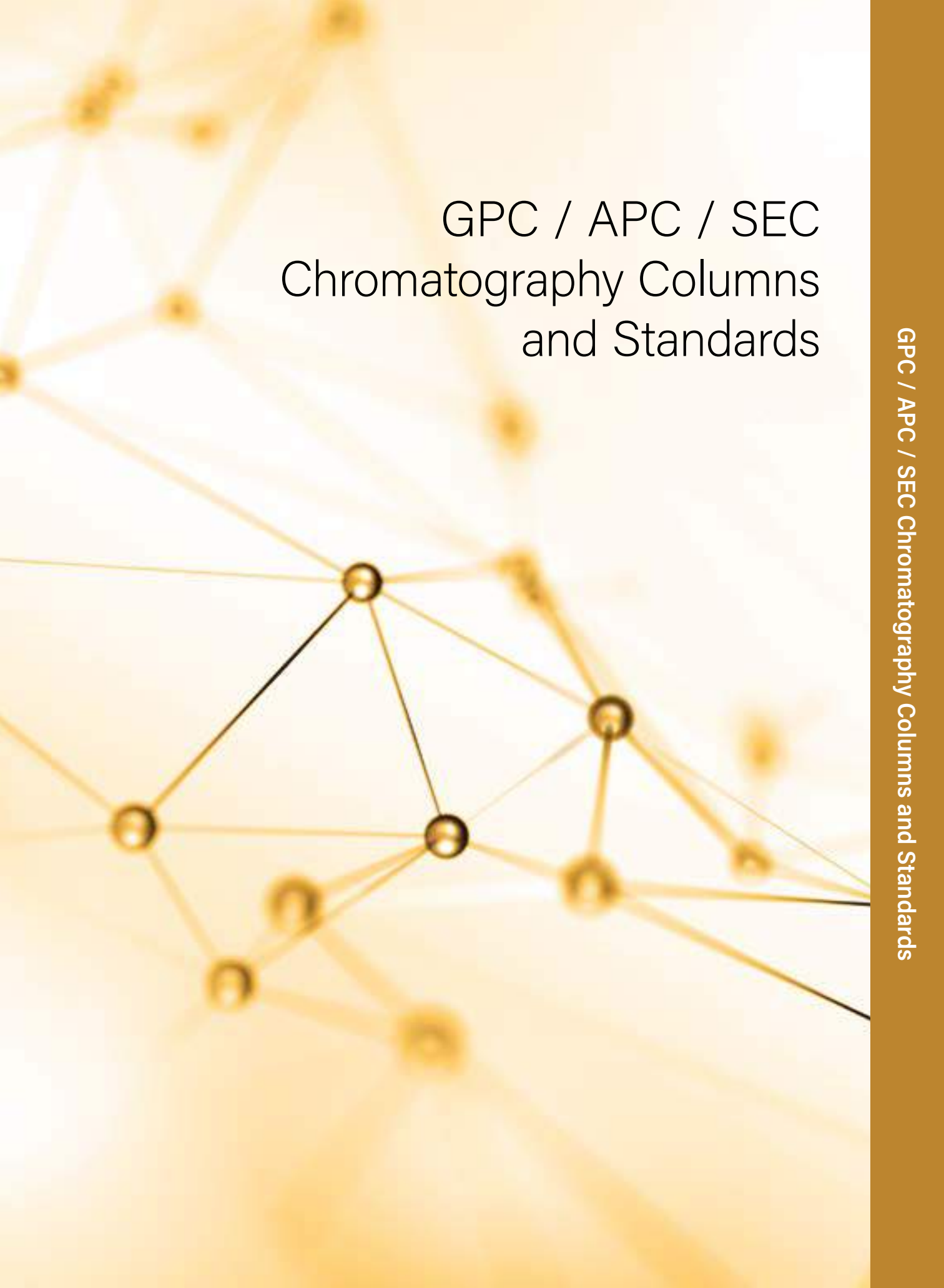


The BioSuite pPhenyl, 1000 Å RPC Columns have a higher ligand density compared to the BioSuite Phenyl, 1000 Å HIC Columns and are not recommended for hydrophobic-interaction separations.

## Ordering Information

### BioSuite Hydrophobic-Interaction Chromatography HPLC and UHPLC Columns

Description	Matrix	Dimension	P/N
BioSuite Phenyl, 10 µm HIC	Polymer	7.5 × 75 mm	<a href="#">186002159</a>
BioSuite Phenyl, 13 µm HIC	Polymer	21.5 × 150 mm	<a href="#">186002160</a>



GPC / APC / SEC  
Chromatography Columns  
and Standards

# Contents

<b>GPC Columns for Non-Aqueous Samples</b> .....	<b><a href="#">455</a></b>
ACQUITY APC XT Columns.....	<a href="#">455</a>
Styragel Columns Selection Guide.....	<a href="#">457</a>
Styragel HT (High-Temperature) Columns.....	<a href="#">459</a>
Ultrastyrigel Columns.....	<a href="#">460</a>
HSPgel Columns.....	<a href="#">461</a>
Shodex Columns.....	<a href="#">463</a>
Envirogel High-Resolution GPC Cleanup Columns.....	<a href="#">463</a>
<b>SEC Columns</b> .....	<b><a href="#">464</a></b>
ACQUITY APC AQ Columns.....	<a href="#">464</a>
XBridge Protein BEH SEC Columns.....	<a href="#">466</a>
XBridge Protein BEH SEC Columns For UHPL-Based Separations.....	<a href="#">467</a>
ACQUITY UPLC Protein SEC Columns.....	<a href="#">468</a>
BioResolve SEC mAB For Monoclonal Aggregate, Monomer, and Fragment Analyses.....	<a href="#">469</a>
Acquity and XBridge Premier Protein SEC 250 Å Columns.....	<a href="#">470</a>
Protein-Pak Size-Exclusion HPLC Columns.....	<a href="#">471</a>
mAB Size Variant Standard.....	<a href="#">471</a>
Protein Standards.....	<a href="#">471</a>
SEC Column Connectors and Connector Kits.....	<a href="#">472</a>
Ultrahydrogel Columns.....	<a href="#">473</a>
<b>Solvent Guide</b> .....	<b><a href="#">474</a></b>
<b>Calibration Standards</b> .....	<b><a href="#">476</a></b>
ACQUITY APC Calibration Standards.....	<a href="#">476</a>
ReadyCal Standards.....	<a href="#">478</a>
Polymer-Specific Calibration Standards.....	<a href="#">478</a>
Individual MW Standards.....	<a href="#">479</a>
SEC Calibration Standards.....	<a href="#">479</a>

# Size-Exclusion Chromatography Columns and Standards

For 60 years, Waters has continuously improved GPC (Gel Permeation Chromatography), and SEC (Size-Exclusion Chromatography), refining instrumentation, packing materials, and technology. Among the resultant innovations are size-exclusion techniques that expand beyond the original polymer analysis. These include applications for separating small and large molecules from interfering matrices such as those in foods, pharmaceutical preparations, and natural products.

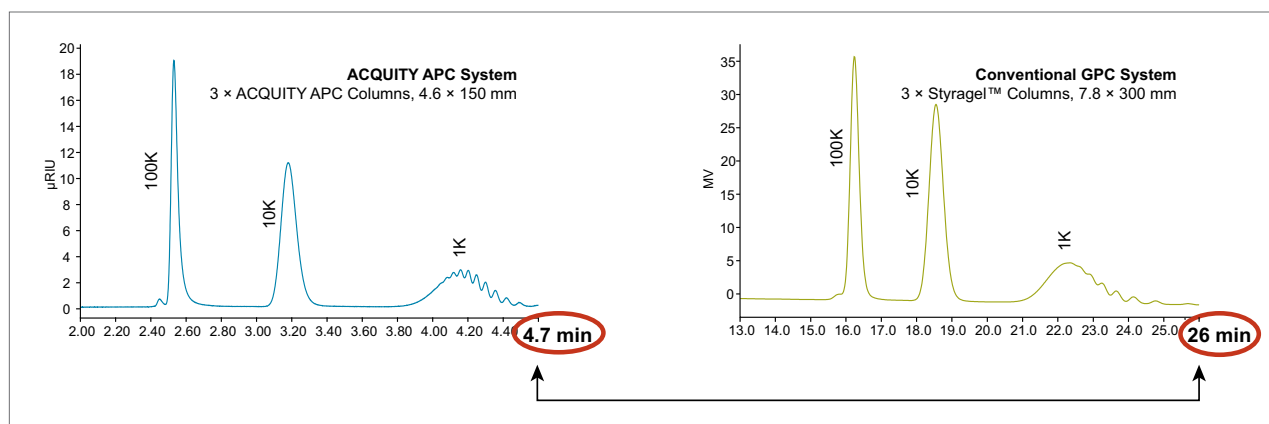
As a market leader and a primary manufacturer of chromatographic instrumentation and consumables, Waters will continue to influence the field of separation science, providing the highest quality products and expert applications support.

## GPC Columns for Non-Aqueous Samples

The goals for a separation can range between maximum speed, for screening purposes, to maximum resolution, for quality control purposes. Each analysis type presents unique challenges. Waters' comprehensive line of GPC columns ensures that the column or column bank you select for an analysis will accommodate a particular temperature, solvent, and polymer type.

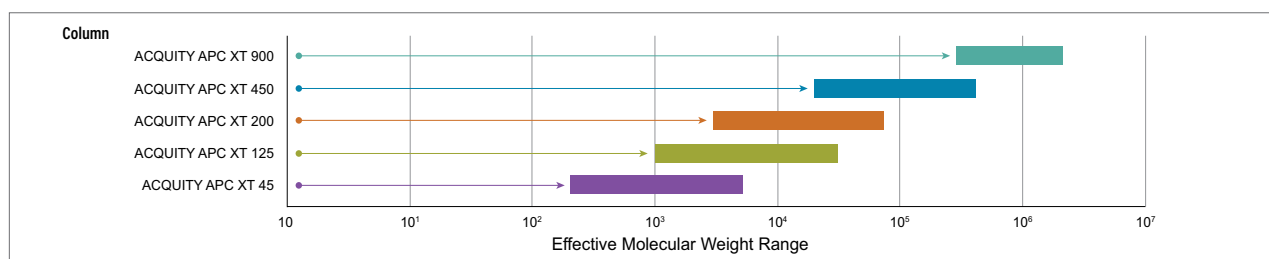
### ACQUITY APC XT COLUMNS

Using ACQUITY APC XT Columns, you can quantify and characterize polymer samples with accuracy and confidence while maximizing productivity. The high-performance chemistries contained in ACQUITY Advanced Polymer Chromatography (APC) Columns enable rapid and accurate chromatographic characterization of synthetic polymer and macromolecular species. The rigid hybrid particles used for ACQUITY APC XT Columns provide an unprecedented capability for rapid solvent switching, allowing you to use multiple conditions for the same column bank. This gives you the ability to quantify and characterize polymer samples with confidence and accuracy while maximizing productivity.

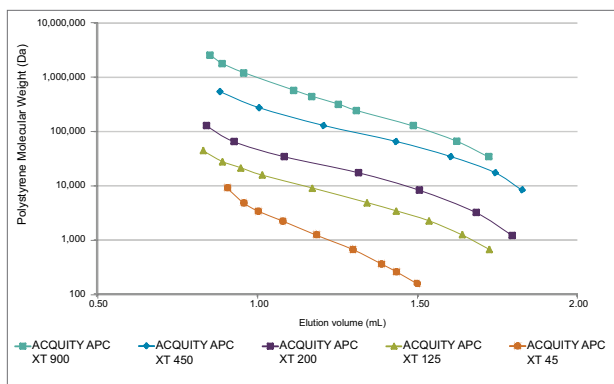


Compared with conventional columns, ACQUITY APC Columns provide faster analysis time and increase chromatographic resolution. Improving data quality enhances your ability to accurately characterize polymers and to do it with confidence. The conventional GPC separation was performed using three Styragel HR Columns (HR 0.5, HR 2, and HR 4E), all 7.8 x 300 mm. The same polystyrene sample was analyzed using a three column bank of 4.6 x 150 mm ACQUITY APC Columns (XT 45, XT 45, and XT 200). The separation used THF, and the flow rate was 1 mL/min.

### ACQUITY APC XT Column Selection Guide







Polystyrene calibration curves for ACQUITY APC XT Columns.

ACQUITY APC XT Columns are shipped dry, with acetal compression plugs at the assembly's ends. If you are storing the columns wet using a strong solvating solvent, consider fitting compression plugs made of stainless steel.

## Ordering Information

### ACQUITY APC XT Columns

Pore Size	Effective MW Range*	Particle Size	Column Length		
			30 mm	75 mm	150 mm
45 Å	200–5000	1.7 µm	<a href="#">186006992</a>	<a href="#">186006993</a>	<a href="#">186006995</a>
125 Å	1000–30,000	2.5 µm	<a href="#">186006997</a>	<a href="#">186006998</a>	<a href="#">186007000</a>
200 Å	3000–70,000	2.5 µm	<a href="#">186007002</a>	<a href="#">186007003</a>	<a href="#">186007005</a>
450 Å	20,000–400,000	2.5 µm	<a href="#">186007007</a>	<a href="#">186007008</a>	<a href="#">186007010</a>
900 Å	300,000–2,000,000	2.5 µm	<a href="#">186007252</a>	<a href="#">186007253</a>	<a href="#">186007254</a>

All columns listed above are 4.6 mm I.D. and are shipped dry.

Maximum operating temperature limit 90 °C.

\*The calibration range is based on well-characterized polystyrene standards.

### ACQUITY APC XT Fitting Compression Plug

Description	P/N
Stainless Steel Pin Plug, 1/16 in., High Pressure, 5/pk	<a href="#">700002747</a>

## Waters ACQUITY APC Column Selector

Easily find column and calibration kit recommendations that fit your polymer analysis requirements.

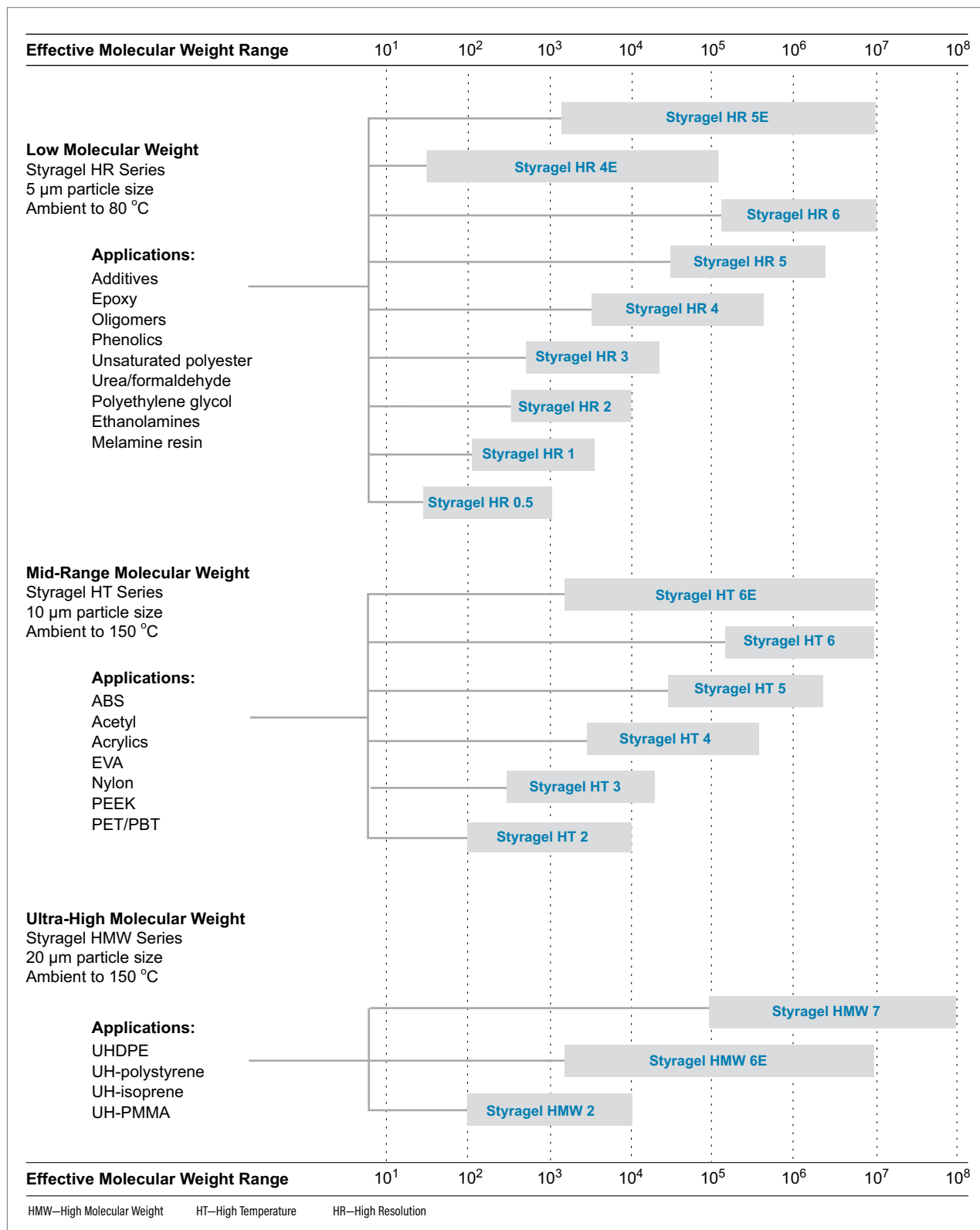
 To try this tool, go to [waters.com/APCselector](https://waters.com/APCselector)



## STYRAGEL COLUMNS SELECTION GUIDE

Waters offers a comprehensive selection of polymeric GPC columns. Select a column or column bank that is compatible with the temperature, solvent, and polymer type analyzed. Refer to the following charts to quickly compare the molecular weight ranges for the specified columns. By connecting two or more columns in series, you extend the effective molecular-weight range, which is necessary preparation for performing increasingly complex sample analyses.

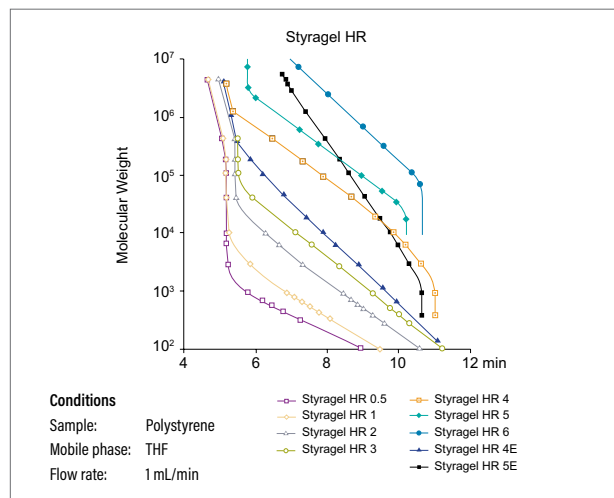
### Selection Guide



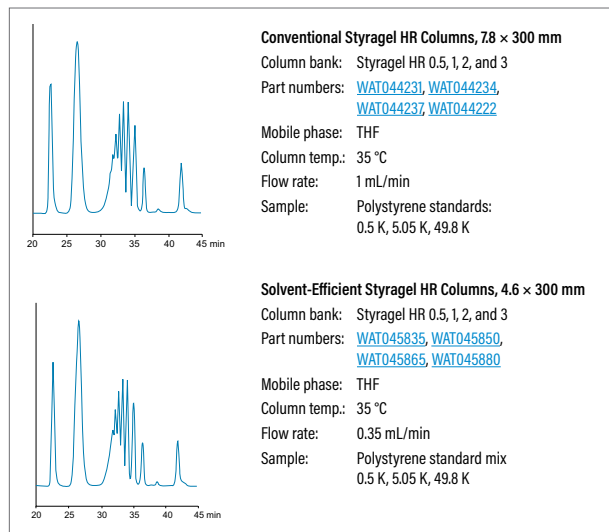
## Styragel HR (High-Resolution) Columns

Designed especially for low-molecular-weight samples, Waters Styragel HR Columns are ideal for analyzing oligomers, epoxies, and polymer additives, where high resolution is critical. Packed with rigid 5  $\mu\text{m}$  particles, these columns deliver unrivaled resolution and efficiency in the low-to-mid molecular-weight region.

### Calibration Curves for the Waters Styragel HR Series of High-Resolution Columns



### Styragel HR Columns for Unrivaled Resolution of Low-Molecular-Weight Samples



## Ordering Information

### Styragel HR Columns (7.8 x 300 mm)

Description	Effective MW Range	P/N		
		THF	DMF	Toluene
Styragel HR 0.5, 50 Å	0–1000	<a href="#">WAT044231</a>	<a href="#">WAT044232</a>	<a href="#">WAT044230</a>
Styragel HR 1, 100 Å	100–5000	<a href="#">WAT044234</a>	<a href="#">WAT044235</a>	<a href="#">WAT044233</a>
Styragel HR 2, 500 Å	500–20,000	<a href="#">WAT044237</a>	<a href="#">WAT044238</a>	<a href="#">WAT044236</a>
Styragel HR 3, 10 <sup>3</sup> Å	500–30,000	<a href="#">WAT044222</a>	<a href="#">WAT044223</a>	<a href="#">WAT044221</a>
Styragel HR 4, 10 <sup>4</sup> Å	5000–600,000	<a href="#">WAT044225</a>	<a href="#">WAT044226</a>	<a href="#">WAT044224</a>
Styragel HR 4E, mixed bed	50–100,000	<a href="#">WAT044240</a>	<a href="#">WAT044241</a>	<a href="#">WAT044239</a>
Styragel HR 5, 10 <sup>5</sup> Å	50,000–4,000,000	<a href="#">WAT054460</a>	<a href="#">WAT054466</a>	<a href="#">WAT054464</a>
Styragel HR 5E, mixed bed	2000–4,000,000	<a href="#">WAT044228</a>	<a href="#">WAT044229</a>	<a href="#">WAT044227</a>
Styragel HR 6, 10 <sup>6</sup> Å	200,000–10,000,000	<a href="#">WAT054468</a>	<a href="#">WAT054474</a>	<a href="#">WAT054470</a>
Styragel Guard Column, 4.6 x 30 mm	—	<a href="#">WAT054405</a>	<a href="#">WAT054415</a>	<a href="#">WAT054410</a>

### Styragel HR Columns (4.6 x 300 mm)\*

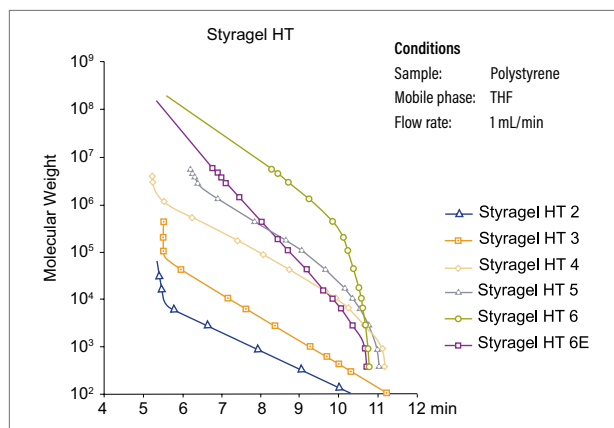
Description	Effective MW Range	P/N		
		THF	DMF	Toluene
Styragel HR 0.5, 50 Å	0–1000	<a href="#">WAT045835</a>	<a href="#">WAT045840</a>	<a href="#">WAT045830</a>
Styragel HR 1, 100 Å	100–5000	<a href="#">WAT045850</a>	<a href="#">WAT045855</a>	<a href="#">WAT045845</a>
Styragel HR 2, 500 Å	500–20,000	<a href="#">WAT045865</a>	<a href="#">WAT045870</a>	<a href="#">WAT045860</a>
Styragel HR 3, 10 <sup>3</sup> Å	500–30,000	<a href="#">WAT045880</a>	<a href="#">WAT045885</a>	<a href="#">WAT045875</a>
Styragel HR 4, 10 <sup>4</sup> Å	5000–600,000	<a href="#">WAT045895</a>	<a href="#">WAT045900</a>	<a href="#">WAT045890</a>
Styragel HR 4E, mixed bed	50–100,000	<a href="#">WAT045805</a>	<a href="#">WAT045810</a>	<a href="#">WAT045800</a>
Styragel HR 5E, mixed bed	2000–4,000,000	<a href="#">WAT045820</a>	<a href="#">WAT045825</a>	<a href="#">WAT045815</a>

\*The same high performance as our conventional Styragel HMW Columns with the added advantage of reducing your solvent consumption by two-thirds.

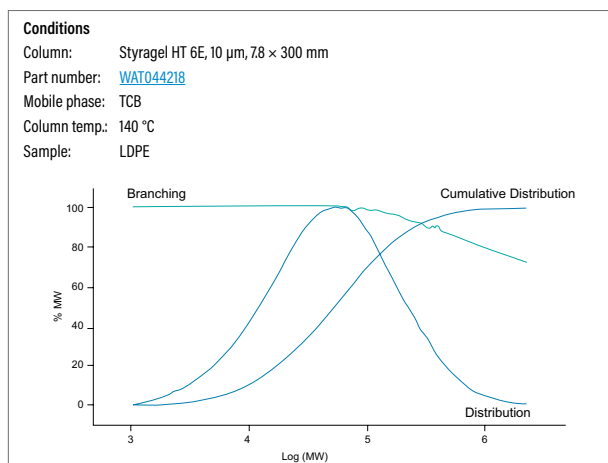
## STYRAGEL HT (HIGH-TEMPERATURE) COLUMNS

You can use Styragel HT Columns with aggressive solvents at high temperatures without sacrificing resolution or column lifetime. Packed with rigid 10 µm particles, a typical plate count exceeds 10,000 plates per column. These columns are extremely durable because of a narrow, particle-size distribution that results in a stable column bed. Suitable for both ambient and high-temperature analysis, the Styragel HT Columns offer excellent resolution of polymers in the mid-to-high molecular-weight range.

### Calibration Curves for the Waters Styragel HT Series of High-Temperature Columns



### Styragel HT Columns Deliver Superior Performance— Even at High Temperatures



## Ordering Information

### Styragel HT Columns (7.8 × 300 mm)

Description	Effective MW Range	P/N	P/N	P/N
		THF	DMF	Toluene
Styragel HT 2, 500 Å	100–10,000	<a href="#">WAT054475</a>	<a href="#">WAT054480</a>	<a href="#">WAT054476</a>
Styragel HT 3, 10 <sup>3</sup> Å	500–30,000	<a href="#">WAT044207</a>	<a href="#">WAT044208</a>	<a href="#">WAT044206</a>
Styragel HT 4, 10 <sup>4</sup> Å	5000–600,000	<a href="#">WAT044210</a>	<a href="#">WAT044211</a>	<a href="#">WAT044209</a>
Styragel HT 5, 10 <sup>5</sup> Å	50,000–4,000,000	<a href="#">WAT044213</a>	<a href="#">WAT044214</a>	<a href="#">WAT044212</a>
Styragel HT 6, 10 <sup>6</sup> Å	200,000–10,000,000	<a href="#">WAT044216</a>	<a href="#">WAT044217</a>	<a href="#">WAT044215</a>
Styragel HT 6E, mixed bed	5000–10,000,000	<a href="#">WAT044219</a>	<a href="#">WAT044220</a>	<a href="#">WAT044218</a>
Styragel Guard Column, 4.6 × 300 mm	—	<a href="#">WAT054405</a>	<a href="#">WAT054415</a>	<a href="#">WAT054410</a>

### Styragel HT Columns (4.6 × 300 mm)\*

Description	Effective MW Range	P/N	P/N	P/N
		THF	DMF	Toluene
Styragel HT 3, 10 <sup>3</sup> Å	500–30,000	<a href="#">WAT045920</a>	<a href="#">WAT045925</a>	<a href="#">WAT045915</a>
Styragel HT 4, 10 <sup>4</sup> Å	5000–600,000	<a href="#">WAT045935</a>	<a href="#">WAT045940</a>	<a href="#">WAT045930</a>
Styragel HT 5, 10 <sup>5</sup> Å	50,000–4,000,000	<a href="#">WAT045950</a>	<a href="#">WAT045955</a>	<a href="#">WAT045945</a>
Styragel HT 6, 10 <sup>6</sup> Å	200,000–10,000,000	<a href="#">WAT045965</a>	<a href="#">WAT045970</a>	<a href="#">WAT045960</a>
Styragel HT 6E, mixed bed	5000–10,000,000	<a href="#">WAT045980</a>	<a href="#">WAT045985</a>	<a href="#">WAT045975</a>

\*The same high performance as our conventional Styragel HT Columns with the added advantage of reducing your solvent consumption by two-thirds.

## Styragel HMW (High-Molecular-Weight) Columns

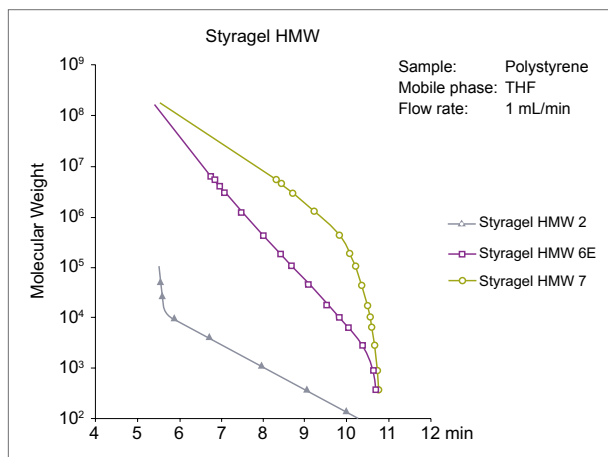
The Styragel HMW Columns are designed specifically to analyze polymers of ultra-high-molecular-weight, which are susceptible to shearing. Combining high-porosity, 10 µm frits and 20 µm particles, the Styragel HMW Columns minimize polymer shear effects. Usable at ambient or elevated temperatures, these state-of-the-art columns exhibit excellent lifetimes.

### Ordering Information

Styragel HMW Columns (7.8 × 300 mm)

Description	Effective MW Range	P/N		
		THF	DMF	Toluene
Styragel HMW 2, 500 Å	100–10,000	<a href="#">WAT054488</a>	<a href="#">WAT054494</a>	<a href="#">WAT054490</a>
Styragel HMW 6E, mixed bed	5000–1 × 10 <sup>7</sup>	<a href="#">WAT044204</a>	<a href="#">WAT044205</a>	<a href="#">WAT044203</a>
Styragel HMW 7, 10 <sup>7</sup> Å	500,000–1 × 10 <sup>8</sup>	<a href="#">WAT044201</a>	<a href="#">WAT044202</a>	<a href="#">WAT044200</a>
Styragel Guard Column, 4.6 × 30 mm	–	<a href="#">WAT054405</a>	<a href="#">WAT054415</a>	<a href="#">WAT054410</a>

## Calibration Curves for Waters Styragel HMW Series of High-Molecular-Weight Columns



Styragel HMW Columns (4.6 × 300 mm)\*

Description	Effective MW Range	P/N		
		THF	DMF	Toluene
Styragel HMW 6E, mixed bed	5000–1 × 10 <sup>7</sup>	<a href="#">WAT046820</a>	<a href="#">WAT046825</a>	<a href="#">WAT046815</a>
Styragel HMW 7, 10 <sup>7</sup> Å	500,000–1 × 10 <sup>8</sup>	<a href="#">WAT046805</a>	<a href="#">WAT046810</a>	<a href="#">WAT046800</a>

System dead volume must be minimized for maximum column performance.  
\*The same high performance as our conventional Styragel HMW Columns with the added advantage of reducing your solvent consumption by two-thirds.

## ULTRASTYRAGEL COLUMNS

UltraStyragel Preparative Columns provide high-efficiency GPC separations for compound isolation and sample cleanup. Closely related to Styragel GPC Columns, the family of UltraStyragel Columns provides a two-to three-fold increase in efficiency (plates/meter) that improves separation speed and reduces solvent consumption for preparative isolation. Separations that once required several smaller Styragel Columns can be performed on a single, more efficient, UltraStyragel Preparative Column.

### Ordering Information

UltraStyragel Columns (19 × 300 mm)

Pore Size	Effective MW Range	(mL/min)	P/N	
		Flow Rate	Toluene	THF
100 Å	50–1500	4–10	<a href="#">WAT025866</a>	<a href="#">WAT025859</a>
500 Å	100–10,000	4–10	<a href="#">WAT025867</a>	<a href="#">WAT025860</a>
10 <sup>3</sup> Å	200–30,000	4–10	<a href="#">WAT025868</a>	<a href="#">WAT025861</a>
10 <sup>4</sup> Å	5000–600,000	4–10	<a href="#">WAT025869</a>	<a href="#">WAT025862</a>
10 <sup>5</sup> Å	50,000–4 M	4–10	<a href="#">WAT025870</a>	<a href="#">WAT025863</a>
10 <sup>6</sup> Å	200,000–10 M	4–10	<a href="#">WAT025871</a>	<a href="#">WAT025864</a>
Linear	2000–4 M	4–10	<a href="#">WAT025872</a>	<a href="#">WAT025865</a>

UltraStyragel Columns (7.8 × 300 mm)

Pore Size	Effective MW Range	P/N	
		Toluene	THF
100 Å	50–1500	<a href="#">WAT085500</a>	<a href="#">WAT010570</a>
500 Å	100–10,000	<a href="#">WAT085501</a>	<a href="#">WAT010571</a>

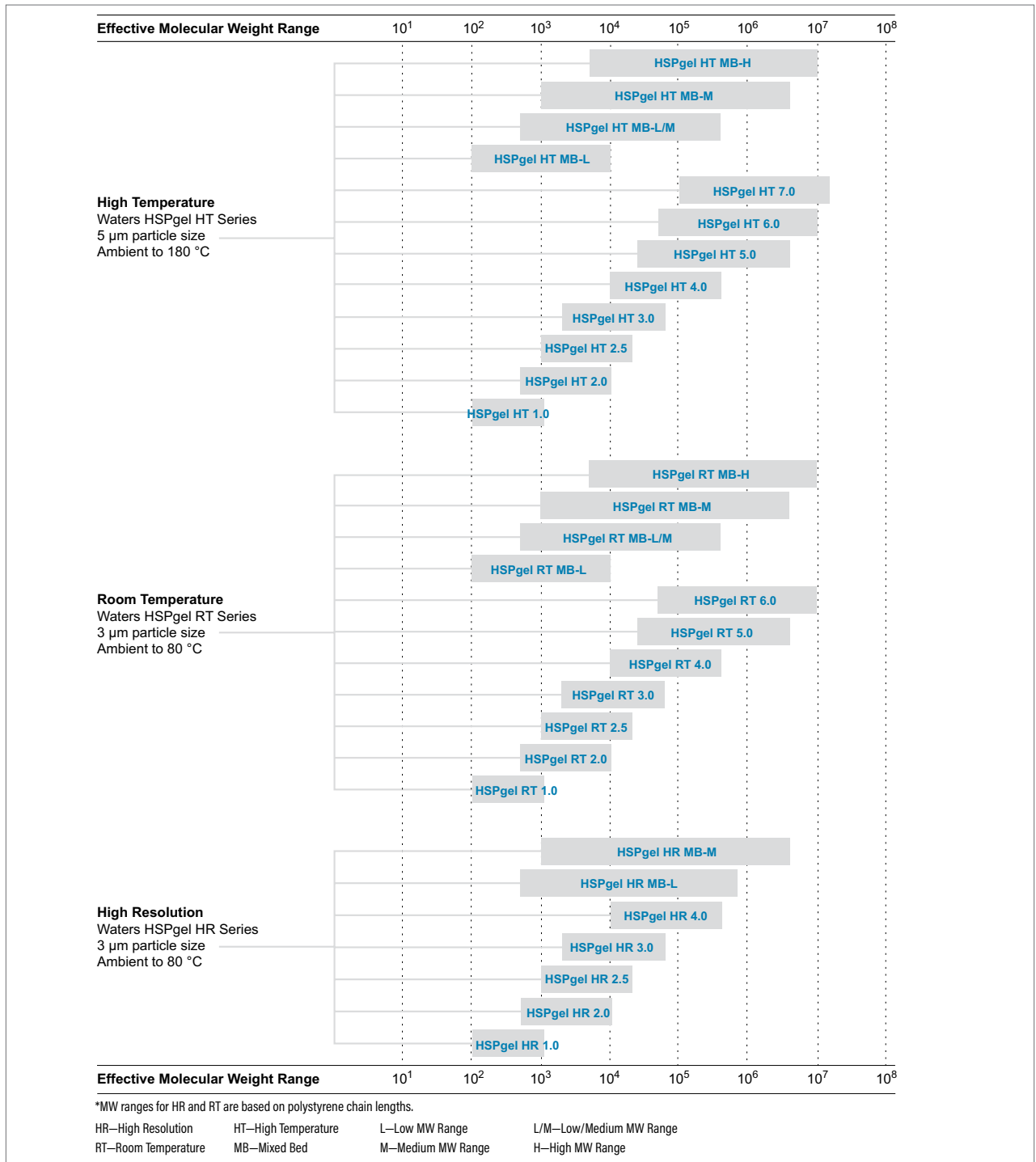
## HSPgel COLUMNS

Designed for high-speed GPC analysis, the Waters HSPgel Column provides an accurate and precise determination of molecular weight, increased sample throughput, and greatly reduced solvent consumption and disposal.

Waters offers these 6.0 × 150 mm columns:

- HSPgel HR series, for high-resolution, room-temperature GPC
- HSPgel RT series, for routine room temperature GPC
- HSPgel HT series for high temperature GPC

### HSPgel Columns Selection Guide\*



## HSPgel HR Column Series

The HSPgel HR columns are designed for high-resolution, room-temperature, organic polymer GPC. These columns are packed in THF and can be converted once to toluene, dichloromethane, or chloroform.

### Ordering Information

HSPgel HR Columns in THF, 3  $\mu$ m, 6.0  $\times$  150 mm

Description	MW Range	P/N
HSPgel HR 1.0	100–1000	<a href="#">186001741</a>
HSPgel HR 2.0	500–10,000	<a href="#">186001742</a>
HSPgel HR 2.5	1000–20,000	<a href="#">186001743</a>
HSPgel HR 3.0	2000–60,000	<a href="#">186001744</a>
HSPgel HR 4.0	10,000–400,000	<a href="#">186001745</a>
HSPgel HR MB-L	500–700,000	<a href="#">186001746</a>
HSPgel HR MB-M	1000–4,000,000	<a href="#">186001747</a>

HR—High Resolution, MB—Mixed Bed, L—Low MW Range, M—Medium MW Range.

## HSPgel RT Column Series

The HSPgel RT columns are designed for the routine, room-temperature work of organic-polymer GPC.

The columns, which are shipped packed in THF, can be converted multiple times, from THF to toluene, chloroform, dichloromethane, DMF, DMSO, etc.

### Ordering Information

HSPgel RT Columns in THF, 3  $\mu$ m, 6.0  $\times$  150 mm

Description	MW Range	P/N
HSPgel RT 1.0	100–1000	<a href="#">186001749</a>
HSPgel RT 2.0	500–10,000	<a href="#">186001750</a>
HSPgel RT 2.5	1000–20,000	<a href="#">186001751</a>
HSPgel RT 3.0	2000–60,000	<a href="#">186001752</a>
HSPgel RT 4.0	10,000–400,000	<a href="#">186001753</a>
HSPgel RT 5.0	25,000–4,000,000	<a href="#">186001754</a>
HSPgel RT 6.0	50,000–10,000,000	<a href="#">186001755</a>
HSPgel RT MB-L	100–10,000	<a href="#">186001757</a>
HSPgel RT MB-L/M	500–400,000	<a href="#">186001758</a>
HSPgel RT MB-M	1000–4,000,000	<a href="#">186001759</a>
HSPgel RT MB-H	5000–10,000,000	<a href="#">186001760</a>

RT—Room Temperature, MB—Mixed Bed, L—Low MW Range, M—Medium MW Range, L/M—Low/Medium MW Range, H—High MW Range.

## HSPgel HT Column Series

The HSPgel HT columns are designed for organic GPC conducted at between room temperature and high temperature (180 °C). The columns are shipped packed in either THF or ODCB. The ODCB-packed column should be used for direct conversion to TCB. These columns can withstand multiple solvent switches.

### Ordering Information

HSPgel HT Columns in THF, 5  $\mu$ m, 6.0  $\times$  150 mm

Description	MW Range	P/N
HSPgel HT 1.0	100–1000	<a href="#">186001761</a>
HSPgel HT 2.0	500–10,000	<a href="#">186001762</a>
HSPgel HT 2.5	1000–20,000	<a href="#">186001763</a>
HSPgel HT 3.0	2000–60,000	<a href="#">186001764</a>
HSPgel HT 4.0	10,000–400,000	<a href="#">186001765</a>
HSPgel HT 5.0	25,000–4,000,000	<a href="#">186001766</a>
HSPgel HT 6.0	50,000–10,000,000	<a href="#">186001767</a>
HSPgel HT 7.0	100,000–15,000,000	<a href="#">186001768</a>
HSPgel HT MB-L	100–1000	<a href="#">186001769</a>
HSPgel HT MB-L/M	500–400,000	<a href="#">186001770</a>
HSPgel HT MB-M	1000–4,000,000	<a href="#">186001771</a>
HSPgel HT MB-H	5000–10,000,000	<a href="#">186001772</a>

HT – High Temperature, MB – Mixed Bed, L – Low MW Range, M – Medium MW Range, L/M – Low/Medium MW Range, H – High MW Range.

HSPgel HT Columns in ODCB, 5  $\mu$ m, 6.0  $\times$  150 mm

Description	MW Range	P/N
HSPgel HT 1.0	100–1000	<a href="#">186001773</a>
HSPgel HT 2.0	500–10,000	<a href="#">186001774</a>
HSPgel HT 2.5	1000–20,000	<a href="#">186001775</a>
HSPgel HT 3.0	2000–60,000	<a href="#">186001776</a>
HSPgel HT 4.0	10,000–400,000	<a href="#">186001777</a>
HSPgel HT 5.0	25,000–4,000,000	<a href="#">186001778</a>
HSPgel HT 6.0	50,000–10,000,000	<a href="#">186001779</a>
HSPgel HT 7.0	100,000–15,000,000	<a href="#">186001780</a>
HSPgel HT MB-L	100–1000	<a href="#">186001781</a>
HSPgel HT MB-L/M	500–400,000	<a href="#">186001782</a>
HSPgel HT MB-M	1000–4,000,000	<a href="#">186001783</a>
HSPgel HT MB-H	5000–10,000,000	<a href="#">186001784</a>

HT – High Temperature, MB – Mixed Bed, L – Low MW Range, M – Medium MW Range, L/M – Low/Medium MW Range, H – High MW Range.

## SHODEX COLUMNS

Waters is proud to distribute Shodex GPC Columns and accessories. For 30 years, Shodex GPC Columns have been used successfully by scientists worldwide. The following selection of highly-reproducible GPC columns contains styrene divinylbenzene resins.

### K-800 Column Series (8 × 300 mm)

Ultra-high-efficiency columns designed for high-resolution performance, available in THF, DMF, or chloroform.

### Ordering Information

Shodex GPC K-800 Columns in THF 5 µm, 8 × 300 mm

Description	Polystyrene Exclusion Limit	P/N
Shodex KF-801	1500	<a href="#">WAT030697</a>
Shodex KF-802	5000	<a href="#">WAT030698</a>
Shodex KF-802.5	20,000	<a href="#">WAT030699</a>
Shodex KF-803	70,000	<a href="#">WAT034100</a>
Shodex KF-804	400,000	<a href="#">WAT034101</a>
Shodex KF-805	4,000,000	<a href="#">WAT034102</a>
Shodex KF-807	200,000,000	<a href="#">WAT034104</a>
Shodex KF-806M (linear)	40,000,000	<a href="#">WAT034105</a>
Shodex KF-G Guard (5 µm, 4.6 × 10 mm)		<a href="#">WAT034106</a>

Shodex GPC K-800 Columns in Chloroform, 5 µm, 8 × 300 mm

Description	Polystyrene Exclusion Limit	P/N
Shodex K-802.5	20,000	<a href="#">WAT030699</a>
Shodex K-803	70,000	<a href="#">WAT034100</a>
Shodex K-804	400,000	<a href="#">WAT034101</a>
Shodex K-805	4,000,000	<a href="#">WAT034102</a>
Shodex K-G Guard (5 µm, 4.6 × 10 mm)		<a href="#">WAT035524</a>

Shodex GPC K-800 Columns in DMF, 5 µm, 8 × 300 mm

Description	Polystyrene Exclusion Limit	P/N
Shodex KD-801	2500	<a href="#">WAT034116</a>
Shodex KD-802	5000	<a href="#">WAT034117</a>
Shodex KD-802.5	20,000	<a href="#">WAT034118</a>
Shodex KD-803	70,000	<a href="#">WAT034119</a>
Shodex KD-804	400,000	<a href="#">WAT034120</a>
Shodex KD-806	40,000,000	<a href="#">WAT034122</a>
Shodex KD-807	200,000,000	<a href="#">WAT034123</a>
Shodex KD-806 M (linear)	40,000,000	<a href="#">WAT034124</a>
Shodex KD-G Guard (5 µm, 4.6 × 10 mm)		<a href="#">WAT034125</a>

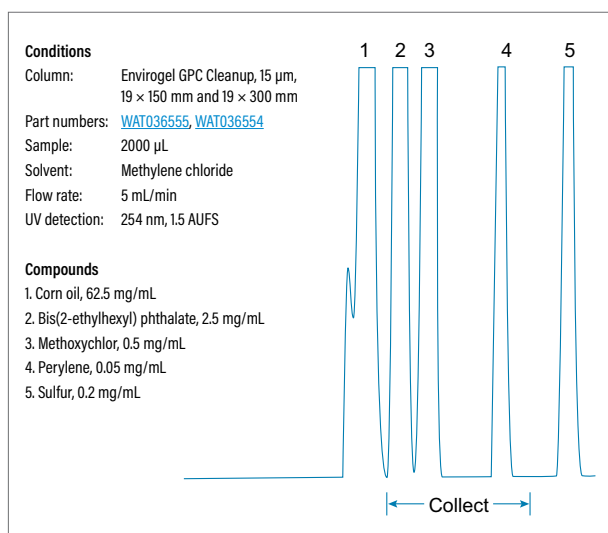
## HFIP-800 Column Series

These columns have the same high efficiency as the K-series columns shipped in HFIP.

## ENVIROGEL HIGH-RESOLUTION GPC CLEANUP COLUMNS

The Envirogel High-Efficiency GPC Cleanup Columns remove low volatility, high-molecular-weight interferences, such as lipids and natural resins, from environmental samples, as specified in EPA Method 3640A. In the past, the cleanup procedure for environmental samples was performed on low-efficiency GPC Columns based on packing particle diameters of 37–75 µm (200–400 mesh) Bio-Beads S-X resins. The high-efficiency Envirogel GPC Cleanup Columns increase the speed of this process, and simultaneously reduce solvent consumption. For optimum capacity and resolution, a 150 mm column is used in series with the 300 mm column. The use of both the 150 mm and 300 mm column provides maximum loading capacity, while the 300 mm column provides maximum throughput when used alone, plus reduced solvent consumption.

### Column Optimization





Envirogel High-Resolution GPC Cleanup Columns

Description	Solvent	Dimension	P/N
Envirogel GPC Cleanup	Methylene chloride	19 × 150 mm	<a href="#">WAT036555</a>
Envirogel GPC Cleanup	Cyclohexane/ethyl acetate	19 × 150 mm	<a href="#">186001915</a>
Envirogel GPC Cleanup	Methylene chloride	19 × 300 mm	<a href="#">WAT036554</a>
Envirogel GPC Cleanup	Cyclohexane/ethyl acetate	19 × 300 mm	<a href="#">186001916</a>
Envirogel GPC Guard	Methylene chloride	4.6 × 30 mm	<a href="#">186001913</a>
Envirogel GPC Guard	Cyclohexane/ethyl acetate	4.6 × 30 mm	<a href="#">186001914</a>

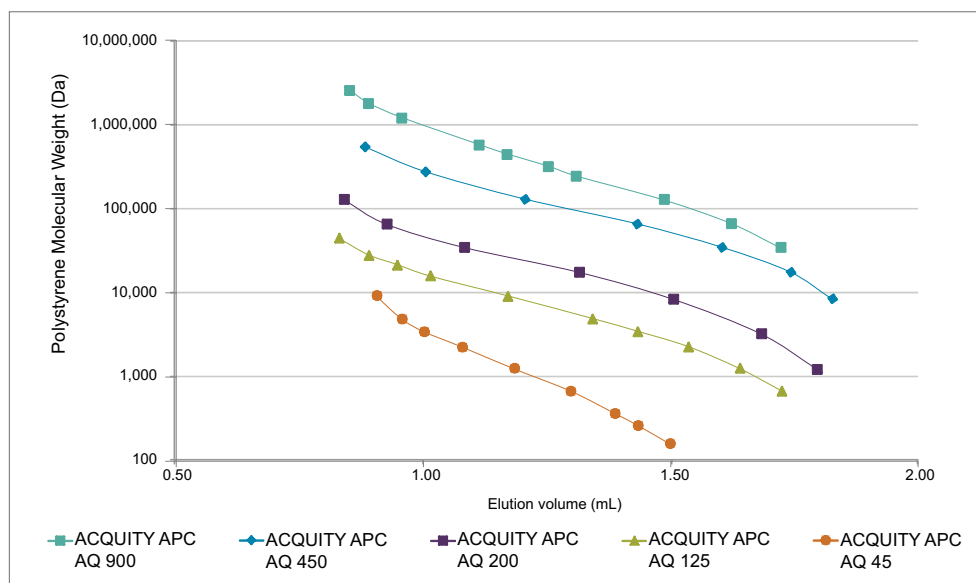
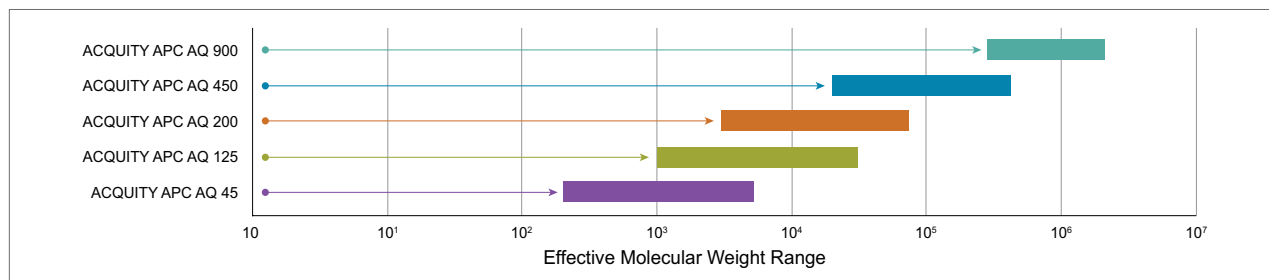
## SEC Columns

Size-exclusion chromatography (SEC) and gel-filtration chromatography (GFC) are synonymous terms for techniques used to separate macromolecules in aqueous environments according to their hydrodynamic volume. Waters SEC Columns efficiently separate cationic, anionic, and non-ionic macromolecules in many physical, chemical, and biological applications.

### ACQUITY APC AQ COLUMNS

Designed for aqueous samples, ACQUITY APC AQ Columns are based on hybrid-polymer sub-3- $\mu\text{m}$  particle technology. The advantages of this technology, detailed in the ACQUITY APC XT section on [page 403](#), apply as well to the AQ columns.

#### ACQUITY APC AQ Column Selection Guide



Polystyrene calibration curves for ACQUITY APC AQ Columns.

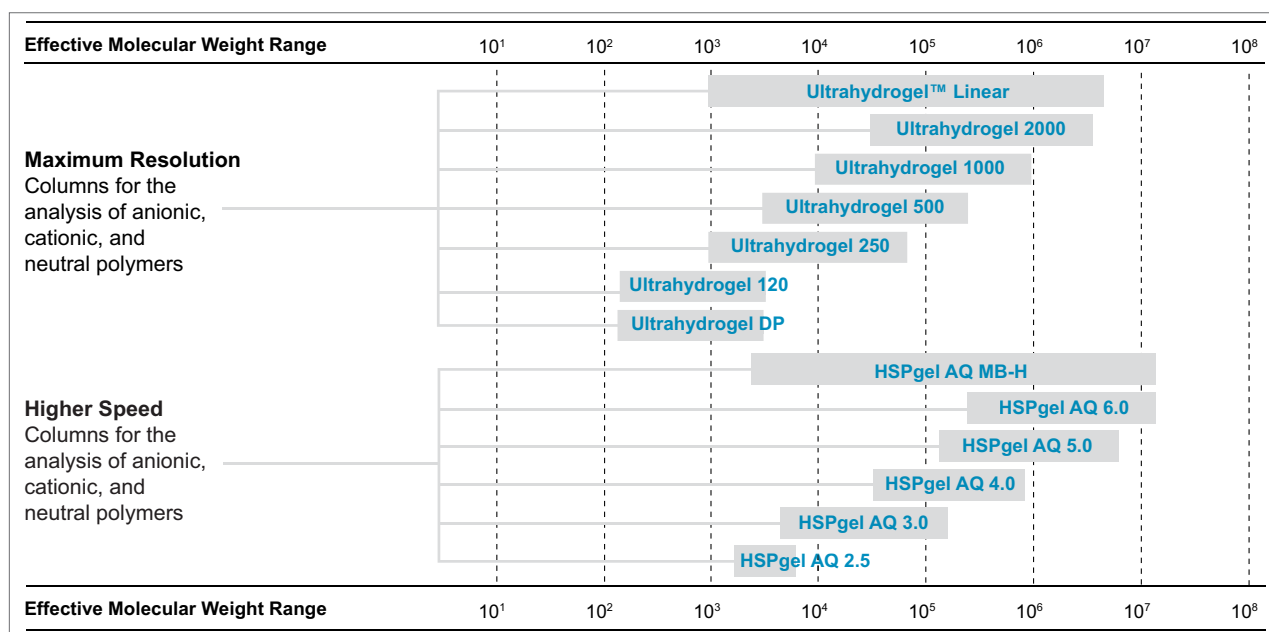
## Ordering Information

### ACQUITY APC AQ Columns

Pore Size	Effective MW Range*	Particle Size	P/N	P/N	P/N
			Column Length		
			30 mm	75 mm	150 mm
45 Å	200–5000	1.7 µm	<a href="#">186006972</a>	<a href="#">186006973</a>	<a href="#">186006975</a>
125 Å	1000–30,000	2.5 µm	<a href="#">186006977</a>	<a href="#">186006978</a>	<a href="#">186006980</a>
200 Å	3000–70,000	2.5 µm	<a href="#">186006982</a>	<a href="#">186006983</a>	<a href="#">186006985</a>
450 Å	20,000–400,000	2.5 µm	<a href="#">186006987</a>	<a href="#">186006988</a>	<a href="#">186006990</a>
900 Å	300,000–2,000,000	2.5 µm	<a href="#">186007249</a>	<a href="#">186007250</a>	<a href="#">186007251</a>

\*All columns are 4.6 mm I.D., maximum temperature limit is 45 °C, columns are shipped dry.

### Aqueous SEC Column Selection Guide



This chart compares the molecular weight ranges for the specified columns. By connecting two or more columns in series, the effective molecular weight range can be extended to provide coverage for more complex sample analysis.



**APPLICATION AREA:** Analyzed Polymers

"These high quality SEC columns can be used for cationic or anionic polymers."

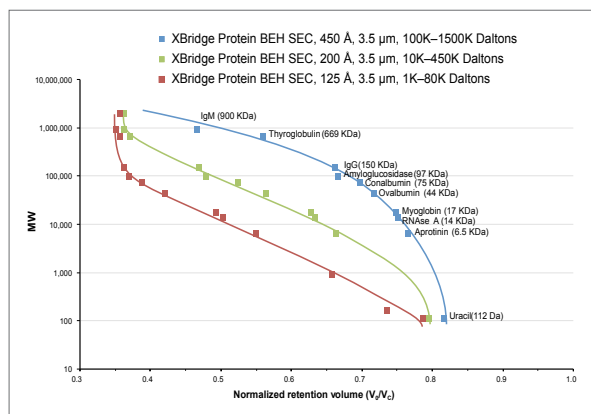
**REVIEWER:** Jang Shing Chiou

**ORGANIZATION:** Alcon Research Ltd.

## XBRIDGE PROTEIN BEH SEC COLUMNS

XBridge Protein BEH SEC Columns containing 3.5 µm are primarily designed for use on HPLC instrumentation. These 3.5 µm guards and columns are available in 125, 200, and 450 Å pore sizes using the same ethylene-bridged hybrid (BEH) particle technology and diol-bonded coating used in Waters' UPLC based SEC columns. This allows you to transfer methods based on laboratory instrumentation and component resolution or sample throughput needs.

Calibration curves on XBridge Protein BEH SEC, 125 Å, 200 Å, and 450 Å Columns.



### Four-Step Guide for Successful SEC Column Selection

What is the molecular weight of what you are trying to separate?			
NEED:	MW 1–8 K Da	MW 10–450 / 650 K Da	MW 100–1500 K Da
Recommended column specifications	125 Å	200 Å / 250 Å	400 Å
What type of LC system dispersion* are you using?			
NEED:	<20 µL (UPLC)	>20–<35 µL (UHPLC)	>35 µL (HPLC)
Recommended column specifications	1.7 µm or 2.5 µm	2.5 µm	2.5 µm or 3.5 µm
Do you need to resolve something that is less than 2-fold difference in MW?***			
NEED:	2.5 µm	2.5 µm	2.5 µm or 3.5 µm
REC. Recommended column specifications SPEC:	4.6 × 300 mm or 7.8 × 300 mm	7.8 × 300 mm	7.8 × 300 mm
Do you need maximum speed on a MW greater than two-fold?			
NEED:	<9 min	<12 min	<18 min
REC. Recommended column specifications SPEC:	1.7 µm 4.6 × 150 mm	2.5 µm 4.6 × 150 mm	2.5 µm 7.8 × 150 mm

\*For guidance on measuring system dispersion, download the SEC Optimization Guide (720006067EN) on [waters.com](http://waters.com).

\*\*To understand the "why" behind these recommendations, read the Application Note (720006336EN) on [waters.com](http://waters.com).

## Ordering Information

### XBridge Protein BEH SEC Columns for HPLC System, 3.5 µm

Pore Size	Effective MW Range*	Particle Size	Column Length		
			P/N 30 mm Guard w/Standard	P/N 150 mm w/Standard	P/N 300 m w/Standard
125 Å	1 K–80 K	3.5 µm	<a href="#">176003591</a>	<a href="#">176003592</a>	<a href="#">176003593</a>
200 Å	10 K–450 K	3.5 µm	<a href="#">176003594</a>	<a href="#">176003595</a>	<a href="#">176003596</a>
450 Å	100 K–1500 K	3.5 µm	<a href="#">176003597</a>	<a href="#">176003598</a>	<a href="#">176003599</a>

Straight Connection Tubing and End-fittings [WAT022681](#)

U-Bend Connection Tubing and End-fittings [WAT084080](#)

SEC Protein Standards are matched to the pore size of the column.

## XBRIDGE PROTEIN BEH SEC COLUMNS FOR UHPLC-BASED SEPARATIONS

XBridge Protein BEH SEC Columns containing 2.5 µm are primarily designed for use on UHPLC instrumentation. These 2.5 µm guards and columns are available in 125, 200, and 450 Å pore sizes using the same ethylene-bridged hybrid (BEH) particle technology and diol-bonded coating used in Waters' UPLC based SEC columns. This allows you to transfer methods based on laboratory instrumentation and component resolution or sample throughput needs.

### Ordering Information

#### XBridge Protein BEH SEC Columns, 2.5 µm, UHPLC

Pore Size	MW Range	Particle Size	P/N	P/N	P/N	P/N	P/N	P/N
			4.6 mm ID × Column Length					
			30 mm Guard	150 mm No Standard	300 mm No Standard	30 mm Guard w/ Std	150 mm w/Standard	300 mm w/Standard
125 Å	1 K–80 K	2.5 µm	<a href="#">186009170</a>	<a href="#">186009171</a>	<a href="#">186009172</a>	<a href="#">176004331</a>	<a href="#">176004332</a>	<a href="#">176004333</a>
200 Å	10 K–450 K	2.5 µm	<a href="#">186009174</a>	<a href="#">186009175</a>	<a href="#">186009176</a>	<a href="#">176004334</a>	<a href="#">176004335</a>	<a href="#">176004336</a>
450 Å	100 K–1500 k	2.5 µm	<a href="#">186006850</a>	<a href="#">186009179</a>	<a href="#">186009180</a>	176002995	<a href="#">176002996</a>	<a href="#">176002997</a>
			7.8 mm ID × Column Length					
			30 mm Guard No Std	150 mm No Standard	300 mm No Standard	30 mm Guard w/Std	150 mm w/Standard	300 mm w/Standard
125 Å	1 K–80 K	2.5 µm	<a href="#">186009158</a>	<a href="#">186009159</a>	<a href="#">186009160</a>	<a href="#">176004322</a>	<a href="#">176004323</a>	<a href="#">176004324</a>
200 Å	10 K–450 K	2.5 µm	<a href="#">186009162</a>	<a href="#">186009163</a>	<a href="#">186009164</a>	<a href="#">176004325</a>	<a href="#">176004326</a>	<a href="#">176004327</a>
Straight Connection Tubing and End-fittings								<a href="#">WAT022681</a>
U-Bend Connection Tubing and End-fittings								<a href="#">WAT084080</a>

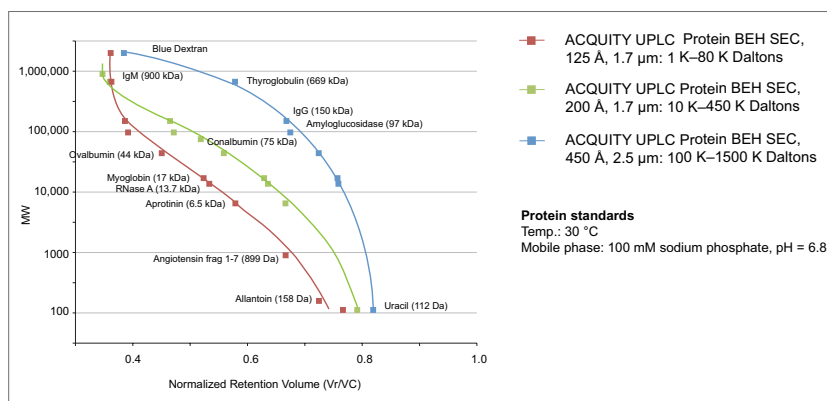
SEC Protein Standards are matched to the pore size of the column.

## ACQUITY UPLC PROTEIN SEC COLUMNS

ACQUITY UPLC Protein SEC Columns are packed with ethylene-bridged hybrid (BEH), diol-coated particles. Manufacturers of biotherapeutics and biosimilars can choose the most effective pore size for their application: 125, 200, and 450 Å.

NOTE: These columns were designed for use on low dispersion LC Systems in order to maintain the separation performance obtain on Columns containing these sub 2 micron SEC particles.

Calibration Curves on ACQUITY UPLC Protein BEH SEC, 125 Å, 200 Å, and 450 Å Columns



## Ordering Information

ACQUITY UPLC Protein BEH SEC Columns, 1.7 and 2.5 µm

Pore Size	MW Range	Particle Size	4.6 mm ID × Column Length				2.1 mm ID × CL		
			30 mm Guard*	50 mm No Standard	150 mm No Standard	300 mm No Standard	150 mm w/Standard	300 mm w/Standard	50 mm No Standard
125 Å	1 K–80 K	1.7 µm	<a href="#">186006504</a>	—	<a href="#">186006505</a>	<a href="#">186006506</a>	<a href="#">176003906</a>	<a href="#">176003907</a>	—
200 Å	10 K–450 K	1.7 µm	<a href="#">186005793</a>	<a href="#">186009082</a>	<a href="#">186005225</a>	<a href="#">186005226</a>	<a href="#">176003904</a>	<a href="#">176003905</a>	<a href="#">186008471</a>
450 Å	100 K–1500 k	2.5 µm	<a href="#">186006850</a>	—	<a href="#">186006851</a>	<a href="#">186006852</a>	<a href="#">176002996</a>	<a href="#">176002997</a>	—

Straight Connection Tubing and End-fittings

[WAT022681](#)

U-Bend Connection Tubing and End-fittings

[WAT084080](#)

SEC Protein Standards are matched to the pore size of the column.

\*Size-exclusion chromatography may require modifications to an existing ACQUITY UPLC System. Please reference "Size-Exclusion and Ion-Exchange Chromatography of Proteins using the ACQUITY UPLC System" (p/n: 715002147) or "Size Exclusion and Ion-Exchange Chromatography of Proteins using the ACQUITY UPLC H-Class System" (p/n: 715002909) for specific recommendations.

\*To connect two UPLC SEC Columns together in series, we recommend using a Waters Sample Loop (p/n: [430001516](#)).



### APPLICATION AREA: Size Characterisation of Proteins

"We use the BEH columns for all our SEC runs. They are UPLC compliant and take around six minutes a run. This means they work fantastically well for high throughput screening and at least for our application they last much longer than other columns – we get >1000 runs per column. The only complaint is that they are expensive, but you get what you pay for and the speed alone means we only need to run one UPLC for 5x the samples on a HPLC."

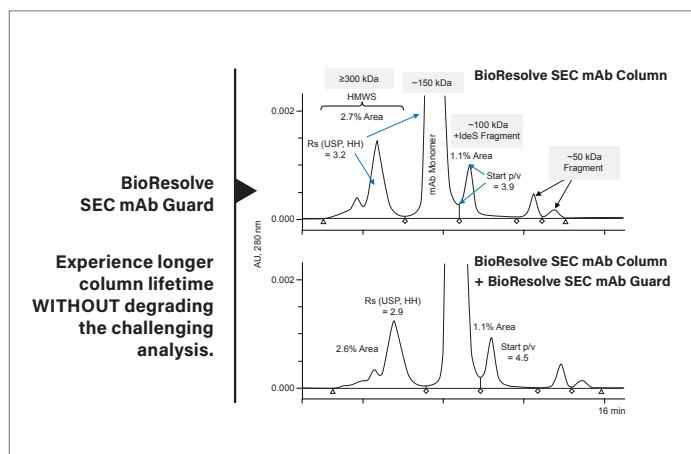
REVIEWER: Nikki Royle

ORGANIZATION: Small Biotech

## BIORESOLVE SEC MAB FOR MONOCLONAL AGGREGATE, MONOMER, AND FRAGMENT ANALYSES

The BioResolve SEC mAb Guards and Columns contain 2.5 µm BEH particle technology and is application specifically tested with the mAb Size Variant Standard to help ensure accurate and highly reproducible quantitation of monoclonal antibody (mAb) monomers from frequently associated high molecular weight aggregates (≥300,000 Da) and lower molecular weight fragments (e.g., ≤100,000 Da). Use of 2.5 µm particles in with 4.6 mm or 7.8 mm ID make them well suited for use on Waters ACQUITY UPLCs, UHPLC, or HPLC platforms.

## BioResolve mAb SEC Separation of mAb Size Variant



## Ordering Information

### BioResolve SEC mAb Columns, Guards, and Method Validation Kits

Pore Size	MW Range	Particle Size	4.6 mm ID × Column Length						
			30 mm Guard	150 mm No Standard	300 mm No Standard	150 mm w/Standard	300 mm w/Standard	150 mm Guard w/Std	300 mm Guard w/Std
200 Å	10 K-450 K	2.5 µm	<a href="#">186009443</a>	<a href="#">186009435</a>	<a href="#">186009437</a>	<a href="#">176004592</a>	<a href="#">176004593</a>	<a href="#">176004596</a>	<a href="#">176004597</a>
Pore Size	MW Range	Particle Size	7.8 mm ID × Column Length						
			30 mm Guard	150 mm No Standard	300 mm No Standard	150 mm w/Standard	300 mm w/Standard	150 mm Guard w/Std	300 mm Guard w/Std
200 Å	10 K-450 K	2.5 µm	—	<a href="#">186009439</a>	<a href="#">186009441</a>	<a href="#">176004594</a>	<a href="#">176004595</a>	<a href="#">176004598</a>	<a href="#">176004599</a>
BioResolve SEC mAb Method Validation Kit – 200 Å, 2.5 µm, 4.6 × 150 mm Columns**									<a href="#">176004639</a>
BioResolve SEC mAb Method Validation Kit – 200 Å, 2.5 µm, 4.6 × 300 mm Columns**									<a href="#">176004640</a>
BioResolve SEC mAb Method Validation Kit – 200 Å, 2.5 µm, 7.8 × 150 mm Columns**									<a href="#">176004641</a>
BioResolve SEC mAb Method Validation Kit – 200 Å, 2.5 µm, 7.8 × 300 mm Columns**									<a href="#">176004642</a>
mAb Size Variant Standard, 160 g*									<a href="#">186009429</a>
Straight Connection Tubing and End-fittings									<a href="#">WAT022681</a>
U-Bend Connection Tubing and End-fittings									<a href="#">WAT084080</a>

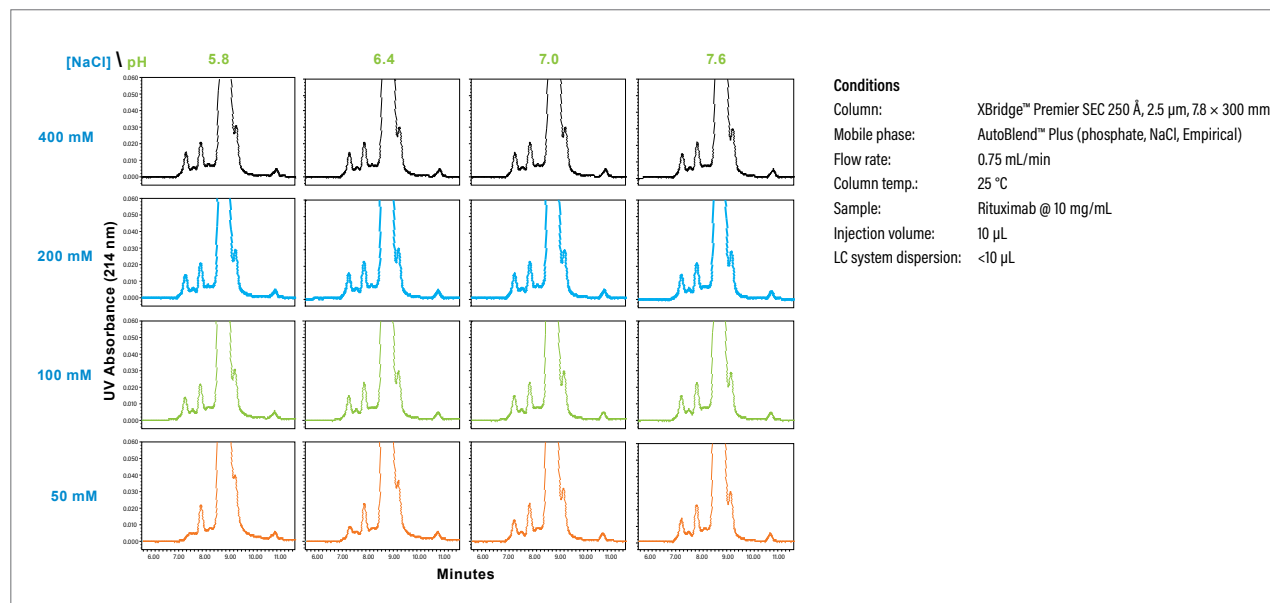
SEC Protein Standards are matched to the pore size of the column.

\*\* Method Validation Kit (MVK) contains three columns from three different batches.

## ACQUITY AND XBRIDGE PREMIER PROTEIN SEC 250 Å COLUMNS

Waters advancements in MaxPeak PREMIER guard and column hardware as well as SEC BEH-PEO particle technology synergistically work to minimize non-desired secondary ionic or hydrophobic interactions between proteins and the SEC offering. This allows chromatographers to obtain reliable protein aggregate, monomer, and fragment analyses using a “generic” or “platform-type” method for LC or LC/MS applications. In addition, a cost and performance effective MaxPeak PREMIER Protein SEC 250 Å Guard column is available to effectively trap insoluble sample or eluent related particulates that can degrade column performance and shorten column life.

### Universality of Method



### Ordering Information

#### MaxPeak Premier SEC 1.7 and 2.5 µm

Pore Size	MW Range	Particle Size	P/N	P/N	P/N	P/N	P/N	P/N	P/N	P/N	P/N
			30 mm Guard	150 mm No Standard	300 mm No Standard	150 mm w/Standard	300 mm w/Standard	150 mm w/Guard	300 mm w/Guard	150 mm Guard w/Std	300 mm Guard w/Std
<b>4.6 mm ID × Column Length</b>											
250 Å	10 K–650 K	1.7 µm	—	<a href="#">186009963</a>	<a href="#">186009964</a>	<a href="#">176005071</a>	<a href="#">176005072</a>	<a href="#">176004783</a>	<a href="#">176004784</a>	<a href="#">176004794</a>	<a href="#">176004795</a>
250 Å	10 K–650 K	2.5 µm	<a href="#">186009969</a>	<a href="#">186009959<sup>5</sup></a>	<a href="#">186009960</a>	<a href="#">176005067</a>	<a href="#">176005068</a>	<a href="#">176004779</a>	<a href="#">176004780</a>	<a href="#">176004790</a>	<a href="#">176004791</a>

Pore Size	MW Range	Particle Size	7.8 mm ID × Column Length								
			30 mm Guard	150 mm No Standard	300 mm No Standard	150 mm w/Standard	300 mm w/Standard	150 mm Guard w/Std	300 mm Guard w/Std	150 mm Guard w/Std	300 mm Guard w/Std
250 Å	10 K–650 K	1.7 µm	—	—	—	—	—	—	—	—	—
250 Å	10 K–650 K	2.5 µm	—	<a href="#">186009961</a>	<a href="#">186009962</a>	<a href="#">176005069</a>	<a href="#">176005070</a>	<a href="#">176004781</a>	<a href="#">176004782</a>	<a href="#">176004792</a>	<a href="#">176004793</a>

mAb Size Variant Standard, 160 g*	<a href="#">186009429</a>
XBridge™ Premier Protein SEC 250 Å, 2.5 µm, 4.6 × 150 mm Column MVK	<a href="#">176004801</a>
XBridge Premier Protein SEC 250 Å, 2.5 µm, 4.6 × 300 mm Column MVK	<a href="#">176004802</a>
XBridge Premier Protein SEC 250 Å, 2.5 µm, 7.8 × 150 mm Column MVK	<a href="#">176004803</a>
XBridge Premier Protein SEC 250 Å, 2.5 µm, 7.8 × 300 mm Column MVK	<a href="#">176004804</a>
ACQUITY Premier Protein SEC 250 Å, 1.7 µm, 4.6 × 150 mm Column MVK	<a href="#">176004805</a>
ACQUITY Premier Protein SEC 250 Å, 1.7 µm, 4.6 × 300 mm Column MVK	<a href="#">176004806</a>

Straight Connection Tubing and End-fittings	<a href="#">WAT022681</a>
U-Bend Connection Tubing and End-fittings	<a href="#">WAT084080</a>

\*\* Method Validation Kit (MVK) contains three columns from three different batches.

## PROTEIN-PAK SIZE-EXCLUSION HPLC COLUMNS

Protein-Pak packings are based on a 10 µm, diol-bonded silica and are available in a selection of pore sizes and column configurations.

The Protein-Pak Size-Exclusion Columns can be expected to resolve proteins that differ in molecular weight by a factor of two and to distinguish proteins differing by as little as 15% in molecular weight. The degree of resolution is more dependent on the sample mass and volume than the interaction between the sample and the stationary phase. Ideally, there should be no interaction between the stationary phase and the sample molecules. Secondary interactions are most often ionic and can, therefore, be reduced by increasing the ionic strength of the mobile phase. Typical, salt concentrations range to 0.2–0.5 M NaCl. It may also be useful in some cases to consider adding 10–20% methanol to eliminate hydrophobic and other hydrogen-bonding interactions.

## mAb SIZE VARIANT STANDARD

Waters mAb Size Variant Standard (p/n: [186009429](#)) contains the NIST humanized monoclonal antibody (Reference Material 8671) and non-reduced IdeS digested NIST mAb fragments F(ab')<sub>2</sub> (~100,000 Da) and (Fc/2)<sub>2</sub> (~50,000 Da). By aliquoting small, standard amounts of IdeS fragments, Waters mAb size variant standard can be effectively used to test column and LC System ability to separate mAb aggregates, monomer, and fragments/clips via SEC.



## PROTEIN STANDARDS

Each standard contains proteins selected for ACQUITY UPLC and XBridge Protein BEH SEC Columns. Use these standards for purposes of quality control, to test an HPLC or UPLC column, and to monitor column performance over time.



## Ordering Information

### Protein-Pak SEC HPLC Columns and Guards

Steel Column	Dimension	MW Range	P/N
Protein-Pak 60	7.8 × 300 mm	1000–20,000	<a href="#">WAT085250</a>
Protein-Pak 60	19 × 300 mm	1000–20,000	<a href="#">WAT025830</a>
Protein-Pak 125	7.8 × 300 mm	2000–80,000	<a href="#">WAT084601</a>
Protein-Pak 125	19 × 300 mm	2000–80,000	<a href="#">WAT025831</a>
Protein-Pak 300SW	7.5 × 300 mm	10,000–300,000	<a href="#">WAT080013</a>
Protein-Pak 125 Sentry Guard Column, 3.9 × 20 mm, 2/pk (requires holder)			<a href="#">18600926</a>
Sentry Universal Guard Column Holder			<a href="#">WAT046910</a>

## Ordering Information

### mAb Size Variant Standard

Description	P/N
mAb Size Variant Standard	<a href="#">186009429</a>

## Ordering Information

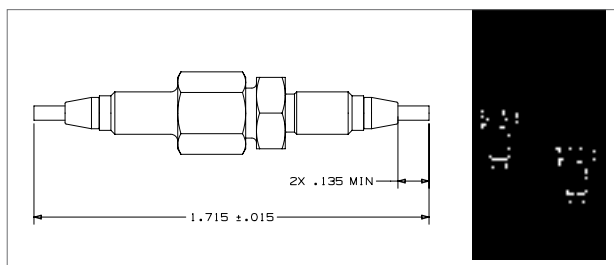
### BEH SEC Column Protein Standards

Description	P/N
BEH125 SEC Protein Standard Mix	<a href="#">186006519</a>
A mix of four proteins: thyroglobulin, ovalbumin, ribonuclease A and uracil	
BEH200 SEC Protein Standard Mix	<a href="#">186006518</a>
A mix of five proteins: thyroglobulin, IgG, BSA, myoglobin, uracil	
BEH450 SEC Protein Standard Mix	<a href="#">186006842</a>
A mix of five proteins: thyroglobulin, IgG, BSA, myoglobin, uracil	



## SEC COLUMN CONNECTORS AND CONNECTOR KITS

Connectors to attach BEH SEC columns in series and/or BEH SEC guards to BEH SEC columns.



\* Ferrules are not staked on tubing upon receipt. The two-piece ferrule is permanently seated upon installation once the fitting is tightened into the column.

### HPLC Column Connectors

Description	P/N
Column Joining Tube Assembly*	<a href="#">WAT084080</a>
Rigid Connector Package*	<a href="#">WAT022681</a>

\*The ferrules are permanently seated to Waters' depth setting upon receipt.

### Ordering Information

#### UPLC Column Connectors

Description	P/N
ACQUITY APC CM-S Column Connector, U, .004" I.D.*	<a href="#">700009535</a>
ACQUITY APC CM-S Column Connector, Offset U, .004" I.D.*	<a href="#">700009534</a>
ACQUITY APC CM-S Column Connector Tube, Long, .004" I.D.	<a href="#">700009560</a>
ACQUITY APC CM-S Inline Column Connection, .005" I.D.	<a href="#">700009524</a>
0.005 × 1.75 UPLC SEC Connection Tubing, 2/pk	<a href="#">186006613</a>

#### Connector Kits

Description	P/N
ACQUITY CM-S 4-Column Bank Connection Kit	<a href="#">205001172</a>
Kit contains:	
Two ACQUITY APC CM-S Inline Column Connector, .005" I.D. (p/n: <a href="#">700009524</a> )	
Two ACQUITY APC CM-S Column Connector, U, .004" I.D. (p/n: <a href="#">700009535</a> )	
One ACQUITY APC CM-S Column Connector, Offset U, .004" I.D. (p/n: <a href="#">700009534</a> )	
ACQUITY CM-S 3-Column Bank Connection Kit	<a href="#">205001171</a>
Kit contains:	
One ACQUITY APC CM-S Inline Column Connector, .005" I.D. (p/n: <a href="#">700009524</a> )	
Two ACQUITY APC CM-S Column Connector, U, .004" I.D. (p/n: <a href="#">700009535</a> )	
ACQUITY CM-S 2-Column Bank Connection Kit	<a href="#">205001169</a>
Kit contains:	
One ACQUITY APC CM-S Inline Column Connector, .005" I.D. (p/n: <a href="#">700009524</a> )	
One ACQUITY APC CM-S Column Connector, U, .004" I.D. (p/n: <a href="#">700009535</a> )	

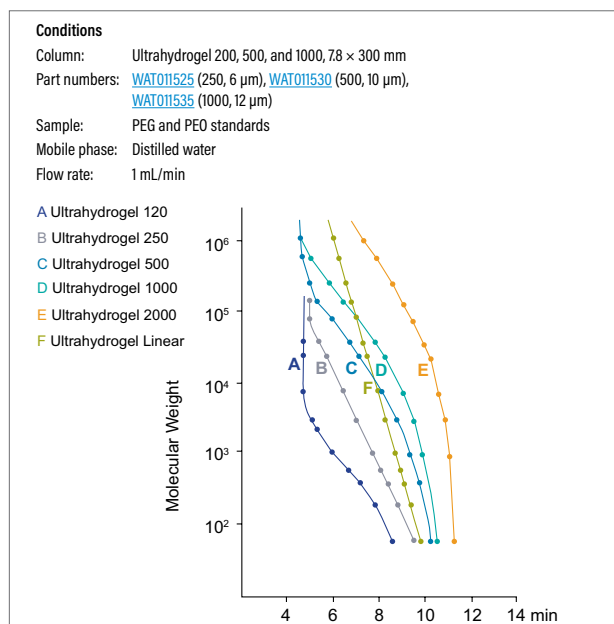
## ULTRAHYDROGEL COLUMNS

Packed with hydroxylated, polymethacrylate-based gel, Waters Ultrahydrogel SEC Columns are ideal for analyzing aqueous-soluble samples such as oligomers, oligosaccharides, and polysaccharides. They are likewise well suited to analyze cationic, anionic, and amphoteric polymers.

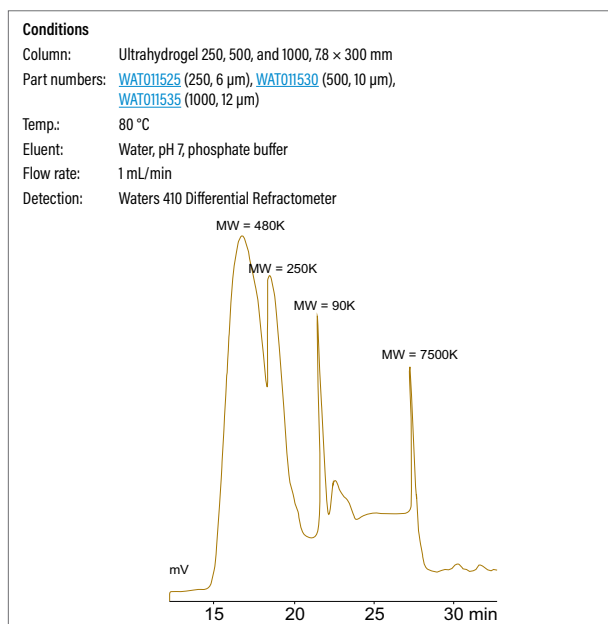
These 7.8 × 300 mm, high-resolution columns offer many advantages over conventional aqueous SEC columns:

- Wide-pH range (2–12)
- Compatibility with high concentrations of organic solvents, as much as 20% organic and 50% organic for mobile phases introduced by gradient
- Greater flexibility for the mobile phase
- Minimal non-size-exclusion effects

### Ultrahydrogel Columns Calibration Curves



### Gelatin Sample



## Ordering Information

### Ultrahydrogel Columns (7.8 × 300 mm)\*

Description	Pore Size	Particle Size	Exclusion Limit	P/N
Ultrahydrogel 120	120 Å	6 μm	5000	<a href="#">WAT011520</a>
Ultrahydrogel 250	250 Å	6 μm	80,000	<a href="#">WAT011525</a>
Ultrahydrogel 500	500 Å	10 μm	400,000	<a href="#">WAT011530</a>
Ultrahydrogel 1000	1000 Å	12 μm	1,000,000	<a href="#">WAT011535</a>
Ultrahydrogel 2000	2000 Å	12 μm	7,000,000	<a href="#">WAT011540</a>
Ultrahydrogel Linear	Blend	10 μm	7,000,000	<a href="#">WAT011545</a>
Ultrahydrogel DP*	120 Å	6 μm	5000	<a href="#">WAT011550</a>
Ultrahydrogel DNA	>2000 Å	10 μm	10,000,000	<a href="#">WAT011560</a>
Ultrahydrogel Guard Column	N/A	6 μm	N/A	<a href="#">WAT011565</a>
Ultrahydrogel Guard Column DP*	N/A	6 μm	N/A	<a href="#">WAT011570</a>

\*DP = Degree of Polymerization, choice of column when working with glucose oligomers.

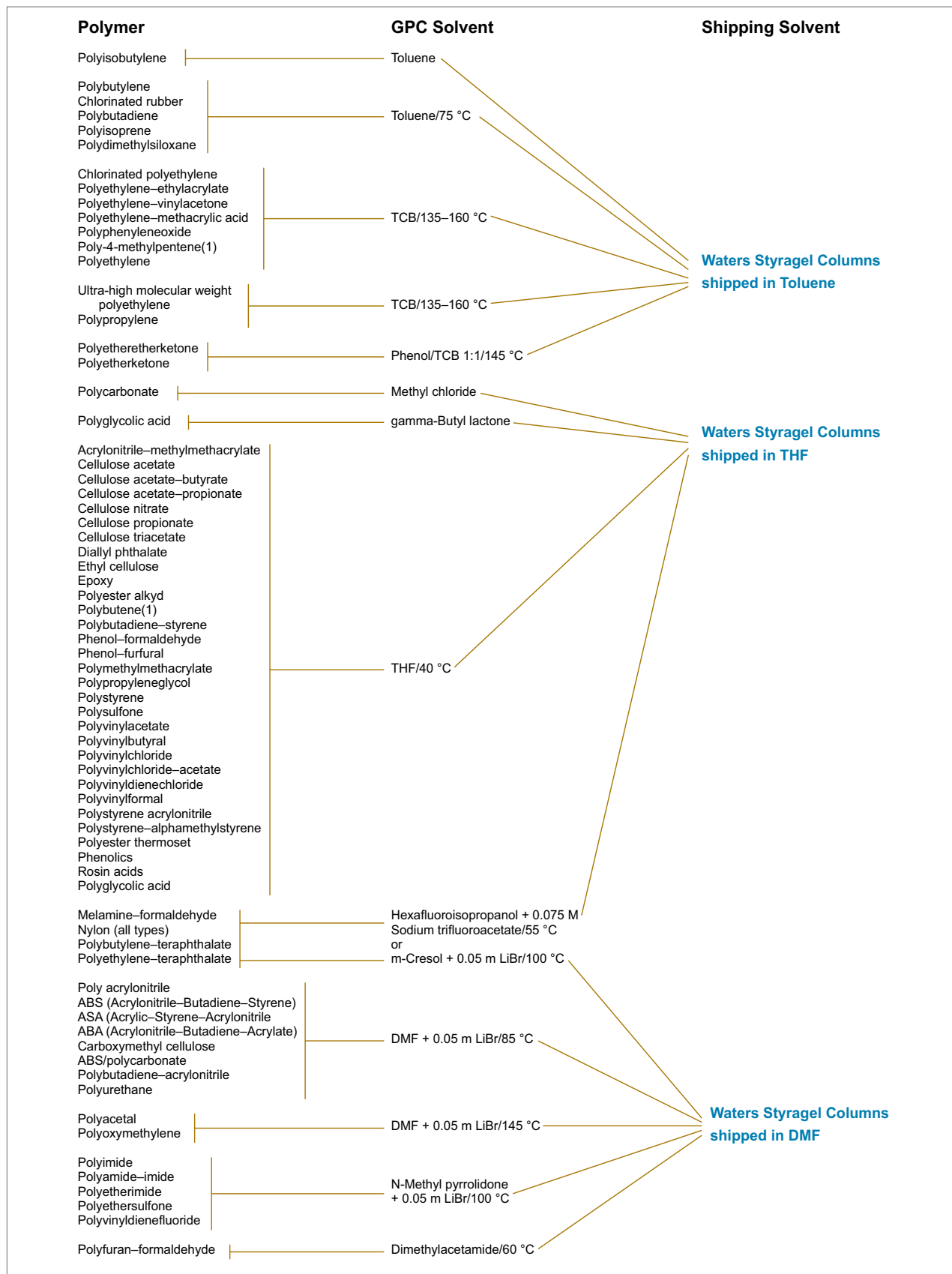
## Solvent Guide

The following graphic is a guide for eluents.

### Aqueous SEC Solvent Selection Guide

Polymer	Class	Eluent
Polyethylene oxide Polyethylene glycol Polysaccharides, pullulans Dextrans Celluloses (water-soluble) Polyvinyl alcohol Polyacrylamide	Neutral	0.10 M Sodium nitrate
Polyvinyl pyrrolidone	Neutral, hydrophobic	80:20 0.10 M Sodium nitrate/Acetonitrile
Polystyrene sulfonate Lignin sulfonate	Anionic, hydrophobic	
Collagen/gelatin	Amphoteric	
Polyacrylic acid Polyalginic acid/alginate Hyaluronic acid Carrageenan	Anionic	0.10 M Sodium nitrate
DEAE dextran Polyvinylamine	Cationic	0.80 M Sodium nitrate
Polyepiamine	Cationic	0.10% TEA
n-Acetylglucosamine	Cationic	0.10 M TEA/1% Acetic acid
Polyethyleneimine Poly(n-methyl-2-vinyl pyridinium) I salt	Cationic, hydrophobic	0.50 M Sodium acetate/0.50 M Acetic acid
Lysozyme Chitosan	Cationic, hydrophobic	0.50 M Acetic acid/0.30 M Sodium sulfate
Polylysine	Cationic, hydrophobic	5% Ammonium biphosphate/3% Acetonitrile (pH = 4.0)
Peptides	Cationic, hydrophobic	0.10% TFA/40% Acetonitrile

Non-Aqueous GPC Solvent Selection Guide

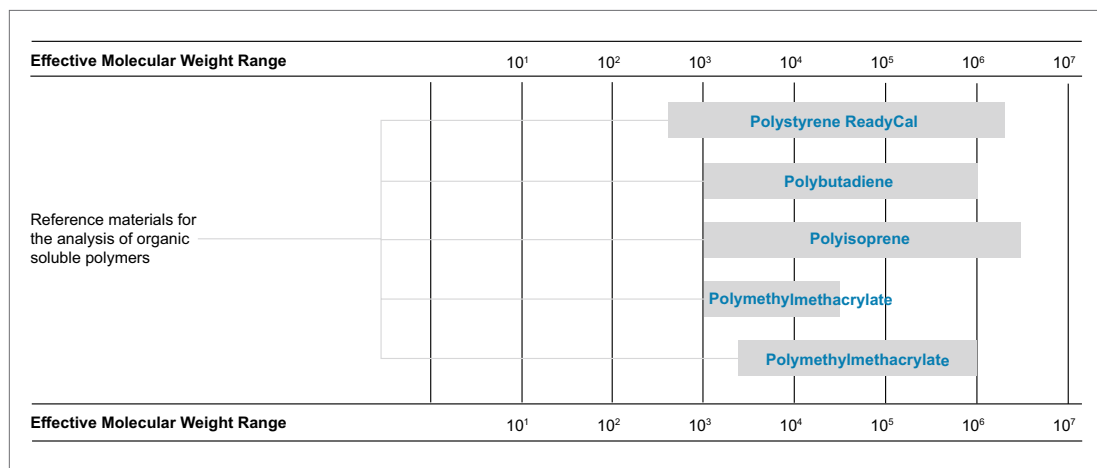


 For more information on XBridge Protein BEH SEC Columns, refer to [page 428](#).

## Calibration Standards

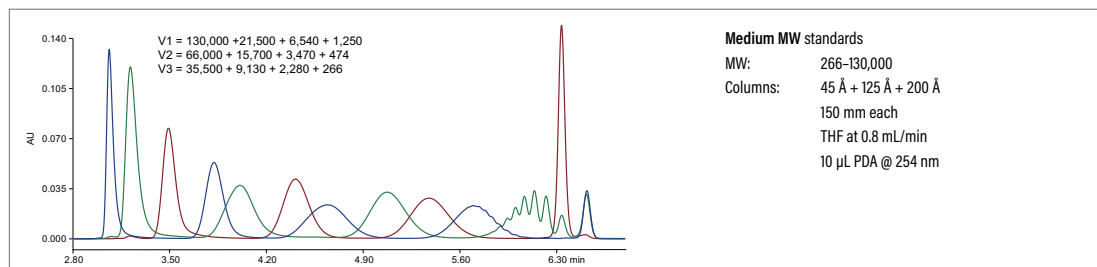
Waters offers a selection of well-characterized polymer standards for calibration. The offering includes kits as well as individual standards. The standards are available for aqueous and non-aqueous applications.

### Non-Aqueous GPC Standards Guide



### ACQUITY APC CALIBRATION STANDARDS

ACQUITY APC Calibration Standards match the molecular-weight range of the ACQUITY APC XT Columns. These kits eliminate the need to manually prepare custom calibration mixes because they provide the correct number of data points for the targeted molecular-weight range. In addition, they reduce, by 3–5 times, the ACQUITY APC System's calibration time. With reduced calibration time, calibrations can be carried out on a more frequent basis, increasing confidence in the accuracy of results.



The ACQUITY APC Calibration Standards are available in both polystyrene and polymethyl methacrylate, configured as low-, middle-, and high-molecular-weight calibration kits. Also available are method development kits, which include the full separation range of the three kits combined.

## Ordering Information

### ACQUITY APC Calibration Standards

Description	MW Range	P/N
<b>ACQUITY APC Polystyrene Low MW Calibration Kit</b> Three sets of 10 vials containing 1.5 mg each of the following: Vial 1: MW 15.5 K, 4.71 K, 1.25 K Vial 2: MW 8.90 K, 3.46 K, 0.570 K Vial 3: MW 6.67 K, 2.25 K, 0.266 K	266–15,000	186007539
<b>ACQUITY APC Polystyrene Middle MW Calibration Kit</b> Three sets of 10 vials containing 1.5 mg each of the following: Vial 1: MW 125 K, 21.2 K, 6.67 K, 1.25 K Vial 2: MW 62.5 K, 15.5 K, 3.46 K, 0.570 K Vial 3: MW 35.4 K, 8.90 K, 2.25 K, 0.266 K	266–130,000	186007540
<b>ACQUITY APC Polystyrene High MW Calibration Kit</b> Three sets of 10 vials containing the following: Vial 1: 0.75 mg MW 1760 K; and 1.5 mg 271 K, 34.0 K, 3.46 K Vial 2: 0.75 mg MW 1170 K; and 1.5 mg 125 K, 17.3 K, 0.570 K Vial 3: 1.5 mg MW 554 K, 62.5 K, 8.90 K, 0.266 K	266–2,500,000	186007541
<b>ACQUITY APC Polystyrene Method Development MW Calibration Kit</b> Three vials containing the following: Vial 1: 0.75 mg Mp 1210 K; and 1.5 mg 130 K, 17.6 K, 0.474 K Vial 2: 0.75 mg Mp 1800 K; and 1.5 mg 277 K, 34.8 K, 3.47 K Vial 3: 1.5 mg Mp 552 K, 66.0 K, 9.13 K, 0.266 K Vial 4: 1.5 mg Mp 66.0 K, 15.7 K, 3.47 K, 0.474 K Vial 5: 1.5 mg Mp 130 K, 21.5 K, 6.54 K, 1.25 K Vial 6: 1.5 mg Mp 35.5 K, 9.13 K, 2.28 K, 0.266 K Vial 7: 1.5 mg Mp 15.7 K, 4.92 K, 1.25 K Vial 8: 1.5 mg Mp 9.13 K, 3.47 K, 0.474 K Vial 9: 1.5 mg Mp 6.54 K, 2.28 K, 0.266 K Vial 10: 1.5 mg BHT	266–2,500,000	186007542
<b>ACQUITY APC Polymethyl Methacrylate Low MW Calibration Kit</b> Three sets of 10 vials containing 1.5 mg each of the following: Vials 1: MW 12.5 K, 4.14 K, 0.997 K Vials 2: MW 9.59 K, 3.15 K, 0.573 K Vials 3: MW 6.27 K, 2.26 K, 0.202 K	202–12,000	186007543
<b>ACQUITY APC Polymethyl Methacrylate Middle MW Calibration Kit</b> Three sets of 10 vials containing 1.5 mg each of the following: Vials 1: MW 199 K, 40.3 K, 6.27 K, 0.997 K Vials 2: MW 107 K, 23.2 K, 4.14 K, 0.573 K Vials 3: MW 69.0 K, 12.5 K, 2.26 K, 0.202 K	202–200,000	186007544
<b>ACQUITY APC Polymethyl Methacrylate High MW Calibration Kit</b> Three sets of 10 vials containing the following: Vial 1: 0.75 mg MW 1430; and 1.5 mg MW 199 K, 23.2 K, 6.37 K Vial 2: 1.5 mg MW 592 K, 86.7 K, 12.5 K, 0.573 K Vial 3: 1.5 mg MW 335 K, 40.3 K, 6.27 K, 0.202 K	202–1,600,000	186007545
<b>ACQUITY APC Polymethyl Methacrylate Method Development MW Calibration Kit</b> Three vials containing the following: Vial 1: 0.75 mg Mp 1600 K; and 1.5 mg Mp 201 K, 23.5 K, 2.38 K Vial 2: 1.5 mg Mp 608 K, 88.5 K, 12.6 K, 0.602 K Vial 3: 1.5 mg Mp 340 K, 41.4 K, 6.37 K, 0.202 K Vial 4: 1.5 mg Mp 108 K, 23.5 K, 4.23 K, 0.602 K Vial 5: 1.5 mg Mp 201 K, 41.4 K, 6.37 K, 1.102 K Vial 6: 1.5 mg Mp 71.8 K, 12.6 K, 2.38 K, 0.202 K Vial 7: 1.5 mg Mp 12.6 K, 4.23 K, 1.102 K Vial 8: 1.5 mg Mp 9.68 K, 3.21 K, 0.602 K Vial 9: 1.5 mg Mp 6.37 K, 2.38 K, 0.202 K Vial 10: 1.5 mg BHT	202–1,600,000	186007546

\*Values listed are approximate molecular weights.

## READYCAL STANDARDS

A ReadyCal Kit allows quick and accurate preparation of a multi-point calibration curve without the need to weigh chemicals. Each vial contains a polymer mix that spans a molecular-weight range, to provide baseline resolution of each component. Simply add solvent directly to the vial and mix.

### Ordering Information

#### ReadyCal Standards

Description*	P/N
<b>Polystyrene ReadyCal Standards 4 mL Kit</b> A complete kit of ready-to-use polystyrene calibration standards. Kit contains 30 autosampler vials, 4 mL each, which contain four polystyrene standards per vial. There are three separate molecular weight ranges in each kit, ten units of each range. Range is from 400 to 2,000,000 Da.	<a href="#">WAT058930</a>
<b>Polystyrene ReadyCal Standards 2 mL Kit</b> A complete kit of ready-to-use polystyrene calibration standards. Kit contains 30 autosampler vials, 2 mL each, which contain four polystyrene standards per vial. There are three separate molecular weight ranges in each kit, ten units of each range. Range is from 400 to 2,000,000 Da.	<a href="#">WAT058931</a>

\*Values listed are approximate molecular weights.

## POLYMER-SPECIFIC CALIBRATION STANDARDS

Tailored specifically for different types of polymer analysis, these calibration standards provide a quick and reliable references to known molecular-weight ranges. Polymer type and MW ranges appear in the table.

### Ordering Information

#### Polymer-Specific Calibration Standards

Description*	P/N
<b>Polybutadiene Standards Kit</b> 0.5 g/vial polybutadiene at each molecular weight: 1000, 3000, 7000, 10,000, 30,000, 70,000, 100,000, 300,000, 700,000, 1,000,000	<a href="#">WAT035709</a>
<b>Polyisoprene Standards Kit</b> 0.5 g/vial polyisoprene at each molecular weight: 1000, 3000, 10,000, 30,000, 70,000, 100,000, 300,000, 500,000, 1,000,000, 3,000,000	<a href="#">WAT035708</a>
<b>Polymethylmethacrylate Low MW Standards Kit</b> 0.5 g/vial polymethylmethacrylate at each molecular weight: 1000, 1700, 2500, 3500, 5000, 7000, 10,000, 13,000, 20,000, 30,000	<a href="#">WAT035707</a>
<b>Polymethylmethacrylate Mid MW Standards Kit</b> 0.5 g/vial polymethylmethacrylate at each molecular weight: 2400, 9500, 31,000, 52,000, 100,000, 170,000, 270,000, 490,000, 730,000, 1,000,000	<a href="#">WAT035706</a>
<b>Polystyrene Low-Mid MW Standards Kit</b> 10 g/vial polystyrene at each molecular weight: 400, 530, 950 5 g/vial polystyrene at each molecular weight: 2800, 6400, 10,000, 17,000, 43,000, 110,000, 180,000	<a href="#">WAT011588</a>
<b>Polystyrene Mid-High MW Standards Kit</b> 5 g/vial polystyrene at each molecular weight: 430,000, 780,000 1 g/vial polystyrene at each molecular weight: 1,300,000, 2,800,000, 3,600,000, 4,300,000, 5,200,000, 6,200,000, 8,400,000, 20,000,000	<a href="#">WAT011610</a>
<b>Polystyrene Low MW Standards Kit</b> 0.5 g/vial polystyrene at each molecular weight: 580, 950, 1200, 1800, 2470, 3770, 5100, 7600, 12,500, 17,000	WAT034208
<b>Polystyrene Mid MW Standards Kit</b> 0.5 g/vial polystyrene at each molecular weight: 1200, 3250, 10,200, 28,000, 68,000, 195,000, 490,000, 1,080,000, 1,750,000, 2,750,000	<a href="#">WAT034209</a>
<b>Polystyrene High MW Standards Kit</b> 0.5 g/vial polystyrene at each molecular weight: 45,000, 1,270,000, 2,300,000, 3,260,000, 4,340,000, 8,000,000, 15,000,000	<a href="#">WAT034210</a>

\*Values listed are approximate molecular weights.

## INDIVIDUAL MW STANDARDS

In many cases, a single calibration standard can verify the molecular weight of a sample-mixture component, making its identification simple and straightforward.

### Ordering Information

#### Individual MW Standards

Description*	P/N
<b>Polystyrene Standard 400</b> 10 g/vial polystyrene, 400 MW	<a href="#">WAT011590</a>
<b>Polystyrene Standard 530</b> 10 g/vial polystyrene, 530 MW	<a href="#">WAT011592</a>
<b>Polystyrene Standard 950</b> 10 g/vial polystyrene, 950 MW	<a href="#">WAT011594</a>
<b>Polystyrene Standard 2800</b> 5 g/vial polystyrene, 2800 MW	<a href="#">WAT011596</a>
<b>Polystyrene Standard 6400</b> 5 g/vial polystyrene, 6400 MW	<a href="#">WAT011598</a>
<b>Polystyrene Standard 10,100</b> 5 g/vial polystyrene, 10,100 MW	<a href="#">WAT011600</a>
<b>Polystyrene Standard 17,000</b> 5 g/vial polystyrene, 17,000 MW	<a href="#">WAT011602</a>
<b>Polystyrene Standard 43,000</b> 5 g/vial polystyrene, 43,000 MW	<a href="#">WAT011604</a>
<b>Polystyrene Standard 110,000</b> 5 g/vial polystyrene, 110,000 MW	<a href="#">WAT011606</a>
<b>Polystyrene Standard 180,000</b> 5 g/vial polystyrene, 180,000 MW	<a href="#">WAT011608</a>

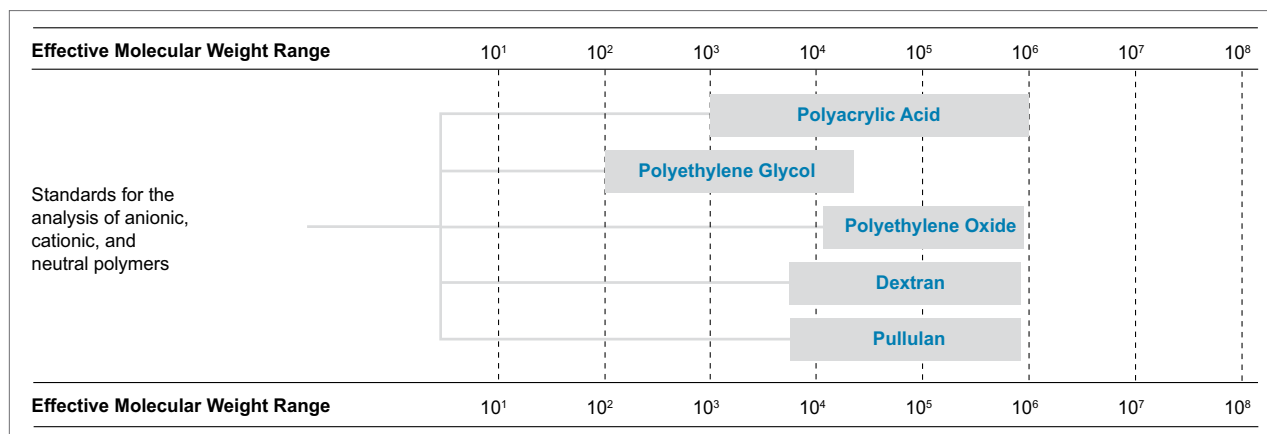
\*Values listed are approximate molecular weights.

Description*	P/N
<b>Polystyrene Standard 430,000</b> 5 g/vial polystyrene, 430,000 MW	<a href="#">WAT011612</a>
<b>Polystyrene Standard 780,000</b> 5 g/vial polystyrene, 780,000 MW	<a href="#">WAT011614</a>
<b>Polystyrene Standard 1,300,000</b> 1 g/vial polystyrene, 1,300,000 MW	<a href="#">WAT011616</a>
<b>Polystyrene Standard 2,800,000</b> 1 g/vial polystyrene, 2,800,000 MW	<a href="#">WAT011618</a>
<b>Polystyrene Standard 3,600,000</b> 1 g/vial polystyrene, 3,600,000 MW	<a href="#">WAT011620</a>
<b>Polystyrene Standard 4,300,000</b> 1 g/vial polystyrene, 4,300,000 MW	<a href="#">WAT011622</a>
<b>Polystyrene Standard 5,200,000</b> 1 g/vial polystyrene, 5,200,000 MW	<a href="#">WAT011624</a>
<b>Polystyrene Standard 6,200,000</b> 1 g/vial polystyrene, 6,200,000 MW	<a href="#">WAT011626</a>
<b>Polystyrene Standard 8,400,000</b> 1 g/vial polystyrene, 8,400,000 MW	<a href="#">WAT011628</a>
<b>Polystyrene Standard 20,000,000</b> 1 g/vial polystyrene, 20,000,000 MW	<a href="#">WAT011630</a>

## SEC CALIBRATION STANDARDS

Waters SEC Calibration Standards are precisely formulated to determine accurate molecular weight and conveniently packaged to minimize errors in SEC calibration methods. The fully traceable aqueous-based polymer kits simplify routine calibration procedures that improve workflow and increase productivity.

#### Aqueous SEC Standards Guide



This chart may be used to determine the appropriate component standard and corresponding molecular weight range.



## Full-Range Calibration Standards

These standards kits provide an accurate calibration range for determining the molecular weight of common water-soluble polymers. The kits contain a series of well-characterized standards of a specified polymer type and include certificates that list component ranges and concentrations.



## Ordering Information

### Full-Range Calibration Standards for SEC

Description*	P/N
<b>Polyacrylic Acid Standards Kit</b>	
250 mg/vial polyacrylic acid at each molecular weight: 1000, 3000, 7000, 15,000, 30,000, 70,000, 100,000, 300,000, 700,000, and 1,000,000	<a href="#">WAT035714</a>
<b>Polyethylene Glycol Standards Kit</b>	
1.0 g/vial polyethylene glycol at each molecular weight: 100, 200, 400, 600, 1000, 1500, 4300, 7000, 13,000, and 22,000	<a href="#">WAT035711</a>
<b>Polyethylene Oxide Kit</b>	
500 mg/vial polyethylene oxide at each molecular weight: 24,000, 40,000, 79,000, 160,000, 340,000, 570,000, and 850,000	<a href="#">WAT011572</a>
<b>Dextrans Standard</b>	
500 mg/vial dextrans at each molecular weight: 1000, 4400, 8500, 15,400, 30,000, 50,400, 87,000, and 225,000	WAT054392
<b>Pullulan Kit</b>	
200 mg/vial pullulan at each molecular weight: 5000, 10,000, 20,000, 50,000, 100,000, 200,000, 400,000, and 800,000	<a href="#">WAT034207</a>

\*Values listed are approximate molecular weights.

## Individual Calibration Standards

In many cases, a single calibration standard can verify the molecular weight of a sample-mixture component, making its identification simple and straightforward.

## Ordering Information

### Individual Calibration Standards for SEC

Description*	P/N
Polyethylene Oxide Standard 24,000	<a href="#">WAT011574</a>
Polyethylene Oxide Standard 40,000	<a href="#">WAT011576</a>
Polyethylene Oxide Standard 79,000	<a href="#">WAT011578</a>
Polyethylene Oxide Standard 160,000	<a href="#">WAT011580</a>
Polyethylene Oxide Standard 340,000	<a href="#">WAT011582</a>
Polyethylene Oxide Standard 570,000	<a href="#">WAT011584</a>
Polyethylene Oxide Standard 850,000	<a href="#">WAT011586</a>

\*Values listed are approximate molecular weights.

# Nano and Micro Flow LC-MS







# Contents

<b>ionKey/MS</b> .....	<b><a href="#">485</a></b>
Simplified Micro-Flow LC-MS with Enhanced Sensitivity .....	<a href="#">485</a>
<b>iKey Separation Device</b> .....	<b><a href="#">486</a></b>
<b>Nano- and Micro-Flow Columns and Trapping Columns</b> .....	<b><a href="#">488</a></b>
Separation Columns.....	<a href="#">488</a>
Trapping Columns.....	<a href="#">488</a>
<b>ACQUITY UPLC M-Class with HDX Technology</b> .....	<b><a href="#">490</a></b>
Enzymate Pepsin Online Digestion Column .....	<a href="#">490</a>
<b>LC-MS Accessories</b> .....	<b><a href="#">491</a></b>
TruView LCMS Certified Vials.....	<a href="#">491</a>
Waters Certified Containers.....	<a href="#">492</a>
pH Buffers.....	<a href="#">492</a>

# Nano- and Micro-Flow LC-MS

Our nano- and micro-flow LC Columns fully exploit the separation power of small, sub-2- $\mu\text{m}$  particles to deliver superior chromatographic resolution.

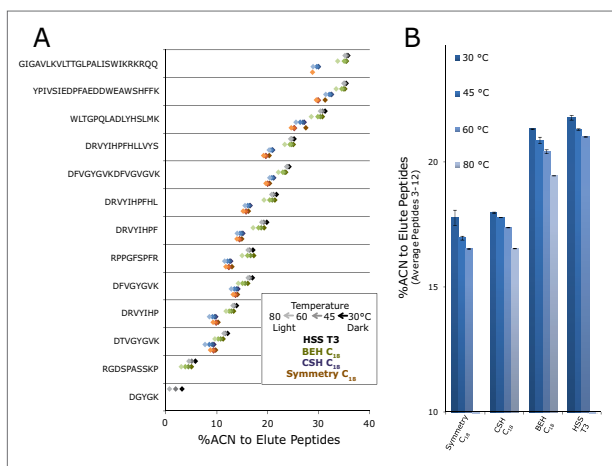
The selected stationary phases for nano-LC columns facilitate the efficiency and selectivity required for separations of complex peptide and protein separations as well as other sample-limited analyses.

Hybrid Particles		Silica-based Particles	
			
			
130 Å	300 Å	130 Å	100 Å
1.7 $\mu\text{m}$	1.7 $\mu\text{m}$	1.7 $\mu\text{m}$	1.8 $\mu\text{m}$
C <sub>18</sub>	C <sub>18</sub> , C <sub>4</sub>	C <sub>18</sub>	T <sub>3</sub>

**Peptide Separation Technology** stationary phases are specifically QC tested with tryptic digests of cytochrome c to ensure consistent performance for peptide separations.

**Protein Separation Technology** stationary phases are specifically designed for the high resolution analysis of proteins of various sizes, hydrophobicities, and isoelectric points. Particles are QC tested using a protein standard mix.

## Trap Elute Peptide Separation

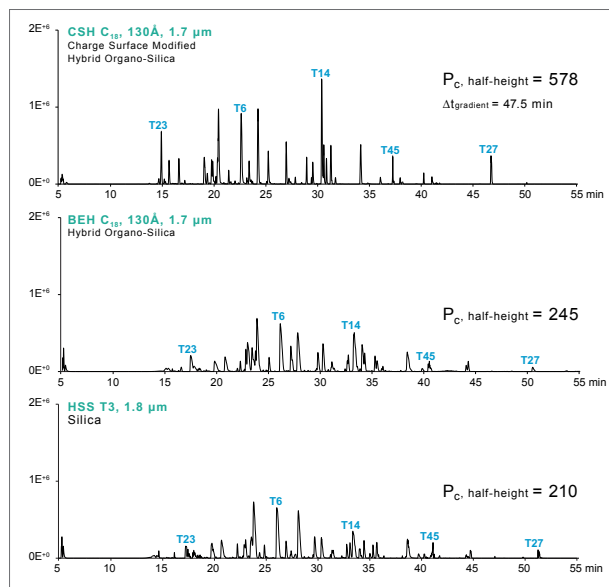


Peptide retention comparison of different stationary phases, including Symmetry Silica (the lower retention of Symmetry is used in trap-elute separations).


In nano- and micro-flow LC-MS, analyzing large-volume samples using a single column can be impractical. In such cases, you can trap analytes at higher flow rates. It is preferable to perform online trapping of analytes at microscale flow rates and to subsequently elute and separate those analytes across an analytical column, wherein a significantly lower nanoscale flow rate is employed.

To be effective, the trapping column's retentivity must be lower than that of the analytical column. This relationship between trapping and analytical columns ensures refocusing of analytes on the analytical column after elution from the trap at the start of the gradient, delivering high peak capacity separations.

## Peak Capacity and Retentivity



Comparison of a base peak ion chromatogram of MassPREP Enolase Digestion Standard, 1  $\mu\text{g}$ , direct injection on a 75  $\mu\text{m}$  (I.D.) column.

 For more information on Waters Particle Technology, please refer to [page 85](#).

Nano- and micro-flow LC-MS is commonplace in areas of bio-separation such as peptide bioanalysis, intact antibody analysis, proteomics, lipidomics and metabolomics. This technique addresses limited sample availability and the need for high sensitivity and the requirement for low limits of detection or quantification.

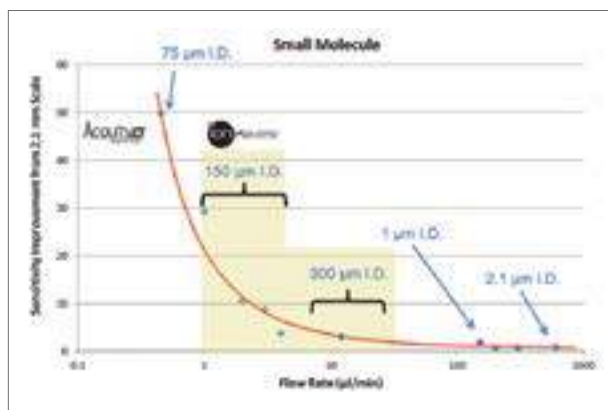
In micro-flow LC-MS, the inner diameter of the separation column, and thus the flow rate of the mobile phase can dramatically alter the sensitivity of the mass spectrometry as follows:

- By increasing sampling efficiency
- By increasing ionization efficiency
- By reducing matrix effects

Nano- LC-MS provides a higher sensitivity increase, compared with 2.1 mm UPLC Columns. Micro-flow separations, which use larger-diameter columns, increase sample throughput dramatically while continuing to deliver excellent sensitivity for many complex biomolecular analyses.

We offer solutions that satisfy the most demanding requirements for assays that rely on nano- and micro-flow LC-MS technology—solutions that ensure the assays' successful performance.

#### Gaining Sensitivity by Reducing Column Diameter and Flow Rate



Sensitivity enhancement for a series of small molecules relative to a 2.1 mm I.D. separation performed on an ACQUITY UPLC System. The volume and concentration of sample injected on each column format was identical.

#### Nano- and Micro-flow LC-MS Consumables



- Includes a 150 µm I.D. separation channel, for highest sensitivity, and a 300 µm I.D. channel, for high-throughput analysis
- Greatly simplified micro-flow LC-MS, with fitting-free connections
- The 150 µm I.D. iKey™ Separation Device demonstrates as much as 40 times the sensitivity of the 2.1 mm I.D. UPLC column
- The 300 µm I.D. iKey, during high-throughput UPLC-cycle times, delivers as much as six times the sensitivity of a 2.1 mm I.D. UPLC column
- Easy post-column addition of MS-modifier solvents
- nanoEase M/Z Columns with easy-to-use ZenFit™ Connection Technology
- Column inner diameters range from 75 to 300 µm
- Column lengths range from 50 to 250 mm
- Trapping columns range from 180 to 300 µm I.D.

## ionKey/MS

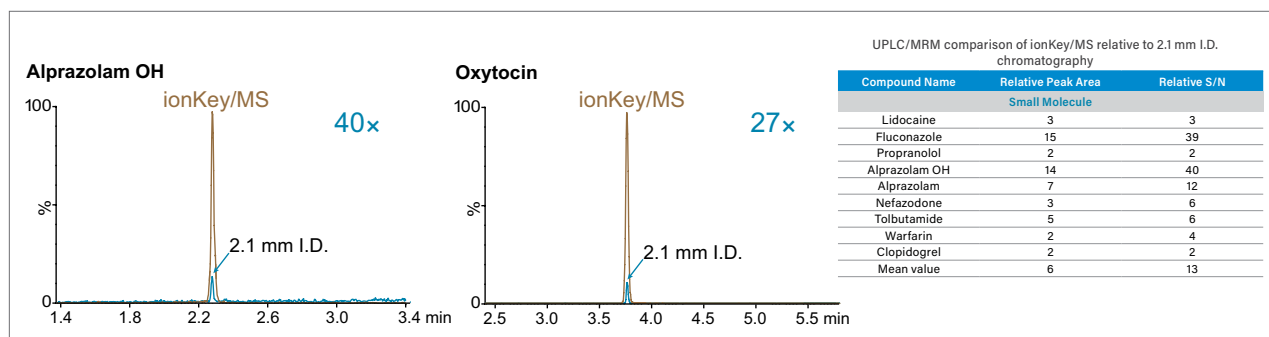
### SIMPLIFIED MICRO-FLOW LC-MS WITH ENHANCED SENSITIVITY

The ionKey/MS System integrates the micro-flow UPLC separation into the source of the mass spectrometer. This delivers LC-MS system performance and sensitivity that cannot be achieved any other way. ionKey/MS Systems are enabled by the iKey Separation Device, which replaces the need for traditional fittings and columns and simplifies the user experience. The “plug and play” design of the iKey Separation Device eliminates operator variability common in traditional micro-flow LC-MS analyses.



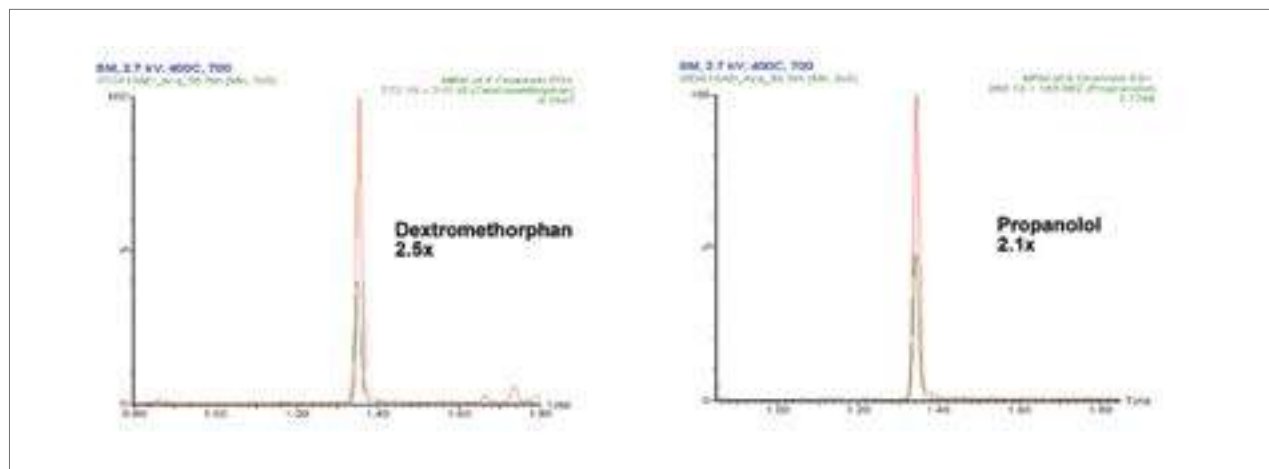
The ionKey MS System with the ACQUITY UPLC M-Class System and Xevo TQ-S Mass Spectrometer.

### 150 $\mu$ m I.D. iKey: Up to 40x Increase in Sensitivity Compared to 2.1 mm UPLC LC-MS Applications



Sensitivity comparison between ionKey/MS™ and 2.1 mm I.D. chromatography; 1  $\mu$ L injection of equal sample load on each.

### 300 $\mu$ m I.D. iKey HT: Increased LC-MS Sensitivity with UPLC Throughput



Sensitivity gains using (300  $\mu$ m  $\times$  50 mm) iKey HT BEH C<sub>18</sub> Separation Device (red) compared to (2.1 mm  $\times$  50 mm) UPLC BEH C<sub>18</sub> Column (green) under identical injection volume and gradient conditions.

## iKey Separation Device

In an ionKey/MS System, the iKey Separation Device contains the fluid connections, electronics, ESI interface, column heater, eCord, and chemistry needed to perform UPLC separations. As such, it replaces the need for traditional fittings and columns, simplifying the user experience. The “plug and play” design of the iKey eliminates user-dependent variation in results that often occurs in traditional micro-flow LC-MS analyses, regardless of users' skill level.

iKey Separation Device



iKey Separation Device with Post-Column Addition (PCA)

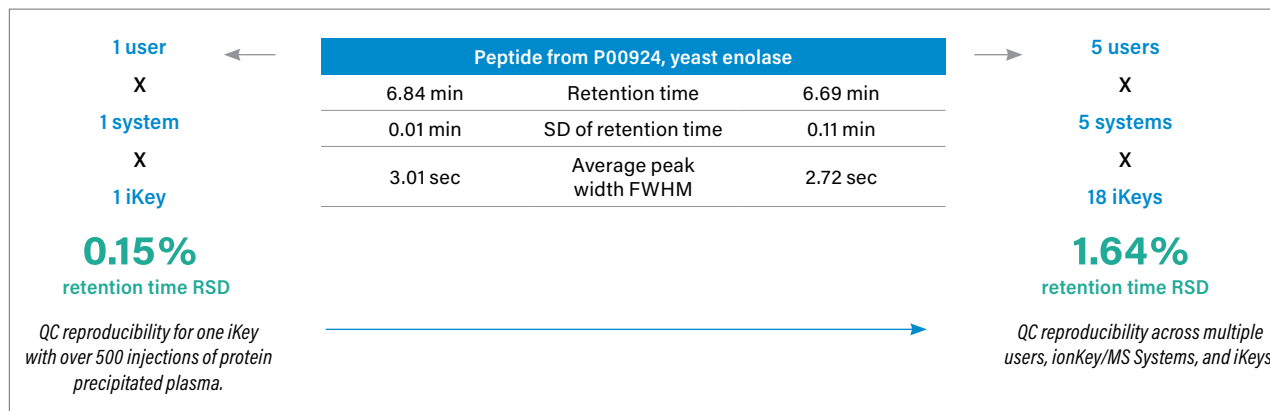


The major component of the ionKey/MS System, the iKey Separation Device performs sub-2- $\mu\text{m}$  UPLC separations, resulting in highly sensitive, efficient, micro-flow LC-MS analyses.

The iKey Separation device is available with two inner diameters: 150  $\mu\text{m}$  I.D. which provides the highest level of sensitivity, and the 300  $\mu\text{m}$  I.D. iKey HT for higher throughput separations.

The PCA iKey incorporates a separation channel as well as a post-column addition (PCA) channel. The design allows for mixing the mobile phase post separation with a desired solvent. Both effluents are merged and collected at the inlet of the emitter. Post-column addition of solvents can enhance the electrospray process and increase sensitivity without adversely affecting the separation.

### Robust, Reproducible, and Reliable



The iKey Separation Device is LC-MS tested to ensure consistent performance not only for a particular iKey but from one iKey to another. The device also exhibits robust performance—performance that achieves high-quality results, even after hundreds of injections.

## Ordering Information

### iKey Separation Devices

Particle Size: 1.7 $\mu\text{m}$		
	Dimension	P/N (1/pk)
BEH C <sub>18</sub> , 130 Å	150 $\mu\text{m}$ $\times$ 50 mm	<a href="#">186007256</a>
	150 $\mu\text{m}$ $\times$ 50 mm (PCA)	<a href="#">186007580</a>
	150 $\mu\text{m}$ $\times$ 100 mm	<a href="#">186007258</a>
CSH C <sub>18</sub> , 130 Å	150 $\mu\text{m}$ $\times$ 50 mm	<a href="#">186007244</a>
	150 $\mu\text{m}$ $\times$ 100 mm	<a href="#">186007245</a>
HSS T3, 100 Å	150 $\mu\text{m}$ $\times$ 50 mm	<a href="#">186007260</a>
	150 $\mu\text{m}$ $\times$ 100 mm	<a href="#">186007261</a>
	300 $\mu\text{m}$ $\times$ 50 mm	<a href="#">186008727</a>

### iKey Peptide Separation Devices

Particle Size: 1.7 $\mu\text{m}$		
	Dimension	P/N (1/pk)
BEH C <sub>18</sub> , 130 Å	150 $\mu\text{m}$ $\times$ 50 mm	<a href="#">186006764</a>
	150 $\mu\text{m}$ $\times$ 50 mm (PCA)	<a href="#">186007557</a>
	150 $\mu\text{m}$ $\times$ 100 mm	<a href="#">186006766</a>
CSH C <sub>18</sub> , 130 Å	150 $\mu\text{m}$ $\times$ 50 mm	<a href="#">186007257</a>
	150 $\mu\text{m}$ $\times$ 100 mm	<a href="#">186007259</a>
BEH C <sub>18</sub> , 300 Å	150 $\mu\text{m}$ $\times$ 50 mm	<a href="#">186006969</a>
	150 $\mu\text{m}$ $\times$ 100 mm	<a href="#">186006970</a>

### iKey Protein Separation Devices

Particle Size: 1.7 $\mu\text{m}$		
	Dimension	P/N (1/pk)
BEH C <sub>4</sub> , 300 Å	150 $\mu\text{m}$ $\times$ 50 mm	<a href="#">186006765</a>
	150 $\mu\text{m}$ $\times$ 100 mm	<a href="#">186006968</a>

### iKey Utility Devices

	Dimension	P/N (1/pk)
iKey Infusion Device	85 $\mu\text{m}$ $\times$ 50 mm	<a href="#">186007049</a>
iKey Flow Injection Analysis Device	85 $\mu\text{m}$ $\times$ 50 mm	<a href="#">186007051</a>
iKey Diagnostic Device V3	n/a	<a href="#">186008450</a>



## Nano- and Micro-Flow Columns and Trapping Columns

Waters Columns for nano-to-microscale LC-MS analyses are designed for low-dispersion nano-UPLC Systems. Our rigorous quality-control measures ensure that the columns achieve their full potential for sensitivity, resolution, and reproducibility for biomarker discovery and also for identifying and characterizing peptides and proteins.

### SEPARATION COLUMNS

These columns enable nano- and microscale separations with MS detection under UPLC conditions at 15,000 psi. They take full advantage of the separation power of sub-2- $\mu$ m particle technology. Columns between 75 and 300  $\mu$ m I.D. provide chromatographic separations with flow rates between 200 nL/min and 100  $\mu$ L/min, covering a 170-fold range of sample amounts. The varying characteristics of available particle technologies provide alternate selectivity, retentivity, and loadability, and thus the flexibility to achieve the most suitable separation for complex LC-MS analyses.

### TRAPPING COLUMNS

Trapping columns are used to desalt and enrich the sample before eluting onto the analytical column for the final separation with MS detection. For fast loading of the trap column and to reduce the cycle time, trap columns are packed with larger 5  $\mu$ m particles.

### nanoEase M/Z Columns with ZenFit Connection Technology

Waters ZenFit Connection Technology introduces easy-to-use, re-usable, fingertight, liquid-line connectors to the family of nanoEase M/Z Columns. These columns are capable of withstanding pressures as high as 15,000 psi and eliminating dead volume, a frequent source of variability associated with regular fittings. ZenFit Connection Technology does not require user training or any further special attention.

\*To use nanoEase M/Z Columns on the ACQUITY UPLC M-Class System, equip systems with the appropriate upgrade kit. The 300  $\mu$ m I.D. ACQUITY UPLC M-Class Columns and Traps are compatible with ZenFit Connections.



**i** nanoEase M/Z Columns and ACQUITY UPLC M-Class Columns are preferred for use with the ACQUITY UPLC M-Class and nanoACQUITY UPLC Systems.

## Ordering Information

### nanoEase M/Z Peptide Columns

	Particle Size: 1.7 $\mu$ m	
	Dimension	P/N (1/pk)
<b>BEH C<sub>18</sub>, 130 Å</b>	75 $\mu$ m $\times$ 100 mm	<a href="#">186008792</a>
	75 $\mu$ m $\times$ 150 mm	<a href="#">186008793</a>
	75 $\mu$ m $\times$ 200 mm	<a href="#">186008794</a>
	75 $\mu$ m $\times$ 250 mm	<a href="#">186008795</a>
	100 $\mu$ m $\times$ 100 mm	<a href="#">186008796</a>
	150 $\mu$ m $\times$ 100 mm	<a href="#">186008797</a>
<b>BEH C<sub>18</sub>, 300 Å</b>	75 $\mu$ m $\times$ 100 mm	<a href="#">186008798</a>
	75 $\mu$ m $\times$ 150 mm	<a href="#">186008799</a>
	75 $\mu$ m $\times$ 200 mm	<a href="#">186008800</a>
	75 $\mu$ m $\times$ 250 mm	<a href="#">186008801</a>
	100 $\mu$ m $\times$ 100 mm	<a href="#">186008802</a>
	150 $\mu$ m $\times$ 100 mm	<a href="#">186008803</a>
<b>CSH C<sub>18</sub>, 130 Å</b>	75 $\mu$ m $\times$ 100 mm	<a href="#">186008807</a>
	75 $\mu$ m $\times$ 150 mm	<a href="#">186008808</a>
	75 $\mu$ m $\times$ 200 mm	<a href="#">186008809</a>
	75 $\mu$ m $\times$ 250 mm	<a href="#">186008810</a>
	100 $\mu$ m $\times$ 100 mm	<a href="#">186008811</a>
	150 $\mu$ m $\times$ 50 mm	<a href="#">186008812</a>
	150 $\mu$ m $\times$ 100 mm	<a href="#">186008813</a>
	150 $\mu$ m $\times$ 150 mm	<a href="#">186008814</a>

### nanoEase M/Z Protein Columns

	Dimension	P/N (1/pk)
	Particle Size: 1.7 $\mu$ m	
<b>BEH C<sub>4</sub>, 300 Å</b>	75 $\mu$ m $\times$ 100 mm	<a href="#">186008804</a>
	100 $\mu$ m $\times$ 100 mm	<a href="#">186008805</a>
	150 $\mu$ m $\times$ 100 mm	<a href="#">186008806</a>

### nanoEase M/Z HSS Columns

	Dimension	P/N (1/pk)
	Particle Size: 1.8 $\mu$ m	
<b>HSS T3, 100 Å</b>	75 $\mu$ m $\times$ 100 mm	<a href="#">186008815</a>
	75 $\mu$ m $\times$ 150 mm	<a href="#">186008816</a>
	75 $\mu$ m $\times$ 200 mm	<a href="#">186008817</a>
	75 $\mu$ m $\times$ 250 mm	<a href="#">186008818</a>
	100 $\mu$ m $\times$ 100 mm	<a href="#">186008819</a>
	150 $\mu$ m $\times$ 100 mm	<a href="#">186008820</a>

### nanoEase M/Z Trap Columns\*

Particle Size: 5 µm		
	Dimension	P/N (1/pk)
<b>Symmetry C<sub>18</sub>, 100 Å</b>	180 µm × 20 mm	<a href="#">186008821</a>

\*For 300 µm I.D. traps please refer to M-Class Trap Columns.

### ACQUITY UPLC M-Class Columns

Particle Size: 1.8 µm		
	Dimension	P/N (1/pk)
<b>HSS T3, 100 Å</b>	75 µm × 100 mm	<a href="#">186008006</a>
	75 µm × 150 mm	<a href="#">186007473</a>
	75 µm × 200 mm	<a href="#">186008007</a>
	75 µm × 250 mm	<a href="#">186007474</a>
	100 µm × 100 mm	<a href="#">186008008</a>
	150 µm × 100 mm	<a href="#">186008009</a>
	300 µm × 50 mm	186007559
	300 µm × 100 mm	186007560
	300 µm × 150 mm	186007472

### ACQUITY UPLC M-Class Trap Columns

Particle Size: 5 µm		
	Dimension	P/N (1/pk)
<b>Symmetry C<sub>18</sub>, 100 Å</b>	180 µm × 20 mm	<a href="#">186007496</a> <sup>4</sup>
	180 µm × 20 mm	<a href="#">186007497</a> <sup>5</sup>
	180 µm × 20 mm	<a href="#">186007500</a> <sup>6</sup>
	180 µm × 20 mm	<a href="#">186007592</a> <sup>7</sup>
<b>Symmetry C<sub>18</sub>, 100 Å</b>	300 µm × 25 mm	186007499 <sup>3</sup>
	300 µm × 50 mm	186007498
<b>Peptide BEH C<sub>18</sub>, 130 Å</b>	300 µm × 50 mm	186007471
<b>BEH C<sub>4</sub>, 300 Å</b>	300 µm × 50 mm	186008470
<b>HSS T3, 100 Å</b>	300 µm × 50 mm	186008029

<sup>3</sup>Configuration HCP (2D).

<sup>4</sup>Configuration: 2G, V/M.

<sup>5</sup>Configuration: 2D, V/M.

<sup>6</sup>Configuration: 2G, V/V.

<sup>7</sup>Configuration: 2D, V/V.

### ACQUITY UPLC M-Class Peptide Columns

Particle Size: 1.7 µm		
	Dimension	P/N (1/pk)
<b>BEH C<sub>18</sub>, 130 Å</b>	75 µm × 100 mm	<a href="#">186007481</a>
	75 µm × 150 mm	<a href="#">186007482</a>
	75 µm × 200 mm	<a href="#">186007483</a>
	75 µm × 250 mm	<a href="#">186007484</a>
	100 µm × 100 mm	<a href="#">186007485</a>
	150 µm × 100 mm	<a href="#">186007486</a>
	300 µm × 50 mm	186007564
	300 µm × 100 mm	186007565
	300 µm × 150 mm	186007566

<b>BEH C<sub>18</sub>, 300 Å</b>	75 µm × 100 mm	<a href="#">186007487</a>
	75 µm × 150 mm	<a href="#">186007490</a>
	75 µm × 200 mm	<a href="#">186007491</a>
	75 µm × 250 mm	<a href="#">186007492</a>
	100 µm × 100 mm	<a href="#">186007488</a>
	150 µm × 100 mm	<a href="#">186007489</a>
	300 µm × 50 mm	186007570
	300 µm × 100 mm	186007571
	300 µm × 150 mm	186007572

<b>CSH C<sub>18</sub>, 130 Å</b>	75 µm × 100 mm	<a href="#">186007475</a>
	75 µm × 150 mm	<a href="#">186007476</a>
	75 µm × 200 mm	<a href="#">186007477</a>
	75 µm × 250 mm	<a href="#">186007478</a>
	100 µm × 100 mm	<a href="#">186007479</a>
	150 µm × 50 mm	<a href="#">186007513</a>
	150 µm × 100 mm	<a href="#">186007480</a>
	150 µm × 150 mm	<a href="#">186007514</a>
	300 µm × 50 mm	186007561
	300 µm × 100 mm	186007562
300 µm × 150 mm	186007563	

### ACQUITY UPLC M-Class Protein Columns

Particle Size: 1.7 µm		
	Dimension	P/N (1/pk)
<b>BEH C<sub>4</sub>, 300 Å</b>	75 µm × 100 mm	<a href="#">186007493</a>
	100 µm × 100 mm	<a href="#">186007494</a>
	150 µm × 100 mm	<a href="#">186007495</a>
	300 µm × 50 mm	186007567
	300 µm × 100 mm	186007568
	300 µm × 150 mm	186007569

## ACQUITY UPLC M-Class with HDX Technology

Hydrogen-deuterium exchange mass spectrometry (HDX-MS) is used to study a protein's structural dynamics and conformational changes, a component of understanding its higher-order structure. Information about protein conformation from an HDX MS study can serve to compare a control compound with an analyte by measuring the relative amount of deuteriation uptake. HDX-MS can monitor domain interaction, localized-protein breathing, and folding or unfolding in the solution phase. The ACQUITY UPLC M-Class System can quantify small changes in protein conformation by extending its pressure range to effect a higher-efficiency separation. An integral part of the ACQUITY UPLC M-Class HDX System is the Waters Enzymate™ BEH Pepsin Column, which performs online protein digestion.



ACQUITY UPLC M-Class System.

The technology offers these benefits:

- True UPLC separations for peptide and protein HDX
- Reproducible, robust, and rapid separations (nano-to-micro-scale at 0 °C and pressure to 15,000 psi)

### ENZYMATE PEPSIN ONLINE DIGESTION COLUMN

Waters Enzymate Pepsin Online Digestion Column digests intact proteins into peptides. The peptic peptides are then retained on a trapping column. Peptides eluting from the trapping column are refocused onto a sub-2- $\mu\text{m}$  ACQUITY UPLC Column and then eluted into a high-resolution mass spectrometer.

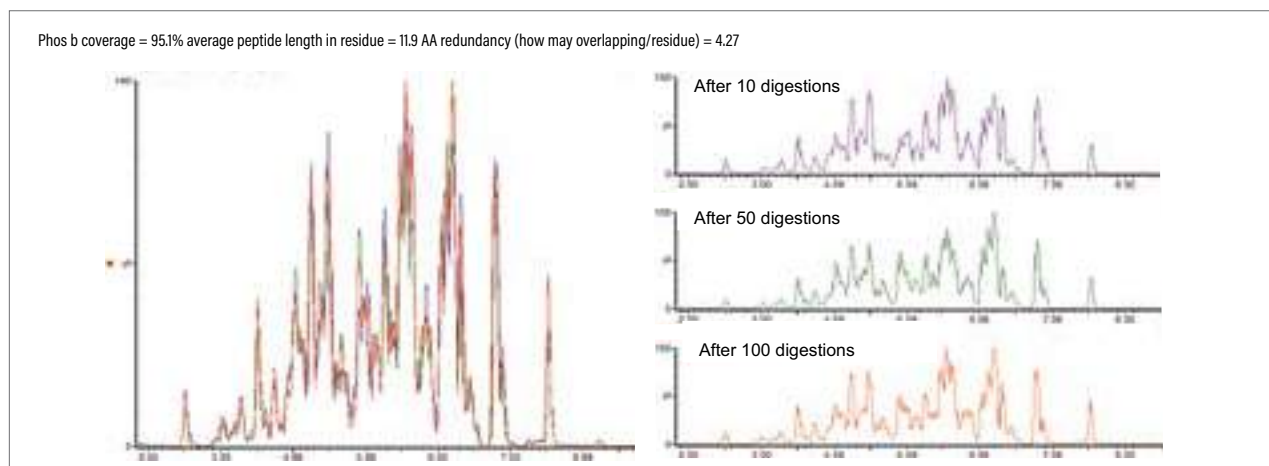
Enzymate Pepsin Online Digestion Columns, an integral part of the ACQUITY UPLC M-Class HDX System, offer these benefits:

- Fast, reproducible, and efficient online protein digestion, typically within 30 seconds
- Shortened preparation time (overall) for protein samples
- Ability to optimize the efficiency of protein digestion by changing temperature, flow rate, or both



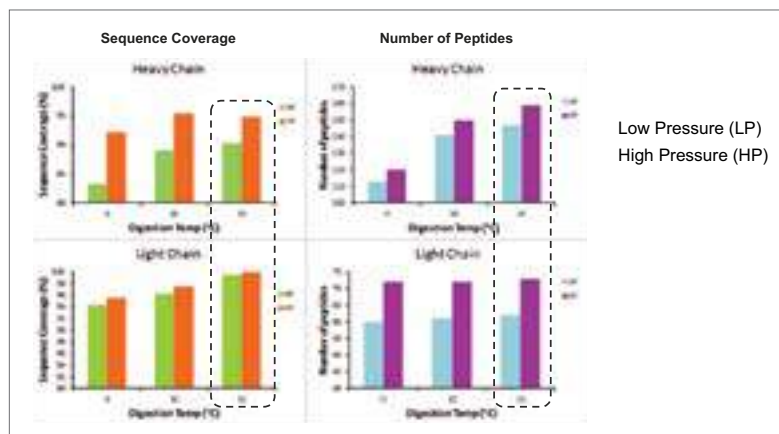
Enzymate Pepsin Online Digestion Column.

### Overlay of Three Phos B Digestions within a 130-Injection HDX MS Study



Reproducible online pepsin digestions of phosphorylase b. A total of 130 digestions were performed using an Enzymate Pepsin Column. The 10<sup>th</sup>, 50<sup>th</sup> and 100<sup>th</sup> digestions are shown. The sequence coverage is shown on the right.

## Comparisons of Low- and High-Pressure Digestion Efficiencies



The Waters Enzyme BEH Pepsin Column was used for digestion of IgG2, at 1000 psi (LP), and 13,000 psi (HP). Results show high-pressure digestion increases protein-sequence coverage and spatial resolution of IgG2, compared with low-pressure digestion.

## Ordering Information

### Enzyme Pepsin Online Digestion Column

Particle Size: 5 $\mu$ m		
Description	Dimension	P/N (1/pk)
Enzyme Pepsin Online Digestion Column	2.1 x 30 mm	<a href="#">186007233</a>

## LC-MS Accessories

### TRUVIEW LCMS CERTIFIED VIALS

TruView LCMS Certified Vials include stringent dimensional tolerances plus UV and MS cleanliness testing. The additional product attribute of TruView Vials is low polar analyte adsorption. The vials are manufactured by a process that limits the concentration of free ions on the surface of glass; ionic sites can cause analyte adsorption. Waters TruView LCMS Certified Vials are tested for high recovery of analyte at 1 ng/mL concentration using UPLC-MS/MS (MRM) and yield little adsorption. These vials exhibit the lowest adsorption of autosampler vials in the market.



## Ordering Information

### TruView LCMS Certified Vials

Description	Clear Glass	Amber Glass	Max Recovery	Total Recovery	Amber Max Recovery
TruView LCMS Certified Vials, 100/pk with cap and pre-slit silicone/PTFE septa	<a href="#">186005666CV</a>	<a href="#">186005661CV</a>	<a href="#">186005662CV</a>	<a href="#">186005663CV</a>	<a href="#">186005670CV</a>
TruView LCMS Certified Vials, 100/pk with cap and silicone/PTFE septa	<a href="#">186005660CV</a>	<a href="#">186005667CV</a>	<a href="#">186005668CV</a>	<a href="#">186005669CV</a>	<a href="#">186005664CV</a>

## WATERS CERTIFIED CONTAINERS

Waters Certified Containers are uniquely processed, treated, and certified in the same unique manner as our highly regarded low TOC vials.

Ultra-clean containers can be used on any LC system, including UPLC, LC/UV, and LC-MS, among others. Manufactured to stringent standards, they prevent extraneous peaks and baseline noise stemming from high TOC. To help assist with contamination prevention and facilitate recommended care and use, each container carries the Waters certified mark for easy differentiation in operational use.



### Ordering Information

#### Certified Containers

Description	P/N
<b>Certified Container Kit</b>	
Kit contains: four certified 1 L bottles, three certified 500 mL bottles, one clean container cap kit	<a href="#">186007088</a>
<b>Low Volume Certified Container Kit</b>	
Kit contains: five certified 250 mL clear bottles, one certified 500 mL clear bottle, one clean container cap kit	<a href="#">186007278</a>
<b>Certified Container, 1 L</b>	<a href="#">186007089</a>
<b>Certified Container, 500 mL</b>	<a href="#">186007090</a>
<b>Clean Container Cap Kit</b>	<a href="#">205000642</a>

## pH BUFFERS

These pH Buffers are directly traceable to NIST SRMs, mercury free, guaranteed stable for at least one year after your receipt, and are supplied with a full certificate of analysis.



### Ordering Information

#### pH Buffers

Description	Volume	P/N
pH 4 Liter	1 L	129
pH 4 Buffer		
pH 7 Liter	1 L	133
pH 7 Buffer		
pH 10 Liter	1 L	137
pH 10 Buffer		
pH 4 Pint	1 pint	127
pH 4 Buffer		
pH 7 Pint	1 pint	131
pH 7 Buffer		
pH 10 Pint	1 pint	135
pH 10 Buffer		

# Application Specific Columns, Kits, and Spare Parts

# Contents

<b>Application-Specific Columns</b> .....	<b><a href="#">495</a></b>
Sugar and Carbohydrate Analysis.....	<a href="#">495</a>
Fermentation Analysis, Organic Acids, Alcohols, and Carbohydrates.....	<a href="#">497</a>
Free Fatty Acid Analysis.....	<a href="#">498</a>
Polar Pesticide Analysis.....	<a href="#">498</a>
Polyaromatic Hydrocarbon Analysis.....	<a href="#">499</a>
Ion Analysis.....	<a href="#">500</a>
<b>Amino Acid Analysis</b> .....	<b><a href="#">501</a></b>
UPLC: AccQ-Tag Ultra C <sub>18</sub> Amino Acid Analysis Solution.....	<a href="#">502</a>
UHPLC and HPLC: AccQ-Tag Ultra C <sub>18</sub> Amino Acid Analysis.....	<a href="#">503</a>
Released N-Glycan Analysis.....	<a href="#">509</a>
GlycoWorks RapiFluor-MS Released N-Glycans Sample Preparation.....	<a href="#">510</a>
Automation of Released N-Glycan Analysis.....	<a href="#">511</a>
Phosphoglycan SPE Buffer Improves Recovery.....	<a href="#">511</a>
Glycan Performance Test Standards and Dextran Calibration Ladders.....	<a href="#">513</a>
<b>Application-Specific Kits – Bioanalysis</b> .....	<b><a href="#">514</a></b>
ProteinWorks SAMPLE PREPARATION KITS for Protein Quantification.....	<a href="#">514</a>
Therapeutic Peptide Method Development Kits.....	<a href="#">516</a>
<b>Application-Specific Kits – Clinical Research</b> .....	<b><a href="#">517</a></b>
Kairos Amino Acid Ki.....	<a href="#">517</a>
SARS-CoV-2 LC-MS Kit.....	<a href="#">519</a>
<b>Application-Specific Kits – Food and Environmental</b> .....	<b><a href="#">521</a></b>
Acrylamide Analysis Kits.....	<a href="#">521</a>
ACQUITY UPLC Bisphenol A Column and Method Kits.....	<a href="#">522</a>
Beverage Analysis Kit.....	<a href="#">522</a>
Carbamate Analysis Kits.....	<a href="#">523</a>
EPA Method 1694 Analysis Kit.....	<a href="#">523</a>
Oasis WAX for PFAS Analysis.....	<a href="#">523</a>
<b>Spare Parts</b> .....	<b><a href="#">524</a></b>
Column and Cartridge Fittings.....	<a href="#">524</a>
PEEK Tubing and Fittings.....	<a href="#">524</a>
LC System Filters.....	<a href="#">527</a>

# Application-Specific Columns, Kits, and Spare Parts

## Application-Specific Columns

### SUGAR AND CARBOHYDRATE ANALYSIS

#### High-Performance Carbohydrate Analysis Cartridge Column, p/n: [WAT044355](#)

Waters High-Performance Carbohydrate Cartridge Column, with reusable end-fittings, is packed with a 4 µm, spherical silica. This column was developed to separate five monosaccharides and disaccharides with baseline resolution in less than 12 minutes. The 4.6 mm I.D. × 250 mm High-Performance Carbohydrate Cartridge Column offers optimal speed, resolution, and longevity. The pre-packed, disposable cartridge column requires reusable end fittings, which are available separately.

#### Carbohydrate Analysis Column, p/n: [WAT084038](#)

The Carbohydrate Analysis Column uses a covalently bonded amino packing on a silica substrate. It is best suited for low-molecular-weight sugars such as mono-, di-, and tri-saccharides.

#### Sugar Pak I Column, p/n: [WAT085188](#)

The Sugar Pak I Column separates monosaccharides and sugar alcohols via a strong cation-exchange mechanism. The resin is based on a sulfonated styrene-divinylbenzene polymer that provides pH stability by means of a calcium counter ion.

Waters offers a range of columns for the analysis of sugars, carbohydrates, organic acids, and alcohols. Refer to the following tables for ordering information.

Typical Applications for Sugar and Carbohydrate Columns						
Cartridge/Column	Carbohydrate Analysis Column	SAM I Reagent with Silica Cartridge	Sugar-Pak I, SC-1011, SP-0810	SH-1011, IC-Pak Ion-Exclusion Fast Fruit Juice	Dextro-Pak	KS-800 series
Mode	Partition	Partition	Ion exchange/size exclusion	Ion exchange/size exclusion	Reversed phase	Size exclusion
Eluent	65–85% acetonitrile/water ambient to 70 °C	70–80% acetonitrile/water 0.1% SAM I ambient	Water 75–95 °C	0.01 N phosphoric acid 50–60 °C	Water ambient	—
Application	Mono-, di- and tri-saccharides up to DP 8 sugars and sugar alcohols	Mono-, di- and tri-saccharides	Mono-, di-, oligosaccharides and sugar alcohols	Sugar acids, sugar alcohols, organic acids	Hydrolysed syrups, derivatized sugars	Mono- through oligosaccharides such as syrups
Elution Order	Smallest elute first	Smallest elute first	Largest elute first	Largest and most acidic elute first	Smallest elute first	Largest elute first

#### Guide to Shodex Sugar Columns

S	C	18	2	1
Type of Column	Cation	% Cross Linkage	Pore Size	0 - Gel Type
S = sugar	H = H <sup>+</sup>	—	1 = 20 Å	1 - Semi-macropore gel
	C = Ca <sup>2+</sup>	—	2 = 50 Å	2 - Permanent pore gel
	P = Pb <sup>2+</sup>	—	3 = 100 Å	
	Z = Zn <sup>2+</sup>	—	4 = 500 Å	
	—	—	5 = 1000 Å	
<b>Example:</b>				
S	C	10	1	1
Sugar column	Ca <sup>2+</sup>	10% cross linkage	20 Å	Semi-macropore gel



## Ordering Information

### SAM I Reagent Column

Description	Dimension	Qty.	P/N
SAM I Reagent	7.8 × 300 mm	1/pk	<a href="#">WAT010873</a>

### Columns for Alcohols and Carbohydrates

Description	Dimension	Particle Size	Qty.	P/N
Carbohydrate Analysis Column	3.0 × 300 mm	10 µm	1/pk	<a href="#">WAT084038</a>
Dextro-Pak Cartridge Column	8.0 × 100 mm	—	1/pk	<a href="#">WAT085650</a>
High-Performance Carbohydrate Sentry Guard Column	3.9 × 20 mm	4 µm	2/pk	<a href="#">WAT046895<sup>1</sup></a>
SC-1011 Column	8.0 × 300 mm	7 µm	1/pk	<a href="#">WAT034238</a>
SC-1011P Pre-column	6.0 × 50 mm	7 µm	1/pk	<a href="#">WAT034244</a>
SH-1011	8.0 × 300 mm	7 µm	1/pk	<a href="#">WAT034236</a>
SH-1011P Pre-column	6.0 × 50 mm	7 µm	1/pk	<a href="#">WAT034243</a>
SP-0810 Column	8.0 × 300 mm	8 µm	1/pk	<a href="#">WAT036954</a>
SP-0810P Pre-column	6.0 × 50 mm	8 µm	1/pk	<a href="#">WAT034245</a>
Sugar-Pak 1 Column	6.5 × 300 mm	10 µm	1/pk	<a href="#">WAT085188</a>
Sugar-Pak 1 Guard-Pak Inserts	—	—	10/pk	<a href="#">WAT015209<sup>2</sup></a>
Shodex KS-801	—	7 µm	1/pk	<a href="#">WAT034276</a>

<sup>1</sup> Requires Sentry Guard Holder, p/n: [WAT046905](#).

<sup>2</sup> Requires Guard-Pak Holder, p/n: [WAT088141](#).

### High-Performance Carbohydrate Analysis Cartridge Column

Description	Dimension	P/N
High-Performance Carbohydrate Cartridge Column (requires end-fittings)	4.6 × 250 mm	<a href="#">WAT044355</a>
Sentry Integrated Guard Holder (for Waters cartridge columns)	—	<a href="#">WAT046905</a>



**APPLICATION AREA:** Small Molecule Scout to Prep

"These columns are a work-horse in our open access environment. We have found with regular flushing these column can last thousands of crude injections. I would highly recommend Waters BEH columns to other chromatographers."

**REVIEWER:** Philip Michaels

**ORGANIZATION:** Novartis

## FERMENTATION ANALYSIS, ORGANIC ACIDS, ALCOHOLS, AND CARBOHYDRATES

The ion-exclusion mode is ideally suited for the separation of monosaccharides, organic acids, or sugar acids. The column packings are sulfonated styrene divinylbenzene resins in the hydrogen form (IC-Pak Ion-Exclusion or SH-1011), and the mobile phase is a dilute acid such as 0.01 N phosphoric acid using column temperatures of 50–60 °C.

In this mode, the Fast Fruit Juice column can effectively separate glycerol, acetic acid, and ethanol in grape or other fruit juice. The column can also analyze the degree of microbial defect, the extent of natural fermentation in grapes, and the amount of sulfite in various foods and beverages. The IC-Pak Ion-exclusion Column can separate a wide range of organic acids while the Shodex SH Column separates acids as well as larger carbohydrates.

The analysis of alcohols and organic acids is important, for they typically help determine the flavor characteristics of beverages such as wine, beer, and some distilled spirits. The presence of alcohols in fruit juices can indicate product deterioration. The Shodex KC-811 Column, which provides ion-exchange and reversed-phase chromatography modes, is packed with a sulfonated, rigid, styrene-divinylbenzene copolymer. With high efficiency, this packing separates low-molecular-weight organic acids and water-soluble organics such as alcohols, aldehydes, and nitriles. The column provides ion-exclusion and reversed-phase mode of chromatography. Typical mobile phases, run at 1 mL/min at 45–80 °C, are composed of aqueous solutions containing 1% phosphoric acid, acetic acid, or perchloric acid.

Shodex KC-811 Column Retention Chart for Organic Acids			
Sample	Retention Time	Sample	Retention Time
Oxalic Acid	5.20	β-Hydroxy-propionic Acid	8.60
Maleic Acid	5.80	D-Glucuronic Acid	8.65
a-Ketoglutaric Acid	5.90	Fumaric Acid	8.95
Citric Acid	6.20	Formic Acid	9.20
Tartaric Acid	6.55	Acetic Acid	9.80
Pyruvic Acid	6.65	Adipic Acid	9.80
trans-Aconitic Acid	6.95	Levulinic Acid	10.00
Glyoxylic Acid	7.00	Mesaconic Acid	10.40
Malic Acid	7.05	Pyroglutamic Acid	10.70
Malonic Acid	7.07	Propionic Acid	11.25
Citraconic Acid	7.20	Acrylic Acid	11.60
Succinic Acid	8.00	Pivalic Acid	14.05
Glycolic Acid	8.40	Methacrylic Acid	14.10
Itaconic	8.50	trans-Crotonic Acid	15.65
Lactic Acid	8.60		

Eluent: Water with 0.1% phosphoric acid, Temperature: 60 °C, Flow rate: 1 mL/min.

### Ordering Information

#### Columns for Fermentation Analysis, Organic Acids, Alcohols, and Carbohydrates

Description	Dimension	Qty.	P/N
Fast Fruit Juice Column	7.8 × 150 mm	1/pk	<a href="#">WAT010639</a>
Fast Fruit Juice Guard-Pak Inserts	—	10/pk	<a href="#">WAT015207</a> <sup>1</sup>
IC-Pak Ion-Exclusion	7.8 × 300 mm	1/pk	<a href="#">WAT010290</a>
SC-1011 Column	8.0 × 300 mm	1/pk	<a href="#">WAT034238</a>
SC-1011P Pre-column	6.0 × 50 mm	1/pk	<a href="#">WAT034244</a>
KC-811	8.0 × 300 mm	1/pk	<a href="#">WAT034298</a>
KC-811 Pre-column	6.0 × 50 mm	1/pk	<a href="#">WAT035501</a>

<sup>1</sup>Requires 7.8 × 10 mm Cartridge Holder, p/n: [186000708](#).

## FREE FATTY ACID ANALYSIS

The Waters Free Fatty Acid HP Column uses a phenyl-bonded packing and a simple isocratic elution method to separate free fatty acids on the basis of carbon-chain length and degree of saturation. The short column dimension (3.9 × 150 mm) significantly reduces analysis time and increases sensitivity.

Column performance is based on:

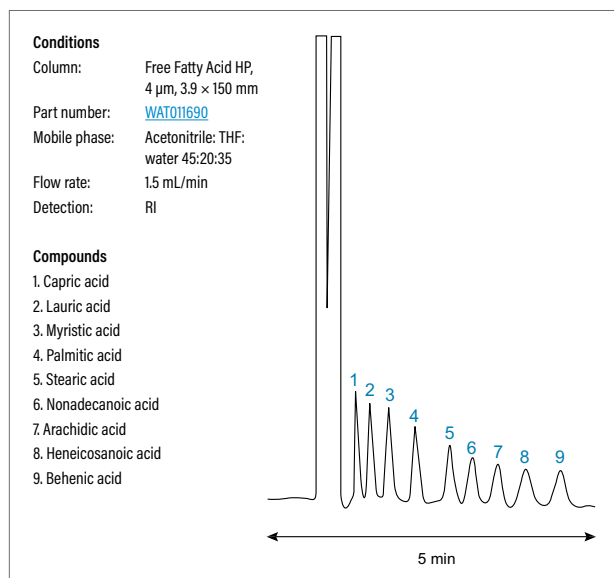
- Straight chain saturated acids, which elute in order of increasing carbon number
- Unsaturated acids which elute before the analogous saturated compound
- Carbon number and chain configuration: the greater the unsaturation, the earlier the elution

### Ordering Information

#### Free Fatty Acid HP Column

Description	Dimension	Particle Size	Qty.	P/N
Free Fatty Acid HP	3.9 × 150 mm	4 μm	1/pk	<a href="#">WAT011690</a>

#### Fatty Acid Standards



## POLAR PESTICIDE ANALYSIS

### Analyze, Without the Need to Derivatize

Waters Anionic Polar Pesticide Column has been designed specifically to provide quick, reproducible testing methods for highly anionic polar pesticides in agriculture products and finished foods. Polar pesticides such as Glyphosate can be challenging to analyze due to their zwitterionic properties and highly polar nature, however, the Anionic Polar Pesticide column provides application specific column chemistry for ease-of-use, quicker results and reliable low-level detection while maintaining key analyte separations.

- Extended Peak Shape Integrity
- Maintain Key Analyte Separations
- Retention Without Derivatization
- Reliable Low-Level Detection – No Need for Non-MS Friendly Buffers



### Ordering Information

#### Anionic Polar Pesticide Columns

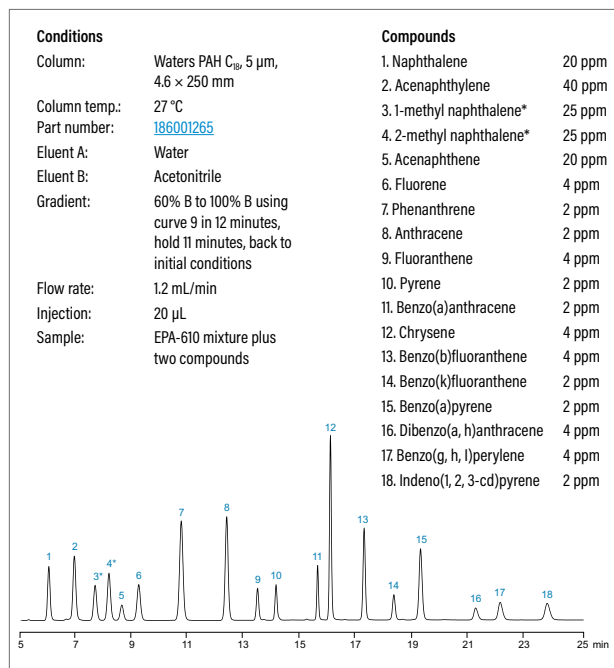
Description	Dimension	Qty.	P/N
Anionic Polar Pesticide, 130 Å, 5 μm Column	2.1 × 50 mm	1/pk	<a href="#">186009286</a>
Anionic Polar Pesticide, 130 Å, 5 μm Column	2.1 × 100 mm	1/pk	<a href="#">186009287</a>
Anionic Polar Pesticide, 130 Å, 5 μm Column	2.1 × 150 mm	1/pk	<a href="#">186009288</a>
Anionic Polar Pesticide VanGuard, 130 Å, 5 μm Cartridge	2.1 × 5 mm	3/pk	<a href="#">186009285</a>

## POLYAROMATIC HYDROCARBON ANALYSIS

Waters PAH Columns are optimized for the HPLC analysis of polyaromatic hydrocarbons to achieve baseline resolution for 16 target analytes in fewer than 25 minutes. These columns are available in seven dimensions (including a capillary format) and two particle sizes. A complete certificate of analysis accompanies each, backed by world-class ISO 9002-registered documentation.



### PAH Analysis According to Florida Administrative Code 17.700



### Ordering Information

#### PAH Columns

	Particle Size: 3 µm		Particle Size: 5 µm	
	Dimension	P/N	Dimension	P/N
C <sub>18</sub>	4.6 × 50 mm	<a href="#">186001260</a>	2.1 × 150 mm	<a href="#">186001261</a>
			2.1 × 250 mm	<a href="#">186001262</a>
			3.0 × 250 mm	<a href="#">186001263</a>
			4.6 × 150 mm	<a href="#">186001264</a>
			4.6 × 250 mm	<a href="#">186001265</a>

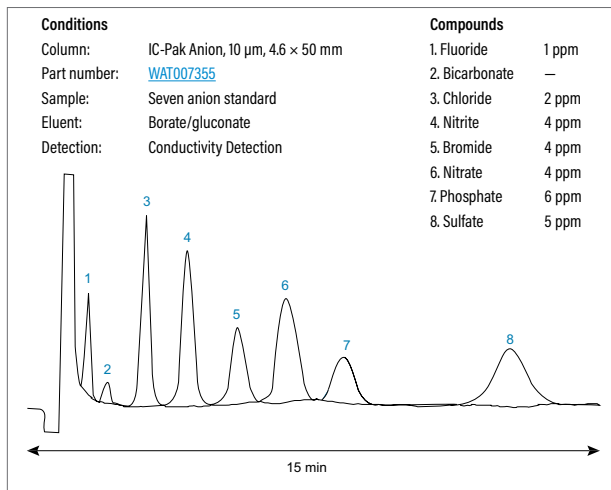
## ION ANALYSIS

Waters IC-Pak resin-based columns separate a full range of ions from complex sample matrices. They offer an exceptional linear loading range, from less than 1.0 ppb to greater than 400 ppm, without dilution and without pH limitations on eluent or sample.

Recommended IC-Pak Columns:

- IC-Pak Anion Columns, for analysis of inorganic anions
- IC-Pak Ion-exclusion Columns, for weak acid anions and organic acids
- IC-Pak Cation Columns, sulfonated styrene-divinylbenzene based resin, for monovalent and divalent cation analysis
- IC-Pak C M/D Columns

### IC-Pak Anion Column



The IC-Pak Anion column is a configuration of 10  $\mu$ m anion-exchange packing material and a short column length which makes this the column of choice for rapid routine analyses.

## Ordering Information

### IC-Pak Anion, Cation and Ion-Exclusion Columns

Description	Dimension	Qty.	P/N
IC-Pak Anion	4.6 $\times$ 50 mm	1/pk	<a href="#">WAT007355</a>
IC-Pak Anion HR	4.6 $\times$ 75 mm	1/pk	<a href="#">WAT026765</a>
IC-Pak Anion HC	4.6 $\times$ 150 mm	1/pk	<a href="#">WAT026770</a>
IC-Pak Anion Concentrator Inserts	—	5/pk	<a href="#">WAT007358</a> <sup>9</sup>
IC-Pak Anion Guard-Pak Inserts	—	5/pk	<a href="#">WAT010551</a> <sup>9</sup>
IC-Pak C M/D Column	3.9 $\times$ 150 mm	1/pk	<a href="#">WAT036570</a>
IC-Pak C M/D Guard-Pak Inserts	—	10/pk	<a href="#">WAT044250</a> <sup>9</sup>
IC-Pak Cation Column	4.6 $\times$ 50 mm	1/pk	<a href="#">WAT007354</a>
IC-Pak Cation Guard Column	4.6 $\times$ 50 mm	1/pk	<a href="#">WAT007356</a> <sup>9</sup>

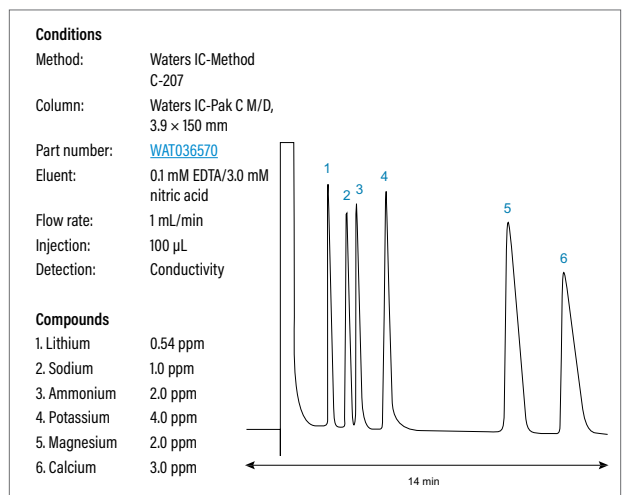
<sup>9</sup>Requires Guard-Pak Holder, p/n: [WAT088141](#).

### Ion-Exclusion Columns

Description	Dimension	Qty.	P/N
IC-Pak Ion-Exclusion Column	7.8 $\times$ 150 mm	1/pk	<a href="#">WAT010295</a>
IC-Pak Ion-Exclusion Column	7.8 $\times$ 300 mm	1/pk	<a href="#">WAT010290</a>
IC-Pak Ion-Exclusion Guard-Pak Inserts	—	10/pk	<a href="#">WAT020770</a> <sup>9</sup>

<sup>9</sup>Requires Guard-Pak Holder, p/n: [WAT088141](#).

### IC-Pak C M/D Cation Column



## Amino Acid Analysis

Amino acids are the constituents of proteins and are the intermediates in many metabolic pathways. Qualitative and quantitative Amino Acid Analysis (AAA) is used to determine the concentration of proteins, identify proteins, and detect structural variants. Amino acid composition is a critical component of the nutritional value of foods and feeds. The same analytical tools are used to monitor cell culture and fermentation processes. AAA is also used as a clinical diagnostic tool for assessing inborn errors of metabolism and nutritional status. For LC-MS based physiological amino acid analysis solution, please refer to Kairos in Application Specific Columns, Kits, and Spare Parts chapter.

The accurate identification and quantification of amino acids in biological research and in the development and commercialization of food, beverage, and biotherapeutic products is challenging. This set of analytes covers a wide range of chemical properties (e.g., acidic, basic, neutral), yet resolution of individual pairs having only minor structural differences is required. Analysis is further complicated by the absence of common chromophores, necessitating use of a derivatization chemistry to enable analyte detection.

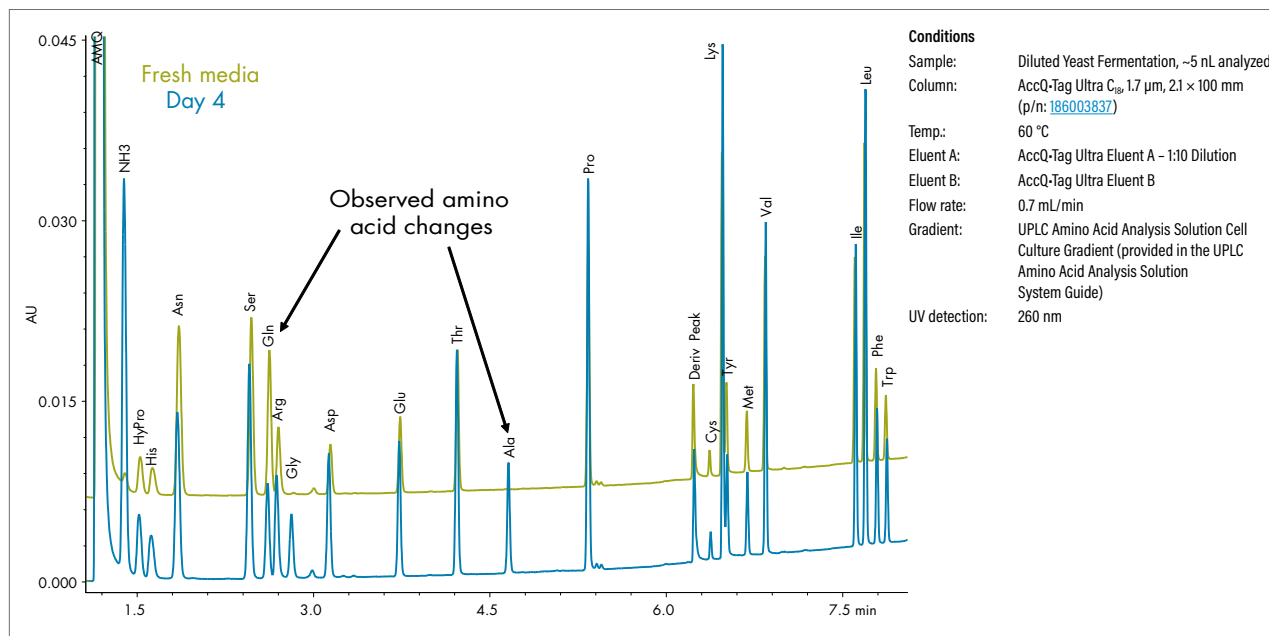
Reversed-phase chromatography provides good selectivity for separating amino acids. The most common approach to reversed-phase AAA includes pre-column derivatization. The derivatized amino acids retain better on the reversed-phase column and can be more easily separated. Most common derivatization reagents react with the amines. Some reagents react only with primary amines, but the most useful ones also react with secondary amines such that proline and hydroxyproline are also measured. In addition to improving chromatography, derivatization can make the amino acids readily detectable by UV absorbance or fluorescence.

For more than 50 years, Waters has provided reversed-phase chromatographic solutions that have successfully addressed a variety of organic compound analytical needs, including amino acid analysis. Hundreds of published papers have positively testified to the successful application of one of Waters pre-column amino acid derivatization chemistries that are used prior to the reversed-phase separation with on-line detection of resolved peaks using either UV absorbance or fluorescence. Waters offers three distinct methods that utilize pre-column derivatization and reversed-phase chromatography for accurate identification and quantitation of free or bound amino acids: Pico-Tag, AccQ-Tag, and AccQ-Tag Ultra C<sub>18</sub>.



Pico-Tag Method	AccQ-Tag Method	AccQ-Tag Ultra C <sub>18</sub> Chemistry Package
1980's	1990's	2006
<ul style="list-style-type: none"> <li>Designed for use with HPLC systems</li> <li>Applicable to any sample including protein hydrolysates, physiologic fluids, feeds, foods, and pharmaceutical preparations</li> <li>Based on the coupling reaction of the well known Edman Degradation, the reaction of phenylisothiocyanate (PITC) with both primary and secondary amino acids to form phenylthiocarbamyl (PTC) derivatives</li> <li>QC tested for use on HPLC with UV detection</li> </ul>	<ul style="list-style-type: none"> <li>Designed for use with HPLC systems</li> <li>Suitable for protein and peptide identification and quantitation, monitoring cell culture media and nutritional content of food and feed</li> <li>Based on AccQ-Tag derivatization of primary and secondary amino acids in aqueous conditions</li> <li>QC tested for use on HPLC with fluorescence detection</li> </ul>	<ul style="list-style-type: none"> <li>Designed specifically for use with the UPLC Amino Acid Analysis Solution</li> <li>AccQ-Tag Ultra C<sub>18</sub> Chemistry Package is part of a complete solution that includes instrument, software, and support for amino acid analysis of protein hydrolysates, cell culture media, foods, and feeds</li> <li>Based on AccQ-Tag derivatization of primary and secondary amino acids in aqueous conditions</li> <li>Reagents, columns, and eluents QC tested with an amino acid separation</li> </ul>

## Amino Acid Analysis of Cell Culture Media



Amino acid levels in a growing cell culture change over a relatively short period shown here as a decrease in glutamine accompanied by an increase in alanine. The supplied methods were used without modification and no sample prep beyond dilution was required.

### UPLC: AccQ-Tag ULTRA C<sub>18</sub> AMINO ACID ANALYSIS SOLUTION

Waters' UPLC Amino Acid Analysis Application Solution is the product of over 25 years of experience in amino acid analysis, highlighted by the development and industry-wide acceptance of the innovative and proven Pico-Tag and AccQ-Tag pre-column derivatization chemistries. The UPLC Amino Acid Analysis Solution is holistically designed to offer a total application solution that is optimized for accurate, reliable, and reproducible analysis of amino acids. The solution leverages Waters experience in separation science, derivatization chemistries, and information management to ensure accurate and precise qualitative and quantitative results. Our solution also provides performance-qualified methodologies that are designed to be rugged and reliable, assuring reproducible results day-to-day, instrument-to-instrument, lab-to-lab, around the world—with the expert support that scientists have come to expect from Waters. Users can feel confident with assured performance in the areas of protein characterization, cell culture monitoring, and nutritional analysis of foods and feeds.

The UPLC Amino Acid Analysis Solution consists of:

- ACQUITY UPLC H-Class (quaternary\*) System with a tunable UV detector for enhanced chromatographic resolution and maximum-sensitivity detection
- AccQ-Tag Ultra C<sub>18</sub> derivatization chemistries including quality-controlled 1.7 µm columns, reagents, and eluents
- Empower™ 3 pre-configured projects, methods, and report templates
- Installation and application training and support
- Connections INSIGHT™ ISDP instrument diagnostics to ensure continuous, consistent, and reliable operation
- Standards and kits to validate and troubleshoot

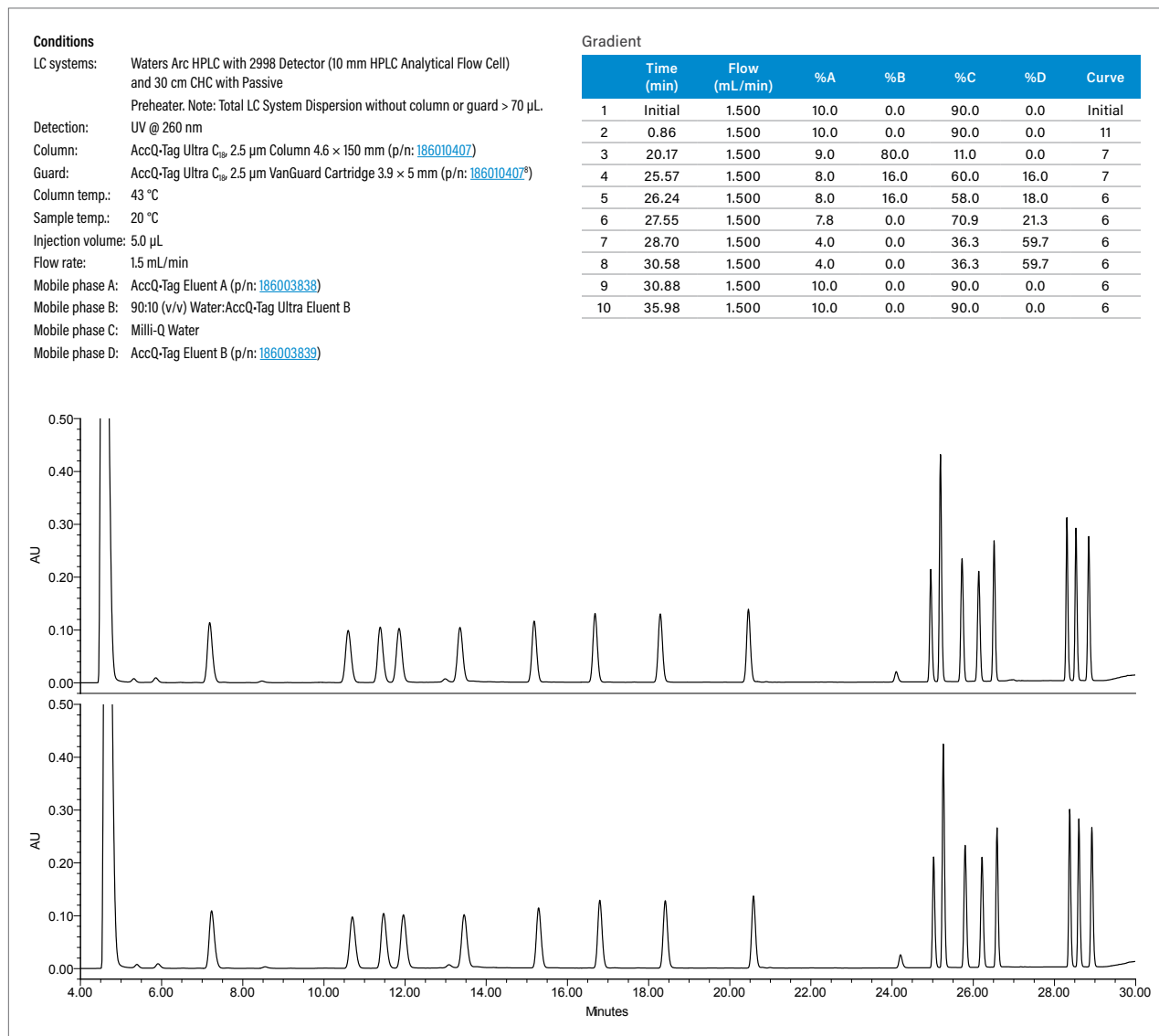
\*Amino acid analysis can be performed on other systems such as ACQUITY UPLC H-Class PLUS Binary and ACQUITY Premier Binary systems. These are not considered as a total solution.

## UHPLC AND HPLC: AccQ-Tag ULTRA C<sub>18</sub> AMINO ACID ANALYSIS

In 2022, Waters expanded its Amino Acid Analysis offerings with the introduction of the same BEH-based, C<sub>18</sub> columns (as used in UPLC-based applications) but using 2.5 µm particles all amino analysis batch tested to work on UHPLC and HPLC systems with <70 µl dispersion with UV detection. These columns combined with the AccQ-Tag Ultra C<sub>18</sub> pre-column derivatization kit for 250 analyses, completes this flexible portfolio to help scientists quickly and accurately obtain accurate quantitative data in half the time compared to use of legacy HPLC methods with FLR detection. Samples can now be successfully analyzed in under an hour.

*\* This is not a full system solution but a detailed care and use manual is available to help successfully use this offering on appropriate LC Systems.*

### Hydrolysate Standard (500 µm) Chromatographic Comparison



Analysis of Protein Hydrolysate standard on the AccQ-Tag Ultra C<sub>18</sub>, 2.5 µm, 4.6 × 150 mm Column with (top) and without AccQ-Tag Ultra C<sub>18</sub>, 2.5 µm VanGuard Cartridge 3.9 × 5 mm (bottom) installed on a Waters Arc HPLC with 2898 Detector. 1) AMQ, 2) His, 3) Ser, 4) Arg, 5) Gly, 6) Asp, 7) Glu, 8) Thr, 9) Ala, 10) Pro, 11) Derivatization peak, 12) Cys, 13) Lys, 15) Tyr, 15) Met, 16) Val, 17) Ile, 18) Leu, 19) Phe.



## AccQ•Tag Ultra C<sub>18</sub> HPLC Chemistry

The AccQ•Tag Ultra C<sub>18</sub> Chemistry is an integral component of the Waters UPLC Amino Acid Analysis Application Solution. This application solution is an integrated combination of instrumentation, derivatization chemistry, separation column and eluents, methods and software. Analysts are assured of accurate and precise amino acid analyses with the complete application solution. The use of the AccQ•Tag Ultra C<sub>18</sub> Chemistry without the rest of the application solution is not supported as an Amino Acid Analysis method.

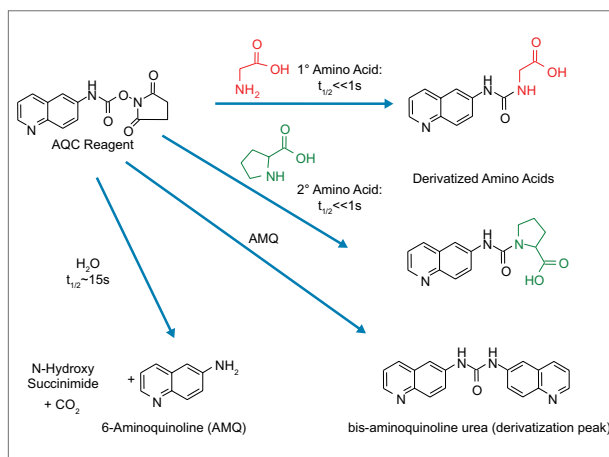
AccQ•Tag Ultra C<sub>18</sub> Chemistry is different from the AccQ•Tag HPLC method, that uses an HPLC Column containing 100% Silica-based C<sub>18</sub>, 4 µm particles, described later in this chapter. Although the components of the two derivatization kits are the same, the QC tests are based on the specific separation and detection protocols. Both methods begin with the same derivatization chemistry but differ in all the other details such that components cannot be interchanged. Most importantly, the AccQ•Tag Ultra C<sub>18</sub> 1.7 µm and 2.5 µm Guard and Columns have a completely different chemistry from the AccQ•Tag HPLC Column. The AccQ•Tag Ultra C<sub>18</sub> Columns leverage Waters 1.7 µm and 2.5 µm hybrid-silica BEH Technology particles that deliver excellent column efficiency and resolution. The AccQ•Tag Ultra C<sub>18</sub> 1.7 µm Column is designed for use on Waters ACQUITY™ UPLC Systems and include use of Waters eCord™ Intelligent Chip Technology that is permanently attached to the column to easily track use history. The mobile phases used in the AccQ•Tag Ultra C<sub>18</sub> method is different from that used for the AccQ•Tag HPLC method, each being optimized for the specific column and detection technique.

Compared to traditional HPLC methods, Waters UPLC Amino Acid Analysis Solution, that uses the AccQ•Tag Ultra C<sub>18</sub>, 1.7 µm Column, results in peaks that are much sharper and better resolved. This improved resolution results in a rugged method where there is no ambiguity in peak identification and it simplifies quantitation. The better resolution provides a precise, reliable method. The dramatically higher throughput (3 to 5 times faster) with UPLC Technology enables users to make more informed decisions faster and to perform more analyses per day.

### AccQ•Tag Derivatization Reaction

- Utilizes AccQ•Tag Ultra C<sub>18</sub> Reagent Powder
  - 6-aminoquinolyl-N-hydroxysuccinimidyl carbamate (AQC)
  - US Patent #5,296,599 and European Patent #EP 0 533 200 B1
- AQC reacts rapidly with both primary and secondary amines
- Excess reagent reacts more slowly with water to form 6-aminoquinoline (AMQ)
- AMQ reacts slowly with excess AQC reagent to form a bisurea
- Derivatized amino acids are separated chromatographically from the byproducts
- Requires no vacuum drying, sample prep, or extraction

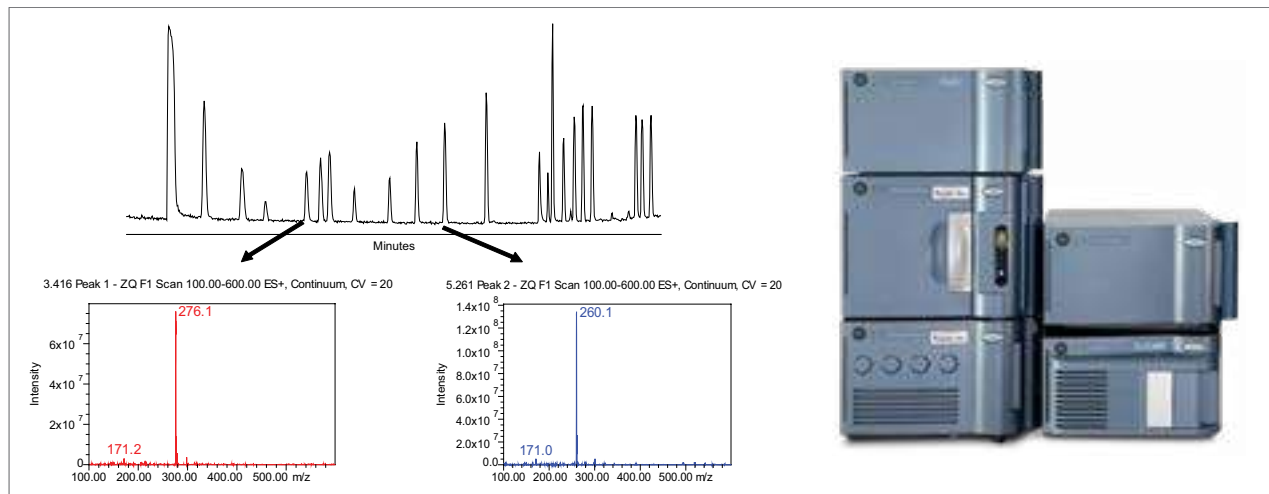
### Chemistry of the AccQ•Tag Derivatization Reaction



## MS Compatible

The UPLC Amino Acid Analysis Application Solution is directly compatible with electrospray mass spectrometry. No adjustment is required to have an MS TIC that exactly matches the UV trace. MS is extremely useful for any samples that may have an extra, unknown, or unexpected peak, since the identification of amino acids can be confirmed by their molecular weight. Although MS is not required for routine peak identification and does not provide additional useful sensitivity, the use of MS-compatible mobile phases makes using MS detection simple.

Direct Flow into Source at 700  $\mu\text{L}/\text{min}$



The UPLC Amino Acid Analysis Application Solution is directly compatible with electrospray mass spectrometry.

## Amino Acid Analysis Standard

Amino acid analysis is required in many applications in pharmaceutical and food and feed industries. A variety of standards containing free amino acids are offered for qualitative and quantitative determination of amino acids, method development, and troubleshooting of the AccQ•Tag™ Ultra C<sub>18</sub> or AccQ•Tag HPLC methods.

## Ordering Information

### Amino Acid Standard

Description	P/N
Amino Acid Standard 10 × 1 mL ampules of unlabeled amino acid standards	<a href="#">WAT088122</a>
Amino Acid Cell Culture Standard Kit Kit contains: 2 vials contain 17 amino acids 8 vials contain 9 cell culture supplemental amino acids	<a href="#">186009300</a>
Amino Acid Food and Feed Standard Kit Kit contains: 2 vials contain 17 amino acids 8 vials contain 4 food and feed supplemental amino acids	<a href="#">186009299</a>
Amino Acid Internal Standard - Norvaline 1 vial	<a href="#">186009301</a>

List of Amino Acids in Each Amino Acid Standard Amino Acid Standard

Amino Acid	Amino Acid Standard	Cell Culture Standard Kit	Food and Feed Standard Kit	Internal Standard
	p/n: <a href="#">WAT088122</a>	p/n: <a href="#">186009300</a>	p/n: <a href="#">186009299</a>	p/n: <a href="#">186009301</a>
Alanine	■	■	■	—
Arginine	■	■	■	—
Aspartic acid	■	■	■	—
Cystine	■	■	■	—
Glutamic acid	■	■	■	—
Glycine	■	■	■	—
Histidine	■	■	■	—
Isoleucine	■	■	■	—
Leucine	■	■	■	—
Lysine	■	■	■	—
Methionine	■	■	■	—
Phenylalanine	■	■	■	—
Proline	■	■	■	—
Serine	■	■	■	—
Threonine	■	■	■	—
Tyrosine	■	■	■	—
Valine	■	■	■	—
Taurine	—	■	■	—
HydroxyProline	—	■	—	—
Asparagine	—	■	—	—
Glutamine	—	■	—	—
GABA ( $\gamma$ -Aminobutyric acid)	—	■	—	—
Tryptophan	—	■	—	—
Ornithine	—	■	—	—
AABA ( $\alpha$ -Aminobutyric acid)	—	■	■	—
HydroxyLysine	—	■	—	—
Methionine Sulfone	—	—	■	—
Cysteic Acid	—	—	■	—
Norvaline	—	—	—	■

## Ordering Information

UPLC: AccQ-Tag Ultra C<sub>18</sub> Amino Acid Analysis Kits and Accessories designed for use on a Waters, low dispersion, ACQUITY UPLCs

Description	Qty.	P/N
<b>UPLC AAA H-Class Applications Kit</b>		<a href="#">176002983</a>
This kit is intended to enable existing ACQUITY UPLC H-Class Systems for AAA applications.		
Kit contains:		
AccQ-Tag Ultra Derivatization Kit, 250 analyses		
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, 2.1 × 100 mm Column		
AccQ-Tag Ultra Eluent A, concentrate	1 L	
AccQ-Tag Ultra Eluent B	1 L	
Amino acid standard, hydrolysate	10 × 1 mL	
Total recovery vials	3 × 100/pk	
Tube inlet 0.0025 I.D. PEEK nut PDA assembly		
Column In-line filter kit		
UPLC AAA H-Class solution information set		
AAA application and familiarization service		
<b>AccQ-Tag Ultra Chemistry Kit</b>		<a href="#">176001235</a>
The refill kit is intended to recharge the AccQ-Tag Ultra chemistries that are part of the application kit. This kit should be purchased by those that have already purchased the AccQ-Tag Ultra Application Solution. This kit is applicable to both ACQUITY UPLC and ACQUITY UPLC H-Class AAA Application Solutions, and should not be purchased as part of an initial system.		
Kit contains:		
AccQ-Tag Ultra Derivatization Kit, 250 analyses		
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, 2.1 × 100 mm Column		
AccQ-Tag Ultra Eluent A, concentrate	1 L	
AccQ-Tag Ultra Eluent B	1 L	
Amino acid standard, hydrolysate	10 × 1 mL	
Sample tubes	4 × 72/pk	
Total recovery vials with caps	3 × 100/pk	
<b>AccQ-Tag Ultra Derivatization Kit, 250 Analyses</b>		<a href="#">186003836</a>
AccQ-Tag Ultra Borate Buffer	5 × 6 mL	
AccQ-Tag Ultra Derivatization Reagent Powder	5 × 3 mg	
AccQ-Tag Ultra Reagent Diluent	5 × 4 mL	
<b>AccQ-Tag Ultra Borate Buffer - 10 mL</b>		<a href="#">186009283</a>
<b>Amino Acid Standard, Hydrolysate (AccQ-Tag, Pico-Tag, AccQ-Tag Ultra)</b>	10 × 1 mL	<a href="#">WAT088122</a>
A standard mixture containing 18 amino acids (17 hydrolysate amino acids each at 2.5 mM and cystine at 1.25 mM)		
Sample Tubes	4 × 72/pk	<a href="#">WAT007571</a>
Total Recovery Vials with Caps	3 × 100/pk	<a href="#">186000384C</a>
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, 2.1 × 100 mm Column		<a href="#">186003837</a>
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, 2.1 × 50 mm Column, 1/pk		<a href="#">186009953</a>
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, 2.1 × 150 mm Column, 1/pk		<a href="#">186009954</a>
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, VanGuard Pre-Column, 2.1 × 5 mm, 3/Pk		<a href="#">186009955</a>
AccQ-Tag Ultra Eluent A, concentrate	1 L	<a href="#">186003838</a>
AccQ-Tag Ultra Eluent B	1 L	<a href="#">186003839</a>
Hydrolysis Primer, Amino Acid Analysis		<a href="#">715006455</a>

UHPLC and HPLC: AccQ-Tag Ultra C<sub>18</sub> Amino Acid Analysis Kit

Description	Qty.	P/N
<b>UHPLC and HPLC: AccQ-Tag Ultra C<sub>18</sub> Amino Acid Analysis Kit</b>		<a href="#">176005152</a>
The kit is intended to provide all the materials needed in order to get started running the AccQ-Tag Ultra chemistries on a UHPLC and HPLC system.		
Kit contains:		
AccQ-Tag Ultra Derivatization Kit, 250 analyses		
AccQ-Tag Ultra C <sub>18</sub> , 2.5 µm, 4.6 × 150 mm Column		
AccQ-Tag Ultra Eluent A, concentrate	1 L	
AccQ-Tag Ultra Eluent B	1 L	
Amino acid standard, hydrolysate	10 × 1 mL	
Total recovery vials	3 × 100/pk	

### UPLC-based Amino Acid Analysis

Description	P/N
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, 2.1 × 50 mm Column	<a href="#">186009953</a>
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, 2.1 × 100 mm Column	<a href="#">186003837</a>
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, 2.1 × 150 mm Column	<a href="#">186009954</a>
AccQ-Tag Ultra C <sub>18</sub> , 1.7 µm, 2.1 × 5 mm VanGuard Pre-Column	<a href="#">186009955</a>

### UHPLC and HPLC-based Amino Acid Analysis

Description	P/N
AccQ-Tag Ultra C <sub>18</sub> , 2.5 µm, 4.6 × 50 mm Column	<a href="#">186010405</a>
AccQ-Tag Ultra C <sub>18</sub> , 2.5 µm, 4.6 × 100 mm Column	<a href="#">186010406</a>
AccQ-Tag Ultra C <sub>18</sub> , 2.5 µm, 4.6 × 150 mm Column	<a href="#">186010406</a>
AccQ-Tag Ultra C <sub>18</sub> , 2.5 µm, 4.6 × 5 mm VanGuard Cartridge*, 3/pk	<a href="#">186010408</a>

\* Requires use of VanGuard 3.9 mm ID Cartridge Holder: p/n [186007949](#)

### Amino Acid Primer

Description	P/N
Hydrolysis Primer, Amino Acid	<a href="#">715006455</a>



## Amino Acid Analysis Automation

Automation increases efficiency, repeatability and avoids contamination and human errors. Amino acid analysis automation is enabled through the automation derivatization kit and verified automation scripts on Andrew+, Tecan, or Hamilton automation platforms. The automation derivatization kit is system agnostic and designed in a 32 × 3 format for up to 96 sample preparation. It has a larger volume per sample than the manual derivatization kit to accommodate the residual volumes required by automation workflow. The script includes barcode scanning, linearity calibration, sample dilution, derivatization, heating, shaking functions, which allow analysts to walk away during sample preparations, and 96 samples are prepared in less than an hour.

### Ordering Information

Automation: AccQ-Tag Ultra C<sub>18</sub> Amino Acid Analysis Kits and Accessories

Description	P/N
AccQ-Tag Ultra C <sub>18</sub> Derivatization Kit – Automation, 96 analyses	<a href="#">186009232</a>
AccQ-Tag Borate Buffer – 10 mL	<a href="#">186009283</a>
96-Well Sample Collection Plate, 800 µL Round Well, 50/pk	<a href="#">186002481</a>
Cap Mat, 5/pk	<a href="#">186006332</a>
AccQ-Tag Ultra Cell Culture Chemistry Kit – Automation	<a href="#">176004534</a>
AccQ-Tag Ultra Food & Feed Chemistry Kit – Automation	<a href="#">176004533</a>
AccQ-Tag Ultra Hydrolysates Chemistry Kit – Automation	<a href="#">176004542</a>
AccQ-Tag Ultra Cell Culture Tecan Script Starter Kit – CD	<a href="#">176004543</a>
AccQ-Tag Ultra Cell Culture Tecan Script Starter Kit – USB	<a href="#">176004544</a>
AccQ-Tag Ultra Cell Culture Hamilton Script Starter Kit – CD	<a href="#">176004545</a>
AccQ-Tag Ultra Cell Culture Hamilton Script Starter Kit – USB	<a href="#">176004546</a>



AccQ-Tag Ultra C<sub>18</sub> Derivatization Automation Kit

## AccQ-Tag Ultra Amino Acid Analysis Automation Kits for Andrew+

Description	P/N
Andrew+ Pipetting Robot Andrew+ Pipetting Robot, waste base, waste container, power supply, cables, and 1 × each single and multi-channel pipette adaptors	176004567
Andrew+ Startup Kit Intended for all new Andrew+ systems and includes Dominos, pipette adaptors, and lab kit with consumables for system installation	176004568
Pipette Kit for AccQ-Tag Includes 3× Andrew Alliance Pipettes	176004583
Domino Kit for AccQ-Tag Includes additional dominos and connected devices for Amino Acid OneLab protocol with Andrew+ automation	176004582
AccQ-Tag Ultra Derivatization Kit – Automation Provides simplified tools to enhance high throughput amino acid automation, enabling processing of up to 96 samples in 3 × 32 sample batches	<a href="#">186009232</a>
Roller for Cap mats Helps to smooth out the cap mat before putting it on system for injection	<a href="#">186002633</a>

## AccQ-Tag Ultra Amino Acid Analysis Optional Accessories for Andrew+

Description	P/N
Amino Acid Cell Culture Standard Kit Contains 26 amino acids monitored in cell culture media or other matrices. The standard is designed for both ID and quantitative amino acid analysis	<a href="#">186009300</a>
Amino Acid Food and Feed Standard Kit Contains 21 amino acids analyzed in food and feed matrix. The standard is designed for both ID and quantitative amino acid analysis	<a href="#">186009299</a>
Amino Acid Internal Standard – Norvaline Compensates for the variability generated in sample hydrolysis and amino acid analysis	<a href="#">186009301</a>
AccQ-Tag Ultra 1.7 µm, 2.1 × 100 mm Column Separates the amino acid derivatives produced in the reaction with Waters AccQ-Tag Ultra Derivatization Reagent	<a href="#">186003837</a>
AccQ-Tag Ultra Eluent A Mobile phase eluents for reversed phase separation of amino acid derivatives	<a href="#">186003838</a>
AccQ-Tag Ultra Eluent B Mobile-phase eluents for reversed phase separation of amino acid derivatives	<a href="#">186003839</a>

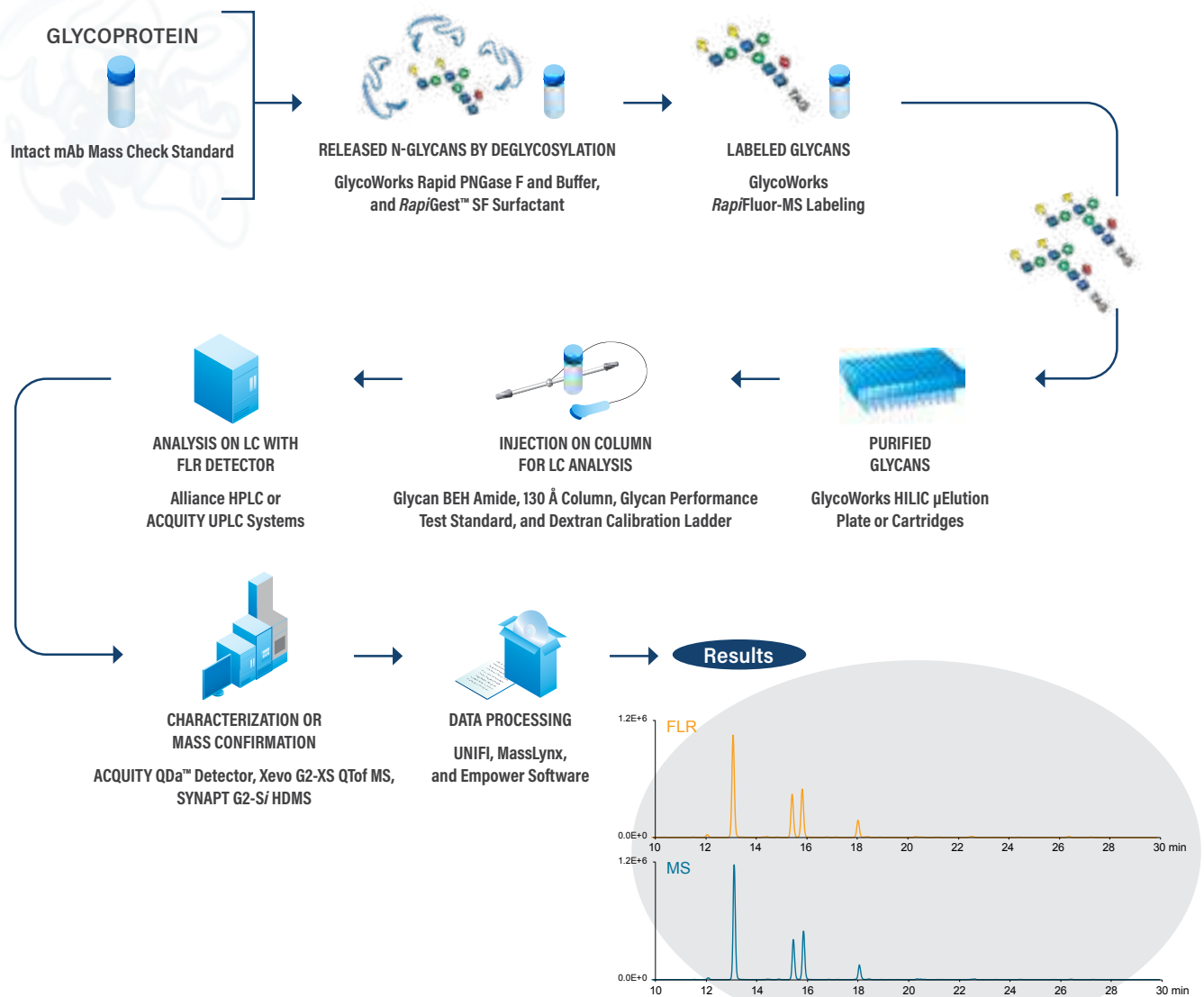
## RELEASED N-GLYCAN ANALYSIS

Waters GlycoWorks Sample Preparation Kits and Standards, along with the ACQUITY UPLC and HPLC Glycan Columns, were designed cohesively to provide a seamless and efficient workflow from bench to analysis.

- Fast and simplified sample preparation with the GlycoWorks *RapiFluor*-MS N-Glycan Kit
- Automation-enabled sample preparations with verified scripts
- Alternative selectivity with either HILIC or Mixed-mode separations
- MaxPeak Premier column format reduces sample adsorption onto metal surfaces and delivers the representative performance from the first injection
- Glycan standards for benchmarking chromatographic performance, calibration and quantification, and complex profiling



### Released N-Glycan Workflow

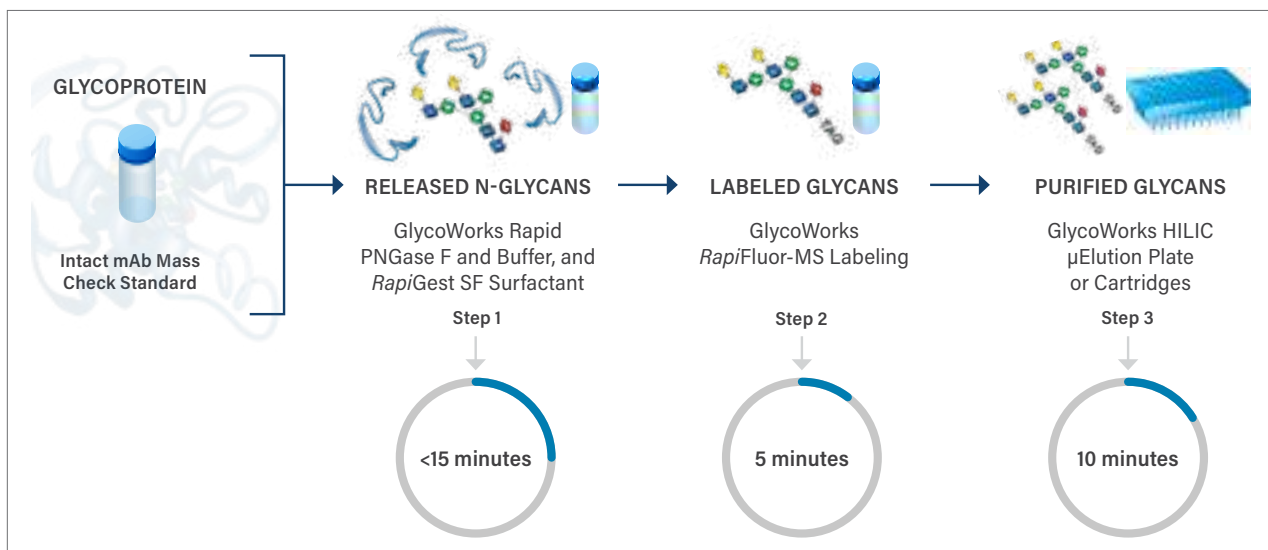


## GLYCOWORKS RAPIFLUOR-MS RELEASED N-GLYCANS SAMPLE PREPARATION

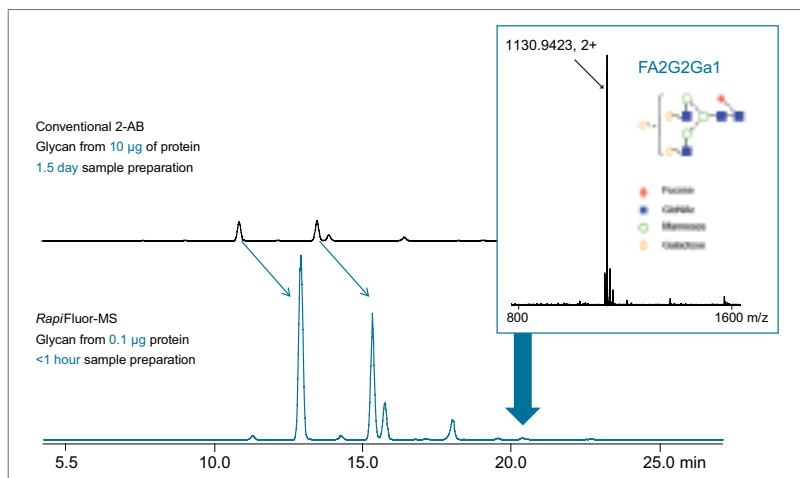
Waters GlycoWorks Consumables offer a more convenient, comprehensive, and effective sample-preparation solution for glycan analysis.

- The GlycoWorks RapiFluor-MS N-Glycan Kit ensures easy, quick preparation of released-labeled, N-glycan samples
- Streamline standard protocols ([720005470EN](#), [720005343EN](#)) for mAbs and a variety of glycoproteins; Optimized reducing protocols ([720006992EN](#), [720006991EN](#)) for complex proteins with multiple disulfide bonds
- Greatly improved FLR and MS signal intensities help easily identify low-abundance N-linked glycans
- Complete modules for processing 96 samples with flexibility of processing between 8, 24, and 48 samples at a time depending on laboratory demands with automation scripts available
- Support easy training of analysts and the transferring of methods throughout an organization

Three Steps, as little as 30 minutes



## Glycan Characterization by UPLC FLR with Xevo G2-XS QToF Mass Spectrometer



Un-ionized form of acids and bases give most retention. Retention of neutral analytes not affected by pH.

Learn more about Waters latest Glycan Solutions.

Visit [waters.com/glycans](https://waters.com/glycans)



## AUTOMATION OF RELEASED N-GLYCAN ANALYSIS

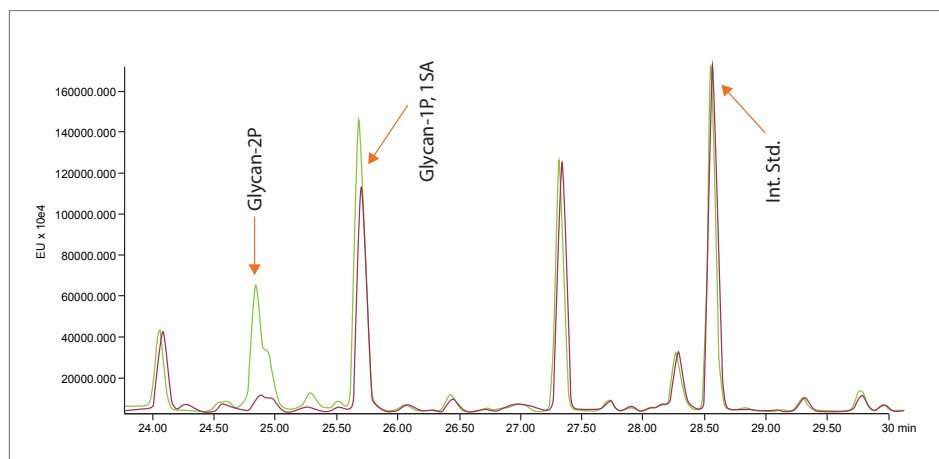
Waters GlycoWorks Consumables offer a more convenient, comprehensive, and effective sample-preparation solution for Released N-glycan analysis. The sample preparation procedures involve multiple steps including enzymatic deglycosylation, labeling, and SPE clean up. Due to this complexity, Waters has developed an application-specific configuration of the Andrew+ Pipetting Robot for released N-glycan analysis. Additionally, verified scripts for the GlycoWorks *RapiFluor*-MS method are available for our partner platforms. We provide you with the information needed, no matter the platform, to ensure that you can start achieving your automation results faster.



*GlycoWorks RapiFluor MS N-Glycan Kit.*

## PHOSPHOGLYCAN SPE BUFFER IMPROVES RECOVERY

The loss of labeled acidic glycans, especially phosphorylated glycan species, during SPE purification has been considered a challenge to accurately monitor the glycosylation of biotherapeutics. The GlycoWorks Phosphoglycan SPE Elution Buffer, optimized with citrate additive, facilitates the elution and recovery of phosphorylated glycans and achieves maximum yield.



*Improved recovery of phosphorylated glycans using citrate containing SPE eluent.*



## Ordering Information

### GlycoWorks *Rapi*Fluor-MS Released N-Glycan Sample Preparation Kits

Description	P/N
<b>GlycoWorks <i>Rapi</i>Fluor-MS N-Glycan Starter Kit—96 Sample</b> Kit contains: GlycoWorks Deglycosylation Module, GlycoWorks Labeling Module, GlycoWorks Cleanup Module, GlycoWorks Sample Collection Module, ACQUITY UPLC Glycan BEH Amide, 1.7 µm, 2.1 × 150 Column, Ammonium Formate Solution – Glycan Analysis, Glycan <i>Rapi</i> Fluor-MS performance Test std, Intact mAb Mass Check Standard	<a href="#">176003635</a>
<b>GlycoWorks <i>Rapi</i>Fluor-MS N-Glycan Kit—96 Sample</b> Kit contains: GlycoWorks Deglycosylation Module, GlycoWorks Labeling Module, GlycoWorks Cleanup Module, GlycoWorks Sample Collection Module, Intact mAb Mass Check Standard	<a href="#">176003606</a>
<b>GlycoWorks <i>Rapi</i>Fluor-MS N-Glycan Starter Kit—24 sample</b> Kit contains: GlycoWorks Deglycosylation Module, GlycoWorks Labeling Module, GlycoWorks Cleanup Module, GlycoWorks Sample Collection Module, ACQUITY UPLC Glycan BEH Amide, 1.7 µm, 2.1 × 150 mm Column, Ammonium Formate Solution – Glycan Analysis, Glycan <i>Rapi</i> Fluor-MS performance Test std, Intact mAb Mass Check Standard	<a href="#">176003712</a>
<b>GlycoWorks <i>Rapi</i>Fluor-MS N-Glycan Kit—24 sample</b> Kit contains: GlycoWorks Deglycosylation Module, GlycoWorks Labeling Module, GlycoWorks Cleanup Module, GlycoWorks Sample Collection Module, Intact mAb Mass Check Standard	<a href="#">176003713</a>
<b>GlycoWorks <i>Rapi</i>Fluor-MS N-Glycan Refill Kit—24 sample</b> Kit contains one of each: GlycoWorks Deglycosylation Module and the GlycoWorks Labeling Module	<a href="#">176003714</a>
<b>GlycoWorks Rapid Deglycosylation 1 × 24</b> Kit contains: one vial of GlycoWorks Rapid PNGaseF Enzyme and Buffer; and, one vial of 10-mg <i>Rapi</i> Gest SF Surfactant	<a href="#">186008939</a>
<b>GlycoWorks Rapid Deglycosylation 3 × 8</b>	<a href="#">186008841</a>
<b>GlycoWorks Rapid Deglycosylation Kit 2 × 48</b>	<a href="#">186004579</a>
<b>GlycoWorks Rapid Deglycosylation kit 4 × 24</b>	<a href="#">186008840</a>
<b>GlycoWorks <i>Rapi</i>Fluor-MS Labeling Kits—24 Sample</b>	<a href="#">186008091</a>
<b>GlycoWorks <i>Rapi</i>Fluor-MS Labeling Kits—96 Sample</b>	<a href="#">186007989</a>
<b>GlycoWorks SPE Reagents</b>	<a href="#">186007992</a>
<b>GlycoWorks Phosphoglycan SPE Reagents HILIC</b>	<a href="#">186010209</a>
<b>GlycoWorks Phosphoglycan SPE Elution Buffer, 4/pk</b>	<a href="#">186009763</a>
<b>GlycoWorks HILIC µElution Plate</b>	<a href="#">186002780</a>
<b>GlycoWorks Sample Collection Module</b>	<a href="#">186007988</a>

### GlycoWorks *Rapi*Fluor-MS N-Glycan Automation Kits

Description	P/N
<b>GlycoWorks <i>Rapi</i>Fluor-MS N-Glycan Script Starter Kit – Automation</b> Kit contains: GlycoWorks Automation Script Pack-CD; Intact mAb Mass Check Standard (unlabeled); <i>Rapi</i> Fluor-MS Intact mAb Mass Check Standard (deglycosylated, labeled, and purified); GlycoWorks Rapid Deglycosylation Kit – 2 × 48; GlycoWorks <i>Rapi</i> Fluor-MS Labeling Module – Automation; GlycoWorks HILIC µElution Plate; GlycoWorks SPE Reagents – Automation; GlycoWorks Sample Collection Module – Automation; ACQUITY UPLC Glycan BEH Amide, 130 Å, 1.7 µm, 2.1 × 150 mm Column; Mobile phase concentrate: ammonium formate	<a href="#">176004151</a>
<b>GlycoWorks <i>Rapi</i>Fluor-MS N-Glycan Starter Kit – Automation</b> Kit contains: Intact mAb Mass Check Standard (unlabeled); <i>Rapi</i> Fluor-MS Intact mAb Mass Check Standard (deglycosylated, labeled, and purified); GlycoWorks Rapid Deglycosylation Kit – 2 × 48; GlycoWorks <i>Rapi</i> Fluor-MS Labeling Module – Automation; GlycoWorks HILIC µElution Plate; GlycoWorks SPE Reagents – Automation; GlycoWorks Sample Collection Module – Automation; ACQUITY UPLC Glycan BEH Amide, 130 Å, 1.7 µm, 2.1 × 150 mm Column; Mobile phase concentrate: ammonium formate	<a href="#">176004152</a>
<b>GlycoWorks <i>Rapi</i>Fluor-MS N-Glycan Kit - Automation</b> Kit contains: GlycoWorks Rapid Deglycosylation Kit – 2 × 48, GlycoWorks <i>Rapi</i> Fluor-MS Labeling Module – Automation, GlycoWorks HILIC µElution Plate, GlycoWorks SPE Reagents – Automation and GlycoWorks Sample Collection Module – Automation	<a href="#">176004153</a>
<b>GlycoWorks <i>Rapi</i>Fluor-MS N-Glycan Basic Kit - Automation</b> Kit contains: GlycoWorks Rapid Deglycosylation Kit – 2 × 48, GlycoWorks <i>Rapi</i> Fluor-MS Labeling Module – Automation, GlycoWorks HILIC µElution Plate, and GlycoWorks SPE Reagents – Automation	<a href="#">176004154</a>
<b>Andrew+ 24 Sample GlycoWorks Application</b> Kit contains: GlycoWorks Rapid Deglyco Module 24-sample, GlycoWorks <i>Rapi</i> Fluor-MS Labeling—24 sample, GlycoWorks HILIC µElution Plate, GlycoWorks SPE Reagents – Automation, Intact mAb Mass Check Standard	176003349
<b>Andrew+ 96 Sample GlycoWorks Application</b> Kit contains: GlycoWorks Rapid Deglyco Module 96-sample, GlycoWorks <i>Rapi</i> Fluor-MS Labeling—96 sample, GlycoWorks HILIC µElution Plate, GlycoWorks SPE Reagents – Automation, Intact mAb Mass Check Standard	17600335
<b>Andrew+ 96 Sample GlycoWorks Application</b> Kit contains: GlycoWorks Rapid Deglyco Module 2 × 48, GlycoWorks <i>Rapi</i> Fluor-MS Labeling – Automation, GlycoWorks HILIC µElution Plate, GlycoWorks SPE Reagents – Automation, Intact mAb Mass Check Standard	176003351

## GLYCAN PERFORMANCE TEST STANDARDS AND DEXTRAN CALIBRATION LADDERS

### Benchmarking, Method Development, and Troubleshooting

Waters purified glycan library standards are used as qualitative/quantitative standards for LC/FLR and LC/MS. These standards come pre-labeled, lyophilized for long term storage in Waters Certified Vials for ease of solubilization and injection.

### Chromatographic Performance

To ensure that the system and chromatographic method is working, it is highly recommended to use a pre-labeled standard to access observed retention time by monitoring the major peaks for performance of the method.

### Calibration and Quantitation

When using LC optical detection, it is important to have standards to assist in profiling glycans under HILIC conditions to ensure reproducible chromatographic assignment providing confidence in data generation.

### Complex Profiling

These performance test standards are helpful when looking for specific glycans monitored in manufacturing and are useful to check retention time of major peaks in LC/FLR, accurate mass or to assess sample preparation efficiency.

## Ordering Information

### RapiFluor-MS Released N-Glycan Standards and Accessories

Description	P/N
RapiFluor-MS Dextran Calibration Ladder 50 µg/vial	<a href="#">186007982</a>
RapiFluor-MS Glycan Performance Test Standard 400 pmol total/vial	<a href="#">186007983</a>
RapiFluor-MS High Mannose Standard	<a href="#">186008317</a>
RapiFluor-MS Intact mAb Standard	<a href="#">186008843</a>
RapiFluor-MS Quantitative Glycan Standard	<a href="#">186008791</a>
RapiFluor-MS Sialylated Glycan Performance Test Standard	<a href="#">186008660</a>
Intact mAb Mass Check Standard*	<a href="#">186006552</a>
2-AB Glycan Performance Test Standard	<a href="#">186006349</a>
2-AB Dextran Calibration Ladder	<a href="#">186006841</a>

\* Controls Standard included in kit.

\*\* Essential for kit use.

Description	P/N
RapiGest SF 3 mg vial	<a href="#">186008090</a>
RapiGest SF 10 mg vial	<a href="#">186002123</a>
96-Well Plate Extraction Manifold	<a href="#">186001831</a>
Vacuum Manifold Shims,** 3/set	<a href="#">186007986</a>
Positive Pressure Manifold Spacer for the GlycoWorks RapiFluor-MS N-Glycan Kit* 1/pk	<a href="#">186007987</a>
Vacuum Pump 220 v/240 v 50 Hz	<a href="#">725000604</a>
Positive Pressure Manifold	<a href="#">186006961</a>
Modular Heat Block for 1 mL tubes/96 wells	<a href="#">186007985</a>
GlycoWorks Rapid Buffer—5 mL	<a href="#">186008100</a>

## Application-Specific Kits – Bioanalysis

### PROTEINWORKS SAMPLE PREPARATION KITS FOR PROTEIN QUANTIFICATION

ProteinWorks™ Sample Preparation Kits, combined with robust and reliable LC-MS methods and instrumentation, allow discovery and early development laboratories to achieve standardized, reproducible, and sensitive protein quantification in whole or immunopurified plasma via the surrogate peptide approach. This flexible and automatable kit-based approach reduces method development time and is easily deployable from lab-to-lab and site-to-site.

- ProteinWorks eXpress Digest Kits simplify and accelerate protein digestion, streamlining and standardizing the traditionally complex pre-analytic workflow for LC-MS protein quantification via the surrogate peptide approach
- ProteinWorks  $\mu$ Elution SPE Kit is designed for post-digestion clean-up, increasing assay sensitivity, and improving system robustness by removing excess digest reagents, phospholipids, and other plasma and serum components
- With pre-measured reagents and automation protocols, ProteinWorks can be automated on the Hamilton STARWorks platform

ProteinWorks eXpress Digest kits are suitable for immuno-purified plasma and serum samples or samples with low total protein content (0.2–1.0 mg total protein). eXpress Direct Digest kits are suitable for non-immuno-purified whole plasma or serum or samples with high total protein content (1.0–5.25 mg total protein)

### Ordering Information

#### ProteinWorks Sample Preparation Kits

Description	P/N
<b>96 Sample Kits</b>	
ProteinWorks Auto-eXpress High 3 Digest Kit Suitable for high protein content samples (1.0–5.25 mg total protein) and contains: ProteinWorks High Digest Ambient Kit and ProteinWorks High Digest Trypsin Kit	<a href="#">176004079</a>
ProteinWorks Auto-eXpress Low 3 Digest Kit Suitable for low protein content samples (0.2–1.0 mg total protein) and contains: ProteinWorks Low Digest Ambient Kit and ProteinWorks Low Digest Trypsin Kit	<a href="#">176004077</a>
ProteinWorks Auto-eXpress Low 5 Digest Kit Suitable for low protein content samples (0.2–1.0 mg total protein) and contains: ProteinWorks Low Digest Ambient Kit, ProteinWorks Low Digest Trypsin Kit, and ProteinWorks Reduction Alkylation Kit	<a href="#">176004078</a>
ProteinWorks Auto-eXpress High 5 Digest Kit Suitable for high protein content samples (1.0–5.25 mg total protein) and contains: ProteinWorks High Digest Ambient Kit, ProteinWorks High Digest Trypsin Kit, and ProteinWorks Reduction Alkylation Kit	<a href="#">176004080</a>
ProteinWorks eXpress Direct Digest Start-Up Kit Kit contains: eXpress Direct Digest Kit, ProteinWorks $\mu$ Elution SPE Cleanup Kit, and a Murine mAb Standard	<a href="#">176003695</a>
ProteinWorks eXpress Direct Digest Kit Suitable for non-immuno-purified whole plasma and serum samples or samples with high protein content (1.0–5.25 mg total protein) and contains: Pre-Measured, Lot-Traceable Reagents; a Flexible 96-Tube Sample Collection Module; and Optimized Protocols	<a href="#">176003688</a>
ProteinWorks eXpress Digest Start-Up Kit Kit contains: eXpress Digest Kit, ProteinWorks $\mu$ Elution SPE Cleanup Kit, and a Murine mAb Standard	<a href="#">176003696</a>
ProteinWorks eXpress Digest Kit suitable for immuno-purified plasma and serum samples or samples with low protein content (0.2–1.0 mg total protein) and contains: Pre-measured, Lot-Traceable Reagents; a Flexible 96-tube Sample Collection Module, and Optimized Protocols	<a href="#">176003689</a>
ProteinWorks $\mu$ Elution SPE Clean-up Kit Kit includes: Optimized SPE Protocol and Oasis $\mu$ Elution Technology	<a href="#">186008304</a>

## Ordering Information

### ProteinWorks Sample Preparation Kits

Description	P/N
<b>96 Sample Kits</b>	
ProteinWorks Auto-eXpress High Digest Kit - Ambient Refill Kit Kit includes: digestion buffer (1x), trypsin dissolving reagent (1x), digestion inactivation reagent (1x), and Rapi/Gest denaturant (1x) for high protein content samples (1.0–5.25 mg total protein)	<a href="#">186008872</a>
ProteinWorks Auto-eXpress Low Digest Kit - Ambient Refill Kit Kit includes: digestion buffer (1x), trypsin dissolving reagent (1x), digestion inactivation reagent (1x), and Rapi/Gest denaturant (1x) for low protein content samples (0.2–1.0 mg total protein)	<a href="#">186008873</a>
ProteinWorks Reduction Alkylation Kit - Cold Storage Refill Kit Kit includes: reduction reagent (3x), alkylation reagent (3x)	<a href="#">186008889</a>
ProteinWorks Auto-eXpress High Trypsin Kit - Cold Storage Refill Kit Kit includes: trypsin (1x) suitable for high protein content samples (1.0–5.25 mg total protein)	<a href="#">186008874</a>
ProteinWorks Auto-eXpress Low Trypsin Kit - Cold Storage Refill Kit Kit includes: trypsin suitable (1x) for low protein content samples (0.2–1.0 mg total protein)	<a href="#">186008875</a>
ProteinWorks eXpress Direct Digest Kit - Ambient Refill Kit Kit includes: digestion buffer (1x), trypsin dissolving reagent (1x), digestion inactivation reagent (1x), denaturant rack (1x), strip caps (1x) suitable for high protein content samples (1.0–5.25 mg total protein) or samples in whole non-immuno-purified serum or plasma	<a href="#">186008065</a>
ProteinWorks eXpress Direct Digest Kit - Cold Storage Refill Kit Kit includes: trypsin (1x), alkylation reagent (3x), and reduction reagent (3x) suitable for high protein content samples (1.0–5.25 mg total protein per sample) or samples in whole non-immuno-purified plasma or serum	<a href="#">186008066</a>
ProteinWorks eXpress Digest Kit - Ambient Refill Kit Kit includes: digestion buffer (1x), trypsin dissolving reagent (1x), digestion inactivation reagent (1x), denaturant rack (1x), strip caps (1x), suitable for low protein content samples (0.2–10 mg total protein) or samples in whole immuno-purified serum or plasma	<a href="#">186008067</a>
ProteinWorks eXpress Digest Kit - Cold Storage Refill Kit Kit includes: trypsin (1x), alkylation reagent (3x), and reduction reagent (3x) suitable for low protein content samples (0.2–1.0 mg total protein per sample) or samples in immuno-purified plasma or serum	<a href="#">186008068</a>



#### APPLICATION AREA: Pharmacokinetic Matrices

"The VanGuard column guards are an exceptional product. They've increased my column life from 8–10 K analysis to over 18 K, essentially doubling its life. The price is excellent, the customer service is also top notch. I also like to run a clean sample, I run SPE and along with my VanGuard pre-column, my instrument is protected from buildup and possible contaminants."

**REVIEWER:** Andrew Urdzela

**ORGANIZATION:** Crown Toxicology

## THERAPEUTIC PEPTIDE METHOD DEVELOPMENT KITS

The Therapeutic Peptide Method Development Kit was developed to simplify the process of sample preparation and LC method development for the analysis of therapeutic peptides in plasma. The kit contains an Oasis Peptide  $\mu$ Elution Method Development Plate, a Peptide BEH  $C_{18}$ , 300 Å reversed-phase column, and the detailed screening protocol which was used to generate the data shown in this publication.

In addition, a comprehensive method development training seminar has been created which describes all aspects of the method development process from the MS conditions to the final validation of a method for the extraction of the therapeutic peptide desmopressin from human plasma.

Although big progress has been made in sample pretreatment over the last years, there are still considerable limitations when it comes to overcoming complexity and dynamic range problems associated with peptide analyses from biological matrices. We focus on techniques which can be employed prior to liquid chromatography coupled to mass spectrometry for peptide detection and identification.

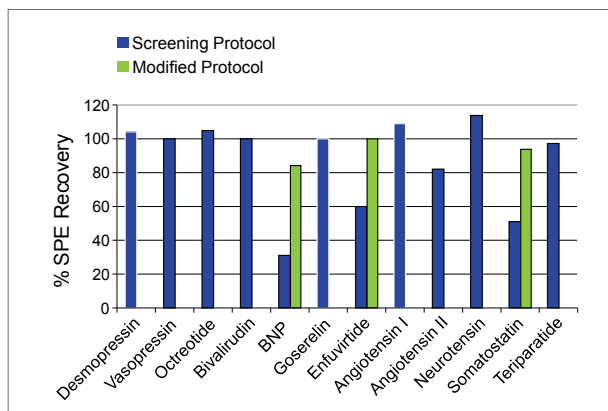
The peptide columns are specifically QC tested with a cytochrome c tryptic digest that helps ensure batch-to-batch consistency in validated methods ideally suited for separating a wide range of large and small, acidic and basic, hydrophilic and hydrophobic peptides.

The complexity of samples still far exceeds the capacity of currently available analytical systems, and specific sample preparation remains a crucial part of the analysis in a whole.

**i** For more resources, visit our [Simplifying Bioanalysis Application Note](#), [Method Development Webinar](#) and our [DMPK Bootcamp Series](#) or contact your local Waters sales office.



## High Recovery of Peptides



The innovative Oasis  $\mu$ Elution Plate allows for up to a 15x sample concentration, increasing the possibility of reaching the required sensitivity levels for bioanalytical assays. The low (25  $\mu$ L) elution volume eliminates the need for evaporation and reconstitution significantly reducing the potential analyte loss due to absorption to the walls of the collection plate and/or chemical instability.

## Ordering Information

### Therapeutic Peptide Method Development Kits

Description	Qty/Box	P/N
UPLC Therapeutic Peptide Method Development Kit		<a href="#">176001835</a>
Oasis $\mu$ Elution Method Development Plate	1	<a href="#">186004713</a>
ACQUITY UPLC Peptide BEH $C_{18}$ , 300 Å, 1.7 $\mu$ m, 2.1 $\times$ 50 mm Column	1	<a href="#">186003685</a>
96-Well 1 mL Collection Plate and Cap Mat	3	600001043
HPLC Peptide Therapeutic Peptide Method Development Kit		<a href="#">176001836</a>
Oasis $\mu$ Elution Method Development Plate	1	<a href="#">186004713</a>
XBridge Peptide BEH $C_{18}$ , 300 Å, 3.5 $\mu$ m, 2.1 $\times$ 50 mm Column	1	<a href="#">186003607</a>
96-Well 1 mL Collection Plate and Cap Mat	3	600001043

### Additional Products (Not Included in Kits)

Oasis MAX 96-Well $\mu$ Elution Plate	1	<a href="#">186001829</a>
Oasis WCX 96-Well $\mu$ Elution Plate	1	<a href="#">186002499</a>
96-Well 1 mL Collection Plate	50	<a href="#">186002481</a>
Cap Mats for 1 mL Collection Plate	50	<a href="#">186002483</a>
Disposable Reservoir Tray	25	<a href="#">WAT058942</a>
Extraction Manifold for 96-Well Plates	1	<a href="#">186001831</a>
Vacuum Box Gasket Kit (contains foam top gaskets and orange O-rings)	2	<a href="#">186003522</a>
SPE Vacuum Pump 115 V, 60 Hz	1	725000417
SPE Vacuum Pump 240 V, 50 Hz	1	<a href="#">725000418</a>

## Application-Specific Kits – Clinical Research

Kairos 

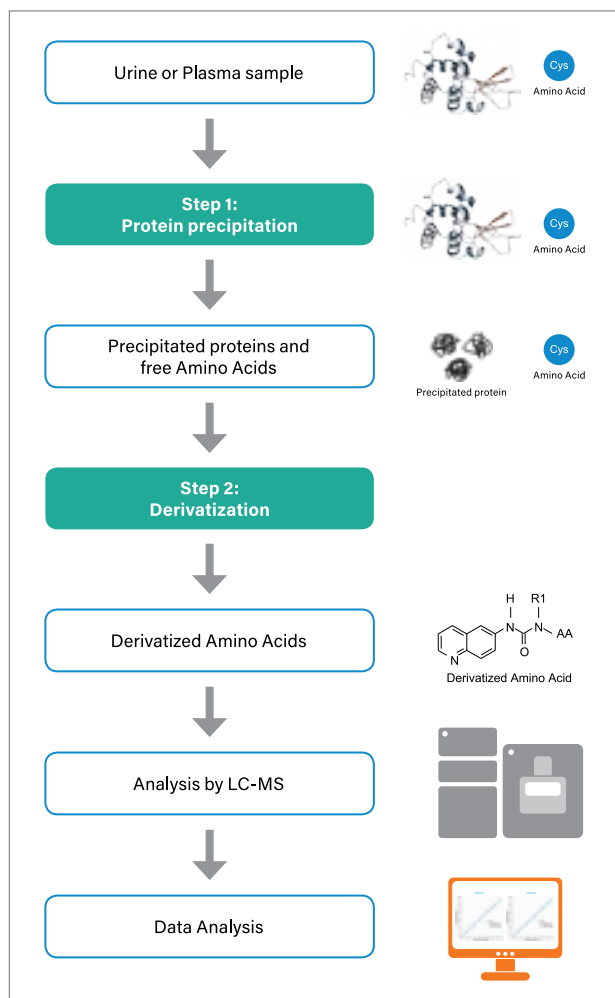
### KAIROS AMINO ACID KIT

The Kairos amino acid kit is the LC-MS-based kit designed to quantitate 40+ amino acids in physiological matrices such as plasma and urine. Built on AccQ•Tag derivatization chemistry, this kit enables unprecedented sensitivity, accuracy, and precision. The Kairos Amino Acid Kit, which can bring run times to under 10 minutes, is fully automated with manual options for physiological samples in both high-throughput (500+ samples) and lower-throughput (100+ samples) amino acid analysis. Automated sample preparation workflow is verified with scripts available on Tecan and Andrew + Systems.



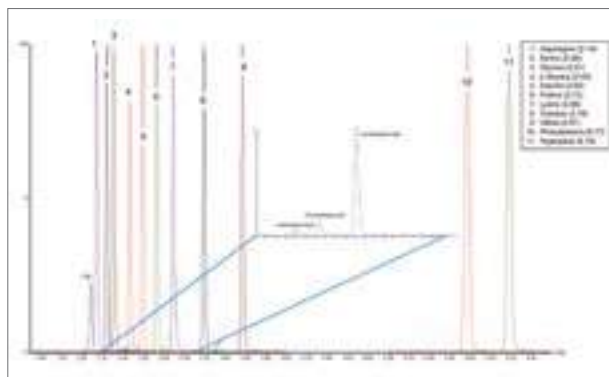
For information about amino acid analysis in cell culture media, food and feed samples, and hydrolysates, please refer to the amino acid section in the chapter of Application Specific Columns, Kits, and Spare Parts.

### Amino Acid Analysis Protocol




2-step sample preparation protocol developed around the AccQTag Ultra derivatization kit and CORTECS column chemistry for LCMS results in complex physiological matrices.

### UPLC-MS/MS Analysis of a Complex Sample



Total Ion Chromatogram (TIC) for 11 amino acids present in a plasma sample and inset a chromatogram to show the separation of gamma-aminobutyric acid, beta-aminoisobutyric acid, and alpha-aminobutyric acid in the same plasma sample.

 For more information, reference application note [720006487EN](#).

## Ordering Information

### Acrylamide Analysis Kits

Description	P/N
<b>Kairos Amino Acid 100+ Manual First Time</b> Includes: Amino Acid Calibrator Set (100+); Amino Acid QC Set (100+); Amino Acid Internal Standard (100+); AccQ-Tag Ultra Derivatization Kit x 2; Amino Acid Reconstitution Reagents; Formic Acid, 1 mL; TruView LCMS Certified Vials, 2/pk; CORTECS UPLC C <sub>18</sub> , 1.6 µm, 2.1 × 150 mm Column	<a href="#">176004375</a>
<b>Kairos Amino Acid 100+ Re-order</b> Includes: Amino Acid Calibrator Set (100+); Amino Acid QC Set (100+); Amino Acid Internal Standard (100+); AccQ-Tag Ultra Derivatization Kit x 2; Amino Acid Reconstitution Reagents; Formic Acid, 1 mL; TruView LCMS Certified Vials, 2/pk	<a href="#">176004376</a>
<b>Kairos Amino Acid 500+ Manual First Time</b> Includes: Amino Acid Calibrator Set (500+); Amino Acid QC Set (500+); Amino Acid Internal Standard (500+); AccQTag Ultra "3x" Derivatization Kit x 3; Amino Acid Reconstitution Reagents; Formic Acid, 1 mL; TruView LCMS Certified Vials, 10/pk; CORTECS UPLC C <sub>18</sub> , 1.6 µm, 2.1 × 150 mm Column	<a href="#">176004379</a>
<b>Kairos Amino Acid 500+ Manual Re-order</b> Includes: Amino Acid Calibrator Set (500+); Amino Acid QC Set (500+); Amino Acid Internal Standard (500+); AccQ-Tag Ultra "3x" Derivatization Kit x 3; Amino Acid Reconstitution Reagents; Formic Acid, 1 mL; TruView LCMS Certified Vials, 10/pk	<a href="#">176004380</a>
<b>Kairos Amino Acid 500+ Automation First</b> Includes: AccQ-Tag Ultra "3x" Derivatization Kit x 3; Amino Acid Reconstitution Reagents; Formic Acid, 1 mL x3; Amino Acid Sample Prep Kit; Amino Acid Script Pack; CORTECS UPLC C <sub>18</sub> , 1.6 µm, 2.1 × 150 mm Column	<a href="#">176004377</a>
<b>Kairos Amino Acid 500+ Automation Re-order</b> Includes: AccQ-Tag Ultra "3x" Derivatization Kit x 3; Amino Acid Reconstitution Reagents; Formic Acid, 1 mL x3; Amino Acid Sample Prep Kit; Amino Acid Script Pack	<a href="#">176004378</a>
<b>Amino Acid Calibrator Set (100+)</b> Includes: Calibrator 1, 5 µm, One Vial; Calibrator 2, 20 µm, One Vial; Calibrator 3, 100 µm, One Vial; Calibrator 4, 250 µm, One Vial; Calibrator 5, 500 µm, One Vial; Calibrator 6, 1000 µm, One Vial; Calibrator 7, 4000 µm, One Vial- Calibrators 1-6 Contain 45 Amino Acids; Calibrator 7 Contains 10 Amino Acids	<a href="#">186009193</a>
<b>Amino Acid Calibrator Set (500+)</b> Includes: Calibrator 1, 5 µm, One Vial; Calibrator 2, 20 µm, One Vial; Calibrator 3, 100 µm, One Vial; Calibrator 4, 250 µm, One Vial; Calibrator 5, 500 µm, One Vial; Calibrator 6, 1000 µm, One Vial; Calibrator 7, 4000 µm, One Vial- Calibrator 1-6 Contain 45 Amino Acids; Calibrator 7 Contains 10 Amino Acids	<a href="#">186009048</a>
<b>Amino Acid QC Set (100+)</b> Includes: QC Low, 50 µm, 2 Vials; QC High, 700 µm, 2 Vials- 45 Amino Acids in Each Standard	<a href="#">186009194</a>
<b>Amino Acid Quality Control Set (500+)</b> Includes: QC Low, 50 µm, 2 Vials; QC High, 700 µm, 2 Vials - 45 Amino Acids in Each Standard	<a href="#">186009049</a>
<b>Amino Acid Internal Standard (100+)</b> Includes: Isotopically Labelled 20 Amino Acids, 1 Vial	<a href="#">186009051</a>
<b>Amino Acid Internal Standard Set (500+)</b> Includes: Isotopically Labelled 20 Amino Acids, 5 Vials	<a href="#">186009050</a>
<b>Amino Acid Sample Preparation Kit</b> Includes: 1 mL Sample Collection Plates, 6/pk; 2 mL Sample Collection Plates, 6/pk; Pre-slit Cap Mats, 6/pk	<a href="#">186009102</a>
<b>Amino Acid Reconstitution Reagents</b> Includes: 0.1 N HCl, 30 mL; 10% Sulfosalicylic Acid, 50 mL	<a href="#">186009103</a>
<b>AccQ-Tag Ultra Derivatization Kit</b>	<a href="#">186003836</a>
<b>AccQ-Tag Ultra "3x" Derivatization Kit</b>	<a href="#">186004535</a>
<b>AccQ-Tag Ultra Borate Buffer, 10 mL</b>	<a href="#">186009283</a>

## SARS-COV-2 LC-MS KIT

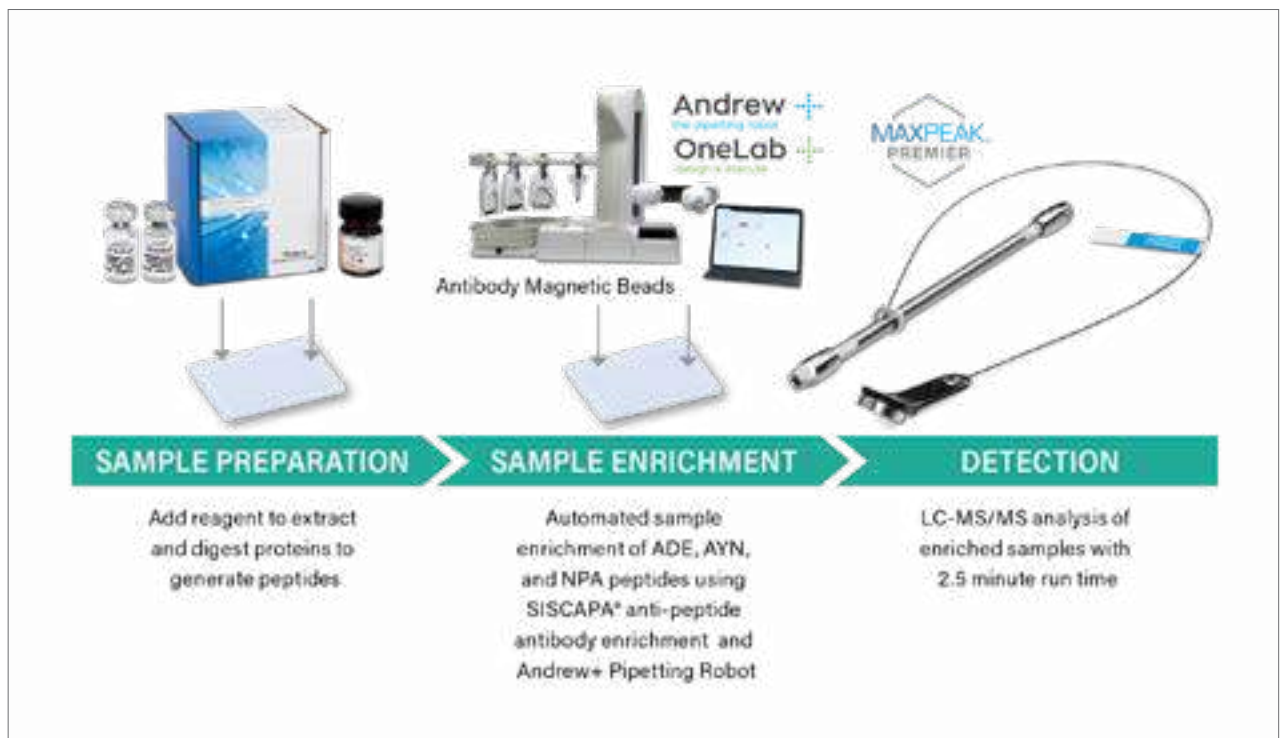
Waters SARS-CoV-2 LC-MS Kit (RUO) can directly detect and quantify SARS-CoV-2 signature NCAP peptides, without the need to amplify the target analytes. Scientists can harness the flexibility and reproducibility of LC-MS to advance critical SARS-CoV-2 research.

- Achieve reproducible results between and within labs
- Ensure high accuracy and analytical sensitivity to enable critical research
- Empower research and development of pioneering SARS-CoV-2 testing, using an alternative and complementary technology to common infectious pathogen research
- Because the method runs on an LC-MS platform it has the potential be multiplexed with other peptides and biomarkers for broader research

### Ensure accurate, sensitive and analytically selective results

The SARS CoV-2 LC-MS Kit (RUO) uses the innovative SISCAPA® anti-peptide antibody enrichment sample preparation method from SISCAPA Assay Technologies, Inc. that improves the performance of mass spectrometry for measurement of pre-selected protein targets.

### A Robust and Automatable Workflow



*This kit is for research use only and has not been approved for use in clinical diagnostic procedures. This RUO Kit has not been tested with clinical samples. SISCAPA® is a mark of Anderson Forschung Group LLC (AFG).*

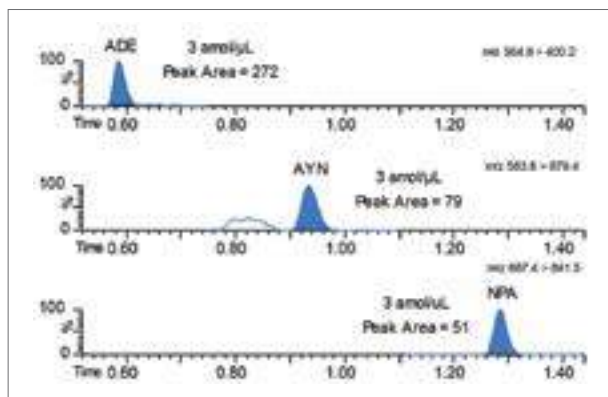


## Ensure Accurate, Sensitive, and Analytically Selective Results

Achieve the analytical sensitivity required to detect low levels of SARS-CoV-2 peptides from complex digested samples with stable isotope standards and capture by anti-peptide antibodies. Increase laboratory efficiency as all components necessary to quickly deploy the supplied method are packaged together for the busy research laboratory.

- Highly analytically selective to three SARS-CoV-2 NCAP signature peptides
- Lower limit of quantitation (LLOQ) of 3 amol/μL
- Anti-peptide antibody capture results in clean, low-noise chromatograms with an ultra-fast run time (<2 minutes)
- The method minimizes sample media interference, providing greater flexibility for the analysis of multiple research samples

## Analytical Sensitivity for NCAP Peptides



Chromatogram of the ADE, AYN, and NPA peptides at 3 amol/μL in VTM after antibody enrichment.

## Ordering Information

### SARS-CoV-2 Kits

Description	P/N
Waters SARS-CoV-2 LC-MS Starter Kit Kit contains: Enrichment Set, Reagent Set, Calibrator and Internal Standard Set, and System Suitability Solution Set, ACQUITY PREMIER Peptide BEH 300 Å, C <sub>18</sub> , 2.1 × 30 mm column, ACQUITY In-Line Filter, Mobile Phase Additive - Formic Acid (2 × 1 mL)	<a href="#">176004946</a>
Waters SARS-CoV-2 LC-MS Re-Order Kit Kit contains: Enrichment Set, Reagent Set, Calibrator and Internal Standard Set, and System Suitability Solution Set	<a href="#">176004947</a>
Waters SARS-CoV-2 LC-MS Sample Preparation and Reagent Kit Kit contains: Enrichment Set, Reagent Set, and Calibrator and Internal Standard Set	<a href="#">176004948</a>
Waters SARS-CoV-2 LC-MS System Suitability Set Kit contains: NCAP Peptide Mixture (ADE, AYN, NPA and DGI), LCGC Certified Vials and Cap with Preslit Septum, 2 mL, 100/pk	<a href="#">176004949</a>
Waters SARS-CoV-2 LC-MS System Suitability Kit contains: 1 vial NCAP peptide mixture at a concentration of 100 fmole/μL	<a href="#">186010232</a>

## Application-Specific Kits – Food and Environmental

### ACRYLAMIDE ANALYSIS KITS

#### Kits for the Extraction and Cleanup of Acrylamide in Processed Foods Prior to LC-MS/MS Analysis

The Acrylamide Analysis Starter and Refill Kits include consumables for the extraction, cleanup and separation of acrylamide from processed foods by LC-MS/MS. These kits provide you with a simple workflow, supporting your method development.

Starter kits include the chromatographic column and consumables including DisQuE Extraction Pouches and dSPE cleanup tubes, Oasis MCX Cartridges, and vials for the preparation of 100 samples. Refill kits contain the necessary consumables for 100 additional samples.



#### Ordering Information

##### Acrylamide Analysis Kits

Description	P/N
<b>Acrylamide Starter Kit LC-MS</b> Kit contains: ACQUITY UPLC HSS C <sub>18</sub> SB Column, 100 Å, 1.8 µm, 2.1 mm × 100 mm, 2 × DisQuE, 1.5 g Sodium Acetate and 6 g MgSO <sub>4</sub> , 50 mL Pouch, 50/pkg, 2 × DisQuE 900 mg MgSO <sub>4</sub> and 300 mg PSA, 15 mL Tube, 50/pkg, and TruView LCMS Certified Clear Glass 12 × 32 mm Screw Neck Vial, with Cap and Preslit PTFE/Silicone Septa, 100/pkg	<a href="#">176004417</a>
<b>Acrylamide Refill Kit LC-MS</b> Kit contains: 2 × DisQuE, 1.5 g Sodium Acetate and 6 g MgSO <sub>4</sub> , 50 mL Pouch, 50/pkg, 2 × DisQuE 900 mg MgSO <sub>4</sub> and 300 mg PSA, 15 mL Tube, 50/pkg, and TruView LCMS Certified Clear Glass 12 × 32 mm Screw Neck Vial, with Cap and Preslit PTFE/Silicone Septa, 100/pkg	<a href="#">176004418</a>
<b>Acrylamide Starter Kit LC-MS Enhanced Cleanup</b> Kit contains: ACQUITY UPLC HSS C <sub>18</sub> SB Column, 100 Å, 1.8 µm, 2.1 mm × 100 mm, 2 × DisQuE, 1.5 g Sodium Acetate and 6 g MgSO <sub>4</sub> , 50 mL Pouch, 50/pkg, Oasis MCX 3 cc Vac Cartridge, 60 mg Sorbent per Cartridge, 60 µm Particle Size, 100/pkg, and TruView LCMS Certified Clear Glass 12 × 32 mm Screw Neck Vial, with Cap and Preslit PTFE/Silicone Septa, 100/pkg	<a href="#">176004419</a>
<b>Acrylamide Refill Kit LC-MS Enhanced Cleanup</b> Kit contains: 2 × DisQuE, 1.5 g Sodium Acetate and 6 g MgSO <sub>4</sub> , 50 mL Pouch, 50/pkg, Oasis MCX 3 cc Vac Cartridge, 60 mg Sorbent per Cartridge, 60 µm Particle Size, 100/pkg, and TruView LCMS Certified Clear Glass 12 × 32 mm Screw Neck Vial, with Cap and Preslit PTFE/Silicone Septa, 100/pkg	<a href="#">176004420</a>
<b>Acrylamide Starter Kit UHPLC Enhanced Cleanup</b> Kit contains: XSelect HSS C <sub>18</sub> SB XP Column, 100 Å, 2.5 µm, 2.1 mm × 100 mm, 2 × DisQuE, 1.5 g Sodium Acetate and 6 g MgSO <sub>4</sub> , 50 mL Pouch, 50/pkg, Oasis MCX 3 cc Vac Cartridge, 60 mg Sorbent per Cartridge, 60 µm Particle Size, 100/pkg, and TruView LCMS Certified Clear Glass 12 × 32 mm Screw Neck Vial, with Cap and Preslit PTFE/Silicone Septa, 100/pkg	<a href="#">176004423</a>
<b>Acrylamide Refill Kit UHPLC Enhanced Cleanup</b> Kit contains: 2 × DisQuE, 1.5 g Sodium Acetate and 6 g MgSO <sub>4</sub> , 50 mL Pouch, 50/pkg, Oasis MCX 3 cc Vac Cartridge, 60 mg Sorbent per Cartridge, 60 µm Particle Size, 100/pkg, and TruView LCMS Certified Clear Glass 12 × 32 mm Screw Neck Vial, with Cap and Preslit PTFE/Silicone Septa, 100/pkg	<a href="#">176004424</a>

## ACQUITY UPLC BISPHENOL A COLUMN AND METHOD KITS

The ACQUITY UPLC Bisphenol A Column and Method Kits are fully compliant with ASTM Method D7574-09. Waters ACQUITY UPLC Solution provides optimum



resolution and sensitivity for the analysis of Bisphenol A in water. The column kit includes the ACQUITY UPLC BEH C<sub>18</sub> Column and ACQUITY UPLC Isolator Column. The Method Kit also includes Oasis HLB SPE Cartridges and LCMS Certified Vials.

## BEVERAGE ANALYSIS KIT

Waters Beverage Analysis Kit was specifically designed for the non-chemist such as onsite bottler quality control workers, to perform quick and accurate analysis of commonly used additives (acesulfame-K, saccharin, caffeine, benzoate, sorbate, and aspartame) in drink formulations. This comprehensive kit is simple and easy-to-use, and can be used in conjunction with a rapid LC method to ensure final product quality and improve manufacturing efficiency.



- Rapid analysis of six additives in soft drinks with minimal sample preparation
- Pre-formulated mobile phase, wash solvent, and standards
- Environmentally friendly solvents (ethanol based)
- Optimized methodology that is easy to follow
- Certificate of Analysis with uncertainty values and verification testing information
- Works with a variety of LC systems; results obtained in as little as 10 minutes by HPLC or seven minutes by UPLC

## Ordering Information

Description	P/N
ACQUITY Bisphenol A Column Kit	<a href="#">176001955</a>
ACQUITY Bisphenol A Method Kit	<a href="#">186004932</a>

## Ordering Information

### Beverage Analysis Kits

Description	P/N
Beverage Analysis Kit Contains six standards: Four 100 mL bottles containing acesulfame-K, saccharin, caffeine, benzoate, and sorbate in solution; four bottles each with 50 mg aspartame in solid form; four 1 L bottles of mobile phase; four 1 L bottles of wash solvent; sufficient for one month of typical use	<a href="#">176002534</a>
Beverage Analysis Five Standards Solution (acesulfame-K, saccharin, caffeine, benzoate, and sorbate), 100 mL	<a href="#">186006008</a>
Beverage Analysis Standard Solid (aspartame), 50 mg	<a href="#">186006010</a>
Beverage Analysis Mobile Phase Reagent (acetate buffer), 1 L	<a href="#">186006006</a>
Beverage Analysis Wash Reagent (ethanol-based), 1 L	<a href="#">186006007</a>
Low-Level Beverage Analysis Standards (50 mg/L caffeine and 50 mg/L acesulfame-K), for beverages with low caffeine content	<a href="#">186007231</a>
High-Level Beverage Analysis Standards (250 mg/L caffeine and 250 mg/L acesulfame-K), for beverages with high caffeine content	<a href="#">186007232</a>

## CARBAMATE ANALYSIS KITS

Waters Carbamate Analysis Kits for environmental and food testing include the Waters Carbamate Column, Oasis HLB Cartridges, vials, and reference standards. When used in part with regulated methods, these proven kits simplify your analysis while increasing your confidence in the result.



### Ordering Information

#### Carbamate Analysis Kits

Description	P/N
Carbamate Analysis Kit for Environmental Testing	<a href="#">176001740</a>
Carbamate Analysis Kit for Food Testing	186004719

#### Carbamate Analysis Column for Pesticides

Description	Dimension	Qty.	P/N
Carbamate Analysis	3.9 × 150 mm	1/pk	<a href="#">WAT035577</a>

## OASIS WAX FOR PFAS ANALYSIS

### Extraction and Concentration Without the Low Background Contamination

Per- and Polyfluoroalkyl substances (PFAS) are a growing environmental concern. Now your lab can extract and concentrate PFAS without worrying about low background contamination through the power of Oasis WAX for PFAS Analysis, a comprehensive quality-control pre-screening test for 32 PFAS. Achieve reproducible results with solutions designed specifically for environmental and food testing laboratories.

PFAS Solution Installation Kits provide everything to meet your PFAS workflow needs. Kits include columns, Isolator column, PEEK™ Tubing and Solvent Lines, Fittings, SPE, Vials, and Standard.

### Ordering Information

#### Acrylamide Analysis Kits

Description	P/N
Oasis WAX for PFAS Analysis 6 cc/150 mg, 30 µm, 300/pk	<a href="#">186009344</a>
Oasis WAX for PFAS Analysis 6 cc/150 mg, 30 µm, 30/pk	<a href="#">186009345</a>
Oasis WAX for PFAS Analysis 6 cc/500 mg, 60 µm, 300/pk	<a href="#">186009346</a>
Oasis WAX for PFAS Analysis 6 cc/500 mg, 60 µm, 30/pk	<a href="#">186009347</a>
Oasis WAX for PFAS Analysis 6 cc/500 mg, 30 µm, 30/pk	<a href="#">186009568</a>
PFAS Solution Installation Kit with Oasis 150 mg Kit 1	<a href="#">176004548</a>

\*Without [PFAC30PAR](#) standard solution

## EPA METHOD 1694 ANALYSIS KIT

Waters EPA Method 1694 Analysis Kit includes the XTerra MS C<sub>18</sub> Column, Atlantis HILIC Column, and Oasis HLB Cartridges; all of which are specified in the EPA Method.

### Ordering Information

Description	P/N
EPA Method 1694 Analysis Kit	<a href="#">176001634</a>
Oasis HLB 20 cc Vac, 1 g (20/box)	<a href="#">186000117</a>



Description	P/N
PFAS Solution Installation Kit with Oasis WAX 500 mg Kit 2	<a href="#">176004549</a>
PFAS Solution Installation Kit with Sep-Pak PS-2 Kit 3	<a href="#">176004550</a>
PFAS Solution Installation Kit for Direct Injection Kit 4	<a href="#">176004554</a>
PFAS Solution Installation Kit for EPA Method 533	176001767
PFAS Solution Installation Kit with Oasis 150 mg (APAC)*	<a href="#">176004588</a>
Native PFAS Precision and Recovery Standard Solution	<a href="#">PFAC30PAR</a>

\*Without [PFAC30PAR](#) standard solution

## Spare Parts

### COLUMN AND CARTRIDGE FITTINGS

#### Ordering Information

##### ACQUITY UPLC Column In-line Filter Unit

Description	P/N
In-line Filter Holder and 6/pk 0.2 µm Stainless Steel Replacement Filters	<a href="#">205000343</a>
Five 0.2 µm Stainless Steel Replacement Filters and End Nuts for <a href="#">205000343</a>	<a href="#">700002775</a>

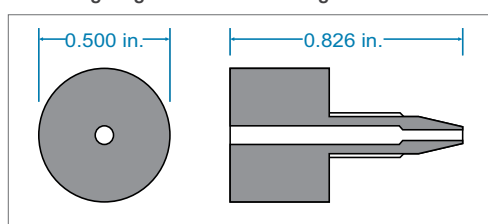


### PEEK TUBING AND FITTINGS

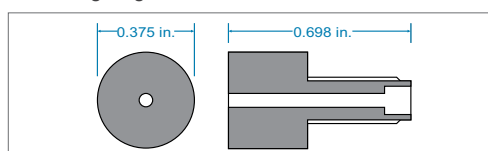
#### PEEK One-Piece Fingertight Fitting, 1/16-inch, 10-32 Thread

For the most demanding applications, we recommend the high-performance fingertight HPLC fitting. Nut and ferrule are made from a single piece of PEEK, which helps the fitting remain leak-tight at pressures as high as 6000 psi (420 bar). With the knurled head of the nut increased in diameter, to facilitate tightening without tools, it's nonetheless a genuine fingertight.

#### PEEK Fingertight One-Piece Fitting



#### PEEK Fingertight Two-Piece Nut



#### Ordering Information

Description	P/N
PEEK Fingertight One-piece Fitting	<a href="#">186008714</a>

### Rely on Genuine Waters Quality Parts

Waters knows how to run chromatography and LC-MS laboratories at peak performance. Our instruments, software, chemistries, and services provide you the tools for success.

Only Waters Quality Parts™ are tested and certified for ensuring optimal performance of Waters systems. Fitting our component parts to your instruments instills confidence that they will operate in a dependable, invariable manner over time; that results will be accurate, precise, and reproducible; and that systems will remain compliant.

## PEEK Fittings with Double Ferrules, 1/16-inch, 10-32 Thread

Double-ferrule fittings made of PEEK grip tubing in two places. The ferrules provide twice the holding power of single-ferrule fittings. They are ideal for use with PEEK and Tefzel tubing, which often slip when used with single-ferrule fittings. When used with stainless steel or titanium tubing, double-ferrule fittings grip tighter, creating a highly reliable connection that performs flawlessly at high pressures.

We offer both fingertight and hex-head nuts for use with double-ferrules. The fingertight version can be hand-tightened for operating pressures as high as 6000 psi. Use the hex-head version for connections that are difficult to reach or closely spaced.

These fittings fit virtually any female 1/16-inch fitting, including Parker, Swagelok, Waters, Valco, Rheodyne, UPChurch, etc.—all with 10-32 threads.

### Ordering Information

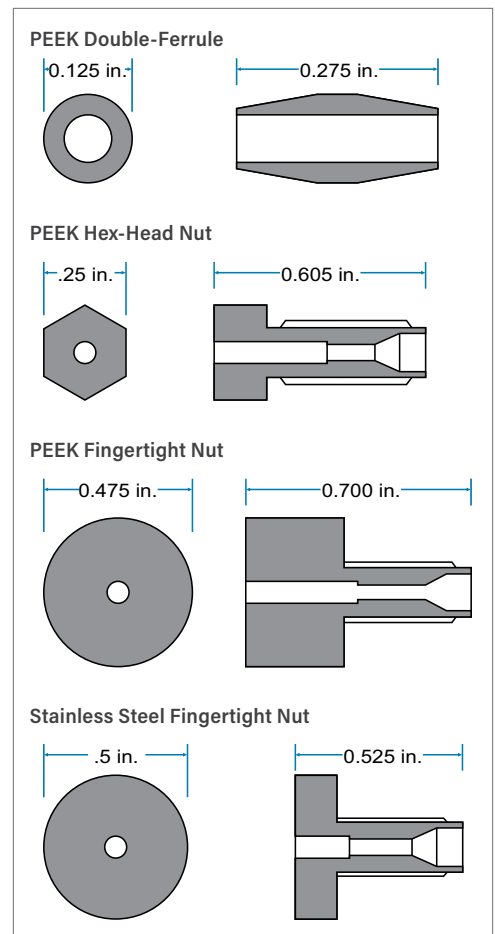
Description	P/N
PEEK Double-ferrule	<a href="#">PSL613302</a>
PEEK Hex-head Nut	<a href="#">PSL613324</a>
PEEK Fingertight Nut	<a href="#">PSL613301</a>
Stainless Steel Fingertight Nut	<a href="#">PSL613325</a>

### PTFE/ETFE Tubing and Fittings

O.D. Inches (mm)	I.D. Inches (mm)	Length/Material	P/N
0.125 (3.2)	0.062 (1.57)	25 ft. (7.6 m), PTFE	<a href="#">WAT026808</a>
0.149 (3.8)	0.119 (30.0)	25 ft. (7.6 m), PTFE	<a href="#">WAT026809</a>
0.250 (6.3)	0.190 (4.8)	10 ft. (3 m), PTFE	<a href="#">WAT026810</a>
0.080 (2.0)	0.058 (1.5)	25 ft. (7.6 m), PTFE	<a href="#">WAT026974</a>
0.178 (4.52)	0.148 (3.76)	25 ft. (7.6 m), PTFE	<a href="#">WAT051041</a>
0.149 (3.8)	0.119 (30.0)	20 ft. (6 m), PTFE	<a href="#">WAT051052</a>
0.125 (3.2)	0.020 (0.508)	10 ft. (3 m), PTFE	<a href="#">WAT088430</a>
0.125 (3.2)	0.009 (0.228)	10 ft. (3 m), PTFE	<a href="#">WAT088431</a>
0.125 (3.2)	0.040 (1.0)	10 ft. (3 m), PTFE	<a href="#">WAT088432</a>
0.062 (1.57)	0.009 (0.228)	36 in. (1 m), ETFE	<a href="#">WAT088561</a>
0.062 (1.57)	0.040 (1.0)	36 in. (1 m), PTFE	<a href="#">WAT088563</a>
PTFE Adapter, 0.125 (3.2) to 0.065 (1.6), 5/pk			<a href="#">WAT005137</a>

### Stainless Steel Tubing and Fittings

O.D. Inches (mm)	I.D. Inches (mm)	Length/Material	P/N
0.0625 (1.6)	0.005 (0.127)	10 ft. (3 m), SS	<a href="#">WAT241039</a>
0.0625 (1.6)	0.020 (0.508)	10 ft. (3 m), SS	<a href="#">WAT026804</a>
0.0625 (1.6)	0.030 (0.762)	10 ft. (3 m), SS	430000366
0.0625 (1.6)	0.040 (1.020)	10 ft. (3 m), SS	<a href="#">WAT026805</a>
0.125 (3.2)	0.062 (1.57)	10 ft. (3 m), SS	<a href="#">WAT026806</a>
0.125 (3.2)	0.093 (2.36)	10 ft. (3 m), SS	<a href="#">WAT026807</a>
0.0625 (1.6)	0.009 (0.228)	10 ft. (3 m), SS	<a href="#">WAT026973</a>
0.0625 in. O.D. Stainless Steel Tubing Cutter with 3 Blades			<a href="#">WAT022384</a>
Replacement Blades for <a href="#">WAT022384</a> , 3/pk			<a href="#">WAT022385</a>



## PEEK Tubing and Fittings

O.D. Inches (mm)	I.D. Inches (mm)	Length/Material	P/N
0.0625 (1.6)	0.005 (0.127)	5 ft. (1.5 m), PEEK	<a href="#">WAT022995</a>
0.0625 (1.6)	0.010 (0.254)	5 ft. (1.5 m), PEEK	<a href="#">WAT022996</a>
0.0625 (1.6)	0.015 (0.381)	5 ft. (1.5 m), PEEK	<a href="#">WAT022997</a>
0.0625 (1.6)	0.020 (0.508)	5 ft. (1.5 m), PEEK	<a href="#">WAT022998</a>
PEEK Tubing Cutter			<a href="#">WAT031795</a>
PEEK Tubing and Fitting Kit			<a href="#">WAT022999</a>
PEEK Union, 0.0625 in.			<a href="#">WAT026-04</a>

## Compression Screws and Ferrules

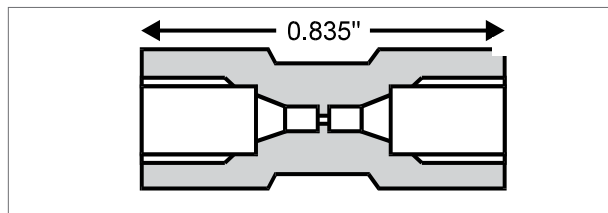
Description	P/N
Ferrule, 01, Stainless Steel, 10/pk	<a href="#">WAT005063</a>
Compression Screw, 0.0625 in., 10/pk	<a href="#">WAT005070</a>
Compression Fitting Plug, Stainless Steel, 5/pk	WAT005079
Rheodyne Ferrule, 10/pk	<a href="#">WAT007020</a>
Ferrule, Stainless Steel	<a href="#">WAT022330</a>
Ferrule, 1/16 in. O.D., PEEK	<a href="#">WAT021817</a>
Compression Screw, Stainless Steel	<a href="#">WAT025313</a>
Compression Fitting Plug, Stainless Steel	WAT025566
Compression Screws and Ferrules, 0.166 in., 5/pk	<a href="#">WAT025604</a>
Compression Screws, 0.125 in., PEEK, 2/pk	<a href="#">WAT046-12</a>
Compression Screw, Long, 1/16 in.	<a href="#">WAT021812</a>
Compression Screw, Short, PEEK 1/16 in.	<a href="#">WAT021815</a>
Extra Long Compression Screw, Stainless Steel, 10/pk	<a href="#">WAT060051</a>
Finger Tight Poly Knob Used with Compression Screws Plus PEEK Ferrules	<a href="#">WAT021816</a>
Tee, 0.0625 in. Compression Screw, Stainless Steel	<a href="#">WAT075215</a>
Tubing Cap, Hex Stainless Steel	<a href="#">WAT084078</a>
Union, 0.0625 in. Stainless Steel	<a href="#">WAT097332</a>

## PEEK Unions, Tees, and Crosses

Inert and biocompatible PEEK unions can withstand operating pressures as high as 6000 psi (420 bar). PEEK tees and crosses can withstand pressures as high as 10,000 psi (690 bar).

PEEK unions, tees, and crosses share these features:

- Connect any 1/16-inch tubing (PEEK, stainless steel, titanium, or Tefzel)
- Low dead volume
- 10–32 thread

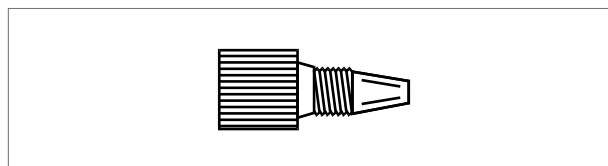


## Ordering Information

Description	P/N
PEEK Union with 2 PEEK Fingertight Nuts and Double Ferrules 1/16 in.	<a href="#">PSL613312</a>
PEEK Union without Nuts and Ferrules 1/16 in.	<a href="#">PSL613313</a>
PEEK TEE with One-piece Fingertight Fitting	<a href="#">PSL613317</a>
PEEK CROSS with One-piece Fingertight Fitting	<a href="#">PSL613319</a>
PEEK TEE without Fittings	<a href="#">PSL613318</a>
PEEK CROSS without Fittings	<a href="#">PSL613320</a>
PEEK One-piece Fingertight Fitting	<a href="#">186008714</a>

## Handilok CTFE Fittings

Handilok fittings can replace, without the need for tools, conventional compression fittings used with 1/16-inch tubing. Compatible with all internal fittings with a 10–32 thread, these fittings meet rigid high-pressure requirements, withstanding pressures greater than 4000 psi (280 bar).



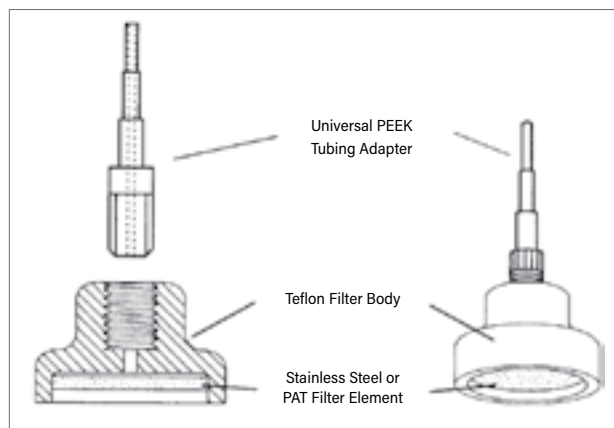
## Ordering Information

Handilok Fittings	P/N
1/16 in. Fitting, 1/pk	<a href="#">PSL618021</a>
1/16 in. Fitting, 10/pk	<a href="#">PSL618022</a>

## LC SYSTEM FILTERS

### Last Drop Mobile Phase Filters

The Last Drop mobile-phase filter incorporates a flat filter element set parallel to the bottom of a reservoir. This design allows the filter to draw all but the last 2% of mobile phase from the reservoir without drawing air into the system. Last Drop filters are available with 316 L stainless steel or PAT (PEEK alloyed with Teflon) filter elements in inert Teflon housings. The top of the housing incorporates a PEEK tripod that fits into pump inlet lines with inner diameters of 1.5, 2.2, or 3.5 mm.

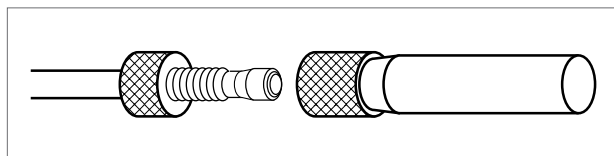


### Ordering Information

Description	P/N
Filter with 2 $\mu\text{m}$ Stainless Steel Filter	<a href="#">PSL901290</a>

### PEEK Biocompatible Mobile Phase Filter

The PEEK Biocompatible Mobile Phase Filter protects an HPLC pumping system against particulate matter in a mobile phase. Many macromolecules are fairly labile and require not only biocompatible chromatographs but also mobile-phase filters that are absolutely inert. These filters are designed from inert polymeric components, which effectively eliminate metal from the fluid path. With a porosity of 5  $\mu\text{m}$ , all fittings (including the inlet tube) are composed of perfectly inert PEEK.



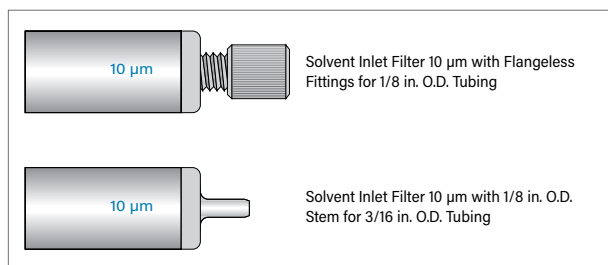
### Ordering Information

Description	P/N
Biocompatible Mobile Phase Filter	<a href="#">PSL901282</a>

## Solvent Inlet Filters

It's good practice to always filter solvents, to avoid damaging the pump. Solvent inlet filters, with a porosity of 10  $\mu\text{m}$ , provide the necessary pump protection, and their large surface area ensures long life without pump cavitation.

Filters should be changed periodically, depending on usage and mobile phase. Replacing the filter is easy; no tools are needed. The unique Plastictight male nut is screwed into the filter and tightened by hand. Finger tightening is sufficient; the Plastictight fitting holds without flanging.



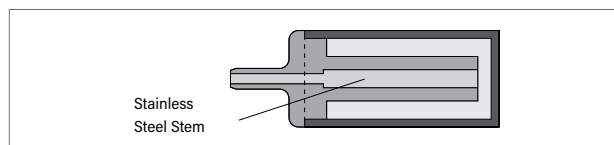
### Ordering Information

Description	P/N
<b>Solvent Inlet Filter Kits</b>	
Assy, Solvent Filter	<a href="#">WAT025531</a>
Plastictight Fitting with Teflon Tubing 1/16 in. I.D. × 1/8 in. O.D. × 3 ft.	<a href="#">PSL613602</a>
Replacement Filter 10 $\mu\text{m}$ , 5/pk	<a href="#">PSL613604</a>
<b>Solvent Inlet Filters for General Use</b>	
Solvent Inlet Filter 10 $\mu\text{m}$ with 1/16 in. O.D. Stem for 1/8 in. O.D. Tubing	<a href="#">PSL613570</a>
Solvent Inlet Filter 10 $\mu\text{m}$ with Flangeless Fittings for 1/8 in. O.D. Tubing	<a href="#">PSL613578</a>
<b>Solvent Inlet Filters for Preparative HPLC</b>	
Solvent Inlet Filter 10 $\mu\text{m}$ with 1/16 in. O.D. Stem for 1/8 in. O.D. Tubing	<a href="#">PSL613607</a>
Solvent Inlet Filter 10 $\mu\text{m}$ with Flangeless Fittings for 1/8 in. O.D. Tubing	<a href="#">PSL613608</a>
<b>Solvent Inlet Filters for Waters HPLC Systems</b>	
Solvent Inlet Filter 10 $\mu\text{m}$ with 1/8 in. O.D. Stem for 3/16 in. O.D. Tubing	<a href="#">PSL613609</a>



## Bottom-of-the-Bottle Solvent Filters

Our Bottom-of-the-Bottle Solvent Filter is designed after the original Bottom-of-the-Bottle replaceable filters. This unique filter is fitted with a stainless steel stem on top, to accommodate 1/16-inch (I.D.) tubing. A lower stem, which goes directly into the filter, reaches to within 0.06 inches of the Bottom-of-the-Bottle filters. The 10 µm filter can easily accommodate flow rates as high as 10 mL/min.



## Ordering Information

Description	P/N
Stainless Steel Filter Assembly	<a href="#">PSL613457</a>



### APPLICATION AREA: Steroid Analysis

"The Oasis prime product line is an awesome solid phase extraction product line. The ease of use and the variety in the product line has made methods development a breeze. The micro elution plates have reduced the loss in evaporation steps that we had experienced in the past."

REVIEWER: Jermaine Ford

ORGANIZATION: US EPA




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# Waters Quality Parts and Supplies

# Contents

Rely on Genuine Waters Quality Parts .....	<a href="#">531</a>	HPLC Pumps .....	<a href="#">559</a>
Performance Maintenance Kits – All the Parts You Need, in One Box.....	<a href="#">531</a>	Gradient Modules .....	<a href="#">561</a>
ACQUITY Premier.....	<a href="#">532</a>	Fluid Handling Units.....	<a href="#">562</a>
ACQUITY I-Class Plus .....	<a href="#">532</a>	Injectors/Fraction Collectors.....	<a href="#">563</a>
ACQUITY H-Class Plus.....	<a href="#">534</a>	Detectors.....	<a href="#">566</a>
ACQUITY H-Class Plus Bio .....	<a href="#">535</a>	Quadrupole Time-of-Flight Mass Spectrometers .....	<a href="#">569</a>
Arc Premier.....	<a href="#">536</a>	Tandem Quadrupole Mass Spectrometers.....	<a href="#">571</a>
ACQUITY Arc Bio .....	<a href="#">537</a>	Atmospheric Solids Analysis Probe (ASAP).....	<a href="#">573</a>
Arc HPLC .....	<a href="#">538</a>	Tool Free Probes.....	<a href="#">574</a>
ACQUITY Arc System.....	<a href="#">539</a>	Single Quadrupole Mass Spectrometers .....	<a href="#">574</a>
ACQUITY UPC2 System .....	<a href="#">540</a>	Time-of-Flight (Tof) Mass Spectrometers.....	<a href="#">576</a>
ACQUITY APC System .....	<a href="#">542</a>	Magnetic Sector Mass Spectrometer .....	<a href="#">577</a>
ACQUITY UPLC I-Class System .....	<a href="#">543</a>	Column and Cartridge Fittings and Accessories.....	<a href="#">578</a>
ACQUITY UPLC System .....	<a href="#">548</a>	SLIPFREE Connectors.....	<a href="#">579</a>
ACQUITY UPLC H-Class System .....	<a href="#">545</a>	PEEK Tubing and Fittings.....	<a href="#">580</a>
ACQUITY UPLC H-Class Bio System....	<a href="#">546</a>	Filters.....	<a href="#">582</a>
ACQUITY UPLC M-Class System .....	<a href="#">553</a>		
nanoACQUITY UPLC System.....	<a href="#">554</a>		
Alliance Separations Modules.....	<a href="#">556</a>		
Common Parts for Alliance Systems...	<a href="#">558</a>		

# Waters Quality Parts and Supplies

## Rely on Genuine Waters Quality Parts

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Only Waters Quality Parts™ are tested and certified for ensuring optimal performance of Waters systems. Fitting our component parts to your instruments instills confidence that they will operate in a dependable, invariable manner over time, that results will be accurate, precise, and reproducible, and that systems will remain compliant.

## Performance Maintenance Kits —All the Parts You Need, in One Box

Our Performance Maintenance (PM) kits meet the requirements of our instruments, providing a dependable, economical way to ensure proper maintenance. Each kit contains the parts necessary to keep an instrument operating at peak performance. You'll also find a sticker, for affixing to the instrument. On it you can document the performance of maintenance procedures and thus be reminded when they are once again due.

Performance maintenance protocols for Waters instruments can be obtained from our support library on **waters.com**. The protocols include details of maintenance tasks and may also include calibration and diagnostic tests, to ensure the instruments function correctly.

## Ordering is Easy, Online or by Phone

Our local Waters sales office can quote prices, in any currency, for PM Kits and Waters Quality Parts. In the United States and Canada, you can obtain pricing by phone at 1-800-252-4752. If you are located elsewhere, you can consult the inside back cover of this catalog, which lists our worldwide sales offices and contact information. Finally, if you're a registered user of the Waters website, you can obtain local-currency prices at **waters.com/order**.

### To Find Parts: Use Our Waters Quality Parts Locator

Visit Waters online at [waters.com/partslocator](http://waters.com/partslocator) to use the Waters Quality Parts Locator to browse Waters systems, identify replacement components, and make purchases.

The Quality Parts Locator provides access to far more items than those that appear in this catalog. It also offers troubleshooting information, by our technical experts, to help you determine how best to correct problems.



**i** The online Waters Quality Parts Locator provides a simple way to find the component parts you need. You move the cursor over depictions of instruments, click on assemblies, and then click on component parts.

## ACQUITY Premier



ACQUITY Premier System.

### Ordering information

#### NEW ACQUITY Premier BSM

Description	P/N
ACQUITY Premier BSM Performance Maintenance Kit	<a href="#">201000328</a>
PM Kit consists of: Check Valves, Mixers, Filters, Plungers & Seals	

#### NEW ACQUITY Premier QSM

Description	P/N
ACQUITY Premier QSM Performance Maintenance Kit	<a href="#">201000244</a>
PM Kit consists of: Check Valves, Mixers, Filters, Plungers & Seals	

#### NEW ACQUITY Premier SM-FTN

Description	P/N
ACQUITY Premier Sample Manager-FTN Performance Maintenance Kit	201000334
PM Kit consists of: Syringe, 15 µL Textured Needle, Guide & Seat, Inject Valve Cartridge, and Filters	

## ACQUITY I-Class Plus

### Ordering information

#### ACQUITY I-Class PLUS Sample Manager-FTN

Description	P/N
ACQUITY I-Class PLUS Sample Manager-FTN Performance Maintenance Kit	<a href="#">201000316</a>
PM Kit consists of: Syringe, 15 µL Textured Needle, Guide & Seat, Inject Valve Cartridge, and Filters	

Parts and Accessories	
Inject Valve Cartridge	<a href="#">700006057</a>
Air Filter, Side Panel	401000694
Guide, Sample Needle	<a href="#">405008854</a>
Seat, Vespel with Anti-rot	<a href="#">405011492</a>
Syringe, 100 µL, HP	<a href="#">700002570</a>
Assy, Seat Port, .003 I.D.	<a href="#">700006056</a>
Assy Textured Needle 15 µL with Guide and Seat	<a href="#">700011628</a>
Assy, Tube, Out, Wash Pump	430002345
Assy, Tube, Feed, Injection Port	430002346
Assy, Tube, Feed, Syringe	430002347
Assy, Tube, Feed, Transducer	430002348
Assy, Tube, Feed, Injection Valve	430002349



ACQUITY I-Class Plus System.

Parts and Accessories	
Assy, Tube, Waste, EXT., Injection Valve	<a href="#">430002360</a>
Assy, Tube, Waste, Injection Valve	<a href="#">700009534</a>
Assy, Tube, Waste, Injection Valve	430002362
Tube Assy, Sample Manager Purge	430002462
Tube, ACQUITY UPLC I-Class to MS MP35N 17 in.	700008939
Tube, ACQUITY UPLC I-Class to MS PEEKsil 17 in.	700008940
Tube, ACQUITY UPLC I-Class to MS PEEK 17 in.	700008941
Tube, ACQUITY UPLC I-Class to MS PEEK 21 in.	700008942
Tube, ACQUITY UPLC I-Class to MS PEEKsil 21 in.	700008943
Tube, ACQUITY UPLC I-Class to MS PEEKsil. 003 × 21 in.	700008944
ACQ. I-Class PDA Tubing Single Detector	700011803
ACQ. I-Class TUV Tubing Single Detector	700011804

## ACQUITY I-Class PLUS Sample Manager-FL

Description	P/N
ACQUITY I-Class PLUS Sample Manager-FL Performance Maintenance Kit	<a href="#">201000258</a>
PM Kit consists of: Syringes, Std 10 µL PEEK Needle, Injection Cartridge, 10 µL Loop and Filters	
<b>Parts and Accessories</b>	
Inject Valve Cartridge	<a href="#">700006069</a>
Syringe, 100 µL, HP	<a href="#">700002570</a>
Syringe, 2.5 mL, Inverted	<a href="#">700006070</a>
Assy, Sample Loop, EXT. Hypo Tip, 5 µL	<a href="#">430002936</a>
Assy, Sample Loop, Hypo Tip, 10 µL	<a href="#">430002938</a>
Assy, Sample Loop, EXT. Hypo Tip, 1 µL	<a href="#">430003166</a>
Assy, Sample Loop, EXT. Hypo Tip, 2 µL	<a href="#">430002928</a>
Assy, Tube, SSV/P-3 to Transducer	430002558
Assy, Tube, SSV P-2 to VM/SSV	430002560
Assy, Tube, WS1 to VM/S-SY	430002564
Assy, Tube, WS2 to VM/W-SY	430002566
Assy, Tube, WS to VM/W-In.	430002568
Assy, Tube, SS to VM/S-In.	430002571
Assy, Tube, NCS Inlet	430002579
Tube, NCS, Puncture Needle to Elbow	430003159
Port, Seal, Needle Wash	700002886
Assy, Puncture Needle, .059 O.D.	<a href="#">700006067</a>
Kit, I-Class FEP/Metal Needle, 10 µL	<a href="#">700005925</a>
Kit, I-Class PEEKsil Needle 10 µL	<a href="#">700005926</a>
Kit, I-Class FEP/Metal Needle, 20 µL	<a href="#">700005929</a>
Kit, I-Class ACQUITY UPLC PEEKsil Needle	<a href="#">700005930</a>
Kit, I-Class PEEK Needle, 10 µL	<a href="#">700005923</a>

## ACQUITY I-Class PLUS BSM

Description	P/N
ACQUITY I-Class BSM Performance Maintenance Kit	<a href="#">201000260</a>
PM Kit consists of: Plungers, Check Valves, Seals, and Filters	
<b>Parts and Accessories</b>	
Primary Inlet Check Valve Filter Kit, 2/pk	<a href="#">700002912</a>
HP Seal, Dual Spring, Perform Seal, 2/pk	<a href="#">700009135</a>
Plunger Assy, 2/pk	<a href="#">700002600</a>
Assy, Housing, Seal Wash, .045, SST, 2PT	<a href="#">700009194</a>
Assy, Cartridge, Filter, SS Frit	<a href="#">700002913</a>
Marker Set, Tubing, ACQUITY, 2/pk	<a href="#">700003102</a>
Filter, Solvent Bottle, SS, 7/pk	<a href="#">700003616</a>
Seal, Wash, .0787 I.D., Fixed, 2/pk	<a href="#">700006048</a>
Kit, Check Valve, Dual Ball and Seat, 2/pk	<a href="#">700003755</a>
Assy, Cart, Vent, Dogleg, 18 K psi, Dome	<a href="#">700006052</a>
Pump Head, 316 SS, DLC, Face Seal	<a href="#">700009190</a>
Support Plant, Thickened, VHP, Head	<a href="#">700002601</a>
Assy, Tube, Degasser Port B2 to SSV B	<a href="#">430001113</a>
Assy, Tube, Degasser Port B1 to SSV B	<a href="#">430001114</a>
Assy, Tube, Degasser Port A1 to SSV A	<a href="#">430001115</a>
Assy, Tube, Degasser Port A2 to SSV A	<a href="#">430001116</a>
Assy, Tube, Accu. "B" Xducer—Vent Valve	<a href="#">430001199</a>
Assy, Tube, Accu. "A" Xducer—Vent Valve	<a href="#">430001200</a>
Assy, Tube, Vent Valve P5 to Tee/Filter	<a href="#">430001207</a>
Assy, Tube, Vent Valve P2 to Tee/Filter	<a href="#">430001208</a>
Assy, Tube, SSV to i2V	<a href="#">430001443</a>
Assy, Tube, Vent Valve P1 to Waste	<a href="#">430001893</a>
Assy, Tube, Vent Valve P4 to Waste	<a href="#">430001894</a>
Assy, Tube, Head to Xducer, MP35N	<a href="#">430002472</a>
Assy, Tube, Prim-out Xducer to CV, MP35N	<a href="#">430002583</a>
Tube Assy, Solvent Inlet, BSM-CR	<a href="#">430002800</a>

## ACQUITY I-Class PLUS CM-A

Parts and Accessories	P/N
ACQUITY I-Class PLUS APH, SS, 12.5 LG	<a href="#">205001757</a>
Kit, ACQ. UPLC I-Class PLUS CM-A Tubing 2 Col	<a href="#">205001826</a>
9-port Valve Cartridge Assembly	<a href="#">700008871</a>

## DID YOU KNOW...

To ensure the maximum performance and longevity of your ACQUITY UPLC System, it is critical that you use Waters Quality Parts for maintenance.

# ACQUITY H-Class Plus

## Ordering information

### ACQUITY H-Class PLUS Sample Manager-FTN

Description	P/N
ACQUITY H-Class PLUS Sample Manager-FTN Performance Maintenance Kit	<a href="#">201000314</a>
PM Kit consists of: Syringe, 15 µL Textured Needle, Guide & Seat, Inject Valve Cartridge, Seat Port Assy and Filters	
<b>Parts and Accessories</b>	
Inject Valve Cartridge	<a href="#">700005236</a>
Air Filter, Side Panel	401000694
Guide, Sample Needle	<a href="#">405008854</a>
Seat, Vespel with Anti-rot	<a href="#">405011492</a>
Syringe, 100 µL, HP	<a href="#">700002570</a>
Assy, Seat Port, .004 I.D.	<a href="#">700005234</a>
Assy Textured Needle 15 µL with Guide and Seat	<a href="#">700011628</a>
Assy, Tube, Out, Wash Pump	430002345
Assy, Tube, Feed, Injection Port	430002346
Assy, Tube, Feed, Syringe	430002347
Assy, Tube, Feed, Transducer	430002348
Assy, Tube, Feed, Injection Valve	430002349
Assy, Tube, Waste, EXT., Injection Valve	430002360
Assy, Tube, Waste, Injection Valve	430002362
Tube Assy, Sample Manager Purge	430002462
Tube Assy, Sample Manager Purge, Bio	430002464
Tube Assy, Sample Manager Wash, Bio	430002487



ACQUITY H-Class Plus System.

### ACQUITY H-Class PLUS Binary Solvent Manager

Description	P/N
ACQUITY H-Class PLUS BSM Performance Maintenance Kit	<a href="#">201000260</a>
PM Kit consists of: Plungers, Check Valves, Seals, and Filters	
<b>Parts and Accessories</b>	
Primary Inlet Check Valve Filter Kit, 2/pk	<a href="#">700002912</a>
HP Seal, Dual Spring, Perform Seal, 2/pk	<a href="#">700009135</a>
Plunger Assy, 2/pk	<a href="#">700002600</a>
Assy, Housing, Seal Wash, .045, SST, 2PT	<a href="#">700009194</a>
Assy, Cartridge, Filter, SS Frit	<a href="#">700002913</a>
Marker Set, Tubing, ACQUITY, 2/pk	<a href="#">700003102</a>
Filter, Solvent Bottle, SS, 7/pk	<a href="#">700003616</a>
Seal, Wash, .0787 I.D., Fixed, 2/pk	<a href="#">700006048</a>
Kit, Check Valve, Dual Ball and Seat, 2/pk	<a href="#">700003755</a>
Assy, Cart, Vent, Dogleg, 18 K psi, Dome	<a href="#">700006052</a>
Pump Head, 316 SS, DLC, Face Seal	<a href="#">700009190</a>
Support Plant, Thickened, VHP, Head	<a href="#">700002601</a>
Assy, Tube, Degasser Port B2 to SSV B	<a href="#">430001113</a>
Assy, Tube, Degasser Port B1 to SSV B	<a href="#">430001114</a>
Assy, Tube, Degasser Port A1 to SSV A	<a href="#">430001115</a>
Assy, Tube, Degasser Port A2 to SSV A	<a href="#">430001116</a>
Assy, Tube, Accu. "B" Xducer—Vent Valve	<a href="#">430001199</a>
Assy, Tube, Accu. "A" Xducer—Vent Valve	<a href="#">430001200</a>
Assy, Tube, Vent Valve P5 to Tee/Filter	<a href="#">430001207</a>
Assy, Tube, Vent Valve P2 to Tee/Filter	<a href="#">430001208</a>
Assy, Tube, SSV to i2V	<a href="#">430001443</a>
Assy, Tube, Vent Valve P1 to Waste	<a href="#">430001893</a>
Assy, Tube, Vent Valve P4 to Waste	<a href="#">430001894</a>
Assy, Tube, Head to Xducer, MP35N	<a href="#">430002472</a>
Assy, Tube, Prim-out Xducer to CV, MP35N	<a href="#">430002583</a>
Tube Assy, Solvent Inlet, BSM-CR	<a href="#">430002800</a>

## ACQUITY H-Class PLUS Quaternary Solvent Manager

Description	P/N
ACQUITY H-Class Quaternary Solvent Manager Performance Maintenance Kit	<a href="#">201000233</a>
PM Kit consists of: Mixer, Plungers, Check Valves, Seals, and Filters	
<b>Parts and Accessories</b>	
Seal Wash Housing Seal, 2/pk	<a href="#">700002598</a>
Head Plunger Seal, 2/pk	<a href="#">700002599</a>
Plunger, 2/pk	<a href="#">700002600</a>
Head Support Plate	<a href="#">700002601</a>
Vent Valve Cartridge Assembly	<a href="#">700002660</a>
Check Valve, Double Ball and Seat, 1/pk	<a href="#">700005164</a>
i2 V Valve Cartridge, 1/pk	<a href="#">700005165</a>
Filter, Air, Door	<a href="#">700005167</a>
Filter for GPV, 4/pk	<a href="#">700005173</a>
Assy, Mixer, 100 µL, QSM	<a href="#">700005119</a>
O-ring, Teflon, Pump Head	<a href="#">WAT076152</a>
Pump Head	<a href="#">700002595</a>
Seal Wash Housing	<a href="#">700002597</a>
Tube Assembly, Degasser to GPV	<a href="#">430002208</a>
Tube Assembly, Transducer to Vent Valve	<a href="#">430002316</a>
Tube Assembly, Vent Valve P4 to Waste	<a href="#">430002317</a>
Tube Assembly, Vent Valve P2 to Outlet Filter	<a href="#">430002319</a>
Tube Assembly, Transducer to Check Valve	<a href="#">430002357</a>
Tube Assembly, GPV-D to Mixer Manifold	<a href="#">430002387</a>
Tube Assembly, GPV-C to Mixer Manifold	<a href="#">430002388</a>
Tube Assembly, GPV-A to Mixer Manifold	<a href="#">430002389</a>
Tube Assembly, GPV-B to Mixer Manifold	<a href="#">430002390</a>
Tube Assembly, Mixer Manifold to i2 V	<a href="#">430002400</a>

## ACQUITY H-Class PLUS CM-A

Parts and Accessories	P/N
ACQUITY H-Class PLUS APH, SS, 12.5 LG	<a href="#">205001774</a>
Kit, ACQ. UPLC H-Class PLUS CM-A Tubing 2 Col	<a href="#">205001819</a>
Kit, ACQ. UPLC H-Class PLUS CM-A Tubing 4 Col	<a href="#">205001821</a>
ACQUITY H-Class PLUS APH, SS, 18.5 LG	<a href="#">205001758</a>
Kit, ACQUITY UPLC 4 × 50 mm CM-A	<a href="#">205001832</a>
Kit, ACQ. UPLC H-Class PLUS CM-A Tubing 6 Col	<a href="#">205001822</a>
9-port Valve Cartridge Assembly	<a href="#">700005438</a>

## ACQUITY H-Class Plus Bio



ACQUITY H-Class Plus Bio System.

### Ordering information

#### ACQUITY H-Class PLUS Bio Sample Manager-FTN

Description	P/N
ACQUITY H-Class PLUS Bio Sample Manager-FTN Performance Maintenance Kit	<a href="#">201000315</a>
PM Kit consists of: Syringe, 15 µL Textured Needle, Guide & Seat, Inject Valve Cartridge, Seat Port Assy and Filters	
<b>Parts and Accessories</b>	
Inject Valve Cartridge	<a href="#">700005407</a>
Air Filter, Side Panel	401000694
Guide, Sample Needle	<a href="#">405008854</a>
Seat, Vespel with Anti-rot	<a href="#">405011492</a>
Syringe, 100 µL, HP	<a href="#">700002570</a>
Assy, Seat Port, .004 I.D.	<a href="#">700005682</a>
Assy Textured Needle 15 µL with Guide and Seat	<a href="#">700011658</a>
Assy, Tube, Out, Wash Pump	430002345
Assy, Tube, Feed, Injection Port	430002346
Assy, Tube, Feed, Syringe	430002347
Assy, Tube, Feed, Transducer	430002348
Assy, Tube, Feed, Injection Valve	430002349
Assy, Tube, Waste, EXT., Injection Valve	430002360
Assy, Tube, Waste, Injection Valve	430002362
Tube Assy, Sample Manager Purge, Bio	430002464
Tube Assy, Sample Manager Wash, Bio	430002487



## ACQUITY H-Class PLUS Bio Quaternary Solvent Manager

Description	P/N
ACQUITY H-Class PLUS Bio QSM Performance Maintenance Kit	<a href="#">201000244</a>
PM Kit consists of: Mixer, Plungers, Check Valves, Seals, and Filters	
Parts and Accessories	Parts and Accessories
Pump Head, ACQUITY, Titanium	<a href="#">700005411</a>
Plunger, .0787 Diameter × 1.415, 2/pk	<a href="#">700002600</a>
Assy, Mixer, 100 µL, BioQSM	<a href="#">700005258</a>
Fitting and Lock Ring, GPV Filter, 4/pk	<a href="#">700005259</a>
Solvent Filter, Titanium, 7/pk	<a href="#">700005378</a>
Cartridge, i2V, BioACQUITY	<a href="#">700005414</a>
Check Valve, Accumulator, Ti	<a href="#">700005415</a>
HP Seal, .0787 I.D., Flanged, Bio	<a href="#">700005418</a>
Holder, 20 Micron Frit, Titanium, 4/pk	<a href="#">700005419</a>
Wash Seal, .0787 I.D., Flanged, Bio	<a href="#">700005422</a>
Ferrule, Flangeless, Tefzel, Lock Ring	<a href="#">700003796</a>
Ferrule, Lock Ring and Screws, Flangeless, 7/pk	<a href="#">700003797</a>
Filter, Air, Door	<a href="#">700005167</a>
Cartridge, Vent Valve, BioQSM	<a href="#">700005413</a>
Barbed Seal Wash Housing, Titanium	<a href="#">700005410</a>
Tube Assy, Solvent Inlet, BioQSM	<a href="#">430002274</a>
Assy, Tube, Vent Valve P4 to Waste, QSM	<a href="#">430002317</a>
Assy, Tube, Head to Xducer, MP35N	<a href="#">430002472</a>
Assy, Tube, Degasser to GPV, MP35N	<a href="#">430002474</a>
Assy, Tube, Xducer to Check Valve, MP35N	<a href="#">430002475</a>
Assy, Tube, Xducer to Vent Valve, MP35N	<a href="#">430002476</a>
Assy, Tube, Vent VLV P2 to Filter, MP35N	<a href="#">430002477</a>
Assy, Tube, Mixer Manifold to i2V, MP35N	<a href="#">430002479</a>
Assy, Tube, GPV-A to Mixer, MP35N	<a href="#">430002481</a>
Assy, Tube, GPV-B to Mixer, MP35N	<a href="#">430002482</a>
Assy, Tube, GPV-C to Mixer, MP35N	<a href="#">430002483</a>
Assy, Tube, GPV-D to Mixer, MP35N	<a href="#">430002484</a>
Support Plant, Thickened, VHP, Head	<a href="#">700002601</a>

## ACQUITY H-Class PLUS Bio CM-A

Parts and Accessories	P/N
ACQUITY H-Class PLUS APH, MP35N, 12.5 LG	<a href="#">205001754</a>
Kit, ACQ. UPLC H-Class PLUS Bio CM-A Tubing 2 Col	<a href="#">205001823</a>
Kit, ACQ. UPLC H-Class PLUS Bio CM-A Tubing 4 Col	<a href="#">205001824</a>
ACQUITY H-Class PLUS APH, MP35N, 18.5 LG	<a href="#">205001755</a>
Kit, ACQUITY UPLC 4 × 50 mm CM-A	<a href="#">205001830</a>
Kit, ACQ. UPLC H-Class PLUS CM-A Tubing 6 Col	<a href="#">205001825</a>
9-port Valve Cartridge Assembly	<a href="#">700005461</a>

## Arc Premier



Arc Premier System.

## Ordering information

### NEW Arc Premier BSM

Description	P/N
Arc Premier BSM Performance Maintenance Kit	<a href="#">201000336</a>
PM Kit consists of: Check Valves, Mixers, Filters, Plungers & Seals	

### NEW Arc Premier QSM

Description	P/N
Arc Premier QSM Performance Maintenance Kit	<a href="#">201000338</a>
PM Kit consists of: Check Valves, Mixers, Filters, Plungers & Seals	

### NEW Arc Premier SM-FTN

Description	P/N
Arc Premier Sample Manager-FTN Performance Maintenance Kit	<a href="#">201000337</a>
PM Kit consists of: 100 µl Syringe, 30 µL Textured Needle, Guide & Seat, Inject Valve Cartridge, and Filters	

# ACQUITY Arc Bio

## Ordering information

### ACQUITY H-Class PLUS Binary Solvent Manager

Description	P/N
Arc Bio QSM Performance Maintenance Kit	<a href="#">201000311</a>
PM Kit consists of: Check Valves, Mixers, Filters, Plungers & Seals	
<b>Parts and Accessories</b>	
Assy, Barbed Seal Wash Housing	700011660
Assy, Plunger, .125 Dia, 2/pk	<a href="#">700010661</a>
Pump Head, Ti	700011661
Wash Seal, Dual Spring MP35N .125 I.D, 2/pk	<a href="#">700011663</a>
Hi Pressure Seal, Dual Spring MP35N .125 I.D, 2/pk	<a href="#">700010662</a>
O-Ring, 2-016, Teflon	<a href="#">WAT076152</a>
Check Valve Accumulator, Ti, 1/pk	<a href="#">700005415</a>
Check Valve Primary, Spring Loaded, 1/pk	700010642
PEEK washer	<a href="#">700005221</a>
Assy, Mixer, 4.6 mm × 100 mm, Path 1	<a href="#">700011553</a>
Assy, Mixer, 4.6 mm × 50 mm, Path 2	<a href="#">700011554</a>
Assy, Cartridge, Dual Mixer Vent Valve	700011664
Assy, Cartridge, Inlet Filter, Ti	<a href="#">700011679</a>
Assy, Solvent Filter, Thru Tube, Ti	<a href="#">700011675</a>
Assy, Solvent Filter, Thru Tube, Ti 7/pk	<a href="#">700011676</a>
Assy, Tube, GPV to PCV	<a href="#">700011677</a>
Assy, Tube, Head to Transducer	700011668
Assy, Tube, Xducer - VV	700011689
Assy, Tube, Xducer - ACC	700011670
Tube Assy, Solvent Inlet	700011674
Tubing, .040 PEEK, GPV, 4/pk	700011680
Assy, Tube, VV P7 to Waste	700011681
Assy, Tube, VV P4 to 100 mm Mixer	700011671
Assy, Tube, VV P2 to 50 mm Mixer	700011672
Assy, Tube, Mixer to VV P1 Path 1	700011673

### ACQUITY Arc BIO 2489, 2998

Description	P/N
ACQUITY PDA/TUV 2489/2998 Performance Maintenance Kit	<a href="#">201000281</a>
PM Kit consists of: PerformancePLUS Lamp	
<b>Parts and Accessories</b>	
Arc Bio 2998 Flow Cell, Inert,	205001043
Arc Bio 2489 Flow Cell, Low Dispersion	205001731
Performance Plus HB Deuterium Lamp Assy	<a href="#">700009330</a>



ACQUITY Arc Bio System.

### ACQUITY Arc Bio FTN

Description	P/N
ACQUITY Arc SM FTN-R Performance Maintenance Kit	<a href="#">201000312</a>
PM Kit consists of: 30 µL Needle Assembly, Guide & Seat, 100 µL Syringe, Injection Valve, Seat Port Assy and Filters	
<b>Parts and Accessories</b>	
Assy, Cart, Inject, Bio FTN, 18 K psi	<a href="#">700005407</a>
Seat, Vespel with Anti-rot	<a href="#">405011492</a>
Kit, Assy, Seat Port, MP35N, .007 I.D.	700011690
Assy, Needle, 15 µL, FTN	<a href="#">700005421</a>
Guide, Sample Needle	<a href="#">405008854</a>
Syringe, 100 µL, HP	<a href="#">700002570</a>
Assy, Solvent Filter, Thru Tube, Ti	<a href="#">700011675</a>
Air Filter, Side Panel	401000694

### ACQUITY Arc Bio 30 CM Column Heater and Column Heater/Cooler

Description	P/N
Passive Pre-Heater Kit, .005	205001709
Passive Pre-Heater Kit, .007	205001726
Tube, MP35N, .062 × .005 × 10 L	700012304
Union, Titanium, V-V, .010" Thru	405011424
Tube, PEEK, .062 × .005 × 24	<a href="#">700010530</a>
Tube, PEEK, .062 × .007 × 24	<a href="#">700010701</a>

### ACQUITY 30 CM Column Heater—Active

Description	P/N
ACQUITY UPLC APH, Bio, .005 I.D. 23.5 LG	<a href="#">205001727</a>
ACQUITY UPLC APH, Bio, .007 I.D. 23.5 LG	<a href="#">205001728</a>

## Arc HPLC

### Ordering information

#### Arc HPLC QSM

Description	P/N
Arc HPLC QSM Performance Maintenance Kit	201000346
PM Kit consists of: Check Valves, Filters, Plungers & Seals	
<b>Parts and Accessories</b>	
Assy, Plunger, .125 Dia, 2/pk	<a href="#">700010661</a>
Wash Seal, Floating, .125 I.D., 2/pk	<a href="#">700009137</a>
HP Seal, Flanged, .125 I.D., Thin Bur, 2/pk	<a href="#">700010663</a>
O-Ring, 2-016, Teflon	<a href="#">WAT076152</a>
Primary Check Valve, 1/pk	<a href="#">700010664</a>
Assy, Check Valve, Double Ball and Seat, 1/pk	<a href="#">700005164</a>
Washer, Check Valve, PEEK	<a href="#">700005221</a>
Assy, Mixer, 4.6 mm × 100 mm, 200 µm	<a href="#">700011656</a>
Assy, Cartridge, Dual Mixer Vent Valve	700010669
Assy, Filter, In-Line, SS Frit	<a href="#">700002912</a>
Assy, Cartridge, Inline Filter, SS Frit	<a href="#">700002913</a>
Assy, Solvent Filter, Bottle, 2/pk	<a href="#">700010196</a>
Assy, Barbed Seal Wash Housing	<a href="#">700012760</a>
Support Plate, Thickened, VHP Head	<a href="#">700002601</a>
Pump Head, 9 K, Shallow Gland	<a href="#">700010662</a>
Tubing, .040 PEEK, GPV, 4/pk	<a href="#">700010683</a>
Assy, Tube, GPV to PCV	<a href="#">700010678</a>
Assy, Tube, Head to Transducer	<a href="#">700010679</a>
Assy, Tube, Xducer - VV	<a href="#">700010680</a>
Assy, Tube, Xducer - ACC	<a href="#">700010681</a>
Tube Assy, Solvent Inlet	700010682
Assy, Tube, VV P7 to Waste	700010684
Assy, Tube, VV P4-5 to Mixers	<a href="#">700010685</a>
Assy, Tube, Mixer to VV P1 Path 1	<a href="#">700010687</a>

#### Arc HPLC FTN

Description	P/N
Arc HPLC SM FTN-R Performance Maintenance Kit	201000345
PM Kit consists of: 30 µL Needle Assembly, Guide & Seat, 100 µL Syringe, Seat Port Assy and Filters	
<b>Parts and Accessories</b>	
Seat, Vespel with Anti-rot	<a href="#">405011492</a>
Kit, Assy, Seat Port, SST, .007 I.D.	<a href="#">700010726</a>
Assy, Needle, 30 µL, FTN	<a href="#">700005279</a>
Guide, Sample Needle	<a href="#">405008854</a>
Syringe, 100 µL, HP	<a href="#">700002570</a>
Inject Valve Cartridge	<a href="#">700005236</a>



Arc HPLC System.

#### Arc HPLC 2489, 2998

Description	P/N
ACQUITY PDA/TUV 2489/2998 Performance Maintenance Kit	<a href="#">201000281</a>
PM Kit consists of: PerformancePLUS Lamp	
<b>Parts and Accessories</b>	
Arc HPLC 2998 Analytical Flow Cell	205001023
Arc HPLC 2489 Analytical Flow Cell	205001027
Performance Plus HB Deuterium Lamp Assy	<a href="#">700009330</a>

#### Arc HPLC CH-A

Description	P/N
Active Pre-Heater 12.5 in.	<a href="#">205001002</a>

# ACQUITY Arc System

## Ordering Information

### ACQUITY Arc QSM-R

Description	P/N
Arc QSM Performance Maintenance Kit	201000303
<b>Parts and Accessories</b>	
Pump, Solenoid, Wash	700010657
Assy, Barbed Seal Wash Housing, SFC-BSM	700008999
Support Plate, Thickened, VHP Head	700002601
Assy, Plunger, .125 Dia, 2/pk	700010661
Pump Head, 9 K, Shallow Gland	700010662
Wash Seal, Floating, .125 I.D., 2/pk	700009137
HP Seal, Flanged, .125 I.D., Thin Bur, 2/pk	700010663
O-Ring, 2–016, Teflon	WAT076152
Primary Check Valve, 1/pk	700010664
Assy, Check Valve, Double Ball and Seat, 1/pk	700005164
Washer, Check Valve, PEEK	700005221
Assy, Mixer, 4.6 mm × 100 mm, 200 µm Path 1	700010589
Assy, Mixer, 4.6 mm × 30 mm, 200 µm Path 2	700010590
Assy, Cartridge, Dual Mixer Vent Valve	700010669
Assy, Filter, In-Line, SS Frit	700002912
Assy, Cartridge, Inline Filter, SS Frit	700002913
Assy, Solvent Filter, Bottle, 2/pk	700010196
Assy, Tube, GPV to PCV	700010678
Assy, Tube, Head to Transducer	700010679
Assy, Tube, Xducer - VV	700010680
Assy, Tube, Xducer - ACC	700010681
Tube Assy, Solvent Inlet	700010682
Tubing, .040 PEEK, GPV, 4/pk	700010683
Assy, Tube, VV P7 to Waste	700010684
Assy, Tube, VV P4–5 to Mixers	700010685
Assy, Tube, VV P2 to Mixer Path 2	700010686
Assy, Tube, Mixer to VV P1 Path 1	700010687

### ACQUITY Arc FTN-R

Description	P/N
ACQUITY Arc SM FTN-R Performance Maintenance Kit	201000302
<b>Parts and Accessories</b>	
Assy, Cart, Inject, STR, FTN, 18 K psi	700006057
Seat, Vespel with Anti-rot	405011492
Kit, Assy, Seat Port, SST, .007 I.D.	700010726
Assy, Needle, 30 µL, FTN	700005279
Guide, Sample Needle	405008854
Syringe, 100 µL, HP	700002570
Filter, Solvent Bottle, SS, 1/pk	700003615
Filter, Solvent Bottle, SS, 7/pk	700003616
Air Filter, Side Panel	401000694



ACQUITY Arc System.

### ACQUITY 30 CM Column Heater and Column Heater/Cooler

Description	P/N
Kit, ACQUITY Arc CM Column H/HC PPH, .005	205001484
Kit, ACQUITY Arc 30 CM Column H/HC PPH, .007	205001524
Tube, SST, .062 × .005 × 10 L	700010708
Tube, SST, .062 × .007 × 10 L, High Flow	700010540
Assy, Tube, SST, .005 I.D., Valve Inlet	700010694
Assy, Tube, SST, .005 I.D., Column Inlet	700010695
Assy, Tube, SST, .007 I.D., Valve Inlet	700010696
Assy, Tube, SST, .007 I.D., Column Inlet	700010697
Valve, 3 Column Switch, 8 Port, 9.5 K psi	700010692
Rebuild Kit, Rotor, 3 Col Switch VLV, 9.5 K	700010447
Assy, Restriction Tube	700001598
PEEK Comp. Screw, Ferr, with Lock Ring, 5/pk	700000991
Kit, Screw, Comp., Lock Ring, Knurled, 8/pk	700010011
Kit, Ferrule B/L PEEK, 1/16 Machined, 10/pk	700010009
Screw, Comp., 10–32, SS Gold Plated, Long, 10/pk	700002645
Ferrule, Set, .062, Two-piece, 10/pk	700002635
Union, SST, V-V, .010" Thru	700010702

### ACQUITY 30 CM Column Heater—Active

Description	P/N
ACQUITY UPLC APH, SS, .005 I.D. 23.5 LG	205001452
ACQUITY UPLC APH, SS, .007 I.D. 23.5 LG	205001451
Assy, Tube, APH to Column, .005 I.D.	700010700
Assy, Tube, APH to Column, .007 I.D.	700010698
Tube, PEEK, .062 × .005 × 24	700010530
Tube, PEEK, .062 × .007 × 24	700010701
PEEK Comp. Screw, Ferr, with Lock Ring, 5/pk	700000991
Screw, Comp., Lock Ring, Hex, Captured	700010699
Kit, Ferrule B/L PEEK, 1/16 Mach, 10/pk	700010009
Screw, Comp., 10–32, SS Gold Plated, Long, 10/pk	700002645
Ferrule, Set, .062, Two-piece, 10/pk	700002635

## ACQUITY DETECTORS FOR ACQUITY ARC SYSTEM

### 2489 UV/Vis Detector

Description	P/N
ACQUITY PDA/TUV 2489/2998 Performance Maintenance Kit	<a href="#">201000281</a>
PM Kit consists of: PerformancePLUS Lamp	
Parts and Accessories	
Performance Plus HB Deuterium Lamp Assy	<a href="#">700009330</a>
Low Dispersion Analytical Flow Cell for Arc 2489	205001553
Flow Cell Rebuild Kit	<a href="#">WAS081346</a>

### 2998 PDA Detector

Description	P/N
Performance Plus HB Deuterium Lamp Assy	<a href="#">700009330</a>
PM Kit consists of: PerformancePLUS Lamp	
Parts and Accessories	
ACQUITY PDA/TUV 2489/2998 Performance Maintenance Kit	<a href="#">201000281</a>
Low Dispersion Analytical Flow Cell for Arc 2998	205001552

### 2414 RI Detector

Description	P/N
Valve, 2-way Solenoid	<a href="#">700002360</a>
Assy, Pressure Relief, 1/4-28, 35 psi	<a href="#">700002361</a>
Valve, 3-way Recycle	<a href="#">700002362</a>
Tubing, Union to Relief Valve	<a href="#">700002363</a>
Tubing, Union to Purge Valve	<a href="#">700002364</a>
Tubing, 2-way to 3-way Valve	<a href="#">700002378</a>

### Common Tubing for Arc Detectors

Description	P/N
Tubing Convoluted	700010532
Tube Assy, PEEK, .062 × .005 × 17 in.	700010533
Tube Assy, PEEK, .062 × .005 × 24 in.	<a href="#">700010530</a>
Tube Assy, PEEK, .062 × .020 × 60 in., Waste	<a href="#">700010531</a>

### 2475 FLR Detector

Description	P/N
ACQUITY UPLC FLR Detector Performance Maintenance Kit	<a href="#">201000193</a>
PM Kit consists of: Lamp Assy	
Parts and Accessories	
Low Dispersion Flow Cell for Arc 2475	205001554

## ACQUITY UPC<sup>2</sup> System

### Ordering Information



ACQUITY UPC<sup>2</sup> System.

### ACQUITY UPC<sup>2</sup> BSM

Description	P/N
UPC <sup>2</sup> BSM Performance Maintenance Kit	<a href="#">201000270</a>
PM Kit consists of: Mixer, Plungers, Check Valves, Seals, and Filters	
Parts and Accessories	
Assy, Seal Wash Housing, B-Pump	<a href="#">700008999</a>
Assy Plunger, SFC, 0.125 Diameter, 2/pk	<a href="#">700009000</a>
Head, SFC	<a href="#">700009001</a>
Assy, Tube, Head to Transducer, No Loop	430003165
Transducer Assy, SFC A-Pump, 15 K psi, Parylene Coated	<a href="#">700009006</a>
Assy, Seal Wash, Copper, SFC A-Pump	<a href="#">700009007</a>
Support Plate, SFC Head, A-Pump	700009008
Insulating Sleeve, SFC Head, 2/pk	700009009
Assy, 250 µL Mixer	<a href="#">700008909</a>
Kit, Cover, Head Insulator UPC <sup>2</sup> BSM	<a href="#">700009012</a>
Bulkhead Actuator Insulation, SFC-BSM	415001943
Insulator, Actuator, Pre-chiller, SFC-BSM	415001945
Assy, Tube, SSV to i2 V, SFC	430003096
Assy, Tube, Degasser to SSV, SFC-BSM	430003104
Assy, Tube, Transducer to C-Valve, SFC-BSM	<a href="#">430003105</a>
Assy Tube, Vent Valve P2 to Tee/Filter, SFC	430003108
Assy, Tube, Vent Valve P5 to Tee/Filter, SFC	430003109
Assy, Tube, Accu, CO <sub>2</sub> Transducer, V-Valve	430003161
Assy Tube, Solvent Inlet, SFC-BSM	430003274
Assy Tube, Vent Valve P4 to Waste	<a href="#">430003277</a>
Assy Tube, Vent Valve P1 to Waste	430003278
Head Seal	<a href="#">700009136</a>
Head Support Plate (Pump B)	<a href="#">700002601</a>
Screw Metric Skt Cap M3 × 16, 4/pk	<a href="#">700004023</a>
Screw M5 × 25, 2/pk	<a href="#">700002478</a>
Screw, Metric, Skt Cap M5 × 40, 138 K, 4/pk	<a href="#">700006049</a>
Transducer Assy, Head Mounted	<a href="#">700002594</a>
Wash Seal, 2/pk	<a href="#">700009137</a>
Solvent Select Valve Cartridge	<a href="#">700005408</a>
Union, 0.020 in. I.D. V-Detail	<a href="#">700002636</a>
Tube, Degasser 2 to SSV 2	700003387
Tube, Degasser 3 to SSV 3	700003388
Tube, Degasser 4 to SSV 4	700003389
Air Filter, Side Panel, Fan Intake	401000813
Air Filter, Vista Pump	<a href="#">700002632</a>
Connector Plug, 12-pin	700001539
ACQUITY UPC <sup>2</sup> CO <sub>2</sub> Connections Kit	<a href="#">205001006</a>

## ACQUITY UPC<sup>2</sup> SM-FL

Description	P/N
UPC <sup>2</sup> SM-FL Performance Maintenance Kit	
PM Kit consists of: Syringes, Needle Assy, Injection Cartridge, 10 µL Loop, Tube Assys, and Filters	<a href="#">201000271</a>
<b>Parts and Accessories</b>	
Injection Valve Cartridge	<a href="#">700009057</a>
In-line Waste Valve	<a href="#">410003180</a>
PEEK Sample Needle Kit, 10 µL	<a href="#">700009095</a>
Needle Assy, 250 µm, PEEKsil	<a href="#">700005179</a>
Syringe, 100 µL	<a href="#">700002570</a>
Volume Detection Device	700009094
Wash Port Fitting, 1/4-28 PEEK	<a href="#">700005297</a>
Sample Loop, 2 µL	<a href="#">430002928</a>
Sample Loop, 5 µL	<a href="#">430002936</a>
Sample Loop, 10 µL	<a href="#">430002938</a>

## ACQUITY UPC<sup>2</sup> Convergence Manager

Description	P/N
Convergence Manager Performance Maintenance Kit	
PM Kit consists of: Valve Cartridge, Pressure Regulator, and Filters	<a href="#">201000272</a>
<b>Parts and Accessories</b>	
Tee, V-Detail, SFC	405013607
Assy Tube, Tee to Vent Valve, SFC	430003194
Assy, Cartridge, Static Regulator	700009459
Assy Tube, Transducer to ABPR	430003200
Assy, Filter, 20 µm, 19 mm	700009059
Tube, Convolved, 3/8 in. I.D., Cuffed End	<a href="#">430003142</a>
Tube, Convolved, 1/4 in. I.D., Cuffed End	<a href="#">430003191</a>
Assy Tube, Vent Valve Tee to ABPR	430003201
Welded Tube, SM P6 to CM P1	<a href="#">430003351</a>
Welded Tube, SS 0.007 in. I.D. × 14.5 in.	<a href="#">430003211</a>
Welded Tube, SM P5 to CM P4	<a href="#">430003350</a>
Welded Tube, SS 0.007 in. I.D. × 26.0 in.	430003339
Welded Tube, SS 0.007 in. I.D. × 20.5 in.	<a href="#">430003341</a>
Injection Cartridge	<a href="#">700009052</a>
Air Filter	401000813

## ACQUITY CM-A

Description	P/N
ACQUITY CM-A/CM-A Aux Performance Maintenance Kit	
PM Kit consists of: Filters	<a href="#">201000207</a>
<b>Parts and Accessories</b>	
Kit, ACQUITY UPC <sup>2</sup> , SST, .007 in. I.D. × 12.5 in.	<a href="#">205001002</a>
Kit, ACQUITY UPC <sup>2</sup> , SST, .007 in. I.D. × 18.5 in.	<a href="#">205001003</a>
Kit, ACQUITY UPC <sup>2</sup> , SST, .007 in. I.D. × 36.5 in.	<a href="#">205001004</a>
Kit, ACQUITY UPC <sup>2</sup> CM-A 6 Column Tubing	<a href="#">205001001</a>
Kit, ACQUITY UPC <sup>2</sup> CM-A 4 Column Tubing	<a href="#">205000999</a>
Kit, ACQUITY UPC <sup>2</sup> CM-A 2 Column Tubing	<a href="#">205000986</a>
Valve Cartridge, Rotary Shear, SS	<a href="#">700005438</a>

## ACQUITY UPC<sup>2</sup> PDA Detector

Description	P/N
PDA/TUV Performance Maintenance Kit	
PM Kit consists of: PerformancePLUS Lamp	<a href="#">201000273</a>
<b>Parts and Accessories</b>	
PerformancePLUS HB Deuterium Lamp Assembly	<a href="#">700005269</a>
I/O Connector 6-pin	<a href="#">700005237</a>
Ethernet Cable, Shielded CAT 5 Cross-over, 3 ft.	<a href="#">440000145</a>
Ethernet Patch Cord, Shielded, 10 ft.	<a href="#">441000372</a>
Fuse Holder	<a href="#">WAT055426</a>
Back Pressure Regulator, 250 psi	<a href="#">700002676</a>
ACQUITY UPC <sup>2</sup> Analytical Flow Cell	<a href="#">205015037</a>
Leak Sensor Assy	<a href="#">205000505</a>

# ACQUITY APC System

## Ordering information

### ACQUITY APC CM-S

Description	P/N
CM-S Performance Maintenance Kit	<a href="#">201000282</a>
PM Kit consists of: Filters	
<b>Parts and Accessories</b>	
Kit, Tubing Configuration, No Vlvs, CM-S	<a href="#">205001166</a>
Kit, 2-column Bank Connection, CM-S	<a href="#">205001169</a>
Kit, 3-column Bank Connection, CM-S	<a href="#">205001171</a>
Kit, 4-column Bank Connection, CM-S	<a href="#">205001172</a>
Tubing, SS Bypass, .004 in. I.D.	<a href="#">430002725</a>
Welded Tube Assy, SST, 44.0 LG, LP	<a href="#">430002772</a>
Welded Tube Assy, SS, 19.0 LG	<a href="#">700005478</a>
Welded Tube Assy, SS, 22.5 LG, LP	<a href="#">700005480</a>
Welded Tube Assy, MP35N, 14.5 LG, LP	<a href="#">700005482</a>
Latch Set, CM-A/CM-Aux Trough Cover, L&R	<a href="#">700005980</a>
Assy, Cartridge, 9-port CM-S	<a href="#">700008871</a>
Tube, .005 I.D., Col Conn, In-line	<a href="#">700009524</a>
Tube, .004 I.D., Col Conn, Offset "U"	<a href="#">700009534</a>
Tube, .004 I.D., Col Conn, "U"	<a href="#">700009535</a>
Cover, Column Manager	<a href="#">700009538</a>
Gasket, Trough Cover	<a href="#">700009539</a>
Retainer Clip, CM-S Trough, APH	<a href="#">700009540</a>
Gasket, Thin, APH, CM-S	<a href="#">700009541</a>
Tube, .004 I.D., Col Conn, Long	<a href="#">700009560</a>

### ACQUITY APC SM-FTN

Description	P/N
ACQUITY APC SM-FTN Performance Maintenance Kit	<a href="#">201000285</a>
PM Kit consists of: Syringe, Std Needle, Injection Cartridge and Filters	
<b>Parts and Accessories</b>	
Assy, Extension Loop, 250 µL	<a href="#">430002007</a>
Assy, Extension Loop, 100 µL	<a href="#">430002011</a>
Assy, Extension Loop, 50 µL	<a href="#">430002012</a>
Cup, Overflow	<a href="#">700009505</a>
Support Sleeve, Fountain Wash PPS	<a href="#">700009506</a>
Guide, Sample Needle, PPS	<a href="#">700009512</a>
Syringe, 100 µL, HP PPS Tip	<a href="#">700009529</a>
Set Screw, M3 × 5, T6, for Needle Guide	<a href="#">700009530</a>
Syringe, 250 µL, HPLC PPS Tip	<a href="#">700009576</a>
Needle, 30 µL, pFTN	<a href="#">700009580</a>
Cartridge, Inject, FTN, 18 K psi, APC	<a href="#">700009919</a>



ACQUITY APC System.

### ACQUITY APC PDA TS

Description	P/N
PDA/TUV Performance Maintenance Kit	<a href="#">201000273</a>
PM Kit consists of: PerformancePLUS Lamp	
<b>Parts and Accessories</b>	
ACQ PDA TS Analytical Flow Cell	<a href="#">205001162</a>
Assy, Tube Inlet .004 I.D. LT PEEK Nut	<a href="#">430001748</a>
Assy, Tube Inlet .0025 I.D. LT PEEK Nut	<a href="#">430001749</a>
Assy, Tube Inlet .0025 I.D. PEEK Nut PDA	<a href="#">430001783</a>
Union, .020 I.D., V-detail	<a href="#">700002636</a>
Performance Plus HB Deuterium Lamp Assy	<a href="#">700005269</a>
Backpressure Restrictor	<a href="#">700009590</a>

### ACQUITY APC p-ISM

Description	P/N
p-ISM Performance Maintenance Kit	<a href="#">201000283</a>
PM Kit consists of: Plungers, Check Valves, Seals, and Filters	
<b>Parts and Accessories</b>	
22 µL Filter Assy	<a href="#">205000731</a>
Tube, Transducer to Check Valve, MP35N	<a href="#">430002475</a>
Tubing Kit, SS, Standard Flow TUV/PDA, 6 and 10 in.	<a href="#">700003756</a>
i2V Cartridge, Hexane/THF	<a href="#">700005272</a>
Assy Check Valve, Dual Ball, and Seat	<a href="#">700005273</a>
Transducer Pressure, Flex Cable	<a href="#">700006045</a>
Assy, Cartridge Vent Valve	<a href="#">700006052</a>
Pump Head, 316 SS, DLC, Face Seal	<a href="#">700009190</a>
Tube, Degasser to i2 V	<a href="#">700009478</a>
Tube Assy, Solvent Inlet, ISM	<a href="#">700009483</a>
Tube, VV P4 to Waste, p-ISM	<a href="#">700009484</a>
Tube, SW to Accum, EFTE	<a href="#">700009485</a>
Tube, SW, Accum to Pri, EFTE	<a href="#">700009489</a>
Tube, Seal to Waste, EFTE	<a href="#">700009490</a>
Tube, Vent Valve P2 to Filter, ISM	<a href="#">700009491</a>
Tube, VV to Waste	<a href="#">700009493</a>
Tubing, GP Pump Outlet	<a href="#">700009911</a>

# ACQUITY UPLC I-Class System

## Ordering Information

### ACQUITY I-Class Sample Manager-FTN

Description	P/N
ACQUITY I-Class Sample Manager-FTN Performance Maintenance Kit	<a href="#">201000259</a>
PM Kit consists of: Syringe, Std Needle, Injection Cartridge, and Filters	
<b>Parts and Accessories</b>	
Air Filter, Side Panel	401000694
Guide, Sample Needle	<a href="#">405008854</a>
Seat, Vespel with Anti-rot	<a href="#">405011492</a>
Assy, Tube, Out, Wash Pump	430002345
Assy, Tube, Feed, Injection Port	430002346
Assy, Tube, Feed, Syringe	430002347
Assy, Tube, Feed, Transducer	430002348
Assy, Tube, Feed, Injection Valve	430002349
Assy, Tube, Waste, EXT., Injection Valve	430002360
Assy, Tube, Waste, Injection Valve	430002362
Tube Assy, Sample Manager Purge	430002462
Syringe, 100 µL, HP	<a href="#">700002570</a>
Filter, Solvent Bottle, SS, 7/pk	<a href="#">700003616</a>
Assy Needle 15 µL with Guide and Seat 18 K psi	<a href="#">700008977</a>
Assy, Seat Port, .003 I.D.	<a href="#">700006056</a>
Assy, Cart, Inject, STR, FTN, 18 K psi	<a href="#">700006057</a>
Tube, ACQUITY UPLC I-Class to MS MP35N 17 in.	700008939
Tube, ACQUITY UPLC I-Class to MS PEEKsil 17 in.	700008940
Tube, ACQUITY UPLC I-Class to MS PEEK 17 in.	700008941
Tube, ACQUITY UPLC I-Class to MS PEEK 21 in.	700008942
Tube, ACQUITY UPLC I-Class to MS PEEKsil 21 in.	700008943
Tube, ACQUITY UPLC I-Class to MS PEEKsil. 003 × 21 in.	700008944
10.5 in. Col to PDA Det Inlet, SST	<a href="#">205000895</a>
8.5 in. Col to TUV Det Inlet, SST	<a href="#">205000896</a>



ACQUITY UPLC I-Class System.

### ACQUITY I-Class Sample Manager-FL

Description	P/N
ACQUITY I-Class Sample Manager-FL Performance Maintenance Kit	<a href="#">201000258</a>
PM Kit consists of: Syringes, Std Needle, Injection Cartridge, 10 µL Loop and Filters	
<b>Parts and Accessories</b>	
Assy, Tube, SSV/P-3 to Transducer	430002558
Assy, Tube, SSV P-2 to VM/SSV	430002560
Assy, Tube, WS1 to VM/S-SY	430002564
Assy, Tube, WS2 to VM/W-SY	430002566
Assy, Tube, WS to VM/W-In.	430002568
Assy, Tube, SS to VM/S-In.	430002571
Assy, Tube, NCS Inlet	430002579
Assy, Tube, VDD	430003103
Tube, NCS, Puncture Needle to Elbow	430003159
Syringe, 100 µL, HP	<a href="#">700002570</a>
Port, Seal, Needle Wash	700002886
Assy, Puncture Needle, .059 O.D.	<a href="#">700006067</a>
Assy, Cart, Inject, STR, FL, 18 K psi	<a href="#">700006069</a>
Syringe, 2.5 mL, Inverted	<a href="#">700006070</a>
Assy, Sample Loop, EXT. Hypo Tip, 5 µL	<a href="#">430002936</a>
Assy, Sample Loop, Hypo Tip, 10 µL	<a href="#">430002938</a>
Assy, Sample Loop, EXT.D. Hypo Tip, 1 µL	<a href="#">430003166</a>
Assy, Sample Loop, EXT. Hypo Tip, 2 µL	<a href="#">430002928</a>
Kit, I-Class FEP/Metal Needle, 10 µL	<a href="#">700005925</a>
Kit, I-Class PEEKsil Needle 10 µL	<a href="#">700005926</a>
Kit, I-Class FEP/Metal Needle, 20 µL	<a href="#">700005929</a>
Kit, I-Class ACQUITY UPLC PEEKsil Needle	<a href="#">700005930</a>
Kit, I-Class PEEK Needle, 10 µL	<a href="#">700005923</a>



ACQUITY I-Class BSM

Description	P/N
ACQUITY I-Class BSM Performance Maintenance Kit	<a href="#">201000260</a>
PM Kit consists of: Plungers, Check Valves, Seals, and Filters	
<b>Parts and Accessories</b>	
Filter, Air	<a href="#">405003507</a>
Assy, Tube, Degasser Port B2 to SSV B	<a href="#">430001113</a>
Assy, Tube, Degasser Port B1 to SSV B	<a href="#">430001114</a>
Assy, Tube, Degasser Port A1 to SSV A	<a href="#">430001115</a>
Assy, Tube, Degasser Port A2 to SSV A	<a href="#">430001116</a>
Assy, Tube, Accu. "B" Xducer—Vent Valve	<a href="#">430001199</a>
Assy, Tube, Accu. "A" Xducer—Vent Valve	<a href="#">430001200</a>
Assy, Tube, Vent Valve P5 to Tee/Filter	<a href="#">430001207</a>
Assy, Tube, Vent Valve P2 to Tee/Filter	<a href="#">430001208</a>
Assy, Tube, SSV to i2V	<a href="#">430001443</a>
Assy, Tube, Vent Valve P1 to Waste	<a href="#">430001893</a>
Assy, Tube, Vent Valve P4 to Waste	<a href="#">430001894</a>
Assy, Tube, Head to Xducer, MP35N	<a href="#">430002472</a>
Assy, Tube, Prim-out Xducer to CV, MP35N	<a href="#">430002583</a>
Tube Assy, Solvent Inlet, BSM-CR	<a href="#">430002800</a>
Plunger Assy, 2/pk	<a href="#">700002600</a>
Support Plant, Thickened, VHP, Head	<a href="#">700002601</a>
Filter, Air	<a href="#">700002632</a>
<b>Parts and Accessories</b>	
Filter, Air	<a href="#">700002633</a>
Screw, Comp., 10–32, SS Gold Plated, Short, 10/pk	<a href="#">700002634</a>
Ferrule, Set, .062, Two-piece, 10/pk	<a href="#">700002635</a>
Screw, Comp., 10–32, SS Gold Plated, Long, 10/pk	<a href="#">700002645</a>
Primary Inlet Check Valve Filter Kit, 2/pk	<a href="#">700002912</a>
Assy, Cartridge, Filter, SS Frit	<a href="#">700002913</a>
Marker Set, Tubing, ACQUITY, 2/pk	<a href="#">700003102</a>
Filter, Solvent Bottle, SS, 7/pk	<a href="#">700003616</a>
Kit, Check Valve, Dual Ball and Seat, 2/pk	<a href="#">700003755</a>
Ferrule, Lock Ring and Screws, Flangless, 7/pk	<a href="#">700003797</a>
Assy, Cartridge, i2 V, Hexane/THF, 2/pk	<a href="#">700004139</a>
Fitting and Lock Ring, GPV Filter, 4/pk	<a href="#">700005259</a>
Pump Head, 316 SS, DLC, Face Seal	<a href="#">700009190</a>
Seal, Wash, .0787 I.D., Fixed, 2/pk	<a href="#">700006048</a>
SCR, Metric SKT Cap M5 × 40, 138 K psi, 4/pk	<a href="#">700006049</a>
Assy, Cart, Vent, Dogleg, 18 K psi, Dome	<a href="#">700006052</a>
*HP Seal, Dual Spring, Perform Seal, 2/pk	<a href="#">700009135</a>
Assy, Housing, Seal Wash, .045, SST, 2PT	<a href="#">700009194</a>

\*S/N prior to G12BUR641M must use 0.045 Seal Wash Housing and Seals Conversion Kit (p/n:[205001097](#)) first.

## ACQUITY UPLC H-Class System



ACQUITY UPLC  
H-Class System.

### Ordering Information

#### ACQUITY H-Class Sample Manager-FTN

Description	P/N
ACQUITY H-Class Sample Manager Flow Through Needle Performance Maintenance Kit	<a href="#">201000234</a>
PM Kit consists of: Mixer, Plungers, Check Valves, Seals, and Filters	
<b>Parts and Accessories</b>	
Sample Needle Kit, 15 µL	<a href="#">700005215</a>
In-line Waste Valve, 1/4-28 Thread	<a href="#">410003180</a>
Seal Extension Tube	<a href="#">700005234</a>
Injector Valve Cartridge, SM-FTN	<a href="#">700005236</a>
Sample Needle Guide	<a href="#">405008854</a>
Needle Seat	<a href="#">405011492</a>
Syringe 100 µL, HP	<a href="#">700002570</a>

#### ACQUITY H-Class Column Heater Active

Description	P/N
Door Latch with Pins	<a href="#">700005248</a>
Clip Retainer	<a href="#">415001544</a>
Active Preheater Assembly	<a href="#">205000730</a>
Column Support Clips, 10/pk	<a href="#">205000478</a>
Screw, Panel, M4 × 16, Blue	<a href="#">410003295</a>
Extension Arm Kit, Optional	<a href="#">205000726</a>
Drip Tray, CH-A	<a href="#">415001608</a>
Tygon Tubing (0.375 in. O.D. × 0.250 in. I.D.)	<a href="#">700001796</a>
External Cable, Right Angle	<a href="#">441001040</a>
I-button, CH-A	<a href="#">700005251</a>

#### ACQUITY H-Class Quaternary Solvent Manager

Description	P/N
ACQUITY H-Class Quaternary Solvent Manager Performance Maintenance Kit	<a href="#">201000233</a>
PM Kit consists of: Mixer, Plungers, Check Valves, Seals, and Filters	
<b>Parts and Accessories</b>	
Bottle Tray	<a href="#">289002414</a>
Seal Wash Waste Fittings	<a href="#">405003015</a>
Plunger Removal Tool	<a href="#">405007627</a>
Inlet Manifold	<a href="#">405010508</a>
Screw, Metric Skt Cap M5 × 40, 2/pk	<a href="#">410001296</a>
Tube Assembly, Degasser to GPV	<a href="#">430002208</a>
Tube Assembly, Transducer to Vent Valve	<a href="#">430002316</a>
Tube Assembly, Vent Valve P4 to Waste	<a href="#">430002317</a>
Tube Assembly, Vent Valve P2 to Outlet Filter	<a href="#">430002319</a>
Tube Assembly, Transducer to Check Valve	<a href="#">430002357</a>
Tube Assembly, GPV-D to Mixer Manifold	<a href="#">430002387</a>
Tube Assembly, GPV-C to Mixer Manifold	<a href="#">430002388</a>
Tube Assembly, GPV-A to Mixer Manifold	<a href="#">430002389</a>
Tube Assembly, GPV-B to Mixer Manifold	<a href="#">430002390</a>
Tube Assembly, Mixer Manifold to i2V	<a href="#">430002400</a>
Outlet Housing Cartridge, Stainless Steel	<a href="#">700001530</a>
Transducer	<a href="#">700002594</a>
Pump Head	<a href="#">700002595</a>
Seal Wash Housing	<a href="#">700002597</a>
Seal Wash Housing Seal	<a href="#">700002598</a>
Head Plunger Seal	<a href="#">700002599</a>
Plunger	<a href="#">700002600</a>
Head Support Plate	<a href="#">700002601</a>
Ferrule Set (.062, 2-piece), 10/pk	<a href="#">700002635</a>
Vent Valve Cartridge Assembly	<a href="#">700002660</a>
Screw, Metric Skt Cap M3 × 16, 4/pk	<a href="#">700004023</a>
i2V Valve	<a href="#">700005162</a>
Check Valve, Double Ball and Seat	<a href="#">700005164</a>
i2V Valve Cartridge, 1/pk	<a href="#">700005165</a>
Filter, Air, Door	<a href="#">700005167</a>
Filter for GPV, 4/pk	<a href="#">700005173</a>
Assy, Mixer, 100 µL, QSM	<a href="#">700005119</a>
O-ring, Teflon, Pump Head	<a href="#">WAT076152</a>
Seal Wash Pump Solenoid	<a href="#">WAT270926</a>

## ACQUITY UPLC H-Class Bio System



ACQUITY UPLC H-Class Bio System.

### Ordering Information

#### ACQUITY H-Class Bio Column Management

Description	P/N
<b>CH30-A</b>	
APH Bio MP35N, 12.5 in. LG	205000756
APH Bio MP35N, 23 in. LG	<a href="#">205000777</a>
CH-30A Tubing Kit, Bio	<a href="#">205000792</a>
Tube, Outlet, MP35N, 22.5 in. LG	<a href="#">700008914</a>
Tube, Outlet, MP35N, 36 in. LG	<a href="#">700008915</a>
<b>CM-A</b>	
CM-A and CM-Aux Performance Maintenance Kit	<a href="#">201000207</a>
PM Kit consists of: Filters	
<b>Parts and Accessories</b>	
Assy, MP35N, 14.5 LG, HP	<a href="#">700005481</a>
Assy, MP35N, 14.5 LG, LP	<a href="#">700005482</a>
Assy, MP35N, 19.0 LG, LP	<a href="#">700005483</a>
Assy, MP35N, 19.0 LG, HP	<a href="#">700005484</a>
Assy, MP35N, 22.5 LG, LP	<a href="#">700005485</a>
By-pass Tubing, MP35N, .005 in. I.D.	430002779
APH Bio MP35N, 12.5 in. LG	205000756
APH Bio MP35N, 18.5 in. LG	205000775
Valve Cartridge Kit, Ti CM-A	205000773

#### ACQUITY H-Class Bio SM-FTN

Description	P/N
H-Class Bio FTN Performance Maintenance Kit	
PM Kit consists of: Syringe, Std Needle, Injection Cartridge, and Filters	<a href="#">201000201</a>
<b>Parts and Accessories</b>	
Air Filter, Side Panel	401000694
Seat, Vespel with Anti-rot	<a href="#">405011492</a>
Calibration Pin, RZZ Mechanism	405013532
Union, 1/4-28, THRU	410001281
Ferrule, Set, .062, Two-piece	<a href="#">410001349</a>
Assy, Tube, Out, Wash Pump	430002345
Assy, Tube, Feed, Injection Port	430002346
Assy, Tube, Feed, Syringe	430002347
Assy, Tube, Feed, Transducer	430002348
Assy, Tube, Feed, Injection Valve	430002349
Assy, Tube, Waste, EXT., Injection Valve	430002360
Assy, Tube, Waste, Injection Valve	430002362
Tube Assy, Sample Manager Purge, Bio	430002464
Tube Assy, Sample Manager Wash, Bio	430002487
Syringe, 100 µL, HP	<a href="#">700002570</a>
Screw, Comp., 10-32, SS Gold Plated, Short, 10/pk	<a href="#">700002634</a>
Ferrule, Set, .062, Two-piece, 10/pk	<a href="#">700002635</a>
Ferrule, Flangeless, Tefzel, Lock Ring	<a href="#">700003796</a>
Ferrule, Lock Ring and Screws, Flangeless, 7/pk	<a href="#">700003797</a>
Solvent Filter, Titanium, 7/pk	<a href="#">700005378</a>
Cartridge, Inject Valve, Bio	<a href="#">700005407</a>
Needle, DI-15 µL, MP35N, BioSM-FTN	<a href="#">700005421</a>
Kit, Tube Markers, Purge/Wash	700005429

## ACQUITY H-Class Bio QSM

Description	P/N
ACQUITY H-Class Bio QSM Performance Maintenance Kit	<a href="#">201000244</a>
PM Kit consists of: Mixer, Plungers, Check Valves, Seals, and Filters	
<b>Parts and Accessories</b>	
Tube Assy, Solvent Inlet, BioQSM	<a href="#">430002274</a>
Assy, Tube, Vent Valve P4 to Waste, QSM	<a href="#">430002317</a>
Assy, Tube, Head to Xducer, MP35N	<a href="#">430002472</a>
Assy, Tube, Degasser to GPV, MP35N	<a href="#">430002474</a>
Assy, Tube, Xducer to Check Valve, MP35N	<a href="#">430002475</a>
Assy, Tube, Xducer to Vent Valve, MP35N	<a href="#">430002476</a>
Assy, Tube, Vent VLV P2 to Filter, MP35N	<a href="#">430002477</a>
Assy, Tube, Mixer Manifold to i2V, MP35N	<a href="#">430002479</a>
Assy, Tube, GPV-A to Mixer, MP35N	<a href="#">430002481</a>
Assy, Tube, GPV-B to Mixer, MP35N	<a href="#">430002482</a>
Assy, Tube, GPV-C to Mixer, MP35N	<a href="#">430002483</a>
Assy, Tube, GPV-D to Mixer, MP35N	<a href="#">430002484</a>
Transducer Assy, Head Mounted, 15 K psi	<a href="#">700002594</a>
Plunger, .0787 Diameter × 1.415, 2/pk	<a href="#">700002600</a>
Support Plant, Thickened, VHP, Head	<a href="#">700002601</a>
Screw, Comp., 10-32, SS Gold Plated, Short, 10/pk	<a href="#">700002634</a>
Ferrule, Set, .062, Two-piece, 10/pk	<a href="#">700002635</a>
Screw, Comp., 10-32, SS Gold Plated, Long, 10/pk	<a href="#">700002645</a>
Pin Plug, 1/16 in., High Pressure, 5/pk	<a href="#">700002747</a>
Ferrule, Flangeless, Tefzel, Lock Ring	<a href="#">700003796</a>
Ferrule, Lock Ring and Screws, Flangeless, 7/pk	<a href="#">700003797</a>
Filter, Air, Door	<a href="#">700005167</a>
Assy, Mixer, 100 µL, BioQSM	<a href="#">700005258</a>
Fitting and Lock Ring, GPV Filter, 4/pk	<a href="#">700005259</a>
Solvent Filter, Titanium, 7/pk	<a href="#">700005378</a>
Barbed Seal Wash Housing, Titanium	<a href="#">700005410</a>
Pump Head, ACQUITY, Titanium	<a href="#">700005411</a>
Cartridge, Vent Valve, BioQSM	<a href="#">700005413</a>
Cartridge, i2V, BioACQUITY	<a href="#">700005414</a>
Check Valve, Accumulator, Ti	<a href="#">700005415</a>
HP Seal, .0787 I.D., Flanged, Bio	<a href="#">700005418</a>
Holder, 20 Micron Frit, Titanium, 4/pk	<a href="#">700005419</a>
Wash Seal, .0787 I.D., Flanged, Bio	<a href="#">700005422</a>

# ACQUITY UPLC System

## Ordering Information

### ACQUITY UPLC Binary Solvent Manager

Description	P/N
ACQUITY i2 Valve Binary Solvent Manager Performance Maintenance Kit	<a href="#">201000197</a>
PM Kit consists of: Plungers, Check Valves, Seals, and Filters	
ACQUITY Binary Solvent Manager Performance Maintenance Kit	<a href="#">201000173</a>
PM Kit consists of: Plungers, Check Valves, Seals, and Filters	

Parts and Accessories	
100 µL Filter Mixer	<a href="#">205000404</a>
High Sensitivity Filter Mixer, 425 µL	<a href="#">205000403</a>
Tube Assembly, Solvent Inlet SDS	<a href="#">430001020</a>
Degasser Port B2 to SSV B Tube Assembly	<a href="#">430001113</a>
Tube Assembly, Transducer to Check Valve	<a href="#">430001121</a>
Vent Valve P5 to Tee/Filter Tube Assembly	<a href="#">430001207</a>
Tube Assembly, System Outlet SDS	<a href="#">430001486</a>
Transducer Assembly, Head Mounted, 15 K psi	<a href="#">700002594</a>
15 K psi Head	<a href="#">700002595</a>
UPLC Primary Check Valve Assembly, 2/pk	<a href="#">700002596</a>
Seal Wash Housing	<a href="#">700002597</a>
Wash Seal, 2/pk	<a href="#">700002598</a>
Head Plunger Seal	<a href="#">700002599</a>
Plunger, 2/pk	<a href="#">700002600</a>
Support Plate, Thickened, VHP Head	<a href="#">700002601</a>
Solenoid Valve, Solvent Select	<a href="#">700002603</a>
Fuse, 5A, 250 V, 5 × 20 mm, SLO BLO, 5/pk	<a href="#">700002604</a>
Screw, Comp., 10–32, SS Gold Plated, Short 10/pk	<a href="#">700002634</a>
Ferrule Set, 1/16 in. I.D., Two-piece, 10/pk	<a href="#">700002635</a>
Union, .020 I.D.	<a href="#">700002636</a>
Screw, Comp., 10–32, SS Gold Plated, Long, 10/pk	<a href="#">700002645</a>
Vent Valve/Trap Valve Cartridge	<a href="#">700002660</a>
Solvent Bottle Filter, Stainless Steel, 7/pk	<a href="#">700003616</a>
Solvent Bottle Filter, Stainless Steel, 1/pk	<a href="#">700003615</a>
50 µL High Pressure Filter Mixer	<a href="#">700002911</a>
Primary Inlet Check Valve Filter Kit, 2/pk	<a href="#">700002912</a>
ACQUITY Accum. Check Valve, 2/pk	<a href="#">700002968</a>
O-ring, Teflon	<a href="#">WAT076152</a>
Assembly, Actuator	<a href="#">700003557</a>
Assembly, Tube, Transducer to Check Valve	<a href="#">430001773</a>
Assembly, Tube, SSV to Active Check Valve	<a href="#">430001443</a>
Fuse, 0.5 A Slow Blow	WAT042091



ACQUITY UPLC System.

### ACQUITY UPLC Sample Manager

Description	P/N
ACQUITY Sample Manager Performance Maintenance Kit	<a href="#">201000174</a>
PM Kit consists of: Syringe, Needle, and Filters	

Parts and Accessories	
ACQUITY UPLC Column In-line Filter Kit	<a href="#">205000343</a>
Needle Stainless Steel, 30 µL	<a href="#">205000362</a>
Needle, 15 µL Stainless Steel	<a href="#">205000363</a>
Needle, Stainless Steel Tip, 30 µL	<a href="#">205000369</a>
Needle, Stainless Steel Tip, 15 µL	<a href="#">205000370</a>
Tube Holder, 24-well, 1.5 mL Tubes	<a href="#">405003740</a>
Tube Holder, 48-well, 0.65 mL Tubes	<a href="#">405003741</a>
Vial Holder, 24-well, 4 mL Vial	<a href="#">405003742</a>
Vial Holder, 48-well, 2 mL Vial	<a href="#">700011047</a>
250 µL Sample Syringe	<a href="#">410001347</a>
Sample Needle Fitting Kit	<a href="#">410001659</a>
Tube Assembly, Inject Outlet, (UPLC Fittings both ends)	<a href="#">430001084</a>
Needle Guide Tube	<a href="#">430001086</a>
Tube Assembly, Inject Out, (UPLC fitting at injector and HPLC fitting at Col. Inlet)	<a href="#">430001221</a>
Sample Loop, 2 µL	<a href="#">430001264</a>
Sample Loop, 5 µL	<a href="#">430001311</a>
Sample Loop, 20 µL, Std.	<a href="#">430001320</a>
Sample Loop, 50 µL	<a href="#">430001325</a>
Sample Loop, 10 µL	<a href="#">430001326</a>
2.5 mL Wash Syringe	<a href="#">700002569</a>
100 µL Sample Syringe	<a href="#">700002570</a>
Needle Seal O-ring, 002 Kalrez	<a href="#">700002572</a>
Needle Assembly, PEEK	<a href="#">700002644</a>
ACQUITY Injector Pod/Cartridge	<a href="#">700002765</a>
0.2 µm SS Column In-line Replacement Frits, 5/pk	<a href="#">700002775</a>

## ACQUITY UPLC Sample Organizer

Description	P/N
ACQUITY Sample Organizer Performance Maintenance Kit	<a href="#">201000208</a>
PM Kit consists of: Filters	
<b>Parts and Accessories</b>	
Door Window Shade	<a href="#">700003794</a>
Vial Holder, 48-well, 2 mL Vial	<a href="#">700011047</a>
Vial Holder, 24-well, 1.5 mL Tubes	<a href="#">405003740</a>
Vial Holder, 48-well, 0.65 mL Tubes	<a href="#">405003741</a>
Vial Holder, 24-well, 4 mL Vial	<a href="#">405003742</a>



ACQUITY UPLC Bottle Accessory Kit.

## ACQUITY UPLC Bottle Accessory Kit

Description	P/N
ACQUITY UPLC Bottle Accessory Kit	<a href="#">205000589</a>

## ACQUITY UPLC Column Manager, Column Heater, and Cooler

Description	P/N
Column Stabilizer Kit, 50/100 mm Columns	<a href="#">205000291</a>
Column Stabilizer Kit, 150 mm Columns	<a href="#">205000365</a>
Column Support Clips, 10/pk	<a href="#">205000478</a>
Ferrule, PEEK, 1/16, HPFT, 10/pk	<a href="#">700003114</a>
Fingertight Reusable Fittings Kit	<a href="#">700003139</a>
Door Seal Gasket	<a href="#">700003147</a>
Snap-in. Clip, 1/16 Tubing	<a href="#">700003151</a>
Column Retainer Rod, 2/pk	<a href="#">700003156</a>
Exit Drip Tray	<a href="#">700003164</a>
I-button Cord Clip	<a href="#">700003167</a>
Collet, Reusable, HPFT, 10/pk	<a href="#">700003168</a>
Screw, Comp., Reusable, HPFT, Gold, 10/pk	<a href="#">700003169</a>
1-piece Fitting, 10-32, 10/pk	<a href="#">700004841</a>
Column Support Clips, Column Heater, 10/pk	205000263
Column Heater Thermal Gasket	<a href="#">425000536</a>
Front Cover, Column Heater	<a href="#">700002587</a>
Collet, Reusable, HPFT, 2/pk	<a href="#">700003115</a>
Screw, Comp., Reusable, HPFT, Gold, 2/pk	<a href="#">700003116</a>

## ACQUITY UPLC Open Architecture System

Description	P/N
Open Architecture UPLC Performance Maintenance Kit	
PM Kit consists of: Injection Cartridge, 10 µL Loop Tension Cords, and Lubricant (Relevant Syringe is ordered separately)	<a href="#">201000198</a>
<b>Parts and Accessories</b>	
10 µL Sample Loop	<a href="#">430001326</a>
25 µL Syringe	<a href="#">700002705</a>
5 µL Sample Loop	<a href="#">430001311</a>
Column Manager Tubing Assembly	<a href="#">430002015</a>
Column Stabilizer Tubing Assembly	<a href="#">205000585</a>
Injection Valve Adapter	<a href="#">700004145</a>
Injection Valve Pod	<a href="#">700011083</a>
MS Inlet Tubing Assembly	<a href="#">430001229</a>
O-ring, Injection Valve Drive	<a href="#">700004147</a>
Syringe Kit, 25 µL	<a href="#">205000275</a>
System Outlet Tubing	<a href="#">430001017</a>
Valve Drive	<a href="#">700002455</a>
Waste Check Valve Kit	<a href="#">700004057</a>
Ferrule Set, (062), 2-piece	<a href="#">700002635</a>
Screw, Comp., 10-32, SS Gold Plated, Long 10/pk	<a href="#">700002645</a>
Screw, Comp., 10-32, SS Gold Plated, Short 10/pk	<a href="#">700002634</a>

## DID YOU KNOW...

Waters supplies System Performance Standards that can help you benchmark and trend ACQUITY UPLC data, enhancing productivity and increasing the accuracy of results.

 For more information, visit [asr.waters.com](http://asr.waters.com)



ACQUITY Isocratic Solvent Manager.

## ACQUITY Isocratic Solvent Manager

Description	P/N
ACQUITY ISM Performance Maintenance Kit	<a href="#">201000286</a>
PM Kit consists of: Plungers, Check Valves, Seals, and Filters	
<b>Parts and Accessories</b>	
22 µL Filter Assy	<a href="#">205000731</a>
Assy, Tube, Head to Xducer	<a href="#">430001120</a>
Assy, Tube, Xducer to Check Valve	<a href="#">430002357</a>
Wash Pump Solenoid	<a href="#">WAT270926</a>
Plunger, .0787 Diameter × 1.415, 2/pk	<a href="#">700002600</a>
Support Plant, Thickened, VHP, Head	<a href="#">700002601</a>
Primary Inlet Check Valve Filter Kit	<a href="#">700002912</a>
Transducer, Pressure	<a href="#">700006045</a>
Seal, Wash, .787 I.D., Fixed, 2/pk	<a href="#">700006048</a>
Tube, Vent Valve P2 to Filter, ISM	<a href="#">700009491</a>
Tubing, .156 O.D. × .031 I.D., Pharmed	<a href="#">700009694</a>
Tube, Inlet to Check Valve	<a href="#">700009699</a>
Tube Assy, Solvent Inlet, ISM	<a href="#">700009700</a>
Tee, w/Bracket	<a href="#">700009708</a>
Tube, PEEK, .007 in. I.D. × 16 in. L	<a href="#">700009709</a>
Module, Restrictor, 100 S/R	<a href="#">700009712</a>
Module, Restrictor, 10 S/R	<a href="#">700009713</a>
Module, Restrictor, 250 S/R	<a href="#">700009714</a>
Capillary Tube, ISM Outlet	<a href="#">700009715</a>
Capillary Tube, Optic Det Inlet	<a href="#">700009716</a>
Module, Restrictor, 5 S/R	<a href="#">700009776</a>
Tube, PEEK, .062 × .010 × 60.0 LG	<a href="#">700009778</a>
Tube, PEEK, .062 × .005 × 26.0 LG	<a href="#">700009779</a>
Tube, PEEK, .007 I.D., 28.0 in. LG	<a href="#">700009780</a>
Tube, Connector, UPC <sup>2</sup>	<a href="#">700009781</a>
Module, Coiled Probe, Dual Det	<a href="#">700009782</a>
Module, Coiled Probe, Triple Det	<a href="#">700009783</a>
Tube, PEEKsil, 75 µm × 31 in. L	<a href="#">700009784</a>
Support Plate for Drip Tab	<a href="#">700009789</a>
Tube, SST w/AU, .007 in. I.D. × 28 in. LG	<a href="#">700009796</a>
Tube, SST, .005 in. I.D. × 20 in. L	<a href="#">700009797</a>
Tube, SST, .01 in. I.D. × 60 in. L	<a href="#">700009798</a>
Tube, SST/w/AU, .007 in. I.D. × 5 in. L	<a href="#">700009799</a>
Solvent Filter, Thru Tube, 316SS	<a href="#">700010196</a>
O-ring, 2-016, Teflon	<a href="#">WAT076152</a>

## ACQUITY UPLC DETECTORS

### ACQUITY QDa Detector

Description	P/N
ACQUITY QDa® 'KAB' STD Performance Maintenance Kit	
PM Kit consists of: O-rings, Seals, Filters, Aperture Disk Assy, and Calibration Pin	<a href="#">201000300</a>
ACQUITY QDa 'KAD' STD Performance Maintenance Kit	
PM Kit consists of: O-rings, Seals, Filters, Aperture Disk Assy, and Calibration Pin	<a href="#">201000308</a>
ACQUITY QDa 'KAB' High Performance Maintenance Kit	
PM Kit consists of: O-rings, Seals, Filters, Aperture Disk Assy, Calibration Pin, and Rotary Pump Components	<a href="#">201000301</a>
ACQUITY QDa 'KAD' High Performance Maintenance Kit	
PM Kit consists of: O-rings, Seals, Filters, Aperture Disk Assy, Calibration Pin, and Rotary Pump Components	<a href="#">201000309</a>
Performance Maintenance Kit does not include the probe. We strongly recommend you purchase and replace annually the appropriate probe, selecting it from the list below.	
Note: Instruments prior to KAB1052 will also require MKII Ion Block Assy, (p/n: <a href="#">700010377</a> ) fitted to the instrument.	
<b>Parts and Accessories</b>	
ESI Probe Assembly 250 mm	<a href="#">700009641</a>
ESI Probe Assembly 500 mm	<a href="#">700009642</a>
SFC Probe Assembly 200 mm	<a href="#">700009771</a>
Probe Assembly 750 L × 50 µm	<a href="#">700009977</a>
O-ring, 2.6 I.D. × 1.9 C/S Viton, 10/pk	<a href="#">700000943</a>
MKII Ion Block Assembly	<a href="#">700010377</a>
Sample Cone	<a href="#">700009597</a>
Gasket, Pumping Block (Front)	<a href="#">700011132</a>
Seal, Custom Shaft	<a href="#">700009601</a>
Gasket, Ion Block	<a href="#">700009603</a>
Source Aperture Carrier	<a href="#">700009608</a>
O-ring, Viton, 28 × 1 mm	<a href="#">700009614</a>
Cone Gas Nozzle	<a href="#">700009625</a>
Cone Clamp	<a href="#">700009626</a>
Source Gas Seal	<a href="#">700009627</a>
Calibration Pin, Assy (for MKII Ion Block)	<a href="#">700011295</a>
Pumping Block Assembly	<a href="#">700009678</a>
Rotary Pump, RE6 B-oil, 1 L	<a href="#">700009679</a>
Diaphragm Pump Service Kit	<a href="#">700009680</a>
ESI Source Attachment Knob, 2/pk	<a href="#">700009690</a>
Aperture Disc Assembly, 0.2 mm, Performance	<a href="#">700009768</a>
Aperture Disc Assembly, 0.09 mm, Standard	<a href="#">700009769</a>
O-ring, Conductive, 7.1 × 1.6 mm	<a href="#">700009810</a>
Septa, Advanced Green, Non Stick, 11 mm	<a href="#">700009976</a>
External Valve Drain Assembly	<a href="#">700010156</a>
Thumbscrew Assembly	<a href="#">700010158</a>
Oil Filter Insert	<a href="#">700010211</a>
Absorbent Felt	<a href="#">700010213</a>
Gasket, Pumping Block (Rear)	<a href="#">700011133</a>



ACQUITY UPLC  
RI Detector.

#### ACQUITY UPLC RI Detector

Description	P/N
Kit, ACQUITY RI Compatibility Kit for APC	<a href="#">205001157</a>
<b>Parts and Accessories</b>	
Valve, 2-way Solenoid	<a href="#">700002360</a>
Assy, Pressure Relief, 1/4–28, 35 psi	<a href="#">700002361</a>
Valve, 3-way Recycle	<a href="#">700002362</a>
Tubing, Union to Relief Valve	<a href="#">700002363</a>
Tubing, Union to Purge Valve	<a href="#">700002364</a>
Tubing, 2-way to 3-way Valve	<a href="#">700002378</a>
Welded Tube Assy, SST, 14.5 LG, HP	<a href="#">700005476</a>
Ferrule, Flangeless w/Lock Ring–3/pk	<a href="#">700009440</a>
Tubing, ETFE, .030 I.D. × .062 O.D.	<a href="#">700009554</a>

#### ACQUITY UPLC TUV Detector

Description	P/N
ACQUITY PDA/TUV 2489/2998 Performance Maintenance Kit	
PM Kit consists of: PerformancePLUS Lamp (TUV with S/N K05UPT700N or higher)	<a href="#">201000281</a>
<b>Parts and Accessories</b>	
ACQUITY UPLC I.D. Cell TUV, Analytical	<a href="#">205015033</a>
Flow Cell, High Sensitivity, 2.4 µL Vol. (TUV with S/N K05UPT700N or higher)	<a href="#">205015018</a>
Connector Plug, 10-position	<a href="#">323000247</a>
Tube Assembly, Low Flow, TUV Inlet	<a href="#">430001749</a>
Tube Assembly, Std. Flow, TUV Inlet	<a href="#">430001748</a>
Ethernet Patch Cord, 5 ft.	<a href="#">441000456</a>
Fuse, 3.15A (250 V, 5 × 20 mm), 2/pk	<a href="#">700001800</a>
Backpressure Regulator	<a href="#">700002676</a>
Power Cord, 110 V	<a href="#">442000176</a>

#### ACQUITY UPLC PDA Detector and eLambda Detector

Description	P/N
ACQUITY PDA/TUV 2489/2998 Performance Maintenance Kit	
PM Kit consists of: PerformancePLUS Lamp	<a href="#">201000281</a>
<b>Parts and Accessories</b>	
ACQUITY PDA, Standard Flow Cell, 10 mm, 500 nL (for earlier models)	<a href="#">205015036</a>
ACQUITY UPLC I.D. Cell PDA, Analytical Flow Cell	<a href="#">205015017</a>
ACQUITY UPLC I.D. Cell PDA, High Sensitivity	<a href="#">205015019</a>
Connector Plug, 10-position	<a href="#">323000247</a>
Ethernet Patch Cord, Shielded, 5 ft.	<a href="#">441000456</a>
Event Cable, 6 ft.	<a href="#">441000373</a>
Backpressure Regulator, 250 psi	<a href="#">700002676</a>
Fuse, 3.15A (250 V, 5 × 20 mm), 2/pk	<a href="#">700001800</a>
Power Cord, 110 V	<a href="#">442000176</a>
Assembly, Tube Inlet .004 I.D. PDA	<a href="#">430001784</a>
Leak Sensor	<a href="#">205000505</a>
Tube Assembly, Low Flow, PDA Inlet	<a href="#">430001783</a>

#### ACQUITY UPLC FLR Detector

Description	P/N
ACQUITY UPLC FLR Detector Performance Maintenance Kit	
PM Kit consists of: Lamp Assy	<a href="#">201000193</a>
<b>Parts and Accessories</b>	
ACQUITY FLR Flow Cell Assembly	<a href="#">700003711</a>
Fuse Drawer	<a href="#">WAT055426</a>
Fuse 3.15A, 250 V	<a href="#">700001800</a>
10-position I/O Connector	<a href="#">323000247</a>
Connector Shell Cover	<a href="#">323000446</a>
Union, Internal Reducer	<a href="#">410002096</a>
Backpressure Regulator	<a href="#">700002676</a>
Fluorescence System PQ Solution	<a href="#">700003694</a>
Analog Out Cable Assembly	<a href="#">WAT057235</a>
Power Cord, 110 V	<a href="#">442000176</a>
External Ethernet Cable	<a href="#">441000372</a>



## ACQUITY UPLC ELS Detector

Description	P/N
ACQUITY ELSD/ELSD Performance Maintenance Kit	<a href="#">201000159</a>
PM Kit consists of: Lamp Assy	
<b>Parts and Accessories</b>	
Nebulizer	<a href="#">205000342</a>
Connector Plug, 10-position	<a href="#">323000247</a>
Packing Ring, Nebulizer	<a href="#">425000326</a>
PEEK Tubing, 6 in. × .004 in. I.D.	<a href="#">430001562</a>
PEEK Tubing, 14 in. × .004 in. I.D.	<a href="#">430001565</a>
Ethernet Cross-over Cable, 3 ft.	<a href="#">440000145</a>
Ethernet Patch Cord, 5 ft.	<a href="#">441000456</a>
Bottle/Vapor Trap, 1000 mL	<a href="#">700002682</a>
Siphon Drain Tube	<a href="#">700002801</a>
Event In./Out Cable Assembly	<a href="#">WAT020321</a>
Analog Out Cable Assembly	<a href="#">WAT057235</a>
Fuse 5.0A, 250 V, 5 × 20 mm, Fast-acting	<a href="#">WAT163-18</a>

## WATERS HIGH BRIGHTNESS LAMP WITH INTELLIGENT TECHNOLOGY

The Waters High Brightness (HB) Lamp boasts features that outshine its competition's. In a lamp history file in the Empower Software Database, the lamp's "intelligent" technology records its serial number, hours of use, and number of ignitions. Moreover, you can include the lamp history in a comprehensive status report, so if you transfer the lamp between units, its data remain with it. Thus you always know exactly how many hours the lamp has operated.

The High Brightness Lamp with Intelligent Technology is currently available for our latest ACQUITY UPLC PDA and TUV Detectors.




Description	P/N
PerformancePLUS HB Deuterium Lamp Assembly	<a href="#">700005269</a>

## Waters Fraction Manager—Analytical

Description	P/N
Analytical Fraction Manager Performance Maintenance Kit	<a href="#">201000291</a>
<b>Parts and Accessories</b>	
Assy, Needle, FC-007 I.D., MP35N	<a href="#">700009406</a>
Assy, Needle, FM-10 I.D., MP35N	<a href="#">700010339</a>
Guide, Needle, FC	700010380
Syringe, 250 µL, HPLC	<a href="#">410001347</a>
Assy, Fraction Valve with Coupling	700009400
Basin, Needle Wash	700010215
Assy, Tube, FM Flush	700010453
Assy, Tube, MSV-FV, Interconnect	700010457
Assy, Tube, FV, Inlet	700010458
Tube, Convoluted, 1/4 I.D. × 72 LG	700009402
Tube, Convoluted, 1/4 I.D. × 1.75 LG	700009408
WFMA Delay Coil 0.1–1 mL Flow Kit #1	205001416
WFMA Delay Coil 0.5–2.2 mL Flow Kit #2	205001417
WFMA Delay Coil 2.2–5 mL Flow Kit #3	205001418
WFMA w/QDa Delay Coil 0.1–1 mL Flow Kit 4	205001419
Low Flow Detector—WFMA Tubing Kit	205001427
Assy, Tube, Det-FM, .007" × 14" L, ETFE	700010334
Assy, Tube, Det-FM, .007" × 32" L, ETFE	700010335
High Flow Detector—WFMA Tubing Kit	205001428
Assy, Tube, Det-FM, .010" × 14" L, ETFE	700010336
Assy, Tube, Det-FM, .010" × 32" L, ETFE	700010337
Assy, Tube, Restrictor/Waste, Frac Valve	700010338
Assy, Tube, Res/Waste, FV, Hi Flow	700010345
Kit, 10 mL Vial Holder	205001042
Vial, 2.2 × 45 mm with 20–400 screw top, 100/pk	<a href="#">186001420</a>
96 Well 350 µL ACQUITY Collection Plate	<a href="#">186002643</a>
Plate, 96-well, 700 µL Round Well, 25/pk	<a href="#">186005837</a>
1 mL Round Collection Plate, 50/pk	<a href="#">186002481</a>
2 mL Square Collection Plate, 50/pk	<a href="#">186002482</a>
Holder, 48-well, 2 mL Vial	<a href="#">700011047</a>
Glass Vial with Screw Neck, 100/pk	<a href="#">186000273</a>
Holder, 24-well, 4 mL Vial	<a href="#">405003742</a>
4 mL Vial, Screw Top, 100/pk	<a href="#">186000840</a>
Holder, 48-well, .65 mL Tubes	<a href="#">405003741</a>
Holder, 24-well, 1.5 mL Tube	<a href="#">405003740</a>

### DID YOU KNOW...

Waters offers a range of services to support Agilent LC and GC Systems.

 Consult your Waters service representative to learn more.

# ACQUITY UPLC M-Class System

## Ordering Information

### ACQUITY M-Class $\mu$ BSM/ASM

Description	P/N
$\mu$ BSM/ASM Performance Maintenance Kit	
PM Kit consists of: Mixer, Plungers, Check Valves, Seals, and Filters	<a href="#">201000289</a>
<b>Parts and Accessories</b>	
Certified Container Low Volume Kit	<a href="#">186007278</a>
Assy, Tube, Vent Valve P1 to Waste	<a href="#">430001209</a>
Assy, Tube, Vent Valve P4 to Waste	<a href="#">430001210</a>
Assy, Tube, Head to Xducer, MP35N	<a href="#">430002472</a>
Assy, Tube, Prim-out Xducer to CV, MP35N	<a href="#">430002583</a>
Plunger, .0787 Diameter $\times$ 1.415, 2/pk	<a href="#">700002600</a>
Support Plant, Thickened, VHP, Head	<a href="#">700002601</a>
Valve, Solenoid, Solvent Select	<a href="#">700002603</a>
Tubing, 3/16 in. O.D. $\times$ 1/16 in. I.D., TYGON, 25 in.	<a href="#">700003751</a>
Filter, In-line, Titanium Kit, 2/pk	<a href="#">700003784</a>
Cartridge, Filtered Ferrule, Titanium, 2/pk	<a href="#">700003785</a>
i2V PEEK High Pressure Gasket	<a href="#">700005218</a>
PEEK Check Valve Washer	<a href="#">700005221</a>
Reduced Height i2V, Bio	<a href="#">700005412</a>
Cartridge, Valve, Vent	<a href="#">700005413</a>
Cartridge, i2V, BioACQUITY	<a href="#">700005414</a>
Check Valve, Accumulator, Ti	<a href="#">700005415</a>
Transducer, Pressure	<a href="#">700006045</a>
Filter, 1/2 micron, HP, Titanium	<a href="#">700009010</a>
Tee, nano, M-detail, Ti	<a href="#">700009830</a>
Seal, Wash HSG, Dual Sprg, 2P, Ti	<a href="#">700009836</a>
Pump Head, Ti, DLC, Face Seal, Straight	<a href="#">700009837</a>
HP Seal, Dual Spring, .045, 2/pk	<a href="#">700009838</a>
Seal, Wash .0787 I.D., Fixed, Bio, 2/pk	<a href="#">700009839</a>
Tube, Degass Port B2-SSV B, MP35N	<a href="#">700009843</a>
Tube, Degass Port A2-SSV A, MP35N	<a href="#">700009844</a>
Tube, SSV to i2V, MP35N	<a href="#">700009845</a>
Tube, Vent Valve P2-filter, MP35N	<a href="#">700009846</a>
Tube, Vent Valve P5-filter, MP35N	<a href="#">700009847</a>
Tube, Accu "A" Xducer-VV P3	<a href="#">700009848</a>
Tube, Accu "B" Xducer-VV P6, MP35N	<a href="#">700009849</a>
Tube, Filter Inlet A, FCM, MP35N	<a href="#">700009850</a>
Tube, Filter Inlet B, FCM, MP35N	<a href="#">700009851</a>
Tube Assembly, Inlet ASM	<a href="#">700009858</a>
O-ring, 2-016, Teflon	<a href="#">WAT076152</a>



### ACQUITY M-Class $\mu$ SM-FL

Description	P/N
$\mu$ SM-FL Performance Maintenance Kit	
PM Kit consists of: Syringes, Std Needle, and Filter	<a href="#">201000290</a>
<b>Parts and Accessories</b>	
Plug, One-piece, 10-32, Coned	<a href="#">410001400</a>
Tube Assy, Strong Needle Wash-in.	<a href="#">430002491</a>
Tube Assy, Weak Needle Wash-in.	<a href="#">430002680</a>
Sample Loop, Ext. Hypo Tip, 2 $\mu$ L	<a href="#">430002928</a>
Sample Loop, Ext. Hypo Tip, 5 $\mu$ L	<a href="#">430002936</a>
Sample Loop, Ext. Hypo Tip, 10 $\mu$ L	<a href="#">430002938</a>
Sample Loop, Ext. Hypo Tip, 1 $\mu$ L	<a href="#">430003166</a>
Syringe, 100 $\mu$ L, HP	<a href="#">700002570</a>
Kit, I-Class PEEKsil Needle 10 $\mu$ L	<a href="#">700005926</a>
Puncture Needle, .059 O.D.	<a href="#">700006067</a>
Tube, Vent/Drain	<a href="#">700009863</a>
Cart, Injection, 18 K psi, $\mu$ SM-FL	<a href="#">700009864</a>

### ACQUITY M-Class TVM

Description	P/N
Tee, MMV Nano	<a href="#">289004442</a>
Tube, Cap, 40 $\mu$ m $\times$ 10 in., V-V, HP	<a href="#">700009875</a>
Tube, Cap, 25 $\mu$ m $\times$ 30 in., M-M, HP	<a href="#">700009876</a>
Tube, Cap, 40 $\mu$ m $\times$ 6 in., V-V, HP	<a href="#">700009878</a>
Tube, Cap, 40 $\mu$ m $\times$ 6 in., M-V, HP	<a href="#">700009880</a>
Tube, Cap, 40 $\mu$ m $\times$ 26 in., V-V, HP	<a href="#">700009881</a>
Cap Tube, 40 $\mu$ m $\times$ 30 in., V-PT, HP	<a href="#">700009889</a>
Capillary Tubing, 40 $\mu$ m $\times$ 40 in., Inlet	<a href="#">700010399</a>
Waste Tube, TVM, 31 in.	<a href="#">700009892</a>
Cap Tube, 40 $\mu$ m $\times$ 20 in. L, M-V	<a href="#">700009894</a>
Cap Tube, 25 $\mu$ m $\times$ 20 in. L, M-V	<a href="#">700009895</a>
Assy, Waste Tube	<a href="#">700010401</a>
Nano Tee, #6-40 Ports	<a href="#">700009920</a>
Tube, PEEKsil, 25 $\mu$ m $\times$ 30 in. L, M-V	<a href="#">700010040</a>
Tube, PEEKsil, 25 $\mu$ m $\times$ 50 cm. LG, V-V	<a href="#">700010042</a>
Tube, Cap w/Frit, 40 $\mu$ m $\times$ 26 in. L	<a href="#">700010059</a>

# nanoACQUITY UPLC System

## Ordering Information

### nanoACQUITY High Pressure BSM/ASM

Description	P/N
nanoACQUITY Solvent Manager Performance Maintenance Kit	<a href="#">201000181</a>
PM Kit consists of: Plungers, Check Valves, Seals, and Filters	

#### Parts and Accessories

Assembly, Bottle Tray	<a href="#">289002414</a>
1/2 µm Filter Assembly	<a href="#">289002111</a>
Solvent Filter Assembly, 5 µm	<a href="#">289002172</a>
Degasser Port B2 to SSV B Tube Assembly	<a href="#">430001113</a>
Degasser Port B1 to SSV B Tube Assembly	<a href="#">430001114</a>
Degasser Port A1 to SSV A Tube Assembly	<a href="#">430001115</a>
Degasser Port A2 to SSV A Tube Assembly	<a href="#">430001116</a>
Tube Assembly, Pump Head to Transducer	<a href="#">430001120</a>
Tube Assembly, Transducer to Check Valve	<a href="#">430001121</a>
Tube, Vent Valve Port 1 to Waste	<a href="#">430001209</a>
Tube, Vent Valve Port 4 to Waste	<a href="#">430001210</a>
Tube, Vent Valve Port 5 to Filter	<a href="#">430001346</a>
Solvent Inlet Tube (Aux. Pump Only)	<a href="#">430001389</a>
Tube Set, A2 and B2 Inlet Lines	<a href="#">430001436</a>
Tube, Vent Valve Port 2 to Filter	<a href="#">430001511</a>
Tube, Vent Valve Port 5 to Filter	<a href="#">430001512</a>
Tube, ACC. A Transducer to Vent Valve P3	<a href="#">430001534</a>
Tube, ACC. B Transducer to Vent Valve P6	<a href="#">430001535</a>
Tube, Filter to Flow Sensor Inlet A	<a href="#">430001568</a>
Tube, Filter to Flow Sensor Inlet B	<a href="#">430001569</a>
Tube, ASM to MS, 25 µm × 60 in.	<a href="#">430001572</a>
Fuse Drawer	<a href="#">700001502</a>
Transducer Assembly, Head Mounted, 15 K psi	<a href="#">700002594</a>
15 K Pump Head	<a href="#">700002595</a>
UPLC Primary Check Valve Assembly, 2/pk	<a href="#">700002596</a>
Wash Seal, 2/pk	<a href="#">700002598</a>
Head Plunger Seal	<a href="#">700002599</a>
I/O Connector Plug, 12 pin	<a href="#">WAT270868</a>
Plunger, 2/pk	<a href="#">700002600</a>
Support Plate, Thickened	<a href="#">700002601</a>
Solenoid Valve, Solvent Select	<a href="#">700002603</a>
Fuse, 5A, 250 V, 5 × 20 mm, SLO BLO, 5/pk	<a href="#">700002604</a>
Ferrule Set, 1/16 i.D., Two-piece, 10/pk	<a href="#">700002635</a>
Screw, Comp., 10–32, SS Gold Plated, Long, 10/pk	<a href="#">700002645</a>
Vent Valve/Trap Valve Cartridge	<a href="#">700002660</a>
1/2 µm Filter Insert Assembly	<a href="#">700002696</a>
Tube, Vent Valve Port 2 to Filter	<a href="#">700002702</a>
Tube, ASM to MS, 25 µm × 60 in.	<a href="#">700002712</a>
Solvent Inlet System Tube Set	<a href="#">700002713</a>
Check Valve, Double Ball and Seat, 2/pk	<a href="#">700002968</a>
O-ring, Teflon	<a href="#">WAT076152</a>

nanoACQUITY  
UPLC System.



### nanoACQUITY High Pressure Sample Manager

Description	P/N
nanoACQUITY Sample Manager Performance Maintenance Kit	<a href="#">201000182</a>
PM Kit consists of: Plungers, Check Valves, Seals, and Filters	

#### Parts and Accessories

Shuttle Tray Kit	<a href="#">205000542</a>
Kit, Tubing 2D/2 Pmp. Trap, nanoACQUITY	<a href="#">205000398</a>
Union, Zero Dead Volume	<a href="#">289000439</a>
nano-Tee without Gauge Pin	<a href="#">289002576</a>
nano Trap Column Holder	<a href="#">289002802</a>
Tube Holder, 24-well, 1.5 mL Tubes	<a href="#">405003740</a>
Tube Holder, 48-well, 0.65 mL Tubes	<a href="#">405003741</a>
Vial Holder, 24-well, 4 mL Vial	<a href="#">405003742</a>
Vial Holder, 48-well, 2 mL Vial	<a href="#">700011047</a>
Fitting, Plug, PEEK, Knurled	<a href="#">405005067</a>
Fitting, PEEK, Knurled One-piece	<a href="#">405005068</a>
50 µL Sample Syringe	<a href="#">410001348</a>
2 µL Sample Loop	<a href="#">430001264</a>
5 µL Sample Loop	<a href="#">430001311</a>
20 µL Sample Loop	<a href="#">430001320</a>
50 µL Sample Loop	<a href="#">430001325</a>
10 µL Sample Loop	<a href="#">430001326</a>
Assembly, Cap. Tube with Frit 25 µm × 18 in.	<a href="#">430002242</a>
Capillary Tubing with Frit, 25 µm × 10 in.	<a href="#">430001570</a>
Capillary Tubing with Frit, 40 µm × 16 in.	<a href="#">430001571</a>
25 µm Capillary, BSM to Trap Valve	<a href="#">430001575</a>
40 µm Capillary, ASM to Inject Valve	<a href="#">430001576</a>
Capillary Tubing Assembly, Injection Valve to Column	<a href="#">430001577</a>
Capillary Tubing Assembly, Injection Valve to Trap Valve	<a href="#">430001629</a>
2.5 mL Wash Syringe	<a href="#">700002569</a>
100 µL Sample Syringe	<a href="#">700002570</a>
Needle Seal O-ring, 002 Kalrez	<a href="#">700002572</a>
Fuse, 0.25A, 250 V	<a href="#">700002576</a>
Fuse, 10A, 5 mm × 20 mm, Slo Blo	<a href="#">700002577</a>
Screw, Comp., 10–32, SS Gold Plated, Short, 10/pk	<a href="#">700002634</a>
Sample Needle, PEEK, 15 µL	<a href="#">700002708</a>
Capillary Tube, 300 µm Column Inlet	<a href="#">700002754</a>
Capillary Tube, 300 µm Column Outlet	<a href="#">700002755</a>
300 µm Column Inlet/Outlet Tubing Kit	<a href="#">700002757</a>
Injector Valve Pod/Cartridge	<a href="#">700002907</a>
Column Heater	<a href="#">700002908</a>

## nanoACQUITY TUV Detector

Description	P/N
ACQUITY PDA/TUV 2489/2998 Performance Maintenance Kit	
PM Kit consists of: PerformancePLUS Deuterium Lamps (with S/N K05UPT700N and above)	<a href="#">201000281</a>
<b>Parts and Accessories</b>	
TUV Flow Cell, 10 nL (TUV with S/N K05UPT700N and above)	<a href="#">205015013</a>
Connector Plug, 10-position	<a href="#">323000247</a>
Fuse, 3.15A (250 V, 5 × 20 mm), 2/pk	<a href="#">700001800</a>
Backpressure Regulator	<a href="#">700002676</a>
Fuse Holder	<a href="#">WAT055426</a>

## nanoACQUITY UPLC System with 2D Technology

Description	P/N
Assembly, Waste Tube, HTM, PEEK	<a href="#">430001456</a>
Union, Nano, 6–40	<a href="#">289004407</a>
Tee, Nano M-M-V-Detail	<a href="#">289004442</a>
Capillary Tubing, BSM-MMV Tee, M-M 25 µm × 24 in.	<a href="#">430002140</a>
Capillary Tubing, Injection Valve to Trap Valve, V-V 40 µm × 13 in.	<a href="#">430001629</a>
Holder, MVM nano-Tee	<a href="#">700004599</a>
Assembly, Capillary Tubing, 1st D Col. In./Out 10 in.	<a href="#">430002183</a>
Assembly, Capillary Tubing, Trap Valve to MMV Tee 12 in.	<a href="#">430002153</a>
Assembly, Capillary Tubing, BSM2-Injection Valve, 22 in.	<a href="#">430002155</a>
Assembly, Capillary Tubing, BSM-Trap Valve, 30 in.	<a href="#">430001575</a>
Assembly, Pod, Trap Valve, 3 trace	<a href="#">700004601</a>
Assembly, Capillary Tube with Frit 25 µm × 18 in.	<a href="#">430002242</a>
nano-Tee, M-M-M Detail	<a href="#">289002576</a>
Pin Plug, 1/16 in., High Press.	<a href="#">700002747</a>
Capillary Tubing Assembly Injection Valve to Trap Valve	<a href="#">430001577</a>
Capillary Tubing with Frit, 40 µm × 16 in.	<a href="#">430001571</a>
Tubing Assembly, Solvent Select Valve to In-line Filter	<a href="#">430001470</a>
Mixer Assembly, 1.0 × 50 mm, Zirc. Bead	<a href="#">289003345</a>
Tubing, Capillary, 300 µm Col. Outlet	<a href="#">430001848</a>
Tubing, Capillary with Frit, 75 µm × 10 in.	<a href="#">430001837</a>
Tubing, Capillary with Frit, 75 µm × 8 in.	<a href="#">430001835</a>
Thumb Screw, Stainless Steel, M5 × 11 mm Large	<a href="#">410001697</a>
Ethernet Switch Box, 8-port	<a href="#">725000455</a>
Mixer Kit for 1 mm Column	<a href="#">205000540</a>

## nanoACQUITY HDX Manager

Description	P/N
<b>Parts and Accessories</b>	
Assy, Tube, Post Column, .005 I.D.	<a href="#">430001919</a>
Assy, Tube, Column HTR/CLR, HPLC	<a href="#">430001923</a>
Column Clip, 4/pk	<a href="#">700002143</a>
Ferrule Set, 1/16 I.D., Two-piece, 10/pk	<a href="#">700002635</a>
Screw, Comp., 10–32, SS Gold Plated, Long, 10/pk	<a href="#">700002645</a>
One-piece Fitting, 10–32, 10/pk	<a href="#">700004841</a>
Clip, Snap-in., 1/16 in. Tubing, 5/pk	<a href="#">700003792</a>
Union	<a href="#">WAT097332</a>


## ACQUITY UPLC FLEXCARTS

### Make Your System Mobile

A complete-system platform, the ACQUITY UPLC FlexCart wheeled cart provides the means to position an ACQUITY UPLC System close to a mass spectrometer's ionization source, facilitating its installation and operation. Fitted with electrical outlets, a computer monitor and keypad, and a container for fluid waste, the FlexCart is compatible for use with ACQUITY UPLC and nanoACQUITY Systems.



Description	P/N
ACQUITY UPLC FlexCart	<a href="#">205015015</a>
nanoACQUITY UPLC FlexCart	<a href="#">205016040</a>

 Visit [waters.com/parts](https://waters.com/parts) for more information about parts and accessories for your ACQUITY UPLC and nanoACQUITY UPLC Systems.

# Alliance Separations Modules

## Ordering Information

### e2695 SEPARATIONS MODULE

e2695 Performance Maintenance Kit



Replacement Plunger



Description	P/N
e2695 Separations Module Performance Maintenance Kit	
PM Kit consists of: Plungers, Check Valves, Seals, Filters, Needle, Syringe (250 µL), and enhanced Injector Rebuild Kit	<a href="#">201000313</a>

### 2695 SEPARATIONS MODULE

2695 Performance Maintenance Kit



Replacement Plunger



Description	P/N
2695 Separations Module Performance Maintenance Kit	
PM Kit consists of: Plungers, Check Valves, Seals, Filters, Needle, Syringe (250 µL), and Injector Rebuild Kit	<a href="#">WAT270944</a>

### 2695D SEPARATIONS MODULE

2695D Separations Module 8 Needle Performance Maintenance Kit



Description	P/N
2695D Separations Module 8 Needle Performance Maintenance Kit*	
PM Kit consists of: Dispenser Syringes, Needles, and Filters	<a href="#">70000201</a>

\*Note: For proper maintenance of the 2695D, please make sure to order, PM Kit: [70000201](#) and PM Kit: [WAT270944](#).

## IMPORTANT INFORMATION ABOUT SELECTING COMPONENTS FOR WATERS SEPARATIONS

### Modules and Pumps

Waters separations modules and pumps are constructed using the highest-quality components available. The component parts recommended in Waters' Performance Maintenance protocols are intended to optimize a system's performance for the widest range of applications possible. Yet, to meet certain performance expectations, some applications may require an alternative technology. For such applications, several options are available that may in some cases affect superior performance in a particular operating environment.

The information that follows serves as a guide to selecting alternative components. It is not intended as a hard-and-fast set of rules. Rather, it is a set of recommendations that, if adopted, may prove more effective, depending on specific application requirements. To determine the best configuration for an application, you may need to experiment.

### Sapphire Plungers

Sustained and proper operation of any pump depends on the cleanliness and smoothness of its plungers. Our Performance Maintenance strategy recommends you change sapphire plungers once a year.

The condition of an LC system's sapphire plungers is critically important to its reliable operation. Our PerformancePLUS Sapphire Plunger's crystalline structure is oriented lengthwise, rather than randomly. The effect is a harder, better-sealing surface at the circumference of the plunger and durability that extends the plunger's usable life considerably beyond that of other plungers.

### Plunger Seals

The material out of which plunger seals are made is critical. You can obtain seals made of various materials that serve as alternatives to the recommended ones. Some of these seals improve performance in specific applications. The usable life of plunger seals is typically six months to one year. If you find that the life of your seals is shorter than six months, you might try alternative seals.

### Plunger-Seal Wash

Seal-wash solvent lubricates the plungers and flushes away any solvent or dried salts forced past the plunger seal from the high-pressure side of the piston chamber. This wash cycle extends the life of the seals. Position the plunger seal-wash reservoir in a visible location above the solvent management system, and refill the reservoir, as necessary, with a solvent suited to your application.

For reversed-phase HPLC applications, use an aqueous seal-wash solution, adding enough organic content to inhibit bacterial growth. For example, depending on your application, you might use an 80:20 water/methanol or water/acetonitrile mixture. For all GPC (normal-phase) separations, use a 50:50 methanol/water mixture as the seal-wash solution.

*Note: Ensure that you use separate solutions and containers for the plunger-seal wash and the needle wash for the sample-management system or autosampler. Because the functions of these solutions differ, the*

*use of one solution for both functions may compromise the effectiveness of either needle washing or plunger-seal washing. Change plunger seal wash seals whenever you change the main plunger seals.*

### Check Valves

Check-valve failures can be a common cause of reproducibility problems. Check-valve failure modes, such as sticking (failure to open or close) and intermittent leaks, can cause variable retention times and pressure fluctuations. Intermittent leaks are often caused by particulate matter that sticks to the ball of the check valve. These particulates can come from the mobile phase, shredded seal material, dirty glassware, or an unclean laboratory environment.

We offer the choice of various types of check-valve cartridges. The standard cartridge incorporates a valve fitted with a ball made of synthetic ruby and a seat made of sapphire. A second option is the PerformancePLUS™ Check-valve Cartridge,\* standard on 500- and 600-series pumps. Like the standard cartridge, the PerformancePLUS Cartridge incorporates a ruby ball and sapphire seat, though both are larger than those in the standard cartridge, as is the internal volume. The PerformancePLUS Cartridge also provides excellent sealing characteristics and, at higher flow rates, its larger orifices can provide a performance advantage. Finally, the PerformancePLUS Cartridge is more effective than the standard cartridge in its resistance to sticking. Nevertheless, where sticking problems associated with ruby/sapphire ball-and-seat check-valves persist, we offer a valve fitted with ceramic ball and seat.

For most applications, expect check valves to perform to specifications for a year or more. Note, however, that laboratory practices, such as solvent preparation, choice of plunger-seal material, and the mobile phase required for certain applications can significantly shorten the usable life of these valves. You can reduce or eliminate a tendency toward sticking. To do so, experiment with different ball-and-seat sizes and materials of construction. Then determine which provide optimal performance for a particular application and operating environment.

\*Requires PerformancePLUS Separations Module Check Valve Housing, p/n: [700002332](#), 2/pk.

## Common Parts for Alliance Systems



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### Ordering Information

#### Common Parts for Alliance System 2695/D

Description	P/N
PerformancePLUS Alliance Plunger Assy	<a href="#">WAT270959</a>
Head, Plunger Seal Kit (Clear)	<a href="#">700001326</a>
Head, Plunger Seals Repl. Kit (Std—Yellow)	<a href="#">WAT270938</a>
Head, GFP Plunger Seal Kit (Optional Black)	<a href="#">WAT271066</a>
Head, Face Seals Replacement Kit, 4/pk	<a href="#">WAT270939</a>
Wash Tubes Seals Replacement Kit, S/W	<a href="#">WAT270940</a>
Seal Wash Face Seal Replacement Kit	<a href="#">WAT271017</a>
Seal Wash Plunger Seal Replacement Kit	<a href="#">WAT271018</a>
Check Valve Cartridge Replacement Kit (2 cart.)	<a href="#">WAT270941</a>
PerformancePLUS Check Valve Cartridge	<a href="#">700002399</a>
Check Valve Cartridge	<a href="#">700002761</a>
Ceramic Check Valve	<a href="#">700002333</a>
PerformancePLUS Check Valve Housing	<a href="#">700002332</a>
In-line Filter	<a href="#">WAT035190</a>
Filter Insert	<a href="#">WAT088084</a>
Assembly, GPV	<a href="#">WAT270927</a>
Nut, Head	<a href="#">WAT270964</a>
Degasser Chamber	700001218
25 µL Syringe	<a href="#">WAT077343</a>
250 µL Syringe	<a href="#">WAT073109</a>
100 µL Syringe	<a href="#">700011456</a>

Description	P/N
2500 µL Syringe	<a href="#">WAT077342</a>
PerformancePLUS Needle	<a href="#">700001247</a>
HPMV Rebuild Kit	<a href="#">WAT045424</a>
HPMV and Seal Tool Kit	<a href="#">WAT045427</a>
Assembly, Seal Pack Replacement Kit with Needle	<a href="#">700002791</a>
Seal Pack Rebuild Kit with Needle	<a href="#">WAT271019</a>
Kit, Carousel Set, 5/pk	<a href="#">WAT270328</a>
Solvent Bottle Caps, 4 L, 4/pk	<a href="#">WAT062341</a>
Bottle Caps, 1 L, 4/pk	<a href="#">WAT062479</a>

# HPLC Pumps

## Ordering Information

### 515 HPLC PUMP



#### 515 Performance Maintenance Kit



#### Clear-100™ Plunger Seals, 4/pk



Description	P/N
515 HPLC Pump Performance Maintenance Kit	<a href="#">WAT052587</a>
PM Kit consists of: Plungers, Check Valves, Seals, and Filters	

### 1515 SERIES HPLC PUMP



#### 1515 Performance Maintenance Kit



#### Solvent Filter



#### Clear-100 Plunger Seals, 4/pk



Description	P/N
1515 Series HPLC Pump Performance Maintenance Kit	<a href="#">201000113</a>
PM Kit consists of: Plungers, Check Valves, Seals, and Filters	

### 1525 SERIES HPLC PUMP



#### 1525 Performance Maintenance Kit



#### Solvent Filter



#### Clear-100™ Plunger Seals, 4/pk



Description	P/N
1525 Series HPLC Pumps Performance Maintenance Kit	<a href="#">201000114</a>
PM Kit consists of: Plungers, Check Valves, Seals, and Filters	
<b>Parts and Accessories</b>	
1525 to 1525 Extended Flow Conversion Kit	<a href="#">205000324</a>
1525 EF Performance Maintenance Kit	<a href="#">201000160</a>



## 1525 MICRO HPLC PUMP



## 1525 micro Performance Maintenance Kit



Description	P/N
1525 micro HPLC Pump Performance Maintenance Kit	<a href="#">201000161</a>
PM Kit consists of: Plungers, Check Valves, Seals, and Filters	

### Common Parts for HPLC Pumps

Description	515	1515 1525	1525 Micro	Extended Flow	P/N
1525 micro Seal Kit			•		<a href="#">205000202</a>
Active Seal Wash Kit 1525		•			<a href="#">205000251</a>
Active Seal Wash Kit 1525 EF				•	<a href="#">205000252</a>
Active Seal Wash Kit 1525 micro			•		<a href="#">205000250</a>
AQ Seal Repl., 2/pk	•	•			<a href="#">WAT025296</a>
AQ Seal Repl., 4/pk	•	•			<a href="#">WAT025297</a>
Plunger Seal UP30, 1/pk				•	<a href="#">700002282</a>
Plunger Seal, TAN (Rulon)	•	•			<a href="#">WAT025384</a>
Seal, Clear-100	•	•			<a href="#">WAT022934</a>
Seal, Clear-100, 4/pk	•	•			<a href="#">WAT022946</a>
Seal, Kit Black, Replace	•	•			<a href="#">WAT026613</a>
Seals, Aqueous, Buffer, 2/pk	•	•			<a href="#">WAT025296</a>
Seals, Aqueous, Buffer, 4/pk	•	•			<a href="#">WAT025297</a>
1525, Check Valve, 2/pk			•		<a href="#">700002275</a>
B and S Check Valve Kit				•	<a href="#">WAT088223</a>
Extended Flow Update Kit	•			•	<a href="#">WAT207119</a>
Inlet Check Valve				•	<a href="#">WAT032646</a>
Inlet Check Valve Housing				•	<a href="#">WAT060308</a>
Outlet Check Valve				•	<a href="#">WAT025028</a>

Description	515	1515 1525	1525 Micro	Extended Flow	P/N
Outlet Check Valve				•	<a href="#">WAT025216</a>
Outlet Check Valve Housing				•	<a href="#">WAT025207</a>
Outlet Check Valve Rebuild Kit				•	<a href="#">WAT026014</a>
PerformancePLUS Cartridge with Housing, 2/pk	•	•	•		<a href="#">700000253</a>
PerformancePLUS Ceramic Check Valve Cartridge	•	•	•		<a href="#">700002399</a>
PerformancePLUS Check Valve Cartridge	•	•	•		<a href="#">700000254</a>
Plunger Wash Kit (225 µL)				•	<a href="#">WAT030852</a>
Assembly, Plunger	•	•			<a href="#">WAS207069</a>
Oriented Plunger, 510	•	•			<a href="#">WAT069511</a>
Plunger				•	<a href="#">WAT060304</a>
Retaining Ring	•	•	•	•	<a href="#">WAT025360</a>
Assembly, Solvent Filter	•	•	•	•	<a href="#">WAT025531</a>
Reference Valve 600/510	•	•		•	<a href="#">WAT026592</a>
Reference Valve Rebuild Pump Kit	•	•	•	•	<a href="#">WAT025746</a>
Safety Syringe, 10 mL	•	•	•	•	<a href="#">WAT027629</a>
Priming Syringe Needle	•	•	•	•	<a href="#">WAT025559</a>
Head Support Bushing	•	•	•	•	<a href="#">WAT060305</a>
Ind. Rod Kit	•	•	•	•	<a href="#">WAT069583</a>

# Gradient Modules

## Ordering Information

### 2545/2525 BINARY GRADIENT MODULE



Description	P/N
2545/2525 Binary Gradient Module Performance Maintenance Kit	<a href="#">201000130</a>
PM Kit consists of: Plungers, Check Valves, Seals, and Filters	

### 2545 QUATERNARY GRADIENT MODULE



Description	P/N
2545Q Performance Maintenance Kit	<a href="#">201000199</a>
PM Kit consists of: Plungers, Check Valves, Seals, and Filters	

### 2535 QUATERNARY GRADIENT MODULE



Description	P/N
2535 QGM Performance Maintenance Kit	<a href="#">201000209</a>
PM Kit consists of: Plungers, Check Valves, Seals, and Filters	

### 2555 QUATERNARY GRADIENT MODULE



Description	P/N
2555 QGM Performance Maintenance Kit	<a href="#">201000210</a>
PM Kit consists of: Plungers, Check Valves, Seals, and Filters	

### Common Parts for Gradient Modules

Description	Binary			Quaternary		P/N
	2545/2525	2535	2545	2535	2555	
Assembly, Leak Sensor		.	.	.		<a href="#">205000505</a>
Plate, Head Support				.		<a href="#">405006414</a>
Pump Head .395				.		<a href="#">405008440</a>
Plunger C-Clip		.		.		<a href="#">410000570</a>
Tubing, Mixer to Vent Valve		.	.	.		<a href="#">430002032</a>
Assembly Tube, Right Transducer Outlet		.	.	.		<a href="#">430002121</a>
Check Valve Cartridge Kit, 4/pk	.					<a href="#">700001493</a>
Plunger Seal Kit, 4/pk	.					<a href="#">700001494</a>
Assembly, Cartridge Housing Outlet		.	.	.		<a href="#">700001530</a>
Assembly Housing, Inlet Check Valve		.	.	.		<a href="#">700001529</a>
Outlet Pump Filter Assembly				.		<a href="#">700001836</a>
Block, Stop Valve Positioning		.	.	.		<a href="#">700004425</a>
Drip Tray, Leak Sensor, 2545Q, LS Ready		.	.	.		<a href="#">700004430</a>

Description	Binary			Quaternary		P/N
	2545/2525	2535	2555	2545	2535	
Inlet Manifold Block		.	.	.		<a href="#">700004431</a>
Bracket Mixer Inlet, Manifold Z		.	.			<a href="#">700004439</a>
Assembly, Mixer				.		<a href="#">700004436</a>
Manifold Outlet Check Valve		.	.	.		<a href="#">700004445</a>
Pump Head Assembly		.	.			<a href="#">700004454</a>
Assembly, Tube 1/4 Solvent Inlet (from Solvent Bottle)				.		<a href="#">700004607</a>
Assembly Pump Head Support Plate		.	.			<a href="#">700004613</a>
Solvent Filters, 4/pk		.	.			<a href="#">700005083</a>
Assembly Mixer				.		<a href="#">700005084</a>
Helium Connection Kit		.	.	.		<a href="#">WAT023486</a>
Assembly, Solvent Filters (Sparge)		.	.	.		<a href="#">WAT025531</a>
Manifold Tee 2555Q				.		<a href="#">WAT070122</a>

# Fluid Handling Units

## Ordering Information

### REAGENT MANAGER



Description	P/N
Reagent Manager Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	<a href="#">201000102</a>
<b>Parts and Accessories</b>	
EZ Grip Nut, 3/pk	<a href="#">700000146</a>
EZ Grip Ferrule, 3/pk	<a href="#">700000145</a>

### Tools

Description	P/N
Capillary Tubing Cutter	<a href="#">605000101</a>
PEEK Tubing Cutter	<a href="#">700001012</a>
Collet and Compression Screw Multi-tool	<a href="#">700003170</a>
3/16 in. Open End Wrench	<a href="#">700000610</a>
Plunger Insertion Tool	<a href="#">WAT011042</a>
Snap Ring Pliers	<a href="#">WAT025263</a>
Tubing Cutter for 1/16 in. Stainless Steel Tubing	<a href="#">WAT022384</a>
Tubing Cutter, Spare Blades, 3/pk	<a href="#">WAT022385</a>
Hex Key for 2465 Flow Cell Assembly	<a href="#">700001985</a>

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## Injectors/Fraction Collectors

### NEW 3767



Description	P/N
3767 Performance Maintenance Kit	
PM Kit consists of: Analytical and Preparative Valve Rebuild kits, Vented Probe/Needle, Inject Ports & Grease. Appropriate Syringes for the configured injection volume should also be ordered separately	<a href="#">201000333</a>
<b>Parts and Accessories</b>	
Syringe, 1.0 mL, 3767	<a href="#">700012876</a>
Syringe, 2.5 mL, 3767	<a href="#">700012877</a>
Syringe, 5.0 mL, 3767	<a href="#">700012878</a>
Syringe, 12.5 mL, 3767	<a href="#">700012879</a>
Vented Probe/Needle	<a href="#">700001387</a>
Inject Port Assembly 4/pk	<a href="#">700002284</a>
Analytical Valve Rebuild Kit	<a href="#">201000124</a>
Preparative Valve Rebuild Kit	<a href="#">700001331</a>
Sample Loop, 2 mL	<a href="#">700001987</a>
Sample Loop, 5 mL	<a href="#">700001989</a>
Sample Loop, 10 mL	<a href="#">700001991</a>
Kit, 2.5 mL Syringe, 3767*	<a href="#">700013083</a>
Kit, 5.0 mL Syringe, 3767*	<a href="#">700013084</a>
Kit, 12.5 mL Syringe, 3767*	<a href="#">700013085</a>

\* Kit includes: Syringes, Loops and Holding Loops and accessories to enable injection volumes of 2 ml, 5 ml or 10 ml.

### NEW GC PAL 3

Description	P/N
GC-PAL3 Performance Maintenance Kit	
PM Kit consists of: Replacement Wash Vials, Lubrication Kit & Agitator belts	<a href="#">201000335</a>
<b>Parts and Accessories</b>	
Drive Belt, PAL3 Agitator, 6 × 20 ml, 3/pk	700012528
Wash Vial Kit, 10 ml	700013059
PAL, Lubrication Kit	<a href="#">700002945</a>
Liquid Tool	<a href="#">700012879</a>
Smart Syringe, 10 µL	<a href="#">700012540</a>

### NEW 3777C



Description	P/N
3777C Performance Maintenance Kit	
PM Kit consists of: 10 µl Syringe, Needle, One piece Needle Seal, Replacement Rotor for Analytical Valve, Holding & Sample Loops Rebuild kits, Vented Probe/Needle, Inject Ports & Lubrication Kit	<a href="#">201000318</a>
<b>Parts and Accessories</b>	
100 µl Syringe 3777C	<a href="#">700011725</a>
Needle 3777C (3/pk)	700011726
Holding Loop 3777C	700011727
Sample Loop 10 µL	<a href="#">700002504</a>
Rotor Inject Valve, 6 Port, 2 Position	700002292
One Piece Needle Seal 3777C (5/pk)	<a href="#">700012893</a>
PAL, Lubrication Kit	<a href="#">700002945</a>



Parts and Accessories	
Headspace Tool:	
Smart Syringe, 2500 µL	<a href="#">700012539</a>
Cap, Magnetic, for 20-ml Vial, Headspace, 100/pk	<a href="#">700012542</a>
Vial, Amber, 20-ml, with Screw Cap, Headspace, 100/pk	700012516
Vial, Clear, 20-ml, with Screw Cap, Headspace, 100/pk	<a href="#">700012541</a>

## 2777/2777C SAMPLE MANAGER

2777C Sample Manager



2777 Sample Manager

Description	P/N
2777/2777C Sample Manager Performance Maintenance Kit PM Kit consists of: Tension Cord and Lubrication Kit	<a href="#">201000162</a>
<b>Rotors List Associated with the Valco Valves</b>	
Rotor 10 Port 2 Pos 0.4 mm Cheminert Valve	700001230
Rotor 6 Port 2 Pos 0.4 mm LC Injection Valve	<a href="#">700002210</a>
Rotor 6 Port 2 Pos 0.4 mm Cheminert	700002292
Rotor 6 Port 2 Pos 0.25 mm Cheminert	<a href="#">700002293</a>
Rotor 10 Port 2 Pos 0.4 mm LC Injection Valve	<a href="#">700002297</a>
Rotor 4 Port 2 Pos 0.5 µL Internal Loop LC Injection Valve	<a href="#">700002298</a>
Rotor 6 Port 2 Pos 0.75 mm Cheminert	700002439

Note: These rotors are not included in the PM Kit; must be ordered separately based on the type of valve.

## 2767 AUTOSAMPLER



2767 Performance Maintenance Kit



Description	P/N
2767 AutoSampler Performance Maintenance Kit PM Kit consists of: Probe, Injector Port, and Rotors	<a href="#">201000195</a>
<b>Syringes to complement the 2767 AutoSampler Performance Maintenance Kit:</b>	
500 µL Reagent Syringe	<a href="#">700003434</a>
1.0 mL Reagent Syringe	<a href="#">700003435</a>
2.5 mL Reagent Syringe	<a href="#">700003436</a>
5.0 mL Reagent Syringe	<a href="#">700003437</a>
10 mL Reagent Syringe	<a href="#">700003438</a>

## 2707 AUTOSAMPLER



2707 Performance Maintenance Kit



Description	P/N
2707 Performance Maintenance Kit PM Kit consists of: Syringe (500 µL), Needle, and Rotor Seal	<a href="#">201000196</a>
2707 Prep Performance Maintenance Kit PM Kit consists of: Syringe (2500 µL), Prep Needle, and Rotor Seal	<a href="#">201000306</a>
<b>Parts and Accessories</b>	
Stainless Steel Sample Loop, 20 µL	<a href="#">700000680</a>
Stainless Steel Sample Loop, 5 µL	<a href="#">700000683</a>
Bio-compatible Sample Loop, 100 µL	<a href="#">700000684</a>
Stainless Steel Sample Loop, 100 µL	<a href="#">700000685</a>
Wash Bottle, Glass, 250 mL	<a href="#">700004063</a>
Stainless Steel Sample Loop, 10 µL	<a href="#">700003872</a>
Air Needles, 50 mm, Yellow	<a href="#">700003921</a>
Air Needles, 56 mm, Red	<a href="#">700003922</a>
Air Needles, 68 mm, Blue	<a href="#">700003923</a>
Air Needles, 74 mm, Green	<a href="#">700003924</a>
Air Needles, 80 mm, Black	<a href="#">700003925</a>
Stainless Steel Sample Loop, 50 µL	<a href="#">700003928</a>
Preparative Sample Loop	<a href="#">700004086</a>
Bio-compatible Sample Loop, 10 µL	<a href="#">700004088</a>
Bio-compatible Sample Loop, 20 µL	<a href="#">700004089</a>
Bio-compatible Sample Loop, 50 µL	<a href="#">700004090</a>
Syringe, 500 µL	<a href="#">700000862</a>
Needle Assy, Std	<a href="#">700003842</a>
Needle Assy, Bio	<a href="#">700003843</a>
Rotor Seal	<a href="#">700003851</a>
Stator	<a href="#">700003852</a>
Bottle, Wash Solvent, 250 mL, Glass	<a href="#">700004063</a>
Vial Holder Tray, 12 pos., 10 mL	<a href="#">700004082</a>
Needle Assy, 60 µL, Prep	<a href="#">700004085</a>

## WATERS FRACTION COLLECTOR III



Description	P/N
Tabletop Rack (for use with prep funnel rack)	<a href="#">289000440</a>
Prep Funnel (32 position, 2 each set)	<a href="#">725000106</a>
Prep Funnel Rack (holds up to 4 prep funnels)	<a href="#">725000107</a>
4-Microtiter Plate Rack	<a href="#">725000110</a>
Multi-purpose Rack	<a href="#">725000113</a>
Carousel Rack (2 × 2690 Carousels)	<a href="#">725000144</a>
Eppendorf Tube Collection Rack	<a href="#">725000145</a>
17 mm O.D. Vial Collection Rack	<a href="#">725000146</a>
28 mm O.D. Vial Collection Rack	<a href="#">725000147</a>
Standard Test Tube Rack, 120 positions	725000152
Tygon Tubing, 6.35 mm I.D. × 9.52 mm O.D. × 5 m, 2/pk (use with prep funnel rack)	<a href="#">WAT037047</a>
Teflon Tubing 8 mm I.D. × 50 ft. (for use with prep funnel rack)	<a href="#">WAT037090</a>

## MANUAL INJECTORS

### 7725 Analytical Injector Performance Maintenance Kit



Description	P/N
3725 High Pressure Manual Valve Performance Maintenance Kit	<a href="#">201000116</a>
7010 Analytical Injector Performance Maintenance Kit	<a href="#">201000117</a>
7125 Sample Injector Performance Maintenance Kit	<a href="#">201000118</a>
7725 Analytical Injector Performance Maintenance Kit	<a href="#">201000119</a>
8125 Micro-scale Injector Performance Maintenance Kit	<a href="#">201000120</a>
9125 PEEK Valve Performance Maintenance Kit	<a href="#">201000121</a>
7750E Stainless Steel Switching Platform Performance Maintenance Kit	<a href="#">201000122</a>
7750E-075 Motorized Sample Injector Performance Maintenance Kit	<a href="#">201000125</a>

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- ✓ Accurate and reproducible results



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## Detectors

### NEW 3465



Description	P/N
Flexcell GC sb	700013047
Flexcell Au sb	700013048
Flexcell GC ISAAC	700013049
Flexcell GC HyREF	700013064
Flexcell Pt HyREF	700013065
Flexcell Au HyREF	700013050
Flexcell Ag HyREF	700013051
Flexcell BDD sb	700013066
Flexcell BDD HyREF	700013067
Flexcell Au HyREF with SS AUX	700013068
SenCell 2 mm GC sb	700013052
SenCell 2 mm Au sb	700013053
SenCell 2 mm Pt sb	700013069
SenCell 2 mm GC ISAAC	700013070
SenCell 2 mm Au ISAAC	700013054
SenCell 2 mm Pt ISAAC	700013071
SenCell 2 mm GC HyREF	700013055
SenCell 2 mm Au HyREF	700013056
SenCell 2 mm Pt HyREF	700013072
SenCell 2 mm Ag HyREF	700013057
ISAAC solution 10 mL	<a href="#">700001949</a>
Fingertight fitting VT-03, M5	<a href="#">700001950</a>
Polishing disc for WE	<a href="#">700001954</a>
Polishing disc for REF	<a href="#">700002069</a>
10 mL diamond slurry 1 µm	<a href="#">700001955</a>
50 ml KCl solution sat'd, with AgCl	<a href="#">700001959</a>

### 2489 UV/VISIBLE DUAL-WAVELENGTH ABSORBANCE DETECTOR

#### 2489 Performance Maintenance Kit



Description	P/N
ACQUITY PDA/TUV 2489/2998 Performance Maintenance Kit	<a href="#">201000281</a>
PM Kit consists of: PerformancePLUS Deuterium Lamp	
<b>Parts and Accessories</b>	
Autopure Flow Cell	<a href="#">289000614</a>
Analytical Flow Cell	<a href="#">WAS081140</a>
Inert Taper Slit Flow Cell	<a href="#">WAT081157</a>
Semi-prep Flow Cell	<a href="#">WAT081158</a>
Microbore Flow Cell	<a href="#">WAT081159</a>
High Pressure Flow Cell	<a href="#">WAT081321</a>
MS Flow Cell Rebuild Kit	700000168
10 mm Flow Cell Rebuild Kit	<a href="#">WAS081346</a>
3 mm Flow Cell Rebuild Kit	<a href="#">WAS081347</a>
I/O Connector, 10 Pin	<a href="#">323000247</a>
Assembly, Cable, Ethernet, 10 ft. Straight Through	<a href="#">441000372</a>
Ethernet 10 ft. Crossover Cable	<a href="#">700003423</a>
Cuvette Holder Assembly	WAS081333
Gasket Kit, 10/pk	<a href="#">WAS081348</a>
10 mm Cell, Linearity Solutions	<a href="#">WAT042881</a>
Wavelength Accuracy Solutions	<a href="#">WAT042885</a>
PQ Test Mix for Absorbance Detector	<a href="#">WAT042887</a>
Two Cuvette Kit (empty)	<a href="#">700004155</a>
Fuse, 3.25A, 250 V 5 × 20 mm, Fast-acting, 5/pk	<a href="#">700001800</a>
Analog Out Cable Assembly	<a href="#">WAT057235</a>
Power Cord, 110 V	<a href="#">442000176</a>

## 2414 REFRACTIVE INDEX DETECTOR



Description	P/N
2414 Valve Upgrade Kit	700002670
Sample Inlet Tubing Assembly	<a href="#">700001710</a>
Compression Screws and Ferrules Kit, 5/pk	<a href="#">WAT025604</a>
Stainless Steel Tubing, 0.062 in. x .040 in. I.D. x 10 ft.	<a href="#">WAT026805</a>
Stainless Steel Tubing, 0.062 in. x .009 in. I.D. x 10 ft.	<a href="#">WAT026973</a>
Analog Signal Cable	<a href="#">WAT057235</a>
IEEE-488 Cable 6 ft. (2 meter)	<a href="#">WAT087141</a>
Power Cord, 110 V	<a href="#">442000176</a>
I/O Connector Plug, 12 Pin	<a href="#">WAT270868</a>

## 2424 EVAPORATIVE LIGHT SCATTERING (ELS) DETECTOR



2424/2420 Performance Maintenance Kit



Description	P/N
2424 ELS Detector Performance Maintenance Kit	<a href="#">201000159</a>
PM Kit consists of: PerformancePLUS Lamp Cartridge Assembly	
<b>Parts and Accessories</b>	
Drip Tray	415000415
Vapor Trap (10 mm O.D. Bottle Trap)	700000574

## 2998 PHOTODIODE ARRAY DETECTOR (PDA)



2996 Performance Maintenance Kit



Description	P/N
ACQUITY PDA/TUV 2489/2998 Performance Maintenance Kit	<a href="#">201000281</a>
<b>Parts and Accessories</b>	
2998 Analytical Flow Cell Kit	<a href="#">205000399</a>
2998 Microbore Flow Cell Kit	<a href="#">205000400</a>
2998 Semi-prep Flow Cell Kit	<a href="#">205000401</a>
2998 AutoPurification Flow Cell Kit	<a href="#">205000402</a>
Fuse, 3.15A, 250 V, 5 x 20 mm Fast Acting, 2/pk	<a href="#">700001800</a>
Connector Plug, 10-Position	<a href="#">323000247</a>
Connector Shell Cover	<a href="#">323000446</a>
Ethernet Patch Cord, Shielded, 10 ft.	<a href="#">441000372</a>
Event Cable, 6 ft.	<a href="#">441000373</a>
Crossover Cable, 5E, 10 ft., Ethernet	<a href="#">700003423</a>
Tubing, 3/8 in. O.D. x 1/4 in. I.D., Tygon	<a href="#">700001796</a>
Cable, Assembly, Shield, Analog Output Signal Cable	<a href="#">WAT057235</a>
PEEK Compression Fitting	<a href="#">WAT021815</a>
Knob, Compression Fitting	<a href="#">WAT021816</a>
Convuluted Tubing	<a href="#">430001556</a>

### DID YOU KNOW...

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 Visit [waters.com/standards](https://www.waters.com/standards)



## 2465 ELECTROCHEMICAL DETECTOR



Description	P/N
Flow Cell Kit: 0.7 mm GC Working Electrode, Salt Bridge Reference Electrode	<a href="#">205004100</a>
Flow Cell Kit: 2 mm GC Working Electrode, Salt Bridge Reference Electrode	<a href="#">205004115</a>
Flow Cell Kit: 2 mm GC Working Electrode, ISAAC Reference Electrode	<a href="#">205004215</a>
Flow Cell Kit: 3 mm Pt Working Electrode, ISAAC Reference Electrode	<a href="#">205004220</a>
Flow Cell Kit: 3 mm AU Working Electrode, "HyREF" Reference Electrode	<a href="#">205004325</a>
Flow Cell Kit: 3 mm Ag Working Electrode, "HyREF" Reference Electrode	<a href="#">205004330</a>
Fuse, 5 × 20, 2.5A, T 250 V	<a href="#">700001004</a>
RS-232 Cable	<a href="#">700001942</a>
Dummy Flow Cell	<a href="#">700001943</a>
External I/O Cable	<a href="#">700001948</a>
ISAAC Solution, 10 mL	<a href="#">700001949</a>
Fingertight Flow Cell Fitting	<a href="#">700001950</a>
Spacer, 120 µm	<a href="#">700001951</a>
Spacer, 25 µm	<a href="#">700001952</a>
Spacer, 50 µm	<a href="#">700001953</a>
Polishing Disk, Work Electrode	<a href="#">700001954</a>
Diamond Slurry, 1 µm, 10 mL	<a href="#">700001955</a>
Swivel, 2465 Salt Bridge Reference Electrode	<a href="#">700001956</a>
Body, 2465 Salt Bridge Reference Electrode	<a href="#">700001957</a>
Salt Bridge Ag/AgCl Reference Electrode	<a href="#">700001958</a>
KCl Solution for Salt Bridge Ref (50 mL)	<a href="#">700001959</a>
Working Electrode Block, 2 mm GC	<a href="#">700001960</a>
Working Electrode Block, 3 mm, Platinum	<a href="#">700001961</a>
Working Electrode Block, 3 mm, Gold	<a href="#">700001962</a>
Working Electrode Block, 2 mm, Silver	<a href="#">700001963</a>
Salt Bridge Inlet Block	<a href="#">700001964</a>
HyREF Inlet Block	<a href="#">700001965</a>
Cell Cable	<a href="#">700001968</a>
2465 Integrator Cable	<a href="#">700001994</a>
2465 ISAAC Inlet Block	<a href="#">700002003</a>
Polishing Disk, Reference Electrode	<a href="#">700002069</a>
Capillary Connection Kit for Micro Cell	700002103

## 2475 MULTI-WAVELENGTH FLUORESCENCE DETECTOR



### 2475 Performance Maintenance Kit



Description	P/N
2475 Multi-wavelength Fluorescence Detector	<a href="#">201000131</a>
PM Kit consists of: Xenon Lamp Assembly	
Parts and Accessories	
Fuse, 4A SMD with Holder, 2/pk	700001840
Flow Cell	<a href="#">700001618</a>

## NEW 2432 CONDUCTIVITY DETECTOR



Description	P/N
Assembly, Cell 2432	700011185
Inlet tube, 2432	700011137
Outlet Tube, 2432	700011186

## Quadrupole Time-of-Flight Mass Spectrometers



### NEW SYNAPT XS

Description	P/N
SYNAPT XS Performance Maintenance Kit PM Kit consists of: Source Components, Heater Cartridge, Gaskets, Seals, LockSpray Reference Probe, Probe Tips, Air Filters.	<a href="#">201000326</a>
<b>Parts and Accessories</b>	
ESI Probe Assembly 500 mm × 125 μm	<a href="#">700011241</a>
ESI Probe Assembly 750 mm × 125 μm	<a href="#">700011242</a>
ESI Probe Assembly (UPC <sup>2</sup> ) 750 mm × 50 μm	<a href="#">700011376</a>
APCI Probe, 500 mm × 125 μm	<a href="#">700011244</a>
APCI Probe, 750 mm × 125 μm	<a href="#">700011245</a>
APCI Probe (UPC <sup>2</sup> ), 750 mm × 50 μm	<a href="#">700011427</a>
LockSpray Reference Probe	<a href="#">700012329</a>
Sample Cone	<a href="#">700011217</a>

Note: The appropriate tool free probe should also be ordered as required for the system configuration.



### NEW SELECT SERIES CYCLIC IMS

Description	P/N
SELECT SERIES Cyclic IMS Performance Maintenance Kit PM Kit consists of: Source Components, Heater Cartridge, Gaskets, Seals, Reference Probe, Probe Tips, Air Filters.	<a href="#">201000327</a>
<b>Parts and Accessories</b>	
ESI Probe Assembly 500 mm × 125 μm	<a href="#">700011241</a>
ESI Probe Assembly 750 mm × 125 μm	<a href="#">700011242</a>
ESI Probe Assembly (UPC <sup>2</sup> ) 750 mm × 50 μm	<a href="#">700011376</a>
APCI Probe, 500 mm × 125 μm	<a href="#">700011244</a>
APCI Probe, 750 mm × 125 μm	<a href="#">700011245</a>
APCI Probe (UPC <sup>2</sup> ), 750 mm × 50 μm	<a href="#">700011427</a>
LockSpray Reference Probe	<a href="#">700012329</a>
Sample Cone	<a href="#">700011217</a>

Note: The appropriate tool free probe should also be ordered as required for the system configuration.



### VION IMS Q-TOF

Description	P/N
Vion™ IMS QToF™ Performance Maintenance Kit PM Kit consists of: Source Components, ESI and Reference Probe Components	<a href="#">201000307</a>
<b>Parts and Accessories</b>	
IonSABRE II Service Kit	<a href="#">700005744</a>
APGC Service Kit	<a href="#">700004842</a>



## SYNAPT G2-S AND SYNAPT G2-Si

Description		P/N
SYNAPT G2-S/G2-Si LockSpray (Rotary) Performance Maintenance Kit	PM Kits consist of: Source Components, ESI and Reference Probe Components, and Vacuum Pump Components	<a href="#">201000254</a>
SYNAPT G2-S/G2-Si LockSpray (Scroll) Performance Maintenance Kit		<a href="#">201000255</a>
SYNAPT G2-S/G2-Si NanoLockSpray (Rotary) Performance Maintenance Kit		<a href="#">201000256</a>
SYNAPT G2-S/G2-Si NanoLockSpray (Scroll) Performance Maintenance Kit		<a href="#">201000257</a>
<b>Parts and Accessories</b>		
Outer APPI Source Service Kit		<a href="#">700004730</a>
IonSABRE II Service Kit		<a href="#">700005744</a>
APGC Service Kit		<a href="#">700004842</a>
ETD Service Kit		<a href="#">700005276</a>
MALDI Service Kit		<a href="#">700005275</a>



## SYNAPT G2

Description		P/N
SYNAPT G2 LockSpray Performance Maintenance Kit	PM Kits consist of: Source Components, ESI and Reference Probe Components, and Vacuum Pump Components	<a href="#">201000229</a>
SYNAPT G2 NanoLockSpray Performance Maintenance Kit		<a href="#">201000230</a>
<b>Parts and Accessories</b>		
Outer APPI Source Service Kit		<a href="#">700004730</a>
APCI Probe Service Kit		<a href="#">700004673</a>
APGC Service Kit		<a href="#">700004842</a>
ETD Service Kit		<a href="#">700005276</a>
MALDI Service Kit		<a href="#">700005275</a>



## XEVO G2-XS QTOF AND XEVO G2-S QTOF

Description		P/N
Xevo G2-S LS (Rotary) Performance Maintenance Kit	PM Kit consists of: Source Components, ESI and Reference Probe Components, and Vacuum Pump Components	<a href="#">201000276</a>
Xevo G2-S LS (Scroll) Performance Maintenance Kit		<a href="#">201000277</a>
Xevo G2-S NLS (Rotary) Performance Maintenance Kit		<a href="#">201000278</a>
Xevo G2-S NLS (Scroll) Performance Maintenance Kit		<a href="#">201000279</a>
<b>Parts and Accessories</b>		
Xevo G2-S ASAP Accessory		<a href="#">176002472</a>
Outer APPI Source Service Kit		<a href="#">700004730</a>
APCI Probe Service Kit		<a href="#">700004673</a>
APGC Service Kit		<a href="#">700004842</a>



## XEVO G2 QTOF

Description		P/N
Xevo G2 QToF LS (Rotary) Performance Maintenance Kit	PM Kits consist of: Source Components, ESI and Reference Probe Components, and Vacuum Pump Components	<a href="#">201000238</a>
Xevo G2 QToF LS (Scroll) Performance Maintenance Kit		<a href="#">201000239</a>
Xevo G2 QToF NLS (Rotary) Performance Maintenance Kit		<a href="#">201000240</a>
Xevo G2 QToF NLS (Scroll) Performance Maintenance Kit		<a href="#">201000241</a>
<b>Parts and Accessories</b>		
Xevo G2 QToF ASAP Accessory		<a href="#">176002472</a>
Outer APPI Source Service Kit		<a href="#">700004730</a>
APCI Probe Service Kit		<a href="#">700004673</a>
APGC Service Kit		<a href="#">700004842</a>

## Tandem Quadrupole Mass Spectrometers



### NEW XEVO TQ-GC

Description	P/N
Xevo TQ-GC Performance Maintenance Kit	
PM Kit consists of: EI Filament Assy, EI Ion Chamber, Repeller, Ceramic Spacer, Fittings, Air Filters and RE6 Rotary Pump Components. Also purchased as part of <a href="#">176004385</a> Xevo TQ-GC Perf Maint kit w/Chem which also provides test samples	<a href="#">201000325</a>
<b>Parts and Accessories</b>	
EI Filament Assembly	<a href="#">700011877</a>
Repeller, XL Source	700011883
EI Ion Chamber	<a href="#">700011878</a>
CI Filament Assembly	<a href="#">700011877</a>
CI Ion Chamber	<a href="#">700012014</a>
Purifier Module, Helium 1/8" Fittings	<a href="#">700012331</a>
Xevo TQ-GC CI Service Kit	<a href="#">700012077</a>
Rotary Pump, RE6 B-oil, 1 L	70009679
Oil Filter Insert	<a href="#">700010211</a>
Absorbent Felt	<a href="#">700010213</a>



### NEW XEVO TQ-S CRONOS

Description	P/N
Xevo TQ-S cronos Performance Maintenance Kit	
PM Kit consists of: O-rings, Seals, Filters, Aperture Disk, Calibration Pin, and nRV14i Rotary Pump Components	<a href="#">201000325</a>
<b>Parts and Accessories</b>	
ESI Probe Assembly 500 LG × 125 μm	<a href="#">700011241</a>
ESI Probe Assembly 750 LG × 125 μm	<a href="#">700011242</a>
ESI Probe Assembly (UPC <sup>2</sup> ) 750 LG × 50 μm	<a href="#">700011376</a>
Sample Cone (Reverse)	<a href="#">700012275</a>
O-ring, Viton, 10 × 1.5 C/S	<a href="#">700004321</a>
O-ring, Silicone, 009 (5/pk)	<a href="#">700004728</a>
Seal, Custom Shaft	<a href="#">700009601</a>
Lens Seal	700009602
O-ring, Viton, 28 × 1 mm	<a href="#">700009614</a>
Rotary Pump Oil	<a href="#">5560020-S</a>
Oil Filter	<a href="#">6060142</a>
APCI Probe, 500 mm × 125 μm	<a href="#">700011244</a>
APCI Probe, 750 mm × 125 μm	<a href="#">700011245</a>
APCI Probe (UPC <sup>2</sup> ), 750 mm × 50 μm	<a href="#">700011427</a>



## XEVO TQ-XS

Description	P/N
Xevo TQ-XS Performance Maintenance Kit with Chemical Kit	PM Kit consists of: Source Components <a href="#">176004023</a>
<b>Parts and Accessories</b>	
ESI Probe Assembly, 500 LG × 125 µm	<a href="#">700011241</a>
ESI Probe Assembly, 750 LG × 125 µm	<a href="#">700011242</a>
APCI Probe Assembly, 500 LG × 125 µm	<a href="#">700011244</a>
APCI Probe Assembly, 750 LG × 125 µm	<a href="#">700011245</a>



## XEVO TQ-S

Description	P/N
Xevo TQ-S (Rotary) Performance Maintenance Kit with Chemical Kit	PM Kits consist of: Source Components, ESI Probe Components, and Vacuum Pump Components <a href="#">176002745</a>
Xevo TQ-S (Scroll) Performance Maintenance Kit with Chemical Kit	<a href="#">176002744</a>
<b>Parts and Accessories</b>	
Xevo TQ-S ASAP Accessory	<a href="#">176002472</a>
Outer APPI Source Service Kit	<a href="#">700004730</a>
IonSABRE II Service Kit	<a href="#">700005744</a>
APGC Service Kit	<a href="#">700004842</a>



## XEVO TQ-S MICRO

Description	P/N
Xevo TQ-S Micro (Rotary) Performance Maintenance Kit with Chemical Kit	PM Kits consist of: Source Components, ESI Probe Components, and Vacuum Pump Components <a href="#">176003850</a>
Xevo TQ-S Micro (Scroll) Performance Maintenance Kit with Chemical Kit	<a href="#">176003851</a>
<b>Parts and Accessories</b>	
Xevo TQ-S Micro ASAP Accessory	<a href="#">176002472</a>
IonSABRE II Service Kit	<a href="#">700005744</a>
Outer APPI Source Service Kit	<a href="#">700004730</a>
APGC Service Kit	<a href="#">700004842</a>



## XEVO TQD

Description	P/N
Xevo TQD (Rotary) Performance Maintenance Kit with Chemical Kit	PM Kits consist of: Source Components, ESI Probe Components, and Vacuum Pump Components <a href="#">176002780</a>
Xevo TQD (Scroll) Performance Maintenance Kit with Chemical Kit	<a href="#">176002781</a>
<b>Parts and Accessories</b>	
Xevo TQD ASAP Accessory	<a href="#">176002472</a>
IonSABRE II Service Kit	<a href="#">700005744</a>
Outer APPI Source Service Kit	<a href="#">700004730</a>
APGC Service Kit	<a href="#">700004842</a>



## XEVO TQ

Description	P/N
Xevo TQ (Rotary) Performance Maintenance Kit with Chemical Kit	PM Kits consist of: Source Components, ESI Probe <a href="#">176002058</a>
Xevo TQ (Scroll) Performance Maintenance Kit with Chemical Kit	Components, and Vacuum Pump Components <a href="#">176002059</a>
Parts and Accessories	
APCI Probe Service Kit	<a href="#">700004673</a>
Outer APPI Source Service Kit	<a href="#">700004730</a>
APGC Service Kit	<a href="#">700004842</a>



## TQ DETECTOR (TQD)

Description	P/N
TQD (Rotary) Performance Maintenance Kit with Chemical Kit	PM Kits consist of: Source Components, ESI Probe <a href="#">176002064</a>
TQD (Oil Free) Performance Maintenance Kit with Chemical Kit	Components, and Vacuum Pump Components <a href="#">176002135</a>
Parts and Accessories	
SQD/TQD ASAP Accessory	<a href="#">176002049</a>

## Atmospheric Solids Analysis Probe (ASAP)

### INCREASE WATERS LC AND MS SYSTEM PERFORMANCE WITH COST-EFFECTIVE UPGRADES

You can extend your laboratory's sample-analysis capabilities and flexibility by fitting certain Waters SYNAPT, Xevo, SQD, and TQD Mass Spectrometers with the Atmospheric Solids Analysis Probe. When installed in the following instruments, the probe enables rapid, direct analyses of volatile and semi-volatile solid and liquid samples:

- Xevo TQ-S
- Xevo TQ-S micro
- SYNAPT G2-Si
- Xevo G2 Tof/QToF
- Xevo G2-S Tof/QToF
- Xevo G2-XS Tof/QToF
- Xevo TQD/SQ Detector 2
- SQD/TQD Instruments

Owing to the game-changing nature of ASAP, these instruments can now perform analyses that they previously could not. For a relatively low cost, ASAP increases asset utilization and provides optimum productivity.

The ASAP technique proves a good alternative to analyses that rely on an EI/CI solids probe, doing so without the need of a vacuum lock. The technique offers these additional benefits:

- High-sensitivity analysis of low-polarity or nonpolar compounds unable to be ionized by ESI, APCI, or APPI
- Direct analysis of complex mixtures—no need for sample preparation or chromatographic separation



Description	P/N
SQD/TQD/3100 ASAP Accessory	<a href="#">176002049</a>
SYNAPT G2-Si, Xevo G2 Tof/QToF, Xevo G2-S Tof/QToF, Xevo G2-XS Tof/QToF, and ASAP Accessory	<a href="#">176002472</a>
Xevo TQD, Xevo TQ-S, Xevo TQ-S micro, SQD Detector 2 ASAP Accessory	<a href="#">176003243</a>

## Tool Free Probes

Tool free probes are now available as standard for many MS instruments and it is now possible to update the following instruments with the same enhanced customer experience that is provided with current production instruments.

**XEVO TQ-S, XEVO TQD, XEVO TQ-S MICRO, XEVO G2-S, XEVO G2-XS, VION, SYNAPT G2-S, SYNAPT G2-SI**

These probes provide significant customer user experience improvements

- 2 min to change capillary now vs 30 min manual rebuild activity previously
- Better operator-to-operator reproducibility
- Improved spray stability with UPC<sup>2</sup>
- Reduced number of potential leak pathways, delivering additional robustness and reliability
- Reduced level of operator training
- Time saving at Performance Maintenance visits



Description	P/N
Upgrade to MKIII Probe - Electrospray Contains ESI probe adaptor & probes <a href="#">700011241</a> and <a href="#">700011242</a>	205001866
Upgrade to MKIII Probe - APCI Contains APCI probe adaptor & probes <a href="#">700011244</a> and <a href="#">700011245</a>	205001867
Upgrade to MKIII Probe - UPC <sup>2</sup> /ESI Contains ESI probe adaptor & probe <a href="#">700011376</a>	205001868
Upgrade to MKIII Probe - UPC <sup>2</sup> /APCI Contains APCI probe adaptor & probe <a href="#">700011427</a>	205001869

There are preconfigured kits for your convenience based on your application listed above. If you wish to run more than one ESI application, or one APCI application you only need one probe adaptor, as pictured. Simply order the listed capillary starting 700... from the other kit as needed to meet your additional application requirements.

Note: Narrowbore / low flow Electrospray probes and IVD systems cannot be updated to tool free probes at this time.

## Single Quadrupole Mass Spectrometers



### NEW RADIAN ASAP

Description	P/N
<b>RADIAN ASAP (High) Performance Maintenance Kit</b> PM Kit consists of: O-rings, Seals, Filters, Aperture Disk Assy, Calibration Pin, and RE6 Rotary Pump Components	<a href="#">201000330</a>
<b>RADIAN ASAP (Std) Performance Maintenance Kit</b> PM Kit consists of: O-rings, Seals, Filters, Aperture Disk Assy, and Calibration Pin	<a href="#">201000329</a>
<b>Parts and Accessories</b>	
Glass Capillaries, 100/pk	<a href="#">700005025</a>
Aperture Disc Assembly, 0.2 mm, Performance	<a href="#">700009768</a>
Aperture Disc Assembly, 0.09 mm, Standard	<a href="#">700009769</a>
MKII Ion Block Assembly	<a href="#">700010377</a>
Sample Cone	<a href="#">700009597</a>
Gasket, Pumping Block (Front)	<a href="#">700011132</a>
Seal, Custom Shaft	<a href="#">700009601</a>
Gasket, Ion Block	<a href="#">700009603</a>
Source Aperture Carrier	<a href="#">700009608</a>
O-ring, Viton, 28 x 1 mm	<a href="#">700009614</a>
Cone Gas Nozzle	<a href="#">700009625</a>
Cone Clamp	<a href="#">700009626</a>
Source Gas Seal	<a href="#">700009627</a>
Calibration Pin, Assy (for MKII Ion Block)	<a href="#">700011295</a>
Pumping Block Assembly	<a href="#">700009678</a>
Rotary Pump, RE6 B-oil, 1 L	<a href="#">700009679</a>
Diaphragm Pump Service Kit	<a href="#">700009680</a>
O-ring, Conductive, 7.1 x 1.6 mm	<a href="#">700009810</a>
Septa, Advanced Green, Non Stick, 11 mm	<a href="#">700009976</a>
Oil Filter Insert	<a href="#">700010211</a>
Absorbent Felt	<a href="#">700010213</a>
Gasket, Pumping Block (Rear) MKII FEPM	<a href="#">700012138</a>



## SQ DETECTOR2

Description		P/N
SQ Detector 2 (Rotary) Performance Maintenance Kit with Chemical Kit	PM Kits consist of: Source Components, ESI Probe Components, and Vacuum Pump Components	<a href="#">176002780</a>
SQ Detector 2 (Scroll) Performance Maintenance Kit with Chemical Kit		<a href="#">176002781</a>
<b>Parts and Accessories</b>		
Xevo TQD ASAP Accessory		<a href="#">176002472</a>
IonSABRE II Service Kit		<a href="#">700005744</a>
Outer APPI Source Service Kit		<a href="#">700004730</a>
APGC Service Kit		<a href="#">700004842</a>



## SQ MASS DETECTOR

Description		P/N
SQD (Rotary) Performance Maintenance Kit with Chemical Kit	PM Kits consist of: Source Components, ESI Probe Components, and Vacuum Pump Components	<a href="#">176002064</a>
SQD (Oil-free) Performance Maintenance Kit with Chemical Kit		<a href="#">176002135</a>
<b>Parts and Accessories</b>		
SQD/TQD/3100 ASAP Accessory		<a href="#">176002049</a>



## 3100 MASS DETECTOR

Description		P/N
3100 (Rotary) Performance Maintenance Kit with Chemical Kit	PM Kits consist of: Source Components, ESI Probe Components, and Vacuum Pump Components	<a href="#">176002064</a>
3100 (Oil-free) Performance Maintenance Kit with Chemical Kit		<a href="#">176002135</a>

### Increase Waters LC and MS System Performance with Cost-Effective Upgrades

Expand the analytical capabilities of your current LC, UPLC, or MS system with a cost-effective upgrade. Visit [waters.com/instrumentupgrades](http://waters.com/instrumentupgrades) for more information about Waters' wide range of upgrades and accessories.





## Time-of-Flight (ToF) Mass Spectrometers



### NEW ACQUITY RDA

Description	P/N
ACQUITY RDa Performance Maintenance Kit	<a href="#">201000325</a>
PM Kit consists of: O-rings, Seals, Filters, Aperture Disk, Calibration Pin, and nRV14i Rotary Pump Components	
<b>Parts and Accessories</b>	
Aperture Disc 0.2 mm, 5/pk	<a href="#">700012106</a>
ESI Probe Assembly 500 mm	<a href="#">700011871</a>
Sample Cone	<a href="#">700012132</a>
O-Ring, Viton, 5.5 × 1.6 C/S	700012105
Seal, Custom Shaft	<a href="#">700009601</a>
Gasket, Ion Block	<a href="#">700009603</a>
O-ring, Viton, 28 × 1 mm	<a href="#">700009614</a>
O-Ring, Viton, 7.1 × 1.6 C/S	5711180
O-Ring, Viton, 11.1 × 1.6 C/S	700009758
Cone Gas Nozzle	<a href="#">700009625</a>
Cone Clamp	<a href="#">700009626</a>
Source Gas Seal	<a href="#">700009627</a>
Restrictor	700012103
Ion Block Assembly	700012137
Pumping Block Assembly	<a href="#">700009678</a>
Gasket, Pumping Block (Front)	<a href="#">700011132</a>
Gasket, Pumping Block (Rear)	<a href="#">700012138</a>
Rotary Pump Oil	<a href="#">5560020-S</a>
Oil Filter	<a href="#">6060142</a>



### XEVO G2-XS TOF AND XEVO G2-S TOF

Description	P/N
Xevo G2-S LS (Rotary) Performance Maintenance Kit	<a href="#">201000276</a>
Xevo G2-S LS (Scroll) Performance Maintenance Kit	<a href="#">201000277</a>
Xevo G2-S NLS (Rotary) Performance Maintenance Kit	201000278
Xevo G2-S NLS (Scroll) Performance Maintenance Kit	201000279
PM Kits consist of: Source Components, ESI and Reference Probe Components, and Vacuum Pump Components	
<b>Parts and Accessories</b>	
Xevo G2-S ASAP Accessory	<a href="#">176002472</a>
Outer APPI Source Service Kit	<a href="#">700004730</a>
APCI Probe Service Kit	<a href="#">700004673</a>
APGC Service Kit	<a href="#">700004842</a>



## XEVO G2 TOF

Description		P/N
Xevo G2 ToF LS (Rotary) Performance Maintenance Kit	PM Kits consist of: Source Components, ESI and Reference Probe Components, and Vacuum Pump Components	<a href="#">201000238</a>
Xevo G2 ToF LS (Scroll) Performance Maintenance Kit		<a href="#">201000239</a>
Xevo G2 ToF NLS (Rotary) Performance Maintenance Kit		<a href="#">201000240</a>
Xevo G2 ToF NLS (Scroll) Performance Maintenance Kit		<a href="#">201000241</a>
Parts and Accessories		
Xevo G2 ToF ASAP Accessory		<a href="#">176002472</a>
Outer APPI Source Service Kit		<a href="#">700004730</a>
APCI Probe Service Kit		<a href="#">700004673</a>
APGC Service Kit		<a href="#">700004842</a>

## Magnetic Sector Mass Spectrometer



## AUTOSPEC/AUTO SPEC PREMIER

Description		P/N
AutoSpec Premier Mass Spectrometer Base Performance Maintenance Kit (Rotary)	PM Kits consist of: Vacuum Pump Maintenance Components	<a href="#">201000245</a>
AutoSpec Premier Mass Spectrometer Base Performance Maintenance Kit (Scroll)		<a href="#">201000246</a>
Parts and Accessories		
Electron Impact (EI) Source PM Kit for AutoSpec		<a href="#">201000152</a>
Chemical Ionization (CI) Source PM Kit for AutoSpec		<a href="#">201000151</a>
Alternate CI/EI (ACE) Source PM Kit for AutoSpec		<a href="#">201000153</a>
Field Desorption (FD) Source PM Kit for AutoSpec		<a href="#">201000155</a>
LSIMS/CS Gun Source PM Kit for AutoSpec		<a href="#">201000150</a>
Outer Source Service Kit		<a href="#">700005589</a>
Lock, Probe, and Valves Service Kit		<a href="#">700005590</a>
GC Interface Service Kit		<a href="#">700005591</a>

## Column and Cartridge Fittings and Accessories

### ACQUITY UPLC COLUMN IN-LINE FILTER UNIT



Description	P/N
In-line Filter Holder and six 0.2 µm Stainless Steel Replacement Filters	<a href="#">205000343</a>
Five 0.2 µm Stainless Steel Replacement Filters and End Nuts for <a href="#">205000343</a>	<a href="#">700002775</a>

### ACQUITY UPLC COLUMN REPLACEMENT PARTS



Description	P/N
Three 0.2 µm Inlet/Outlet Frits for 2.1 mm I.D. UPLC Columns	<a href="#">700003776</a>
Three 0.2 µm Inlet/Outlet Frits for 1.0 mm I.D. UPLC Columns	700003775
One Inlet End Nut for 2.1 mm I.D. UPLC Column	<a href="#">700003779</a>
One Outlet End Nut for 2.1 mm I.D. UPLC Column	700003780

### END CONNECTOR KIT (END-FITTINGS FOR CARTRIDGE COLUMNS)



Description	P/N
End Connector Kit (contains 1 Pair of End-fittings, C-clips and Coupling)	<a href="#">WAT037525</a>
Replacement O-ring, 2/pk	<a href="#">WAT023401</a>
Replacement C-clip, 1/pk	<a href="#">WAT037560</a>

### REPLACEMENT FILTER ASSEMBLIES FOR COLUMNS



Description	Porosity	P/N
2.1 mm	2 µm	600000177
2.1 mm	0.5 µm	600000178
3.0, 3.9, 4.6 mm	2 µm	600000179
3.0, 3.9, 4.6 mm	0.5 µm	<a href="#">600000180</a>
7.8 mm	2 µm	600000181
7.8 mm	5 µm	600000182
19 mm	2 µm	600000183
30 mm	2 µm	600000184

### PARKER-STYLE CARTRIDGE FITTINGS AND ACCESSORIES

You can use the end-fittings and accessories shown in the following table with these cartridge sizes:

- 46 mm (I.D.)
- 40 mm (I.D.)
- 30 mm (I.D.)



Description	P/N
Removable Column End-fitting, 2/pk	<a href="#">PSS614100</a>
Frit Assembly (2 µm), 5/pk	<a href="#">PSS614103</a>
Frit Assembly (0.5 µm), 5/pk	<a href="#">PSS614104</a>
Column Coupler, 2/pk	<a href="#">PSS614102</a>
Extended End-fitting for use with 10 mm Integral Guard, 1/pk	<a href="#">PSS614108</a>
Nylon Column Plugs for Storage of Complete Column, 1/pk	<a href="#">WAT015674</a>
Nylon Column Caps for Storage of Replacement Cartridge Column, 10/pk	<a href="#">PSS614113</a>
In-line 10 mm Guard Cartridge Holder Kit for use with above items	<a href="#">PSS830008</a>

<sup>1</sup> 30 mm Stand Alone Guard/Column (end-fittings not included).

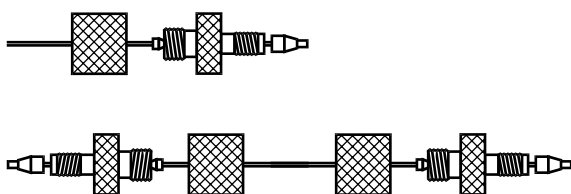
<sup>2</sup> Extended end-fitting for use with 10 mm Integral Guard, p/n: [PSS614108](#).

<sup>3</sup> 10 mm Integral Guard Column.

<sup>4</sup> Column Coupler, p/n: [PSS614102](#).

# SLIPFREE Connectors

## GENERATION HPLC COLUMN CONNECTOR



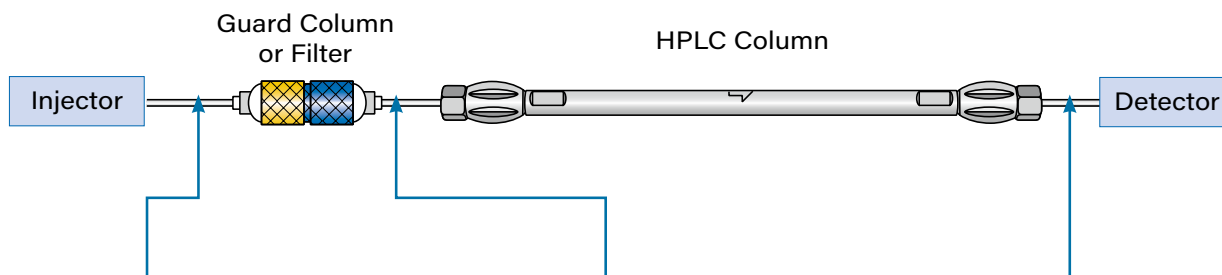
- Guarantees a void-free connection because it pushes tubing into the end-fitting (the connector is installed on the tubing at the factory)
- Fingertight to 10,000 psi—never need wrenches
- Readjusts to all column end-fittings; compatible with all tested commercially available end-fittings
- Stainless steel tread, for good stability and no particle generation
- Unique design separates tube-holding function from sealing function

SLIPFREE Fittings	P/N
Single SLIPFREE, 6 cm Long, 0.005 in. I.D.	PSL618000
Single SLIPFREE, 20 cm Long, 0.005 in. I.D.	PSL618004
Single SLIPFREE, 6 cm Long, 0.010 in. I.D.	PSL618006
Single SLIPFREE, 10 cm Long, 0.010 in. I.D.	PSL618008
Single SLIPFREE, 20 cm Long, 0.010 in. I.D.	PSL618010
Double SLIPFREE, 6 cm Long, 0.005 in. I.D.	PSL618001
Double SLIPFREE, 10 cm Long, 0.005 in. I.D.	PSL618003
Double SLIPFREE, 20 cm Long, 0.005 in. I.D.	PSL618005
Double SLIPFREE, 6 cm Long, 0.010 in. I.D.	PSL618007
Double SLIPFREE, 10 cm Long, 0.010 in. I.D.	PSL618009
Double SLIPFREE, 20 cm Long, 0.010 in. I.D.	PSL618011

0.010 in. I.D. is recommended for routine work.  
 0.005 in. I.D. is recommended for column connection to short 4.6 mm I.D. and for small-bore or microbore connections.  
 0.020 in. I.D. is recommended for prep or semi-prep connections, or for connections ahead of the injector.

### How to Use a SLIPFREE Connector

Place a SLIPFREE Connector at any location in an HPLC system where connections must be made or broken frequently. Install a single SLIPFREE Connector at the injector or at any other fitting with conventional nuts and ferrules that would require infrequent removal. Install a double SLIPFREE Connector for column coupling or places where both ends of the connector must be loosened frequently.



#### Single SLIPFREE (length as needed)

The connecting end of a single SLIPFREE Connector should be placed where connections and disconnections will be made frequently, for example, the end-fitting of a column or detector. In the image, the other end-fitting is seated within the injector, held in place by a stainless steel nut and ferrule compatible with the injector brand.

#### Double SLIPFREE (60 mm length)

Place a double SLIPFREE Connector where you will make frequent connections and disconnections at both ends of the connector, for example, between an analytical column and guard column. Very short (6 cm) connectors of small inner diameter are available, to minimize resultant dead-volume. SLIPFREE Connectors fit the end-fitting of any column, regardless of its manufacturer.

#### Single SLIPFREE (length as needed)

Place the connecting end of a single SLIPFREE Connector where you will frequently make connections and disconnections, for example, the end-fitting of a column or detector. In the image, the other end of the tubing is seated within the detector, held in place by a stainless steel nut and ferrule compatible with the detector brand. If there is not a convenient way to connect to the detector, you can attach a union.

## PEEK Tubing and Fittings

### PEEK ONE-PIECE FINGERTIGHT FITTING, 1/16-INCH, 10-32 THREAD

For the most demanding applications, we recommend the high-performance fingertight HPLC fitting. Nut and ferrule are made from a single piece of PEEK, which helps the fitting remain leak-tight at pressures as high as 6000 psi (420 bar). With the knurled head of the nut increased in diameter, to facilitate tightening without tools, it's nonetheless a genuine fingertight.

Description	P/N
PEEK Fingertight One-piece Fitting	<a href="#">186008714</a>

### PEEK TWO-PIECE FINGERTIGHT FITTINGS, 1/16-INCH, 10-32 THREAD

Two-piece fingertight fittings, with a pressure rating of 4000 psi (280 bar), allow connections by hand. The inexpensive PEEK ferrules resist wear and deformation, lasting for at least 50 connections and disconnections before they require replacement. The nuts can be reused repeatedly. Chemically inert to a high degree, the PEEK ferrule can be used with any mobile phase. This fitting provides an inexpensive alternative to traditional HPLC fittings. It fits almost all HPLC fittings, including Swagelok, Parker, Rheodyne, Beckman, Valco, Waters, etc.—all with 10-32 female threads.

Description	P/N
PEEK Single Ferrule	<a href="#">PSL613316</a>

### PEEK FITTINGS WITH DOUBLE FERRULES, 1/16-INCH, 10-32 THREAD

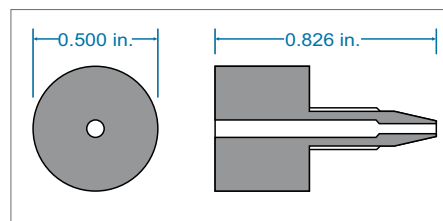
Double-ferrule fittings made of PEEK grip tubing in two places. The ferrules provide twice the holding power of single-ferrule fittings. They are ideal for use with PEEK and Tefzel tubing, which often slip when used with single-ferrule fittings. When used with stainless steel or titanium tubing, double-ferrule fittings grip tighter, creating a highly reliable connection that performs flawlessly at high pressures.

We offer both fingertight and hex-head nuts for use with double-ferrules. The fingertight version can be hand-tightened for operating pressures as high as 6000 psi. Use the hex-head version for connections that are difficult to reach or closely spaced.

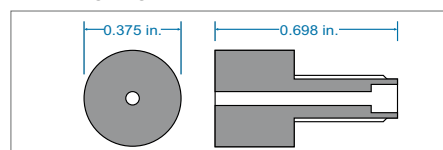
These fittings fit virtually any female 1/16-inch fitting, including Parker, Swagelok, Waters, Valco, Rheodyne, UPChurch, etc.—all with 10-32 threads.

Description	P/N
PEEK Double-ferrule	<a href="#">PSL613302</a>
PEEK Hex-head Nut	<a href="#">PSL613324</a>
PEEK Fingertight Nut	<a href="#">PSL613301</a>
Stainless Steel Fingertight Nut	<a href="#">PSL613325</a>

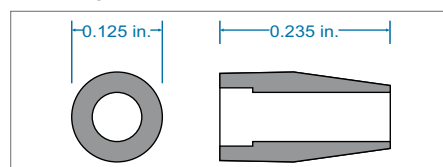
#### PEEK Fingertight One-Piece Fitting



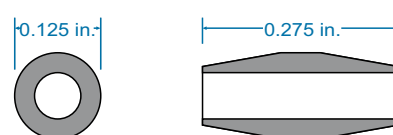
#### PEEK Fingertight Two-Piece Nut



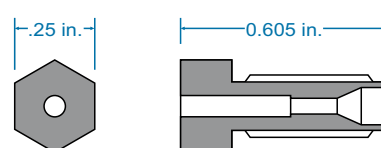
#### PEEK Single Ferrule



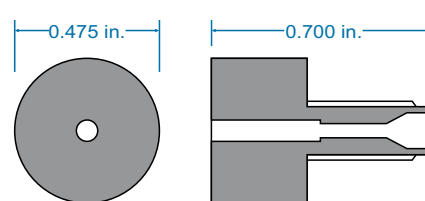
#### PEEK Double-Ferrule



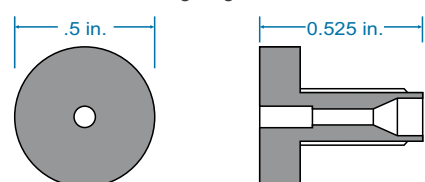
#### PEEK Hex-Head Nut



#### PEEK Fingertight Nut



#### Stainless Steel Fingertight Nut



## PTFE/ETFE Tubing and Fittings

O.D. Inches (mm)	I.D. Inches (mm)	Length/Material	P/N
0.125 (3.2)	0.062 (1.57)	25 ft. (7.6 m), PTFE	<a href="#">WAT026808</a>
0.149 (3.8)	0.119 (30.0)	25 ft. (7.6 m), PTFE	<a href="#">WAT026809</a>
0.250 (6.3)	0.190 (4.8)	10 ft. (3 m), PTFE	<a href="#">WAT026810</a>
0.080 (2.0)	0.058 (1.5)	25 ft. (7.6 m), PTFE	<a href="#">WAT026974</a>
0.178 (4.52)	0.148 (3.76)	25 ft. (7.6 m), PTFE	<a href="#">WAT051041</a>
0.149 (3.8)	0.119 (30.0)	20 ft. (6 m), PTFE	<a href="#">WAT051052</a>
0.125 (3.2)	0.020 (0.508)	10 ft. (3 m), PTFE	<a href="#">WAT088430</a>
0.125 (3.2)	0.009 (0.228)	10 ft. (3 m), PTFE	<a href="#">WAT088431</a>
0.125 (3.2)	0.040 (1.0)	10 ft. (3 m), PTFE	<a href="#">WAT088432</a>
0.062 (1.57)	0.009 (0.228)	36 in. (1 m), ETFE	<a href="#">WAT088561</a>
0.062 (1.57)	0.040 (1.0)	36 in. (1 m), PTFE	<a href="#">WAT088563</a>
PTFE Adapter, 0.125 (3.2) to 0.065 (1.6), 5/pk			<a href="#">WAT005137</a>

## Stainless Steel Tubing and Fittings

O.D. Inches (mm)	I.D. Inches (mm)	Length/Material	P/N
0.0625 (1.6)	0.005 (0.127)	10 ft. (3 m), SS	<a href="#">WAT241039</a>
0.0625 (1.6)	0.020 (0.508)	10 ft. (3 m), SS	<a href="#">WAT026804</a>
0.0625 (1.6)	0.030 (0.762)	10 ft. (3 m), SS	430000366
0.0625 (1.6)	0.040 (1.020)	10 ft. (3 m), SS	<a href="#">WAT026805</a>
0.125 (3.2)	0.062 (1.57)	10 ft. (3 m), SS	<a href="#">WAT026806</a>
0.125 (3.2)	0.093 (2.36)	10 ft. (3 m), SS	<a href="#">WAT026807</a>
0.0625 (1.6)	0.009 (0.228)	10 ft. (3 m), SS	<a href="#">WAT026973</a>
0.0625 in. O.D. Stainless Steel Tubing Cutter with 3 Blades			<a href="#">WAT022384</a>
Replacement Blades for <a href="#">WAT022384</a> , 3/pk			<a href="#">WAT022385</a>

## PEEK Tubing and Fittings

O.D. Inches (mm)	I.D. Inches (mm)	Length/Material	P/N
0.0625 (1.6)	0.005 (0.127)	5 ft. (1.5 m), PEEK	<a href="#">WAT022995</a>
0.0625 (1.6)	0.010 (0.254)	5 ft. (1.5 m), PEEK	<a href="#">WAT022996</a>
0.0625 (1.6)	0.015 (0.381)	5 ft. (1.5 m), PEEK	<a href="#">WAT022997</a>
0.0625 (1.6)	0.020 (0.508)	5 ft. (1.5 m), PEEK	<a href="#">WAT022998</a>
PEEK Tubing Cutter			<a href="#">WAT031795</a>
PEEK Tubing and Fitting Kit			<a href="#">WAT022999</a>
PEEK Union, 0.0625 in.			<a href="#">WAT026-04</a>

## Compression Screws and Ferrules

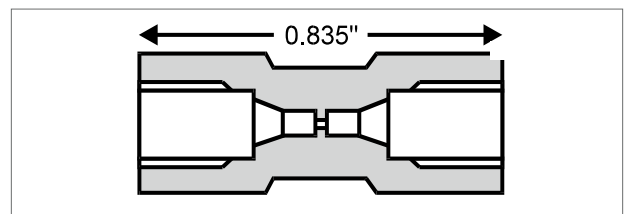
Description	P/N
Ferrule, 01, Stainless Steel, 10/pk	<a href="#">WAT005063</a>
Compression Screw, 0.0625 in., 10/pk	<a href="#">WAT005070</a>
Compression Fitting Plug, Stainless Steel, 5/pk	WAT005079
Rheodyne Ferrule, 10/pk	<a href="#">WAT007020</a>
Ferrule, Stainless Steel	<a href="#">WAT022330</a>
Ferrule, 1/16 in. O.D., PEEK	<a href="#">WAT021817</a>
Compression Screw, Stainless Steel	<a href="#">WAT025313</a>
Compression Fitting Plug, Stainless Steel	WAT025566
Compression Screws and Ferrules, 0.166 in., 5/pk	<a href="#">WAT025604</a>
Compression Screws, 0.125 in., PEEK, 2/pk	<a href="#">WAT046-12</a>
Compression Screw, Long, 1/16 in.	<a href="#">WAT021812</a>
Compression Screw, Short, PEEK 1/16 in.	<a href="#">WAT021815</a>
Extra Long Compression Screw, Stainless Steel, 10/pk	<a href="#">WAT060051</a>
Finger Tight Poly Knob Used with Compression Screws Plus PEEK Ferrules	<a href="#">WAT021816</a>
Tee, 0.0625 in. Compression Screw, Stainless Steel	<a href="#">WAT075215</a>
Tubing Cap, Hex Stainless Steel	<a href="#">WAT084078</a>
Union, 0.0625 in. Stainless Steel	<a href="#">WAT097332</a>

## PEEK UNIONS, TEES, AND CROSSES

Inert and biocompatible PEEK unions can withstand operating pressures as high as 6000 psi (420 bar). PEEK tees and crosses can withstand pressures as high as 10,000 psi (690 bar).

PEEK unions, tees, and crosses share these features:

- Connect any 1/16-inch tubing (PEEK, stainless steel, titanium, or Tefzel)
- Low dead volume
- 10–32 thread

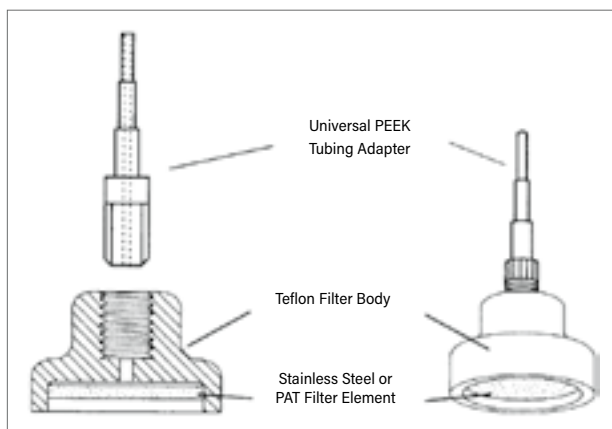


Description	P/N
PEEK Union with 2 PEEK Fingertight Nuts and Double Ferrules 1/16 in.	<a href="#">PSL613312</a>
PEEK Union without Nuts and Ferrules 1/16 in.	<a href="#">PSL613313</a>
PEEK TEE with One-piece Fingertight Fitting	<a href="#">PSL613317</a>
PEEK CROSS with One-piece Fingertight Fitting	<a href="#">PSL613319</a>
PEEK TEE without Fittings	<a href="#">PSL613318</a>
PEEK CROSS without Fittings	<a href="#">PSL613320</a>
PEEK One-piece Fingertight Fitting	<a href="#">186008714</a>

## Filters

### LAST DROP MOBILE PHASE FILTERS

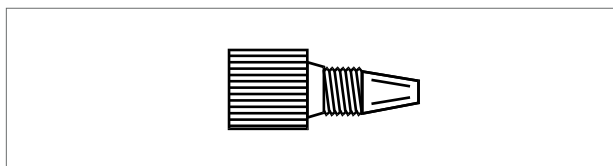
The Last Drop mobile-phase filter incorporates a flat filter element set parallel to the bottom of a reservoir. This design allows the filter to draw all but the last 2% of mobile phase from the reservoir without drawing air into the system. Last Drop filters are available with 316 L stainless steel or PAT (PEEK alloyed with Teflon) filter elements in inert Teflon housings. The top of the housing incorporates a PEEK tripod that fits into pump inlet lines with inner diameters of 1.5, 2.2, or 3.5 mm.



Description	P/N
Filter with 2 $\mu$ m Stainless Steel Filter	<a href="#">PSL901290</a>

### HANDILOK CTFE FITTINGS

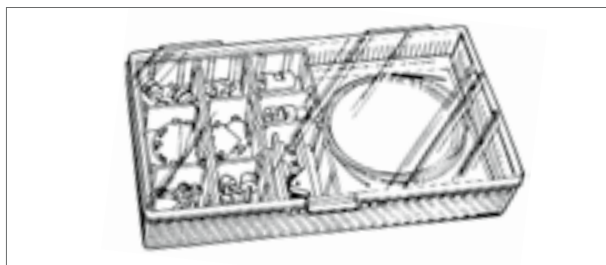
Handilok fittings can replace, without the need for tools, conventional compression fittings used with 1/16-inch tubing. Compatible with all internal fittings with a 10–32 thread, these fittings meet rigid high-pressure requirements, withstanding pressures greater than 4000 psi (280 bar).



Handilok Fittings	P/N
1/16 in. Fitting, 1/pk	<a href="#">PSL618021</a>
1/16 in. Fitting, 10/pk	<a href="#">PSL618022</a>

### PEEK STARTER KIT

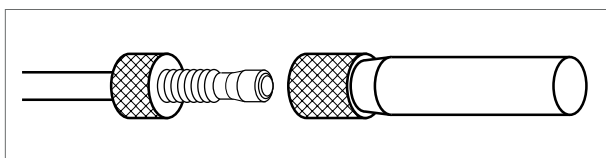
By replacing stainless steel parts, such as tubing, fittings, ferrules, mobile-phase filters, in-line filters, etc., you create a biocompatible, metal-free environment for samples and mobile phases. In a sturdy plastic case, the PEEK Starter Kit contains items that all biochromatographers will find helpful. Purchasing this kit earns you savings of 25% of the cost of purchasing its components individually.



Description	P/N
PEEK Starter Kit	<a href="#">PSL613321</a>
<b>Contains the following:</b>	
PEEK Fingertight One-piece, 6/pk	
PEEK Handtight Nut, 4/pk	
PEEK Hex-head Nut, 4/pk	
PEEK Double Ferrules, 20/pk	
PEEK Tubing 1/16 in. $\times$ 0.25 mm (1 $\times$ 3 m)	
PEEK Tubing 1/16 in. $\times$ 0.50 mm (1 $\times$ 3 m)	
PEEK Union, 1/pk	
Elbow 90 Degrees, 2/pk	
Elbow 180 Degrees, 2/pk	
Guillotine Cutter, 1/pk	
PAT Mobile Phase Filter—"Last Drop", 1/pk	

### PEEK BIOCOMPATIBLE MOBILE PHASE FILTER

The PEEK Biocompatible Mobile Phase Filter protects an HPLC pumping system against particulate matter in a mobile phase. Many macromolecules are fairly labile and require not only biocompatible chromatographs but also mobile-phase filters that are absolutely inert. These filters are designed from inert polymeric components, which effectively eliminate metal from the fluid path. With a porosity of 5  $\mu$ m, all fittings (including the inlet tube) are composed of perfectly inert PEEK.

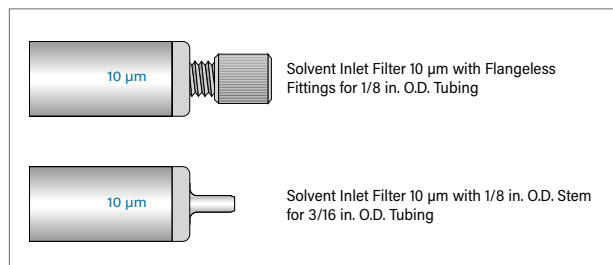


Description	P/N
Biocompatible Mobile Phase Filter	<a href="#">PSL901282</a>

## SOLVENT INLET FILTERS

It's good practice to always filter solvents, to avoid damaging the pump. Solvent inlet filters, with a porosity of 10  $\mu\text{m}$ , provide the necessary pump protection, and their large surface area ensures long life without pump cavitation.

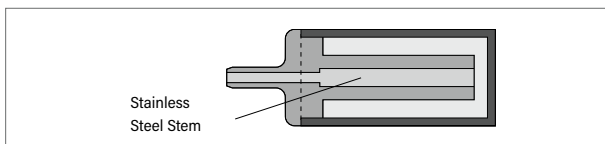
Filters should be changed periodically, depending on usage and mobile phase. Replacing the filter is easy; no tools are needed. The unique Plastictight male nut is screwed into the filter and tightened by hand. Finger tightening is sufficient; the Plastictight fitting holds without flanging.



## BOTTOM-OF-THE-BOTTLE SOLVENT FILTERS

Our Bottom-of-the-Bottle Solvent Filter is designed after the original Bottom-of-the-Bottle replaceable filters. This unique filter is fitted with a stainless steel stem on top, to accommodate 1/16-inch (I.D.) tubing. A lower stem, which goes directly into the filter, reaches to within 0.06 inches of the Bottom-of-the-Bottle filters. The 10  $\mu\text{m}$  filter can easily accommodate flow rates as high as 10 mL/min.

Description	P/N
<b>Solvent Inlet Filter Kits</b>	
Assy, Solvent Filter	<a href="#">WAT025531</a>
Plastictight Fitting with Teflon Tubing 1/16 in. I.D. $\times$ 1/8 in. O.D. $\times$ 3 ft.	<a href="#">PSL613602</a>
Replacement Filter 10 $\mu\text{m}$ , 5/pk	<a href="#">PSL613604</a>
<b>Solvent Inlet Filters for General Use</b>	
Solvent Inlet Filter 10 $\mu\text{m}$ with 1/16 in. O.D. Stem for 1/8 in. O.D. Tubing	<a href="#">PSL613570</a>
Solvent Inlet Filter 10 $\mu\text{m}$ with Flangeless Fittings for 1/8 in. O.D. Tubing	<a href="#">PSL613578</a>
<b>Solvent Inlet Filters for Preparative HPLC</b>	
Solvent Inlet Filter 10 $\mu\text{m}$ with 1/16 in. O.D. Stem for 1/8 in. O.D. Tubing	<a href="#">PSL613607</a>
Solvent Inlet Filter 10 $\mu\text{m}$ with Flangeless Fittings for 1/8 in. O.D. Tubing	<a href="#">PSL613608</a>
<b>Solvent Inlet Filters for Waters HPLC Systems</b>	
Solvent Inlet Filter 10 $\mu\text{m}$ with 1/8 in. O.D. Stem for 3/16 in. O.D. Tubing	<a href="#">PSL613609</a>



Bottom-of-the-Bottle Solvent Filter	P/N
Stainless Steel Filter Assembly	<a href="#">PSL613457</a>

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Indices

# Contents

Alphabetical Index.....[457](#)

Part Number Index.....[463](#)

# Alphabetical Index

<b>≥3 μm Analytical HPLC Columns</b> .....	<b>181</b>	XBridge Oligonucleotide BEH Columns.....	154	Vials for Fixed-Loop-Needle ACQUITY Systems .....	61
Application-Specific Columns .....	493	XBridge Peptide BEH <i>XP</i> Columns.....	150	Vials for Flow-Through-Needle ACQUITY Systems .....	64
Atlantis Columns .....	207	XBridge Protein BEH Columns .....	142	<b>ACQUITY UPLC H-Class</b>	
Cartridge Columns, Fittings and Accessories .....	240	XSelect CSH Peptide <i>XP</i> Columns.....	159	Sub-2 μm-Columns .....	105
Delta-Pak Columns .....	234	XSelect CSH <i>XP</i> Method Validation Kits.....	160	Vials for Fixed-Loop-Needle ACQUITY Systems.....	61
Ion Analysis Columns.....	494, 500	XSelect CSH <i>XP</i> VanGuard Cartridges.....	161	Vials for Flow-Through-Needle ACQUITY Systems.....	64
μBondapak/Bondapak Columns.....	235	XSelect HSS <i>XP</i> Columns.....	155	ACQUITY UPLC H-Class Bio.....	
μPorasil/Porasil Columns .....	237	XSelect HSS <i>XP</i> Method Validation Kits.....	166	Sub-2 μm-Columns .....	105
Nova-Pak Columns.....	232	XSelect HSS <i>XP</i> VanGuard Cartridges.....	167	Vials for Fixed-Loop-Needle ACQUITY Systems.....	61
PAH Columns.....	499	XSelect Peptide HSS <i>XP</i> Columns.....	162	Vials for Flow-Through-Needle ACQUITY Systems.....	64
Peptide Columns.....	385	XTerra Columns.....	174	<b>ACQUITY UPLC I-Class</b>	
Resolve Columns .....	233	XTerra Method Validation Kits.....	177	CORTECS UPLC Columns .....	106
Shodex RSpak Polymer Reversed-Phase Columns.....	237	XTerra VanGuard Cartridges .....	177	Vials for Fixed-Loop-Needle ACQUITY Systems.....	61
Spherisorb Columns.....	227	<b>8 × 100 Cartridge Holder, Parts, and Accessories</b> .....	<b>305</b>	Vials for Flow-Through-Needle ACQUITY Systems .....	64
SunFire Columns.....	211	<b>96-well Plates</b> .....	<b>57</b>	<b>ACQUITY UPLC M-Class</b>	
Symmetry Columns.....	216	<b>μBondapak/Bondapak Columns</b> .....		ACQUITY UPLC M-Class Columns.....	488
XBridge Columns.....	181	≥3 μm Analytical HPLC Columns .....	181	HDX Technology .....	490
XSelect Columns .....	196	≥5 μm Preparative HPLC Columns .....	249	LC-MS Accessories.....	491
XTerra Columns.....	221	<b>μElution 96-well Plates</b> .....	<b>17</b>	Trap Columns .....	488
<b>≥5 μm Preparative HPLC Columns</b> .....	<b>247</b>	<b>μPorasil/Porasil Columns</b> .....		Vials for Fixed-Loop-Needle ACQUITY Systems .....	61
AccellPlus PrepPak Cartridges.....	450	≥3 μm Analytical HPLC Columns .....	181	Vials for Flow-Through-Needle ACQUITY Systems .....	64
Atlantis Columns .....	281	≥5 μm Preparative HPLC Columns .....	249	<b>Advanced Purification (AP) Glass Columns</b> .....	<b>448</b>
Delta-Pak Columns .....	301	<b>A</b>		<b>Alcohols Columns</b> .....	<b>497</b>
Gas Chromatography Packings .....	304	<b>AccellPlus</b> .....	<b>20, 27, 324, 450</b>	<b>Amino Acids Analysis</b> .....	<b>501</b>
μBondapak/Bondapak Columns.....	299	<b>AccellPlus Ion-Exchange Bulk Packings</b> .....	<b>451</b>	<b>Analysis Cartridge Column</b> .....	<b>495</b>
μPorasil/Porasil Columns .....	299	<b>AccellPlus PrepPak Cartridges</b> .....	<b>450</b>	<b>Andrew+ Pipetting Robot and Automation Kits</b> .....	<b>44</b>
Nova-Pak Columns.....	299	<b>AccQ-Tag Amino Acid Analysis Using HPLC</b> .....	<b>344</b>	<b>Application-Specific Columns</b> .....	<b>495</b>
Peptide Columns.....	390, 392	<b>AccQ-Tag Amino Acid Analysis Using UPLC</b> .....	<b>343</b>	Sugar and Carbohydrate Analysis.....	495
Radial Compression-Module Products.....	305	<b>AccQ-Tag Derivitization Kit</b> .....	<b>343</b>	Fermentation Analysis, Organic Acids, Alcohols, and Carbohydrates.....	497
Spherisorb Columns.....	295	<b>AccQ-Tag Ultra 2.5 μm</b> .....	<b>344</b>	Free Fatty Acid Analysis.....	498
SunFire Columns.....	276	<b>ACQUITY APC</b>		Ion Analysis.....	500
Symmetry Columns.....	291	ACQUITY APC AQ Columns.....	464	Polyaromatic Hydrocarbon Analysis.....	499
XBridge Columns.....	264	ACQUITY APC XT Columns.....	455	<b>Application-Specific Kits</b>	
XSelect Columns .....	266	ACQUITY APC Calibration Standards.....	476	ACQUITY UPLC Biphenol A Column and Method Kits .....	522
XTerra Columns.....	285	Vials for Fixed-Loop-Needle ACQUITY Systems.....	61	Beverage Analysis Kit.....	522
<b>2.x μm Columns and Consumables</b> .....	<b>130</b>	Vials for Flow-Through-Needle ACQUITY Systems.....	64	Carbamate Analysis Kits.....	523
AccQ-Tag Ultra 2.5 μm .....	343, 507	<b>ACQUITY UPC<sup>2</sup></b>		EPA Method 1694 Analysis Kit .....	523
BioResolve RP mAb Polyphenyl Columns .....	406, 435	Columns.....	311	GlycoWorks <i>Rapi</i> Fluor-MS N-Glycan Kits... ..	362
BioResolve SCX Columns.....	435-441	Quality Control Reference Materials.....	316	ProteinWorks SAMPLE PREPARATION KITS.....	514
Column Selection Guide .....	131	Standards for SFC and UPC <sup>2</sup> Systems.....	317	SARS-CoV-2 LC-MS Kit.....	519
CORTECS 2.7 μm Columns.....	132	<b>ACQUITY UPLC</b>		UPLC Amino Acid Solution.....	342
CORTECS 2.7 μm Method Validation Kits.....	138	Sub-2 μm-Columns .....	113	Therapeutic Peptide Method Development Kits .....	516
CORTECS 2.7 μm VanGuard Cartridges.....	141	In-Line Filter Unit.....	578		
SunFire Columns.....	169	Method Development Kits.....	127		
SunFire Columns Method Validation Kits.....	173	Method Validation Kits.....	123		
SunFire VanGuard Cartridges .....	173	Quality Control Reference Materials.....	115		
Universal VanGuard Cartridge Holder .....	173	VanGuard Pre-columns.....	180, 241		
XBridge BEH <i>XP</i> Columns .....	142				
XBridge BEH <i>XP</i> Glycan Columns.....	150				
XBridge BEH <i>XP</i> Method Validation Kits .....	152				
XBridge BEH VanGuard Cartridges .....	154				

<b>Atlantis Columns</b>			
≥3 μm Analytical HPLC Columns .....	181		
≥5 μm Preparative HPLC Columns .....	249		
Method Validation Kits .....	210		
VanGuard Cartridges.....	406		
<b>Autosampler Vials for Compatible Systems... 75</b>			
<b>Autosampler Vials for Waters Systems .....72</b>			
<b>B</b>			
<b>BEH Particle Technology ..... 469</b>			
ACQUITY UPLC BEH Columns.....	116		
XBridge BEH Columns .....	180		
<b>Biomolecule Purification, Characterization, and Analysis..... 323</b>			
AccellPlus Ion-Exchange Bulk Packings.....	451		
AccellPlus Ion-Exchange Packings.....	450		
AccellPlus PrepPak Cartridges.....	450		
AccellPlus Sep-Pak Cartridges.....	450		
AccQ-Tag Derivatization Kit.....	349		
AccQ-Tag Ultra Amino Acid Analysis Using HPLC.....	503		
AccQ-Tag Ultra Amino Acid Analysis Using UPLC.....	502		
ACQUITY UPLC SEC System Solution.....	427		
Advanced Purification (AP) Glass Columns.....	448		
Amino Acid Analysis.....	340		
BioResolve Columns.....	325		
BioSuite Columns.....	398, 418, 431		
Capillary, Nano, and Trapping Columns.....	488		
Certified Containers.....	492		
Columns for Large DNA/RNA Species.....	380		
Cytochrome c Digestion Standard.....	402		
Nucleic Acid Separations.....	375		
Enzymate Pepsin Online Digestion Column.....	490		
Gen-Pak FAX Anion-Exchange Columns.....	380		
Glycan Separations.....	353		
Glycoprotein Separations.....	353		
GlycoWorks Kits.....	361		
iKey Separation Device.....	486		
Insulin HMWP HPLC Column.....	429		
Ion-Exchange Columns.....	380, 435, 443		
Ion-Exchange Standards.....	443		
ionKey.....	485		
ionKey/MS.....	485		
MassPREP Oligonucleotide Standard.....	384		
MassPREP Peptide Standard.....	402		
MassPREP Phosphopeptide Standard.....	405		
MassPREP Protein Standard Mix.....	415		
Nano and Micro-Flow Columns and Trapping Columns.....	488		
nanoEase M/Z Columns.....	488		
Oasis μElution Plates.....	384		
Oligonucleotide Separations.....	375		
Peptide Separations.....	385		
Pico-Tag HPLC Method.....	350		
Protein-Pak Hi Res HIC Column and HIC Protein Standard.....	417		
Protein-Pak Hi Res Ion-Exchange (IEX) Columns.....	442		
Protein-Pak High Resolution (HR) UPLC Columns.....	417		
Protein-Pak HR Ion-Exchange Glass Columns.....	447		
Protein Separations.....	412		
Protein Test Mixtures.....	417		
RapiGest SF Protein Digestion Surfactant.....	402		
Symmetry300 C <sub>4</sub> HPLC Columns.....	434		
Symmetry HPLC and UHPLC Columns.....	400		
Therapeutic Peptide Method Development Kits .....	516		
TruView LCMS Certified Vials.....	491		
Ultrahydrogel HPLC Columns.....	473		
XBridge Protein BEH SEC, 125 Å, 200 Å.....	466		
<b>BioResolve Columns and Buffers</b>			
BioResolve CX pH Buffer Concentrates.....	438		
BioResolve SEC mAb Columns.....	426		
RP mAb Polyphenyl Columns.....	406		
SCX mAb Columns.....	435		
<b>BioSuite</b>			
BioSuite HPLC and UHPLC Peptide Analysis Columns .....	399		
Hydrophobic-Interaction Chromatography HPLC Columns.....	452		
Ion-Exchange HPLC Columns .....	445		
pC18 and pPhenyl RPc HPLC Columns.....	452		
Size-Exclusion Chromatography (SEC) HPLC Columns.....	471		
<b>Bottom-of-the-Bottle Solvent Filters ..... 528</b>			
<b>Bulk Sorbents</b>			
Graphitized Carbon Black.....	38		
Oasis.....	8		
PoraPak Rxn.....	34		
<b>C</b>			
<b>Cap Mats Roller ..... 71</b>			
<b>Capillary, Nano, and Trapping Columns..... 488</b>			
<b>Carbamate Analysis Kits..... 523</b>			
Environmental Testing.....	523		
Food Testing.....	523		
<b>Carbohydrate Analysis Column..... 495</b>			
<b>Cartridge Columns..... 240</b>			
<b>Cartridge Columns and Guard Holders..... 240</b>			
<b>Cartridge Columns, Fittings and Accessories ...</b>			
Cartridge Columns and Guard Holder.....	240		
Guard-Pak Holder and Inserts.....	246		
Sentry Guard Cartridges.....	244		
Spherisorb Cartridge and Guard Columns.....	240		
VanGuard Pre-columns and Cartridges.....	241		
<b>Cation Analysis..... 500</b>			
<b>Certified Containers..... 82</b>			
<b>Certified Sep-Pak Solid-Phase Extraction (SPE) Cartridges..... 31</b>			
<b>Certified Sep-Pak Sorbent Selection Guide... 32</b>			
<b>Certified Vials..... 53</b>			
<b>Charged Surface Hybrid Particle Technology..... 86</b>			
<b>Chiral Methods Using Trefoil Columns..... 319</b>			
<b>Column and Cartridge Fittings and Accessories</b>			
ACQUITY UPLC Column In-line Filter Unit..	578		
ACQUITY UPLC Column Replacement Parts.....	578		
End Connector Kit (End Fittings for Cartridge Columns).....	578		
Replacement Filter Assemblies for Columns .....	578		
<b>Column Configurations ..... 83</b>			
<b>Column L/dp Comparison Chart ..... 92</b>			
<b>Column Nomenclature ..... 91</b>			
<b>Column Selection Guide..... 87, 131</b>			
<b>Columns</b>			
μBondapak/Bondapak Columns.....	235, 299		
μPorasil/Porasil Columns .....	237, 299		
ACQUITY UPLC Columns.....	113		
Amino Acid Analysis Columns.....	501		
Analysis Cartridge Columns .....	495		
APC Columns.....	464		
Application-Specific Columns.....	494		
Atlantis Columns.....	180, 207		
BioResolve Columns.....	406, 435		
Carbohydrate Analysis Column.....	495		
Cartridge Columns.....	495		
Cartridge Columns and Guard Holders.....	240		
Cartridge Columns, Fittings and Accessories.....	240		
Column Configurations .....	91		
Column Nomenclature .....	91		
Column Selection Guide .....	131		
CORTECS 2.7 μm Columns .....	132		
CORTECS UPLC .....	108		
Delta-Pak Columns .....	234		
Nucleic Acid Separations .....	375		
Envirogel High-Resolution GPC Cleanup Columns .....	463		
Fermentation Analysis, Organic Acids, Alcohols, and Carbohydrates Columns .....	495		
Free Fatty Acids Columns .....	498		
Glycan Analysis Columns.....	98		
Guard Cartridges .....	244		
Guard Column Fittings and Accessories .....	224		
Guard-Pak Holder and Inserts .....	246		
HPLC Columns .....	247		
HSPgel Columns .....	461		
HSPgel Columns for High-Speed GPC Analysis .....	461		
Insulin HMWP HPLC Columns .....	429		
Ion Analysis .....	500		
Ion-Exclusion Columns .....	500		
Nova-Pak Columns .....	232		
Oligonucleotides Separations Columns .....	334		
PAH Columns .....	499		

Particle Technologies .....	85	DNA, RNA, and Oligonucleotides .....	379	<b>H</b>	
Peptides Separations Columns .....	385	<b>E</b>		<b>Handilok CTFE Fittings .....</b>	<b>582</b>
Polyaromatic Hydrocarbon Analysis Columns .....	499	<b>End Connector Kit (End-Fittings for Cartridge Columns).....</b>	<b>578</b>	<b>High-Performance Carbohydrate Analysis Cartridge Column .....</b>	<b>495</b>
Prep Nova-Pak HR Columns .....	299	<b>Envirogel High-Resolution GPC Cleanup Columns.....</b>	<b>463</b>	<b>High Strength Silica Particle Technology .....</b>	<b>86</b>
<b>Preparative Columns</b>		<b>Environmental and Food Solution Kits</b>		<b>HILIC QC Reference Material .....</b>	<b>109</b>
Protein Separations Columns .....	406	ACQUITY UPLC Bisphenol A Column and Method Kits .....	522	<b>Holder for 12 x 32 mm Vials .....</b>	<b>71</b>
Resolve Columns .....	233	Beverage Analysis Kit.....	522	<b>HPLC Columns and Consumables .....</b>	
SEC Columns .....	422	Carbamate Analysis Kit.....	523	≥3 μm HPLC Analytical Columns .....	181
Sentry Guard Cartridges .....	244	EPA Method 1694 Analysis Kit.....	523	≥5 μm Preparative HPLC Columns .....	249
Shodex GPC Columns .....	463	<b>Ethylene Bridged Hybrid Particle Technology.....</b>	<b>85</b>	μBondapak/Bondapak Columns .....	235
Shodex RSPak Polymer Reversed-Phase Columns .....	237	<b>Enzymate Pepsin Online Digestion Column .....</b>	<b>490</b>	μPorasil/Porasil Columns .....	237
Spherisorb Cartridge Columns .....	240	<b>eXtended Performance [XP] Columns</b>		Anion Analysis.....	500
Spherisorb Columns.....	227, 295	XBridge BEH.....	142, 181, 428	Application-Specific Columns .....	495
Styragel Columns for Polymer Characterization .....	457	XSelect CSH.....	155-160	Atlantis HPLC Columns .....	281
Sugar and Carbohydrate Analysis Columns .....	495	XSelect HSS.....	155, 164-167	Carbamate Analysis Kit for Environmental Testing.....	523
SunFire Columns .....	169, 211, 276	<b>Extraction Cartridges Manifold and Accessories .....</b>	<b>36</b>	Carbamate Analysis Kit for Food Testing.....	523
Symmetry Columns .....	216, 291	<b>Extraction Manifolds Spare Parts.....</b>	<b>35</b>	Cartridge Column Fittings and Accessories .....	240
Torus Columns .....	312, 314	<b>Extraction Plate Manifold and Accessories... 35</b>		Cartridge Columns .....	240
Trefoil Columns .....	318	<b>F</b>		Cation Analysis .....	500
Ultrahydrogel Columns .....	473	<b>Fatty Acid Analysis.....</b>	<b>498</b>	CORTECS Columns.....	241
Ultrastayragel Columns .....	460	<b>Fermentation Analysis Columns, Alcohols, and Carbohydrates.....</b>	<b>497</b>	Delta-Pak Columns .....	234
UPLC Columns .....	86	<b>Filter Design and Membrane Choices .....</b>	<b>40</b>	Fermentation Analysis, Organic Acids, Alcohols, and Carbohydrates .....	497
USP "L" Column Listing.....	87	<b>Filters</b>		Free Fatty Acid Analysis .....	498
VanGuard Pre-columns.....	241	Bottom-of-the-Bottle Solvent Filters.....	528	Gas-Chromatography Packings .....	304
XBridge Columns .....	142, 181, 253	Handilok CTFE Fittings.....	582	Guard Column Fittings and Accessories ...	240
XP 2.5 μm Columns .....	142, 155, 162	Last Drop Mobile Phase Filters.....	582	Guard Holders .....	244
XSelect Columns .....	155, 196, 266	PEEK Biocompatible Mobile Phase Filter ...	582	Guard-Pak Holder and Inserts .....	246
XTerra Columns .....	174, 221, 285	Solvent Inlet Filters.....	583	High-Performance Carbohydrate Analysis Cartridge Column .....	495
<b>Column Particle Technology .....</b>	<b>85</b>	Waters/Pall Life Sciences Sample and Solvent Filtration Products.....	39	Ion Analysis Columns .....	500
<b>Columns for Large DNA .....</b>	<b>380</b>	<b>Free Fatty Acid HP Column.....</b>	<b>498</b>	Ion-Exclusion Columns .....	500
<b>Compression Screws and Ferrules .....</b>	<b>526</b>	<b>G</b>		Nova-Pak Columns .....	232
<b>CORTECS</b>		<b>Gas-Chromatography Packings .....</b>	<b>304</b>	PAH Columns .....	499
CORTECS UPLC 1.6 μm Columns .....	108	<b>Gen-Pak FAX Anion-Exchange Columns .....</b>	<b>380</b>	Resolve Columns .....	233
CORTECS 2.7 μm Columns .....	132	<b>Glass Cartridges for PPT Detection Levels.....</b>	<b>18</b>	Sentry Guard Cartridges .....	245
CORTECS 2.7 μm Method Validation Kits.....	123, 138	<b>Glycan Analysis Standards.....</b>	<b>98</b>	Shodex Columns .....	463
CORTECS 2.7 μm VanGuard Cartridges..	112, 141	<b>Glycans and Glycoprotein Analysis .....</b>	<b>353</b>	Spherisorb Cartridge Columns .....	227, 240
<b>CSH Particle Technology .....</b>	<b>86</b>	<b>Glycoprotein Performance Test Standard....</b>	<b>360</b>	Sugar and Carbohydrate Analysis.....	495
<b>Cytochrome c Digestion Standard .....</b>	<b>402</b>	<b>GlycoWorks Kits.....</b>	<b>365</b>	SunFire HPLC Columns .....	211
<b>D</b>		<b>GPC Columns for Non-Aqueous Samples....</b>	<b>455</b>	Symmetry HPLC Columns .....	216
<b>Delta-Pak</b>		<b>Guard-Pak Holder and Inserts.....</b>	<b>246</b>	USP "L" Column Listing .....	87
≥3 μm Analytical HPLC Columns .....	181	<b>Guide to Shodex Sugar Columns.....</b>	<b>495</b>	XBridge Columns .....	181
≥5 μm Preparative HPLC Columns .....	249			XP 2.5 μm Columns .....	142, 155
Delta-Pak HPLC and UHPLC Columns .....	401			XSelect Columns .....	196, 266
Radial Compression Column Segments.....	307			XTerra Columns .....	221, 285
<b>Dispersive Sample Preparation.....</b>	<b>37</b>			<b>HSPgel Columns .....</b>	<b>454, 461</b>
<b>DisQuE Sample Preparation</b>				<b>HSS Particle Technology .....</b>	<b>86</b>
<b>Solutions for QuEChERS .....</b>	<b>37</b>			<b>iKey Separation Device .....</b>	<b>485</b>
Extraction and Cleanup Tubes and Pouches.....	38			<b>In-line Guard Cartridge Holder .....</b>	<b>240</b>
Kitted Solutions.....	37				
<b>DNA/RNA Species Columns.....</b>	<b>379</b>				

Insulin HMWP HPLC Column .....	429	nanoEase M/Z Columns .....	488	Ozone Scrubber Cartridges .....	29
<b>Intelligent Technology</b>		nanoEase M/Z Trap Columns.....	489	<b>P</b>	
Ion Analysis .....	500	Trapping Columns .....	488	PAH Columns .....	499
Anion Analysis .....	500	nanoEase M/Z Columns.....	488	<b>Particle Technology</b> .....	85
Cation Analysis .....	500	<b>Neutrals QC Reference Materials</b> .....	119, 122	BEH (Ethylene Bridged Hybrid).....	85
<b>Ion Analysis Columns</b> .....	500	<b>NIST Digestion Standards</b> .....	404	CSH (Charged Surface Hybrid).....	86
<b>Ion-Exchange</b>		<b>Normal-Phase SunFire Silica</b>		HSS (High Strength Silica).....	86
AccellPlus Ion-Exchange		<b>OBD Preparative Columns</b> .....	276	<b>PEEK</b>	
Bulk Packings .....	451	<b>Nova-Pak</b> .....		Biocompatible Mobile Phase Filter.....	527
Glass Columns .....	446	≥3 μm Analytical HPLC Columns .....	181	Compression Screws and Ferrules.....	526
<b>Ion Exclusion</b> .....	497	≥5 μm Preparative HPLC Columns .....	249	Fittings with Double-Ferrules.....	525
<b>IonHance</b> .....		Radial Compression Column Segments		One-piece Finger-tight Fitting .....	526
IonHance CX-MS Buffers.....	439	and PrepPak Cartridges .....	307	Tubing and Fittings.....	524
IonHance Difluoroacetic Acid.....	410	<b>Nucleic Acid Separations</b> .....	375	Unions, Tees, and Crosses.....	526
IonHance Glycan C <sub>18</sub> AX Ammonium		MaxPeak Premier Oligonucleotide		Stainless Steel Tubing and Fittings.....	525
Formate Concentrate .....	367, 369	BEH Columns .....	333	<b>Peptide Mapping</b>	
<b>ionKey</b> .....	485	Oligonucleotide BEH Columns.....	334	see Peptide Analysis .....	385
<b>L</b>		<b>O</b>		<b>Peptide Separations</b> .....	385
L/dp Comparison Chart for Columns .....	92	Oasis Solid-Phase Extraction		<b>Pesticide Analysis</b> .....	23
Last Drop Mobile Phase Filters .....	527, 582	(SPE) Products.....	8	<b>pH Buffers</b> .....	492
LC/GC Certified Vials .....	53	μElution 96-well Plates.....	17	<b>Pico-Tag HPLC Method</b> .....	350
LCMS Certified Vials .....	53	μElution Plates for Oligonucleotides.....	384	<b>Pipette+</b> .....	46
<b>M</b>		2 × 4 Method Development Protocol .....	16	<b>Plates</b> .....	62, 63, 65, 71, 74
<b>MassPREP</b>		Analysis/Column/Method		<b>PoraPak RDX Sep-Pak Extraction Cartridge</b> ..	29
Digestion Standard Mixtures.....	404	Development Kits .....	522	<b>PoraPak Rxn Bulk Material</b> .....	34
Oligonucleotide Standard.....	384	Bulk Sorbents.....	18	<b>PoraPak Rxn Cartridges</b> .....	34
Peptide Standard.....	403	HLB (Hydrophilic-lipophilic Balanced)		<b>Premier Columns</b> .....	95
Phosphopeptide Standard .....	405	Sample Extraction Products .....	12	<b>Prep Nova-Pak Radial Compression Column</b>	
Protein Standard Mix .....	415	MAX (for acidic compounds)		<b>Segments and PrepPak Cartridges</b> .....	308
<b>MaxPeak Premier</b> .....	93	Sample Extraction Products .....	15	<b>Preparative Bulk Material</b> .....	303
<b>Method Development Kits</b>		MCX (for basic compounds)		<b>Preparative Guard Cartridge Holders</b> .....	301
ACQUITY UPLC.....	127	Sample Extraction Products .....	14	<b>Preparative LC Columns</b>	
Therapeutic Peptide.....	397	On-Line Columns and Cartridges.....	17	see ≥5 μm Preparative HPLC Columns	
Torus.....	314	PRiME HLB.....	12	<b>Preparative Standards</b> .....	302
Trefoil.....	319	PRiME MCX.....	14	<b>PrepPak Cartridges</b> .....	307
Viridis.....	322	Product Selection Guide.....	10	<b>PRiME HLB</b> .....	12
<b>M-Class</b> .....	490, 553	Sorbents.....	12	<b>Protein Separations</b> .....	406
<b>N</b>		Symbiosis/Prospekt-2 Cartridges.....	17	AccellPlus PrepPak Cartridges.....	450
<b>Nano- and Micro-Flow LC</b> .....	483	WAX (for strong acidic compounds) Sample		AccellPlus Sep-Pak Cartridges.....	450
ACQUITY UPLC M-Class Columns.....	489	Extraction Products .....	16	ACQUITY UPLC SEC System Solution.....	427
ACQUITY UPLC M-Class		WCX (for strong basic compounds) Sample		Advanced Purification (AP)	
Peptide Columns.....	489	Extraction Products .....	15	Glass Columns .....	448
ACQUITY UPLC M-Class		<b>OBD Column Design</b> .....	249	BEH SEC Protein Standards .....	429
Protein Columns.....	489	<b>Organic Acids Columns</b> .....	497	BioResolve Columns .....	325
ACQUITY UPLC M-Class Trap Columns.....	489	Organic-Soluble Polymers.....		BioSuite Hydrophobic-Interaction	
ACQUITY UPLC M-Class		Envirogel High-Resolution		Chromatography HPLC Columns.....	452
with HDX Technology.....	490	GPC Cleanup Columns.....	463	BioSuite Ion-Exchange HPLC Columns.....	445
Enzymate Pepsin Online		GPC Columns for Non-Aqueous Samples...	455	BioSuite pC18 and pPhenyl Reversed-Phase	
Digestion Column.....	490	HSPgel Columns for High-Speed		Chromatography (RPC) HPLC Columns.....	452
iKey Separation Device.....	486	GPC Analysis .....	461	BioSuite Size-Exclusion Columns (SEC).....	431
ionKey/MS.....	485	Shodex GPC Columns .....	463		
nanoACQUITY UPLC .....	489	Styragel Columns for Polymer			
		Characterization.....	457		
		Ultrastryragel Columns.....	460		
		<b>Ostro Pass-Through Sample</b>			
		<b>Preparation Plate</b> .....	19		
		<b>Otto SPECIALIST and Consumable Kits</b> .....	29		

Ion-Exchange Sample Preparation with Sep-Pak Cartridges.....	451		
Ion-Exchange Standards.....	443		
MassPREP Protein Standard Mix.....	415		
MaxPeak Premier Protein Columns.....	412		
Protein BEH Columns.....	412		
Protein Standards.....	415		
Protein-Pak Hi Res HIC Column and HIC Protein Standard.....	417		
Protein-Pak Hi Res Ion-Exchange (IEX) Columns.....	442		
Protein-Pak High Resolution (HR) Ion-Exchange Glass Columns.....	447		
ProteinWorks Digest Kits.....	514		
SEC HPLC Columns.....	433		
Symmetry300 C <sub>4</sub> HPLC Columns.....	434		
Ultrahydrogel HPLC Columns.....	473		
XBridge Protein BEH SEC, 125 Å, 200 Å, and 450 Å Columns and Protein Standard Test Mixtures.....	466		
<b>Protein-Pak</b>			
Hi Res HIC Column and HIC Protein Standard.....	417		
Hi Res Ion-Exchange (IEX) Columns.....	442		
High Resolution (HR) Ion-Exchange Glass Columns.....	447		
High Resolution (HR) UPLC Columns.....	447		
<b>ProteinWorks Digest Kits</b> .....	514		
<b>PTFE Tubing and Fittings</b> .....	525		
<b>Purification and Isolation Cartridge Holders</b> .....	301		
<b>Q</b>			
<b>QC Reference Materials</b> .....			
HILIC QC Reference Materials.....	119		
Neutrals QC Reference Materials.....	119		
Reversed-Phase QC Reference Materials.....	119		
UPC <sup>2</sup> QC Reference Materials.....	316		
<b>Quality Control Reference Materials</b>			
see QC Reference Materials			
<b>Quantitative Peptide Analysis Standards</b> .....	404		
<b>R</b>			
<b>Radial Compression Module Products</b> .....	305		
Delta-Pak Radial Compression Column Segments.....	307		
Nova-Pak Radial Compression Column Segments and PrepPak Cartridges.....	308		
Prep Nova-Pak Radial Compression Column Segments and PrepPak Cartridge.....	308		
PrepPak Cartridges.....	307		
Resolve Radial Compression Column Segments and PrepPak Cartridges.....	307		
<b>RapiFluor-MS</b> .....	363		
<b>RapiFluor-MS Dextran Calibration Standard</b> .....	366, 513		
<b>RapiFluor-MS Intact mAb Standard</b> .....	366, 513		
<b>RapiFluor-MS Quantitative Glycan Standard</b> .....	366, 513		
<b>RapiFluor-MS Sialylated Glycan Performance Test Standard</b> .....	366, 513		
<b>RapiGest SF Protein Digestion Surfactant</b> .....	402		
<b>Replacement Filter Assemblies for Columns</b> 36			
<b>Resolve Columns</b> .....	233, 307		
<b>Reversed-Phase QC Reference Materials</b> .....	112		
<b>Roller for Cap Mats</b> .....	71		
<b>S</b>			
<b>Sample Plates and Seals</b> .....	57		
<b>Sample Preparation</b> .....	3		
Accessories.....	49		
Bulk Sorbents.....	18, 38		
Certified Sep-Pak Solid-Phase Extraction (SPE) Cartridges.....	31		
DisQuE Sample Preparation Solutions for QuEChERS.....	37		
Extraction Cartridges Manifold and Accessories.....	36		
Extraction Manifolds Spare Parts.....	35		
Extraction Plate Manifold and Accessories.....	35		
Oasis Solid-Phase Extraction (SPE) Products.....	8		
Ostro Pass-Through Sample Preparation Plate.....	19		
Ozone Scrubber Cartridges.....	29		
PoraPak Rxn Cartridges for Post-Synthesis Cleanup.....	34		
QuEChERS.....	37-38		
Sep-Pak Solid-Phase Extraction (SPE) Products.....	20		
Solvent Filtration Products.....	39		
SPE Products.....	8		
Therapeutic Peptide Method Development Kits.....	397, 516		
Vacuum Manifold.....	35, 366, 513		
Waters/Pall Life Sciences Sample and Solvent Filtration Products.....	39		
<b>Sample Vials and Accessories</b> .....	51-53		
<b>SARS-CoV-2 LC-MS Kit</b> .....	519		
<b>Seals</b> .....	57		
<b>SEC Column Connectors and Connector Kits</b> .....	430, 472		
<b>SEC Columns for Aqueous Samples</b> .....	464		
<b>Selection Guide</b>			
2.x µm Columns.....	131		
Aqueous SEC Columns.....	473		
Aqueous SEC Solvents.....	474		
Aqueous SEC Standards.....	479		
Cartridge Selection Guide.....	24		
Certified Sep-Pak Sorbents.....	32		
Columns.....	87		
HSPgel Columns.....	461		
Non-Aqueous GPC Solvents.....	475		
Non-Aqueous GPC Standards.....	476		
Oasis Products.....	8-9		
Sep-Pak Cartridges.....	24		
Sep-Pak Sorbents.....	21		
Shodex Sugar Columns.....	495		
SPE Formats.....	6		
Styragel Columns.....	457, 460		
Vials for Alliance HPLC Systems.....	67		
Vials for Fixed-Loop-Needle ACQUITY Systems.....	61		
Vials for Flow-Through-Needle ACQUITY Systems.....	64		
Vials Selection.....	54		
<b>Sentry Guard Cartridges</b> .....	244-245		
<b>Sep-Pak Solid-Phase Extraction (SPE) Products</b> .....	20		
96-well µElution Plates.....	20		
Cartridge Accessories.....	36		
Cartridge Connections Kit.....	36		
Cartridge Selection Guide.....	24		
Certified Sep-Pak Solid-Phase Extraction (SPE) Cartridges.....	31		
Certified Sep-Pak Sorbent Selection Guide.....	32		
DNPH-Silica Cartridges.....	29		
Dry SPE Cartridge.....	30		
Formats.....	20		
Ozone Scrubber Cartridge.....	29, 30		
PoraPak RDX Cartridges and Accessories.....	29		
Sorbent Selection Guide.....	21-22, 32		
Specialty Chemistries.....	6, 30		
XPoSure Aldehyde Sampler Cartridge.....	29-30		
<b>SFC Analytical and Preparative Columns</b> .....	309		
Torus (for Achiral SFC).....	312		
Torus Preparative (for Achiral SFC).....	315		
Trefoil (for Chiral SFC).....	318		
Viridis Columns.....	311, 320		
<b>Shodex GPC Columns</b> .....	463		
<b>Shodex RSpak Polymer Reversed-Phase Columns</b> .....	237		
<b>Shodex Sugar Columns</b> .....	495		
<b>Size-Exclusion Chromatography Columns and Standards</b> .....	455, 464-468		
<b>Solid Core Particle Technology</b> .....	86		
<b>Solvent Filtration Apparatus</b> .....	43		
<b>Solvent Filtration Products</b> .....	39		
<b>Solvent Inlet Filters</b> .....	583		
<b>SPE Products</b>			
see Sample Preparation			
<b>Spherisorb</b>			
≥3 µm Analytical HPLC Columns.....	240		
≥5 µm Preparative HPLC Columns.....	295		
<b>Stainless Steel Tubing and Fittings</b> .....	581		
<b>Standard 96-Well Plates</b> .....	57		
<b>Standards</b>			
ACQUITY APC Calibration Standards.....	476		
ACQUITY UPC <sup>2</sup> and SFC Standards.....	322		
Amino Acid.....	345		



BEH SEC Protein Standards .....	429	Separations).....	315	<b>Viridis</b>	Hybrid and HSS SFC Columns.....	320
Glycan Analysis Standards .....	513	<b>Trefoil</b>		Method Development Kits.....	322	
Glycoprotein Performance Test Standard ..	360	Columns (for Chiral SFC Separations).....	319	QC Reference Materials.....	322	
Ion Exchange Standards.....	443	Method Development Kits .....	319	Silica-Based SFC Columns .....	320	
mAb Subunit Standard .....	471	<b>TruView LCMS Certified Vials .....</b>	<b>53</b>			
MassPREP Oligonucleotide Standard.....	384					
Preparative Standards.....	302	<b>U</b>				
Protein Standard .....	471	<b>UHPLC Columns and Consumables</b>				
<i>RapiFluor</i> -MS Dextran		see 2.x µm Columns and Consumables				
Calibration Standard.....	366	<b>Ultrahydrogel Columns .....</b>	<b>473</b>			
<i>RapiFluor</i> -MS Intact mAb Standard.....	366	<b>Ultrastyrigel Columns.....</b>	<b>460</b>			
<i>RapiFluor</i> -MS Quantitative		<b>Universal VanGuard Cartridge Holder.....</b>	<b>215</b>			
Glycan Standard.....	366	<b>UPC<sup>2</sup></b>				
<i>RapiFluor</i> -MS Sialylated Glycan		ACQUITY UPC <sup>2</sup> QC Reference Materials.....	316			
Performance Test Standard.....	366	Chiral Methods Using Trefoil Columns .....	319			
SFC and UPC <sup>2</sup> Standards .....	317	<b>UPLC Columns and Consumables</b>				
		see Sub-2 µm-Columns				
<b>Styragel Columns for Polymer</b>		<b>USP "L" Column Listing.....</b>	<b>87-90</b>			
<b>Characterization.....</b>	<b>457</b>					
<b>Sub-2 µm-Columns.....</b>	<b>105</b>	<b>V</b>				
ACQUITY UPLC Columns.....	113	<b>Vacuum Manifold .....</b>	<b>35</b>			
Amino Acid Analysis Columns.....	340	<b>VanGuard Cartridges</b>				
Column Accessories .....	112, 115, 119, 122	Atlantis .....	210			
CORTECS Columns.....	108	CORTECS 2.7 µm .....	141			
Glycan Columns.....	355	SunFire.....	173			
In-line Filter Unit .....	112, 115, 119, 122	Symmetry.....	195			
Method Development Kits.....	127	XBridge .....	154			
Method Validation Kits .....	123	XSelect CSH.....	161			
Oligonucleotide Columns .....	375	XSelect HSS.....	167			
QC Reference Materials.....	112, 115, 119, 122	XTERRA.....	177			
Peptide Columns.....	385	<b>VanGuard Pre-columns and Cartridges .....</b>	<b>241</b>			
Protein Columns.....	406	<b>Vials and Accessories .....</b>	<b>53</b>			
VanGuard Pre-columns.....	112, 115, 119, 122	Autosampler Vials for Compatible Systems ..	75			
Waters UPLC Particle Technology .....	107	Autosampler Vials for Waters Systems.....	72			
		Certified Containers .....	82			
<b>Sugar and Carbohydrate Analysis Columns</b>	<b>495</b>	Certified Vials .....	53			
<b>Sugar Pak I Column.....</b>	<b>495</b>	Holder for 12 x 32 mm Vials.....	71			
<b>SunFire.....</b>		Plates.....	57			
≥3 µm Analytical HPLC Columns .....	211	Quick Selection Guide: Alliance HPLC				
≥5 µm Preparative HPLC Columns .....	276	Systems.....	67			
2.5 µm Columns .....	169	Quick Selection Guide: Fixed-Loop-Needle				
Method Validation Kits .....	173, 215, 280	ACQUITY Systems.....	61			
Preparative Scouting Columns.....	172, 214, 279	Quick Selection Guide: Flow-Through-Needle				
VanGuard Cartridges .....	173, 215, 280	ACQUITY Systems.....	64			
		Sample Plates .....	57			
		Seals.....	57			
<b>Supercritical Fluid Chromatography (SFC) ...</b>	<b>311</b>	Vials Descriptions .....	79			
<b>Symmetry</b>		Vials Holder .....	61			
≥3 µm Columns.....	216	Vials for Aqua Analysis System.....	73			
≥5 µm Preparative HPLC Columns .....	291	Vials for ACQUITY UPLC Systems.....	79			
Method Validation Kits .....	220, 294	Vials for Alliance Systems.....	79			
VanGuard Cartridges.....	220, 294	Vials for GPC 2000.....	73			
		Vials for PATROL UPLC Process				
		Analysis System .....	73			
		Vials Troubleshooting Guide.....	81			
<b>T</b>						
<b>Therapeutic Peptide Method</b>						
<b>Development Kits.....</b>	<b>397, 494, 516</b>					
<b>Torus</b>						
Analytical Columns (for Achiral SFC						
Separations).....	314					
Method Development Kits.....	314					
Preparative Columns (for Achiral SFC						

# Part Number Index

5711180.....576	176001883.....128	176002162.....114	176002592.....149, 189, 259	176002648.....165, 202, 271
6060142.....571, 576	176001884.....128	176002163.....114	176002593.....149, 189, 259	176002649.....165, 202, 271
17600335.....365, 512	176001885.....128	176002164.....114	176002594.....156, 198, 267	176002650.....166, 203, 272
70009679.....571	176001886.....128	176002165.....114	176002595.....156, 198, 267	176002651.....166, 203, 272
176001042.....128	176001887.....128	176002166.....114	176002596.....156, 198, 267	176002652.....166, 203, 272
176001043.....128	176001888.....128	176002167.....114	176002597.....156, 198, 267	176002653.....166, 203, 272
176001121.....121	176001889.....128	176002168.....114	176002598.....156, 198, 267	176002654.....166, 203, 272
176001122.....121	176001890.....128	176002169.....114	176002599.....156, 198, 267	176002655.....166, 203, 272
176001123.....121	176001903.....37	176002472.....570, 572-573, 575-577	176002600.....156, 198, 267	176002656.....166, 203, 272
176001124.....121	176001955.....522	176002534.....522	176002601.....156, 198, 267	176002657.....166, 203, 272
176001125.....121	176001959.....128	176002546.....144, 184, 254	176002602.....157, 199, 268	176002690.....122
176001126.....121	176001960.....128	176002547.....144, 184, 254	176002603.....157, 199, 268	176002691.....122
176001127.....121	176001961.....128	176002548.....144, 184, 254	176002604.....157, 199, 268	176002692.....122
176001129.....121	176001962.....128	176002549.....144, 184, 254	176002605.....157, 199, 268	176002693.....122
176001130.....121	176001963.....128	176002550.....144, 184, 254	176002606.....157, 199, 268	176002694.....122
176001131.....121	176001964.....128	176002551.....144, 184, 254	176002607.....157, 199, 268	176002695.....122
176001132.....121	176001965.....128	176002552.....144, 184, 254	176002608.....157, 199, 268	176002696.....122
176001133.....121	176001966.....128	176002553.....144, 184, 254	176002609.....157, 199, 268	176002697.....122
176001235.....347, 507	176002049.....573, 575	176002554.....145, 185, 255	176002610.....158, 200, 269	176002698.....122
176001375.....121	176002058.....573	176002555.....145, 185, 255	176002611.....158, 200, 269	176002699.....122
176001398.....121	176002059.....573	176002556.....145, 185, 255	176002612.....158, 200, 269	176002700.....122
176001556.....121	176002064.....573, 575	176002557.....145, 185, 255	176002613.....158, 200, 269	176002701.....122
176001557.....121	176002123.....128	176002558.....145, 185, 255	176002614.....158, 200, 269	176002702.....122
176001558.....121	176002124.....128	176002559.....145, 185, 255	176002615.....158, 200, 269	176002703.....122
176001559.....121	176002125.....128	176002560.....145, 185, 255	176002616.....158, 200, 269	176002704.....122
176001560.....121	176002126.....128	176002561.....145, 185, 255	176002617.....158, 200, 269	176002705.....122
176001561.....121	176002127.....128	176002562.....146, 186, 256	176002618.....164, 201, 270	176002706.....122
176001562.....121	176002128.....128	176002563.....146, 186, 256	176002619.....164, 201, 270	176002707.....122
176001603.....128	176002129.....128	176002564.....146, 186, 256	176002620.....164, 201, 270	176002708.....122
176001604.....128	176002130.....128	176002565.....146, 186, 256	176002621.....164, 201, 270	176002709.....122
176001605.....128	176002135.....573, 575	176002566.....146, 186, 256	176002622.....164, 201, 270	176002710.....122
176001606.....128	176002136.....114	176002567.....146, 186, 256	176002623.....164, 201, 270	176002711.....122
176001607.....128	176002137.....114	176002568.....146, 186, 256	176002624.....164, 201, 270	176002712.....122
176001608.....128	176002138.....114	176002569.....146, 186, 256	176002625.....164, 201, 270	176002713.....122
176001609.....128	176002139.....114	176002570.....147, 187, 257	176002626.....165, 202, 271	176002714.....122
176001610.....128	176002140.....114	176002571.....147, 187, 257	176002627.....165, 202, 271	176002715.....122
176001634.....523	176002141.....114	176002572.....147, 187, 257	176002628.....165, 202, 271	176002744.....572
176001676.....37	176002142.....114	176002573.....147, 187, 257	176002629.....165, 202, 271	176002745.....572
176001740.....523	176002143.....114	176002574.....147, 187, 257	176002630.....165, 202, 271	176002780.....572, 575
176001767.....523	176002144.....114	176002575.....147, 187, 257	176002631.....165, 202, 271	176002781.....572, 575
176001813.....121	176002145.....114	176002576.....147, 187, 257	176002632.....165, 202, 271	176002811.....317, 322
176001814.....121	176002146.....114	176002577.....147, 187, 257	176002633.....165, 202, 271	176002879.....144, 184, 254
176001815.....121	176002148.....114	176002578.....148, 188, 258	176002634.....164, 201, 270	176002880.....144, 184, 254
176001816.....121	176002149.....114	176002579.....148, 188, 258	176002635.....164, 201, 270	176002881.....145, 185, 255
176001817.....121	176002150.....114	176002580.....148, 188, 258	176002636.....164, 201, 270	176002882.....145, 185, 255
176001818.....121	176002151.....114	176002581.....148, 188, 258	176002637.....164, 201, 270	176002883.....146, 186, 256
176001819.....121	176002152.....114	176002582.....148, 188, 258	176002638.....164, 201, 270	176002884.....146, 186, 256
176001820.....121	176002153.....114	176002583.....148, 188, 258	176002639.....164, 201, 270	176002885.....147, 187, 257
176001821.....121	176002154.....114	176002584.....148, 188, 258	176002640.....164, 201, 270	176002886.....147, 187, 257
176001822.....121	176002155.....114	176002585.....148, 188, 258	176002641.....164, 201, 270	176002887.....148, 188, 258
176001823.....121	176002156.....114	176002586.....149, 189, 259	176002642.....165, 202, 271	176002888.....148, 188, 258
176001824.....121	176002157.....114	176002587.....149, 189, 259	176002643.....165, 202, 271	176002889.....149, 189, 259
176001835.....397, 516	176002158.....114	176002588.....149, 189, 259	176002644.....165, 202, 271	176002890.....149, 189, 259
176001836.....397, 516	176002159.....114	176002589.....149, 189, 259	176002645.....165, 202, 271	176002891.....156, 198, 267
176001881.....128	176002160.....114	176002590.....149, 189, 259	176002646.....165, 202, 271	176002892.....156, 198, 267
176001882.....128	176002161.....114	176002591.....149, 189, 259	176002647.....165, 202, 271	176002893.....157, 199, 268

<a href="#">176002894</a> .....	157, 199, 268	<a href="#">176003154</a> .....	110, 134	<a href="#">176003318</a> .....	112, 135	<a href="#">176003805</a> .....	111, 135	<a href="#">176003899</a> .....	111, 137
<a href="#">176002895</a> .....	158, 200, 269	<a href="#">176003155</a> .....	110, 134	<a href="#">176003319</a> .....	112, 135	<a href="#">176003806</a> .....	111, 135	<a href="#">176003900</a> .....	111, 137
<a href="#">176002896</a> .....	158, 200, 269	<a href="#">176003156</a> .....	112, 135	<a href="#">176003320</a> .....	112, 135	<a href="#">176003807</a> .....	111, 135	<a href="#">176003904</a> .....	119, 427, 468
<a href="#">176002897</a> .....	164, 201, 270	<a href="#">176003157</a> .....	112, 135	<a href="#">176003321</a> .....	112, 135	<a href="#">176003808</a> .....	111, 135	<a href="#">176003905</a> .....	119, 427, 468
<a href="#">176002898</a> .....	164, 201, 270	<a href="#">176003158</a> .....	112, 135	<a href="#">176003322</a> .....	110, 134	<a href="#">176003809</a> .....	111, 135	<a href="#">176003906</a> .....	119, 427, 468
<a href="#">176002899</a> .....	165, 202, 271	<a href="#">176003159</a> .....	112, 135	<a href="#">176003323</a> .....	110, 134	<a href="#">176003810</a> .....	111, 135	<a href="#">176003907</a> .....	119, 427, 468
<a href="#">176002900</a> .....	165, 202, 271	<a href="#">176003160</a> .....	112, 135	<a href="#">176003324</a> .....	110, 134	<a href="#">176003811</a> .....	111, 135	<a href="#">176003912</a> .....	111, 136
<a href="#">176002901</a> .....	164, 201, 270	<a href="#">176003161</a> .....	112, 135	<a href="#">176003325</a> .....	110, 134	<a href="#">176003812</a> .....	111, 135	<a href="#">176003913</a> .....	111, 136
<a href="#">176002902</a> .....	164, 201, 270	<a href="#">176003162</a> .....	112, 135	<a href="#">176003326</a> .....	110, 134	<a href="#">176003813</a> .....	111, 135	<a href="#">176003914</a> .....	111, 136
<a href="#">176002903</a> .....	165, 202, 271	<a href="#">176003163</a> .....	112, 135	<a href="#">176003349</a> .....	365, 512	<a href="#">176003814</a> .....	111, 135	<a href="#">176003915</a> .....	111, 136
<a href="#">176002904</a> .....	165, 202, 271	<a href="#">176003164</a> .....	112, 135	<a href="#">176003351</a> .....	365, 512	<a href="#">176003815</a> .....	111, 135	<a href="#">176003916</a> .....	111, 136
<a href="#">176002905</a> .....	166, 203, 272	<a href="#">176003165</a> .....	112, 135	<a href="#">176003575</a> .....	417	<a href="#">176003816</a> .....	111, 135	<a href="#">176003917</a> .....	111, 136
<a href="#">176002906</a> .....	166, 203, 272	<a href="#">176003166</a> .....	110, 134	<a href="#">176003576</a> .....	417	<a href="#">176003817</a> .....	111, 135	<a href="#">176003918</a> .....	111, 136
<a href="#">176002922</a> .....	37	<a href="#">176003167</a> .....	110, 134	<a href="#">176003577</a> .....	319	<a href="#">176003818</a> .....	111, 135	<a href="#">176003919</a> .....	111, 136
<a href="#">176002923</a> .....	37	<a href="#">176003168</a> .....	110, 134	<a href="#">176003578</a> .....	319	<a href="#">176003819</a> .....	112, 136	<a href="#">176003920</a> .....	111, 136
<a href="#">176002983</a> .....	347, 507	<a href="#">176003169</a> .....	110, 134	<a href="#">176003579</a> .....	314	<a href="#">176003820</a> .....	112, 136	<a href="#">176003921</a> .....	111, 136
<a href="#">176002995</a> .....	428, 467	<a href="#">176003170</a> .....	110, 134	<a href="#">176003580</a> .....	314	<a href="#">176003821</a> .....	112, 136	<a href="#">176003922</a> .....	111, 136
<a href="#">176002996</a> .....	427-428, 467-468	<a href="#">176003171</a> .....	110, 134	<a href="#">176003591</a> .....	466	<a href="#">176003822</a> .....	112, 136	<a href="#">176003923</a> .....	111, 136
<a href="#">176002997</a> .....	427-428, 467-468	<a href="#">176003172</a> .....	110, 134	<a href="#">176003592</a> .....	466	<a href="#">176003823</a> .....	112, 136	<a href="#">176003924</a> .....	111, 136
<a href="#">176003050</a> .....	322	<a href="#">176003173</a> .....	110, 134	<a href="#">176003593</a> .....	466	<a href="#">176003824</a> .....	112, 136	<a href="#">176003925</a> .....	111, 136
<a href="#">176003061</a> .....	126, 395	<a href="#">176003174</a> .....	110, 134	<a href="#">176003594</a> .....	466	<a href="#">176003825</a> .....	112, 136	<a href="#">176003926</a> .....	111, 136
<a href="#">176003062</a> .....	126, 395	<a href="#">176003175</a> .....	110, 134	<a href="#">176003595</a> .....	466	<a href="#">176003826</a> .....	112, 136	<a href="#">176003927</a> .....	111, 136
<a href="#">176003063</a> .....	126, 395	<a href="#">176003243</a> .....	573	<a href="#">176003596</a> .....	466	<a href="#">176003827</a> .....	112, 136	<a href="#">176003928</a> .....	111, 136
<a href="#">176003064</a> .....	126, 395	<a href="#">176003269</a> .....	110, 134	<a href="#">176003597</a> .....	466	<a href="#">176003828</a> .....	112, 136	<a href="#">176003929</a> .....	111, 136
<a href="#">176003065</a> .....	126, 395	<a href="#">176003270</a> .....	110, 134	<a href="#">176003598</a> .....	466	<a href="#">176003829</a> .....	111, 135	<a href="#">176003930</a> .....	111, 136
<a href="#">176003066</a> .....	395	<a href="#">176003271</a> .....	110, 134	<a href="#">176003599</a> .....	466	<a href="#">176003830</a> .....	111, 135	<a href="#">176003931</a> .....	111, 136
<a href="#">176003067</a> .....	115, 395	<a href="#">176003272</a> .....	110, 134	<a href="#">176003606</a> .....	365, 512	<a href="#">176003831</a> .....	111, 135	<a href="#">176003932</a> .....	111, 136
<a href="#">176003068</a> .....	126, 395	<a href="#">176003273</a> .....	110, 134	<a href="#">176003606</a> .....	365, 512	<a href="#">176003832</a> .....	111, 135	<a href="#">176003933</a> .....	111, 136
<a href="#">176003069</a> .....	395	<a href="#">176003274</a> .....	110, 134	<a href="#">176003635</a> .....	365, 512	<a href="#">176003833</a> .....	111, 135	<a href="#">176003934</a> .....	111, 136
<a href="#">176003070</a> .....	395	<a href="#">176003275</a> .....	110, 134	<a href="#">176003688</a> .....	514	<a href="#">176003834</a> .....	111, 135	<a href="#">176003935</a> .....	111, 136
<a href="#">176003071</a> .....	395	<a href="#">176003276</a> .....	110, 134	<a href="#">176003689</a> .....	514	<a href="#">176003835</a> .....	111, 135	<a href="#">176003936</a> .....	111, 136
<a href="#">176003072</a> .....	396	<a href="#">176003277</a> .....	110, 134	<a href="#">176003695</a> .....	514	<a href="#">176003836</a> .....	111, 135	<a href="#">176003992</a> .....	396
<a href="#">176003073</a> .....	396	<a href="#">176003278</a> .....	110, 134	<a href="#">176003696</a> .....	514	<a href="#">176003837</a> .....	111, 135	<a href="#">176003993</a> .....	396
<a href="#">176003074</a> .....	395	<a href="#">176003279</a> .....	112, 135	<a href="#">176003699</a> .....	355, 357, 360, 420	<a href="#">176003838</a> .....	111, 135	<a href="#">176003994</a> .....	396
<a href="#">176003075</a> .....	395	<a href="#">176003280</a> .....	112, 135	<a href="#">176003700</a> .....	355, 357, 360, 420	<a href="#">176003850</a> .....	572	<a href="#">176003995</a> .....	396
<a href="#">176003076</a> .....	396	<a href="#">176003281</a> .....	112, 135	<a href="#">176003701</a> .....	355, 357, 360, 420	<a href="#">176003851</a> .....	572	<a href="#">176003996</a> .....	396
<a href="#">176003077</a> .....	395	<a href="#">176003282</a> .....	112, 135	<a href="#">176003702</a> .....	355, 357, 359-360, 419-420	<a href="#">176003876</a> .....	111, 137	<a href="#">176003997</a> .....	396
<a href="#">176003078</a> .....	395	<a href="#">176003283</a> .....	112, 135	<a href="#">176003703</a> .....	355, 357, 360, 420	<a href="#">176003877</a> .....	111, 137	<a href="#">176003998</a> .....	396
<a href="#">176003079</a> .....	395	<a href="#">176003284</a> .....	112, 135	<a href="#">176003712</a> .....	365, 512	<a href="#">176003878</a> .....	111, 137	<a href="#">176004006</a> .....	396
<a href="#">176003080</a> .....	396	<a href="#">176003285</a> .....	112, 135	<a href="#">176003713</a> .....	365, 512	<a href="#">176003880</a> .....	111, 137	<a href="#">176004007</a> .....	396
<a href="#">176003081</a> .....	395	<a href="#">176003286</a> .....	112, 135	<a href="#">176003714</a> .....	365, 512	<a href="#">176003881</a> .....	111, 137	<a href="#">176004008</a> .....	396
<a href="#">176003082</a> .....	395	<a href="#">176003287</a> .....	112, 135	<a href="#">176003789</a> .....	112, 136	<a href="#">176003882</a> .....	111, 137	<a href="#">176004009</a> .....	396
<a href="#">176003083</a> .....	395	<a href="#">176003288</a> .....	112, 135	<a href="#">176003790</a> .....	112, 136	<a href="#">176003883</a> .....	111, 137	<a href="#">176004017</a> .....	396
<a href="#">176003084</a> .....	395	<a href="#">176003289</a> .....	110, 134	<a href="#">176003791</a> .....	112, 136	<a href="#">176003884</a> .....	111, 137	<a href="#">176004018</a> .....	396
<a href="#">176003085</a> .....	395	<a href="#">176003290</a> .....	110, 134	<a href="#">176003792</a> .....	112, 136	<a href="#">176003885</a> .....	111, 137	<a href="#">176004020</a> .....	396
<a href="#">176003086</a> .....	396	<a href="#">176003291</a> .....	110, 134	<a href="#">176003793</a> .....	112, 136	<a href="#">176003886</a> .....	111, 137	<a href="#">176004021</a> .....	396
<a href="#">176003090</a> .....	370	<a href="#">176003292</a> .....	110, 134	<a href="#">176003794</a> .....	112, 136	<a href="#">176003887</a> .....	111, 137	<a href="#">176004023</a> .....	572
<a href="#">176003091</a> .....	322	<a href="#">176003293</a> .....	110, 134	<a href="#">176003795</a> .....	112, 136	<a href="#">176003888</a> .....	111, 137	<a href="#">176004077</a> .....	514
<a href="#">176003093</a> .....	395	<a href="#">176003294</a> .....	110, 134	<a href="#">176003796</a> .....	112, 136	<a href="#">176003889</a> .....	111, 137	<a href="#">176004078</a> .....	514
<a href="#">176003119</a> .....	370	<a href="#">176003295</a> .....	110, 134	<a href="#">176003797</a> .....	112, 136	<a href="#">176003890</a> .....	111, 137	<a href="#">176004079</a> .....	514
<a href="#">176003146</a> .....	110, 134	<a href="#">176003296</a> .....	110, 134	<a href="#">176003798</a> .....	112, 136	<a href="#">176003891</a> .....	111, 137	<a href="#">176004080</a> .....	514
<a href="#">176003147</a> .....	110, 134	<a href="#">176003297</a> .....	110, 134	<a href="#">176003799</a> .....	112, 136	<a href="#">176003892</a> .....	111, 137	<a href="#">176004080</a> .....	514
<a href="#">176003148</a> .....	110, 134	<a href="#">176003298</a> .....	110, 134	<a href="#">176003800</a> .....	112, 136	<a href="#">176003893</a> .....	111, 137	<a href="#">176004151</a> .....	365, 512
<a href="#">176003149</a> .....	110, 134	<a href="#">176003312</a> .....	110, 134	<a href="#">176003801</a> .....	112, 136	<a href="#">176003894</a> .....	111, 137	<a href="#">176004152</a> .....	365, 512
<a href="#">176003150</a> .....	110, 134	<a href="#">176003313</a> .....	110, 134	<a href="#">176003802</a> .....	112, 136	<a href="#">176003895</a> .....	111, 137	<a href="#">176004153</a> .....	365, 512
<a href="#">176003151</a> .....	110, 134	<a href="#">176003314</a> .....	110, 134	<a href="#">176003803</a> .....	112, 136	<a href="#">176003896</a> .....	111, 137	<a href="#">176004154</a> .....	365, 512
<a href="#">176003152</a> .....	110, 134	<a href="#">176003315</a> .....	110, 134	<a href="#">176003804</a> .....	111, 135	<a href="#">176003897</a> .....	111, 137	<a href="#">176004156</a> .....	411
<a href="#">176003153</a> .....	110, 134	<a href="#">176003316</a> .....	110, 134			<a href="#">176003898</a> .....	111, 137	<a href="#">176004157</a> .....	411
		<a href="#">176003317</a> .....	112, 135					<a href="#">176004158</a> .....	411

<a href="#">176004159</a> .....	411	<a href="#">176004533</a> .....	348, 508	<a href="#">176004806</a> .....	425, 470	<a href="#">186000181</a> .....	220, 294	<a href="#">186000287</a> .....	220, 294, 400, 434
<a href="#">176004160</a> .....	411	<a href="#">176004534</a> .....	348, 508	<a href="#">176004850</a> .....	47	<a href="#">186000185</a> .....	400	<a href="#">186000288</a> .....	220, 294, 400, 434
<a href="#">176004161</a> .....	411	<a href="#">176004542</a> .....	348, 508	<a href="#">176004851</a> .....	47	<a href="#">186000187</a> .....	219, 293, 400	<a href="#">186000289</a> .....	220, 294, 400, 434
<a href="#">176004167</a> .....	411	<a href="#">176004543</a> .....	348, 508	<a href="#">176004852</a> .....	47	<a href="#">186000188</a> .....	219, 293, 400	<a href="#">186000291</a> .....	220, 294
<a href="#">176004168</a> .....	411	<a href="#">176004544</a> .....	348, 508	<a href="#">176004853</a> .....	47	<a href="#">186000189</a> .....	219, 293, 400	<a href="#">186000293</a> .....	220, 294
<a href="#">176004169</a> .....	411	<a href="#">176004545</a> .....	348, 508	<a href="#">176004854</a> .....	47	<a href="#">186000190</a> .....	219, 293, 400	<a href="#">186000294</a> .....	220, 294
<a href="#">176004170</a> .....	411	<a href="#">176004546</a> .....	348, 508	<a href="#">176004866</a> .....	355, 357, 360, 420	<a href="#">186000195</a> .....	220, 294	<a href="#">186000295</a> .....	220, 294
<a href="#">176004171</a> .....	411	<a href="#">176004548</a> .....	523	<a href="#">176004867</a> .....	355, 357, 360, 420	<a href="#">186000197</a> .....	219, 293, 400	<a href="#">186000302</a> .....	70
<a href="#">176004212</a> .....	411	<a href="#">176004549</a> .....	523	<a href="#">176004868</a> .....	355, 357, 360, 420	<a href="#">186000198</a> .....	245	<a href="#">186000303</a> .....	70, 75
<a href="#">176004322</a> .....	428, 467	<a href="#">176004550</a> .....	523	<a href="#">176004946</a> .....	520	<a href="#">186000200</a> .....	219, 293, 400	<a href="#">186000304</a> .....	70, 75
<a href="#">176004323</a> .....	428, 467	<a href="#">176004554</a> .....	523	<a href="#">176004947</a> .....	520	<a href="#">186000201</a> .....	219, 293, 400	<a href="#">186000305</a> .....	69, 77
<a href="#">176004324</a> .....	428, 467	<a href="#">176004567</a> .....	348, 508	<a href="#">176004948</a> .....	520	<a href="#">186000206</a> .....	217, 291	<a href="#">186000309</a> .....	13, 17
<a href="#">176004325</a> .....	428, 467	<a href="#">176004568</a> .....	348, 508	<a href="#">176004949</a> .....	520	<a href="#">186000207</a> .....	217, 291	<a href="#">186000328</a> .....	70, 75
<a href="#">176004326</a> .....	428, 467	<a href="#">176004577</a> .....	47	<a href="#">176004949</a> .....	520	<a href="#">186000208</a> .....	217, 291	<a href="#">186000349</a> .....	62-63, 65
<a href="#">176004327</a> .....	428, 467	<a href="#">176004579</a> .....	47	<a href="#">176005067</a> .....	103, 338, 425, 470	<a href="#">186000209</a> .....	217, 291	<a href="#">186000366</a> .....	11, 15
<a href="#">176004331</a> .....	428, 467	<a href="#">176004582</a> .....	348, 508	<a href="#">176005068</a> .....	103, 338, 425, 470	<a href="#">186000210</a> .....	217, 291	<a href="#">186000367</a> .....	11, 15
<a href="#">176004332</a> .....	428, 467	<a href="#">176004583</a> .....	348, 508	<a href="#">176005069</a> .....	103, 338, 425, 470	<a href="#">186000211</a> .....	217, 291	<a href="#">186000368</a> .....	11, 15
<a href="#">176004333</a> .....	428, 467	<a href="#">176004584</a> .....	47	<a href="#">176005070</a> .....	103, 338, 425, 470	<a href="#">186000213</a> .....	218, 292	<a href="#">186000369</a> .....	11, 15
<a href="#">176004334</a> .....	428, 467	<a href="#">176004588</a> .....	523	<a href="#">176005071</a> .....	100, 336, 425, 470	<a href="#">186000214</a> .....	218, 292	<a href="#">186000370</a> .....	11, 15
<a href="#">176004335</a> .....	428, 467	<a href="#">176004592</a> .....	426, 469	<a href="#">176005072</a> .....	100, 336, 425, 470	<a href="#">186000215</a> .....	218, 292	<a href="#">186000371</a> .....	11, 15
<a href="#">176004336</a> .....	428, 467	<a href="#">176004593</a> .....	426, 469	<a href="#">176005107</a> .....	100, 336, 416	<a href="#">186000217</a> .....	218, 292	<a href="#">186000372</a> .....	11, 15
<a href="#">176004340</a> .....	440	<a href="#">176004594</a> .....	426, 469	<a href="#">176005108</a> .....	100, 336, 416	<a href="#">186000218</a> .....	218, 292	<a href="#">186000373</a> .....	15, 17
<a href="#">176004341</a> .....	440	<a href="#">176004595</a> .....	426, 469	<a href="#">176005109</a> .....	100, 336, 416	<a href="#">186000224</a> .....	219, 293	<a href="#">186000375</a> .....	15, 17
<a href="#">176004342</a> .....	440	<a href="#">176004596</a> .....	426, 469	<a href="#">176005110</a> .....	103, 338, 416	<a href="#">186000229</a> .....	218, 292	<a href="#">186000378</a> .....	11, 15
<a href="#">176004343</a> .....	440	<a href="#">176004597</a> .....	426, 469	<a href="#">176005111</a> .....	103, 338, 416	<a href="#">186000234</a> .....	70	<a href="#">186000380</a> .....	11, 14
<a href="#">176004344</a> .....	440	<a href="#">176004598</a> .....	426, 469	<a href="#">176005112</a> .....	103, 338, 416	<a href="#">186000236</a> .....	217-218, 291-292	<a href="#">186000381</a> .....	11, 13
<a href="#">176004345</a> .....	440	<a href="#">176004599</a> .....	426, 469	<a href="#">176005113</a> .....	103, 338, 416	<a href="#">186000237</a> .....	218, 292	<a href="#">186000382</a> .....	11, 13
<a href="#">176004346</a> .....	440	<a href="#">176004605</a> .....	49	<a href="#">176005114</a> .....	103, 338, 416	<a href="#">186000238</a> .....	218, 292	<a href="#">186000383</a> .....	11, 13
<a href="#">176004347</a> .....	440	<a href="#">176004606</a> .....	49	<a href="#">176005115</a> .....	103, 338, 416	<a href="#">186000248</a> .....	14, 17	<a href="#">186000398</a> .....	175, 222, 286
<a href="#">176004348</a> .....	440	<a href="#">176004607</a> .....	49	<a href="#">176005152</a> .....	347, 507	<a href="#">186000250</a> .....	14, 17	<a href="#">186000400</a> .....	175, 222, 286
<a href="#">176004349</a> .....	440	<a href="#">176004608</a> .....	49	<a href="#">176009547</a> .....	420	<a href="#">186000252</a> .....	11, 14	<a href="#">186000401</a> .....	176, 223, 287
<a href="#">176004350</a> .....	440	<a href="#">176004609</a> .....	49	<a href="#">176009548</a> .....	420	<a href="#">186000253</a> .....	11, 14	<a href="#">186000402</a> .....	224, 288
<a href="#">176004351</a> .....	440	<a href="#">176004610</a> .....	49	<a href="#">176009549</a> .....	420	<a href="#">186000254</a> .....	11, 14	<a href="#">186000404</a> .....	175, 222, 286
<a href="#">176004352</a> .....	440	<a href="#">176004611</a> .....	49	<a href="#">186000102</a> .....	220, 294	<a href="#">186000255</a> .....	11, 14	<a href="#">186000405</a> .....	176, 223, 287
<a href="#">176004353</a> .....	440	<a href="#">176004639</a> .....	426, 469	<a href="#">186000103</a> .....	220, 294	<a href="#">186000256</a> .....	11, 14	<a href="#">186000406</a> .....	224, 288
<a href="#">176004354</a> .....	440	<a href="#">176004640</a> .....	426, 469	<a href="#">186000108</a> .....	245	<a href="#">186000259</a> .....	14, 17	<a href="#">186000408</a> .....	175, 222, 286
<a href="#">176004355</a> .....	440	<a href="#">176004641</a> .....	426, 469	<a href="#">186000109</a> .....	218, 292	<a href="#">186000261</a> .....	11, 14	<a href="#">186000409</a> .....	176, 223, 287
<a href="#">176004356</a> .....	440	<a href="#">176004642</a> .....	426, 469	<a href="#">186000111</a> .....	218, 292	<a href="#">186000262</a> .....	36, 244-245	<a href="#">186000410</a> .....	224, 288
<a href="#">176004357</a> .....	440	<a href="#">176004779</a> .....	425, 470	<a href="#">186000112</a> .....	218, 292	<a href="#">186000270</a> .....	218, 292	<a href="#">186000414</a> .....	175, 222, 286
<a href="#">176004358</a> .....	440	<a href="#">176004780</a> .....	425, 470	<a href="#">186000115</a> .....	11, 13	<a href="#">186000271</a> .....	217, 291	<a href="#">186000416</a> .....	224, 288
<a href="#">176004375</a> .....	518	<a href="#">176004781</a> .....	425, 470	<a href="#">186000116</a> .....	11, 13	<a href="#">186000273</a> .....	68, 76, 552	<a href="#">186000417</a> .....	225, 289
<a href="#">176004376</a> .....	518	<a href="#">176004782</a> .....	425, 470	<a href="#">186000117</a> .....	11, 13, 523	<a href="#">186000274</a> .....	69, 77	<a href="#">186000418</a> .....	175, 222, 286
<a href="#">176004377</a> .....	518	<a href="#">176004783</a> .....	425, 470	<a href="#">186000118</a> .....	11, 13	<a href="#">186000275</a> .....	245	<a href="#">186000420</a> .....	224, 288
<a href="#">176004378</a> .....	518	<a href="#">176004784</a> .....	425, 470	<a href="#">186000128</a> .....	13, 17	<a href="#">186000276</a> .....	400, 434	<a href="#">186000421</a> .....	225, 289
<a href="#">176004379</a> .....	518	<a href="#">176004790</a> .....	103, 338, 425, 470	<a href="#">186000132</a> .....	11, 13	<a href="#">186000277</a> .....	220, 294, 400, 434	<a href="#">186000422</a> .....	175, 222, 286
<a href="#">176004380</a> .....	518	<a href="#">176004791</a> .....	103, 338, 425, 470	<a href="#">186000169</a> .....	245	<a href="#">186000279</a> .....	220, 294, 400, 434	<a href="#">186000424</a> .....	224, 288
<a href="#">176004385</a> .....	571	<a href="#">176004792</a> .....	103, 338, 425, 470	<a href="#">186000172</a> .....	218, 292	<a href="#">186000280</a> .....	220, 294, 400, 434	<a href="#">186000425</a> .....	225, 289
<a href="#">176004417</a> .....	521	<a href="#">176004793</a> .....	103, 338, 425, 470	<a href="#">186000173</a> .....	218, 292	<a href="#">186000281</a> .....	220, 294, 400, 434	<a href="#">186000426</a> .....	175, 222, 286
<a href="#">176004418</a> .....	521	<a href="#">176004794</a> .....	100, 336, 425, 470	<a href="#">186000174</a> .....	218, 292	<a href="#">186000282</a> .....	220, 294, 400, 434	<a href="#">186000427</a> .....	176, 223, 287
<a href="#">176004419</a> .....	521	<a href="#">176004795</a> .....	100, 336, 425, 470	<a href="#">186000177</a> .....	218, 292	<a href="#">186000283</a> .....	220, 294, 400, 434	<a href="#">186000428</a> .....	224, 288
<a href="#">176004420</a> .....	521	<a href="#">176004801</a> .....	425, 470	<a href="#">186000178</a> .....	218, 292	<a href="#">186000284</a> .....	245	<a href="#">186000429</a> .....	225, 289
<a href="#">176004423</a> .....	521	<a href="#">176004802</a> .....	425, 470	<a href="#">186000179</a> .....	218, 292	<a href="#">186000285</a> .....	220, 294, 400, 434	<a href="#">186000430</a> .....	175, 222, 286
<a href="#">176004424</a> .....	521	<a href="#">176004803</a> .....	425, 470	<a href="#">186000180</a> .....	218, 292	<a href="#">186000286</a> .....	220, 294, 400, 434	<a href="#">186000432</a> .....	175, 222, 286
<a href="#">176004434</a> .....	58	<a href="#">176004804</a> .....	425, 470					<a href="#">186000433</a> .....	176, 223, 287
<a href="#">176004498</a> .....	441	<a href="#">176004805</a> .....	425, 470					<a href="#">186000434</a> .....	224, 288
<a href="#">176004499</a> .....	441							<a href="#">186000435</a> .....	225, 289
<a href="#">176004500</a> .....	441							<a href="#">186000436</a> .....	175, 222, 286
<a href="#">176004501</a> .....	441								
<a href="#">176004502</a> .....	441								

<a href="#">186000437</a>	176, 223, 287	<a href="#">186000658</a>	245	<a href="#">186001001</a>	175, 222, 286	<a href="#">186001261</a>	499	<a href="#">186001728</a>	73
<a href="#">186000438</a>	224, 288	<a href="#">186000660</a>	245	<a href="#">186001002</a>	175, 222, 286	<a href="#">186001262</a>	499	<a href="#">186001741</a>	462
<a href="#">186000439</a>	225, 289	<a href="#">186000661</a>	245	<a href="#">186001006</a>	224, 288	<a href="#">186001263</a>	499	<a href="#">186001742</a>	462
<a href="#">186000440</a>	175, 222, 286	<a href="#">186000662</a>	245	<a href="#">186001007</a>	224, 288	<a href="#">186001264</a>	499	<a href="#">186001743</a>	462
<a href="#">186000441</a>	176, 223, 287	<a href="#">186000678</a>	14, 17	<a href="#">186001008</a>	225, 289	<a href="#">186001265</a>	499	<a href="#">186001744</a>	462
<a href="#">186000442</a>	224, 288	<a href="#">186000679</a>	13, 17	<a href="#">186001009</a>	225, 289	<a href="#">186001287</a>	209, 283	<a href="#">186001745</a>	462
<a href="#">186000443</a>	225, 289	<a href="#">186000683</a>	11, 13, 18	<a href="#">186001034</a>	175, 222, 286	<a href="#">186001291</a>	209, 283	<a href="#">186001746</a>	462
<a href="#">186000446</a>	175, 222, 286	<a href="#">186000690</a>	217, 291	<a href="#">186001035</a>	176, 223, 287	<a href="#">186001293</a>	209, 283	<a href="#">186001747</a>	462
<a href="#">186000447</a>	176, 223, 287	<a href="#">186000691</a>	218, 292	<a href="#">186001036</a>	224, 288	<a href="#">186001295</a>	209, 283	<a href="#">186001749</a>	462
<a href="#">186000448</a>	224, 288	<a href="#">186000692</a>	218, 292	<a href="#">186001037</a>	225, 289	<a href="#">186001297</a>	209, 283	<a href="#">186001750</a>	462
<a href="#">186000450</a>	175, 222, 286	<a href="#">186000693</a>	218, 292	<a href="#">186001104</a>	175, 222, 286	<a href="#">186001299</a>	209, 283	<a href="#">186001751</a>	462
<a href="#">186000451</a>	176, 223, 287	<a href="#">186000695</a>	217, 291	<a href="#">186001105</a>	176, 223, 287	<a href="#">186001301</a>	209, 283	<a href="#">186001752</a>	462
<a href="#">186000452</a>	224, 288	<a href="#">186000696</a>	217, 291	<a href="#">186001106</a>	224, 288	<a href="#">186001303</a>	209, 283	<a href="#">186001753</a>	462
<a href="#">186000454</a>	175, 222, 286	<a href="#">186000697</a>	218, 292	<a href="#">186001107</a>	225, 289	<a href="#">186001305</a>	209, 283	<a href="#">186001754</a>	462
<a href="#">186000455</a>	176, 223, 287	<a href="#">186000698</a>	218, 292	<a href="#">186001124</a>	75	<a href="#">186001307</a>	209, 283	<a href="#">186001755</a>	462
<a href="#">186000456</a>	224, 288	<a href="#">186000699</a>	218, 292	<a href="#">186001125</a>	75	<a href="#">186001309</a>	209, 283	<a href="#">186001757</a>	462
<a href="#">186000457</a>	225, 289	<a href="#">186000700</a>	218, 292	<a href="#">186001127</a>	75	<a href="#">186001311</a>	209, 283	<a href="#">186001758</a>	462
<a href="#">186000458</a>	175, 222, 286	<a href="#">186000701</a>	245	<a href="#">186001135</a>	72, 78	<a href="#">186001317</a>	209, 283	<a href="#">186001759</a>	462
<a href="#">186000459</a>	176, 223, 287	<a href="#">186000706</a>	17	<a href="#">186001138</a>	177, 226, 290	<a href="#">186001319</a>	209, 283	<a href="#">186001760</a>	462
<a href="#">186000460</a>	224, 288	<a href="#">186000708</a>	175-176, 217-219, 222-225, 286-289, 291-293, 301, 497	<a href="#">186001139</a>	177, 226, 290	<a href="#">186001321</a>	245	<a href="#">186001761</a>	462
<a href="#">186000462</a>	175, 222, 286	<a href="#">186000709</a>	144-152, 156-159, 164, 170-172, 175-176, 184-192, 198-201, 203, 208-210, 212-214, 217-219, 222-225, 261-262, 267-270, 272, 277-279, 282-284, 286-289, 291-293, 301, 394-396, 416	<a href="#">186001140</a>	177, 226, 290	<a href="#">186001323</a>	245	<a href="#">186001762</a>	462
<a href="#">186000464</a>	224, 288	<a href="#">186000711</a>	217, 291	<a href="#">186001142</a>	177, 226, 290	<a href="#">186001329</a>	209, 283	<a href="#">186001763</a>	462
<a href="#">186000466</a>	175, 222, 286	<a href="#">186000712</a>	218, 292	<a href="#">186001143</a>	177, 226, 290	<a href="#">186001331</a>	209, 283	<a href="#">186001764</a>	462
<a href="#">186000468</a>	224, 288	<a href="#">186000713</a>	217, 291	<a href="#">186001144</a>	177, 226, 290	<a href="#">186001333</a>	209, 283	<a href="#">186001765</a>	462
<a href="#">186000469</a>	225, 289	<a href="#">186000714</a>	218, 292	<a href="#">186001145</a>	177, 226, 290	<a href="#">186001335</a>	209, 283	<a href="#">186001766</a>	462
<a href="#">186000470</a>	175, 222, 286	<a href="#">186000715</a>	217, 291	<a href="#">186001146</a>	177, 226, 290	<a href="#">186001337</a>	209, 283	<a href="#">186001767</a>	462
<a href="#">186000472</a>	224, 288	<a href="#">186000717</a>	217, 291	<a href="#">186001147</a>	177, 226, 290	<a href="#">186001340</a>	209, 283	<a href="#">186001768</a>	462
<a href="#">186000473</a>	225, 289	<a href="#">186000718</a>	218, 292	<a href="#">186001152</a>	175, 222, 286	<a href="#">186001342</a>	209, 283	<a href="#">186001769</a>	462
<a href="#">186000474</a>	175, 222, 286	<a href="#">186000719</a>	217, 291	<a href="#">186001153</a>	176, 223, 287	<a href="#">186001344</a>	209, 283	<a href="#">186001770</a>	462
<a href="#">186000476</a>	224, 288	<a href="#">186000722</a>	218, 292	<a href="#">186001154</a>	224, 288	<a href="#">186001346</a>	209, 283	<a href="#">186001771</a>	462
<a href="#">186000478</a>	175, 222, 286	<a href="#">186000726</a>	177, 226, 290	<a href="#">186001155</a>	225, 289	<a href="#">186001361</a>	209, 283	<a href="#">186001772</a>	462
<a href="#">186000479</a>	176, 223, 287	<a href="#">186000729</a>	177, 226, 290	<a href="#">186001156</a>	175, 222, 286	<a href="#">186001363</a>	209-210, 283-284	<a href="#">186001773</a>	462
<a href="#">186000480</a>	224, 288, 382	<a href="#">186000730</a>	177, 226, 290	<a href="#">186001157</a>	176, 223, 287	<a href="#">186001365</a>	209, 283	<a href="#">186001774</a>	462
<a href="#">186000481</a>	225, 289	<a href="#">186000731</a>	177, 226, 290	<a href="#">186001158</a>	224, 288	<a href="#">186001367</a>	209, 283	<a href="#">186001775</a>	462
<a href="#">186000482</a>	175, 222, 286	<a href="#">186000732</a>	177, 226, 290	<a href="#">186001159</a>	225, 289	<a href="#">186001369</a>	209-210, 283-284	<a href="#">186001776</a>	462
<a href="#">186000483</a>	176, 223, 287	<a href="#">186000733</a>	177, 226, 290	<a href="#">186001160</a>	175, 222, 286	<a href="#">186001371</a>	209-210, 283-284	<a href="#">186001777</a>	462
<a href="#">186000484</a>	224, 288	<a href="#">186000734</a>	177, 226, 290	<a href="#">186001161</a>	176, 223, 287	<a href="#">186001373</a>	209, 283	<a href="#">186001778</a>	462
<a href="#">186000485</a>	225, 289	<a href="#">186000735</a>	177, 226, 290	<a href="#">186001162</a>	224, 288	<a href="#">186001377</a>	245	<a href="#">186001781</a>	462
<a href="#">186000486</a>	175, 222, 286	<a href="#">186000736</a>	11, 14	<a href="#">186001163</a>	225, 289	<a href="#">186001389</a>	209, 283	<a href="#">186001782</a>	462
<a href="#">186000487</a>	176, 223, 287	<a href="#">186000737</a>	11, 14	<a href="#">186001164</a>	175, 222, 286	<a href="#">186001393</a>	209, 283	<a href="#">186001783</a>	462
<a href="#">186000488</a>	224, 288	<a href="#">186000738</a>	11, 14	<a href="#">186001165</a>	176, 223, 287	<a href="#">186001413</a>	17	<a href="#">186001784</a>	462
<a href="#">186000489</a>	225, 289	<a href="#">186000739</a>	11, 14	<a href="#">186001166</a>	224, 288	<a href="#">186001414</a>	17	<a href="#">186001792</a>	17
<a href="#">186000490</a>	175, 222, 286	<a href="#">186000782</a>	11, 14	<a href="#">186001167</a>	225, 289	<a href="#">186001420</a>	73-74, 552	<a href="#">186001829</a>	15, 17, 397, 516
<a href="#">186000491</a>	176, 223, 287	<a href="#">186000826</a>	177, 226, 290	<a href="#">186001168</a>	175, 222, 286	<a href="#">186001421</a>	73	<a href="#">186001831</a>	35, 366, 397, 513, 516
<a href="#">186000492</a>	224, 288	<a href="#">186000829</a>	177, 226, 290	<a href="#">186001169</a>	176, 223, 287	<a href="#">186001422</a>	73	<a href="#">186001835</a>	218, 292
<a href="#">186000493</a>	225, 289	<a href="#">186000830</a>	177, 226, 290	<a href="#">186001170</a>	224, 288	<a href="#">186001436</a>	62, 65	<a href="#">186001836</a>	218, 292
<a href="#">186000494</a>	175, 222, 286	<a href="#">186000840</a>	72-73, 78, 552	<a href="#">186001171</a>	225, 289	<a href="#">186001437</a>	62-63, 65	<a href="#">186001837</a>	218, 292
<a href="#">186000495</a>	176, 223, 287	<a href="#">186000841</a>	72, 78	<a href="#">186001172</a>	175, 222, 286	<a href="#">186001438</a>	62-63, 65	<a href="#">186001838</a>	218, 292
<a href="#">186000496</a>	224, 288	<a href="#">186000842</a>	72, 78	<a href="#">186001173</a>	176, 223, 287	<a href="#">186001470</a>	175, 222, 286	<a href="#">186001839</a>	218, 292
<a href="#">186000497</a>	225, 289	<a href="#">186000848</a>	68, 76	<a href="#">186001174</a>	224, 288	<a href="#">186001471</a>	176, 223, 287	<a href="#">186001840</a>	218, 292
<a href="#">186000592</a>	175, 222, 286	<a href="#">186000855</a>	62, 65	<a href="#">186001175</a>	225, 289	<a href="#">186001472</a>	224, 288	<a href="#">186001841</a>	219, 293
<a href="#">186000600</a>	175, 222, 286	<a href="#">186000861</a>	177, 226, 290	<a href="#">186001178</a>	177, 226, 290	<a href="#">186001473</a>	225, 289	<a href="#">186001842</a>	219, 293
<a href="#">186000602</a>	175, 222, 286	<a href="#">186000862</a>	177, 226, 290	<a href="#">186001180</a>	177, 226, 290	<a href="#">186001474</a>	177, 226, 290	<a href="#">186001843</a>	219, 293
<a href="#">186000603</a>	176, 223, 287	<a href="#">186000863</a>	177, 226, 290	<a href="#">186001181</a>	177, 226, 290	<a href="#">186001475</a>	175, 222, 286	<a href="#">186001844</a>	219, 293
<a href="#">186000644</a>	245	<a href="#">186000865</a>	11, 15	<a href="#">186001184</a>	177, 226, 290	<a href="#">186001476</a>	176, 223, 287	<a href="#">186001845</a>	219, 293
<a href="#">186000646</a>	245	<a href="#">1860008925</a>	236, 300	<a href="#">186001205</a>	15, 17	<a href="#">186001477</a>	224, 288	<a href="#">186001846</a>	219, 293
<a href="#">186000652</a>	245	<a href="#">186000926</a>	433, 471	<a href="#">186001256</a>	15, 17	<a href="#">186001478</a>	225, 289		
<a href="#">186000654</a>	245	<a href="#">186000965</a>	72, 78	<a href="#">186001260</a>	499				
<a href="#">186000656</a>	245	<a href="#">186000981</a>	175, 222, 286						
		<a href="#">186000984</a>	70, 75						
		<a href="#">186000988</a>	13						
		<a href="#">186000989</a>	69						
		<a href="#">186000998</a>	218, 292						
		<a href="#">186000999</a>	72, 78						

186001847.....	219, 293, 400	186002036.....	17	186002181.....	446	186002344.....	118	186002507.....	17
186001848.....	219, 293, 400	186002037.....	17	186002182.....	398, 446	186002346.....	118	186002508.....	17
186001849.....	219, 293, 400	186002038.....	17	186002183.....	398, 445-446	186002347.....	118	186002509.....	17
186001850.....	219, 293	186002039.....	17	186002184.....	398, 445-446	186002349.....	118	186002520.....	72, 78
186001855.....	11	186002040.....	17	186002185.....	398, 446	186002350.....	118, 373	186002530.....	245
186001860.....	370, 402	186002041.....	17	186002186.....	445-446	186002352.....	118, 372-373	186002533.....	170, 212, 277
186001861.....	402	186002043.....	17	186002187.....	446	186002353.....	118	186002534.....	170, 212, 277
186001879.....	11, 13	186002044.....	17	186002218.....	175, 222, 286	186002379.....	175, 222, 286	186002535.....	170, 212, 277
186001880.....	11, 13	186002045.....	17	186002219.....	176, 223, 287	186002380.....	176, 223, 287	186002536.....	245
186001881.....	11, 14	186002046.....	17	186002220.....	224, 288	186002381.....	224, 288	186002539.....	170, 212, 277
186001882.....	11, 14	186002047.....	17	186002221.....	225, 289	186002382.....	225, 289	186002540.....	170, 212, 277
186001883.....	11, 15	186002048.....	17	186002222.....	175, 222, 286	186002388.....	176, 223, 287	186002541.....	170, 212, 277
186001884.....	11, 15	186002049.....	17	186002223.....	176, 223, 287	186002389.....	224, 288	186002542.....	170, 212, 277
186001888.....	11	186002051.....	17	186002224.....	224, 288	186002390.....	225, 289	186002543.....	170, 212, 277
186001889.....	175, 222, 286	186002052.....	17	186002225.....	225, 289	186002418.....	209-210, 283-284	186002544.....	170, 212, 277
186001913.....	464	186002053.....	17	186002225.....	175, 222, 286	186002425.....	399	186002545.....	170, 212, 277
186001914.....	464	186002054.....	17	186002255.....	175, 222, 286	186002426.....	399	186002546.....	170, 212, 277
186001915.....	464	186002055.....	17	186002256.....	176, 223, 287	186002427.....	399	186002547.....	170, 212, 277
186001916.....	464	186002057.....	17	186002257.....	224, 288	186002428.....	399	186002548.....	170, 212, 277
186001917.....	24	186002082.....	217, 291	186002258.....	225, 289	186002428.....	399	186002549.....	170, 212, 277
186001920.....	245	186002084.....	218, 292	186002259.....	175, 222, 286	186002429.....	399	186002551.....	170, 212, 277
186001925.....	224, 288	186002086.....	217, 291	186002260.....	176, 223, 287	186002430.....	399	186002552.....	170, 212, 277
186001927.....	245	186002087.....	218, 292	186002261.....	224, 288	186002431.....	399	186002553.....	170, 212, 277
186001930.....	175, 222, 253, 286	186002089.....	219, 293	186002262.....	225, 289	186002432.....	399	186002554.....	170, 212, 277
186001931.....	176, 223, 287	186002094.....	217, 291	186002263.....	175, 222, 286	186002433.....	399	186002556.....	170, 212, 277
186001932.....	224, 288	186002122.....	402	186002264.....	176, 223, 287	186002434.....	399	186002557.....	170, 212, 277
186001934.....	175, 222, 286	186002123.....	366, 402, 513	186002265.....	224, 288	186002435.....	399	186002558.....	170, 212, 277
186001935.....	176, 223, 287	186002127.....	69, 77	186002266.....	225, 289	186002436.....	399	186002559.....	170, 212, 276-277
186001936.....	224, 288	186002128.....	69, 77	186002267.....	175, 222, 286	186002437.....	399	186002560.....	170, 212, 277
186001937.....	225, 289	186002129.....	69, 77	186002268.....	176, 223, 287	186002438.....	399	186002565.....	170, 212, 277
186001938.....	175, 222, 286	186002130.....	69, 77	186002269.....	224, 288	186002439.....	399	186002566.....	170, 212, 277
186001940.....	224, 288	186002152.....	445	186002270.....	225, 289	186002440.....	399	186002567.....	170, 212, 277
186001941.....	225, 289	186002153.....	445	186002271.....	175, 222, 286	186002452.....	209-210, 283-284	186002568.....	170, 212, 277
186001942.....	175, 222, 286	186002154.....	418, 445	186002272.....	176, 223, 287	186002455.....	209, 283	186002569.....	170, 212, 277
186001943.....	176, 223, 287	186002155.....	445	186002273.....	224, 288	186002456.....	69	186002570.....	170, 212, 277
186001944.....	224, 288	186002156.....	445, 452	186002274.....	225, 289	186002457.....	69	186002571.....	170, 212, 277
186001945.....	225, 289	186002157.....	418, 445	186002275.....	175, 222, 286	186002481.....	57, 62-63, 65, 71, 74, 348, 397, 508, 516, 552	186002572.....	170, 212, 277
186001979.....	175, 222, 286	186002158.....	445	186002276.....	176, 223, 287	186002482.....	57, 62-63, 65, 71, 74, 552	186002608.....	217, 291
186002005.....	245	186002159.....	418, 452	186002277.....	224, 288	186002483.....	62-63, 71, 74, 397, 516	186002609.....	218, 292
186002007.....	210, 284	186002160.....	452	186002278.....	225, 289	186002484.....	62-63, 71, 74	186002612.....	217, 291
186002009.....	210, 284	186002161.....	432-433	186002279.....	175, 222, 286	186002489.....	11, 16	186002616.....	217, 291
186002011.....	210, 284	186002162.....	432-433	186002280.....	176, 223, 287	186002490.....	11, 16	186002617.....	218, 292
186002012.....	210, 284	186002163.....	433	186002282.....	225, 289	186002491.....	11, 16	186002618.....	218, 292
186002013.....	210, 284	186002164.....	432-433	186002283.....	209, 283	186002492.....	11, 16	186002619.....	219, 293
186002014.....	210, 284	186002165.....	431-433	186002300.....	210, 284	186002493.....	11, 16	186002626.....	68, 76
186002015.....	210, 284	186002166.....	432-433	186002314.....	210, 284	186002494.....	11, 16	186002628.....	70, 75
186002016.....	210, 284	186002167.....	433	186002315.....	210, 284	186002495.....	11, 15	186002631.....	57, 62-63, 71, 74
186002017.....	210, 284	186002168.....	432-433	186002316.....	210, 284	186002496.....	11, 15	186002632.....	57, 62-63, 65, 71, 74
186002018.....	210, 284	186002169.....	433	186002318.....	25	186002497.....	11, 15	186002633.....	71, 348, 508
186002019.....	210, 284	186002170.....	432-433	186002319.....	24	186002498.....	11, 15	186002639.....	61, 64, 67-68, 74, 76, 381
186002027.....	210, 284	186002171.....	433	186002320.....	24	186002499.....	15, 17, 397, 516	186002640.....	68, 74, 76, 359
186002028.....	210, 284	186002172.....	432-433	186002321.....	24	186002500.....	16-17	186002641.....	70, 75
186002029.....	210, 284	186002173.....	433	186002325.....	404-405	186002501.....	15, 17	186002642.....	70, 75
186002030.....	210, 284	186002174.....	433	186002326.....	404	186002502.....	16-17	186002643.....	57, 62-63, 65, 71, 74, 552
186002031.....	210, 284	186002175.....	433	186002327.....	404	186002503.....	15, 17	186002645.....	70, 75
186002032.....	210, 284	186002176.....	446	186002328.....	404	186002504.....	16-17	186002646.....	70, 75
186002033.....	210, 284	186002177.....	446	186002329.....	404	186002505.....	17		
186002034.....	17	186002178.....	446	186002330.....	404				
186002035.....	17	186002179.....	446	186002337.....	386, 389, 403				
		186002180.....	446	186002338.....	403				

<a href="#">186002647</a> .....70, 75	<a href="#">186002757</a> .....171, 213, 278	<a href="#">186002988</a> .....146, 186, 256	<a href="#">186003051</a> .....145, 185, 255	<a href="#">186003277</a> .....147, 187, 257
<a href="#">186002648</a> .....70, 75	<a href="#">186002758</a> .....171, 213, 278	<a href="#">186002989</a> .....146, 186, 256	<a href="#">186003052</a> .....145, 185, 255	<a href="#">186003278</a> .....147, 187, 257
<a href="#">186002649</a> .....70, 75	<a href="#">186002761</a> .....171, 213, 278	<a href="#">186002990</a> .....146, 186, 256	<a href="#">186003053</a> .....145, 185, 255	<a href="#">186003279</a> .....147, 187, 257
<a href="#">186002650</a> .....70, 75	<a href="#">186002763</a> .....171, 213, 278	<a href="#">186002991</a> .....145, 185, 255	<a href="#">186003054</a> .....145, 185, 255	<a href="#">186003284</a> .....144, 184, 254
<a href="#">186002663</a> .....170, 212, 277	<a href="#">186002764</a> .....171, 213, 278	<a href="#">186002992</a> .....145, 185, 255	<a href="#">186003055</a> .....145, 185, 255	<a href="#">186003285</a> .....405
<a href="#">186002666</a> .....170, 212, 277	<a href="#">186002765</a> .....171, 213, 278	<a href="#">186002993</a> .....145, 185, 255	<a href="#">186003060</a> .....245	<a href="#">186003286</a> .....405
<a href="#">186002667</a> .....170, 212, 277	<a href="#">186002766</a> .....171, 213, 278	<a href="#">186002994</a> .....145, 185, 255	<a href="#">186003061</a> .....245	<a href="#">186003287</a> .....405
<a href="#">186002668</a> .....170, 212, 277	<a href="#">186002767</a> .....171, 213, 278	<a href="#">186002995</a> .....145, 185, 255	<a href="#">186003062</a> .....245	<a href="#">186003321</a> .....147, 187, 257
<a href="#">186002669</a> .....170, 212, 277	<a href="#">186002768</a> .....171, 213, 278	<a href="#">186002996</a> .....145, 185, 255	<a href="#">186003063</a> .....245	<a href="#">186003322</a> .....147, 187, 257
<a href="#">186002670</a> .....170, 212, 277	<a href="#">186002780</a> .....365, 370, 512	<a href="#">186002997</a> .....145, 185, 255	<a href="#">186003064</a> .....245	<a href="#">186003323</a> .....147, 187, 257
<a href="#">186002671</a> .....170, 212, 277	<a href="#">186002788</a> .....62-63, 65, 71, 74	<a href="#">186002999</a> .....146, 186, 256	<a href="#">186003069</a> .....245	<a href="#">186003324</a> .....147, 187, 257
<a href="#">186002672</a> .....170, 212, 277	<a href="#">186002789</a> .....62-63, 71, 74	<a href="#">186003002</a> .....146, 186, 256	<a href="#">186003070</a> .....245	<a href="#">186003327</a> .....147, 187, 257
<a href="#">186002673</a> .....170, 212, 277	<a href="#">186002795</a> .....171, 213, 278	<a href="#">186003003</a> .....146, 186, 256	<a href="#">186003071</a> .....245	<a href="#">186003328</a> .....147, 187, 257
<a href="#">186002675</a> .....173, 215, 280	<a href="#">186002797</a> .....170, 212, 277	<a href="#">186003004</a> .....146, 186, 256	<a href="#">186003072</a> .....245	<a href="#">186003329</a> .....147, 187, 257
<a href="#">186002676</a> .....173, 215, 280	<a href="#">186002799</a> .....42	<a href="#">186003005</a> .....146, 186, 256	<a href="#">186003073</a> .....245	<a href="#">186003331</a> .....147, 187, 257
<a href="#">186002679</a> .....173, 215, 280	<a href="#">186002800</a> .....209, 283	<a href="#">186003006</a> .....146, 186, 256	<a href="#">186003078</a> .....245	<a href="#">186003332</a> .....147, 187, 257
<a href="#">186002680</a> .....173, 215, 280	<a href="#">186002801</a> .....209, 283	<a href="#">186003007</a> .....146, 186, 256	<a href="#">186003079</a> .....245	<a href="#">186003333</a> .....147, 187, 257
<a href="#">186002681</a> .....245	<a href="#">186002802</a> .....68, 76	<a href="#">186003008</a> .....146, 186, 256	<a href="#">186003080</a> .....245	<a href="#">186003334</a> .....147, 187, 257
<a href="#">186002682</a> .....245	<a href="#">186002803</a> .....76	<a href="#">186003009</a> .....146, 186, 256	<a href="#">186003081</a> .....245	<a href="#">186003335</a> .....147, 187, 257
<a href="#">186002683</a> .....245	<a href="#">186002804</a> .....76	<a href="#">186003010</a> .....146, 186, 256	<a href="#">186003082</a> .....245	<a href="#">186003338</a> .....147, 187, 257
<a href="#">186002684</a> .....245	<a href="#">186002805</a> .....68	<a href="#">186003011</a> .....145, 185, 255	<a href="#">186003083</a> .....145, 185, 255	<a href="#">186003339</a> .....147, 187, 257
<a href="#">186002708</a> .....245	<a href="#">186002843</a> .....175, 222, 286	<a href="#">186003012</a> .....145, 185, 255	<a href="#">186003107</a> .....144, 184, 254	<a href="#">186003340</a> .....147, 187, 257
<a href="#">186002710</a> .....171, 213, 278	<a href="#">186002844</a> .....176, 223, 287	<a href="#">186003013</a> .....145, 185, 255	<a href="#">186003108</a> .....144, 184, 254	<a href="#">186003343</a> .....147, 187, 257
<a href="#">186002711</a> .....171, 213, 278	<a href="#">186002846</a> .....225, 289	<a href="#">186003014</a> .....145, 185, 255	<a href="#">186003109</a> .....144, 184, 254	<a href="#">186003344</a> .....147, 187, 257
<a href="#">186002712</a> .....171, 213, 278	<a href="#">186002847</a> .....175, 222, 286	<a href="#">186003015</a> .....145, 185, 255	<a href="#">186003110</a> .....144, 184, 254	<a href="#">186003345</a> .....147, 187, 257
<a href="#">186002713</a> .....245	<a href="#">186002849</a> .....224, 288	<a href="#">186003016</a> .....145, 185, 255	<a href="#">186003111</a> .....144, 184, 254	<a href="#">186003346</a> .....147, 187, 257
<a href="#">186002715</a> .....171, 213, 278	<a href="#">186002850</a> .....225, 289	<a href="#">186003017</a> .....145, 185, 255	<a href="#">186003112</a> .....144, 184, 254	<a href="#">186003349</a> .....147, 187, 257
<a href="#">186002716</a> .....171, 213, 278	<a href="#">186002851</a> .....118	<a href="#">186003018</a> .....145, 185, 255	<a href="#">186003113</a> .....144, 184, 254	<a href="#">186003350</a> .....147, 187, 257
<a href="#">186002717</a> .....171, 213, 278	<a href="#">186002852</a> .....118	<a href="#">186003019</a> .....144, 184, 254	<a href="#">186003114</a> .....144, 184, 254	<a href="#">186003351</a> .....147, 187, 257
<a href="#">186002718</a> .....245	<a href="#">186002853</a> .....118	<a href="#">186003020</a> .....144, 184, 254	<a href="#">186003115</a> .....144, 184, 254, 371-373	<a href="#">186003352</a> .....147, 187, 257
<a href="#">186002719</a> .....171, 213, 278	<a href="#">186002854</a> .....118	<a href="#">186003021</a> .....144, 184, 254	<a href="#">186003116</a> .....144, 184, 254	<a href="#">186003353</a> .....147, 187, 257
<a href="#">186002720</a> .....171, 213, 278	<a href="#">186002867</a> .....170, 212, 277	<a href="#">186003022</a> .....144, 184, 254	<a href="#">186003117</a> .....144, 184, 254	<a href="#">186003354</a> .....147, 187, 257
<a href="#">186002721</a> .....171, 213, 278	<a href="#">186002868</a> .....171, 213, 278	<a href="#">186003023</a> .....144, 184, 254	<a href="#">186003129</a> .....144, 184, 254	<a href="#">186003355</a> .....147, 187, 257
<a href="#">186002722</a> .....245	<a href="#">186002869</a> .....170, 212, 277	<a href="#">186003025</a> .....144, 184, 254	<a href="#">186003131</a> .....144, 184, 254	<a href="#">186003356</a> .....147, 187, 257
<a href="#">186002723</a> .....171, 213, 278	<a href="#">186002870</a> .....171, 213, 278	<a href="#">186003026</a> .....144, 184, 254	<a href="#">186003132</a> .....144, 184, 254	<a href="#">186003357</a> .....147, 187, 257
<a href="#">186002724</a> .....171, 213, 278	<a href="#">186002871</a> .....170, 212, 277	<a href="#">186003027</a> .....144, 184, 254	<a href="#">186003133</a> .....144, 184, 254	<a href="#">186003358</a> .....147, 187, 257
<a href="#">186002725</a> .....171, 213, 278	<a href="#">186002872</a> .....171, 213, 278	<a href="#">186003028</a> .....144, 184, 254	<a href="#">186003135</a> .....144, 184, 254	<a href="#">186003365</a> .....11, 13
<a href="#">186002727</a> .....245	<a href="#">186002875</a> .....118	<a href="#">186003030</a> .....144, 184, 254	<a href="#">186003140</a> .....146, 186, 256	<a href="#">186003369</a> .....30
<a href="#">186002729</a> .....171, 213, 278	<a href="#">186002876</a> .....118	<a href="#">186003031</a> .....144, 184, 254	<a href="#">186003144</a> .....146, 186, 256	<a href="#">186003373</a> .....118
<a href="#">186002730</a> .....171, 213, 278	<a href="#">186002877</a> .....118	<a href="#">186003032</a> .....144, 184, 254	<a href="#">186003153</a> .....146, 186, 256	<a href="#">186003374</a> .....118
<a href="#">186002731</a> .....171, 213, 278	<a href="#">186002878</a> .....118	<a href="#">186003033</a> .....144, 184, 254, 372-373	<a href="#">186003155</a> .....146, 186, 256	<a href="#">186003375</a> .....118
<a href="#">186002732</a> .....171, 213, 278	<a href="#">186002882</a> .....118	<a href="#">186003034</a> .....144, 184, 254	<a href="#">186003157</a> .....146, 186, 256	<a href="#">186003376</a> .....118
<a href="#">186002733</a> .....245	<a href="#">186002883</a> .....118	<a href="#">186003035</a> .....146, 186, 256	<a href="#">186003160</a> .....146, 186, 256	<a href="#">186003377</a> .....118
<a href="#">186002734</a> .....171, 213, 278	<a href="#">186002884</a> .....118	<a href="#">186003036</a> .....146, 186, 256	<a href="#">186003161</a> .....146, 186, 256	<a href="#">186003378</a> .....118
<a href="#">186002735</a> .....171, 213, 278	<a href="#">186002885</a> .....118	<a href="#">186003037</a> .....146, 186, 256	<a href="#">186003182</a> .....145, 185, 255	<a href="#">186003379</a> .....11, 13
<a href="#">186002736</a> .....171, 213, 278	<a href="#">186002972</a> .....144, 184, 254	<a href="#">186003038</a> .....146, 186, 256	<a href="#">186003184</a> .....145, 185, 255	<a href="#">186003390</a> .....172, 214, 279
<a href="#">186002737</a> .....171, 213, 278	<a href="#">186002975</a> .....144, 184, 254	<a href="#">186003039</a> .....146, 186, 256	<a href="#">186003185</a> .....145, 185, 255	<a href="#">186003391</a> .....172, 214, 279
<a href="#">186002738</a> .....171, 213, 278	<a href="#">186002977</a> .....144, 184, 253-254	<a href="#">186003040</a> .....146, 186, 256	<a href="#">186003187</a> .....145, 185, 255	<a href="#">186003399</a> .....170, 212, 277
<a href="#">186002740</a> .....173, 215, 280	<a href="#">186002978</a> .....144, 184, 254	<a href="#">186003041</a> .....146, 186, 256	<a href="#">186003189</a> .....145, 185, 255	<a href="#">186003401</a> .....170, 212, 277
<a href="#">186002741</a> .....173, 215, 280	<a href="#">186002979</a> .....144, 184, 254	<a href="#">186003042</a> .....146, 186, 256	<a href="#">186003190</a> .....145, 185, 255	<a href="#">186003407</a> .....170, 212, 277
<a href="#">186002744</a> .....173, 215, 280	<a href="#">186002980</a> .....144, 184, 254	<a href="#">186003043</a> .....146, 186, 256	<a href="#">186003191</a> .....145, 185, 255	<a href="#">186003409</a> .....170, 212, 277
<a href="#">186002745</a> .....173, 215, 280	<a href="#">186002981</a> .....144, 184, 254	<a href="#">186003044</a> .....146, 186, 256	<a href="#">186003192</a> .....145, 185, 255	<a href="#">186003410</a> .....171, 213, 278
<a href="#">186002750</a> .....171, 213, 278	<a href="#">186002982</a> .....144, 184, 254	<a href="#">186003045</a> .....146, 186, 256	<a href="#">186003194</a> .....145, 185, 255	<a href="#">186003417</a> .....170, 212, 277
<a href="#">186002751</a> .....171, 213, 278	<a href="#">186002983</a> .....146, 186, 256	<a href="#">186003046</a> .....145, 185, 255	<a href="#">186003195</a> .....145, 185, 255	<a href="#">186003429</a> .....172, 214, 279
<a href="#">186002752</a> .....171, 213, 278	<a href="#">186002984</a> .....146, 186, 256	<a href="#">186003047</a> .....145, 185, 255	<a href="#">186003249</a> .....16	<a href="#">186003431</a> .....172, 214, 279
<a href="#">186002753</a> .....171, 213, 278	<a href="#">186002985</a> .....146, 186, 256	<a href="#">186003048</a> .....145, 185, 255	<a href="#">186003262</a> .....146, 186, 256	<a href="#">186003432</a> .....172, 214, 279
<a href="#">186002754</a> .....171, 213, 278	<a href="#">186002986</a> .....146, 186, 256	<a href="#">186003049</a> .....145, 185, 255	<a href="#">186003269</a> .....145, 185, 255	<a href="#">186003433</a> .....172, 214, 279
<a href="#">186002755</a> .....171, 213, 278	<a href="#">186002987</a> .....146, 186, 256	<a href="#">186003050</a> .....145, 185, 255	<a href="#">186003276</a> .....147, 187, 257	<a href="#">186003434</a> .....172, 214, 279
<a href="#">186002756</a> .....171, 213, 278				<a href="#">186003435</a> .....172, 214, 279

<a href="#">186003436</a>	.....172, 214, 279	<a href="#">186003567</a>	.....150, 190, 260, 394	<a href="#">186003656</a>	.....150, 190, 260, 394	<a href="#">186003736</a>	.....208, 282	<a href="#">186003809</a>	.....153, 193, 263
<a href="#">186003437</a>	.....172, 214, 279	<a href="#">186003568</a>	.....150, 190, 260, 394	<a href="#">186003657</a>	.....150, 190, 260, 394	<a href="#">186003738</a>	.....208, 282	<a href="#">186003820</a>	.....405
<a href="#">186003438</a>	.....172, 214, 279	<a href="#">186003569</a>	.....150, 190, 260, 394	<a href="#">186003658</a>	.....150, 190, 260, 394	<a href="#">186003739</a>	.....208, 282	<a href="#">186003836</a>	.....347, 507, 518
<a href="#">186003439</a>	.....172, 214, 279	<a href="#">186003570</a>	.....150, 190, 260, 394	<a href="#">186003659</a>	.....150, 190, 260, 394	<a href="#">186003740</a>	.....208, 282	<a href="#">186003837</a>	341-342, 347-348, 502, 507-508
<a href="#">186003440</a>	.....172, 214, 279	<a href="#">186003571</a>	.....150, 190, 260, 394	<a href="#">186003660</a>	.....150, 190, 260, 394	<a href="#">186003741</a>	.....208, 282	<a href="#">186003838</a>	.....343, 347-348, 503, 507-508
<a href="#">186003441</a>	.....172, 214, 279	<a href="#">186003572</a>	.....150, 190, 260, 394	<a href="#">186003661</a>	.....150, 190, 260, 394	<a href="#">186003744</a>	.....208, 282	<a href="#">186003839</a>	.....343, 347-348, 503, 507-508
<a href="#">186003444</a>	.....172, 214, 279	<a href="#">186003573</a>	.....150, 190, 260, 394	<a href="#">186003662</a>	.....150, 190, 260, 394	<a href="#">186003745</a>	.....208, 282	<a href="#">186003849</a>	.....13
<a href="#">186003445</a>	.....172, 214, 279	<a href="#">186003574</a>	.....150, 190, 260, 394	<a href="#">186003663</a>	.....151, 191, 261, 394	<a href="#">186003746</a>	.....208, 281-282	<a href="#">186003852</a>	.....11, 13
<a href="#">186003446</a>	.....172, 214, 279	<a href="#">186003575</a>	.....150, 190, 260, 394	<a href="#">186003664</a>	.....151, 191, 261, 394	<a href="#">186003747</a>	.....208, 282	<a href="#">186003853</a>	.....171, 213, 278
<a href="#">186003447</a>	.....172, 214, 279	<a href="#">186003576</a>	.....150, 190, 260, 394	<a href="#">186003665</a>	.....151, 191, 261, 394	<a href="#">186003748</a>	.....208, 282	<a href="#">186003854</a>	.....170, 212, 277
<a href="#">186003448</a>	.....172, 214, 279	<a href="#">186003577</a>	.....150, 190, 260, 394	<a href="#">186003666</a>	.....151, 191, 261, 394	<a href="#">186003751</a>	.....210, 284	<a href="#">186003855</a>	.....172, 214, 279
<a href="#">186003449</a>	.....172, 214, 279	<a href="#">186003578</a>	.....150, 190, 260, 394	<a href="#">186003667</a>	.....151, 191, 261, 394	<a href="#">186003754</a>	.....210, 284	<a href="#">186003863</a>	.....405
<a href="#">186003450</a>	.....172, 214, 279	<a href="#">186003579</a>	.....150, 190, 260, 394	<a href="#">186003671</a>	.....151, 191, 261, 394	<a href="#">186003755</a>	.....210, 284	<a href="#">186003864</a>	.....405
<a href="#">186003451</a>	.....172, 214, 279	<a href="#">186003580</a>	.....150, 190, 260, 394	<a href="#">186003672</a>	.....151, 191, 261, 394	<a href="#">186003756</a>	.....245	<a href="#">186003889</a>	.....144, 184, 254
<a href="#">186003452</a>	.....172, 214, 279	<a href="#">186003581</a>	.....150, 190, 260, 394	<a href="#">186003673</a>	.....151, 191, 261, 394	<a href="#">186003758</a>	.....245	<a href="#">186003892</a>	.....144, 184, 254
<a href="#">186003453</a>	.....172, 214, 279	<a href="#">186003586</a>	.....150, 190, 260, 394	<a href="#">186003674</a>	.....151, 191, 261, 394	<a href="#">186003761</a>	.....245	<a href="#">186003893</a>	.....144, 184, 254
<a href="#">186003454</a>	.....172, 214, 279	<a href="#">186003587</a>	.....150, 190, 260, 394	<a href="#">186003675</a>	.....151, 191, 261, 394	<a href="#">186003766</a>	.....153, 193, 263	<a href="#">186003894</a>	.....144, 184, 254
<a href="#">186003455</a>	.....69	<a href="#">186003604</a>	.....151, 191, 261, 394	<a href="#">186003677</a>	.....151, 191, 261, 394	<a href="#">186003767</a>	.....153, 193, 263	<a href="#">186003895</a>	.....144, 184, 254
<a href="#">186003457</a>	.....118	<a href="#">186003605</a>	.....151, 191, 261, 394	<a href="#">186003685</a>	.....119, 392, 397, 516	<a href="#">186003768</a>	.....153, 193, 263	<a href="#">186003896</a>	.....144, 184, 254
<a href="#">186003458</a>	.....118	<a href="#">186003606</a>	.....151, 191, 261, 394	<a href="#">186003686</a>	.....119, 392	<a href="#">186003769</a>	.....153, 193, 263	<a href="#">186003897</a>	.....144, 184, 254
<a href="#">186003459</a>	.....118	<a href="#">186003607</a>	.....151, 191, 261, 394, 397, 516	<a href="#">186003687</a>	.....119, 359, 392	<a href="#">186003770</a>	.....153, 193, 263	<a href="#">186003898</a>	.....144, 184, 254
<a href="#">186003460</a>	.....118	<a href="#">186003608</a>	.....151, 191, 261, 394	<a href="#">186003695</a>	.....208, 282	<a href="#">186003771</a>	.....153, 193, 263	<a href="#">186003899</a>	.....144, 184, 254
<a href="#">186003461</a>	.....118	<a href="#">186003609</a>	.....151, 191, 261, 394	<a href="#">186003696</a>	.....208, 282	<a href="#">186003772</a>	.....153, 193, 263	<a href="#">186003900</a>	.....144, 184, 254
<a href="#">186003462</a>	.....118	<a href="#">186003610</a>	.....151, 191, 261, 394	<a href="#">186003697</a>	.....208, 281-282	<a href="#">186003773</a>	.....153, 193, 263	<a href="#">186003901</a>	.....144, 184, 254
<a href="#">186003463</a>	.....16	<a href="#">186003611</a>	.....151, 191, 261, 394	<a href="#">186003698</a>	.....208, 282	<a href="#">186003774</a>	.....153, 193, 263	<a href="#">186003902</a>	.....144, 184, 254
<a href="#">186003467</a>	.....172, 214, 279	<a href="#">186003612</a>	.....151, 191, 261, 394	<a href="#">186003699</a>	.....208, 282	<a href="#">186003775</a>	.....153, 193, 263	<a href="#">186003908</a>	.....13
<a href="#">186003468</a>	.....172, 214, 279	<a href="#">186003613</a>	.....151, 191, 261, 394	<a href="#">186003700</a>	.....208, 282	<a href="#">186003776</a>	.....153, 193, 263	<a href="#">186003909</a>	.....118
<a href="#">186003516</a>	.....11, 14	<a href="#">186003614</a>	.....151, 191, 261, 394	<a href="#">186003701</a>	.....208, 282	<a href="#">186003777</a>	.....153, 193, 263	<a href="#">186003910</a>	.....118
<a href="#">186003517</a>	.....11, 15	<a href="#">186003615</a>	.....191, 261, 394	<a href="#">186003702</a>	.....208, 281-282	<a href="#">186003778</a>	.....153, 193, 263	<a href="#">186003911</a>	.....118
<a href="#">186003518</a>	.....11, 15	<a href="#">186003616</a>	.....191, 261, 394	<a href="#">186003703</a>	.....208, 282	<a href="#">186003779</a>	.....153, 193, 263	<a href="#">186003915</a>	.....16-17
<a href="#">186003519</a>	.....11, 16	<a href="#">186003617</a>	.....191, 261, 394	<a href="#">186003706</a>	.....208, 282	<a href="#">186003780</a>	.....153, 193, 263	<a href="#">186003929</a>	.....144, 184, 254
<a href="#">186003522</a>	.....35, 397, 516	<a href="#">186003618</a>	.....191, 261, 394	<a href="#">186003707</a>	.....208, 282	<a href="#">186003781</a>	.....153, 193, 263	<a href="#">186003930</a>	.....144, 184, 254
<a href="#">186003529</a>	.....121	<a href="#">186003619</a>	.....191, 261, 394	<a href="#">186003708</a>	.....208, 282	<a href="#">186003782</a>	.....153, 193, 263	<a href="#">186003933</a>	.....144, 184, 254
<a href="#">186003530</a>	.....121	<a href="#">186003620</a>	.....191, 261, 394	<a href="#">186003709</a>	.....208, 282	<a href="#">186003785</a>	.....153, 193, 263	<a href="#">186003934</a>	.....145, 185, 255
<a href="#">186003531</a>	.....121	<a href="#">186003621</a>	.....191, 261, 394	<a href="#">186003710</a>	.....208, 282	<a href="#">186003786</a>	.....153, 193, 263	<a href="#">186003935</a>	.....146, 186, 256
<a href="#">186003532</a>	.....121	<a href="#">186003622</a>	.....191, 261, 394	<a href="#">186003711</a>	.....208, 282	<a href="#">186003787</a>	.....153, 193, 263	<a href="#">186003936</a>	.....147, 187, 257
<a href="#">186003533</a>	.....121	<a href="#">186003623</a>	.....191, 261, 394	<a href="#">186003712</a>	.....208, 282	<a href="#">186003788</a>	.....153, 193, 263	<a href="#">186003937</a>	.....144, 184, 254
<a href="#">186003534</a>	.....121	<a href="#">186003624</a>	.....191, 261, 394	<a href="#">186003713</a>	.....208, 282	<a href="#">186003789</a>	.....153, 193, 263	<a href="#">186003938</a>	.....145, 185, 255
<a href="#">186003535</a>	.....121	<a href="#">186003625</a>	.....191, 261, 394	<a href="#">186003714</a>	.....208, 282	<a href="#">186003790</a>	.....153, 193, 263	<a href="#">186003939</a>	.....146, 186, 256
<a href="#">186003536</a>	.....121	<a href="#">186003630</a>	.....151, 191, 261, 394	<a href="#">186003715</a>	.....208, 282	<a href="#">186003791</a>	.....153, 193, 263	<a href="#">186003940</a>	.....147, 187, 257
<a href="#">186003537</a>	.....121	<a href="#">186003631</a>	.....151, 191, 261, 394	<a href="#">186003716</a>	.....208, 282	<a href="#">186003792</a>	.....153, 193, 263	<a href="#">186003941</a>	.....170, 212, 277
<a href="#">186003538</a>	.....121	<a href="#">186003634</a>	.....150, 190, 260, 394	<a href="#">186003717</a>	.....208, 282	<a href="#">186003793</a>	.....153, 193, 263	<a href="#">186003943</a>	.....144, 184, 254
<a href="#">186003539</a>	.....121	<a href="#">186003638</a>	.....150, 190, 260, 394	<a href="#">186003718</a>	.....208, 282	<a href="#">186003794</a>	.....153, 193, 263	<a href="#">186003944</a>	.....121
<a href="#">186003540</a>	.....121	<a href="#">186003648</a>	.....150, 190, 260, 394	<a href="#">186003719</a>	.....208, 282	<a href="#">186003795</a>	.....153, 193, 263	<a href="#">186003945</a>	.....150, 190, 260, 394
<a href="#">186003554</a>	.....119, 392	<a href="#">186003649</a>	.....150, 190, 260, 394	<a href="#">186003721</a>	.....208, 282	<a href="#">186003796</a>	.....153, 193, 263	<a href="#">186003946</a>	.....151, 191, 261, 394
<a href="#">186003555</a>	.....119, 392	<a href="#">186003650</a>	.....150, 190, 260, 394	<a href="#">186003722</a>	.....208, 282	<a href="#">186003797</a>	.....153, 193, 263	<a href="#">186003949</a>	.....376-378
<a href="#">186003556</a>	.....119, 392	<a href="#">186003651</a>	.....150, 190, 260, 394	<a href="#">186003723</a>	.....208, 282	<a href="#">186003798</a>	.....153, 193, 263	<a href="#">186003950</a>	.....377
<a href="#">186003560</a>	.....150, 190, 260, 394			<a href="#">186003724</a>	.....208, 282	<a href="#">186003799</a>	.....153, 193, 263	<a href="#">186003952</a>	.....377, 379
<a href="#">186003561</a>	.....150, 190, 260, 394			<a href="#">186003726</a>	.....208, 282	<a href="#">186003800</a>	.....153, 193, 263	<a href="#">186003953</a>	.....377, 379
<a href="#">186003562</a>	.....150, 190, 260, 394			<a href="#">186003727</a>	.....208, 282	<a href="#">186003801</a>	.....153, 193, 263	<a href="#">186003956</a>	.....210, 284
<a href="#">186003563</a>	.....150, 190, 260, 394			<a href="#">186003728</a>	.....208, 282	<a href="#">186003802</a>	.....153, 193, 263	<a href="#">186003957</a>	.....210, 284
<a href="#">186003564</a>	.....150, 190, 260, 394			<a href="#">186003729</a>	.....208, 282	<a href="#">186003803</a>	.....153, 193, 263	<a href="#">186003958</a>	.....210, 284
<a href="#">186003565</a>	.....150, 190, 260, 394			<a href="#">186003733</a>	.....208, 282	<a href="#">186003804</a>	.....153, 193, 263	<a href="#">186003959</a>	.....210, 284
<a href="#">186003566</a>	.....150, 190, 260, 394			<a href="#">186003734</a>	.....208, 282	<a href="#">186003805</a>	.....153, 193, 263	<a href="#">186003960</a>	.....210, 284
				<a href="#">186003735</a>	.....208, 282	<a href="#">186003806</a>	.....153, 193, 263	<a href="#">186003961</a>	.....210, 284
						<a href="#">186003807</a>	.....153, 193, 263	<a href="#">186003962</a>	.....210, 284
						<a href="#">186003808</a>	.....153, 193, 263		



<a href="#">186003963</a> .....	145, 185, 255	<a href="#">186004052</a> .....	126	<a href="#">186004487</a> .....	71	<a href="#">186004614</a> .....	32	<a href="#">186004699</a> .....	126
<a href="#">186003964</a> .....	146, 186, 256	<a href="#">186004053</a> .....	126	<a href="#">186004495</a> .....	413, 416	<a href="#">186004615</a> .....	32	<a href="#">186004700</a> .....	126
<a href="#">186003965</a> .....	147, 187, 257	<a href="#">186004054</a> .....	126	<a href="#">186004496</a> .....	357, 416	<a href="#">186004616</a> .....	32	<a href="#">186004701</a> .....	126
<a href="#">186003966</a> .....	24	<a href="#">186004055</a> .....	126	<a href="#">186004497</a> .....	415-416, 419	<a href="#">186004617</a> .....	32	<a href="#">186004702</a> .....	126
<a href="#">186003969</a> .....	170, 212, 277	<a href="#">186004056</a> .....	126	<a href="#">186004498</a> .....	152, 192, 262, 413, 416	<a href="#">186004618</a> .....	32	<a href="#">186004703</a> .....	126
<a href="#">186003970</a> .....	170, 212, 277	<a href="#">186004057</a> .....	126	<a href="#">186004499</a> .....	152, 192, 262, 416	<a href="#">186004619</a> .....	32	<a href="#">186004704</a> .....	126
<a href="#">186003971</a> .....	170, 212, 277	<a href="#">186004058</a> .....	126	<a href="#">186004500</a> .....	152, 192, 262, 416	<a href="#">186004620</a> .....	32	<a href="#">186004705</a> .....	126
<a href="#">186003972</a> .....	170, 212, 277	<a href="#">186004080</a> .....	208, 282	<a href="#">186004501</a> .....	152, 192, 262, 416	<a href="#">186004621</a> .....	32	<a href="#">186004709</a> .....	126
<a href="#">186003975</a> .....	119, 241, 392	<a href="#">186004081</a> .....	208, 282	<a href="#">186004502</a> .....	152, 192, 262, 416	<a href="#">186004623</a> .....	416	<a href="#">186004711</a> .....	144, 184, 254
<a href="#">186003976</a> .....	122, 241	<a href="#">186004082</a> .....	208, 282	<a href="#">186004503</a> .....	152, 192, 262, 416	<a href="#">186004629</a> .....	392	<a href="#">186004712</a> .....	208, 282
<a href="#">186003977</a> .....	119, 241	<a href="#">186004083</a> .....	208, 282	<a href="#">186004504</a> .....	152, 192, 262, 416	<a href="#">186004632</a> .....	74	<a href="#">186004713</a> .....	17, 397, 516
<a href="#">186003978</a> .....	119, 241	<a href="#">186004084</a> .....	208, 282	<a href="#">186004505</a> .....	152, 192, 262, 416	<a href="#">186004646</a> .....	11, 15	<a href="#">186004717</a> .....	77
<a href="#">186003979</a> .....	119, 241	<a href="#">186004085</a> .....	208, 282	<a href="#">186004503</a> .....	152, 192, 262, 416	<a href="#">186004647</a> .....	11, 16	<a href="#">186004719</a> .....	523
<a href="#">186003980</a> .....	119, 241	<a href="#">186004086</a> .....	208, 282	<a href="#">186004504</a> .....	152, 192, 262, 414, 416	<a href="#">186004648</a> .....	11, 14	<a href="#">186004720</a> .....	148, 188, 258
<a href="#">186003981</a> .....	122, 241	<a href="#">186004107</a> .....	144, 184, 254	<a href="#">186004505</a> .....	152, 192, 262, 416	<a href="#">186004649</a> .....	11, 15	<a href="#">186004723</a> .....	148, 188, 258
<a href="#">186003987</a> .....	121	<a href="#">186004108</a> .....	73	<a href="#">186004505</a> .....	152, 192, 262, 416	<a href="#">186004650</a> .....	11, 15	<a href="#">186004724</a> .....	148, 188, 258
<a href="#">186003988</a> .....	146, 186, 256	<a href="#">186004109</a> .....	73	<a href="#">186004535</a> .....	518	<a href="#">186004651</a> .....	11, 16	<a href="#">186004725</a> .....	148, 188, 258
<a href="#">186003991</a> .....	146, 186, 256	<a href="#">186004111</a> .....	73	<a href="#">186004536</a> .....	25	<a href="#">186004653</a> .....	17	<a href="#">186004726</a> .....	148, 188, 258
<a href="#">186003992</a> .....	146, 186, 256	<a href="#">186004112</a> .....	61, 64, 68	<a href="#">186004537</a> .....	25	<a href="#">186004654</a> .....	17	<a href="#">186004727</a> .....	148, 188, 258
<a href="#">186003993</a> .....	146, 186, 256	<a href="#">186004114</a> .....	121	<a href="#">186004538</a> .....	25	<a href="#">186004655</a> .....	17	<a href="#">186004728</a> .....	148, 188, 258
<a href="#">186003994</a> .....	146, 186, 256	<a href="#">186004115</a> .....	121	<a href="#">186004540</a> .....	30, 450	<a href="#">186004656</a> .....	17	<a href="#">186004729</a> .....	148, 188, 258
<a href="#">186003995</a> .....	146, 186, 256	<a href="#">186004116</a> .....	121	<a href="#">186004541</a> .....	34	<a href="#">186004659</a> .....	118	<a href="#">186004730</a> .....	148, 188, 258
<a href="#">186003996</a> .....	146, 186, 256	<a href="#">186004117</a> .....	121	<a href="#">186004542</a> .....	34	<a href="#">186004660</a> .....	118	<a href="#">186004731</a> .....	148, 188, 258
<a href="#">186003997</a> .....	146, 186, 256	<a href="#">186004118</a> .....	121	<a href="#">186004543</a> .....	34	<a href="#">186004661</a> .....	118	<a href="#">186004732</a> .....	148, 188, 258, 369
<a href="#">186003998</a> .....	146, 186, 256	<a href="#">186004119</a> .....	121	<a href="#">186004544</a> .....	34	<a href="#">186004663</a> .....	118	<a href="#">186004733</a> .....	148, 188, 258, 369
<a href="#">186003999</a> .....	146, 186, 256	<a href="#">186004120</a> .....	121	<a href="#">186004545</a> .....	34	<a href="#">186004664</a> .....	118	<a href="#">186004734</a> .....	148, 188, 258, 369
<a href="#">186004001</a> .....	146, 186, 256	<a href="#">186004134</a> .....	11, 13	<a href="#">186004546</a> .....	34	<a href="#">186004665</a> .....	118	<a href="#">186004735</a> .....	148, 188, 258
<a href="#">186004002</a> .....	146, 186, 256	<a href="#">186004135</a> .....	143, 182, 375, 384	<a href="#">186004547</a> .....	34	<a href="#">186004666</a> .....	118	<a href="#">186004739</a> .....	119, 368
<a href="#">186004003</a> .....	145, 185, 255	<a href="#">186004136</a> .....	122, 241	<a href="#">186004548</a> .....	34	<a href="#">186004668</a> .....	118	<a href="#">186004741</a> .....	119, 368
<a href="#">186004006</a> .....	145, 185, 255	<a href="#">186004137</a> .....	126	<a href="#">186004560</a> .....	25	<a href="#">186004669</a> .....	118	<a href="#">186004742</a> .....	119, 368, 373
<a href="#">186004007</a> .....	145, 185, 255	<a href="#">186004138</a> .....	126	<a href="#">186004561</a> .....	25	<a href="#">186004670</a> .....	118	<a href="#">186004743</a> .....	164, 201, 270
<a href="#">186004008</a> .....	145, 185, 255	<a href="#">186004169</a> .....	69, 77	<a href="#">186004562</a> .....	25	<a href="#">186004671</a> .....	118	<a href="#">186004744</a> .....	164, 201, 270
<a href="#">186004009</a> .....	145, 185, 255	<a href="#">186004432</a> .....	148, 188, 258	<a href="#">186004563</a> .....	25	<a href="#">186004672</a> .....	118	<a href="#">186004747</a> .....	164, 201, 270
<a href="#">186004010</a> .....	145, 185, 255	<a href="#">186004433</a> .....	148, 188, 258	<a href="#">186004564</a> .....	25	<a href="#">186004673</a> .....	118	<a href="#">186004748</a> .....	164, 201, 270
<a href="#">186004011</a> .....	145, 185, 255	<a href="#">186004434</a> .....	148, 188, 258	<a href="#">186004565</a> .....	25	<a href="#">186004674</a> .....	118	<a href="#">186004749</a> .....	164, 201, 270
<a href="#">186004012</a> .....	145, 185, 255	<a href="#">186004436</a> .....	148, 188, 258	<a href="#">186004566</a> .....	25	<a href="#">186004675</a> .....	118	<a href="#">186004751</a> .....	164, 201, 270
<a href="#">186004013</a> .....	145, 185, 255	<a href="#">186004439</a> .....	148, 188, 258	<a href="#">186004567</a> .....	25	<a href="#">186004676</a> .....	118	<a href="#">186004753</a> .....	164, 201, 270
<a href="#">186004014</a> .....	145, 185, 255	<a href="#">186004440</a> .....	148, 188, 258	<a href="#">186004568</a> .....	25	<a href="#">186004677</a> .....	118	<a href="#">186004754</a> .....	164, 201, 270
<a href="#">186004015</a> .....	145, 185, 255	<a href="#">186004441</a> .....	148, 188, 258	<a href="#">186004569</a> .....	34	<a href="#">186004678</a> .....	121	<a href="#">186004755</a> .....	164, 201, 270
<a href="#">186004016</a> .....	145, 185, 255	<a href="#">186004444</a> .....	148, 188, 258	<a href="#">186004570</a> .....	34	<a href="#">186004679</a> .....	121	<a href="#">186004756</a> .....	164, 201, 270
<a href="#">186004021</a> .....	144, 184, 254	<a href="#">186004445</a> .....	148, 188, 258	<a href="#">186004571</a> .....	38	<a href="#">186004680</a> .....	121	<a href="#">186004757</a> .....	164, 201, 270
<a href="#">186004022</a> .....	146, 186, 256	<a href="#">186004446</a> .....	148, 188, 258	<a href="#">186004572</a> .....	38	<a href="#">186004681</a> .....	121	<a href="#">186004758</a> .....	164, 201, 270
<a href="#">186004023</a> .....	145, 185, 255	<a href="#">186004448</a> .....	148, 188, 258	<a href="#">186004578</a> .....	25	<a href="#">186004682</a> .....	121	<a href="#">186004762</a> .....	164, 201, 270
<a href="#">186004024</a> .....	147, 187, 257	<a href="#">186004451</a> .....	148, 188, 258	<a href="#">186004579</a> .....	365, 512	<a href="#">186004683</a> .....	121	<a href="#">186004763</a> .....	164, 201, 270
<a href="#">186004025</a> .....	144, 184, 254	<a href="#">186004452</a> .....	148, 188, 258	<a href="#">186004590</a> .....	30	<a href="#">186004684</a> .....	121	<a href="#">186004765</a> .....	164, 201, 270
<a href="#">186004026</a> .....	208, 282	<a href="#">186004453</a> .....	148, 188, 258	<a href="#">186004598</a> .....	25	<a href="#">186004685</a> .....	121	<a href="#">186004766</a> .....	164, 201, 270
<a href="#">186004027</a> .....	170, 212, 277	<a href="#">186004454</a> .....	148, 188, 258	<a href="#">186004602</a> .....	33	<a href="#">186004686</a> .....	121	<a href="#">186004767</a> .....	164, 201, 270
<a href="#">186004028</a> .....	171, 213, 278	<a href="#">186004464</a> .....	150, 190, 260, 394	<a href="#">186004603</a> .....	33	<a href="#">186004687</a> .....	121	<a href="#">186004768</a> .....	164, 201, 270
<a href="#">186004029</a> .....	172, 214, 279	<a href="#">186004465</a> .....	150, 190, 260, 394	<a href="#">186004604</a> .....	33	<a href="#">186004689</a> .....	121	<a href="#">186004770</a> .....	164, 201, 270
<a href="#">186004030</a> .....	209, 283	<a href="#">186004466</a> .....	151, 191, 261, 394	<a href="#">186004605</a> .....	33	<a href="#">186004690</a> .....	118	<a href="#">186004772</a> .....	164, 201, 270
<a href="#">186004031</a> .....	72, 78	<a href="#">186004467</a> .....	151, 191, 261, 394	<a href="#">186004606</a> .....	33	<a href="#">186004691</a> .....	126	<a href="#">186004773</a> .....	164, 201, 270
<a href="#">186004044</a> .....	126	<a href="#">186004468</a> .....	150, 190, 260, 394	<a href="#">186004607</a> .....	33	<a href="#">186004692</a> .....	126	<a href="#">186004775</a> .....	164, 201, 270
<a href="#">186004045</a> .....	126	<a href="#">186004469</a> .....	150, 190, 260, 394	<a href="#">186004608</a> .....	33	<a href="#">186004693</a> .....	126	<a href="#">186004776</a> .....	164, 201, 270
<a href="#">186004046</a> .....	126	<a href="#">186004470</a> .....	151, 191, 261, 394	<a href="#">186004609</a> .....	33	<a href="#">186004694</a> .....	126	<a href="#">186004780</a> .....	165, 202, 271
<a href="#">186004047</a> .....	126	<a href="#">186004471</a> .....	151, 191, 261, 394	<a href="#">186004610</a> .....	33	<a href="#">186004695</a> .....	126	<a href="#">186004781</a> .....	165, 202, 271
<a href="#">186004048</a> .....	126	<a href="#">186004475</a> .....	16-17	<a href="#">186004611</a> .....	33	<a href="#">186004696</a> .....	126	<a href="#">186004782</a> .....	245
<a href="#">186004049</a> .....	126			<a href="#">186004612</a> .....	33	<a href="#">186004697</a> .....	126	<a href="#">186004783</a> .....	165, 202, 271
<a href="#">186004050</a> .....	126			<a href="#">186004613</a> .....	33	<a href="#">186004698</a> .....	126		
<a href="#">186004051</a> .....	30								

<a href="#">186004784</a>	165, 202, 271	<a href="#">186004910</a>	321	<a href="#">186005262</a>	156, 198, 267	<a href="#">186005352</a>	114	<a href="#">186005447</a>	158, 200, 269
<a href="#">186004785</a>	165, 202, 271	<a href="#">186004911</a>	321	<a href="#">186005263</a>	156, 198, 267	<a href="#">186005353</a>	114	<a href="#">186005448</a>	158, 200, 269
<a href="#">186004786</a>	165, 202, 271	<a href="#">186004916</a>	322	<a href="#">186005264</a>	245	<a href="#">186005354</a>	114	<a href="#">186005450</a>	158, 200, 269
<a href="#">186004787</a>	245	<a href="#">186004917</a>	322	<a href="#">186005267</a>	156, 198, 267	<a href="#">186005355</a>	114	<a href="#">186005451</a>	158, 200, 269
<a href="#">186004788</a>	165, 202, 271	<a href="#">186004918</a>	322	<a href="#">186005268</a>	156, 198, 267	<a href="#">186005356</a>	114	<a href="#">186005452</a>	158, 200, 269
<a href="#">186004790</a>	165, 202, 271	<a href="#">186004919</a>	322	<a href="#">186005269</a>	156, 198, 267	<a href="#">186005357</a>	114	<a href="#">186005463</a>	393
<a href="#">186004791</a>	165, 202, 271	<a href="#">186004920</a>	322	<a href="#">186005270</a>	156, 198, 267	<a href="#">186005358</a>	115, 241	<a href="#">186005464</a>	393
<a href="#">186004792</a>	245	<a href="#">186004921</a>	322	<a href="#">186005274</a>	156, 198, 267	<a href="#">186005365</a>	158, 200, 269	<a href="#">186005465</a>	416
<a href="#">186004793</a>	165, 202, 271	<a href="#">186004922</a>	322	<a href="#">186005275</a>	156, 198, 267	<a href="#">186005366</a>	158, 200, 269	<a href="#">186005491</a>	156, 198, 267
<a href="#">186004794</a>	165, 202, 271	<a href="#">186004923</a>	322	<a href="#">186005276</a>	156, 198, 267	<a href="#">186005367</a>	158, 200, 269	<a href="#">186005492</a>	156, 198, 267
<a href="#">186004795</a>	165, 202, 271	<a href="#">186004924</a>	322	<a href="#">186005279</a>	156, 198, 267	<a href="#">186005371</a>	158, 200, 269	<a href="#">186005493</a>	156, 198, 267
<a href="#">186004799</a>	119, 241	<a href="#">186004925</a>	322	<a href="#">186005280</a>	156, 198, 267	<a href="#">186005372</a>	158, 200, 269	<a href="#">186005494</a>	156, 198, 267
<a href="#">186004800</a>	118	<a href="#">186004926</a>	322	<a href="#">186005281</a>	156, 198, 267	<a href="#">186005373</a>	158, 200, 269	<a href="#">186005495</a>	156, 198, 267
<a href="#">186004801</a>	118	<a href="#">186004927</a>	322	<a href="#">186005282</a>	156, 198, 267	<a href="#">186005377</a>	158, 200, 269	<a href="#">186005496</a>	156, 198, 267
<a href="#">186004802</a>	118	<a href="#">186004928</a>	322	<a href="#">186005283</a>	156, 198, 267	<a href="#">186005378</a>	158, 200, 269	<a href="#">186005497</a>	156, 198, 267
<a href="#">186004803</a>	118	<a href="#">186004929</a>	442-443	<a href="#">186005285</a>	245	<a href="#">186005379</a>	158, 200, 269	<a href="#">186005498</a>	157, 199, 268
<a href="#">186004804</a>	118	<a href="#">186004930</a>	442	<a href="#">186005287</a>	156, 198, 267	<a href="#">186005380</a>	158, 200, 269	<a href="#">186005499</a>	157, 199, 268
<a href="#">186004805</a>	118	<a href="#">186004931</a>	381, 442, 444	<a href="#">186005289</a>	156, 198, 267	<a href="#">186005384</a>	158, 200, 269	<a href="#">186005500</a>	157, 199, 268
<a href="#">186004806</a>	118	<a href="#">186004932</a>	522	<a href="#">186005290</a>	156, 198, 267	<a href="#">186005385</a>	158, 200, 269	<a href="#">186005501</a>	157, 199, 268
<a href="#">186004807</a>	126	<a href="#">186004935</a>	321	<a href="#">186005291</a>	156, 198, 267	<a href="#">186005386</a>	158, 200, 269	<a href="#">186005502</a>	157, 199, 268
<a href="#">186004808</a>	126	<a href="#">186004936</a>	321	<a href="#">186005292</a>	114	<a href="#">186005390</a>	158, 200, 269	<a href="#">186005503</a>	157, 199, 268
<a href="#">186004809</a>	126	<a href="#">186004937</a>	321	<a href="#">186005293</a>	114	<a href="#">186005391</a>	158, 200, 269	<a href="#">186005504</a>	157, 199, 268
<a href="#">186004810</a>	126	<a href="#">186004938</a>	321	<a href="#">186005294</a>	114	<a href="#">186005392</a>	158, 200, 269	<a href="#">186005505</a>	158, 200, 269
<a href="#">186004826</a>	121	<a href="#">186004943</a>	322	<a href="#">186005295</a>	114	<a href="#">186005393</a>	158, 200, 269	<a href="#">186005506</a>	158, 200, 269
<a href="#">186004830</a>	38	<a href="#">186004944</a>	322	<a href="#">186005296</a>	114, 266	<a href="#">186005397</a>	158, 200, 269	<a href="#">186005507</a>	158, 200, 269
<a href="#">186004831</a>	38	<a href="#">186004945</a>	322	<a href="#">186005297</a>	114	<a href="#">186005398</a>	158, 200, 269	<a href="#">186005508</a>	158, 200, 269
<a href="#">186004832</a>	38	<a href="#">186004946</a>	322	<a href="#">186005298</a>	114	<a href="#">186005399</a>	158, 200, 269	<a href="#">186005509</a>	158, 200, 269
<a href="#">186004833</a>	38	<a href="#">186004947</a>	322	<a href="#">186005299</a>	114	<a href="#">186005400</a>	158, 200, 269	<a href="#">186005510</a>	158, 200, 269
<a href="#">186004834</a>	38	<a href="#">186004948</a>	322	<a href="#">186005300</a>	114	<a href="#">186005401</a>	158, 200, 269	<a href="#">186005511</a>	158, 200, 269
<a href="#">186004835</a>	38	<a href="#">186004949</a>	322	<a href="#">186005301</a>	114	<a href="#">186005402</a>	114	<a href="#">186005516</a>	377
<a href="#">186004837</a>	38	<a href="#">186004950</a>	322	<a href="#">186005302</a>	114	<a href="#">186005403</a>	114	<a href="#">186005518</a>	19
<a href="#">186004839</a>	118	<a href="#">186004951</a>	322	<a href="#">186005303</a>	115, 241	<a href="#">186005404</a>	114	<a href="#">186005520</a>	158, 200, 269
<a href="#">186004848</a>	118	<a href="#">186004952</a>	322	<a href="#">186005310</a>	157, 199, 268	<a href="#">186005405</a>	114	<a href="#">186005538</a>	160, 204, 273
<a href="#">186004849</a>	118	<a href="#">186004953</a>	322	<a href="#">186005311</a>	157, 199, 268	<a href="#">186005406</a>	114	<a href="#">186005539</a>	160, 204, 273
<a href="#">186004850</a>	118	<a href="#">186004954</a>	322	<a href="#">186005312</a>	157, 199, 268	<a href="#">186005407</a>	114	<a href="#">186005540</a>	160, 204, 273
<a href="#">186004852</a>	164, 201, 270	<a href="#">186004955</a>	322	<a href="#">186005316</a>	157, 199, 268	<a href="#">186005408</a>	114	<a href="#">186005541</a>	160, 204, 273
<a href="#">186004858</a>	149, 189, 259	<a href="#">186005125</a>	11, 13	<a href="#">186005317</a>	157, 199, 268	<a href="#">186005409</a>	114	<a href="#">186005542</a>	160, 204, 273
<a href="#">186004859</a>	149, 189, 259	<a href="#">186005219</a>	68, 76	<a href="#">186005318</a>	157, 199, 268	<a href="#">186005410</a>	114	<a href="#">186005543</a>	160, 204, 273
<a href="#">186004860</a>	149, 189, 259	<a href="#">186005220</a>	68, 76	<a href="#">186005322</a>	157, 199, 268	<a href="#">186005411</a>	114	<a href="#">186005544</a>	160, 204, 273
<a href="#">186004861</a>	149, 189, 259	<a href="#">186005221</a>	61, 64, 68, 76	<a href="#">186005323</a>	157, 199, 268	<a href="#">186005412</a>	114	<a href="#">186005545</a>	160, 204, 273
<a href="#">186004863</a>	149, 189, 259	<a href="#">186005222</a>	70, 75	<a href="#">186005324</a>	157, 199, 268	<a href="#">186005413</a>	115, 241	<a href="#">186005546</a>	160, 204, 273
<a href="#">186004864</a>	149, 189, 259	<a href="#">186005223</a>	70, 75	<a href="#">186005325</a>	157, 199, 268	<a href="#">186005418</a>	156, 198, 267	<a href="#">186005547</a>	160, 204, 273
<a href="#">186004867</a>	149, 189, 259	<a href="#">186005224</a>	70, 75	<a href="#">186005329</a>	157, 199, 268	<a href="#">186005420</a>	156, 198, 267	<a href="#">186005548</a>	160, 204, 273
<a href="#">186004868</a>	149, 189, 259	<a href="#">186005225</a>	119, 427, 468	<a href="#">186005330</a>	157, 199, 268	<a href="#">186005421</a>	156, 198, 266-267	<a href="#">186005549</a>	160, 204, 273
<a href="#">186004869</a>	149, 189, 259	<a href="#">186005226</a>	119, 427, 468	<a href="#">186005331</a>	157, 199, 268	<a href="#">186005422</a>	156, 198, 267	<a href="#">186005550</a>	160, 204, 273
<a href="#">186004870</a>	149, 189, 259	<a href="#">186005230</a>	61, 64, 68	<a href="#">186005335</a>	157, 199, 268	<a href="#">186005423</a>	156, 198, 267	<a href="#">186005551</a>	160, 204, 273
<a href="#">186004896</a>	126, 392	<a href="#">186005231</a>	18	<a href="#">186005336</a>	157, 199, 268	<a href="#">186005424</a>	156, 198, 267	<a href="#">186005552</a>	160, 204, 273
<a href="#">186004897</a>	392	<a href="#">186005232</a>	18	<a href="#">186005337</a>	157, 199, 268	<a href="#">186005425</a>	156, 198, 267	<a href="#">186005553</a>	160, 204, 273
<a href="#">186004898</a>	377	<a href="#">186005233</a>	18	<a href="#">186005338</a>	157, 199, 268	<a href="#">186005426</a>	156, 198, 267	<a href="#">186005554</a>	160, 204, 273
<a href="#">186004899</a>	416	<a href="#">186005249</a>	156, 198, 267	<a href="#">186005342</a>	157, 199, 268	<a href="#">186005431</a>	157, 199, 268	<a href="#">186005555</a>	160, 204, 273
<a href="#">186004900</a>	100, 103, 143, 182, 216, 234, 336, 338, 412-413, 415	<a href="#">186005251</a>	156, 198, 267	<a href="#">186005343</a>	157, 199, 268	<a href="#">186005433</a>	157, 199, 268	<a href="#">186005556</a>	160, 204, 273
<a href="#">186004904</a>	393	<a href="#">186005252</a>	245	<a href="#">186005344</a>	157, 199, 268	<a href="#">186005434</a>	157, 199, 268	<a href="#">186005557</a>	160, 204, 273
<a href="#">186004905</a>	393	<a href="#">186005254</a>	156, 198, 267	<a href="#">186005345</a>	157, 199, 268	<a href="#">186005435</a>	157, 199, 268	<a href="#">186005558</a>	160, 204, 273
<a href="#">186004906</a>	154, 193, 263, 377	<a href="#">186005255</a>	156, 198, 267	<a href="#">186005346</a>	157, 199, 268	<a href="#">186005436</a>	157, 199, 268	<a href="#">186005559</a>	160, 204, 273
<a href="#">186004907</a>	126, 368	<a href="#">186005256</a>	156, 198, 267	<a href="#">186005347</a>	114	<a href="#">186005437</a>	157, 199, 268	<a href="#">186005560</a>	160, 204, 273
<a href="#">186004908</a>	321	<a href="#">186005257</a>	156, 198, 267	<a href="#">186005348</a>	114	<a href="#">186005438</a>	157, 199, 268	<a href="#">186005561</a>	160, 204, 273
<a href="#">186004909</a>	321	<a href="#">186005258</a>	245	<a href="#">186005349</a>	114	<a href="#">186005439</a>	157, 199, 268	<a href="#">186005562</a>	160, 204, 273
		<a href="#">186005260</a>	156, 198, 267	<a href="#">186005350</a>	114	<a href="#">186005444</a>	158, 200, 269	<a href="#">186005563</a>	160, 204, 273
		<a href="#">186005261</a>	156, 198, 267	<a href="#">186005351</a>	114	<a href="#">186005446</a>	158, 200, 269	<a href="#">186005564</a>	160, 204, 273

<a href="#">186005565</a> .....	160, 204, 273	<a href="#">186005653</a> .....	208, 282	<a href="#">186005765</a> .....	322	<a href="#">186005886</a> .....	165, 202, 271	<a href="#">186005972</a> .....	122
<a href="#">186005566</a> .....	160, 204, 273	<a href="#">186005657</a> .....	118	<a href="#">186005766</a> .....	322	<a href="#">186005890</a> .....	167, 205, 274	<a href="#">186005973</a> .....	122
<a href="#">186005567</a> .....	160, 204, 273	<a href="#">186005658</a> .....	118	<a href="#">186005767</a> .....	322	<a href="#">186005891</a> .....	167, 205, 274	<a href="#">186005974</a> .....	122, 241
<a href="#">186005568</a> .....	160, 204, 273	<a href="#">186005671</a> .....	17	<a href="#">186005768</a> .....	322	<a href="#">186005892</a> .....	167, 205, 274	<a href="#">186005975</a> .....	126
<a href="#">186005569</a> .....	160, 204, 273	<a href="#">186005672</a> .....	18	<a href="#">186005769</a> .....	322	<a href="#">186005893</a> .....	167, 205, 274	<a href="#">186005976</a> .....	126
<a href="#">186005570</a> .....	160, 204, 273	<a href="#">186005673</a> .....	18	<a href="#">186005770</a> .....	322	<a href="#">186005894</a> .....	167, 205, 274	<a href="#">186005977</a> .....	126
<a href="#">186005571</a> .....	126	<a href="#">186005688</a> .....	321	<a href="#">186005771</a> .....	322	<a href="#">186005895</a> .....	167, 205, 274	<a href="#">186005978</a> .....	126
<a href="#">186005572</a> .....	126	<a href="#">186005689</a> .....	321	<a href="#">186005772</a> .....	322	<a href="#">186005896</a> .....	167, 205, 274	<a href="#">186005982</a> .....	122
<a href="#">186005573</a> .....	126	<a href="#">186005690</a> .....	321	<a href="#">186005773</a> .....	322	<a href="#">186005897</a> .....	167, 205, 274	<a href="#">186005983</a> .....	122
<a href="#">186005574</a> .....	126	<a href="#">186005691</a> .....	321	<a href="#">186005774</a> .....	322	<a href="#">186005898</a> .....	167, 205, 274	<a href="#">186005984</a> .....	122
<a href="#">186005575</a> .....	126	<a href="#">186005692</a> .....	321	<a href="#">186005781</a> .....	17	<a href="#">186005899</a> .....	167, 205, 274	<a href="#">186005985</a> .....	122
<a href="#">186005576</a> .....	126	<a href="#">186005693</a> .....	321	<a href="#">186005782</a> .....	17	<a href="#">186005900</a> .....	167, 205, 274	<a href="#">186005986</a> .....	122
<a href="#">186005577</a> .....	126	<a href="#">186005694</a> .....	321	<a href="#">186005783</a> .....	17	<a href="#">186005907</a> .....	166, 203, 272	<a href="#">186005987</a> .....	122
<a href="#">186005578</a> .....	126	<a href="#">186005695</a> .....	321	<a href="#">186005784</a> .....	17	<a href="#">186005908</a> .....	166, 203, 272	<a href="#">186005988</a> .....	122
<a href="#">186005579</a> .....	126	<a href="#">186005700</a> .....	322	<a href="#">186005785</a> .....	17	<a href="#">186005909</a> .....	166, 203, 272	<a href="#">186005989</a> .....	122
<a href="#">186005580</a> .....	126	<a href="#">186005701</a> .....	322	<a href="#">186005786</a> .....	17	<a href="#">186005910</a> .....	166, 203, 272	<a href="#">186005990</a> .....	122
<a href="#">186005581</a> .....	126	<a href="#">186005702</a> .....	322	<a href="#">186005791</a> .....	303	<a href="#">186005913</a> .....	166, 203, 272	<a href="#">186005991</a> .....	122
<a href="#">186005582</a> .....	126	<a href="#">186005703</a> .....	322	<a href="#">186005792</a> .....	119	<a href="#">186005914</a> .....	166, 203, 272	<a href="#">186005992</a> .....	122
<a href="#">186005587</a> .....	29, 35-36	<a href="#">186005704</a> .....	322	<a href="#">186005793</a> .....	119, 427, 468	<a href="#">186005915</a> .....	166, 203, 272	<a href="#">186005993</a> .....	122
<a href="#">186005589</a> .....	416	<a href="#">186005705</a> .....	322	<a href="#">186005794</a> .....	217, 291	<a href="#">186005916</a> .....	166, 203, 272	<a href="#">186005994</a> .....	122
<a href="#">186005590</a> .....	416	<a href="#">186005706</a> .....	322	<a href="#">186005800</a> .....	321	<a href="#">186005919</a> .....	166, 203, 272	<a href="#">186005995</a> .....	122, 241
<a href="#">186005591</a> .....	416	<a href="#">186005707</a> .....	322	<a href="#">186005801</a> .....	321	<a href="#">186005920</a> .....	166, 203, 272	<a href="#">186005996</a> .....	126
<a href="#">186005592</a> .....	119, 392	<a href="#">186005708</a> .....	322	<a href="#">186005802</a> .....	321	<a href="#">186005921</a> .....	166, 203, 272	<a href="#">186005997</a> .....	126
<a href="#">186005593</a> .....	119, 392	<a href="#">186005709</a> .....	322	<a href="#">186005803</a> .....	321	<a href="#">186005922</a> .....	166, 203, 272	<a href="#">186005998</a> .....	126
<a href="#">186005594</a> .....	119, 392	<a href="#">186005710</a> .....	322	<a href="#">186005804</a> .....	321	<a href="#">186005923</a> .....	166, 203, 272	<a href="#">186005999</a> .....	126
<a href="#">186005604</a> .....	118	<a href="#">186005711</a> .....	322	<a href="#">186005805</a> .....	321	<a href="#">186005929</a> .....	166, 203, 272	<a href="#">186006006</a> .....	522
<a href="#">186005605</a> .....	118	<a href="#">186005712</a> .....	322	<a href="#">186005806</a> .....	321	<a href="#">186005931</a> .....	166, 203, 272	<a href="#">186006007</a> .....	522
<a href="#">186005606</a> .....	118	<a href="#">186005719</a> .....	321	<a href="#">186005807</a> .....	321	<a href="#">186005932</a> .....	166, 203, 272	<a href="#">186006008</a> .....	522
<a href="#">186005607</a> .....	118	<a href="#">186005720</a> .....	321	<a href="#">186005826</a> .....	69	<a href="#">186005935</a> .....	166, 203, 272	<a href="#">186006010</a> .....	522
<a href="#">186005608</a> .....	118	<a href="#">186005721</a> .....	321	<a href="#">186005827</a> .....	69	<a href="#">186005937</a> .....	166, 203, 272	<a href="#">186006011</a> .....	404
<a href="#">186005609</a> .....	118	<a href="#">186005722</a> .....	321	<a href="#">186005828</a> .....	69	<a href="#">186005938</a> .....	166, 203, 272	<a href="#">186006012</a> .....	404
<a href="#">186005610</a> .....	118	<a href="#">186005723</a> .....	321	<a href="#">186005829</a> .....	69	<a href="#">186005939</a> .....	166, 203, 272	<a href="#">186006016</a> .....	126
<a href="#">186005611</a> .....	118	<a href="#">186005724</a> .....	321	<a href="#">186005837</a> .....	57, 62-63, 65, 71, 74, 552	<a href="#">186005942</a> .....	166, 203, 272	<a href="#">186006017</a> .....	126
<a href="#">186005612</a> .....	118	<a href="#">186005725</a> .....	321	<a href="#">186005847</a> .....	165, 202, 271	<a href="#">186005943</a> .....	166, 203, 272	<a href="#">186006018</a> .....	126
<a href="#">186005613</a> .....	118	<a href="#">186005726</a> .....	321	<a href="#">186005848</a> .....	165, 202, 271	<a href="#">186005944</a> .....	166, 203, 272	<a href="#">186006019</a> .....	126
<a href="#">186005614</a> .....	121	<a href="#">186005731</a> .....	322	<a href="#">186005849</a> .....	165, 202, 271	<a href="#">186005945</a> .....	166, 203, 272	<a href="#">186006020</a> .....	126
<a href="#">186005615</a> .....	121	<a href="#">186005732</a> .....	322	<a href="#">186005850</a> .....	165, 202, 271	<a href="#">186005946</a> .....	166, 203, 272	<a href="#">186006021</a> .....	126
<a href="#">186005616</a> .....	121	<a href="#">186005733</a> .....	322	<a href="#">186005852</a> .....	165, 202, 271	<a href="#">186005950</a> .....	167, 206, 275	<a href="#">186006022</a> .....	126
<a href="#">186005617</a> .....	121	<a href="#">186005734</a> .....	322	<a href="#">186005853</a> .....	165, 202, 271	<a href="#">186005951</a> .....	167, 206, 275	<a href="#">186006023</a> .....	126
<a href="#">186005618</a> .....	121	<a href="#">186005735</a> .....	322	<a href="#">186005854</a> .....	165, 202, 271	<a href="#">186005952</a> .....	167, 206, 275	<a href="#">186006024</a> .....	126
<a href="#">186005619</a> .....	121	<a href="#">186005736</a> .....	322	<a href="#">186005855</a> .....	165, 202, 271	<a href="#">186005953</a> .....	167, 206, 275	<a href="#">186006025</a> .....	126
<a href="#">186005620</a> .....	114	<a href="#">186005737</a> .....	322	<a href="#">186005855</a> .....	165, 202, 271	<a href="#">186005954</a> .....	167, 206, 275	<a href="#">186006026</a> .....	126
<a href="#">186005621</a> .....	114	<a href="#">186005738</a> .....	322	<a href="#">186005856</a> .....	165, 202, 271	<a href="#">186005955</a> .....	167, 206, 275	<a href="#">186006027</a> .....	126
<a href="#">186005622</a> .....	114	<a href="#">186005739</a> .....	322	<a href="#">186005859</a> .....	165, 202, 271	<a href="#">186005956</a> .....	167, 206, 275	<a href="#">186006028</a> .....	144, 151, 184, 191, 254, 261
<a href="#">186005623</a> .....	114	<a href="#">186005740</a> .....	322	<a href="#">186005860</a> .....	165, 202, 271	<a href="#">186005957</a> .....	167, 206, 275	<a href="#">186006029</a> .....	144, 151, 184, 191, 254, 261
<a href="#">186005624</a> .....	114	<a href="#">186005741</a> .....	322	<a href="#">186005861</a> .....	165, 202, 271	<a href="#">186005958</a> .....	167, 206, 275	<a href="#">186006030</a> .....	144, 151, 184, 191, 254, 261
<a href="#">186005625</a> .....	114	<a href="#">186005742</a> .....	322	<a href="#">186005862</a> .....	165, 202, 271	<a href="#">186005959</a> .....	167, 206, 275	<a href="#">186006031</a> .....	144, 151, 184, 191, 254, 261, 372-373
<a href="#">186005634</a> .....	170, 212, 277	<a href="#">186005743</a> .....	322	<a href="#">186005863</a> .....	165, 202, 271	<a href="#">186005960</a> .....	167, 206, 275	<a href="#">186006032</a> .....	144, 151, 184, 191, 254, 261
<a href="#">186005636</a> .....	170, 212, 277	<a href="#">186005750</a> .....	321	<a href="#">186005869</a> .....	165, 202, 271	<a href="#">186005961</a> .....	122	<a href="#">186006033</a> .....	144, 151, 184, 191, 254, 261
<a href="#">186005641</a> .....	165, 202, 271	<a href="#">186005751</a> .....	321	<a href="#">186005871</a> .....	165, 202, 271	<a href="#">186005962</a> .....	122	<a href="#">186006036</a> .....	144, 151, 184, 191, 254, 261
<a href="#">186005642</a> .....	164, 201, 270	<a href="#">186005752</a> .....	321	<a href="#">186005872</a> .....	165, 202, 271	<a href="#">186005963</a> .....	122	<a href="#">186006037</a> .....	144, 151, 184, 191, 254, 261
<a href="#">186005643</a> .....	164, 201, 270	<a href="#">186005753</a> .....	321	<a href="#">186005875</a> .....	165, 202, 271	<a href="#">186005964</a> .....	122		
<a href="#">186005644</a> .....	156, 198, 267	<a href="#">186005754</a> .....	321	<a href="#">186005877</a> .....	165, 202, 271	<a href="#">186005965</a> .....	122		
<a href="#">186005645</a> .....	158, 200, 269	<a href="#">186005755</a> .....	321	<a href="#">186005878</a> .....	165, 202, 271	<a href="#">186005966</a> .....	122		
<a href="#">186005646</a> .....	157, 199, 268	<a href="#">186005756</a> .....	321	<a href="#">186005879</a> .....	165, 202, 271	<a href="#">186005967</a> .....	122		
<a href="#">186005647</a> .....	156, 198, 267	<a href="#">186005757</a> .....	321	<a href="#">186005882</a> .....	165, 202, 271	<a href="#">186005968</a> .....	122		
<a href="#">186005648</a> .....	158, 200, 269	<a href="#">186005762</a> .....	322	<a href="#">186005883</a> .....	165, 202, 271	<a href="#">186005969</a> .....	122		
<a href="#">186005649</a> .....	157, 199, 268	<a href="#">186005763</a> .....	322	<a href="#">186005884</a> .....	165, 202, 271	<a href="#">186005970</a> .....	122		
<a href="#">186005652</a> .....	208, 282	<a href="#">186005764</a> .....	322	<a href="#">186005885</a> .....	165, 202, 271	<a href="#">186005971</a> .....	122		



<a href="#">186006433</a> .....164, 201, 270	<a href="#">186006519</a> .....143, 182, 429, 471	<a href="#">186006611</a> .....149, 189, 259	<a href="#">186006714</a> .....145, 185, 255	<a href="#">186006786</a> .....160, 204, 273
<a href="#">186006434</a> .....164, 201, 270	<a href="#">186006521</a> .....317, 322	<a href="#">186006613</a> .....119, 430, 472	<a href="#">186006715</a> .....146, 186, 256	<a href="#">186006787</a> .....160, 204, 273
<a href="#">186006437</a> .....164, 201, 270	<a href="#">186006522</a> .....317, 322	<a href="#">186006614</a> .....317, 322	<a href="#">186006716</a> .....146, 186, 256	<a href="#">186006788</a> .....160, 204, 273
<a href="#">186006438</a> .....164, 201, 270	<a href="#">186006523</a> .....317, 322	<a href="#">186006616</a> .....321	<a href="#">186006717</a> .....146, 186, 256	<a href="#">186006789</a> .....160, 204, 273
<a href="#">186006439</a> .....164, 201, 270	<a href="#">186006524</a> .....317, 322	<a href="#">186006617</a> .....321	<a href="#">186006718</a> .....147, 187, 257	<a href="#">186006790</a> .....160, 204, 273
<a href="#">186006440</a> .....164, 201, 270	<a href="#">186006541</a> .....321	<a href="#">186006618</a> .....321	<a href="#">186006719</a> .....147, 187, 257	<a href="#">186006791</a> .....160, 204, 273
<a href="#">186006443</a> .....164, 201, 270	<a href="#">186006542</a> .....321	<a href="#">186006619</a> .....321	<a href="#">186006720</a> .....147, 187, 257	<a href="#">186006792</a> .....160, 204, 273
<a href="#">186006444</a> .....164, 201, 270	<a href="#">186006543</a> .....321	<a href="#">186006620</a> .....321	<a href="#">186006721</a> .....148, 188, 258	<a href="#">186006793</a> .....160, 204, 273
<a href="#">186006447</a> .....166, 205, 274	<a href="#">186006544</a> .....321	<a href="#">186006621</a> .....321	<a href="#">186006722</a> .....148, 188, 258	<a href="#">186006794</a> .....166, 205, 274
<a href="#">186006448</a> .....166, 205, 274	<a href="#">186006545</a> .....321	<a href="#">186006622</a> .....321	<a href="#">186006723</a> .....148, 188, 258	<a href="#">186006795</a> .....166, 205, 274
<a href="#">186006449</a> .....166, 205, 274	<a href="#">186006549</a> .....416	<a href="#">186006623</a> .....321	<a href="#">186006724</a> .....149, 189, 259	<a href="#">186006796</a> .....166, 205, 274
<a href="#">186006450</a> .....166, 205, 274	<a href="#">186006551</a> .....317, 322	<a href="#">186006624</a> .....321	<a href="#">186006725</a> .....149, 189, 259	<a href="#">186006797</a> .....167, 205, 274
<a href="#">186006451</a> .....166, 205, 274	<a href="#">186006552</a> .....328, 355, 357, 360, 366, 411, 415, 513	<a href="#">186006625</a> .....321	<a href="#">186006726</a> .....149, 189, 259	<a href="#">186006798</a> .....167, 205, 274
<a href="#">186006452</a> .....166, 205, 274	<a href="#">186006555</a> .....143, 182, 196, 216, 404	<a href="#">186006626</a> .....321	<a href="#">186006727</a> .....156, 198, 267	<a href="#">186006799</a> .....167, 205, 274
<a href="#">186006453</a> .....166, 205, 274	<a href="#">186006557</a> .....321	<a href="#">186006627</a> .....321	<a href="#">186006728</a> .....156, 198, 267	<a href="#">186006800</a> .....166, 205, 274
<a href="#">186006454</a> .....166, 205, 274	<a href="#">186006558</a> .....321	<a href="#">186006628</a> .....321	<a href="#">186006729</a> .....156, 198, 267	<a href="#">186006801</a> .....166, 205, 274
<a href="#">186006455</a> .....166, 205, 274	<a href="#">186006559</a> .....321	<a href="#">186006629</a> .....321	<a href="#">186006730</a> .....157, 199, 268	<a href="#">186006802</a> .....166, 205, 274
<a href="#">186006456</a> .....166, 205, 274	<a href="#">186006560</a> .....321	<a href="#">186006630</a> .....321	<a href="#">186006731</a> .....157, 199, 268	<a href="#">186006803</a> .....167, 205, 274
<a href="#">186006457</a> .....166, 205, 274	<a href="#">186006561</a> .....321	<a href="#">186006631</a> .....321	<a href="#">186006732</a> .....157, 199, 268	<a href="#">186006804</a> .....167, 205, 274
<a href="#">186006459</a> .....165, 202, 271	<a href="#">186006562</a> .....321	<a href="#">186006632</a> .....321	<a href="#">186006733</a> .....158, 200, 269	<a href="#">186006805</a> .....167, 205, 274
<a href="#">186006460</a> .....165, 202, 271	<a href="#">186006563</a> .....321	<a href="#">186006633</a> .....321	<a href="#">186006734</a> .....158, 200, 269	<a href="#">186006806</a> .....167, 206, 275
<a href="#">186006462</a> .....165, 202, 271	<a href="#">186006564</a> .....321	<a href="#">186006634</a> .....321	<a href="#">186006735</a> .....158, 200, 269	<a href="#">186006807</a> .....167, 206, 275
<a href="#">186006463</a> .....165, 202, 271	<a href="#">186006566</a> .....321	<a href="#">186006635</a> .....321	<a href="#">186006736</a> .....164, 201, 270	<a href="#">186006808</a> .....167, 206, 275
<a href="#">186006464</a> .....165, 202, 271	<a href="#">186006567</a> .....321	<a href="#">186006636</a> .....321	<a href="#">186006737</a> .....164, 201, 270	<a href="#">186006812</a> .....38
<a href="#">186006465</a> .....165, 202, 271	<a href="#">186006568</a> .....321	<a href="#">186006637</a> .....321	<a href="#">186006738</a> .....164, 201, 270	<a href="#">186006813</a> .....38
<a href="#">186006466</a> .....165, 202, 271	<a href="#">186006569</a> .....321	<a href="#">186006638</a> .....321	<a href="#">186006739</a> .....165, 202, 271	<a href="#">186006814</a> .....38
<a href="#">186006469</a> .....165, 202, 271	<a href="#">186006570</a> .....321	<a href="#">186006639</a> .....321	<a href="#">186006740</a> .....165, 202, 271	<a href="#">186006815</a> .....167, 205, 274
<a href="#">186006470</a> .....245	<a href="#">186006571</a> .....321	<a href="#">186006640</a> .....321	<a href="#">186006741</a> .....165, 202, 271	<a href="#">186006816</a> .....167, 205, 274
<a href="#">186006473</a> .....165, 202, 271	<a href="#">186006572</a> .....321	<a href="#">186006641</a> .....321	<a href="#">186006742</a> .....164, 201, 270	<a href="#">186006817</a> .....167, 205, 274
<a href="#">186006474</a> .....165, 202, 271	<a href="#">186006573</a> .....321	<a href="#">186006642</a> .....321	<a href="#">186006743</a> .....164, 201, 270	<a href="#">186006818</a> .....167, 205, 274
<a href="#">186006475</a> .....165, 202, 271	<a href="#">186006575</a> .....321	<a href="#">186006643</a> .....321	<a href="#">186006744</a> .....164, 201, 270	<a href="#">186006841</a> .....182, 366, 370, 513
<a href="#">186006478</a> .....165, 202, 271	<a href="#">186006576</a> .....321	<a href="#">186006644</a> .....321	<a href="#">186006745</a> .....165, 202, 271	<a href="#">186006842</a> .....143, 182, 328, 429, 471
<a href="#">186006479</a> .....165, 202, 271	<a href="#">186006577</a> .....321	<a href="#">186006645</a> .....321	<a href="#">186006746</a> .....165, 202, 271	<a href="#">186006850</a> .....427-428, 467-468
<a href="#">186006480</a> .....165, 202, 271	<a href="#">186006578</a> .....321	<a href="#">186006646</a> .....321	<a href="#">186006747</a> .....165, 202, 271	<a href="#">186006851</a> .....427, 468
<a href="#">186006481</a> .....165, 202, 271	<a href="#">186006579</a> .....321	<a href="#">186006648</a> .....321	<a href="#">186006748</a> .....166, 203, 272	<a href="#">186006852</a> .....427, 468
<a href="#">186006484</a> .....165, 202, 271	<a href="#">186006580</a> .....321	<a href="#">186006649</a> .....321	<a href="#">186006749</a> .....166, 203, 272	<a href="#">186006869</a> .....443
<a href="#">186006485</a> .....165, 202, 271	<a href="#">186006581</a> .....321	<a href="#">186006650</a> .....321	<a href="#">186006750</a> .....166, 203, 272	<a href="#">186006870</a> .....443
<a href="#">186006488</a> .....167, 205, 274	<a href="#">186006582</a> .....321	<a href="#">186006651</a> .....321	<a href="#">186006757</a> .....153, 193, 263	<a href="#">186006875</a> .....209-210, 283-284
<a href="#">186006489</a> .....167, 205, 274	<a href="#">186006587</a> .....149, 189, 259	<a href="#">186006652</a> .....321	<a href="#">186006758</a> .....153, 193, 263	<a href="#">186006876</a> .....209, 283
<a href="#">186006490</a> .....167, 205, 274	<a href="#">186006588</a> .....149, 189, 259	<a href="#">186006653</a> .....321	<a href="#">186006759</a> .....153, 193, 263	<a href="#">186006877</a> .....210, 284
<a href="#">186006491</a> .....167, 205, 274	<a href="#">186006589</a> .....149, 189, 259	<a href="#">186006654</a> .....321	<a href="#">186006760</a> .....153, 193, 263	<a href="#">186006878</a> .....208, 282
<a href="#">186006492</a> .....167, 205, 274	<a href="#">186006590</a> .....149, 189, 259	<a href="#">186006655</a> .....321	<a href="#">186006761</a> .....153, 193, 263	<a href="#">186006879</a> .....208, 282
<a href="#">186006493</a> .....167, 205, 274	<a href="#">186006591</a> .....149, 189, 259	<a href="#">186006656</a> .....321	<a href="#">186006762</a> .....153, 193, 263	<a href="#">186006880</a> .....394
<a href="#">186006494</a> .....167, 205, 274	<a href="#">186006592</a> .....149, 189, 259	<a href="#">186006657</a> .....321	<a href="#">186006763</a> .....153, 193, 263	<a href="#">186006882</a> .....151, 191, 261, 394
<a href="#">186006495</a> .....167, 205, 274	<a href="#">186006593</a> .....149, 189, 259	<a href="#">186006658</a> .....321	<a href="#">186006764</a> .....487	<a href="#">186006884</a> .....170, 212, 277
<a href="#">186006496</a> .....167, 205, 274	<a href="#">186006594</a> .....149, 189, 259	<a href="#">186006659</a> .....321	<a href="#">186006765</a> .....487	<a href="#">186006885</a> .....170, 212, 277
<a href="#">186006497</a> .....167, 205, 274	<a href="#">186006595</a> .....149, 189, 259	<a href="#">186006685</a> .....321	<a href="#">186006766</a> .....487	<a href="#">186006886</a> .....171, 213, 278
<a href="#">186006498</a> .....167, 205, 274	<a href="#">186006596</a> .....149, 189, 259	<a href="#">186006686</a> .....321	<a href="#">186006774</a> .....153, 193, 263	<a href="#">186006887</a> .....171, 213, 278
<a href="#">186006499</a> .....11	<a href="#">186006597</a> .....149, 189, 259	<a href="#">186006687</a> .....321	<a href="#">186006775</a> .....153, 193, 263	<a href="#">186006888</a> .....172, 214, 279
<a href="#">186006500</a> .....11	<a href="#">186006598</a> .....149, 189, 259	<a href="#">186006688</a> .....321	<a href="#">186006776</a> .....153, 193, 263	<a href="#">186006889</a> .....172, 214, 279
<a href="#">186006501</a> .....11	<a href="#">186006599</a> .....149, 189, 259	<a href="#">186006703</a> .....302	<a href="#">186006777</a> .....153, 193, 263	<a href="#">186006890</a> .....149, 189, 259
<a href="#">186006502</a> .....11	<a href="#">186006603</a> .....149, 189, 259	<a href="#">186006709</a> .....144, 151, 184, 191, 254, 261	<a href="#">186006778</a> .....153, 193, 263	<a href="#">186006891</a> .....147, 187, 257
<a href="#">186006504</a> .....119, 427, 468	<a href="#">186006604</a> .....149, 189, 259	<a href="#">186006710</a> .....144, 151, 184, 191, 254, 261, 373	<a href="#">186006779</a> .....154, 194, 264	<a href="#">186006892</a> .....144, 184, 254
<a href="#">186006505</a> .....119, 427, 468	<a href="#">186006605</a> .....149, 189, 259	<a href="#">186006711</a> .....144, 151, 184, 191, 254, 261	<a href="#">186006780</a> .....154, 194, 264	<a href="#">186006893</a> .....144, 184, 254
<a href="#">186006506</a> .....119, 427, 429, 468	<a href="#">186006606</a> .....149, 189, 259	<a href="#">186006712</a> .....145, 185, 255	<a href="#">186006781</a> .....154, 194, 264	<a href="#">186006894</a> .....145, 185, 255
<a href="#">186006516</a> .....392	<a href="#">186006607</a> .....149, 189, 259	<a href="#">186006713</a> .....145, 185, 255	<a href="#">186006782</a> .....154, 194, 264	<a href="#">186006895</a> .....145, 185, 255
<a href="#">186006517</a> .....126, 392	<a href="#">186006608</a> .....149, 189, 259		<a href="#">186006783</a> .....154, 194, 264	
<a href="#">186006518</a> .....143, 182, 329, 429, 471	<a href="#">186006609</a> .....149, 189, 259		<a href="#">186006784</a> .....154, 194, 264	
	<a href="#">186006610</a> .....149, 189, 259		<a href="#">186006785</a> .....160, 204, 273	

<a href="#">186006896</a> .....	148, 188, 258	<a href="#">186006972</a> .....	465	<a href="#">186007095</a> .....	110, 134	<a href="#">186007185</a> .....	123, 138	<a href="#">186007305</a> .....	152, 192, 262, 416
<a href="#">186006897</a> .....	146, 186, 256	<a href="#">186006973</a> .....	465	<a href="#">186007096</a> .....	110, 134	<a href="#">186007187</a> .....	61, 64, 67, 69, 74, 77	<a href="#">186007310</a> .....	152, 192, 262, 416
<a href="#">186006898</a> .....	146, 186, 256	<a href="#">186006975</a> .....	465	<a href="#">186007097</a> .....	110, 134	<a href="#">186007198</a> .....	69	<a href="#">186007311</a> .....	152, 192, 262, 416
<a href="#">186006899</a> .....	156, 198, 267	<a href="#">186006977</a> .....	465	<a href="#">186007098</a> .....	110, 134	<a href="#">186007224</a> .....	72-73, 78	<a href="#">186007312</a> .....	152, 192, 262, 416
<a href="#">186006900</a> .....	157, 199, 268	<a href="#">186006978</a> .....	465	<a href="#">186007099</a> .....	110, 134	<a href="#">186007226</a> .....	108, 112, 117, 119, 133, 143, 169, 182, 207, 211	<a href="#">186007313</a> .....	152, 192, 262, 414, 416
<a href="#">186006901</a> .....	158, 200, 269	<a href="#">186006980</a> .....	465	<a href="#">186007100</a> .....	110, 134	<a href="#">186007230</a> .....	416	<a href="#">186007314</a> .....	152, 192, 262, 416
<a href="#">186006902</a> .....	175, 222, 286	<a href="#">186006982</a> .....	465	<a href="#">186007102</a> .....	110, 134	<a href="#">186007231</a> .....	522	<a href="#">186007315</a> .....	152, 192, 262, 416
<a href="#">186006903</a> .....	175, 222, 286	<a href="#">186006983</a> .....	465	<a href="#">186007103</a> .....	112, 135	<a href="#">186007232</a> .....	522	<a href="#">186007316</a> .....	152, 192, 262, 416
<a href="#">186006904</a> .....	176, 223, 287	<a href="#">186006985</a> .....	465	<a href="#">186007104</a> .....	112, 135	<a href="#">186007233</a> .....	491	<a href="#">186007317</a> .....	152, 192, 262, 416
<a href="#">186006905</a> .....	224, 288	<a href="#">186006987</a> .....	465	<a href="#">186007105</a> .....	112, 135	<a href="#">186007235</a> .....	416	<a href="#">186007318</a> .....	152, 192, 262, 416
<a href="#">186006906</a> .....	224, 288	<a href="#">186006988</a> .....	465	<a href="#">186007106</a> .....	112, 135	<a href="#">186007239</a> .....	370	<a href="#">186007319</a> .....	152, 192, 262, 416
<a href="#">186006907</a> .....	322	<a href="#">186006990</a> .....	465	<a href="#">186007107</a> .....	112, 135	<a href="#">186007244</a> .....	487	<a href="#">186007320</a> .....	152, 192, 262, 416
<a href="#">186006908</a> .....	322	<a href="#">186006992</a> .....	456	<a href="#">186007108</a> .....	112, 135	<a href="#">186007245</a> .....	487	<a href="#">186007325</a> .....	152, 192, 262, 416
<a href="#">186006909</a> .....	322	<a href="#">186006993</a> .....	456	<a href="#">186007109</a> .....	112, 135	<a href="#">186007249</a> .....	465	<a href="#">186007330</a> .....	152, 192, 262, 416
<a href="#">186006910</a> .....	322	<a href="#">186006995</a> .....	456	<a href="#">186007110</a> .....	112, 135	<a href="#">186007250</a> .....	465	<a href="#">186007331</a> .....	152, 192, 262, 416
<a href="#">186006911</a> .....	322	<a href="#">186006997</a> .....	456	<a href="#">186007111</a> .....	112, 135	<a href="#">186007251</a> .....	465	<a href="#">186007332</a> .....	152, 192, 262, 416
<a href="#">186006912</a> .....	144-149, 151-152, 156-158, 164, 170-172, 175-176, 184-189, 191-192, 198-201, 208-210, 212-214, 222-224, 254-259, 261-262, 267-270, 277-279, 282-284, 286-288, 301, 315, 322, 394, 416	<a href="#">186006998</a> .....	456	<a href="#">186007112</a> .....	112, 135	<a href="#">186007252</a> .....	456	<a href="#">186007333</a> .....	152, 192, 262, 416
<a href="#">186006933</a> .....	115, 395	<a href="#">186007000</a> .....	456	<a href="#">186007113</a> .....	110, 134	<a href="#">186007253</a> .....	456	<a href="#">186007335</a> .....	152, 192, 262, 416
<a href="#">186006934</a> .....	115, 395	<a href="#">186007002</a> .....	456	<a href="#">186007114</a> .....	110, 134	<a href="#">186007254</a> .....	456	<a href="#">186007336</a> .....	152, 192, 262, 416
<a href="#">186006935</a> .....	115, 395	<a href="#">186007003</a> .....	456	<a href="#">186007115</a> .....	110, 134	<a href="#">186007256</a> .....	487	<a href="#">186007337</a> .....	152, 192, 262, 416
<a href="#">186006936</a> .....	115, 395	<a href="#">186007005</a> .....	456	<a href="#">186007116</a> .....	110, 134	<a href="#">186007257</a> .....	487	<a href="#">186007338</a> .....	152, 192, 262, 416
<a href="#">186006937</a> .....	115, 395	<a href="#">186007007</a> .....	456	<a href="#">186007117</a> .....	110, 134	<a href="#">186007258</a> .....	487	<a href="#">186007339</a> .....	152, 192, 262, 416
<a href="#">186006938</a> .....	115, 395	<a href="#">186007008</a> .....	456	<a href="#">186007118</a> .....	110, 134	<a href="#">186007259</a> .....	487	<a href="#">186007340</a> .....	152, 192, 262
<a href="#">186006939</a> .....	115, 395	<a href="#">186007010</a> .....	456	<a href="#">186007119</a> .....	110, 134	<a href="#">186007261</a> .....	487	<a href="#">186007364</a> .....	110, 134
<a href="#">186006940</a> .....	126, 395	<a href="#">186007012</a> .....	301	<a href="#">186007120</a> .....	110, 134	<a href="#">186007262</a> .....	370	<a href="#">186007365</a> .....	110, 134
<a href="#">186006941</a> .....	159, 203, 272, 395	<a href="#">186007015</a> .....	159, 203, 272, 395	<a href="#">186007121</a> .....	110, 134	<a href="#">186007263</a> .....	150, 190, 260, 370	<a href="#">186007366</a> .....	110, 134
<a href="#">186006942</a> .....	159, 203, 272, 395	<a href="#">186007019</a> .....	159, 203, 272, 395	<a href="#">186007122</a> .....	110, 134	<a href="#">186007264</a> .....	150, 190, 260, 370	<a href="#">186007367</a> .....	110, 134
<a href="#">186006943</a> .....	159, 203, 272, 395	<a href="#">186007020</a> .....	159, 203, 272, 395	<a href="#">186007123</a> .....	112, 241	<a href="#">186007265</a> .....	150, 190, 260, 370	<a href="#">186007368</a> .....	110, 134
<a href="#">186006944</a> .....	396	<a href="#">186007021</a> .....	159, 203, 272, 395	<a href="#">186007124</a> .....	112, 241	<a href="#">186007266</a> .....	154, 194, 264, 370	<a href="#">186007369</a> .....	110, 134
<a href="#">186006945</a> .....	160, 204, 274, 396	<a href="#">186007022</a> .....	159, 203, 272, 395	<a href="#">186007125</a> .....	112, 241	<a href="#">186007267</a> .....	370	<a href="#">186007370</a> .....	110, 134
<a href="#">186006946</a> .....	159, 203, 272, 395	<a href="#">186007023</a> .....	159, 203, 272, 395	<a href="#">186007156</a> .....	124, 138	<a href="#">186007268</a> .....	150, 190, 260, 370	<a href="#">186007371</a> .....	110, 134
<a href="#">186006947</a> .....	159, 203, 272, 395	<a href="#">186007024</a> .....	159, 203, 272, 395	<a href="#">186007157</a> .....	124, 138	<a href="#">186007269</a> .....	150, 190, 260, 370	<a href="#">186007372</a> .....	110, 134
<a href="#">186006950</a> .....	159, 203, 272, 395	<a href="#">186007025</a> .....	159, 203, 272, 395	<a href="#">186007158</a> .....	124, 138	<a href="#">186007270</a> .....	150, 190, 260, 370	<a href="#">186007373</a> .....	110, 134
<a href="#">186006951</a> .....	159, 203, 272, 395	<a href="#">186007026</a> .....	159, 203, 272, 395	<a href="#">186007159</a> .....	124, 138	<a href="#">186007271</a> .....	154, 194, 264, 370	<a href="#">186007374</a> .....	110, 134
<a href="#">186006952</a> .....	159, 203, 272, 395	<a href="#">186007027</a> .....	159, 203, 272, 395	<a href="#">186007160</a> .....	124, 138	<a href="#">186007272</a> .....	370	<a href="#">186007375</a> .....	110, 134
<a href="#">186006953</a> .....	160, 204, 274, 396	<a href="#">186007028</a> .....	159, 203, 272, 395	<a href="#">186007161</a> .....	124, 138	<a href="#">186007273</a> .....	150, 190, 260, 370	<a href="#">186007376</a> .....	110, 134
<a href="#">186006954</a> .....	395	<a href="#">186007029</a> .....	159, 203, 272, 395	<a href="#">186007162</a> .....	124, 138	<a href="#">186007274</a> .....	150, 190, 260, 370	<a href="#">186007377</a> .....	110, 134
<a href="#">186006955</a> .....	159, 203, 272, 395	<a href="#">186007030</a> .....	159, 203, 272, 395	<a href="#">186007163</a> .....	124, 138	<a href="#">186007275</a> .....	150, 190, 260, 370	<a href="#">186007378</a> .....	110, 134
<a href="#">186006956</a> .....	159, 203, 272, 395	<a href="#">186007031</a> .....	159, 203, 272, 395	<a href="#">186007164</a> .....	124, 138	<a href="#">186007276</a> .....	150, 190, 260, 370	<a href="#">186007379</a> .....	112, 135
<a href="#">186006957</a> .....	159, 203, 272, 395	<a href="#">186007034</a> .....	370	<a href="#">186007165</a> .....	124, 138	<a href="#">186007277</a> .....	370	<a href="#">186007380</a> .....	112, 135
<a href="#">186006958</a> .....	395	<a href="#">186007038</a> .....	159, 203, 272, 395	<a href="#">186007166</a> .....	124, 139	<a href="#">186007278</a> .....	82, 492, 553	<a href="#">186007381</a> .....	112, 135
<a href="#">186006959</a> .....	160, 204, 274, 396	<a href="#">186007049</a> .....	487	<a href="#">186007167</a> .....	124, 139	<a href="#">186007285</a> .....	156, 198, 267	<a href="#">186007382</a> .....	112, 135
<a href="#">186006961</a> .....	366, 513	<a href="#">186007051</a> .....	487	<a href="#">186007168</a> .....	124, 139	<a href="#">186007290</a> .....	156, 198, 267	<a href="#">186007383</a> .....	112, 135
<a href="#">186006966</a> .....	160, 204, 274, 396	<a href="#">186007076</a> .....	159, 203, 272, 395	<a href="#">186007169</a> .....	124, 139	<a href="#">186007291</a> .....	156, 198, 267	<a href="#">186007384</a> .....	112, 135
<a href="#">186006967</a> .....	70	<a href="#">186007077</a> .....	159, 203, 272, 395	<a href="#">186007170</a> .....	124, 139	<a href="#">186007292</a> .....	156, 198, 267	<a href="#">186007385</a> .....	112, 135
<a href="#">186006968</a> .....	487	<a href="#">186007078</a> .....	159, 203, 272, 395	<a href="#">186007171</a> .....	124, 139	<a href="#">186007293</a> .....	156, 198, 267	<a href="#">186007386</a> .....	112, 135
<a href="#">186006969</a> .....	487	<a href="#">186007080</a> .....	370	<a href="#">186007172</a> .....	124, 139	<a href="#">186007294</a> .....	156, 198, 267	<a href="#">186007387</a> .....	112, 135
<a href="#">186006970</a> .....	487	<a href="#">186007081</a> .....	359, 369-370	<a href="#">186007173</a> .....	124, 139	<a href="#">186007295</a> .....	156, 198, 267	<a href="#">186007388</a> .....	112, 135
		<a href="#">186007083</a> .....	404	<a href="#">186007174</a> .....	124, 139	<a href="#">186007296</a> .....	156, 198, 267	<a href="#">186007389</a> .....	112, 135
		<a href="#">186007084</a> .....	404	<a href="#">186007175</a> .....	124, 139	<a href="#">186007297</a> .....	156, 198, 267	<a href="#">186007390</a> .....	112, 135
		<a href="#">186007088</a> .....	82, 492	<a href="#">186007176</a> .....	123, 138	<a href="#">186007298</a> .....	156, 198, 267	<a href="#">186007391</a> .....	112, 135
		<a href="#">186007089</a> .....	82, 492	<a href="#">186007177</a> .....	123, 138	<a href="#">186007299</a> .....	156, 198, 267	<a href="#">186007392</a> .....	112, 135
		<a href="#">186007090</a> .....	82, 492	<a href="#">186007178</a> .....	123, 138	<a href="#">186007300</a> .....	156, 198, 267	<a href="#">186007393</a> .....	112, 135
		<a href="#">186007092</a> .....	110, 134	<a href="#">186007179</a> .....	123, 138	<a href="#">186007301</a> .....	156, 198, 267	<a href="#">186007394</a> .....	110, 134
		<a href="#">186007093</a> .....	110, 134	<a href="#">186007180</a> .....	123, 138	<a href="#">186007302</a> .....	156, 198, 267	<a href="#">186007395</a> .....	110, 134
		<a href="#">186007094</a> .....	110, 134	<a href="#">186007181</a> .....	123, 138	<a href="#">186007303</a> .....	156, 198, 267	<a href="#">186007396</a> .....	110, 134
				<a href="#">186007182</a> .....	123, 138	<a href="#">186007304</a> .....	156, 198, 267	<a href="#">186007397</a> .....	110, 134
				<a href="#">186007183</a> .....	123, 138				
				<a href="#">186007184</a> .....	123, 138				



<a href="#">186007860</a>	167, 206, 243, 275	<a href="#">186008010</a>	355, 357, 359-360, 419-420	<a href="#">186008155</a>	170, 212, 277	<a href="#">186008214</a>	146, 186, 256	<a href="#">186008273</a>	152, 192, 262, 416
<a href="#">186007862</a>	167, 206, 243, 275	<a href="#">186008029</a>	489	<a href="#">186008156</a>	170, 212, 277	<a href="#">186008215</a>	145, 185, 255	<a href="#">186008274</a>	152, 192, 262, 416
<a href="#">186007863</a>	167, 206, 243, 275	<a href="#">186008038</a>	150, 190, 260, 370	<a href="#">186008157</a>	170, 212, 277	<a href="#">186008216</a>	145, 185, 255	<a href="#">186008275</a>	152, 192, 262, 416
<a href="#">186007865</a>	167, 206, 243, 275	<a href="#">186008039</a>	150, 190, 260, 370	<a href="#">186008158</a>	171, 213, 278	<a href="#">186008217</a>	148, 188, 258	<a href="#">186008276</a>	152, 192, 262, 416
<a href="#">186007866</a>	167, 206, 243, 275	<a href="#">186008040</a>	150, 190, 260, 370	<a href="#">186008159</a>	171, 213, 278	<a href="#">186008218</a>	148, 188, 258	<a href="#">186008277</a>	152, 192, 262, 416
<a href="#">186007868</a>	167, 206, 243, 275	<a href="#">186008052</a>	12, 17	<a href="#">186008160</a>	171, 213, 278	<a href="#">186008219</a>	164, 201, 270	<a href="#">186008278</a>	152, 192, 262, 416
<a href="#">186007869</a>	167, 206, 243, 275	<a href="#">186008053</a>	12, 17	<a href="#">186008161</a>	171, 213, 278	<a href="#">186008220</a>	164, 201, 270	<a href="#">186008279</a>	152, 192, 262, 416
<a href="#">186007871</a>	167, 206, 243, 275	<a href="#">186008054</a>	12, 17	<a href="#">186008162</a>	171, 213, 278	<a href="#">186008221</a>	164, 201, 270	<a href="#">186008280</a>	165, 202, 271
<a href="#">186007872</a>	167, 206, 243, 275	<a href="#">186008055</a>	10, 12	<a href="#">186008163</a>	171, 213, 278	<a href="#">186008222</a>	164, 201, 270	<a href="#">186008281</a>	230, 298
<a href="#">186007874</a>	167, 206, 243, 275	<a href="#">186008056</a>	10, 12	<a href="#">186008164</a>	144, 184, 254	<a href="#">186008223</a>	164, 201, 270	<a href="#">186008282</a>	230, 298
<a href="#">186007875</a>	167, 206, 243, 275	<a href="#">186008057</a>	10, 12	<a href="#">186008165</a>	144, 184, 254	<a href="#">186008224</a>	164, 201, 270	<a href="#">186008284</a>	228, 295
<a href="#">186007877</a>	167, 206, 243, 275	<a href="#">186008065</a>	11, 12	<a href="#">186008166</a>	144, 184, 254	<a href="#">186008225</a>	165, 202, 271	<a href="#">186008285</a>	228, 295
<a href="#">186007878</a>	167, 206, 243, 275	<a href="#">186008066</a>	515	<a href="#">186008167</a>	144, 184, 254	<a href="#">186008226</a>	165, 202, 271	<a href="#">186008286</a>	230, 297
<a href="#">186007880</a>	167, 206, 243, 275	<a href="#">186008067</a>	515	<a href="#">186008168</a>	146, 186, 256	<a href="#">186008227</a>	165, 202, 271	<a href="#">186008287</a>	230, 297
<a href="#">186007881</a>	167, 206, 243, 275	<a href="#">186008068</a>	515	<a href="#">186008169</a>	146, 186, 256	<a href="#">186008228</a>	322	<a href="#">186008288</a>	229, 296
<a href="#">186007883</a>	167, 206, 243, 275	<a href="#">186008071</a>	38	<a href="#">186008170</a>	146, 186, 256	<a href="#">186008229</a>	322	<a href="#">186008289</a>	229, 297
<a href="#">186007884</a>	167, 206, 243, 275	<a href="#">186008072</a>	38	<a href="#">186008171</a>	146, 186, 256	<a href="#">186008230</a>	322	<a href="#">186008291</a>	228, 296
<a href="#">186007886</a>	167, 206, 243, 275	<a href="#">186008073</a>	38	<a href="#">186008172</a>	145, 185, 255	<a href="#">186008231</a>	322	<a href="#">186008292</a>	228, 295
<a href="#">186007887</a>	177, 226, 243, 290	<a href="#">186008074</a>	38	<a href="#">186008173</a>	145, 185, 255	<a href="#">186008232</a>	322	<a href="#">186008294</a>	228, 295
<a href="#">186007889</a>	177, 226, 243, 290	<a href="#">186008075</a>	38	<a href="#">186008174</a>	145, 185, 255	<a href="#">186008233</a>	322	<a href="#">186008295</a>	229, 296
<a href="#">186007892</a>	177, 226, 243, 290	<a href="#">186008076</a>	38	<a href="#">186008175</a>	145, 185, 255	<a href="#">186008234</a>	322	<a href="#">186008296</a>	231, 298
<a href="#">186007894</a>	177, 226, 243, 290	<a href="#">186008077</a>	38	<a href="#">186008176</a>	147, 187, 257	<a href="#">186008235</a>	322	<a href="#">186008297</a>	228, 296
<a href="#">186007896</a>	177, 226, 243, 290	<a href="#">186008078</a>	38	<a href="#">186008177</a>	147, 187, 257	<a href="#">186008236</a>	156, 198, 267	<a href="#">186008298</a>	230, 297
<a href="#">186007899</a>	177, 226, 243, 290	<a href="#">186008079</a>	38	<a href="#">186008178</a>	147, 187, 257	<a href="#">186008237</a>	156, 198, 267	<a href="#">186008299</a>	229, 297
<a href="#">186007901</a>	177, 226, 243, 290	<a href="#">186008080</a>	38	<a href="#">186008179</a>	147, 187, 257	<a href="#">186008238</a>	156, 198, 267	<a href="#">186008300</a>	230, 297
<a href="#">186007903</a>	177, 226, 243, 290	<a href="#">186008081</a>	38	<a href="#">186008180</a>	172, 214, 279	<a href="#">186008239</a>	156, 198, 267	<a href="#">186008301</a>	231, 298
<a href="#">186007905</a>	177, 226, 243, 290	<a href="#">186008089</a>	366, 402, 513	<a href="#">186008181</a>	172, 214, 279	<a href="#">186008240</a>	157, 199, 268	<a href="#">186008302</a>	231, 298
<a href="#">186007907</a>	243	<a href="#">186008091</a>	365, 512	<a href="#">186008182</a>	172, 214, 279	<a href="#">186008241</a>	157, 199, 268	<a href="#">186008303</a>	231, 298
<a href="#">186007909</a>	177, 226, 243, 290	<a href="#">186008100</a>	366, 513	<a href="#">186008183</a>	172, 214, 279	<a href="#">186008242</a>	157, 199, 268	<a href="#">186008304</a>	514
<a href="#">186007911</a>	243	<a href="#">186008103</a>	175, 222, 286	<a href="#">186008184</a>	172, 214, 279	<a href="#">186008243</a>	157, 199, 268	<a href="#">186008317</a>	366, 513
<a href="#">186007917</a>	177, 226, 243, 290	<a href="#">186008104</a>	176, 223, 287	<a href="#">186008185</a>	172, 214, 279	<a href="#">186008244</a>	158, 200, 269	<a href="#">186008318</a>	112, 136
<a href="#">186007919</a>	177, 226, 243, 290	<a href="#">186008105</a>	224, 288	<a href="#">186008186</a>	150, 190, 260, 394	<a href="#">186008245</a>	158, 200, 269	<a href="#">186008319</a>	112, 136
<a href="#">186007921</a>	177, 226, 243, 290	<a href="#">186008106</a>	225, 289	<a href="#">186008187</a>	150, 190, 260, 394	<a href="#">186008246</a>	158, 200, 269	<a href="#">186008320</a>	112, 136
<a href="#">186007923</a>	177, 226, 243, 290	<a href="#">186008107</a>	175, 222, 286	<a href="#">186008188</a>	150, 190, 260, 394	<a href="#">186008247</a>	158, 200, 269	<a href="#">186008321</a>	112, 136
<a href="#">186007929</a>	177, 226, 243, 290	<a href="#">186008128</a>	224, 288	<a href="#">186008189</a>	150, 190, 260, 394	<a href="#">186008248</a>	322	<a href="#">186008322</a>	112, 136
<a href="#">186007931</a>	177, 226, 243, 290	<a href="#">186008129</a>	175, 222, 286	<a href="#">186008190</a>	151, 191, 261, 394	<a href="#">186008249</a>	322	<a href="#">186008323</a>	124, 140
<a href="#">186007933</a>	177, 226, 243, 290	<a href="#">186008130</a>	176, 223, 287	<a href="#">186008191</a>	151, 191, 261, 394	<a href="#">186008250</a>	322	<a href="#">186008324</a>	124, 140
<a href="#">186007935</a>	177, 226, 243, 290	<a href="#">186008131</a>	224, 288	<a href="#">186008192</a>	151, 191, 261, 394	<a href="#">186008251</a>	322	<a href="#">186008325</a>	124, 140
<a href="#">186007941</a>	177, 226, 243, 290	<a href="#">186008132</a>	225, 289	<a href="#">186008193</a>	151, 191, 261, 394	<a href="#">186008252</a>	322	<a href="#">186008326</a>	124, 140
<a href="#">186007943</a>	177, 226, 243, 290	<a href="#">186008133</a>	175, 222, 286	<a href="#">186008194</a>	150, 190, 260, 394	<a href="#">186008253</a>	322	<a href="#">186008327</a>	124, 140
<a href="#">186007947</a>	177, 226, 243, 290	<a href="#">186008134</a>	176, 223, 287	<a href="#">186008195</a>	150, 190, 260, 394	<a href="#">186008254</a>	322	<a href="#">186008328</a>	112, 136
<a href="#">186007949</a>	141, 154, 161, 166, 173, 177, 195, 206, 210, 215, 220, 226, 241, 265, 275, 280, 284, 290, 294, 347, 396, 411, 416, 507	<a href="#">186008135</a>	224, 288	<a href="#">186008196</a>	150, 190, 260, 394	<a href="#">186008255</a>	322	<a href="#">186008329</a>	112, 136
<a href="#">186007950</a>	317, 322	<a href="#">186008136</a>	225, 289	<a href="#">186008197</a>	150, 190, 260, 394	<a href="#">186008256</a>	322	<a href="#">186008330</a>	112, 136
<a href="#">186007953</a>	417	<a href="#">186008137</a>	175, 222, 286	<a href="#">186008198</a>	151, 191, 261, 394	<a href="#">186008257</a>	322	<a href="#">186008331</a>	112, 136
<a href="#">186007982</a>	366, 513	<a href="#">186008138</a>	176, 223, 287	<a href="#">186008199</a>	151, 191, 261, 394	<a href="#">186008258</a>	322	<a href="#">186008332</a>	112, 136
<a href="#">186007983</a>	366, 513	<a href="#">186008139</a>	224, 288	<a href="#">186008200</a>	151, 191, 261, 394	<a href="#">186008259</a>	322	<a href="#">186008333</a>	124, 140
<a href="#">186007985</a>	366, 513	<a href="#">186008140</a>	225, 289	<a href="#">186008201</a>	151, 191, 261, 394	<a href="#">186008260</a>	149, 189, 259	<a href="#">186008334</a>	124, 140
<a href="#">186007986</a>	366, 513	<a href="#">186008141</a>	175, 222, 286	<a href="#">186008202</a>	208, 282	<a href="#">186008261</a>	149, 189, 259	<a href="#">186008335</a>	124, 140
<a href="#">186007987</a>	366, 513	<a href="#">186008142</a>	176, 223, 287	<a href="#">186008203</a>	208, 282	<a href="#">186008262</a>	149, 189, 259	<a href="#">186008336</a>	124, 140
<a href="#">186007988</a>	365, 512	<a href="#">186008143</a>	224, 288	<a href="#">186008204</a>	208, 282	<a href="#">186008263</a>	149, 189, 259	<a href="#">186008337</a>	124, 140
<a href="#">186007989</a>	365, 512	<a href="#">186008144</a>	225, 289	<a href="#">186008205</a>	208, 282	<a href="#">186008264</a>	159, 203, 272, 395	<a href="#">186008338</a>	112, 136
<a href="#">186007992</a>	365, 370, 512	<a href="#">186008146</a>	209, 283	<a href="#">186008206</a>	208, 282	<a href="#">186008265</a>	159, 203, 272, 395	<a href="#">186008339</a>	112, 136
<a href="#">186008006</a>	489	<a href="#">186008148</a>	209, 283	<a href="#">186008207</a>	208, 282	<a href="#">186008266</a>	159, 203, 272, 395	<a href="#">186008340</a>	112, 136
<a href="#">186008007</a>	489	<a href="#">186008149</a>	209-210, 283-284	<a href="#">186008208</a>	170, 212, 277	<a href="#">186008267</a>	159, 203, 272, 395	<a href="#">186008341</a>	112, 136
<a href="#">186008008</a>	489	<a href="#">186008151</a>	209-210, 283-284	<a href="#">186008209</a>	171, 213, 278	<a href="#">186008268</a>	156, 198, 267	<a href="#">186008342</a>	112, 136
<a href="#">186008009</a>	489	<a href="#">186008152</a>	170, 212, 277	<a href="#">186008210</a>	144, 184, 254	<a href="#">186008269</a>	156, 198, 267	<a href="#">186008343</a>	124, 140
		<a href="#">186008153</a>	170, 212, 277	<a href="#">186008211</a>	144, 184, 254	<a href="#">186008270</a>	156, 198, 267	<a href="#">186008344</a>	124, 140
		<a href="#">186008154</a>	170, 212, 277	<a href="#">186008212</a>	152, 192, 262, 377	<a href="#">186008271</a>	156, 198, 267	<a href="#">186008345</a>	124, 140
				<a href="#">186008213</a>	146, 186, 256	<a href="#">186008272</a>	152, 192, 262, 416	<a href="#">186008346</a>	124, 140



<a href="#">186008347</a> .....	124, 140	<a href="#">186008407</a> .....	123, 139	<a href="#">186008525</a> .....	125, 141	<a href="#">186008590</a> .....	315	<a href="#">186008650</a> .....	315
<a href="#">186008348</a> .....	111, 135	<a href="#">186008408</a> .....	111, 135	<a href="#">186008526</a> .....	125, 141	<a href="#">186008591</a> .....	315	<a href="#">186008651</a> .....	315
<a href="#">186008349</a> .....	111, 135	<a href="#">186008409</a> .....	111, 135	<a href="#">186008527</a> .....	125, 141	<a href="#">186008592</a> .....	315	<a href="#">186008652</a> .....	315
<a href="#">186008350</a> .....	111, 135	<a href="#">186008410</a> .....	111, 135	<a href="#">186008528</a> .....	125, 141	<a href="#">186008593</a> .....	315	<a href="#">186008653</a> .....	315
<a href="#">186008351</a> .....	111, 135	<a href="#">186008411</a> .....	111, 135	<a href="#">186008529</a> .....	125, 141	<a href="#">186008594</a> .....	315	<a href="#">186008658</a> .....	303
<a href="#">186008352</a> .....	111, 135	<a href="#">186008412</a> .....	111, 135	<a href="#">186008530</a> .....	125, 141	<a href="#">186008595</a> .....	315	<a href="#">186008660</a> .....	366, 513
<a href="#">186008353</a> .....	123, 139	<a href="#">186008413</a> .....	123, 139	<a href="#">186008531</a> .....	125, 141	<a href="#">186008596</a> .....	315	<a href="#">186008661</a> .....	111, 136
<a href="#">186008354</a> .....	123, 139	<a href="#">186008414</a> .....	123, 139	<a href="#">186008536</a> .....	125, 141	<a href="#">186008597</a> .....	315	<a href="#">186008662</a> .....	111, 136
<a href="#">186008355</a> .....	123, 139	<a href="#">186008415</a> .....	123, 139	<a href="#">186008537</a> .....	125, 141	<a href="#">186008598</a> .....	315	<a href="#">186008663</a> .....	111, 136
<a href="#">186008356</a> .....	123, 139	<a href="#">186008416</a> .....	123, 139	<a href="#">186008538</a> .....	125, 141	<a href="#">186008599</a> .....	315	<a href="#">186008664</a> .....	111, 136
<a href="#">186008357</a> .....	123, 139	<a href="#">186008417</a> .....	123, 139	<a href="#">186008539</a> .....	125, 141	<a href="#">186008600</a> .....	315	<a href="#">186008665</a> .....	111, 136
<a href="#">186008358</a> .....	111, 135	<a href="#">186008418</a> .....	141	<a href="#">186008540</a> .....	125, 141	<a href="#">186008601</a> .....	315	<a href="#">186008666</a> .....	125, 140
<a href="#">186008359</a> .....	111, 135	<a href="#">186008419</a> .....	141	<a href="#">186008541</a> .....	125, 141	<a href="#">186008602</a> .....	315	<a href="#">186008667</a> .....	125, 140
<a href="#">186008360</a> .....	111, 135	<a href="#">186008420</a> .....	112, 241	<a href="#">186008542</a> .....	125, 141	<a href="#">186008603</a> .....	315	<a href="#">186008668</a> .....	125, 140
<a href="#">186008361</a> .....	111, 135	<a href="#">186008421</a> .....	141	<a href="#">186008543</a> .....	314	<a href="#">186008604</a> .....	315	<a href="#">186008669</a> .....	125, 140
<a href="#">186008362</a> .....	111, 135	<a href="#">186008422</a> .....	141	<a href="#">186008544</a> .....	314	<a href="#">186008605</a> .....	315	<a href="#">186008670</a> .....	125, 140
<a href="#">186008363</a> .....	123, 139	<a href="#">186008423</a> .....	112, 241	<a href="#">186008545</a> .....	314	<a href="#">186008606</a> .....	315	<a href="#">186008671</a> .....	111, 136
<a href="#">186008364</a> .....	123, 139	<a href="#">186008450</a> .....	487	<a href="#">186008546</a> .....	314	<a href="#">186008607</a> .....	315	<a href="#">186008672</a> .....	111, 136
<a href="#">186008365</a> .....	123, 139	<a href="#">186008470</a> .....	489	<a href="#">186008549</a> .....	314	<a href="#">186008608</a> .....	315	<a href="#">186008673</a> .....	111, 136
<a href="#">186008366</a> .....	123, 139	<a href="#">186008471</a> .....	119, 427, 468	<a href="#">186008550</a> .....	314	<a href="#">186008609</a> .....	315	<a href="#">186008674</a> .....	111, 136
<a href="#">186008367</a> .....	123, 139	<a href="#">186008481</a> .....	111, 137	<a href="#">186008551</a> .....	314	<a href="#">186008610</a> .....	315	<a href="#">186008675</a> .....	111, 136
<a href="#">186008368</a> .....	111, 135	<a href="#">186008482</a> .....	111, 137	<a href="#">186008552</a> .....	314	<a href="#">186008611</a> .....	315	<a href="#">186008676</a> .....	125, 140
<a href="#">186008369</a> .....	111, 135	<a href="#">186008483</a> .....	111, 137	<a href="#">186008553</a> .....	314	<a href="#">186008612</a> .....	315	<a href="#">186008677</a> .....	125, 140
<a href="#">186008370</a> .....	111, 135	<a href="#">186008484</a> .....	111, 137	<a href="#">186008554</a> .....	314	<a href="#">186008613</a> .....	315	<a href="#">186008678</a> .....	125, 140
<a href="#">186008371</a> .....	111, 135	<a href="#">186008485</a> .....	111, 137	<a href="#">186008555</a> .....	314	<a href="#">186008614</a> .....	315	<a href="#">186008679</a> .....	125, 140
<a href="#">186008372</a> .....	111, 135	<a href="#">186008486</a> .....	111, 137	<a href="#">186008556</a> .....	314	<a href="#">186008615</a> .....	315	<a href="#">186008680</a> .....	125, 140
<a href="#">186008373</a> .....	123, 139	<a href="#">186008487</a> .....	111, 137	<a href="#">186008557</a> .....	314	<a href="#">186008616</a> .....	315	<a href="#">186008681</a> .....	111, 136
<a href="#">186008374</a> .....	123, 139	<a href="#">186008488</a> .....	111, 137	<a href="#">186008558</a> .....	314	<a href="#">186008617</a> .....	315	<a href="#">186008682</a> .....	111, 136
<a href="#">186008375</a> .....	123, 139	<a href="#">186008489</a> .....	111, 137	<a href="#">186008559</a> .....	314	<a href="#">186008618</a> .....	315	<a href="#">186008683</a> .....	111, 136
<a href="#">186008376</a> .....	123, 139	<a href="#">186008490</a> .....	111, 137	<a href="#">186008560</a> .....	314	<a href="#">186008619</a> .....	315	<a href="#">186008684</a> .....	111, 136
<a href="#">186008377</a> .....	123, 139	<a href="#">186008491</a> .....	111, 137	<a href="#">186008561</a> .....	314	<a href="#">186008620</a> .....	315	<a href="#">186008685</a> .....	111, 136
<a href="#">186008378</a> .....	112, 136	<a href="#">186008492</a> .....	111, 137	<a href="#">186008562</a> .....	314	<a href="#">186008621</a> .....	315	<a href="#">186008686</a> .....	125, 140
<a href="#">186008379</a> .....	112, 136	<a href="#">186008493</a> .....	111, 137	<a href="#">186008563</a> .....	314	<a href="#">186008622</a> .....	315	<a href="#">186008687</a> .....	125, 140
<a href="#">186008380</a> .....	112, 136	<a href="#">186008494</a> .....	111, 137	<a href="#">186008564</a> .....	314	<a href="#">186008623</a> .....	315	<a href="#">186008688</a> .....	125, 140
<a href="#">186008381</a> .....	112, 136	<a href="#">186008495</a> .....	111, 137	<a href="#">186008565</a> .....	314	<a href="#">186008624</a> .....	315	<a href="#">186008689</a> .....	125, 140
<a href="#">186008382</a> .....	112, 136	<a href="#">186008496</a> .....	111, 137	<a href="#">186008566</a> .....	314	<a href="#">186008625</a> .....	315	<a href="#">186008690</a> .....	125, 140
<a href="#">186008383</a> .....	124, 140	<a href="#">186008497</a> .....	111, 137	<a href="#">186008567</a> .....	314	<a href="#">186008626</a> .....	315	<a href="#">186008691</a> .....	111, 136
<a href="#">186008384</a> .....	124, 140	<a href="#">186008498</a> .....	111, 137	<a href="#">186008568</a> .....	314	<a href="#">186008627</a> .....	315	<a href="#">186008692</a> .....	111, 136
<a href="#">186008386</a> .....	124, 140	<a href="#">186008499</a> .....	111, 137	<a href="#">186008569</a> .....	314	<a href="#">186008628</a> .....	315	<a href="#">186008693</a> .....	111, 136
<a href="#">186008387</a> .....	124, 140	<a href="#">186008500</a> .....	111, 137	<a href="#">186008570</a> .....	314	<a href="#">186008629</a> .....	315	<a href="#">186008694</a> .....	111, 136
<a href="#">186008388</a> .....	112, 136	<a href="#">186008501</a> .....	111, 137	<a href="#">186008571</a> .....	314	<a href="#">186008630</a> .....	315	<a href="#">186008695</a> .....	111, 136
<a href="#">186008389</a> .....	112, 136	<a href="#">186008502</a> .....	111, 137	<a href="#">186008572</a> .....	314	<a href="#">186008631</a> .....	315	<a href="#">186008696</a> .....	125, 140
<a href="#">186008390</a> .....	112, 136	<a href="#">186008503</a> .....	111, 137	<a href="#">186008573</a> .....	314	<a href="#">186008632</a> .....	315	<a href="#">186008697</a> .....	125, 140
<a href="#">186008391</a> .....	112, 136	<a href="#">186008504</a> .....	111, 137	<a href="#">186008574</a> .....	314	<a href="#">186008633</a> .....	315	<a href="#">186008698</a> .....	125, 140
<a href="#">186008392</a> .....	112, 136	<a href="#">186008505</a> .....	111, 137	<a href="#">186008575</a> .....	314	<a href="#">186008634</a> .....	315	<a href="#">186008699</a> .....	125, 140
<a href="#">186008393</a> .....	124, 140	<a href="#">186008506</a> .....	141	<a href="#">186008576</a> .....	314	<a href="#">186008635</a> .....	315	<a href="#">186008700</a> .....	125, 140
<a href="#">186008394</a> .....	124, 140	<a href="#">186008507</a> .....	141	<a href="#">186008577</a> .....	314	<a href="#">186008636</a> .....	315	<a href="#">186008701</a> .....	111, 136
<a href="#">186008395</a> .....	124, 140	<a href="#">186008508</a> .....	112, 241	<a href="#">186008578</a> .....	314	<a href="#">186008637</a> .....	315	<a href="#">186008702</a> .....	111, 136
<a href="#">186008396</a> .....	124, 140	<a href="#">186008509</a> .....	125, 141	<a href="#">186008579</a> .....	314	<a href="#">186008638</a> .....	315	<a href="#">186008703</a> .....	111, 136
<a href="#">186008397</a> .....	124, 140	<a href="#">186008510</a> .....	125, 141	<a href="#">186008580</a> .....	314	<a href="#">186008639</a> .....	315	<a href="#">186008704</a> .....	111, 136
<a href="#">186008398</a> .....	111, 135	<a href="#">186008516</a> .....	125, 141	<a href="#">186008581</a> .....	315	<a href="#">186008640</a> .....	315	<a href="#">186008705</a> .....	111, 136
<a href="#">186008399</a> .....	111, 135	<a href="#">186008517</a> .....	125, 141	<a href="#">186008582</a> .....	315	<a href="#">186008641</a> .....	315	<a href="#">186008706</a> .....	125, 140
<a href="#">186008400</a> .....	111, 135	<a href="#">186008518</a> .....	125, 141	<a href="#">186008583</a> .....	315	<a href="#">186008642</a> .....	315	<a href="#">186008707</a> .....	125, 140
<a href="#">186008401</a> .....	111, 135	<a href="#">186008519</a> .....	125, 141	<a href="#">186008584</a> .....	315	<a href="#">186008643</a> .....	315	<a href="#">186008708</a> .....	125, 140
<a href="#">186008402</a> .....	111, 135	<a href="#">186008520</a> .....	125, 141	<a href="#">186008585</a> .....	315	<a href="#">186008644</a> .....	315	<a href="#">186008709</a> .....	125, 140
<a href="#">186008403</a> .....	123, 139	<a href="#">186008521</a> .....	125, 141	<a href="#">186008586</a> .....	315	<a href="#">186008645</a> .....	315	<a href="#">186008710</a> .....	125, 140
<a href="#">186008404</a> .....	123, 139	<a href="#">186008522</a> .....	125, 141	<a href="#">186008587</a> .....	315	<a href="#">186008646</a> .....	315	<a href="#">186008711</a> .....	141
<a href="#">186008405</a> .....	123-124, 139-140	<a href="#">186008523</a> .....	125, 141	<a href="#">186008588</a> .....	315	<a href="#">186008648</a> .....	315	<a href="#">186008712</a> .....	141
<a href="#">186008406</a> .....	123, 139	<a href="#">186008524</a> .....	125, 141	<a href="#">186008589</a> .....	315	<a href="#">186008649</a> .....	315	<a href="#">186008713</a> .....	112, 241

<a href="#">186008714</a> .....524, 526, 580-581	<a href="#">186008816</a> .....488	<a href="#">186008959</a> .....411	<a href="#">186009102</a> .....518	<a href="#">186009326</a> .....42
<a href="#">186008717</a> .....12-Nov	<a href="#">186008817</a> .....488	<a href="#">186008960</a> .....411	<a href="#">186009103</a> .....518	<a href="#">186009327</a> .....42
<a href="#">186008718</a> .....12-Nov	<a href="#">186008818</a> .....488	<a href="#">186008961</a> .....411	<a href="#">186009110</a> .....440	<a href="#">186009328</a> .....42
<a href="#">186008727</a> .....1-May	<a href="#">186008819</a> .....488	<a href="#">186008962</a> .....262, 377	<a href="#">186009125</a> .....411, 439	<a href="#">186009329</a> .....42
<a href="#">186008741</a> .....315	<a href="#">186008820</a> .....488	<a href="#">186008963</a> .....262, 377	<a href="#">186009126</a> .....404	<a href="#">186009330</a> .....43
<a href="#">186008742</a> .....315	<a href="#">186008821</a> .....489	<a href="#">186008964</a> .....262, 377	<a href="#">186009127</a> .....416	<a href="#">186009331</a> .....42
<a href="#">186008743</a> .....315	<a href="#">186008840</a> .....365, 512	<a href="#">186008979</a> .....394	<a href="#">186009128</a> .....416	<a href="#">186009344</a> .....523
<a href="#">186008744</a> .....315	<a href="#">186008841</a> .....365, 512	<a href="#">186008980</a> .....394	<a href="#">186009129</a> .....416	<a href="#">186009345</a> .....523
<a href="#">186008745</a> .....254-260, 315	<a href="#">186008843</a> .....366, 513	<a href="#">186008981</a> .....394	<a href="#">186009131</a> .....416	<a href="#">186009346</a> .....523
<a href="#">186008751</a> .....396	<a href="#">186008846</a> .....228, 295	<a href="#">186008982</a> .....394	<a href="#">186009132</a> .....416	<a href="#">186009347</a> .....523
<a href="#">186008752</a> .....396	<a href="#">186008847</a> .....228, 295	<a href="#">186008983</a> .....394	<a href="#">186009133</a> .....416	<a href="#">186009357</a> .....104, 339
<a href="#">186008753</a> .....396	<a href="#">186008848</a> .....228, 296	<a href="#">186008984</a> .....394	<a href="#">186009134</a> .....416	<a href="#">186009358</a> .....104, 339
<a href="#">186008754</a> .....396	<a href="#">186008849</a> .....229, 296	<a href="#">186008985</a> .....394	<a href="#">186009135</a> .....416	<a href="#">186009359</a> .....104, 339
<a href="#">186008755</a> .....396	<a href="#">186008850</a> .....229, 296	<a href="#">186008986</a> .....394	<a href="#">186009136</a> .....416	<a href="#">186009360</a> .....104, 339
<a href="#">186008756</a> .....396	<a href="#">186008851</a> .....230, 298	<a href="#">186008987</a> .....394	<a href="#">186009137</a> .....416	<a href="#">186009361</a> .....104, 339
<a href="#">186008757</a> .....396	<a href="#">186008852</a> .....230, 297	<a href="#">186008988</a> .....393	<a href="#">186009138</a> .....416	<a href="#">186009365</a> .....104, 339
<a href="#">186008758</a> .....396	<a href="#">186008853</a> .....229, 297	<a href="#">186008989</a> .....393	<a href="#">186009139</a> .....416	<a href="#">186009366</a> .....104, 339
<a href="#">186008759</a> .....396	<a href="#">186008854</a> .....230, 297	<a href="#">186008990</a> .....35	<a href="#">186009140</a> .....416	<a href="#">186009367</a> .....104, 339
<a href="#">186008760</a> .....396	<a href="#">186008855</a> .....231, 298	<a href="#">186008991</a> .....35	<a href="#">186009158</a> .....428, 467	<a href="#">186009368</a> .....104, 339
<a href="#">186008761</a> .....396	<a href="#">186008856</a> .....231, 298	<a href="#">186008994</a> .....35	<a href="#">186009159</a> .....428, 467	<a href="#">186009369</a> .....104, 339
<a href="#">186008762</a> .....396	<a href="#">186008857</a> .....228, 295	<a href="#">186008995</a> .....35	<a href="#">186009160</a> .....428, 467	<a href="#">186009373</a> .....104, 339
<a href="#">186008763</a> .....396	<a href="#">186008858</a> .....228, 295	<a href="#">186008996</a> .....35	<a href="#">186009162</a> .....428, 467	<a href="#">186009374</a> .....104, 339
<a href="#">186008764</a> .....396	<a href="#">186008859</a> .....228, 296	<a href="#">186008997</a> .....35	<a href="#">186009163</a> .....428, 467	<a href="#">186009375</a> .....104, 339
<a href="#">186008765</a> .....396	<a href="#">186008860</a> .....229, 296	<a href="#">186008998</a> .....36	<a href="#">186009164</a> .....428, 467	<a href="#">186009376</a> .....104, 339
<a href="#">186008775</a> .....396	<a href="#">186008861</a> .....229, 296	<a href="#">186009002</a> .....393	<a href="#">186009170</a> .....428, 467	<a href="#">186009378</a> .....104, 339
<a href="#">186008776</a> .....396	<a href="#">186008862</a> .....230, 298	<a href="#">186009003</a> .....393	<a href="#">186009171</a> .....428, 467	<a href="#">186009379</a> .....104, 339
<a href="#">186008777</a> .....396	<a href="#">186008863</a> .....230, 297	<a href="#">186009004</a> .....393	<a href="#">186009172</a> .....428, 467	<a href="#">186009383</a> .....104, 339
<a href="#">186008779</a> .....396	<a href="#">186008864</a> .....229, 297	<a href="#">186009005</a> .....25	<a href="#">186009174</a> .....428, 467	<a href="#">186009384</a> .....104, 339
<a href="#">186008780</a> .....396	<a href="#">186008865</a> .....230, 297	<a href="#">186009015</a> .....411	<a href="#">186009175</a> .....428, 467	<a href="#">186009385</a> .....104, 339
<a href="#">186008781</a> .....396	<a href="#">186008866</a> .....231, 298	<a href="#">186009016</a> .....411	<a href="#">186009176</a> .....428, 467	<a href="#">186009389</a> .....104, 339
<a href="#">186008782</a> .....396	<a href="#">186008867</a> .....231, 298	<a href="#">186009017</a> .....411	<a href="#">186009179</a> .....428, 467	<a href="#">186009390</a> .....104, 339
<a href="#">186008783</a> .....396	<a href="#">186008872</a> .....515	<a href="#">186009018</a> .....411	<a href="#">186009180</a> .....428, 467	<a href="#">186009391</a> .....104, 339
<a href="#">186008784</a> .....396	<a href="#">186008873</a> .....515	<a href="#">186009019</a> .....411	<a href="#">186009184</a> .....58	<a href="#">186009392</a> .....104, 339
<a href="#">186008787</a> .....396	<a href="#">186008874</a> .....515	<a href="#">186009048</a> .....518	<a href="#">186009186</a> .....58, 368, 382	<a href="#">186009393</a> .....104, 339
<a href="#">186008788</a> .....396	<a href="#">186008875</a> .....515	<a href="#">186009049</a> .....518	<a href="#">186009193</a> .....518	<a href="#">186009397</a> .....104, 339
<a href="#">186008791</a> .....366, 513	<a href="#">186008886</a> .....11, 12	<a href="#">186009050</a> .....518	<a href="#">186009194</a> .....518	<a href="#">186009398</a> .....104, 339
<a href="#">186008792</a> .....488	<a href="#">186008887</a> .....11, 12	<a href="#">186009051</a> .....518	<a href="#">186009201</a> .....410	<a href="#">186009402</a> .....104, 339
<a href="#">186008793</a> .....488	<a href="#">186008889</a> .....515	<a href="#">186009061</a> .....440	<a href="#">186009232</a> .....348, 508	<a href="#">186009403</a> .....104, 339
<a href="#">186008794</a> .....488	<a href="#">186008914</a> .....14, 17	<a href="#">186009062</a> .....440	<a href="#">186009243</a> .....42	<a href="#">186009404</a> .....104, 339
<a href="#">186008795</a> .....488	<a href="#">186008915</a> .....14, 17	<a href="#">186009063</a> .....440	<a href="#">186009244</a> .....42	<a href="#">186009405</a> .....104, 339
<a href="#">186008796</a> .....488	<a href="#">186008916</a> .....14, 17	<a href="#">186009064</a> .....440	<a href="#">186009280</a> .....441	<a href="#">186009406</a> .....104, 339
<a href="#">186008797</a> .....488	<a href="#">186008917</a> .....11, 14	<a href="#">186009065</a> .....404, 438-440	<a href="#">186009281</a> .....441	<a href="#">186009407</a> .....104, 339
<a href="#">186008798</a> .....488	<a href="#">186008918</a> .....11, 14	<a href="#">186009068</a> .....394	<a href="#">186009283</a> .....347-348, 507-508, 518	<a href="#">186009408</a> .....104, 339
<a href="#">186008799</a> .....488	<a href="#">186008919</a> .....11, 14	<a href="#">186009069</a> .....394	<a href="#">186009285</a> .....498	<a href="#">186009409</a> .....104, 339
<a href="#">186008800</a> .....488	<a href="#">186008927</a> .....404, 411	<a href="#">186009070</a> .....394	<a href="#">186009286</a> .....498	<a href="#">186009410</a> .....104, 339
<a href="#">186008801</a> .....488	<a href="#">186008939</a> .....365, 512	<a href="#">186009071</a> .....394	<a href="#">186009287</a> .....498	<a href="#">186009411</a> .....104, 339
<a href="#">186008802</a> .....488	<a href="#">186008943</a> .....411	<a href="#">186009072</a> .....394	<a href="#">186009288</a> .....498	<a href="#">186009412</a> .....104, 339
<a href="#">186008803</a> .....488	<a href="#">186008944</a> .....411	<a href="#">186009073</a> .....394	<a href="#">186009299</a> .....345-346, 348, 505-506, 508	<a href="#">186009413</a> .....104, 339
<a href="#">186008804</a> .....488	<a href="#">186008945</a> .....411	<a href="#">186009074</a> .....394	<a href="#">186009300</a> .....345-346, 348, 505-506, 508	<a href="#">186009416</a> .....104, 339
<a href="#">186008805</a> .....488	<a href="#">186008946</a> .....410-411	<a href="#">186009075</a> .....394	<a href="#">186009301</a> .....345-346, 348, 505-506, 508	<a href="#">186009417</a> .....104, 339
<a href="#">186008806</a> .....488	<a href="#">186008947</a> .....411	<a href="#">186009076</a> .....394	<a href="#">186009314</a> .....42	<a href="#">186009418</a> .....104, 339
<a href="#">186008807</a> .....488	<a href="#">186008948</a> .....411	<a href="#">186009077</a> .....393-394	<a href="#">186009315</a> .....42	<a href="#">186009421</a> .....104, 339
<a href="#">186008808</a> .....488	<a href="#">186008949</a> .....411	<a href="#">186009078</a> .....393	<a href="#">186009316</a> .....43	<a href="#">186009422</a> .....104, 339
<a href="#">186008809</a> .....488	<a href="#">186008950</a> .....411	<a href="#">186009079</a> .....393	<a href="#">186009319</a> .....42	<a href="#">186009426</a> .....104, 339
<a href="#">186008810</a> .....488	<a href="#">186008953</a> .....411	<a href="#">186009080</a> .....393	<a href="#">186009323</a> .....42	<a href="#">186009427</a> .....104, 339
<a href="#">186008811</a> .....488	<a href="#">186008954</a> .....411	<a href="#">186009081</a> .....393	<a href="#">186009324</a> .....43	<a href="#">186009429</a> .....100, 103, 336, 338, 425-426, 429, 469-471
<a href="#">186008812</a> .....488	<a href="#">186008955</a> .....411	<a href="#">186009082</a> .....427, 468		<a href="#">186009435</a> .....426, 469
<a href="#">186008813</a> .....488	<a href="#">186008956</a> .....411	<a href="#">186009083</a> .....35-36		<a href="#">186009437</a> .....426, 469
<a href="#">186008814</a> .....488	<a href="#">186008957</a> .....411	<a href="#">186009084</a> .....35		
<a href="#">186008815</a> .....488	<a href="#">186008958</a> .....411			

<a href="#">186009439</a> .....	426, 469	<a href="#">186009508</a> .....	99, 335, 383	<a href="#">186009840</a> .....	103, 338, 392	<a href="#">186009899</a> .....	103, 338, 392	<a href="#">186009961</a> .....	425, 470
<a href="#">186009441</a> .....	426, 469	<a href="#">186009509</a> .....	99, 335, 383	<a href="#">186009841</a> .....	103, 338, 392	<a href="#">186009900</a> .....	103, 338, 392	<a href="#">186009962</a> .....	425, 470
<a href="#">186009443</a> .....	426, 469	<a href="#">186009510</a> .....	99, 335, 383	<a href="#">186009842</a> .....	102, 338	<a href="#">186009901</a> .....	103, 338, 377	<a href="#">186009963</a> .....	425, 470
<a href="#">186009452</a> .....	99, 335	<a href="#">186009522</a> .....	100, 336, 369	<a href="#">186009843</a> .....	101, 337	<a href="#">186009902</a> .....	103, 338, 377	<a href="#">186009964</a> .....	425, 470
<a href="#">186009453</a> .....	99, 335	<a href="#">186009523</a> .....	100, 336, 369	<a href="#">186009844</a> .....	101, 337	<a href="#">186009903</a> .....	103, 338, 377	<a href="#">186009969</a> .....	100, 103, 336, 338, 425, 470
<a href="#">186009454</a> .....	99, 335	<a href="#">186009524</a> .....	100, 336, 368-369	<a href="#">186009845</a> .....	101, 337	<a href="#">186009904</a> .....	392	<a href="#">186009970</a> .....	100, 336, 369
<a href="#">186009457</a> .....	99, 335	<a href="#">186009547</a> .....	100, 336, 355, 357, 360	<a href="#">186009846</a> .....	102, 338	<a href="#">186009905</a> .....	392	<a href="#">186009971</a> .....	100, 336, 369
<a href="#">186009458</a> .....	99, 335	<a href="#">186009548</a> .....	100, 336, 355, 357, 360	<a href="#">186009847</a> .....	101, 337	<a href="#">186009906</a> .....	392	<a href="#">186009972</a> .....	100, 336, 369
<a href="#">186009459</a> .....	99, 335	<a href="#">186009549</a> .....	100, 336, 355, 357, 360	<a href="#">186009848</a> .....	101, 337	<a href="#">186009907</a> .....	392	<a href="#">186009973</a> .....	100, 336, 369
<a href="#">186009460</a> .....	99, 335	<a href="#">186009568</a> .....	523	<a href="#">186009849</a> .....	101, 337	<a href="#">186009908</a> .....	392	<a href="#">186009974</a> .....	100, 336, 369
<a href="#">186009461</a> .....	99, 335	<a href="#">186009605</a> .....	47	<a href="#">186009850</a> .....	101, 337	<a href="#">186009909</a> .....	392	<a href="#">186009975</a> .....	100, 336, 369
<a href="#">186009462</a> .....	99, 335	<a href="#">186009606</a> .....	47	<a href="#">186009851</a> .....	101, 337	<a href="#">186009910</a> .....	103, 338, 392	<a href="#">186009976</a> .....	100, 336, 369
<a href="#">186009463</a> .....	99, 335	<a href="#">186009607</a> .....	47	<a href="#">186009852</a> .....	101, 337	<a href="#">186009911</a> .....	103, 338, 392	<a href="#">186009977</a> .....	100, 336, 369
<a href="#">186009464</a> .....	99, 335	<a href="#">186009608</a> .....	47	<a href="#">186009853</a> .....	102, 338	<a href="#">186009912</a> .....	103, 338, 392	<a href="#">186009978</a> .....	104, 339
<a href="#">186009465</a> .....	99, 335	<a href="#">186009615</a> .....	47	<a href="#">186009854</a> .....	102, 337	<a href="#">186009913</a> .....	102, 338	<a href="#">186009979</a> .....	104, 339
<a href="#">186009466</a> .....	99, 335	<a href="#">186009708</a> .....	49	<a href="#">186009855</a> .....	102, 337	<a href="#">186009914</a> .....	101, 337	<a href="#">186009980</a> .....	104, 339
<a href="#">186009467</a> .....	99, 335	<a href="#">186009712</a> .....	49	<a href="#">186009856</a> .....	102, 337	<a href="#">186009915</a> .....	101, 337	<a href="#">186009981</a> .....	104, 339
<a href="#">186009468</a> .....	99, 335	<a href="#">186009713</a> .....	49	<a href="#">186009857</a> .....	102, 338	<a href="#">186009916</a> .....	101, 337	<a href="#">186009982</a> .....	104, 339
<a href="#">186009469</a> .....	99, 335	<a href="#">186009714</a> .....	49	<a href="#">186009858</a> .....	102, 337	<a href="#">186009917</a> .....	101, 337	<a href="#">186009983</a> .....	104, 339
<a href="#">186009470</a> .....	99, 335	<a href="#">186009715</a> .....	49	<a href="#">186009859</a> .....	102, 337	<a href="#">186009918</a> .....	101, 337	<a href="#">186009984</a> .....	104, 339
<a href="#">186009471</a> .....	99, 335	<a href="#">186009716</a> .....	49	<a href="#">186009860</a> .....	102, 337	<a href="#">186009919</a> .....	101, 337	<a href="#">186009985</a> .....	104, 339
<a href="#">186009472</a> .....	99, 335	<a href="#">186009717</a> .....	49	<a href="#">186009861</a> .....	102, 337	<a href="#">186009920</a> .....	102, 338	<a href="#">186009986</a> .....	104, 339
<a href="#">186009473</a> .....	99, 335	<a href="#">186009718</a> .....	49	<a href="#">186009862</a> .....	102, 337	<a href="#">186009921</a> .....	101, 337	<a href="#">186009987</a> .....	104, 339
<a href="#">186009474</a> .....	99, 335	<a href="#">186009719</a> .....	49	<a href="#">186009863</a> .....	102, 337	<a href="#">186009922</a> .....	101, 337	<a href="#">186009988</a> .....	104, 339
<a href="#">186009475</a> .....	99, 335	<a href="#">186009720</a> .....	49	<a href="#">186009864</a> .....	102, 338	<a href="#">186009923</a> .....	101, 337	<a href="#">186009989</a> .....	104, 339
<a href="#">186009476</a> .....	99, 335	<a href="#">186009721</a> .....	49	<a href="#">186009865</a> .....	101, 337	<a href="#">186009924</a> .....	101, 337	<a href="#">186009990</a> .....	104, 339
<a href="#">186009477</a> .....	99, 335	<a href="#">186009722</a> .....	49	<a href="#">186009866</a> .....	101, 337	<a href="#">186009925</a> .....	101, 337	<a href="#">186009991</a> .....	104, 339
<a href="#">186009478</a> .....	99, 335	<a href="#">186009723</a> .....	49	<a href="#">186009867</a> .....	101, 337	<a href="#">186009926</a> .....	101, 337	<a href="#">186009992</a> .....	104, 339
<a href="#">186009479</a> .....	99, 335	<a href="#">186009724</a> .....	49	<a href="#">186009868</a> .....	101, 337	<a href="#">186009927</a> .....	102, 338, 383	<a href="#">186009993</a> .....	104, 339
<a href="#">186009480</a> .....	99, 335	<a href="#">186009725</a> .....	49	<a href="#">186009869</a> .....	101, 337	<a href="#">186009928</a> .....	101, 337, 383	<a href="#">186009994</a> .....	104, 339
<a href="#">186009481</a> .....	100, 336, 392	<a href="#">186009726</a> .....	49	<a href="#">186009870</a> .....	101, 337	<a href="#">186009929</a> .....	101, 337, 383	<a href="#">186009995</a> .....	104, 339
<a href="#">186009482</a> .....	100, 336, 392	<a href="#">186009727</a> .....	49	<a href="#">186009871</a> .....	102, 338	<a href="#">186009930</a> .....	101, 337, 383	<a href="#">186009996</a> .....	104, 339
<a href="#">186009483</a> .....	100, 336, 392	<a href="#">186009733</a> .....	103, 338, 392	<a href="#">186009872</a> .....	101, 337	<a href="#">186009931</a> .....	101, 337, 383	<a href="#">186009997</a> .....	104, 339
<a href="#">186009484</a> .....	100, 336, 377	<a href="#">186009734</a> .....	103, 338, 392	<a href="#">186009873</a> .....	101, 337	<a href="#">186009932</a> .....	101, 337, 383	<a href="#">186009998</a> .....	104, 339
<a href="#">186009485</a> .....	100, 336, 377	<a href="#">186009735</a> .....	392	<a href="#">186009874</a> .....	101, 337	<a href="#">186009933</a> .....	101, 337, 383	<a href="#">186009999</a> .....	104, 339
<a href="#">186009486</a> .....	100, 336, 377	<a href="#">186009758</a> .....	100, 336, 369	<a href="#">186009875</a> .....	101, 337	<a href="#">186009934</a> .....	102, 338, 383	<a href="#">186010000</a> .....	104, 339
<a href="#">186009487</a> .....	100, 336, 392	<a href="#">186009759</a> .....	100, 336, 369	<a href="#">186009876</a> .....	101, 337	<a href="#">186009935</a> .....	101, 337, 383	<a href="#">186010001</a> .....	104, 339
<a href="#">186009488</a> .....	100, 336, 392	<a href="#">186009760</a> .....	100, 336, 367, 369	<a href="#">186009877</a> .....	101, 337	<a href="#">186009936</a> .....	101, 337, 383	<a href="#">186010002</a> .....	104, 339
<a href="#">186009489</a> .....	100, 336, 392	<a href="#">186009763</a> .....	365, 512	<a href="#">186009878</a> .....	102, 338	<a href="#">186009937</a> .....	101, 337, 383	<a href="#">186010003</a> .....	104, 339
<a href="#">186009490</a> .....	100, 335-336, 392	<a href="#">186009765</a> .....	47	<a href="#">186009879</a> .....	102, 337	<a href="#">186009938</a> .....	101, 337, 383	<a href="#">186010004</a> .....	104, 339
<a href="#">186009491</a> .....	100, 336, 392	<a href="#">186009766</a> .....	47	<a href="#">186009880</a> .....	102, 337	<a href="#">186009939</a> .....	101, 337, 383	<a href="#">186010005</a> .....	104, 339
<a href="#">186009492</a> .....	100, 336, 392	<a href="#">186009767</a> .....	47	<a href="#">186009881</a> .....	102, 337	<a href="#">186009940</a> .....	101, 337, 383	<a href="#">186010006</a> .....	104, 339
<a href="#">186009493</a> .....	100, 336, 377, 380, 392	<a href="#">186009768</a> .....	47	<a href="#">186009882</a> .....	102, 337	<a href="#">186009941</a> .....	103, 338, 370	<a href="#">186010007</a> .....	104, 339
<a href="#">186009494</a> .....	100, 336, 377, 380, 392	<a href="#">186009769</a> .....	47	<a href="#">186009883</a> .....	102, 337	<a href="#">186009942</a> .....	103, 338, 370	<a href="#">186010008</a> .....	104, 339
<a href="#">186009495</a> .....	100, 336, 377, 380, 392	<a href="#">186009776</a> .....	47	<a href="#">186009884</a> .....	102, 337	<a href="#">186009943</a> .....	103, 338, 370	<a href="#">186010009</a> .....	104, 339
<a href="#">186009497</a> .....	99, 335	<a href="#">186009777</a> .....	47	<a href="#">186009885</a> .....	102, 338	<a href="#">186009944</a> .....	103, 338, 370	<a href="#">186010010</a> .....	104, 339
<a href="#">186009498</a> .....	99, 335	<a href="#">186009827</a> .....	101, 337	<a href="#">186009886</a> .....	102, 337	<a href="#">186009945</a> .....	103, 338, 370	<a href="#">186010011</a> .....	104, 339
<a href="#">186009499</a> .....	99, 335	<a href="#">186009828</a> .....	101, 337	<a href="#">186009887</a> .....	102, 337	<a href="#">186009946</a> .....	103, 338, 370	<a href="#">186010012</a> .....	104, 339
<a href="#">186009499</a> .....	99, 335	<a href="#">186009829</a> .....	101, 337	<a href="#">186009888</a> .....	102, 337	<a href="#">186009947</a> .....	103, 338, 370	<a href="#">186010013</a> .....	104, 339
<a href="#">186009500</a> .....	99, 335	<a href="#">186009830</a> .....	102, 337	<a href="#">186009889</a> .....	102, 337	<a href="#">186009948</a> .....	103, 338, 370	<a href="#">186010014</a> .....	104, 339
<a href="#">186009501</a> .....	99, 335	<a href="#">186009831</a> .....	102, 337	<a href="#">186009890</a> .....	102, 337	<a href="#">186009949</a> .....	103, 338, 370	<a href="#">186010102</a> .....	47
<a href="#">186009502</a> .....	99, 335	<a href="#">186009832</a> .....	102, 337	<a href="#">186009891</a> .....	102, 337	<a href="#">186009950</a> .....	103, 338, 370	<a href="#">186010103</a> .....	47
<a href="#">186009503</a> .....	99, 335	<a href="#">186009835</a> .....	103, 338	<a href="#">186009892</a> .....	103, 338, 377, 392	<a href="#">186009951</a> .....	103, 338, 370	<a href="#">186010104</a> .....	47, 365, 512
<a href="#">186009504</a> .....	99, 335, 382-383	<a href="#">186009836</a> .....	103, 338, 377	<a href="#">186009893</a> .....	103, 338, 377, 392	<a href="#">186009952</a> .....	103, 338, 370	<a href="#">186010105</a> .....	47
<a href="#">186009505</a> .....	99, 335, 383	<a href="#">186009837</a> .....	103, 338, 377	<a href="#">186009894</a> .....	103, 338, 377, 392	<a href="#">186009953</a> .....	347, 507	<a href="#">186010179</a> .....	47
<a href="#">186009506</a> .....	99, 335, 383	<a href="#">186009838</a> .....	103, 338, 377	<a href="#">186009895</a> .....	103, 338, 377, 392	<a href="#">186009954</a> .....	347, 507	<a href="#">186010209</a> .....	365, 512
<a href="#">186009507</a> .....	99, 335, 383	<a href="#">186009839</a> .....	103, 338, 392	<a href="#">186009896</a> .....	103, 338, 377, 392	<a href="#">186009955</a> .....	347, 507	<a href="#">186010232</a> .....	520
				<a href="#">186009897</a> .....	103, 338, 377, 392	<a href="#">186009959</a> .....	425, 470	<a href="#">186010294</a> .....	99
				<a href="#">186009898</a> .....	103, 338, 392	<a href="#">186009960</a> .....	425, 470		

<a href="#">186010326</a> .....	416	<a href="#">201000118</a> .....	565	<a href="#">201000281</a> .....	537-538, 540, 551, 555, 566-567	<a href="#">205000404</a> .....	548	<a href="#">205001819</a> .....	535
<a href="#">186010327</a> .....	416	<a href="#">201000119</a> .....	565	<a href="#">201000282</a> .....	542	<a href="#">205000478</a> .....	545, 549	<a href="#">205001821</a> .....	535
<a href="#">186010328</a> .....	416	<a href="#">201000120</a> .....	565	<a href="#">201000283</a> .....	542	<a href="#">205000505</a> .....	541, 551, 561	<a href="#">205001822</a> .....	535
<a href="#">186010329</a> .....	416	<a href="#">201000121</a> .....	565	<a href="#">201000285</a> .....	542	<a href="#">205000540</a> .....	555	<a href="#">205001823</a> .....	536
<a href="#">186010330</a> .....	416	<a href="#">201000122</a> .....	565	<a href="#">201000286</a> .....	550	<a href="#">205000542</a> .....	554	<a href="#">205001824</a> .....	536
<a href="#">186010331</a> .....	416	<a href="#">201000124</a> .....	563	<a href="#">201000289</a> .....	553	<a href="#">205000585</a> .....	549	<a href="#">205001825</a> .....	536
<a href="#">186010332</a> .....	416	<a href="#">201000125</a> .....	565	<a href="#">201000290</a> .....	553	<a href="#">205000589</a> .....	82, 549	<a href="#">205001826</a> .....	533
<a href="#">186010333</a> .....	416	<a href="#">201000130</a> .....	561	<a href="#">201000291</a> .....	552	<a href="#">205000642</a> .....	82, 492	<a href="#">205001830</a> .....	536
<a href="#">186010334</a> .....	416	<a href="#">201000131</a> .....	568	<a href="#">201000300</a> .....	550	<a href="#">205000726</a> .....	545	<a href="#">205001832</a> .....	535
<a href="#">186010336</a> .....	99	<a href="#">201000150</a> .....	577	<a href="#">201000301</a> .....	550	<a href="#">205000730</a> .....	545	<a href="#">205001866</a> .....	574
<a href="#">186010337</a> .....	99	<a href="#">201000151</a> .....	577	<a href="#">201000302</a> .....	539	<a href="#">205000731</a> .....	542, 550	<a href="#">205001867</a> .....	574
<a href="#">186010338</a> .....	99	<a href="#">201000152</a> .....	577	<a href="#">201000303</a> .....	539	<a href="#">205000756</a> .....	546	<a href="#">205001868</a> .....	574
<a href="#">186010339</a> .....	99	<a href="#">201000153</a> .....	577	<a href="#">201000306</a> .....	564	<a href="#">205000773</a> .....	546	<a href="#">205001869</a> .....	574
<a href="#">186010340</a> .....	99	<a href="#">201000155</a> .....	577	<a href="#">201000307</a> .....	569	<a href="#">205000775</a> .....	546	<a href="#">205004100</a> .....	568
<a href="#">186010341</a> .....	99	<a href="#">201000159</a> .....	552, 567	<a href="#">201000308</a> .....	550	<a href="#">205000777</a> .....	546	<a href="#">205004115</a> .....	568
<a href="#">186010342</a> .....	101	<a href="#">201000160</a> .....	559	<a href="#">201000309</a> .....	550	<a href="#">205000792</a> .....	546	<a href="#">205004215</a> .....	568
<a href="#">186010343</a> .....	101	<a href="#">201000161</a> .....	560	<a href="#">201000311</a> .....	537	<a href="#">205000895</a> .....	543	<a href="#">205004220</a> .....	568
<a href="#">186010344</a> .....	101	<a href="#">201000162</a> .....	564	<a href="#">201000312</a> .....	537	<a href="#">205000896</a> .....	543	<a href="#">205004325</a> .....	568
<a href="#">186010345</a> .....	101	<a href="#">201000173</a> .....	548	<a href="#">201000313</a> .....	556	<a href="#">205000986</a> .....	541	<a href="#">205004330</a> .....	568
<a href="#">186010346</a> .....	101	<a href="#">201000174</a> .....	548	<a href="#">201000314</a> .....	534	<a href="#">205000999</a> .....	541	<a href="#">205015013</a> .....	555
<a href="#">186010347</a> .....	101	<a href="#">201000181</a> .....	554	<a href="#">201000315</a> .....	535	<a href="#">205001001</a> .....	541	<a href="#">205015015</a> .....	555
<a href="#">186010348</a> .....	102	<a href="#">201000182</a> .....	554	<a href="#">201000316</a> .....	532	<a href="#">205001002</a> .....	538, 541	<a href="#">205015017</a> .....	551
<a href="#">186010349</a> .....	101	<a href="#">201000193</a> .....	540, 551	<a href="#">201000318</a> .....	563	<a href="#">205001003</a> .....	541	<a href="#">205015018</a> .....	551
<a href="#">186010350</a> .....	101	<a href="#">201000195</a> .....	564	<a href="#">201000318</a> .....	571, 576	<a href="#">205001004</a> .....	541	<a href="#">205015019</a> .....	551
<a href="#">186010351</a> .....	101	<a href="#">201000196</a> .....	564	<a href="#">201000325</a> .....	569	<a href="#">205001006</a> .....	540	<a href="#">205015033</a> .....	551
<a href="#">186010352</a> .....	101	<a href="#">201000197</a> .....	548	<a href="#">201000326</a> .....	569	<a href="#">205001023</a> .....	538	<a href="#">205015036</a> .....	551
<a href="#">186010353</a> .....	101	<a href="#">201000198</a> .....	549	<a href="#">201000327</a> .....	532	<a href="#">205001027</a> .....	538	<a href="#">205015037</a> .....	541
<a href="#">186010354</a> .....	101	<a href="#">201000199</a> .....	561	<a href="#">201000328</a> .....	574	<a href="#">205001042</a> .....	552	<a href="#">205016040</a> .....	555
<a href="#">186010355</a> .....	102	<a href="#">201000201</a> .....	546	<a href="#">201000329</a> .....	574	<a href="#">205001043</a> .....	537	<a href="#">289000439</a> .....	554
<a href="#">186010356</a> .....	99	<a href="#">201000207</a> .....	541, 546	<a href="#">201000330</a> .....	563	<a href="#">205001097</a> .....	544	<a href="#">289000440</a> .....	565
<a href="#">186010357</a> .....	99	<a href="#">201000208</a> .....	549	<a href="#">201000333</a> .....	532	<a href="#">205001157</a> .....	551	<a href="#">289000614</a> .....	566
<a href="#">186010358</a> .....	99	<a href="#">201000209</a> .....	561	<a href="#">201000334</a> .....	563	<a href="#">205001162</a> .....	542	<a href="#">289000779</a> .....	144-152, 156-159, 164-165, 170-172, 175-176, 184- 192, 198-203, 208-210, 212-214, 222-225, 254-262, 267-272, 277-279, 282-284, 286-289, 301, 394, 396, 416
<a href="#">186010359</a> .....	99	<a href="#">201000210</a> .....	561	<a href="#">201000335</a> .....	536	<a href="#">205001166</a> .....	542	<a href="#">289002111</a> .....	554
<a href="#">186010360</a> .....	99	<a href="#">201000229</a> .....	570	<a href="#">201000336</a> .....	536	<a href="#">205001169</a> .....	430, 472, 542	<a href="#">289002172</a> .....	554
<a href="#">186010361</a> .....	99	<a href="#">201000230</a> .....	570	<a href="#">201000337</a> .....	536	<a href="#">205001171</a> .....	430, 472, 542	<a href="#">289002414</a> .....	545, 554
<a href="#">186010362</a> .....	99	<a href="#">201000233</a> .....	535, 545	<a href="#">201000338</a> .....	538	<a href="#">205001172</a> .....	430, 472, 542	<a href="#">289002576</a> .....	554-555
<a href="#">186010363</a> .....	101	<a href="#">201000234</a> .....	545	<a href="#">201000345</a> .....	538	<a href="#">205001416</a> .....	552	<a href="#">289002802</a> .....	554
<a href="#">186010364</a> .....	101	<a href="#">201000238</a> .....	570, 577	<a href="#">201000346</a> .....	538	<a href="#">205001417</a> .....	552	<a href="#">289003345</a> .....	555
<a href="#">186010365</a> .....	101	<a href="#">201000239</a> .....	570, 577	<a href="#">205000202</a> .....	560	<a href="#">205001418</a> .....	552	<a href="#">289004407</a> .....	555
<a href="#">186010366</a> .....	101	<a href="#">201000240</a> .....	570, 577	<a href="#">205000250</a> .....	560	<a href="#">205001419</a> .....	552	<a href="#">289004442</a> .....	553, 555
<a href="#">186010367</a> .....	101	<a href="#">201000241</a> .....	570, 577	<a href="#">205000251</a> .....	560	<a href="#">205001427</a> .....	552	<a href="#">323000247</a> .....	551-552, 555, 566-567
<a href="#">186010368</a> .....	101	<a href="#">201000244</a> .....	532, 536, 547	<a href="#">205000252</a> .....	560	<a href="#">205001428</a> .....	552	<a href="#">323000446</a> .....	551, 567
<a href="#">186010369</a> .....	102	<a href="#">201000245</a> .....	577	<a href="#">205000263</a> .....	549	<a href="#">205001451</a> .....	539	<a href="#">401000694</a> .....	532, 534-535, 537-539, 543, 546
<a href="#">186010370</a> .....	101	<a href="#">201000246</a> .....	577	<a href="#">205000275</a> .....	549	<a href="#">205001452</a> .....	539	<a href="#">401000813</a> .....	540-541
<a href="#">186010371</a> .....	101	<a href="#">201000254</a> .....	570	<a href="#">205000291</a> .....	549	<a href="#">205001484</a> .....	539	<a href="#">405003015</a> .....	545
<a href="#">186010372</a> .....	101	<a href="#">201000255</a> .....	570	<a href="#">205000324</a> .....	559	<a href="#">205001524</a> .....	539	<a href="#">405003507</a> .....	544
<a href="#">186010373</a> .....	101	<a href="#">201000256</a> .....	570	<a href="#">205000342</a> .....	552	<a href="#">205001552</a> .....	540	<a href="#">405003740</a> .....	548-549, 552, 554
<a href="#">186010374</a> .....	101	<a href="#">201000257</a> .....	570	<a href="#">205000343</a> .....	112, 115, 119, 122, 524, 548, 578	<a href="#">205001553</a> .....	540	<a href="#">405003741</a> .....	548-549, 552, 554
<a href="#">186010375</a> .....	101	<a href="#">201000258</a> .....	533, 543	<a href="#">205000362</a> .....	548	<a href="#">205001554</a> .....	540	<a href="#">405003742</a> .....	548-549, 552, 554
<a href="#">186010376</a> .....	102	<a href="#">201000259</a> .....	543	<a href="#">205000363</a> .....	548	<a href="#">205001709</a> .....	537	<a href="#">405005067</a> .....	554
<a href="#">186010405</a> .....	347, 507	<a href="#">201000260</a> .....	533-534, 544	<a href="#">205000365</a> .....	549	<a href="#">205001726</a> .....	537	<a href="#">405005068</a> .....	554
<a href="#">186010406</a> .....	347, 507	<a href="#">201000270</a> .....	540	<a href="#">205000369</a> .....	548	<a href="#">205001727</a> .....	537	<a href="#">405006414</a> .....	561
<a href="#">186010407</a> .....	343, 503	<a href="#">201000271</a> .....	541	<a href="#">205000370</a> .....	548	<a href="#">205001728</a> .....	537		
<a href="#">186010408</a> .....	347, 507	<a href="#">201000272</a> .....	541	<a href="#">205000398</a> .....	554	<a href="#">205001754</a> .....	536		
<a href="#">201000102</a> .....	562	<a href="#">201000273</a> .....	541-542	<a href="#">205000399</a> .....	567	<a href="#">205001755</a> .....	536		
<a href="#">201000113</a> .....	559	<a href="#">201000276</a> .....	570, 576	<a href="#">205000400</a> .....	567	<a href="#">205001757</a> .....	533		
<a href="#">201000114</a> .....	559	<a href="#">201000277</a> .....	570, 576	<a href="#">205000402</a> .....	567	<a href="#">205001758</a> .....	535		
<a href="#">201000116</a> .....	565	<a href="#">201000278</a> .....	570, 576	<a href="#">205000403</a> .....	548	<a href="#">205001774</a> .....	535		
<a href="#">201000117</a> .....	565	<a href="#">201000279</a> .....	570, 576						

<a href="#">405007627</a> .....	545	<a href="#">430001470</a> .....	555	430002362.....	532, 534-535, 543, 546	430003339.....	541	<a href="#">700001800</a> .....	551, 555, 566-567
<a href="#">405008440</a> .....	561	<a href="#">430001486</a> .....	548	<a href="#">430002387</a> .....	535, 545	<a href="#">430003341</a> .....	541	<a href="#">700001836</a> .....	561
<a href="#">405008854</a> .....	532, 534-535, 537-539, 543, 545	<a href="#">430001511</a> .....	554	<a href="#">430002388</a> .....	535, 545	<a href="#">430003350</a> .....	541	700001840.....	568
<a href="#">405010508</a> .....	545	<a href="#">430001512</a> .....	554	<a href="#">430002389</a> .....	535, 545	<a href="#">430003351</a> .....	541	<a href="#">700001942</a> .....	568
405011424.....	537	<a href="#">430001516</a> .....	427, 468	<a href="#">430002390</a> .....	535, 545	<a href="#">440000145</a> .....	541, 552	<a href="#">700001943</a> .....	568
<a href="#">405011492</a> .....	532, 534-535, 537-539, 543, 545-546	<a href="#">430001534</a> .....	554	<a href="#">430002400</a> .....	535, 545	<a href="#">441000372</a> .....	541, 551, 566-567	<a href="#">700001948</a> .....	568
405013532.....	546	<a href="#">430001535</a> .....	554	430002462.....	532, 534, 543	<a href="#">441000373</a> .....	551, 567	<a href="#">700001949</a> .....	566, 568
405013607.....	541	<a href="#">430001556</a> .....	567	430002464.....	534-535, 546	<a href="#">441000456</a> .....	551-552	<a href="#">700001950</a> .....	566, 568
<a href="#">410000570</a> .....	561	<a href="#">430001562</a> .....	119, 552	<a href="#">430002472</a> .....	533-534, 536, 544, 547, 553	<a href="#">442000176</a> .....	551, 566-567	<a href="#">700001951</a> .....	568
410001281.....	546	<a href="#">430001565</a> .....	552	<a href="#">430002474</a> .....	536, 547	600000177.....	578	<a href="#">700001952</a> .....	568
<a href="#">410001296</a> .....	545	<a href="#">430001568</a> .....	554	<a href="#">430002475</a> .....	536, 542, 547	600000178.....	578	<a href="#">700001953</a> .....	568
<a href="#">410001347</a> .....	548, 552	<a href="#">430001569</a> .....	554	<a href="#">430002476</a> .....	536, 547	600000179.....	578	<a href="#">700001954</a> .....	566, 568
<a href="#">410001348</a> .....	554	<a href="#">430001570</a> .....	554	<a href="#">430002477</a> .....	536, 547	<a href="#">600000180</a> .....	578	<a href="#">700001955</a> .....	566, 568
<a href="#">410001349</a> .....	546	<a href="#">430001571</a> .....	554-555	<a href="#">430002478</a> .....	536, 547	600000181.....	578	<a href="#">700001956</a> .....	568
<a href="#">410001400</a> .....	553	<a href="#">430001572</a> .....	554	<a href="#">430002479</a> .....	536, 547	600000182.....	578	<a href="#">700001957</a> .....	568
<a href="#">410001659</a> .....	548	<a href="#">430001575</a> .....	554-555	<a href="#">430002481</a> .....	536, 547	600000183.....	578	<a href="#">700001958</a> .....	568
<a href="#">410001697</a> .....	555	<a href="#">430001576</a> .....	554	<a href="#">430002482</a> .....	536, 547	600000184.....	578	<a href="#">700001959</a> .....	566, 568
<a href="#">410002096</a> .....	551	<a href="#">430001577</a> .....	554-555	<a href="#">430002483</a> .....	536, 547	600001043.....	397, 516	<a href="#">700001960</a> .....	568
<a href="#">410003180</a> .....	541, 545	<a href="#">430001629</a> .....	554-555	<a href="#">430002484</a> .....	536, 547	<a href="#">600001282</a> .....	370	<a href="#">700001961</a> .....	568
<a href="#">410003295</a> .....	545	<a href="#">430001748</a> .....	542, 551	430002487.....	534-535, 546	<a href="#">605000101</a> .....	562	<a href="#">700001962</a> .....	568
415000415.....	567	<a href="#">430001749</a> .....	542, 551	430002491.....	553	<a href="#">615003783</a> .....	61, 64	<a href="#">700001963</a> .....	568
415001544.....	545	<a href="#">430001773</a> .....	548	430002550.....	533, 543	<a href="#">700000117</a> .....	240	<a href="#">700001964</a> .....	568
<a href="#">415001608</a> .....	545	<a href="#">430001783</a> .....	542, 551	430002560.....	533, 543	<a href="#">700000145</a> .....	562	<a href="#">700001965</a> .....	568
415001943.....	540	<a href="#">430001784</a> .....	551	430002564.....	533, 543	<a href="#">700000146</a> .....	562	<a href="#">700001968</a> .....	568
415001945.....	540	<a href="#">430001835</a> .....	555	430002566.....	533, 543	700000168.....	566	<a href="#">700001985</a> .....	562
<a href="#">425000326</a> .....	552	<a href="#">430001837</a> .....	555	430002568.....	533, 543	<a href="#">700000201</a> .....	556	<a href="#">700001987</a> .....	563
<a href="#">425000536</a> .....	549	<a href="#">430001848</a> .....	555	430002571.....	533, 543	<a href="#">700000253</a> .....	560	<a href="#">700001989</a> .....	563
430000366.....	525, 581	<a href="#">430001893</a> .....	533-534, 544	430002579.....	533, 543	<a href="#">700000254</a> .....	560	<a href="#">700001991</a> .....	563
<a href="#">430001017</a> .....	549	<a href="#">430001894</a> .....	533-534, 544	<a href="#">430002583</a> .....	533-534, 544, 553	700000574.....	567	<a href="#">700001994</a> .....	568
<a href="#">430001020</a> .....	548	<a href="#">430001919</a> .....	555	430002680.....	553	<a href="#">700000610</a> .....	562	<a href="#">700002003</a> .....	568
<a href="#">430001084</a> .....	548	<a href="#">430001923</a> .....	555	<a href="#">430002725</a> .....	542	<a href="#">700000680</a> .....	564	<a href="#">700002069</a> .....	566, 568
<a href="#">430001086</a> .....	548	<a href="#">430002007</a> .....	542	<a href="#">430002772</a> .....	542	<a href="#">700000683</a> .....	564	700002103.....	568
<a href="#">430001113</a> .....	533-534, 544, 548, 554	<a href="#">430002011</a> .....	542	<a href="#">430002779</a> .....	546	<a href="#">700000684</a> .....	564	<a href="#">700002143</a> .....	555
<a href="#">430001114</a> .....	533-534, 544, 554	<a href="#">430002012</a> .....	542	<a href="#">430002779</a> .....	546	<a href="#">700000685</a> .....	564	<a href="#">700002210</a> .....	564
<a href="#">430001115</a> .....	533-534, 544, 554	<a href="#">430002015</a> .....	549	<a href="#">430002800</a> .....	533-534, 544	<a href="#">700000685</a> .....	564	<a href="#">700002275</a> .....	560
<a href="#">430001116</a> .....	533-534, 544, 554	<a href="#">430002032</a> .....	561	<a href="#">430002928</a> .....	533, 541, 543, 553	<a href="#">700000862</a> .....	564	<a href="#">700002282</a> .....	560
<a href="#">430001120</a> .....	550, 554	<a href="#">430002121</a> .....	561	<a href="#">430002936</a> .....	533, 541, 543, 553	<a href="#">700000943</a> .....	550	<a href="#">700002284</a> .....	563
<a href="#">430001121</a> .....	548, 554	<a href="#">430002140</a> .....	555	<a href="#">430002938</a> .....	533, 541, 543, 553	<a href="#">700000991</a> .....	539	700002292.....	563-564
<a href="#">430001199</a> .....	533-534, 544	<a href="#">430002153</a> .....	555	430003096.....	540	<a href="#">700001004</a> .....	568	<a href="#">700002293</a> .....	564
<a href="#">430001200</a> .....	533-534, 544	<a href="#">430002155</a> .....	555	430003103.....	543	<a href="#">700001012</a> .....	562	<a href="#">700002297</a> .....	564
<a href="#">430001207</a> .....	533-534, 544, 548	<a href="#">430002183</a> .....	555	430003104.....	540	<a href="#">700001019</a> .....	301, 396	<a href="#">700002298</a> .....	564
<a href="#">430001208</a> .....	533-534, 544	<a href="#">430002208</a> .....	535, 545	<a href="#">430003105</a> .....	540	<a href="#">700001020</a> .....	301	<a href="#">700002332</a> .....	557-558
<a href="#">430001209</a> .....	553-554	<a href="#">430002242</a> .....	554-555	430003108.....	540	700001218.....	558	<a href="#">700002333</a> .....	558
<a href="#">430001210</a> .....	553-554	<a href="#">430002274</a> .....	536, 547	430003109.....	540	700001230.....	564	<a href="#">700002360</a> .....	540, 551
<a href="#">430001221</a> .....	548	<a href="#">430002316</a> .....	535, 545	<a href="#">430003142</a> .....	541	<a href="#">700001247</a> .....	558	<a href="#">700002361</a> .....	540, 551
<a href="#">430001229</a> .....	549	<a href="#">430002317</a> .....	535-536, 545, 547	430003159.....	533, 543	<a href="#">700001326</a> .....	558	<a href="#">700002362</a> .....	540, 551
<a href="#">430001264</a> .....	548, 554	<a href="#">430002319</a> .....	535, 545	430003161.....	540	<a href="#">700001331</a> .....	563	<a href="#">700002363</a> .....	540, 551
<a href="#">430001311</a> .....	548-549, 554	430002345.....	532, 534-535, 543, 546	430003165.....	540	<a href="#">700001387</a> .....	563	<a href="#">700002364</a> .....	540, 551
<a href="#">430001320</a> .....	548, 554	430002346.....	532, 534-535, 543, 546	430003166.....	533, 543, 553	<a href="#">700001436</a> .....	301, 396	<a href="#">700002378</a> .....	540, 551
<a href="#">430001325</a> .....	548, 554	430002347.....	532, 534-535, 543, 546	<a href="#">430003191</a> .....	541	<a href="#">700001493</a> .....	561	<a href="#">700002399</a> .....	558, 560
<a href="#">430001326</a> .....	548-549, 554	430002348.....	532, 534-535, 543, 546	430003194.....	541	<a href="#">700001502</a> .....	554	700002439.....	564
<a href="#">430001346</a> .....	554	430002349.....	532, 534-535, 543, 546	430003200.....	541	<a href="#">700001529</a> .....	561	<a href="#">700002455</a> .....	549
<a href="#">430001389</a> .....	554	<a href="#">430002357</a> .....	535, 545, 550	430003201.....	541	<a href="#">700001530</a> .....	545, 561	<a href="#">700002478</a> .....	540
<a href="#">430001436</a> .....	554	430002360.....	532, 534-535, 543, 546	<a href="#">430003211</a> .....	541	700001539.....	540	<a href="#">700002504</a> .....	563
<a href="#">430001443</a> .....	533-534, 544, 548	<a href="#">430002357</a> .....	535, 545, 550	430003274.....	540	<a href="#">700001598</a> .....	539	<a href="#">700002570</a> .....	532-535, 537-539, 541, 543, 545-546, 548, 553-554
<a href="#">430001456</a> .....	555	430002360.....	532, 534-535, 543, 546	<a href="#">430003277</a> .....	540	<a href="#">700001618</a> .....	568	<a href="#">700002572</a> .....	548, 554
				<a href="#">430003278</a> .....	540	<a href="#">700001710</a> .....	567		
						<a href="#">700001796</a> .....	545, 567		

<a href="#">700002576</a>	554	<a href="#">700003115</a>	549	<a href="#">700004139</a>	544	<a href="#">700005414</a>	536, 547, 553	<a href="#">700009010</a>	553
<a href="#">700002577</a>	554	<a href="#">700003116</a>	549	<a href="#">700004145</a>	549	<a href="#">700005415</a>	536-537, 547, 553	<a href="#">700009012</a>	540
<a href="#">700002587</a>	549	<a href="#">700003139</a>	549	<a href="#">700004147</a>	549	<a href="#">700005418</a>	536, 547	<a href="#">700009052</a>	541
<a href="#">700002594</a>	540, 545, 547-548, 554	<a href="#">700003147</a>	549	<a href="#">700004155</a>	566	<a href="#">700005419</a>	536, 547	<a href="#">700009057</a>	541
<a href="#">700002595</a>	535, 545, 548, 554	<a href="#">700003151</a>	549	<a href="#">700004321</a>	571	<a href="#">700005421</a>	537, 546	<a href="#">700009059</a>	541
<a href="#">700002596</a>	548, 554	<a href="#">700003156</a>	549	<a href="#">700004425</a>	561	<a href="#">700005422</a>	536, 547	<a href="#">700009094</a>	541
<a href="#">700002597</a>	535, 545, 548	<a href="#">700003164</a>	549	<a href="#">700004430</a>	561	<a href="#">700005429</a>	546	<a href="#">700009095</a>	541
<a href="#">700002598</a>	535, 545, 548, 554	<a href="#">700003167</a>	549	<a href="#">700004431</a>	561	<a href="#">700005438</a>	535, 541	<a href="#">700009135</a>	533-534, 544
<a href="#">700002599</a>	535, 545, 548, 554	<a href="#">700003168</a>	549	<a href="#">700004436</a>	561	<a href="#">700005461</a>	536	<a href="#">700009136</a>	540
<a href="#">700002600</a>	533-536, 544-545, 547-548, 550, 553-554	<a href="#">700003169</a>	549	<a href="#">700004439</a>	561	<a href="#">700005476</a>	551	<a href="#">700009137</a>	538-540
<a href="#">700002601</a>	533-536, 538-540, 544-545, 547-548, 550, 553-554	<a href="#">700003170</a>	562	<a href="#">700004445</a>	561	<a href="#">700005478</a>	542	<a href="#">700009190</a>	533-534, 542, 544
<a href="#">700002603</a>	548, 553-554	<a href="#">700003387</a>	540	<a href="#">700004454</a>	561	<a href="#">700005480</a>	542	<a href="#">700009194</a>	533-534, 544
<a href="#">700002604</a>	548, 554	<a href="#">700003388</a>	540	<a href="#">700004599</a>	555	<a href="#">700005481</a>	546	<a href="#">700009330</a>	537-538, 540
<a href="#">700002632</a>	540, 544	<a href="#">700003389</a>	540	<a href="#">700004601</a>	555	<a href="#">700005482</a>	542, 546	<a href="#">700009400</a>	552
<a href="#">700002633</a>	544	<a href="#">700003423</a>	566-567	<a href="#">700004607</a>	561	<a href="#">700005483</a>	546	<a href="#">700009402</a>	552
<a href="#">700002634</a>	544, 546-549, 554	<a href="#">700003434</a>	564	<a href="#">700004613</a>	561	<a href="#">700005484</a>	546	<a href="#">700009406</a>	552
<a href="#">700002635</a>	539, 544-549, 554-555	<a href="#">700003435</a>	564	<a href="#">700004673</a>	570, 573, 576-577	<a href="#">700005485</a>	546	<a href="#">700009408</a>	552
<a href="#">700002636</a>	540, 542, 548	<a href="#">700003436</a>	564	<a href="#">700004715</a>	449	<a href="#">700005589</a>	577	<a href="#">700009440</a>	551
<a href="#">700002644</a>	548	<a href="#">700003437</a>	564	<a href="#">700004728</a>	571	<a href="#">700005590</a>	577	<a href="#">700009459</a>	541
<a href="#">700002645</a>	539, 544, 547-549, 554-555	<a href="#">700003438</a>	564	<a href="#">700004730</a>	570, 572-573, 575-577	<a href="#">700005591</a>	577	<a href="#">700009478</a>	542
<a href="#">700002660</a>	535, 545, 548, 554	<a href="#">700003557</a>	548	<a href="#">700004841</a>	549, 555	<a href="#">700005674</a>	317, 322	<a href="#">700009483</a>	542
<a href="#">700002670</a>	567	<a href="#">700003615</a>	82, 538-539, 548	<a href="#">700004842</a>	569-570, 572-573, 575-577	<a href="#">700005675</a>	317, 322	<a href="#">700009484</a>	542
<a href="#">700002676</a>	541, 551, 555	<a href="#">700003616</a>	82, 533-534, 538-539, 543-544, 548	<a href="#">700005025</a>	574	<a href="#">700005682</a>	535	<a href="#">700009485</a>	542
<a href="#">700002682</a>	552	<a href="#">700003694</a>	551	<a href="#">700005083</a>	561	<a href="#">700005744</a>	569-570, 572, 575	<a href="#">700009489</a>	542
<a href="#">700002696</a>	554	<a href="#">700003711</a>	551	<a href="#">700005084</a>	561	<a href="#">700005923</a>	533, 543	<a href="#">700009490</a>	542
<a href="#">700002702</a>	554	<a href="#">700003751</a>	553	<a href="#">700005119</a>	535, 545	<a href="#">700005925</a>	533, 543	<a href="#">700009491</a>	542, 550
<a href="#">700002705</a>	549	<a href="#">700003755</a>	533-534, 544	<a href="#">700005162</a>	545	<a href="#">700005926</a>	533, 543, 553	<a href="#">700009493</a>	542
<a href="#">700002708</a>	554	<a href="#">700003756</a>	542	<a href="#">700005164</a>	535, 538-539, 545	<a href="#">700005929</a>	533, 543	<a href="#">700009505</a>	542
<a href="#">700002712</a>	554	<a href="#">700003775</a>	578	<a href="#">700005165</a>	535, 545	<a href="#">700005930</a>	533, 543	<a href="#">700009506</a>	542
<a href="#">700002713</a>	554	<a href="#">700003776</a>	578	<a href="#">700005166</a>	535, 545	<a href="#">700005980</a>	542	<a href="#">700009512</a>	542
<a href="#">700002747</a>	456, 547, 555	<a href="#">700003779</a>	578	<a href="#">700005167</a>	535-536, 545, 547	<a href="#">700006045</a>	542, 550, 553	<a href="#">700009524</a>	430, 472, 542
<a href="#">700002754</a>	554	<a href="#">700003780</a>	578	<a href="#">700005173</a>	535, 545	<a href="#">700006048</a>	533-534, 544, 550	<a href="#">700009529</a>	542
<a href="#">700002755</a>	554	<a href="#">700003784</a>	553	<a href="#">700005179</a>	541	<a href="#">700006049</a>	540, 544	<a href="#">700009530</a>	542
<a href="#">700002757</a>	554	<a href="#">700003785</a>	553	<a href="#">700005215</a>	545	<a href="#">700006052</a>	533-534, 542, 544	<a href="#">700009534</a>	430, 472, 532, 542
<a href="#">700002761</a>	558	<a href="#">700003792</a>	555	<a href="#">700005218</a>	553	<a href="#">700006056</a>	532, 543	<a href="#">700009535</a>	430, 472, 542
<a href="#">700002765</a>	548	<a href="#">700003794</a>	549	<a href="#">700005221</a>	537-539, 553	<a href="#">700006057</a>	532, 539, 543	<a href="#">700009538</a>	542
<a href="#">700002775</a>	112, 115, 119, 122, 524, 548, 578	<a href="#">700003796</a>	536, 546-547	<a href="#">700005234</a>	534, 545	<a href="#">700006067</a>	533, 543, 553	<a href="#">700009539</a>	542
<a href="#">700002791</a>	558	<a href="#">700003797</a>	536, 544, 546-547	<a href="#">700005236</a>	534, 538, 545	<a href="#">700006069</a>	533, 543	<a href="#">700009540</a>	542
<a href="#">700002801</a>	552	<a href="#">700003842</a>	564	<a href="#">700005237</a>	541	<a href="#">700006070</a>	533, 543	<a href="#">700009541</a>	542
<a href="#">700002886</a>	533, 543	<a href="#">700003843</a>	564	<a href="#">700005248</a>	545	<a href="#">700006071</a>	533, 543	<a href="#">700009554</a>	551
<a href="#">700002907</a>	554	<a href="#">700003851</a>	564	<a href="#">700005251</a>	545	<a href="#">700008871</a>	533, 542	<a href="#">700009560</a>	430, 472, 542
<a href="#">700002908</a>	554	<a href="#">700003852</a>	564	<a href="#">700005258</a>	536, 547	<a href="#">700008909</a>	540	<a href="#">700009576</a>	542
<a href="#">700002911</a>	548	<a href="#">700003872</a>	564	<a href="#">700005259</a>	536, 544, 547	<a href="#">700008914</a>	546	<a href="#">700009580</a>	542
<a href="#">700002912</a>	533-534, 538-539, 544, 548, 550	<a href="#">700003921</a>	564	<a href="#">700005269</a>	541-542, 552	<a href="#">700008915</a>	546	<a href="#">700009590</a>	542
<a href="#">700002913</a>	533-534, 538-539, 544	<a href="#">700003922</a>	564	<a href="#">700005272</a>	542	<a href="#">700008939</a>	532, 543	<a href="#">700009597</a>	550, 574
<a href="#">700002945</a>	563	<a href="#">700003923</a>	564	<a href="#">700005273</a>	542	<a href="#">700008940</a>	532, 543	<a href="#">700009601</a>	550, 571, 574, 576
<a href="#">700002968</a>	548, 554	<a href="#">700003924</a>	564	<a href="#">700005275</a>	570	<a href="#">700008941</a>	532, 543	<a href="#">700009602</a>	571
<a href="#">700003102</a>	533-534, 544	<a href="#">700003925</a>	564	<a href="#">700005276</a>	570	<a href="#">700008942</a>	532, 543	<a href="#">700009603</a>	550, 574, 576
<a href="#">700003114</a>	549	<a href="#">700003928</a>	564	<a href="#">700005279</a>	538-539	<a href="#">700008943</a>	532, 543	<a href="#">700009608</a>	550, 574
		<a href="#">700004023</a>	540, 545	<a href="#">700005297</a>	541	<a href="#">700008944</a>	532, 543	<a href="#">700009614</a>	550, 571, 574, 576
		<a href="#">700004057</a>	549	<a href="#">700005338</a>	61, 64	<a href="#">700008977</a>	543	<a href="#">700009625</a>	550, 574, 576
		<a href="#">700004063</a>	564	<a href="#">700005378</a>	536, 546-547	<a href="#">700008999</a>	539-540	<a href="#">700009626</a>	550, 574, 576
		<a href="#">700004082</a>	564	<a href="#">700005407</a>	535, 537, 546	<a href="#">700009000</a>	540	<a href="#">700009627</a>	550, 574, 576
		<a href="#">700004085</a>	564	<a href="#">700005408</a>	540	<a href="#">700009001</a>	540	<a href="#">700009641</a>	550
		<a href="#">700004086</a>	564	<a href="#">700005410</a>	536, 547	<a href="#">700009006</a>	540	<a href="#">700009642</a>	550
		<a href="#">700004088</a>	564	<a href="#">700005411</a>	536, 547	<a href="#">700009007</a>	540	<a href="#">700009678</a>	550, 574, 576
		<a href="#">700004089</a>	564	<a href="#">700005412</a>	553	<a href="#">700009008</a>	540	<a href="#">700009679</a>	550, 574
		<a href="#">700004090</a>	564	<a href="#">700005413</a>	536, 547, 553	<a href="#">700009009</a>	540	<a href="#">700009680</a>	550, 574

<a href="#">700009690</a>	550	<a href="#">70000977</a>	550	<a href="#">700010701</a>	537, 539	<a href="#">700012137</a>	576	<a href="#">725000110</a>	565
<a href="#">700009694</a>	550	<a href="#">700010009</a>	539	<a href="#">700010702</a>	539	<a href="#">700012138</a>	574, 576	<a href="#">725000113</a>	565
<a href="#">700009699</a>	550	<a href="#">700010011</a>	539	<a href="#">700010708</a>	539	<a href="#">700012275</a>	571	<a href="#">725000144</a>	565
<a href="#">700009700</a>	550	<a href="#">700010040</a>	553	<a href="#">700010726</a>	538-539	<a href="#">700012304</a>	537	<a href="#">725000145</a>	565
<a href="#">700009708</a>	550	<a href="#">700010042</a>	553	<a href="#">70001047</a>	61, 64, 548-549, 552, 554	<a href="#">700012329</a>	569	<a href="#">725000146</a>	565
<a href="#">700009709</a>	550	<a href="#">700010059</a>	553	<a href="#">700011083</a>	549	<a href="#">700012331</a>	571	<a href="#">725000147</a>	565
<a href="#">700009712</a>	550	<a href="#">700010156</a>	550	<a href="#">700011132</a>	550, 574, 576	<a href="#">700012516</a>	563	<a href="#">725000152</a>	565
<a href="#">700009713</a>	550	<a href="#">700010158</a>	550	<a href="#">700011133</a>	550	<a href="#">700012528</a>	563	<a href="#">725000417</a>	35-36, 43, 397, 516
<a href="#">700009714</a>	550	<a href="#">700010196</a>	538-539, 550	<a href="#">700011137</a>	568	<a href="#">700012539</a>	563	<a href="#">725000418</a>	516
<a href="#">700009715</a>	550	<a href="#">700010211</a>	550, 571, 574	<a href="#">700011185</a>	568	<a href="#">700012540</a>	563	<a href="#">725000455</a>	555
<a href="#">700009716</a>	550	<a href="#">700010213</a>	550, 571, 574	<a href="#">700011186</a>	568	<a href="#">700012542</a>	563	<a href="#">725000604</a>	35-36, 43, 366, 397, 513
<a href="#">700009758</a>	576	<a href="#">700010215</a>	552	<a href="#">700011217</a>	569	<a href="#">700012760</a>	538	<a href="#">725000682</a>	49
<a href="#">700009768</a>	550, 574	<a href="#">700010334</a>	552	<a href="#">700011241</a>	569, 571-572, 574	<a href="#">700012876</a>	563	<a href="#">186000272C</a>	68, 74, 76
<a href="#">700009769</a>	550, 574	<a href="#">700010335</a>	552	<a href="#">700011242</a>	569, 571-572, 574	<a href="#">700012877</a>	563	<a href="#">186000272DV</a>	68, 76
<a href="#">700009771</a>	550	<a href="#">700010336</a>	552	<a href="#">700011244</a>	569, 571-572, 574	<a href="#">700012878</a>	563	<a href="#">186000273DV</a>	68, 76
<a href="#">700009776</a>	550	<a href="#">700010337</a>	552	<a href="#">700011245</a>	569, 571-572, 574	<a href="#">700012879</a>	563	<a href="#">186000302DV</a>	70
<a href="#">700009778</a>	550	<a href="#">700010338</a>	552	<a href="#">700011295</a>	550, 574	<a href="#">700012893</a>	563	<a href="#">186000307C</a>	61, 64, 67-68, 74, 76
<a href="#">700009779</a>	550	<a href="#">700010339</a>	552	<a href="#">700011376</a>	569, 571, 574	<a href="#">700013047</a>	566	<a href="#">186000307DV</a>	61, 64, 67-68, 74, 76
<a href="#">700009780</a>	550	<a href="#">700010345</a>	552	<a href="#">700011427</a>	569, 571, 574	<a href="#">700013048</a>	566	<a href="#">186000326C</a>	68, 74, 76
<a href="#">700009781</a>	550	<a href="#">700010377</a>	550, 574	<a href="#">700011456</a>	558	<a href="#">700013049</a>	566	<a href="#">186000326DV</a>	68, 76
<a href="#">700009782</a>	550	<a href="#">700010380</a>	552	<a href="#">700011553</a>	537	<a href="#">700013050</a>	566	<a href="#">186000327C</a>	61, 64, 67-68, 74, 76
<a href="#">700009783</a>	550	<a href="#">700010399</a>	553	<a href="#">700011554</a>	537	<a href="#">700013051</a>	566	<a href="#">186000327DV</a>	61, 64, 67-68, 74, 76
<a href="#">700009784</a>	550	<a href="#">700010401</a>	553	<a href="#">700011628</a>	532, 534	<a href="#">700013052</a>	566	<a href="#">186000327DV</a>	61, 64, 67-68, 74, 76
<a href="#">700009789</a>	550	<a href="#">700010447</a>	539	<a href="#">700011656</a>	538	<a href="#">700013053</a>	566	<a href="#">186000384C</a>	68, 347, 507
<a href="#">700009796</a>	550	<a href="#">700010453</a>	552	<a href="#">700011658</a>	535	<a href="#">700013054</a>	566	<a href="#">186000384DV</a>	68
<a href="#">700009797</a>	550	<a href="#">700010457</a>	552	<a href="#">700011660</a>	537	<a href="#">700013055</a>	566	<a href="#">186000385C</a>	61, 64, 67-68
<a href="#">700009798</a>	550	<a href="#">700010458</a>	552	<a href="#">700011661</a>	537	<a href="#">700013056</a>	566	<a href="#">186000385DV</a>	61, 64, 67-68
<a href="#">700009799</a>	550	<a href="#">700010530</a>	537, 539-540	<a href="#">700011663</a>	537	<a href="#">700013057</a>	566	<a href="#">186000837C</a>	73
<a href="#">700009810</a>	550, 574	<a href="#">700010531</a>	540	<a href="#">700011664</a>	537	<a href="#">700013059</a>	563	<a href="#">186000837DV</a>	73
<a href="#">700009830</a>	553	<a href="#">700010532</a>	540	<a href="#">700011668</a>	537	<a href="#">700013064</a>	566	<a href="#">186000838C</a>	72, 78
<a href="#">700009836</a>	553	<a href="#">700010533</a>	540	<a href="#">700011670</a>	537	<a href="#">700013065</a>	566	<a href="#">186000838DV</a>	72, 78
<a href="#">700009837</a>	553	<a href="#">700010540</a>	539	<a href="#">700011671</a>	537	<a href="#">700013066</a>	566	<a href="#">186000839C</a>	72, 78
<a href="#">700009838</a>	553	<a href="#">700010589</a>	539	<a href="#">700011672</a>	537	<a href="#">700013069</a>	566	<a href="#">186000840DV</a>	78
<a href="#">700009839</a>	553	<a href="#">700010590</a>	539	<a href="#">700011673</a>	537	<a href="#">700013070</a>	566	<a href="#">186000846C</a>	68, 74, 76
<a href="#">700009843</a>	553	<a href="#">700010642</a>	537	<a href="#">700011674</a>	537	<a href="#">700013071</a>	566	<a href="#">186000846DV</a>	68, 76
<a href="#">700009844</a>	553	<a href="#">700010657</a>	539	<a href="#">700011675</a>	537	<a href="#">700013072</a>	566	<a href="#">186000847C</a>	61, 64, 67-68, 74, 76
<a href="#">700009845</a>	553	<a href="#">700010661</a>	537-539	<a href="#">700011676</a>	537	<a href="#">700013083</a>	563	<a href="#">186000847DV</a>	61, 64, 67-68, 74, 76
<a href="#">700009846</a>	553	<a href="#">700010662</a>	537-539	<a href="#">700011677</a>	537	<a href="#">700013084</a>	563	<a href="#">186000848DV</a>	68, 76
<a href="#">700009847</a>	553	<a href="#">700010663</a>	538-539	<a href="#">700011679</a>	537	<a href="#">700013085</a>	563	<a href="#">186000848DV</a>	68, 76
<a href="#">700009848</a>	553	<a href="#">700010664</a>	538-539	<a href="#">700011680</a>	537	<a href="#">715001531</a>	239	<a href="#">186000984DV</a>	70, 75
<a href="#">700009849</a>	553	<a href="#">700010669</a>	538-539	<a href="#">700011681</a>	537	<a href="#">715002098</a>	238	<a href="#">186001126C</a>	76
<a href="#">700009850</a>	553	<a href="#">700010678</a>	538-539	<a href="#">700011689</a>	537	<a href="#">715002099</a>	239	<a href="#">186001126DV</a>	76
<a href="#">700009851</a>	553	<a href="#">700010679</a>	538-539	<a href="#">700011690</a>	537	<a href="#">715002147</a>	427, 442, 468	<a href="#">186001128C</a>	76
<a href="#">700009858</a>	553	<a href="#">700010680</a>	538-539	<a href="#">700011725</a>	563	<a href="#">715002531</a>	239	<a href="#">186001128DV</a>	76
<a href="#">700009863</a>	553	<a href="#">700010681</a>	538-539	<a href="#">700011726</a>	563	<a href="#">715002909</a>	427, 468	<a href="#">186001130C</a>	76
<a href="#">700009864</a>	553	<a href="#">700010682</a>	538-539	<a href="#">700011727</a>	563	<a href="#">715003405</a>	239	<a href="#">186001130DV</a>	76
<a href="#">700009875</a>	553	<a href="#">700010683</a>	538-539	<a href="#">700011803</a>	532	<a href="#">715004398</a>	239	<a href="#">186001131C</a>	76
<a href="#">700009876</a>	553	<a href="#">700010684</a>	538-539	<a href="#">700011804</a>	532	<a href="#">715005427</a>	238	<a href="#">186001131DV</a>	76
<a href="#">700009878</a>	553	<a href="#">700010685</a>	538-539	<a href="#">700011871</a>	576	<a href="#">715005428</a>	238	<a href="#">186001133C</a>	72, 78
<a href="#">700009880</a>	553	<a href="#">700010686</a>	539	<a href="#">700011877</a>	571	<a href="#">715005429</a>	238	<a href="#">186001133DV</a>	72, 78
<a href="#">700009881</a>	553	<a href="#">700010687</a>	538-539	<a href="#">700011878</a>	571	<a href="#">715006455</a>	238, 347, 507	<a href="#">186001134C</a>	72, 78
<a href="#">700009889</a>	553	<a href="#">700010692</a>	539	<a href="#">700011883</a>	571	<a href="#">716000765</a>	302	<a href="#">186001134DV</a>	72, 78
<a href="#">700009892</a>	553	<a href="#">700010694</a>	539	<a href="#">700012014</a>	571	<a href="#">725000106</a>	565	<a href="#">186001135DV</a>	78
<a href="#">700009894</a>	553	<a href="#">700010695</a>	539	<a href="#">700012077</a>	571	<a href="#">725000107</a>	565	<a href="#">186001828BA</a>	13, 17, 384
<a href="#">700009895</a>	553	<a href="#">700010696</a>	539	<a href="#">700012103</a>	576			<a href="#">186001830BA</a>	14, 17
<a href="#">700009911</a>	542	<a href="#">700010697</a>	539	<a href="#">700012105</a>	576				
<a href="#">700009919</a>	542	<a href="#">700010698</a>	539	<a href="#">700012106</a>	576				
<a href="#">700009920</a>	553	<a href="#">700010699</a>	539	<a href="#">700012132</a>	576				
<a href="#">700009976</a>	550, 574	<a href="#">700010700</a>	539						

<a href="#">186002629C</a> .....	72, 78	<a href="#">PSL613319</a> .....	526, 581	<a href="#">PSS831015</a> .....	229, 296	<a href="#">WAS081140</a> .....	566	<a href="#">WAT011390</a> .....	35-36
<a href="#">186002630C</a> .....	72, 78	<a href="#">PSL613320</a> .....	526, 581	<a href="#">PSS831113</a> .....	229, 297	<a href="#">WAS081333</a> .....	566	<a href="#">WAT011400</a> .....	36
<a href="#">186003885C</a> .....	68, 74, 76	<a href="#">PSL613321</a> .....	582	<a href="#">PSS831115</a> .....	229, 297	<a href="#">WAS081346</a> .....	540, 566	<a href="#">WAT011520</a> .....	473
<a href="#">186003886C</a> .....	61, 64, 67-68, 74, 76	<a href="#">PSL613324</a> .....	525, 580	<a href="#">PSS831812</a> .....	228, 296	<a href="#">WAS081347</a> .....	566	<a href="#">WAT011525</a> .....	473
<a href="#">186004132C</a> .....	61, 64, 67-68	<a href="#">PSL613325</a> .....	525, 580	<a href="#">PSS831813</a> .....	228, 296	<a href="#">WAS081348</a> .....	566	<a href="#">WAT011530</a> .....	473
<a href="#">186004133C</a> .....	61, 64, 68	<a href="#">PSL613457</a> .....	528, 583	<a href="#">PSS831815</a> .....	228, 296	<a href="#">WAS207069</a> .....	560	<a href="#">WAT011535</a> .....	473
<a href="#">186004167C</a> .....	61, 64, 68	<a href="#">PSL613570</a> .....	527, 583	<a href="#">PSS831911</a> .....	228, 295	<a href="#">WAT005063</a> .....	449, 526, 581	<a href="#">WAT011540</a> .....	473
<a href="#">186004168C</a> .....	61, 64, 68	<a href="#">PSL613578</a> .....	527, 583	<a href="#">PSS831912</a> .....	228, 295	<a href="#">WAT005070</a> .....	449, 526, 581	<a href="#">WAT011545</a> .....	473
<a href="#">186004902C</a> .....	73	<a href="#">PSL613602</a> .....	527, 583	<a href="#">PSS831913</a> .....	228, 295	<a href="#">WAT005079</a> .....	526, 581	<a href="#">WAT011550</a> .....	473
<a href="#">186004903C</a> .....	73	<a href="#">PSL613604</a> .....	527, 583	<a href="#">PSS831915</a> .....	228, 295	<a href="#">WAT005129</a> .....	305-306	<a href="#">WAT011560</a> .....	473
<a href="#">186005660CV</a> .....	68, 491	<a href="#">PSL613607</a> .....	527, 583	<a href="#">PSS832013</a> .....	230, 298	<a href="#">WAT005130</a> .....	305	<a href="#">WAT011565</a> .....	473
<a href="#">186005661CV</a> .....	61, 64, 67-68, 491	<a href="#">PSL613608</a> .....	527, 583	<a href="#">PSS832111</a> .....	228, 295	<a href="#">WAT005136</a> .....	448-449	<a href="#">WAT011570</a> .....	473
<a href="#">186005662CV</a> .....	61, 64, 67-68, 491	<a href="#">PSL613609</a> .....	527, 583	<a href="#">PSS832112</a> .....	228, 295	<a href="#">WAT005137</a> .....	305, 448-449, 525, 581	<a href="#">WAT011572</a> .....	480
<a href="#">186005663CV</a> .....	61, 64, 67-68, 491	<a href="#">PSL618000</a> .....	579	<a href="#">PSS832113</a> .....	228, 295	<a href="#">WAT005138</a> .....	448-449	<a href="#">WAT011574</a> .....	480
<a href="#">186005664CV</a> .....	68, 491	<a href="#">PSL618001</a> .....	579	<a href="#">PSS832211</a> .....	228, 296	<a href="#">WAT005139</a> .....	36	<a href="#">WAT011576</a> .....	480
<a href="#">186005666CV</a> .....	61, 64, 67-68, 491	<a href="#">PSL618003</a> .....	579	<a href="#">PSS832212</a> .....	228, 296	<a href="#">WAT005147</a> .....	305	<a href="#">WAT011578</a> .....	480
<a href="#">186005667CV</a> .....	68, 491	<a href="#">PSL618004</a> .....	579	<a href="#">PSS832213</a> .....	228, 296	<a href="#">WAT007020</a> .....	526, 581	<a href="#">WAT011580</a> .....	480
<a href="#">186005668CV</a> .....	68, 491	<a href="#">PSL618005</a> .....	579	<a href="#">PSS832311</a> .....	229, 297	<a href="#">WAT007354</a> .....	500	<a href="#">WAT011582</a> .....	480
<a href="#">186005669CV</a> .....	68, 491	<a href="#">PSL618006</a> .....	579	<a href="#">PSS832312</a> .....	229, 297	<a href="#">WAT007355</a> .....	500	<a href="#">WAT011584</a> .....	480
<a href="#">186005670CV</a> .....	61, 64, 67-68, 491	<a href="#">PSL618007</a> .....	579	<a href="#">PSS832313</a> .....	229, 297	<a href="#">WAT007356</a> .....	500	<a href="#">WAT011586</a> .....	480
<a href="#">186007193C</a> .....	68	<a href="#">PSL618008</a> .....	579	<a href="#">PSS832322</a> .....	229, 297	<a href="#">WAT007358</a> .....	500	<a href="#">WAT011588</a> .....	478
<a href="#">186007194C</a> .....	68	<a href="#">PSL618009</a> .....	579	<a href="#">PSS832413</a> .....	230, 297	<a href="#">WAT007360</a> .....	351	<a href="#">WAT011590</a> .....	479
<a href="#">186007195C</a> .....	68	<a href="#">PSL618010</a> .....	579	<a href="#">PSS832612</a> .....	229, 296	<a href="#">WAT007571</a> .....	347, 507	<a href="#">WAT011592</a> .....	479
<a href="#">186007196C</a> .....	68	<a href="#">PSL618011</a> .....	579	<a href="#">PSS832613</a> .....	229, 296	<a href="#">WAT010001</a> .....	303	<a href="#">WAT011594</a> .....	479
<a href="#">186007197C</a> .....	68	<a href="#">PSL618021</a> .....	526, 582	<a href="#">PSS832615</a> .....	229, 296	<a href="#">WAT010004</a> .....	303	<a href="#">WAT011596</a> .....	479
<a href="#">186007199C</a> .....	68	<a href="#">PSL618022</a> .....	526, 582	<a href="#">PSS832711</a> .....	231, 298	<a href="#">WAT010025</a> .....	233, 299	<a href="#">WAT011598</a> .....	479
<a href="#">186007200C</a> .....	68	<a href="#">PSL901282</a> .....	527, 582	<a href="#">PSS832713</a> .....	231, 298	<a href="#">WAT010223</a> .....	308	<a href="#">WAT011600</a> .....	479
<a href="#">186007201C</a> .....	68	<a href="#">PSL901290</a> .....	527, 582	<a href="#">PSS832715</a> .....	231, 298	<a href="#">WAT010224</a> .....	308	<a href="#">WAT011602</a> .....	479
<a href="#">186007202C</a> .....	68	<a href="#">PSL904301</a> .....	70	<a href="#">PSS833113</a> .....	229, 296	<a href="#">WAT010270</a> .....	233, 299	<a href="#">WAT011604</a> .....	479
<a href="#">186007203C</a> .....	68	<a href="#">PSS614100</a> .....	231, 240, 578	<a href="#">PSS833411</a> .....	228, 295	<a href="#">WAT010290</a> .....	497, 500	<a href="#">WAT011606</a> .....	479
<a href="#">5560020-S</a> .....	571, 576	<a href="#">PSS614102</a> .....	231, 240, 578	<a href="#">PSS833412</a> .....	228, 295	<a href="#">WAT010295</a> .....	500	<a href="#">WAT011608</a> .....	479
<a href="#">600000668CV</a> .....	61, 64, 67-68, 74, 76	<a href="#">PSS614103</a> .....	240, 578	<a href="#">PSS833413</a> .....	228, 295	<a href="#">WAT010551</a> .....	500	<a href="#">WAT011610</a> .....	478
<a href="#">600000669CV</a> .....	61, 64, 67-68, 74, 76	<a href="#">PSS614104</a> .....	240, 578	<a href="#">PSS833422</a> .....	228, 295	<a href="#">WAT010570</a> .....	460	<a href="#">WAT011612</a> .....	479
<a href="#">600000670CV</a> .....	61, 64, 67-68, 74, 76	<a href="#">PSS614108</a> .....	231, 240, 578	<a href="#">PSS833711</a> .....	230, 297	<a href="#">WAT010571</a> .....	460	<a href="#">WAT011614</a> .....	479
<a href="#">600000671CV</a> .....	61, 64, 67-68	<a href="#">PSS614113</a> .....	240, 578	<a href="#">PSS837511</a> .....	231, 298	<a href="#">WAT010571</a> .....	460	<a href="#">WAT011616</a> .....	479
<a href="#">600000749CV</a> .....	68, 76	<a href="#">PSS830008</a> .....	231, 240, 245, 578	<a href="#">PSS837512</a> .....	231, 298	<a href="#">WAT010639</a> .....	497	<a href="#">WAT011618</a> .....	479
<a href="#">600000750CV</a> .....	68	<a href="#">PSS830051</a> .....	231, 240	<a href="#">PSS837515</a> .....	231, 298	<a href="#">WAT010640</a> .....	446	<a href="#">WAT011620</a> .....	479
<a href="#">600000751CV</a> .....	68, 76	<a href="#">PSS830053</a> .....	231, 240	<a href="#">PSS837813</a> .....	231, 298	<a href="#">WAT010656</a> .....	233, 299	<a href="#">WAT011622</a> .....	479
<a href="#">600000752CV</a> .....	68, 76	<a href="#">PSS830055</a> .....	231, 240	<a href="#">PSS837815</a> .....	231, 298	<a href="#">WAT010657</a> .....	308	<a href="#">WAT011624</a> .....	479
<a href="#">600000754CV</a> .....	68, 76	<a href="#">PSS830057</a> .....	231, 240	<a href="#">PSS839451</a> .....	231, 240	<a href="#">WAT010658</a> .....	308	<a href="#">WAT011626</a> .....	479
<a href="#">600000755CV</a> .....	61, 64, 67-68, 74, 76	<a href="#">PSS830073</a> .....	231, 240	<a href="#">PSS839458</a> .....	231, 240	<a href="#">WAT010739</a> .....	451	<a href="#">WAT011628</a> .....	479
<a href="#">JJAN20229</a> .....	30	<a href="#">PSS830074</a> .....	231, 240	<a href="#">PSS839465</a> .....	231, 240	<a href="#">WAT010740</a> .....	451	<a href="#">WAT011630</a> .....	479
<a href="#">PFAC30PAR</a> .....	523	<a href="#">PSS830075</a> .....	231, 240	<a href="#">PSS839471</a> .....	231, 240	<a href="#">WAT010741</a> .....	451	<a href="#">WAT011633</a> .....	307
<a href="#">PSL404219</a> .....	70, 75	<a href="#">PSS830076</a> .....	231, 240	<a href="#">PSS839476</a> .....	231, 240	<a href="#">WAT010742</a> .....	451	<a href="#">WAT011669</a> .....	307
<a href="#">PSL404231</a> .....	70, 75	<a href="#">PSS830077</a> .....	231, 240	<a href="#">PSS839478</a> .....	231, 240	<a href="#">WAT010823</a> .....	25	<a href="#">WAT011670</a> .....	232, 299
<a href="#">PSL613301</a> .....	525, 580	<a href="#">PSS830079</a> .....	231, 240	<a href="#">PSS845277</a> .....	228, 295	<a href="#">WAT010830</a> .....	25	<a href="#">WAT011675</a> .....	233, 299
<a href="#">PSL613302</a> .....	525, 580	<a href="#">PSS830115</a> .....	230, 298	<a href="#">PSS845280</a> .....	228, 296	<a href="#">WAT010835</a> .....	25	<a href="#">WAT011690</a> .....	498
<a href="#">PSL613312</a> .....	526, 581	<a href="#">PSS830125</a> .....	230, 298	<a href="#">PSS845281</a> .....	228, 296	<a href="#">WAT010873</a> .....	496	<a href="#">WAT011695</a> .....	232, 299
<a href="#">PSL613313</a> .....	526, 581	<a href="#">PSS830612</a> .....	228, 295	<a href="#">PSS845284</a> .....	229, 296	<a href="#">WAT010910</a> .....	25	<a href="#">WAT011740</a> .....	233
<a href="#">PSL613316</a> .....	580	<a href="#">PSS830613</a> .....	228, 295	<a href="#">PSS845293</a> .....	230, 297	<a href="#">WAT010947</a> .....	351	<a href="#">WAT011783</a> .....	446
<a href="#">PSL613317</a> .....	526, 581	<a href="#">PSS830615</a> .....	228, 295	<a href="#">PSS845297</a> .....	230, 297	<a href="#">WAT010950</a> .....	351	<a href="#">WAT011784</a> .....	446
<a href="#">PSL613318</a> .....	526, 581	<a href="#">PSS830815</a> .....	230, 297	<a href="#">PSS845301</a> .....	229, 297	<a href="#">WAT010960</a> .....	351	<a href="#">WAT011786</a> .....	433
		<a href="#">PSS830908</a> .....	230, 298	<a href="#">PSS845305</a> .....	231, 298	<a href="#">WAT010965</a> .....	351	<a href="#">WAT011787</a> .....	433
		<a href="#">PSS830909</a> .....	230, 298	<a href="#">PSS845309</a> .....	231, 298	<a href="#">WAT010983</a> .....	351	<a href="#">WAT011793</a> .....	234, 301, 401
		<a href="#">PSS830912</a> .....	230, 297	<a href="#">PSS845540</a> .....	230, 298	<a href="#">WAT010985</a> .....	351	<a href="#">WAT011794</a> .....	234, 301, 401
		<a href="#">PSS830913</a> .....	230, 297	<a href="#">PSS845541</a> .....	228, 295	<a href="#">WAT010986</a> .....	308	<a href="#">WAT011795</a> .....	401
		<a href="#">PSS830915</a> .....	230, 297	<a href="#">PSS845542</a> .....	228, 295	<a href="#">WAT010987</a> .....	308	<a href="#">WAT011796</a> .....	401
		<a href="#">PSS831012</a> .....	229, 296	<a href="#">PSS845543</a> .....	228, 295	<a href="#">WAT010988</a> .....	307	<a href="#">WAT011797</a> .....	235, 301, 401
						<a href="#">WAT011042</a> .....	562	<a href="#">WAT011798</a> .....	235, 301, 401



<a href="#">WAT011799</a> .....	235, 301, 401	<a href="#">WAT020721</a> .....	303	<a href="#">WAT022454</a> .....	306	<a href="#">WAT025051</a> .....	72, 78	<a href="#">WAT026765</a> .....	500
<a href="#">WAT011800</a> .....	235, 301, 401	<a href="#">WAT020722</a> .....	303	<a href="#">WAT022476</a> .....	73	<a href="#">WAT025053C</a> .....	73	<a href="#">WAT026770</a> .....	500
<a href="#">WAT011801</a> .....	235, 301, 401	<a href="#">WAT020723</a> .....	303	<a href="#">WAT022479</a> .....	73	<a href="#">WAT025053DV</a> .....	73	<a href="#">WAT026804</a> .....	525, 581
<a href="#">WAT011802</a> .....	234, 301, 401	<a href="#">WAT020724</a> .....	303	<a href="#">WAT02268J</a> .....	244, 425-426, 428, 430, 466-467, 469-470, 472	<a href="#">WAT025054C</a> .....	73	<a href="#">WAT026805</a> .....	525, 567, 581
<a href="#">WAT011803</a> .....	234, 301, 401	<a href="#">WAT020731</a> .....	303	<a href="#">WAT02286I</a> .....	72, 78	<a href="#">WAT025054DV</a> .....	73	<a href="#">WAT026806</a> .....	525, 581
<a href="#">WAT011804</a> .....	234, 301, 401	<a href="#">WAT020732</a> .....	303	<a href="#">WAT022934</a> .....	560	<a href="#">WAT025207</a> .....	560	<a href="#">WAT026807</a> .....	525, 581
<a href="#">WAT011805</a> .....	234, 301, 401	<a href="#">WAT020733</a> .....	303	<a href="#">WAT022946</a> .....	560	<a href="#">WAT025216</a> .....	560	<a href="#">WAT026808</a> .....	525, 581
<a href="#">WAT011807</a> .....	235, 301, 401	<a href="#">WAT020734</a> .....	303	<a href="#">WAT022995</a> .....	526, 581	<a href="#">WAT025263</a> .....	562	<a href="#">WAT026809</a> .....	525, 581
<a href="#">WAT011808</a> .....	235, 301, 401	<a href="#">WAT020739</a> .....	303	<a href="#">WAT022996</a> .....	526, 581	<a href="#">WAT025296</a> .....	560	<a href="#">WAT026810</a> .....	525, 581
<a href="#">WAT011809</a> .....	235, 301, 401	<a href="#">WAT020740</a> .....	303	<a href="#">WAT022997</a> .....	526, 581	<a href="#">WAT025297</a> .....	560	<a href="#">WAT026973</a> .....	525, 567, 581
<a href="#">WAT011810</a> .....	235, 301, 401	<a href="#">WAT020741</a> .....	303	<a href="#">WAT022998</a> .....	526, 581	<a href="#">WAT025313</a> .....	526, 581	<a href="#">WAT026974</a> .....	525, 581
<a href="#">WAT011812</a> .....	234, 301, 401	<a href="#">WAT020770</a> .....	500	<a href="#">WAT022998</a> .....	526, 581	<a href="#">WAT025360</a> .....	560	<a href="#">WAT027047</a> .....	304
<a href="#">WAT011813</a> .....	234, 301, 401	<a href="#">WAT020805</a> .....	25	<a href="#">WAT022999</a> .....	526, 581	<a href="#">WAT025384</a> .....	560	<a href="#">WAT027048</a> .....	304
<a href="#">WAT011814</a> .....	234, 301, 401	<a href="#">WAT020810</a> .....	25	<a href="#">WAT023321</a> .....	448	<a href="#">WAT025531</a> .....	527, 560-561, 583	<a href="#">WAT027049</a> .....	304
<a href="#">WAT011815</a> .....	234, 301, 401	<a href="#">WAT020815</a> .....	25	<a href="#">WAT023323</a> .....	448	<a href="#">WAT025559</a> .....	560	<a href="#">WAT027053</a> .....	304
<a href="#">WAT015199</a> .....	72, 78	<a href="#">WAT020820</a> .....	25	<a href="#">WAT023326</a> .....	448	<a href="#">WAT025566</a> .....	526, 581	<a href="#">WAT027054</a> .....	304
<a href="#">WAT015199DV</a> .....	78	<a href="#">WAT020825</a> .....	25	<a href="#">WAT023332</a> .....	448	<a href="#">WAT025604</a> .....	306, 526, 567, 581	<a href="#">WAT027055</a> .....	304
<a href="#">WAT015207</a> .....	497	<a href="#">WAT020830</a> .....	25	<a href="#">WAT023343</a> .....	449	<a href="#">WAT025746</a> .....	560	<a href="#">WAT027059</a> .....	304
<a href="#">WAT015209</a> .....	496	<a href="#">WAT020835</a> .....	25	<a href="#">WAT023344</a> .....	29, 449	<a href="#">WAT025820</a> .....	232, 299	<a href="#">WAT027060</a> .....	304
<a href="#">WAT015220</a> .....	246	<a href="#">WAT020840</a> .....	25	<a href="#">WAT023345</a> .....	449	<a href="#">WAT025821</a> .....	233, 299	<a href="#">WAT027061</a> .....	304
<a href="#">WAT015401</a> .....	307	<a href="#">WAT020845</a> .....	25	<a href="#">WAT023346</a> .....	449	<a href="#">WAT025822</a> .....	232, 299	<a href="#">WAT027065</a> .....	304
<a href="#">WAT015490</a> .....	381	<a href="#">WAT020850</a> .....	25	<a href="#">WAT023347</a> .....	449	<a href="#">WAT025823</a> .....	233, 299	<a href="#">WAT027066</a> .....	304
<a href="#">WAT015674</a> .....	240, 578	<a href="#">WAT020855</a> .....	25	<a href="#">WAT023348</a> .....	449	<a href="#">WAT025828</a> .....	236, 300	<a href="#">WAT027067</a> .....	304
<a href="#">WAT015715</a> .....	381	<a href="#">WAT021812</a> .....	526, 581	<a href="#">WAT023349</a> .....	449	<a href="#">WAT025829</a> .....	237, 300	<a href="#">WAT027071</a> .....	304
<a href="#">WAT015797</a> .....	305	<a href="#">WAT021815</a> .....	526, 567, 581	<a href="#">WAT023370</a> .....	449	<a href="#">WAT025830</a> .....	433, 471	<a href="#">WAT027072</a> .....	304
<a href="#">WAT015814</a> .....	305	<a href="#">WAT021816</a> .....	526, 567, 581	<a href="#">WAT023371</a> .....	449	<a href="#">WAT025831</a> .....	433, 471	<a href="#">WAT027073</a> .....	304
<a href="#">WAT015831</a> .....	305-306	<a href="#">WAT021817</a> .....	526, 581	<a href="#">WAT023372</a> .....	449	<a href="#">WAT025832</a> .....	236, 300	<a href="#">WAT027077</a> .....	304
<a href="#">WAT015833</a> .....	305-306	<a href="#">WAT021901</a> .....	448	<a href="#">WAT023373</a> .....	449	<a href="#">WAT025834</a> .....	236, 300	<a href="#">WAT027078</a> .....	304
<a href="#">WAT015834</a> .....	305-306	<a href="#">WAT021902</a> .....	448	<a href="#">WAT023396</a> .....	449	<a href="#">WAT025835</a> .....	237, 300	<a href="#">WAT027079</a> .....	304
<a href="#">WAT015835</a> .....	306	<a href="#">WAT021903</a> .....	448	<a href="#">WAT023401</a> .....	244, 578	<a href="#">WAT025843</a> .....	308	<a href="#">WAT027083</a> .....	304
<a href="#">WAT015848</a> .....	305-306	<a href="#">WAT021904</a> .....	448	<a href="#">WAT023486</a> .....	561	<a href="#">WAT025844</a> .....	308	<a href="#">WAT027084</a> .....	304
<a href="#">WAT015854</a> .....	305	<a href="#">WAT021906</a> .....	448	<a href="#">WAT023501</a> .....	25	<a href="#">WAT025845</a> .....	307, 401	<a href="#">WAT027085</a> .....	304
<a href="#">WAT015859</a> .....	306	<a href="#">WAT021907</a> .....	448	<a href="#">WAT023507</a> .....	25	<a href="#">WAT025846</a> .....	307, 401	<a href="#">WAT027089</a> .....	304
<a href="#">WAT015860</a> .....	305-306	<a href="#">WAT021908</a> .....	305	<a href="#">WAT023513</a> .....	25	<a href="#">WAT025848</a> .....	307, 401	<a href="#">WAT027090</a> .....	304
<a href="#">WAT019311</a> .....	305	<a href="#">WAT021910</a> .....	448	<a href="#">WAT023519</a> .....	25	<a href="#">WAT025853</a> .....	307	<a href="#">WAT027091</a> .....	304
<a href="#">WAT019876</a> .....	449	<a href="#">WAT021927</a> .....	448	<a href="#">WAT023525</a> .....	25	<a href="#">WAT025859</a> .....	460	<a href="#">WAT027198</a> .....	236, 300
<a href="#">WAT019877</a> .....	449	<a href="#">WAT021945</a> .....	448	<a href="#">WAT023531</a> .....	25	<a href="#">WAT025860</a> .....	460	<a href="#">WAT027324</a> .....	236, 300
<a href="#">WAT019878</a> .....	449	<a href="#">WAT021946</a> .....	448	<a href="#">WAT023537</a> .....	25	<a href="#">WAT025861</a> .....	460	<a href="#">WAT027477</a> .....	237, 300
<a href="#">WAT019891</a> .....	449	<a href="#">WAT021947</a> .....	448	<a href="#">WAT023543</a> .....	25	<a href="#">WAT025862</a> .....	460	<a href="#">WAT027501</a> .....	448
<a href="#">WAT019892</a> .....	449	<a href="#">WAT021950</a> .....	448	<a href="#">WAT023549</a> .....	25	<a href="#">WAT025863</a> .....	460	<a href="#">WAT027502</a> .....	448
<a href="#">WAT019893</a> .....	449	<a href="#">WAT021951</a> .....	449	<a href="#">WAT023555</a> .....	25	<a href="#">WAT025864</a> .....	460	<a href="#">WAT027503</a> .....	448
<a href="#">WAT020321</a> .....	552	<a href="#">WAT021992</a> .....	448	<a href="#">WAT023561</a> .....	25	<a href="#">WAT025865</a> .....	460	<a href="#">WAT027506</a> .....	448
<a href="#">WAT020500</a> .....	25	<a href="#">WAT022033</a> .....	448	<a href="#">WAT023575</a> .....	25	<a href="#">WAT025866</a> .....	460	<a href="#">WAT027509</a> .....	306
<a href="#">WAT020505</a> .....	25	<a href="#">WAT022034</a> .....	448	<a href="#">WAT023580</a> .....	25	<a href="#">WAT025867</a> .....	460	<a href="#">WAT027518</a> .....	306
<a href="#">WAT020510</a> .....	25	<a href="#">WAT022035</a> .....	448	<a href="#">WAT023585</a> .....	25	<a href="#">WAT025868</a> .....	460	<a href="#">WAT027519</a> .....	306
<a href="#">WAT020515</a> .....	25	<a href="#">WAT022180</a> .....	305	<a href="#">WAT023590</a> .....	25	<a href="#">WAT025869</a> .....	460	<a href="#">WAT027525</a> .....	449
<a href="#">WAT020520</a> .....	25	<a href="#">WAT022276</a> .....	306	<a href="#">WAT023595</a> .....	25	<a href="#">WAT025870</a> .....	460	<a href="#">WAT027528</a> .....	449
<a href="#">WAT020525</a> .....	25	<a href="#">WAT022280</a> .....	306	<a href="#">WAT023600</a> .....	25	<a href="#">WAT025871</a> .....	460	<a href="#">WAT027530</a> .....	449
<a href="#">WAT020530</a> .....	25	<a href="#">WAT022281</a> .....	306	<a href="#">WAT023605</a> .....	25	<a href="#">WAT025872</a> .....	460	<a href="#">WAT027542</a> .....	449
<a href="#">WAT020535</a> .....	25	<a href="#">WAT022282</a> .....	306	<a href="#">WAT023610</a> .....	25	<a href="#">WAT025874</a> .....	237, 300	<a href="#">WAT027543</a> .....	449
<a href="#">WAT020540</a> .....	25	<a href="#">WAT022283</a> .....	306	<a href="#">WAT023615</a> .....	25	<a href="#">WAT025875</a> .....	236, 300	<a href="#">WAT027544</a> .....	449
<a href="#">WAT020545</a> .....	25, 450	<a href="#">WAT022330</a> .....	526, 581	<a href="#">WAT023620</a> .....	25	<a href="#">WAT025876</a> .....	307	<a href="#">WAT027577</a> .....	305
<a href="#">WAT020550</a> .....	25, 450	<a href="#">WAT022365</a> .....	305	<a href="#">WAT023625</a> .....	25	<a href="#">WAT025877</a> .....	307	<a href="#">WAT027578</a> .....	305
<a href="#">WAT020587</a> .....	303	<a href="#">WAT022384</a> .....	525, 562, 581	<a href="#">WAT023635</a> .....	25	<a href="#">WAT026-04</a> .....	526, 581	<a href="#">WAT027629</a> .....	560
<a href="#">WAT020588</a> .....	303	<a href="#">WAT022385</a> .....	525, 562, 581	<a href="#">WAT023650</a> .....	401	<a href="#">WAT026014</a> .....	560	<a href="#">WAT030632</a> .....	303
<a href="#">WAT020589</a> .....	303	<a href="#">WAT022400</a> .....	306	<a href="#">WAT023655</a> .....	232, 299	<a href="#">WAT026592</a> .....	560	<a href="#">WAT030633</a> .....	303
<a href="#">WAT020594</a> .....	303	<a href="#">WAT022440</a> .....	305	<a href="#">WAT024310</a> .....	29, 35-36	<a href="#">WAT026613</a> .....	560	<a href="#">WAT030634</a> .....	303
<a href="#">WAT020595</a> .....	303	<a href="#">WAT022441</a> .....	305	<a href="#">WAT025028</a> .....	560	<a href="#">WAT026745</a> .....	246	<a href="#">WAT030697</a> .....	463
<a href="#">WAT020596</a> .....	303	<a href="#">WAT022453</a> .....	306	<a href="#">WAT025050</a> .....	72, 78	<a href="#">WAT026760</a> .....	246	<a href="#">WAT030698</a> .....	463

<a href="#">WAT030699</a> .....	463	<a href="#">WAT035884</a> .....	308	<a href="#">WAT038511</a> .....	308	<a href="#">WAT044200</a> .....	460	<a href="#">WAT045830</a> .....	458
<a href="#">WAT030852</a> .....	560	<a href="#">WAT035890</a> .....	308	<a href="#">WAT038520</a> .....	307, 401	<a href="#">WAT044201</a> .....	460	<a href="#">WAT045835</a> .....	458
<a href="#">WAT031795</a> .....	526, 581	<a href="#">WAT035943</a> .....	434	<a href="#">WAT038522</a> .....	307, 401	<a href="#">WAT044202</a> .....	460	<a href="#">WAT045840</a> .....	458
<a href="#">WAT032472</a> .....	401	<a href="#">WAT035946</a> .....	433-434	<a href="#">WAT038524</a> .....	307, 401	<a href="#">WAT044203</a> .....	460	<a href="#">WAT045845</a> .....	458
<a href="#">WAT032646</a> .....	560	<a href="#">WAT035970</a> .....	447	<a href="#">WAT038526</a> .....	307, 401	<a href="#">WAT044204</a> .....	460	<a href="#">WAT045850</a> .....	458
<a href="#">WAT033994</a> .....	305	<a href="#">WAT035980</a> .....	447	<a href="#">WAT038528</a> .....	308	<a href="#">WAT044205</a> .....	460	<a href="#">WAT045855</a> .....	458
<a href="#">WAT033996</a> .....	306	<a href="#">WAT036545</a> .....	450	<a href="#">WAT038530</a> .....	308	<a href="#">WAT044206</a> .....	459	<a href="#">WAT045860</a> .....	458
<a href="#">WAT033997</a> .....	306	<a href="#">WAT036554</a> .....	464	<a href="#">WAT038564</a> .....	447	<a href="#">WAT044207</a> .....	459	<a href="#">WAT045865</a> .....	458
<a href="#">WAT034100</a> .....	463	<a href="#">WAT036555</a> .....	464	<a href="#">WAT038567</a> .....	447	<a href="#">WAT044208</a> .....	459	<a href="#">WAT045870</a> .....	458
<a href="#">WAT034101</a> .....	463	<a href="#">WAT036570</a> .....	500	<a href="#">WAT038570</a> .....	307	<a href="#">WAT044209</a> .....	459	<a href="#">WAT045875</a> .....	458
<a href="#">WAT034102</a> .....	463	<a href="#">WAT036613</a> .....	434	<a href="#">WAT038571</a> .....	307	<a href="#">WAT044210</a> .....	459	<a href="#">WAT045880</a> .....	458
<a href="#">WAT034104</a> .....	463	<a href="#">WAT036770</a> .....	25	<a href="#">WAT038800</a> .....	448	<a href="#">WAT044211</a> .....	459	<a href="#">WAT045885</a> .....	458
<a href="#">WAT034105</a> .....	463	<a href="#">WAT036775</a> .....	25	<a href="#">WAT038802</a> .....	448	<a href="#">WAT044212</a> .....	459	<a href="#">WAT045890</a> .....	458
<a href="#">WAT034106</a> .....	463	<a href="#">WAT036780</a> .....	25	<a href="#">WAT038803</a> .....	448	<a href="#">WAT044213</a> .....	459	<a href="#">WAT045895</a> .....	458
<a href="#">WAT034116</a> .....	463	<a href="#">WAT036785</a> .....	25	<a href="#">WAT038804</a> .....	448	<a href="#">WAT044214</a> .....	459	<a href="#">WAT045900</a> .....	458
<a href="#">WAT034117</a> .....	463	<a href="#">WAT036790</a> .....	25	<a href="#">WAT038805</a> .....	448	<a href="#">WAT044215</a> .....	459	<a href="#">WAT045905</a> .....	217, 291, 400
<a href="#">WAT034118</a> .....	463	<a href="#">WAT036795</a> .....	25	<a href="#">WAT038806</a> .....	448	<a href="#">WAT044216</a> .....	459	<a href="#">WAT045915</a> .....	459
<a href="#">WAT034119</a> .....	463	<a href="#">WAT036800</a> .....	25	<a href="#">WAT038807</a> .....	448	<a href="#">WAT044217</a> .....	459	<a href="#">WAT045920</a> .....	459
<a href="#">WAT034120</a> .....	463	<a href="#">WAT036805</a> .....	25	<a href="#">WAT038846</a> .....	305	<a href="#">WAT044218</a> .....	459	<a href="#">WAT045925</a> .....	459
<a href="#">WAT034122</a> .....	463	<a href="#">WAT036810</a> .....	25	<a href="#">WAT038849</a> .....	305	<a href="#">WAT044219</a> .....	459	<a href="#">WAT045930</a> .....	459
<a href="#">WAT034123</a> .....	463	<a href="#">WAT036815</a> .....	25	<a href="#">WAT038851</a> .....	305	<a href="#">WAT044220</a> .....	459	<a href="#">WAT045935</a> .....	459
<a href="#">WAT034124</a> .....	463	<a href="#">WAT036820</a> .....	25	<a href="#">WAT039550</a> .....	29-30	<a href="#">WAT044221</a> .....	458	<a href="#">WAT045940</a> .....	459
<a href="#">WAT034125</a> .....	463	<a href="#">WAT036865</a> .....	401	<a href="#">WAT039570</a> .....	447	<a href="#">WAT044222</a> .....	458	<a href="#">WAT045945</a> .....	459
<a href="#">WAT034207</a> .....	480	<a href="#">WAT036870</a> .....	401	<a href="#">WAT039575</a> .....	447	<a href="#">WAT044223</a> .....	458	<a href="#">WAT045950</a> .....	459
<a href="#">WAT034208</a> .....	478	<a href="#">WAT036875</a> .....	401	<a href="#">WAT039625</a> .....	447	<a href="#">WAT044224</a> .....	458	<a href="#">WAT045955</a> .....	459
<a href="#">WAT034209</a> .....	478	<a href="#">WAT036905</a> .....	25	<a href="#">WAT039630</a> .....	447	<a href="#">WAT044225</a> .....	458	<a href="#">WAT045960</a> .....	459
<a href="#">WAT034210</a> .....	478	<a href="#">WAT036910</a> .....	25	<a href="#">WAT039780</a> .....	447	<a href="#">WAT044226</a> .....	458	<a href="#">WAT045965</a> .....	459
<a href="#">WAT034220</a> .....	237	<a href="#">WAT036915</a> .....	25	<a href="#">WAT039782</a> .....	447	<a href="#">WAT044227</a> .....	458	<a href="#">WAT045970</a> .....	459
<a href="#">WAT034221</a> .....	237	<a href="#">WAT036920</a> .....	25	<a href="#">WAT039783</a> .....	447	<a href="#">WAT044228</a> .....	458	<a href="#">WAT045975</a> .....	459
<a href="#">WAT034223</a> .....	237	<a href="#">WAT036925</a> .....	25	<a href="#">WAT039785</a> .....	447	<a href="#">WAT044229</a> .....	458	<a href="#">WAT045980</a> .....	459
<a href="#">WAT034224</a> .....	237	<a href="#">WAT036930</a> .....	25	<a href="#">WAT039786</a> .....	447	<a href="#">WAT044230</a> .....	458	<a href="#">WAT045985</a> .....	459
<a href="#">WAT034225</a> .....	237	<a href="#">WAT036935</a> .....	25	<a href="#">WAT039787</a> .....	447	<a href="#">WAT044231</a> .....	458	<a href="#">WAT045995</a> .....	218, 292
<a href="#">WAT034227</a> .....	237	<a href="#">WAT036940</a> .....	25	<a href="#">WAT039790</a> .....	447	<a href="#">WAT044232</a> .....	458	<a href="#">WAT046-12</a> .....	526, 581
<a href="#">WAT034236</a> .....	496	<a href="#">WAT036945</a> .....	25	<a href="#">WAT039791</a> .....	447	<a href="#">WAT044233</a> .....	458	<a href="#">WAT046800</a> .....	460
<a href="#">WAT034238</a> .....	496-497	<a href="#">WAT036950</a> .....	25	<a href="#">WAT042091</a> .....	548	<a href="#">WAT044234</a> .....	458	<a href="#">WAT046805</a> .....	460
<a href="#">WAT034243</a> .....	496	<a href="#">WAT036954</a> .....	496	<a href="#">WAT042881</a> .....	566	<a href="#">WAT044235</a> .....	458	<a href="#">WAT046810</a> .....	460
<a href="#">WAT034244</a> .....	496-497	<a href="#">WAT037047</a> .....	565	<a href="#">WAT042885</a> .....	566	<a href="#">WAT044236</a> .....	458	<a href="#">WAT046815</a> .....	460
<a href="#">WAT034245</a> .....	496	<a href="#">WAT037090</a> .....	565	<a href="#">WAT042887</a> .....	566	<a href="#">WAT044237</a> .....	458	<a href="#">WAT046820</a> .....	460
<a href="#">WAT034276</a> .....	496	<a href="#">WAT037500</a> .....	29-30	<a href="#">WAT043345</a> .....	25	<a href="#">WAT044238</a> .....	458	<a href="#">WAT046825</a> .....	460
<a href="#">WAT034298</a> .....	497	<a href="#">WAT037525</a> .....	240, 578	<a href="#">WAT043350</a> .....	25	<a href="#">WAT044239</a> .....	458	<a href="#">WAT046830</a> .....	244
<a href="#">WAT035190</a> .....	558	<a href="#">WAT037560</a> .....	578	<a href="#">WAT043355</a> .....	25	<a href="#">WAT044240</a> .....	458	<a href="#">WAT046835</a> .....	244
<a href="#">WAT035501</a> .....	497	<a href="#">WAT037663</a> .....	447	<a href="#">WAT043360</a> .....	25	<a href="#">WAT044241</a> .....	458	<a href="#">WAT046840</a> .....	244
<a href="#">WAT035520</a> .....	418	<a href="#">WAT037688</a> .....	307, 401	<a href="#">WAT043365</a> .....	25	<a href="#">WAT044245</a> .....	233, 299	<a href="#">WAT046845</a> .....	244
<a href="#">WAT035524</a> .....	463	<a href="#">WAT037692</a> .....	307, 401	<a href="#">WAT043370</a> .....	25	<a href="#">WAT044250</a> .....	500	<a href="#">WAT046850</a> .....	244
<a href="#">WAT035577</a> .....	523	<a href="#">WAT037696</a> .....	307, 401	<a href="#">WAT043375</a> .....	25	<a href="#">WAT044355</a> .....	240, 495-496	<a href="#">WAT046855</a> .....	244
<a href="#">WAT035650</a> .....	447	<a href="#">WAT037700</a> .....	307, 401	<a href="#">WAT043380</a> .....	25	<a href="#">WAT044370</a> .....	236, 300	<a href="#">WAT046860</a> .....	244
<a href="#">WAT035655</a> .....	447	<a href="#">WAT037704</a> .....	308	<a href="#">WAT043385</a> .....	25	<a href="#">WAT044375</a> .....	232, 299	<a href="#">WAT046865</a> .....	244
<a href="#">WAT035672</a> .....	38, 303	<a href="#">WAT037842</a> .....	307, 401	<a href="#">WAT043390</a> .....	25	<a href="#">WAT044380</a> .....	244	<a href="#">WAT046875</a> .....	244, 401
<a href="#">WAT035674</a> .....	303	<a href="#">WAT037845</a> .....	307, 401	<a href="#">WAT043395</a> .....	25	<a href="#">WAT044385</a> .....	36	<a href="#">WAT046880</a> .....	244, 401
<a href="#">WAT035676</a> .....	303	<a href="#">WAT037851</a> .....	307, 401	<a href="#">WAT043400</a> .....	25	<a href="#">WAT044395</a> .....	36	<a href="#">WAT046885</a> .....	244, 401
<a href="#">WAT035706</a> .....	478	<a href="#">WAT037854</a> .....	308	<a href="#">WAT043405</a> .....	25	<a href="#">WAT044480</a> .....	244	<a href="#">WAT046890</a> .....	244, 401
<a href="#">WAT035707</a> .....	478	<a href="#">WAT037857</a> .....	308	<a href="#">WAT043410</a> .....	25	<a href="#">WAT045424</a> .....	558	<a href="#">WAT046895</a> .....	496
<a href="#">WAT035708</a> .....	478	<a href="#">WAT038500</a> .....	232, 299	<a href="#">WAT043415</a> .....	25	<a href="#">WAT045427</a> .....	558	<a href="#">WAT046905</a> .....	244, 496
<a href="#">WAT035709</a> .....	478	<a href="#">WAT038501</a> .....	233, 299	<a href="#">WAT043425</a> .....	25	<a href="#">WAT045800</a> .....	458	<a href="#">WAT046910</a> .....	36, 244-245, 370, 395, 401, 416, 433, 471
<a href="#">WAT035711</a> .....	480	<a href="#">WAT038506</a> .....	307, 401	<a href="#">WAT043430</a> .....	25	<a href="#">WAT045805</a> .....	458	<a href="#">WAT046915</a> .....	244
<a href="#">WAT035714</a> .....	480	<a href="#">WAT038507</a> .....	307, 401	<a href="#">WAT043435</a> .....	25	<a href="#">WAT045810</a> .....	458	<a href="#">WAT046955</a> .....	220, 294
<a href="#">WAT035876</a> .....	233, 299	<a href="#">WAT038508</a> .....	307, 401	<a href="#">WAT043460</a> .....	25	<a href="#">WAT045815</a> .....	458	<a href="#">WAT046970</a> .....	218, 292
<a href="#">WAT035877</a> .....	233, 299	<a href="#">WAT038509</a> .....	307, 401	<a href="#">WAT043475</a> .....	25	<a href="#">WAT045820</a> .....	458	<a href="#">WAT046980</a> .....	217, 291
<a href="#">WAT035880</a> .....	246	<a href="#">WAT038510</a> .....	308	<a href="#">WAT043485</a> .....	25	<a href="#">WAT045825</a> .....	458		

<a href="#">WAT047205</a> .....	29-30	<a href="#">WAT054520</a> .....	25	<a href="#">WAT056975</a> .....	217, 291	<a href="#">WAT077342</a> .....	558	<a href="#">WAT088108</a> .....	351
<a href="#">WAT047210</a> .....	220, 294	<a href="#">WAT054525</a> .....	25	<a href="#">WAT057235</a> .....	551-552, 566-567	<a href="#">WAT077343</a> .....	558	<a href="#">WAT088112</a> .....	351
<a href="#">WAT047220</a> .....	29-30	<a href="#">WAT054530</a> .....	25	<a href="#">WAT058839</a> .....	35	<a href="#">WAT078515</a> .....	73	<a href="#">WAT088119</a> .....	351
<a href="#">WAT048160</a> .....	35-36	<a href="#">WAT054535</a> .....	25	<a href="#">WAT058840</a> .....	35	<a href="#">WAT080013</a> .....	433, 471	<a href="#">WAT088122</a> .....	345-347, 349, 505-507
<a href="#">WAT051041</a> .....	525, 581	<a href="#">WAT054540</a> .....	25	<a href="#">WAT058851</a> .....	35	<a href="#">WAT080046</a> .....	246	<a href="#">WAT088123</a> .....	351
<a href="#">WAT051052</a> .....	525, 581	<a href="#">WAT054545</a> .....	25	<a href="#">WAT058874</a> .....	69, 77	<a href="#">WAT080100</a> .....	308	<a href="#">WAT088131</a> .....	351
<a href="#">WAT051800</a> .....	25	<a href="#">WAT054550</a> .....	25	<a href="#">WAT058875</a> .....	69, 77	<a href="#">WAT081157</a> .....	566	<a href="#">WAT088141</a> .....	246, 401, 496, 500
<a href="#">WAT051810</a> .....	25	<a href="#">WAT054555</a> .....	25	<a href="#">WAT058876</a> .....	77	<a href="#">WAT081158</a> .....	566	<a href="#">WAT088223</a> .....	560
<a href="#">WAT051820</a> .....	25	<a href="#">WAT054560</a> .....	25	<a href="#">WAT058882</a> .....	11, 13	<a href="#">WAT081159</a> .....	566	<a href="#">WAT088430</a> .....	525, 581
<a href="#">WAT051900</a> .....	25	<a href="#">WAT054565</a> .....	25	<a href="#">WAT058883</a> .....	11, 13	<a href="#">WAT081321</a> .....	566	<a href="#">WAT088431</a> .....	525, 581
<a href="#">WAT051910</a> .....	25	<a href="#">WAT054570</a> .....	25	<a href="#">WAT058886</a> .....	77	<a href="#">WAT082708</a> .....	448-449	<a href="#">WAT088432</a> .....	525, 581
<a href="#">WAT051960</a> .....	25	<a href="#">WAT054575</a> .....	25	<a href="#">WAT058930</a> .....	478	<a href="#">WAT082734</a> .....	449	<a href="#">WAT088494</a> .....	305
<a href="#">WAT052587</a> .....	559	<a href="#">WAT054580</a> .....	25	<a href="#">WAT058931</a> .....	478	<a href="#">WAT082745</a> .....	36, 448	<a href="#">WAT088500</a> .....	236, 300
<a href="#">WAT052705</a> .....	25	<a href="#">WAT054585</a> .....	25	<a href="#">WAT058942</a> .....	35, 397, 516	<a href="#">WAT082853</a> .....	306	<a href="#">WAT088561</a> .....	525, 581
<a href="#">WAT052710</a> .....	25	<a href="#">WAT054590</a> .....	25	<a href="#">WAT058943</a> .....	35	<a href="#">WAT082887</a> .....	305, 307-308	<a href="#">WAT088563</a> .....	525, 581
<a href="#">WAT052715</a> .....	25	<a href="#">WAT054595</a> .....	25	<a href="#">WAT058951</a> .....	13, 17	<a href="#">WAT082888</a> .....	305	<a href="#">WAT088919</a> .....	305
<a href="#">WAT052720</a> .....	25	<a href="#">WAT054600</a> .....	25	<a href="#">WAT058958</a> .....	35	<a href="#">WAT082892</a> .....	305	<a href="#">WAT089592</a> .....	307, 450
<a href="#">WAT052725</a> .....	25	<a href="#">WAT054605</a> .....	25	<a href="#">WAT058959</a> .....	35	<a href="#">WAT084038</a> .....	495-496	<a href="#">WAT091631</a> .....	307
<a href="#">WAT052740</a> .....	233, 299	<a href="#">WAT054610</a> .....	25	<a href="#">WAT058961</a> .....	218, 292	<a href="#">WAT084040</a> .....	236, 300	<a href="#">WAT091648</a> .....	237, 300
<a href="#">WAT052745</a> .....	233, 299	<a href="#">WAT054615</a> .....	25	<a href="#">WAT058965</a> .....	217, 291	<a href="#">WAT084042</a> .....	236, 300	<a href="#">WAT091681</a> .....	351
<a href="#">WAT052860</a> .....	240	<a href="#">WAT054620</a> .....	25	<a href="#">WAT058969</a> .....	219, 293	<a href="#">WAT084078</a> .....	526, 581	<a href="#">WAT091784</a> .....	307
<a href="#">WAT052874</a> .....	349	<a href="#">WAT054625</a> .....	25	<a href="#">WAT058973</a> .....	217, 291	<a href="#">WAT084080</a> .....	425-428, 430, 466-470, 472	<a href="#">WAT094170</a> .....	69-70, 75-76
<a href="#">WAT052875</a> .....	349	<a href="#">WAT054630</a> .....	25	<a href="#">WAT060051</a> .....	526, 581	<a href="#">WAT084175</a> .....	237, 300	<a href="#">WAT094170DV</a> .....	76
<a href="#">WAT052880</a> .....	349	<a href="#">WAT054635</a> .....	25	<a href="#">WAT060304</a> .....	560	<a href="#">WAT084176</a> .....	236, 300	<a href="#">WAT094171</a> .....	67, 69-70, 74-76
<a href="#">WAT052885</a> .....	349	<a href="#">WAT054640</a> .....	25	<a href="#">WAT060305</a> .....	560	<a href="#">WAT084177</a> .....	236, 300	<a href="#">WAT094171DV</a> .....	76
<a href="#">WAT052890</a> .....	349	<a href="#">WAT054645</a> .....	25	<a href="#">WAT060308</a> .....	560	<a href="#">WAT084178</a> .....	236, 300	<a href="#">WAT094172</a> .....	76
<a href="#">WAT052895</a> .....	349	<a href="#">WAT054650</a> .....	25	<a href="#">WAT062341</a> .....	82, 558	<a href="#">WAT084179</a> .....	236, 300	<a href="#">WAT094174</a> .....	77
<a href="#">WAT054200</a> .....	217, 291	<a href="#">WAT054655</a> .....	25	<a href="#">WAT062479</a> .....	558	<a href="#">WAT084560</a> .....	36	<a href="#">WAT094219</a> .....	70, 75
<a href="#">WAT054225</a> .....	245	<a href="#">WAT054660</a> .....	25	<a href="#">WAT063300</a> .....	68, 76	<a href="#">WAT084601</a> .....	433, 471	<a href="#">WAT094219DV</a> .....	70, 75
<a href="#">WAT054230</a> .....	218, 292	<a href="#">WAT054665</a> .....	25	<a href="#">WAT063300DV</a> .....	68, 76	<a href="#">WAT084620</a> .....	307	<a href="#">WAT094220</a> .....	70, 75
<a href="#">WAT054250</a> .....	245	<a href="#">WAT054670</a> .....	25	<a href="#">WAT064-01</a> .....	448	<a href="#">WAT084624</a> .....	307	<a href="#">WAT094220DV</a> .....	70, 75
<a href="#">WAT054260</a> .....	29, 35-36	<a href="#">WAT054675</a> .....	25	<a href="#">WAT064-02</a> .....	448	<a href="#">WAT084626</a> .....	307	<a href="#">WAT094222</a> .....	70, 75
<a href="#">WAT054265</a> .....	30	<a href="#">WAT054680</a> .....	25	<a href="#">WAT066200</a> .....	218, 292	<a href="#">WAT084630</a> .....	307	<a href="#">WAT094222DV</a> .....	70, 75
<a href="#">WAT054270</a> .....	218, 292	<a href="#">WAT054685</a> .....	25	<a href="#">WAT066204</a> .....	218, 292	<a href="#">WAT084634</a> .....	307	<a href="#">WAT094223</a> .....	70, 75
<a href="#">WAT054275</a> .....	217, 291	<a href="#">WAT054690</a> .....	25	<a href="#">WAT066220</a> .....	217, 291	<a href="#">WAT084636</a> .....	307	<a href="#">WAT094223DV</a> .....	70, 75
<a href="#">WAT054392</a> .....	480	<a href="#">WAT054695</a> .....	25	<a href="#">WAT066224</a> .....	217, 291	<a href="#">WAT084720</a> .....	307	<a href="#">WAT094225</a> .....	11, 13
<a href="#">WAT054405</a> .....	458-460	<a href="#">WAT054700</a> .....	25	<a href="#">WAT066225</a> .....	218, 292	<a href="#">WAT084730</a> .....	307	<a href="#">WAT094226</a> .....	11, 13
<a href="#">WAT054410</a> .....	458-460	<a href="#">WAT054705</a> .....	25	<a href="#">WAT066228</a> .....	218, 292	<a href="#">WAT085188</a> .....	495-496	<a href="#">WAT094237</a> .....	220, 294
<a href="#">WAT054415</a> .....	458-460	<a href="#">WAT054710</a> .....	25	<a href="#">WAT066230</a> .....	218, 292	<a href="#">WAT085250</a> .....	433, 471	<a href="#">WAT094240</a> .....	220, 294
<a href="#">WAT054420</a> .....	29-30	<a href="#">WAT054715</a> .....	25	<a href="#">WAT066235</a> .....	217, 291	<a href="#">WAT085500</a> .....	460	<a href="#">WAT094243</a> .....	219, 293
<a href="#">WAT054435</a> .....	220, 294	<a href="#">WAT054720</a> .....	25	<a href="#">WAT066240</a> .....	217, 291	<a href="#">WAT085501</a> .....	460	<a href="#">WAT094245</a> .....	219, 293
<a href="#">WAT054438</a> .....	220, 294	<a href="#">WAT054725</a> .....	25	<a href="#">WAT066245</a> .....	217, 291	<a href="#">WAT085650</a> .....	496	<a href="#">WAT094257</a> .....	219, 293
<a href="#">WAT054448</a> .....	220, 294	<a href="#">WAT054730</a> .....	25	<a href="#">WAT066285</a> .....	218, 292	<a href="#">WAT085670</a> .....	307	<a href="#">WAT094260</a> .....	219, 293
<a href="#">WAT054450</a> .....	220, 294	<a href="#">WAT054735</a> .....	25	<a href="#">WAT066288</a> .....	217, 291	<a href="#">WAT085672</a> .....	307	<a href="#">WAT094263</a> .....	219, 293
<a href="#">WAT054460</a> .....	458	<a href="#">WAT054740</a> .....	25	<a href="#">WAT069511</a> .....	560	<a href="#">WAT085711</a> .....	233	<a href="#">WAT094266</a> .....	219, 293
<a href="#">WAT054464</a> .....	458	<a href="#">WAT054925</a> .....	25	<a href="#">WAT069583</a> .....	560	<a href="#">WAT085824</a> .....	246	<a href="#">WAT094269</a> .....	219, 293
<a href="#">WAT054466</a> .....	458	<a href="#">WAT054930</a> .....	25	<a href="#">WAT070122</a> .....	561	<a href="#">WAT086342</a> .....	308	<a href="#">WAT094278</a> .....	220, 294
<a href="#">WAT054468</a> .....	458	<a href="#">WAT054935</a> .....	25	<a href="#">WAT072030</a> .....	72, 78	<a href="#">WAT086344</a> .....	232, 299	<a href="#">WAT097332</a> .....	526, 555, 581
<a href="#">WAT054470</a> .....	458	<a href="#">WAT054940</a> .....	25	<a href="#">WAT072294</a> .....	73	<a href="#">WAT086680</a> .....	236, 300	<a href="#">WAT097944</a> .....	35
<a href="#">WAT054474</a> .....	458	<a href="#">WAT054945</a> .....	25	<a href="#">WAT072704</a> .....	72, 78	<a href="#">WAT086684</a> .....	236, 300	<a href="#">WAT097945</a> .....	35
<a href="#">WAT054475</a> .....	459	<a href="#">WAT054955</a> .....	25	<a href="#">WAT072704DV</a> .....	78	<a href="#">WAT086688</a> .....	236, 300	<a href="#">WAT097946</a> .....	35
<a href="#">WAT054476</a> .....	459	<a href="#">WAT054960</a> .....	25	<a href="#">WAT072708</a> .....	72, 78	<a href="#">WAT086692</a> .....	237, 300	<a href="#">WAT097954</a> .....	244
<a href="#">WAT054480</a> .....	459	<a href="#">WAT054965</a> .....	25	<a href="#">WAT072711</a> .....	72-73, 78	<a href="#">WAT087141</a> .....	567	<a href="#">WAT097958</a> .....	244-245, 370, 395, 416
<a href="#">WAT054488</a> .....	460	<a href="#">WAT054975</a> .....	25	<a href="#">WAT072714</a> .....	72-73, 78	<a href="#">WAT088027</a> .....	305	<a href="#">WAT106005</a> .....	217, 291
<a href="#">WAT054490</a> .....	460	<a href="#">WAT054980</a> .....	25	<a href="#">WAT073005</a> .....	72, 78	<a href="#">WAT088043</a> .....	446	<a href="#">WAT106008</a> .....	219, 293
<a href="#">WAT054494</a> .....	460	<a href="#">WAT054985</a> .....	25	<a href="#">WAT073109</a> .....	558	<a href="#">WAT088044</a> .....	446	<a href="#">WAT106011</a> .....	218, 292
<a href="#">WAT054500</a> .....	25	<a href="#">WAT055426</a> .....	541, 551, 555	<a href="#">WAT075215</a> .....	526, 581	<a href="#">WAT088070</a> .....	246	<a href="#">WAT106127</a> .....	245
<a href="#">WAT054505</a> .....	25	<a href="#">WAT056920</a> .....	233, 299	<a href="#">WAT076152</a> .....	535, 537-539, 545, 548, 550, 553-554	<a href="#">WAT088084</a> .....	558	<a href="#">WAT106128</a> .....	245
<a href="#">WAT054515</a> .....	25	<a href="#">WAT056955</a> .....	218, 292						

<a href="#">WAT106129</a>	245	<a href="#">WAT200538</a>	43	<a href="#">WAT200687</a>	35	<a href="#">WAT200843</a>	42
<a href="#">WAT106151</a>	219, 293, 400	<a href="#">WAT200539</a>	43	<a href="#">WAT200689</a>	35	<a href="#">WAT200844</a>	42
<a href="#">WAT106154</a>	400	<a href="#">WAT200540</a>	43	<a href="#">WAT200690</a>	35	<a href="#">WAT200846</a>	42
<a href="#">WAT106157</a>	219, 293, 400	<a href="#">WAT200543</a>	43	<a href="#">WAT200691</a>	35	<a href="#">WAT201549</a>	429
<a href="#">WAT106166</a>	245	<a href="#">WAT200545</a>	43	<a href="#">WAT200800</a>	42	<a href="#">WAT207119</a>	560
<a href="#">WAT106172</a>	219, 293, 400	<a href="#">WAT200546</a>	43	<a href="#">WAT200804</a>	42	<a href="#">WAT210591</a>	220, 294
<a href="#">WAT106184</a>	220, 294	<a href="#">WAT200547</a>	43	<a href="#">WAT200806</a>	42	<a href="#">WAT210685</a>	77
<a href="#">WAT106187</a>	220, 294	<a href="#">WAT200556</a>	42	<a href="#">WAT200808</a>	42	<a href="#">WAT241039</a>	525, 581
<a href="#">WAT106190</a>	220, 294	<a href="#">WAT200558</a>	42	<a href="#">WAT200810</a>	42	<a href="#">WAT270328</a>	558
<a href="#">WAT106202</a>	11, 13	<a href="#">WAT200560</a>	42	<a href="#">WAT200812</a>	42	<a href="#">WAT270868</a>	554, 567
<a href="#">WAT106209</a>	219, 293, 400	<a href="#">WAT200562</a>	42	<a href="#">WAT200818</a>	42	<a href="#">WAT270926</a>	545, 550
<a href="#">WAT163-18</a>	552	<a href="#">WAT200564</a>	42	<a href="#">WAT200820</a>	42	<a href="#">WAT270927</a>	558
<a href="#">WAT200500</a>	42	<a href="#">WAT200566</a>	43	<a href="#">WAT200821</a>	42	<a href="#">WAT270938</a>	558
<a href="#">WAT200502</a>	42	<a href="#">WAT200606</a>	36	<a href="#">WAT200822</a>	42	<a href="#">WAT270939</a>	558
<a href="#">WAT200504</a>	42	<a href="#">WAT200607</a>	36	<a href="#">WAT200823</a>	42	<a href="#">WAT270940</a>	558
<a href="#">WAT200506</a>	42	<a href="#">WAT200608</a>	36	<a href="#">WAT200824</a>	42	<a href="#">WAT270941</a>	558
<a href="#">WAT200508</a>	42	<a href="#">WAT200609</a>	36	<a href="#">WAT200825</a>	42	<a href="#">WAT270944</a>	556
<a href="#">WAT200510</a>	42	<a href="#">WAT200610</a>	30	<a href="#">WAT200826</a>	42	<a href="#">WAT270946C</a>	67-68, 76
<a href="#">WAT200512</a>	42	<a href="#">WAT200620</a>	218, 292	<a href="#">WAT200827</a>	42	<a href="#">WAT270946DV</a>	68, 76
<a href="#">WAT200518</a>	42	<a href="#">WAT200624</a>	218, 292	<a href="#">WAT200828</a>	42	<a href="#">WAT270959</a>	558
<a href="#">WAT200520</a>	42	<a href="#">WAT200625</a>	217, 291	<a href="#">WAT200831</a>	42	<a href="#">WAT270964</a>	558
<a href="#">WAT200522</a>	42	<a href="#">WAT200630</a>	218, 292	<a href="#">WAT200832</a>	42	<a href="#">WAT271017</a>	558
<a href="#">WAT200524</a>	42	<a href="#">WAT200632</a>	217, 291	<a href="#">WAT200833</a>	42	<a href="#">WAT271018</a>	558
<a href="#">WAT200531</a>	43	<a href="#">WAT200650</a>	217, 291	<a href="#">WAT200834</a>	42	<a href="#">WAT271019</a>	558
<a href="#">WAT200532</a>	43	<a href="#">WAT200655</a>	219, 293	<a href="#">WAT200835</a>	42	<a href="#">WAT271066</a>	558
<a href="#">WAT200533</a>	43	<a href="#">WAT200662</a>	219, 293	<a href="#">WAT200836</a>	42		
<a href="#">WAT200534</a>	43	<a href="#">WAT200670</a>	219, 293	<a href="#">WAT200838</a>	42		
<a href="#">WAT200535</a>	43	<a href="#">WAT200675</a>	245	<a href="#">WAT200839</a>	42		
<a href="#">WAT200536</a>	43	<a href="#">WAT200685</a>	35	<a href="#">WAT200840</a>	42		

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