eXceptional selectivity

XSELECT™ Columns

Waters

THE SCIENCE OF WHAT'S POSSIBLE.™

XSELECT HPLC COLUMNS

Successful Separations Start with Selectivity

XSelect™ HPLC Columns redefine the definition of a broad, selective, modern HPLC column family. Carefully chosen ligands (C_{18}, T3, Phenyl-Hexyl, Fluoro-Phenyl, PFP and CN) combined with proprietary Charged Surface Hybrid (CSH™) and HSS Technologies provide chromatographers with uniquely selective columns that deliver high analyte loading, operational stability, and full scalability for UPLC®, HPLC and preparative separation platforms.

XSELECT™ Columns

OBD™ OPTIMUM BED DENSITY PREPARATIVE COLUMNS

CSH C_{18}

CSH Phenyl-Hexyl

CSH Fluoro-Phenyl

HSS C_{18}

HSS C_{18} SB

HSS T3

HSS PFP

HSS CN

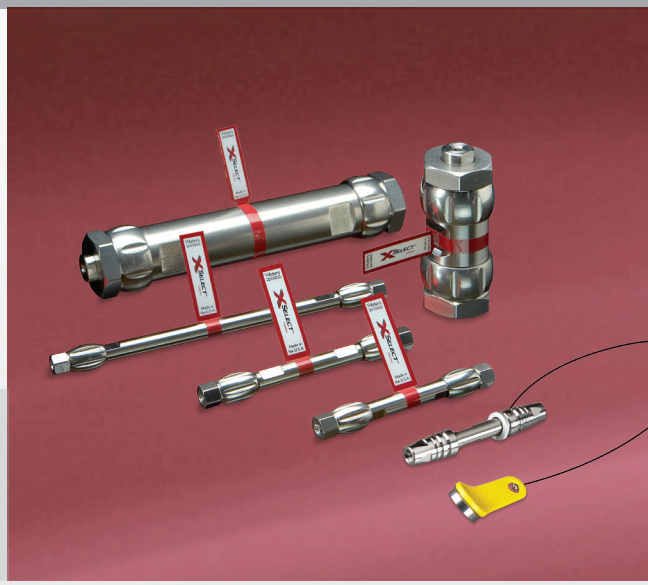
CSH™ Technology

HSS
HIGH STRENGTH SILICA

Designed for the Widest Range of Chromatographic Separations

- 2 base particle technologies (CSH and HSS)
- 8 selectivity-optimized bonded phases
- 3 scalable particle sizes (2.5, 3.5 and 5 µm)
- 40 column dimensions providing 500+ column configurations

XSELECT™ Columns



Achieve Unmatched Reproducibility and Selectivity

As sample complexity increases, more diverse chromatographic sorbents are required to separate closely eluting sample constituents. Offering a family of chromatographic sorbents that provides diverse analyte selectivity was one of the design considerations for the XSelect HPLC Columns family.

Experienced separation scientists realize that it is the combination of ligand and base particles that influence chromatographic selectivity. Choosing one base particle substrate over another will impart a drastic difference in the observed chromatography. Optimizing ligand-bonding density and end capping will further impact retention characteristics. As a primary manufacturer of base particles and synthetic ligand bonding, Waters can supply the most diverse family of chromatographic sorbents available. This allows scientists to choose the XSelect Column that will achieve the best separation in the laboratory.

XSelect	CSH C_{18}	CSH Phenyl-Hexyl	CSH Fluoro-Phenyl	HSS T3	HSS C_{18}	HSS C_{18} SB	HSS PFP	HSS CN
Ligand Type	Trifunctional C_{18}	Trifunctional C_6 Phenyl	Trifunctional Propylfluoro-phenyl	Trifunctional C_{18}	Trifunctional C_{18}	Trifunctional C_{18}	Trifunctional Pentafluoro-phenyl	Monofunctional Cyano-Propyl
Ligand Density*	2.3 µmol/m²	2.3 µmol/m²	2.3 µmol/m²	1.6 µmol/m²	3.2 µmol/m²	1.6 µmol/m²	3.2 µmol/m²	2.0 µmol/m²
Carbon Load*	15%	14%	10%	11%	15%	8%	7%	5%
Endcap Style	proprietary	proprietary	none	proprietary	proprietary	none	none	none
USP Classification	L1	L11	L43	L1	L1	L1	L43	L10
pH Range	1-11	1-11	1-8	2-8	1-8	2-8	2-8	2-8
Low pH Temp. Limit	80 °C	80 °C	60 °C	45 °C	45 °C	45 °C	45 °C	45 °C
High pH Temp. Limit	45 °C	45 °C	45 °C	45 °C	45 °C	45 °C	45 °C	45 °C
Pore Diameter*	130 Å	130 Å	130 Å	100 Å	100 Å	100 Å	100 Å	100 Å
Surface Area*	185 m²/g	185 m²/g	185 m²/g	230 m²/g	230 m²/g	230 m²/g	230 m²/g	230 m²/g
Particle Size	2.5, 3.5, 5 µm	2.5, 3.5, 5 µm	2.5, 3.5, 5 µm	2.5, 3.5, 5 µm	2.5, 3.5, 5 µm	2.5, 3.5, 5 µm	2.5, 3.5, 5 µm	2.5, 3.5, 5 µm

All XSelect Columns are available in UPLC particle sizes (ACQUITY UPLC CSH 1.7 µm and ACQUITY UPLC HSS 1.8 µm).

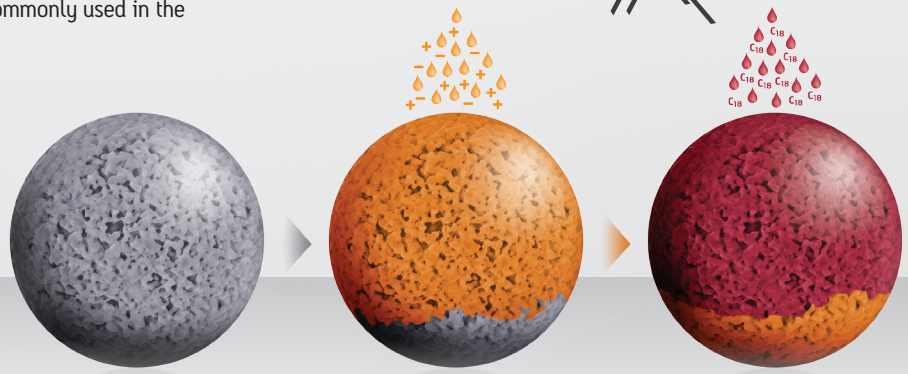
* Expected or approximate values.

Charged Suface Hybrid (CSH) Technology

Waters has been at the forefront of chromatographic materials science for the last 50 years. Recent stationary-phase innovations include ultra-pure silica for improved peak shape for basic compounds; optimized pore properties and bonded phase coverage for polar compound retention and aqueous mobile phase compatibility; and most importantly, hybrid particle technology (HPT) when engineered as sub-2-µm particles that enable the revolutionary ACQUITY UPLC® Systems family. These advances have empowered separation scientists in almost every industry to realize the business and scientific benefits of this transformative technology combination.

Charged Surface Hybrid (CSH) Technology is the next evolution of particle technology. CSH Technology dramatically improves virtually all facets of LC column performance in acidic, low ionic strength mobile phases that are commonly used in the chromatographic laboratory.

CSH™ Technology



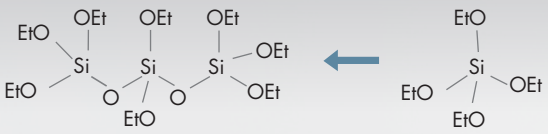
Learn more about CSH Technology, visit **www.waters.com** and reference 720003929EN.

High Strength Silica (HSS) Technology

Waters understands the role that the particle substrate plays in chromatographic selectivity and retentivity: no single particle substrate can meet every chromatographic challenge. Further, the same ligand bonded to different substrates can yield vastly different chromatographic results. High Strength Silica [HSS] technology was developed specifically to complement the chromatographic performance of the more hydrophobic BEH and CSH Particles. When compared to the ethylene-bridge-containing BEH and CSH particles, the higher silanophilicity of the (100% silica) HSS particle offers chromatographers significant advantages including increased polar compound retention and significantly different selectivity. Additionally, as its name implies, the HSS particle was designed and synthesized to possess the mechanical strength necessary to tolerate UPLC pressures.

Reproducibility and transferability are the cornerstones of BEH, CSH and HSS particle technologies. With these key strengths in mind, the 2.5-, 3.5- and 5-µm XSelect HSS HPLC Columns are seamlessly scalable and posses the same chemical and physical characteristics as the 1.8 µm ACQUITY UPLC HSS particle.

HSS
HIGH STRENGTH SILICA



Polyethoxysilane (PEOS)

Tetraethoxysilane (TEOS)

Selectivity Matters - Influencing Retention with Column Choice

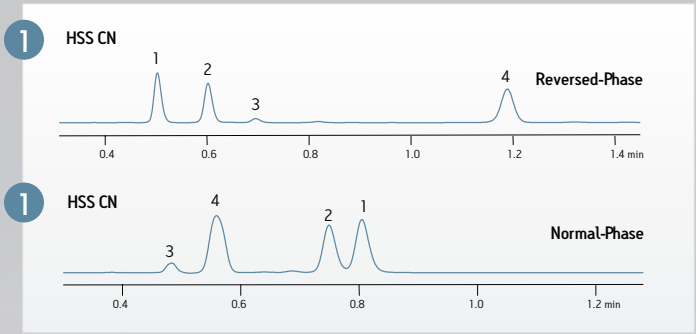
Higher resolution separations are required for complex samples in order to isolate and quantify the sample constituents. As HPLC particle technology progressed from relatively inefficient 10-µm particles to highly efficient 2.5-µm particles, separation quality improved. The gains in resolution are now limited, not by efficiency, but by selectivity.

The unique phases of the XSelect HPLC Column portfolio combine efficiency and selectivity to enhance the resolution of very complex samples. However, choosing the most effective stationary phase can be especially difficult when you need to solve a specific chromatographic challenge. In these cases, having a more direct column choice within the column portfolio can save valuable time and effort when developing a chromatographic assay.

XSELECT™ Columns

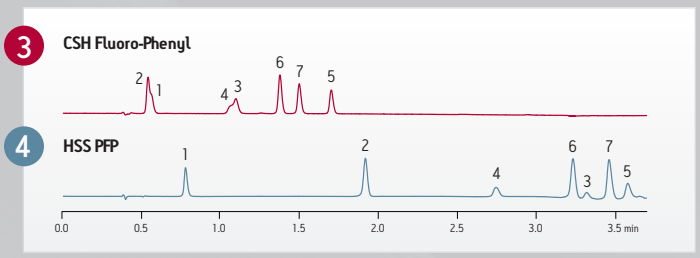
Plotting analyte selectivity [ln(α)] versus column hydrophobicity [ln(k)] is a common approach to quantifying selectivity differences between columns. A broadly scattered distribution is an indicator of sorbent diversity when tested against probe analytes and standard LC conditions.

Reversed-Phase and Normal-Phase Compatibility



The XSelect HSS CN Phase is the most diverse phase in the XSelect HPLC Column family. This column can be successfully used for normal-phase and reversed-phase separations as shown in this steroid separation. Compounds: 1. Hydrocortisone; 2. Corticosterone; 3. β–Estradiol; 4. Progesterone.

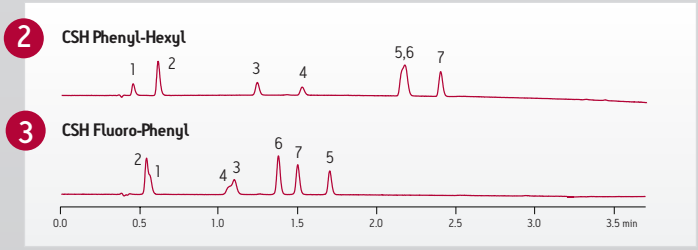
Fluorinated Phases for Selectivity



Fluorinated phases offer the chromatographer useful alternatives to standard C_{18} phases, especially when selectivity for bases or planar aromatic compounds are required. The XSelect HSS PFP and CSH Fluoro-Phenyl Columns share the same ligand, however the base particle provides the mechanism to achieve different retention characteristics.

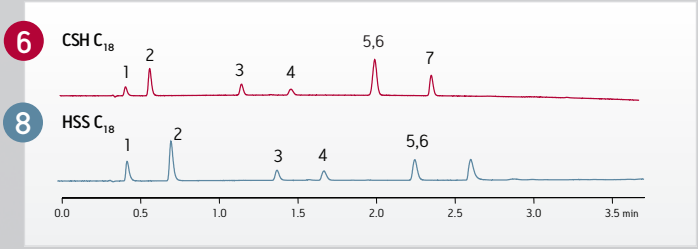
Compounds: 1. Aminopyrazine, 2. Pindolol, 3. Quinine, 4. Labetalol, 5. Verapamil, 6. Diltiazem, 7. Amitriptyline

Aromatic Compound Retention



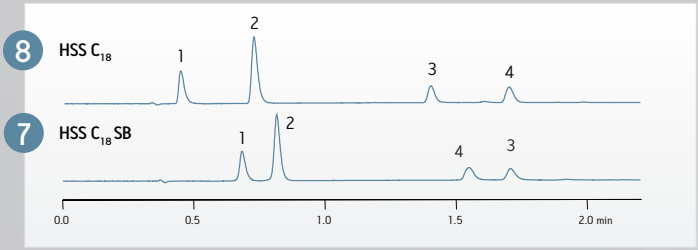
Phenyl phases provide enhanced interaction with planar aromatic compounds through pi-pi interactions. In contrast to fluorinated phenyl columns, the XSelect CSH Phenyl-Hexyl Column places more emphasis on reversed-phase interactions versus those of a secondary Lewis-base interaction.

Particle Substrate Selectivity



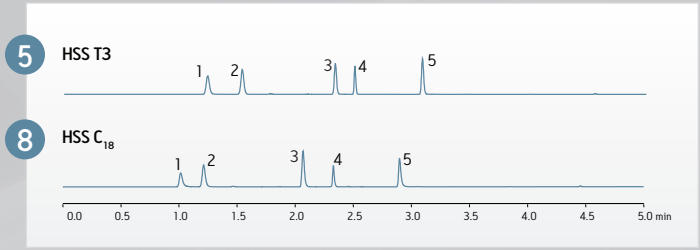
Different compound selectivity and retention can be achieved by choosing a different base particle. The XSelect HSS and CSH particles are two substrates that provide enhanced selectivity for acidic, alkaline, and neutral compounds.

Enhanced Selectivity for Bases



XSelect HSS C_{18} SB was engineered to provide enhanced retention for basic polar compounds using low-pH mobile phases.

Polar Retention



When compared to a standard C_{18} phase, XSelect HSS T3 Columns provide increased retention for polar compounds. These reversed-phase columns perform well when using up to 100% aqueous mobile phases. They also provide the widest retention capability when using standard reversed-phase mobile phases for mixtures of polar and non-polar compounds.

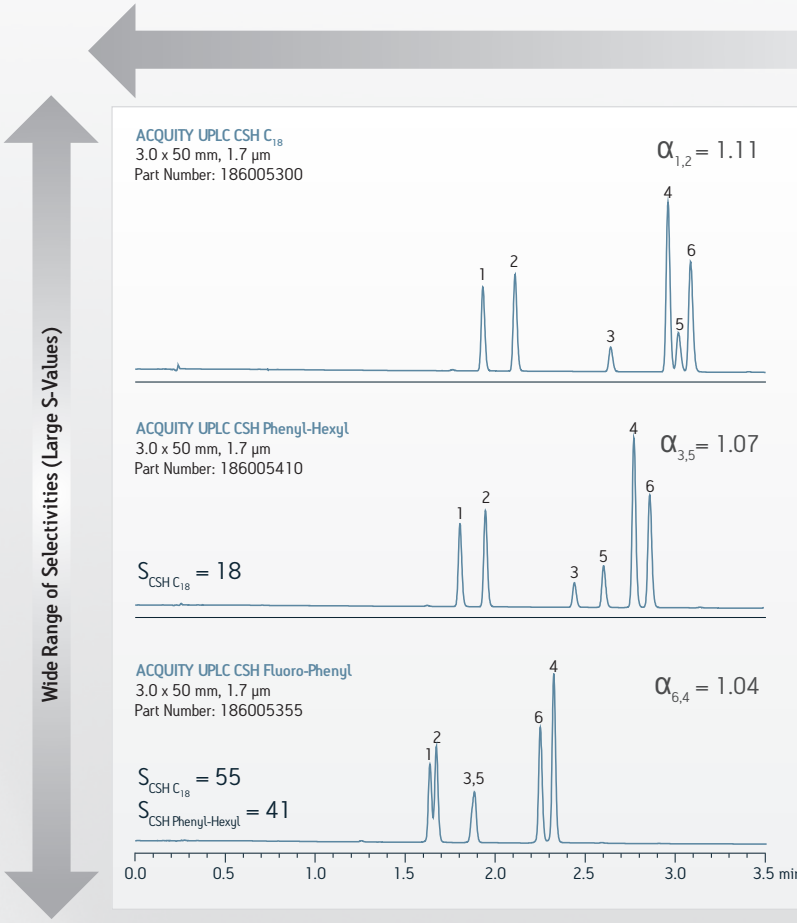
For more information about the Waters Reversed-Phase Column Selectivity Chart, visit

www.waters.com/selectivitychart

Method Development and Transferability

XSelect HPLC Columns offer method development scientists in all application areas the widest range of selectivities of any modern LC columns produced by Waters. This was accomplished without compromising such necessary performance attributes as superior peak shape for basic compounds, low column bleed, excellent batch-to-batch reproducibility, ultra-efficiencies and seamless transferability between different particle sizes and column formats.

Many chromatographic laboratories are now part of multi-national/ multi-site organizations that utilize LC systems from different vendors with varying LC platform configurations and detection modes. From a global business perspective, it is vital to be able to quickly and easily develop robust methods that are not only compatible with all modern chromatographic detection modes but are also transferable to laboratories and sites that may operate different LC system platforms. XSelect and ACQUITY UPLC® Columns, as part of the ACQUITY UPLC H-Class total system solution, were strategically created for the 21st-century global chromatographic marketplace.

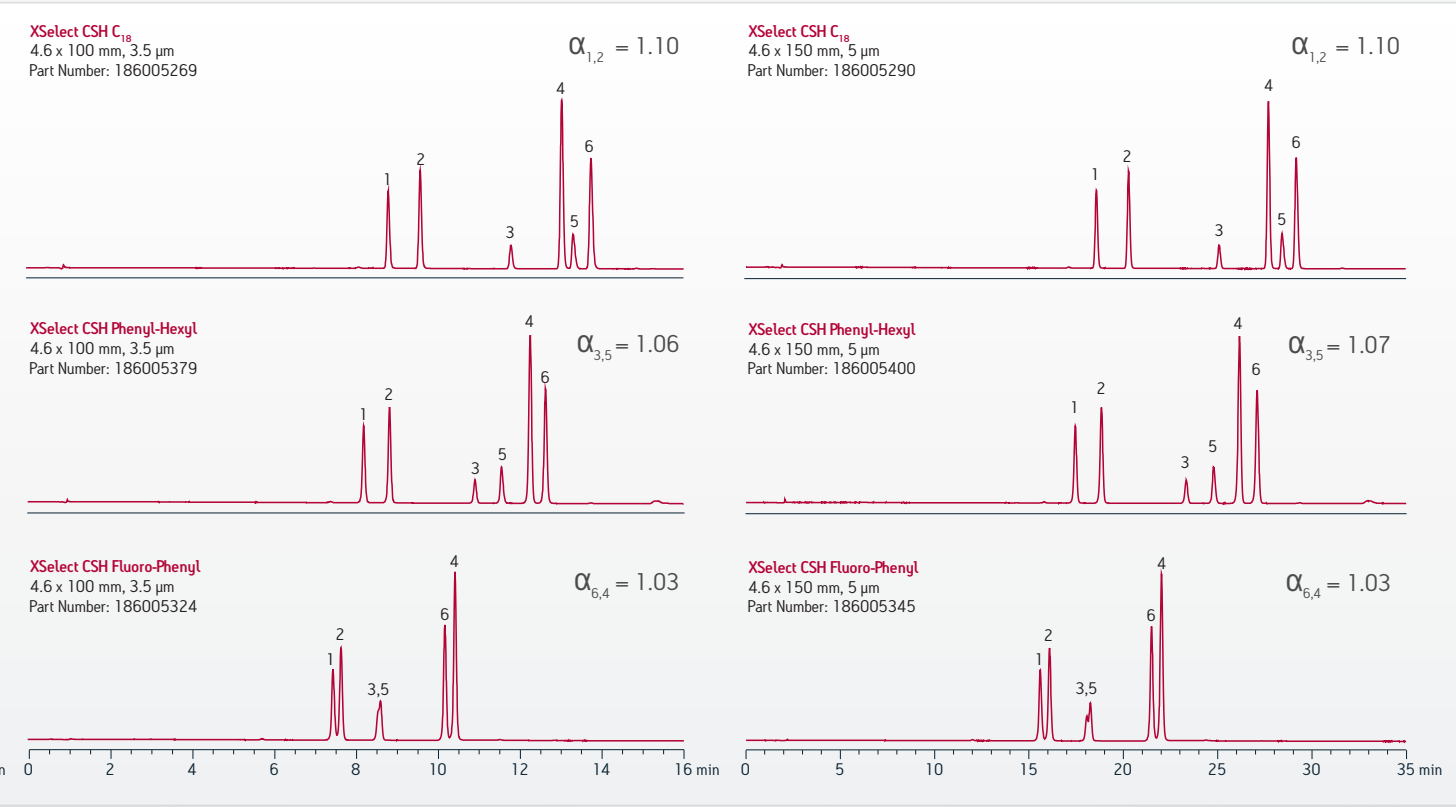


ACQUITY UPLC CSH and XSelect Columns offer not only a wide range of selectivity differences (large S-values), 3. Fenoprofen (10 µg/mL), 4. Indomethacin (10 µg/mL), 5. Ibuprofen (100 µg/mL), 6. Diclofenac (10 µg/mL).

The ACQUITY UPLC Columns Calculator can be downloaded from the ACQUITY UPLC Online Community at

www.waters.com/myuplc

Ease of Transferability (Identical α's Across Particle Sizes)



but also seamless and straightforward transferability (nearly identical α's) between UPLC, analytical HPLC and preparative HPLC particle and column configurations. Compounds: 1. Tolmetin (10 µg/mL), 2. Naproxen (10 µg/mL),

Reproducible Results

Uniquely-selective LC columns, such as fluorinated phases, have a poor reputation for column reproducibility and method stability. Method ruggedness is one of the most concerning issues for method developers. Reproducible stationary phases give the separation scientist chromatographic methods that are easily transferable across laboratories, independent of the LC system or detection method used.

Columns:	2.1 x 50 mm
Flow Rate:	0.5 mL/min
Mobile Phase A:	15.4 mM ammonium formate, pH 3.0
Mobile Phase B:	acetonitrile
Gradient:	5 to 90% B linear in 5 minutes
Injection Volume:	5 µL
Sample Diluent:	water
Sample Conc.:	imipramine: 0.5 mg/mL; amitriptyline: as indicated (% of imipramine)
Column Temp.:	30 °C
Detection:	UV @ 254 nm
Sampling Rate:	20 pts/sec
Filter Response:	normal
System:	ACQUITY UPLC with ACQUITY UPLC PDA Detector

Compounds:
1. Thiourea
2. Resorcinol
3. Metoprolol
4. 3-nitrophenol
5. 2-chlorobenzoic acid
6. Amitriptyline
7. Diethylphtalate
8. Fenoprofen
9. Dipropylphthalate.
10. Pyrenesulfonic acid

Reproducibility and scalability for gradient separations on 2.1 x 50 mm columns containing different batches of CSH Fluoro-Phenyl representing three (1.7, 3.5 and 5 µm) particle sizes.

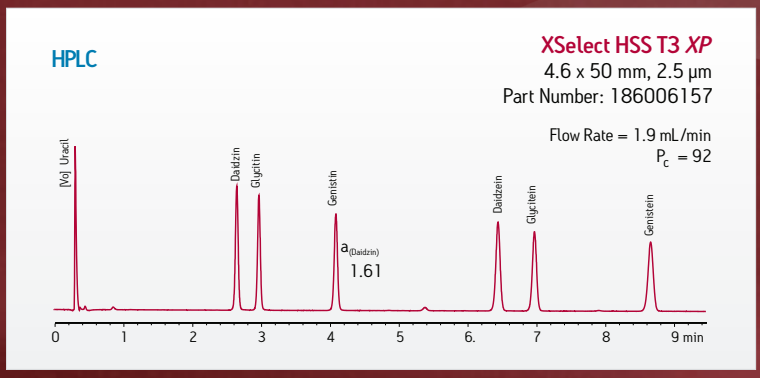
XSelect HPLC *XP* 2.5 µm Columns

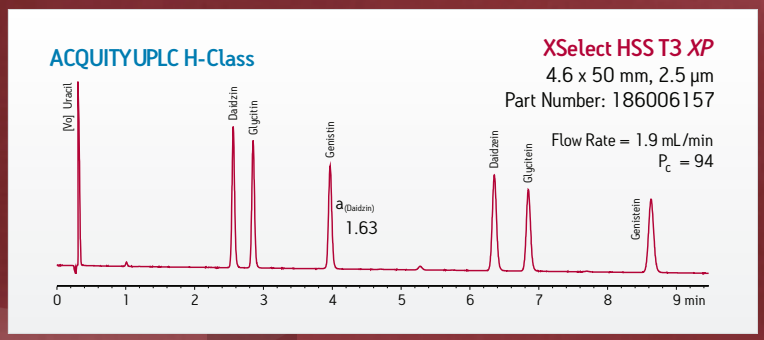
The availability of multiple particle sizes and dimensions allows the optimization of the total cycle time without sacrificing resolution. Methods can easily be transferred from HPLC to UPLC and from UPLC to HPLC. XSelect e*X*tended *P*erformance [*XP*] 2.5 µm Columns offer exceptional separation performance, robustness and throughput for HPLC assays while being fully compatible with all HPLC, UHPLC and UPLC Technology platforms.

Improve HPLC productivity 2-4X with unmatched selectivity and flexibility.

- Directly scalable to ACQUITY UPLC CSH 1.7 µm or ACQUITY UPLC HSS 1.8 µm Columns and larger XSelect HPLC 3.5/5 µm Columns.
- Designed to withstand higher pressures of 9000 psi (4.6 mm ID) and 18,000 psi (2.1 and 3.0 mm ID).
- Select column length (30, 50, 75 and 100 mm) for the correct balance between resolution and throughput.

COMPATIBLE WITH ANY LC PLATFORM



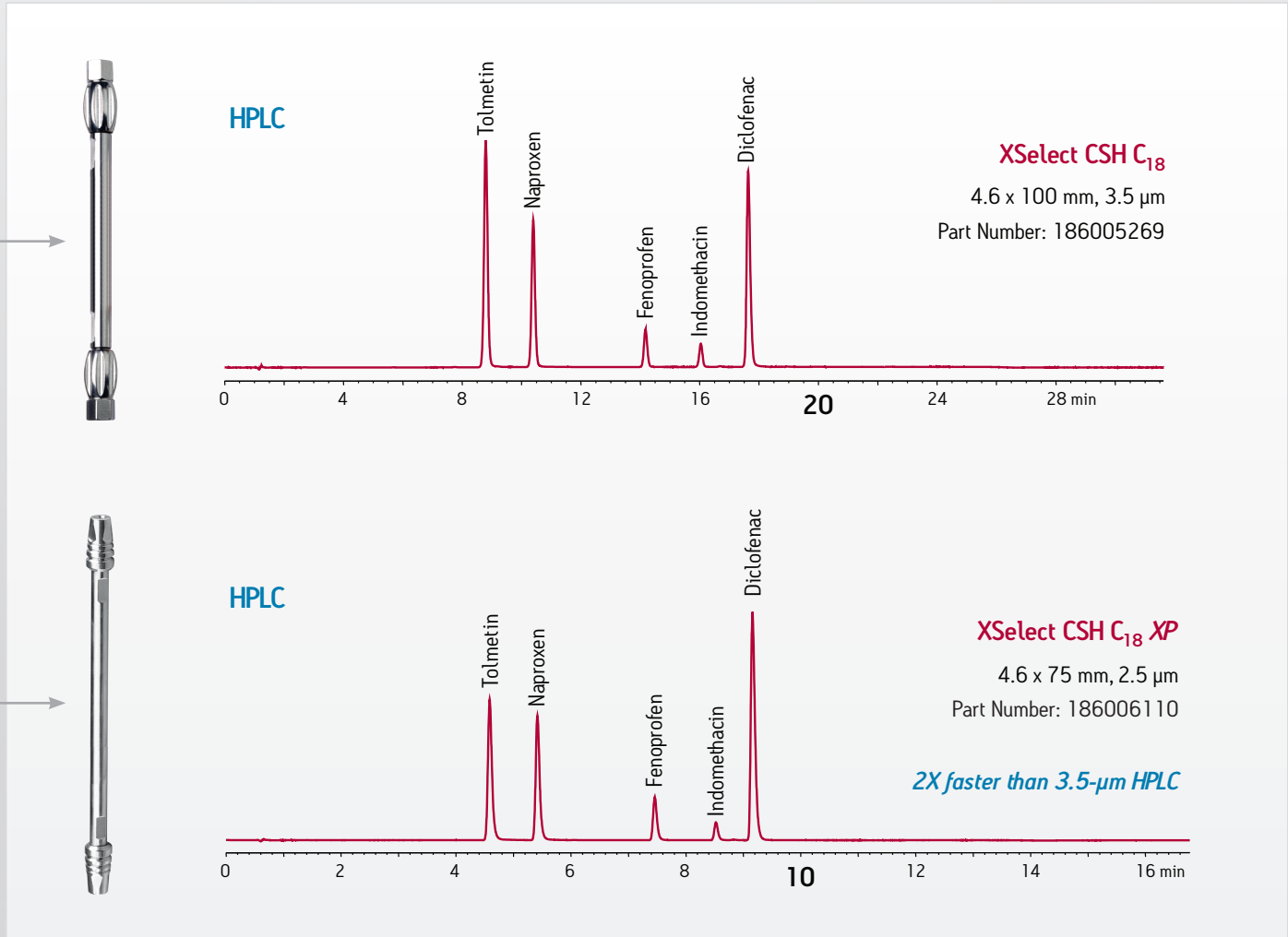


e*X*tended *P*erformance 2.5 µm Columns are compatible with HPLC, UHPLC and UPLC pressures, providing a great deal of flexibility when transferring methods between laboratories.

Extending Perfomance for HPLC

Reducing cost per analysis has led companies to look at new ways to maximize the productivity of their existing HPLC instrumentation. Developing LC methods that take advantage of smaller particle technologies (i.e., 2.5 µm) is one approach that laboratories use to increase throughput by reducing analysis time. For existing LC methods that routinely use 3.5- or 5-µm HPLC columns, transitioning to smaller particle columns is often misunderstood and is overlooked as an option. By maintaining a constant column length to particle size (L/dp) ratio, scaling LC methods for different particle sizes and column dimensions becomes a straightforward approach to streamlining laboratory throughput.

By maintaining the L/dp ratio between two columns of different dimension and particle size, the resolution between critical analyte pairs is maintained. When using XSelect HSS and CSH ***XP*** 2.5 µm Columns and hardware, shorter columns can be used to reduce runtime. The increased productivity and the savings through reduced solvent consumption can be significant.



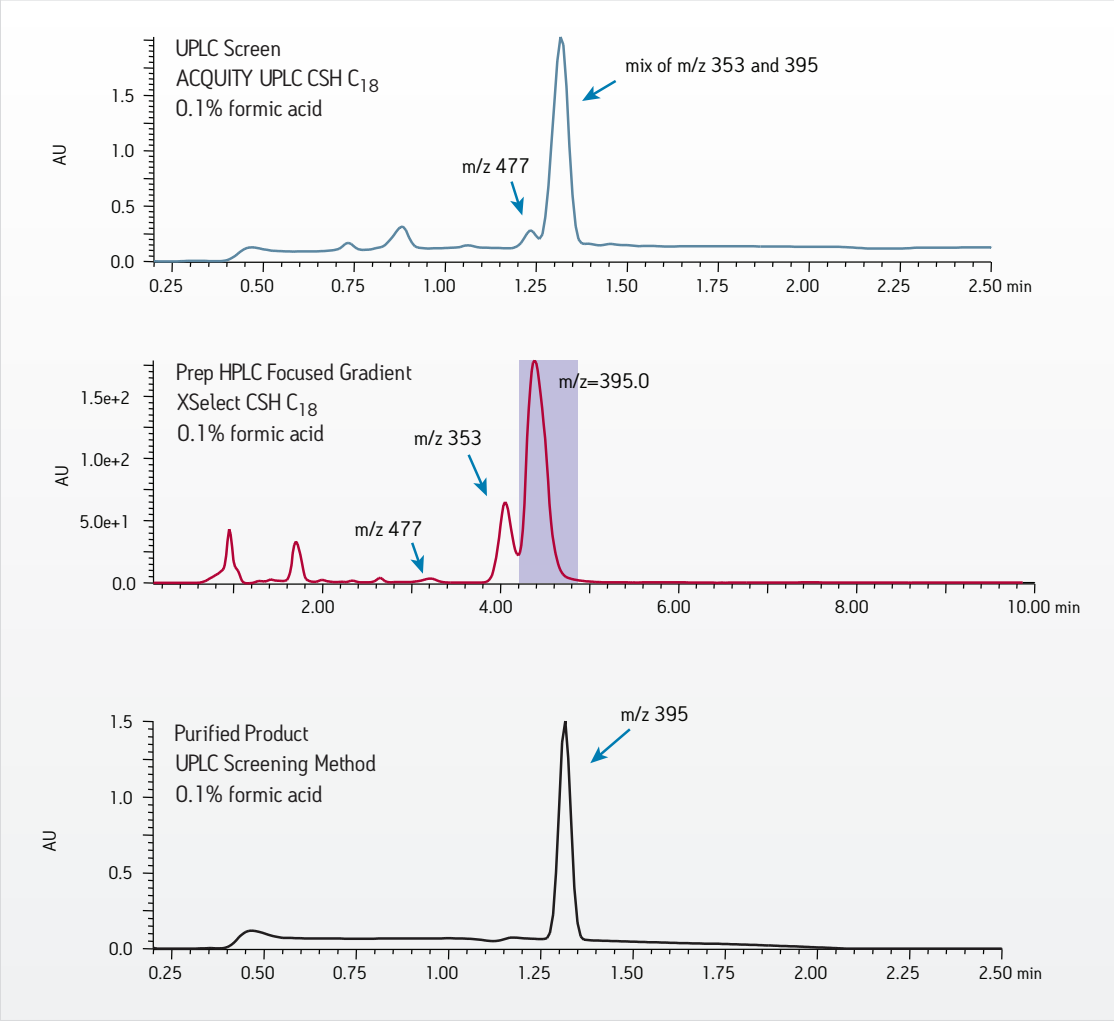
*An HPLC method scaled using an XSelect CSH C_{18} **XP** Column.*

Learn more about ***XP*** Columns, visit **www.waters.com** and reference 720004195EN.

XSelect OBD Columns: Designed for Isolation and Purification

The scalability and versatility of XSelect CSH Columns allow them to be used as powerful method development tools for the isolation and purification scientist. The hybrid materials used to create the CSH stationary phases are known industry-wide for being the most pressure-tolerant columns available. Rugged performance combined with OBD™ Packing Technology produces columns that have exceptional column lifetimes under a wide range of operating conditions. The scalability inherent in the column design allows the purification scientist to choose from larger to smaller and narrower preparative columns to reduce solvent consumption and fraction volumes.

As a product of the latest generation of hybrid particle technology, XSelect CSH Columns revolutionized preparative separations. Achieving high-mass-load separations using conventional preparative columns is challenging. Many separations rely on ion-pairing mobile phases to achieve the narrowest possible peak shape for basic compound isolation. This imposes limitations on the preparative assay because the scientist now has to remove non-volatile buffers and salts from the collected fractions thus increasing time and cost.

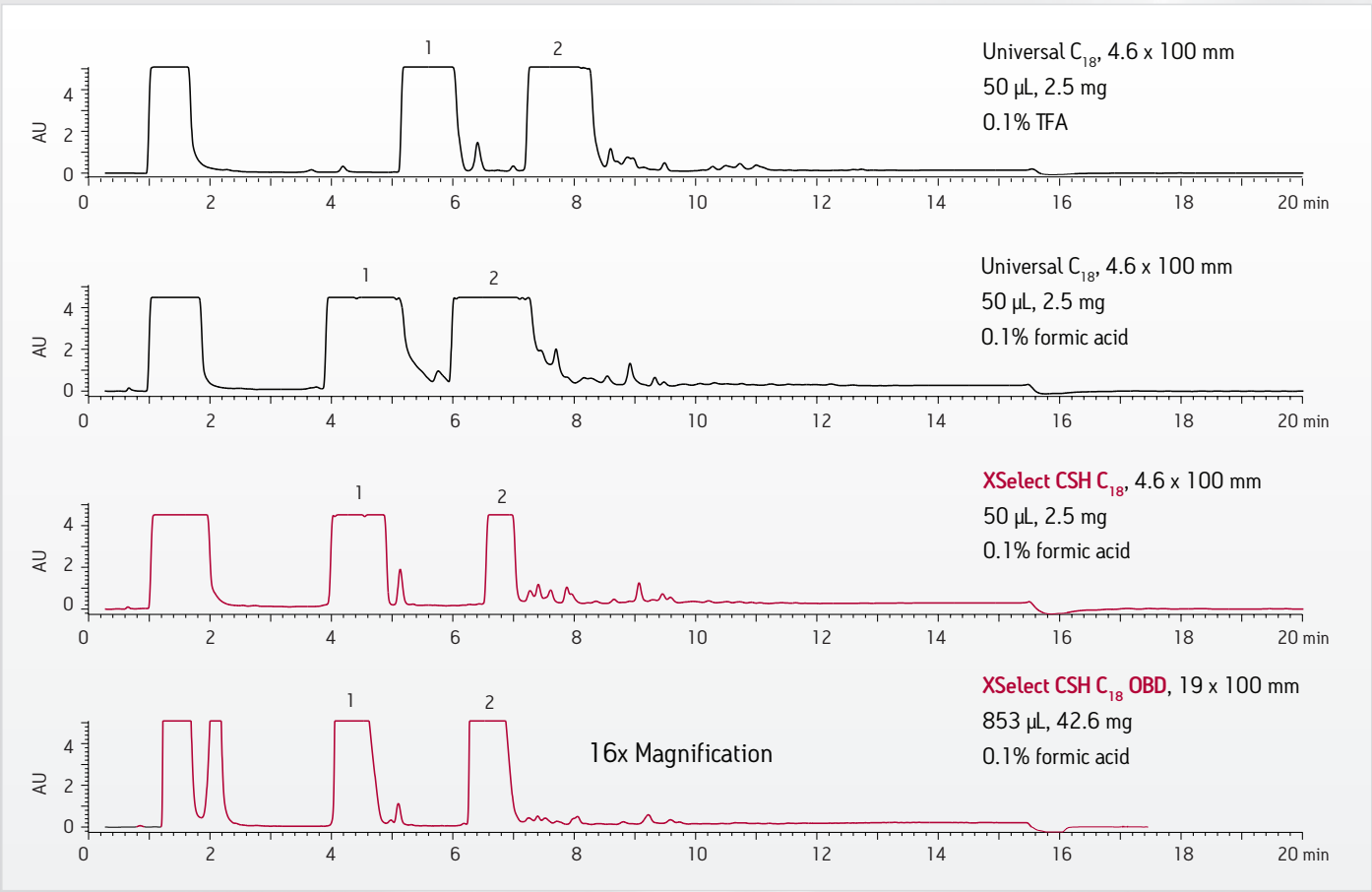


CSH Technology maintains separation performance under increased mass loading conditions. A narrower target analyte peak maintains the chromatographic space needed to isolate and separate it from any closely-eluting, trace-level impurities or degradants. This example demonstrates the resolution advantages of using a focused gradient with an XSelect CSH C_{18} Preparative Column.

Formic Acid Versus TFA as a Mobile-Phase Additive

Trifluoroacetic acid (TFA) is commonly used as a mobile-phase additive to increase preparative loading by improving the chromatographic peak shape for basic compounds. However, its use as an ion-pairing agent has chromatographic limitations. One well known issue is that once a column is exposed to a TFA-containing mobile phase (i.e., when used for screening chromatographic conditions), the residual TFA is very difficult to completely remove from the stationary phase after the mobile-phase switch. A benefit of CSH Technology is the ability to rapidly screen and equilibrate the column without the lingering chromatographic effects of previous mobile-phase additive exposure.

For mass directed purification, formic acid is often preferred as the mobile-phase additive because of compatibility with MS detection and it is easier to remove during post-purification compared to TFA. Mobile phases with formic acid do not suffer the same lingering effects as those mobile phases that contain TFA. Chromatographic reproducibility improves, but usually at the expense of analyte mass load. The development of a new particle technology removes these limitations to maintain chromatographic peak shape and mass load when using formic acid mobile phases.



A preparative loading study using diphenhydramine (peak 1) and terfenadine (peak 2) comparing TFA and formic acid. Chromatograms 1 and 2 compare the effects of TFA and formic acid mobile phases using a universal C_{18} column. Even though both results indicate mass overload, there is significantly more peak shape deterioration using the formic acid mobile-phase conditions. However, when the conventional column is compared to the XSelect CSH C_{18} Column (chromatograms 2 and 3) using 0.1% formic acid mobile phase, the chromatographic peak shape improves significantly. The results of this loading study were scaled to the preparative separation using an XSelect CSH C_{18} OBD 19 x 100 mm Column (chromatogram 4).

Learn more about Preparative OBD Columns, visit **www.waters.com** and reference 720002336EN.

Ordering Information

XSelect Analytical Columns

Dimension	Type	Particle Size	Qty.	CSH C_{18}	CSH Fluoro-Phenyl	CSH Phenyl-Hexyl	HSS C_{18}	HSS C_{18} SB	HSS T3	HSS PFP	HSS CN
2.1 x 30 mm *XP*	Column	2.5 µm	1/pk	186006100	186006112	186006124	186006136	186006160	186006148	186006172	186006184
2.1 x 30 mm *XP*	Column	2.5 µm	3/pk	176002594	176002602	176002610	176002618	176002634	176002626	176002642	176002650
2.1 x 50 mm *XP*	Column	2.5 µm	1/pk	186006101	186006113	186006125	186006137	186006161	186006149	186006173	186006185
2.1 x 50 mm *XP*	Column	2.5 µm	3/pk	176002595	176002603	176002611	176002619	176002635	176002627	176002643	176002651
2.1 x 75 mm *XP*	Column	2.5 µm	1/pk	186006102	186006114	186006126	186006138	186006162	186006150	186006174	186006186
2.1 x 75 mm *XP*	Column	2.5 µm	3/pk	176002596	176002604	176002612	176002620	176002636	176002628	176002644	176002652
2.1 x 100 mm *XP*	Column	2.5 µm	1/pk	186006103	186006115	186006127	186006139	186006163	186006151	186006175	186006187
2.1 x 100 mm *XP*	Column	2.5 µm	3/pk	176002597	176002605	176002613	176002621	176002637	176002629	176002645	176002653
3.0 x 30 mm *XP*	Column	2.5 µm	1/pk	186006104	186006116	186006128	186006140	186006164	186006152	186006176	186006188
3.0 x 30 mm *XP*	Column	2.5 µm	3/pk	176002598	176002606	176002614	176002622	176002638	176002630	176002646	176002654
3.0 x 50 mm *XP*	Column	2.5 µm	1/pk	186006105	186006117	186006129	186006141	186006165	186006153	186006177	186006189
3.0 x 50 mm *XP*	Column	2.5 µm	3/pk	176002599	176002607	176002615	176002623	176002639	176002631	176002647	176002655
3.0 x 75 mm *XP*	Column	2.5 µm	1/pk	186006106	186006118	186006130	186006142	186006166	186006154	186006178	186006190
3.0 x 75 mm *XP*	Column	2.5 µm	3/pk	176002600	176002608	176002616	176002624	176002640	176002632	176002648	176002656
3.0 x 100 mm *XP*	Column	2.5 µm	1/pk	186006107	186006119	186006131	186006143	186006167	186006155	186006179	186006191
3.0 x 100 mm *XP*	Column	2.5 µm	3/pk	176002601	176002609	176002617	176002625	176002641	176002633	176002649	176002657
4.6 x 30 mm *XP*	Column	2.5 µm	1/pk	186006108	186006120	186006132	186006144	186006168	186006156	186006180	186006192
4.6 x 50 mm *XP*	Column	2.5 µm	1/pk	186006109	186006121	186006133	186006145	186006169	186006157	186006181	186006193
4.6 x 75 mm *XP*	Column	2.5 µm	1/pk	186006110	186006122	186006134	186006146	186006170	186006158	186006182	186006194
4.6 x 100 mm *XP*	Column	2.5 µm	1/pk	186006111	186006123	186006135	186006147	186006171	186006159	186006183	186006195
1.0 x 50 mm	Column	3.5 µm	1/pk	186005249	186005304	186005359	186006376	186006417	186006458	186005842	186005901
1.0 x 100 mm	Column	3.5 µm	1/pk	186005250	186005305	186005360	186006377	186006418	186006459	186005843	186005903
1.0 x 150 mm	Column	3.5 µm	1/pk	186005251	186005306	186005361	186006378	186006419	186006460	186005844	186005904
2.1 x 10 mm	Guard	3.5 µm	2/pk	186005252[3]	186005307[3]	186005362[3]	186006388[3]	186006429[3]	186006470[3]	186005864[3]	186005924[3]
2.1 x 20 mm *IS*™	Column	3.5 µm	1/pk	186005253	186005308	186005363	186006379	186006420	186006461	186005845	186005905
2.1 x 30 mm	Column	3.5 µm	1/pk	186005254	186005309	186005364	186006380	186006421	186006462	186005846	186005906
2.1 x 50 mm	Column	3.5 µm	1/pk	186005255	186005310	186005365	186006381	186006422	186006463	186005847	186005907
2.1 x 75 mm	Column	3.5 µm	1/pk	186005644	186005646	186005645	186006383	186006424	186006465	186005849	186005909
2.1 x 100 mm	Column	3.5 µm	1/pk	186005256	186005311	186005366	186006382	186006423	186006464	186005848	186005908
2.1 x 150 mm	Column	3.5 µm	1/pk	186005257	186005312	186005367	186006384	186006425	186006466	186005850	186005910
3.0 x 20 mm	Guard	3.5 µm	2/pk	186005258[4]	186005313[4]	186005368[4]	186004764[4]	186004745[4]	186004782[4]	186005865[4]	186005925[4]
3.0 x 20 mm *IS*	Column	3.5 µm	1/pk	186005259	186005314	186005369	186006385	186006426	186006467	186005851	186005911
3.0 x 30 mm	Column	3.5 µm	1/pk	186005260	186005315	186005370	186004765	186004746	186004783	186005852	186005912
3.0 x 50 mm	Column	3.5 µm	1/pk	186005261	186005316	186005371	186004766	186004747	186004784	186005853	186005913
3.0 x 75 mm	Column	3.5 µm	1/pk	186005647	186005649	186005648	186005642	186005643	176005641	186005854	186005914
3.0 x 100 mm	Column	3.5 µm	1/pk	186005262	186005317	186005372	186004762	186004743	186004780	186005855	186005915
3.0 x 150 mm	Column	3.5 µm	1/pk	186005263	186005318	186005373	186004763	186004744	186004781	186005856	186005916
4.6 x 20 mm	Guard	3.5 µm	2/pk	186005264[4]	186005319[4]	186005374[4]	186004769[4]	186004750[4]	186004787[4]	186005866[4]	186005926[4]
4.6 x 20 mm *IS*	Column	3.5 µm	1/pk	186005265	186005320	186005375	186006386	186006427	186006468	186005857	186005917
4.6 x 30 mm	Column	3.5 µm	1/pk	186005266	186005321	186005376	186004771	186004752	186004789	186005858	186005918
4.6 x 50 mm	Column	3.5 µm	1/pk	186005267	186005322	186005377	186004772	186004753	186004790	186005859	186005919
4.6 x 75 mm	Column	3.5 µm	1/pk	186005268	186005323	186005378	186006387	186006428	186006469	186005860	186005920
4.6 x 100 mm	Column	3.5 µm	1/pk	186005269	186005324	186005379	186004767	186004748	186004785	186005861	186005921
4.6 x 150 mm	Column	3.5 µm	1/pk	186005270	186005325	186005380	186004768	186004749	186004786	186005862	186005922
4.6 x 250 mm	Column	3.5 µm	1/pk	—	—	—	186004770	186004751	186004788	186005863	186005923
2.1 x 10 mm	Guard	5 µm	2/pk	186005271[3]	186005326[3]	186005381[3]	186006404[3]	186006445[3]	186006486[3]	186005887[3]	186005947[3]
2.1 x 20 mm *IS*	Column	5 µm	1/pk	186005272	186005327	186005382	186006389	186006430	186006471	186005867	186005927
2.1 x 30 mm	Column	5 µm	1/pk	186005273	186005328	186005383	186006390	186006431	186006472	186005868	186005928
2.1 x 50 mm	Column	5 µm	1/pk	186005274	186005329	186005384	186006391	186006432	186006473	186005869	186005929
2.1 x 100 mm	Column	5 µm	1/pk	186005275	186005330	186005385	186006392	186006433	186006474	186005871	186005931
2.1 x 150 mm	Column	5 µm	1/pk	186005276	186005331	186005386	186006393	186006434	186006475	186005872	186005932
3.0 x 20 mm	Guard	5 µm	2/pk	186005277[4]	186005332[4]	186005387[4]	186006405[4]	186006446[4]	186006487[4]	186005888[4]	186005948[4]
3.0 x 20 mm *IS*	Column	5 µm	1/pk	186005278	186005333	186005388	186006394	186006435	186006476	186005873	186005933
3.0 x 30 mm	Column	5 µm	1/pk	186005279	186005334	186005389	186006395	186006436	186006477	186005874	186005934
3.0 x 50 mm	Column	5 µm	1/pk	186005280	186005335	186005390	186006396	186006437	186006478	186005875	186005935
3.0 x 100 mm	Column	5 µm	1/pk	186005281	186005336	186005391	186006397	186006438	186006479	186005877	186005937
3.0 x 150 mm	Column	5 µm	1/pk	186005282	186005337	186005392	186006398	186006439	186006480	186005878	186005938
3.0 x 250 mm	Column	5 µm	1/pk	186005283	186005338	186005393	186006399	186006440	186006481	186005879	186005939

[3] Requires 2.1 x 10 mm Universal Sentry Guard Holder, Part No. WAT097958

[4] Requires 3.0 x 20 mm/4.6 x 20 mm Universal Sentry Guard Holder, Part No. WAT046910

XSelect Analytical Columns

Dimension	Type	Particle Size	Qty.	CSH C_{18}	CSH Fluoro-Phenyl	CSH Phenyl-Hexyl	HSS C_{18}	HSS C_{18} SB	HSS T3	HSS PFP	HSS CN
4.6 x 20 mm	Guard	5 µm	2/pk	186005285[4]	186005340[4]	186005395[4]	186004774[4]	186004755[4]	186004792[4]	186005889[4]	186005949[4]
4.6 x 20 mm *IS*	Column	5 µm	1/pk	186005284	186005339	186005394	186006400	186006441	186006482	186005880	186005940
4.6 x 30 mm	Column	5 µm	1/pk	186005286	186005341	186005396	186006401	186006442	186006483	186005881	186005941
4.6 x 50 mm	Column	5 µm	1/pk	186005287	186005342	186005397	186004852	186004757	186004794	186005882	186005942
4.6 x 75 mm	Column	5 µm	1/pk	186005288	186005343	186005398	186006402	186006443	186006484	186005883	186005943
4.6 x 100 mm	Column	5 µm	1/pk	186005289	186005344	186005399	186006403	186006444	186006485	186005884	186005944
4.6 x 150 mm	Column	5 µm	1/pk	186005290	186005345	186005400	186004773	186004754	186004791	186005885	186005945
4.6 x 250 mm	Column	5 µm	1/pk	186005291	186005346	186005401	186004775	186004756	186004793	186005886	186005946

[3] Requires 2.1 x 10 mm Universal Sentry Guard Holder, Part No. WAT097958

[4] Requires 3.0 x 20 mm/4.6 x 20 mm Universal Sentry Guard Holder, Part No. WAT046910

XSelect Preparative Columns

Dimension	Type	Particle Size	CSH C_{18}	CSH Fluoro-Phenyl	CSH Phenyl-Hexyl	HSS C_{18}	HSS C_{18} SB	HSS T3	HSS PFP	HSS CN
10 x 10 mm	Guard	5 µm	186005491[1]	186005498[1]	186005505[1]	186004776[1]	186004758[1]	186004795[1]	—	—
10 x 50 mm	Column	5 µm	186005414	186005427	186005440	186004778	186004760	186004797	—	—
10 x 100 mm	Column	5 µm	186005415	186005428	186005441	186004779	186004761	186004798	—	—
10 x 150 mm	Column	5 µm	186005416	186005429	186005442	186004777	186004759	186004796	—	—
10 x 250 mm	Column	5 µm	186005417	186005430	186005443	—	—	—	—	—
19 x 10 mm	Guard	5 µm	186005418[2]	186005431[2]	186005444[2]	—	—	—	—	—
OBD 19 x 50 mm	Column	5 µm	186005420	186005433	186005446	—	—	—	—	—
OBD 19 x 100 mm	Column	5 µm	186005421	186005434	186005447	—	—	—	—	—
OBD 19 x 150 mm	Column	5 µm	186005422	186005435	186005448	—	—	—	—	—
OBD 19 x 250 mm	Column	5 µm	186005492	186005499	186005506	—	—	—	—	—
OBD 30 x 50 mm	Column	5 µm	186005423	186005436	186005520	—	—	—	—	—
OBD 30 x 75 mm	Column	5 µm	186005424	186005437	186005450	—	—	—	—	—
OBD 30 x 100 mm	Column	5 µm	186005425	186005438	186005451	—	—	—	—	—
OBD 30 x 150 mm	Column	5 µm	186005426	186005439	186005452	—	—	—	—	—
OBD 30 x 250 mm	Column	5 µm	186005493	186005500	186005507	—	—	—	—	—
OBD 50 x 50 mm	Column	5 µm	186005494	186005501	186005508	—	—	—	—	—
OBD 50 x 100 mm	Column	5 µm	186005495	186005502	186005509	—	—	—	—	—
OBD 50 x 150 mm	Column	5 µm	186005496	186005503	186005510	—	—	—	—	—
OBD 50 x 250 mm	Column	5 µm	186005497	186005504	186005511	—	—	—	—	—

[1] Requires 10 x 10 mm Prep Guard Holder, Part No. 289000779

[2] Requires 19 x 10 mm Prep Guard Holder, Part No. 186000709

XSelect Column Method Validaton Kits— Each Method Validation Kit contains 3 columns, each from a different batch.

Dimension	Particle Size	CSH C_{18}	CSH Fluoro-Phenyl	CSH Phenyl-Hexyl	HSS C_{18}	HSS C_{18} SB	HSS T3	HSS PFP	HSS CN
2.1 x 100 mm	3.5 µm	186005538	186005549	186005560	186006406	186006447	186006488	Custom	186005950
3.0 x 100 mm	3.5 µm	186005539	186005550	186005561	186006407	186006448	186006489	Custom	186005951
3.0 x 150 mm	3.5 µm	186005540	186005551	186005562	186006408	186006449	186006490	Custom	186005952
4.6 x 100 mm	3.5 µm	186005541	186005552	186005563	186006409	186006450	186006491	Custom	186005953
4.6 x 150 mm	3.5 µm	186005542	186005553	186005564	186006410	186006451	186006492	Custom	186005954
2.1 x 150 mm	5 µm	186005543	186005554	186005565	186006411	186006452	186006493	Custom	186005955
3.0 x 100 mm	5 µm	186005544	186005555	186005566	186006412	186006453	186006494	Custom	186005956
3.0 x 150 mm	5 µm	186005545	186005556	186005567	186006413	186006454	186006495	Custom	186005957
4.6 x 100 mm	5 µm	186005546	186005557	186005568	186006414	186006455	186006496	Custom	186005958
4.6 x 150 mm	5 µm	186005547	186005558	186005569	186006415	186006456	186006497	Custom	186005959
4.6 x 250 mm	5 µm	186005548	186005559	186005570	186006416	186006457	186006498	Custom	186005960

VanGuard™ Pre-Column 3 Pack (Guard Columns)

Chemistry	Particle Size	Dimension	Part No. 3 Pack
XSelect CSH C_{18}	2.5 µm	2.1 x 5 mm	186006297
XSelect CSH Fluoro-Phenyl	2.5 µm	2.1 x 5 mm	186006298
XSelect CSH Phenyl-Hexyl	2.5 µm	2.1 x 5 mm	186006299
XSelect HSS T3	2.5 µm	2.1 x 5 mm	186006301
XSelect HSS C_{18}	2.5 µm	2.1 x 5 mm	186006300
XSelect HSS C_{18} SB	2.5 µm	2.1 x 5 mm	186006302
XSelect HSS Cyano	2.5 µm	2.1 x 5 mm	186006304
XSelect HSS PFP	2.5 µm	2.1 x 5 mm	186006303

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Finland 358 9 5659 6288
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Hong Kong 852 2964 1800
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