A Simple Guide to Improving Column Lifetime

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Introduction

Poor column lifetime is usually caused by non-volatile or caustic contaminants in the sample damaging the first 4 - 6" of the column. Cutting off the damage portion will usually restore the column performance, but over time performance will degrade to a point where the column can no longer be used. If you are experiencing rapid degradation of column performance, there are several simple ways to help protect your column and increase lifetime.

Liners

The liner is the first line of defense for your column and the style you choose can make a big difference in how much contamination gets onto your column. The easiest thing you can do is to add a small amount of silanized glass wool to a liner, which traps the non-volatile compounds and prevents them from entering the column. Glass wool will also help catch pieces of your septa that result after repeated injections.

Caution: glass wool can also add activity for acids, bases, and pesticides. Activity is the result of free silanol (-OH) groups on the surface of the glass wool that form even after it has been deactivated. Crushing the glass wool can lead to increased activity, so it is recommended to purchase pre-packed liners, rather than try to pack your own.

Here are some liners that are available pre-packed with glass wool:

GC Model No.	Dimensions IDxLxOD (mm)	Material* (deactivated)	Quartz Wool (Y / N)	Mfr. No.	Part No.	Unit
Split/Splitless						
5880/5890/6890	4 x 78.5 x 6.3	B (y)	Y	092002	AG0-7515	5/pk
				092219	AG0-7582	25/pk
Split/Splitless, Recessed Gooseneck Liner						
5880/5890/6890	4 x 78.5 x 6.3	B (y)	Y	5181-3316	AG0-4661	5/pk
					AG0-4662	25/pk
Cup Splitter/Split Liner						
5880/5890/6890	4 x 78.5 x 6.3	B (n)	N	HP 18740-80190;	AG0-4647	5/pk
				5183-4699	AG0-4648	25/pk
Cup Splitter/Split Liner						
Autosystem	3.5 x 100 x 5	B (n)	N	0330-5181	AG0-4663	5/pk
Split/Splitless Single Taper/Gooseneck Liner						
5880/5890/6890	4 x 78.5 x 6.3	B (y)	Y	5062-3587;	AG0-4657	5/pk
				5183-4693;	AG0-4658	25/pk
				5183-4694		

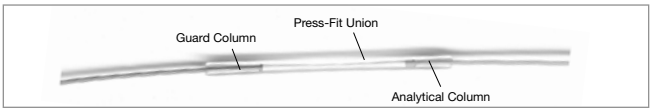
** B = Borosilicate; Deactivated = Yes (y) or No (n)*

Guard Columns – Standard Guards

Z-Guard columns are 5 or 10m pieces of deactivated tubing that are connected to an analytical column using a glass press-fit connector (Figure 1). The tubing acts like a trap for non-volatile residues that would otherwise damage the stationary phase of your analytical column. Since there is no stationary phase in the Z-Guard, cutting the column does not significantly affect retention times or chromatographic separation. Additional Z-Guards may be attached as necessary, as long as the analytical column is still providing good separation.

Since guard columns can also be a source of activity, each Z-Guard is individually QC tested to ensure it is completely deactivated. This added level of quality ensures that you will get the best performance

Figure 1. Z-Guard connection using press-fit union

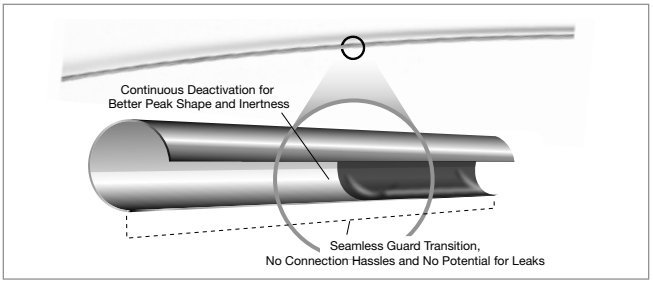


Guardian™ Integrated Guard Columns

Guardian™ columns have the 5m or 10m guard built directly into the analytical column in one continuous length of tubing (Figure 2). Unlike traditional guard columns, there is no mechanical connection between the guard and the analytical column. Each Guardian™ column undergoes a special deactivation and QC-testing procedure that ensures good performance for acids, bases, and other sensitive compounds. **The result: all the benefits of a guard column without the possibility of leaks or activity resulting from a faulty connection.**

The Guardian™ system is the ideal solution to all the problems associated with traditional guard columns!

Figure 2. Representation of a Guardian™ column



Column Bake Out

The easiest way to reduce column contamination is to add a short, high temperature bake out at the end of your standard GC method. This bake out helps remove high boiling contaminants that would otherwise remain in the column and cause damage. If adding a bake out significantly increases the method run time, a separate high temperature cleaning program can be run after every 10 injections or so.

The temperature used for bake out has a direct impact on the amount of contaminants removed. Using columns with higher upper temperature limits will increase your ability to remove unwanted contaminants. For example, the Zebron ZB-5 30meter x 0.25mm x 0.25µm column can sustain temperature programs up to 370°C, which is 20°C higher than our ZB-5ms column of similar dimension. Check the upper temperature limit of the column you currently use. If you think a high temperature bake out could improve your column life, consider using a phase with increased thermal stability.

You can also apply this thought process to the column phase you choose when developing a method. For example, many pesticide applications are done on polar phases such as a Zebron ZB-1701 (14%-cyanopropylphenyl-86%-dimethylpolysiloxane), which has an upper temperature limit of 300°C. In some cases, these same methods can be done on alternate phases such as the Zebron ZB-35 (35%-phenyl–65%-dimethylpolysiloxane), which has an upper temperature limit of 360°C.