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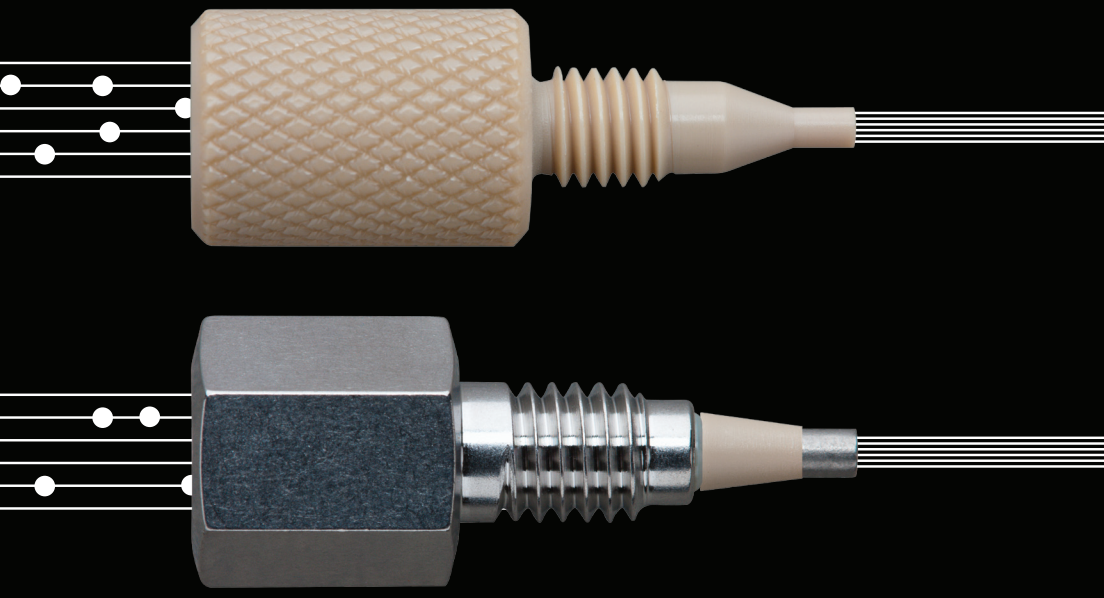
Pre-Column Filters



Protect your HPLC and UHPLC/UPLC® Columns!

Over 70% of the failures of HPLC columns are caused by inlet frit plugging.

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Pre-Column Filters

One of the most common causes of HPLC column failure is particulate material collecting on the inlet frit of the column, causing high back pressure and/or distortion of peak shape. By one estimate, over 70% of the failures of HPLC columns are caused by inlet frit plugging. UHPLC columns, especially those packed with sub-2 µm size particles, are particularly vulnerable to inlet frit plugging.

MAC-MOD Analytical offers two different pre-column filters, one for HPLC and one for UHPLC.

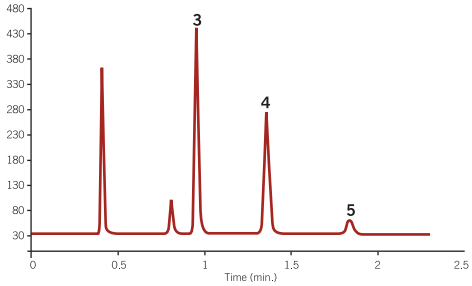
UltraShield | UltraShield WW | UltraShield WP

Pre-column filters for UHPLC and UPLC columns

UltraShield pre-column filters are designed and manufactured specifically for use in fast, high efficiency separations. The ultralow dispersion of UltraShield filters (1 µL swept volume) allows you to maintain efficiency and peak shape for your analytes while protecting your valuable UHPLC column from particulates.

The following chromatograms and results demonstrate the minimal impact on column performance from the use of an UltraShield filter in front of a 4.6 x 50 mm, 2.7 µm HALO C18 column under isocratic conditions.

Without Ultrashield



With UltraShield installed on UHPLC column

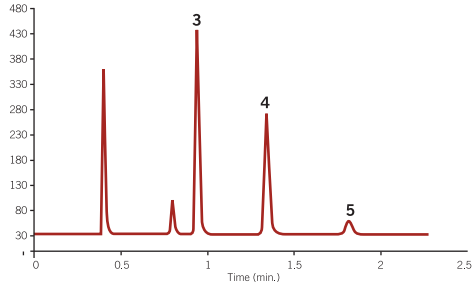


Table 1 Comparison of Efficiencies with and without UltraShield Filters

	Peak 3	Peak 4	Peak 5
	k=1.9	k=2.4	k=3.6
Plate Count without UltraShield	10542	11459	10796
Plate Count with UltraShield	10307	11457	10784
% Change with UltraShield	-2.2%	-0.02%	-0.1%

The results from a similar experiment using a narrow bore 2.1 x 50 mm, 2.7 µm HALO C18 column showed a small change in efficiency and USP Tailing Factor with UltraShield compared to that without the filter (Table 2).

Table 2 Minimal Change in Performance with UltraShield

Column	% of Original Efficiency	% Increase in USP Tailing Factor
2.1 x 50 mm, 2.7 µm	93%	7%

Note: Analyte k was 6.6, and efficiency and USP tailing factors were the average of multiple measurements for 5 different UltraShield filters.

UltraShield filters are now available in several different formats (thread depth combinations) for different instrumentation and column brands. See Table 3 below for more information.

Table 3 UltraShield Filter Formats

UltraShield Filter	Instrument Brand	Column Brand
UltraShield [1]	Agilent, Shimadzu, Thermo, Dionex, Hitachi, etc.	Other than Waters
UltraShield WW [2]	Waters UPLC	Waters
UltraShield WP [3]	Waters UPLC	Other than Waters

[1] Inlet and outlet thread depths compatible with all instruments and columns other than Waters.

[2] Both inlet and outlet thread depths are for Waters' instruments and columns.

[3] Inlet end is Waters' thread depth for UPLC systems, Outlet is standard thread depth.

UltraShield | UltraShield WW | UltraShield WP

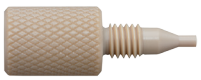
Pre-column filters for UHPLC and UPLC columns

"Connect Your Column/Protect Your Column"

The two new options for UltraShield filters allow you to not only protect your column from harmful particulates, but also make it easier for you to connect your particular brand and type of UHPLC column to a given system.

UltraShield WW filters are the choice for Waters' UPLC columns with Waters' UPLC systems; UltraShield WP filters are designed for all other column brands on UPLC systems.

Note: UPLC refers specifically to Waters Acquity columns and instrumentation.



ColumnShield

Low dispersion pre-column filters for HPLC columns

ColumnShield pre-column filters (1 µL swept volume) are ideal for all HPLC columns (2.1, 3.0 and 4.6 mm ID) and can be used safely up to pressures of 400 bar (6,000 psi), where finger-tight fittings are applicable.

ColumnShield filters, with their 0.5 µm porosity titanium frits, are routinely used for both LC and LC-MS applications. They utilize a PEEK (polyetheretherketone) design, which connects directly to any 1/16", 10-32 internal thread inlet port regardless of column brand. ColumnShield filters can also be used on the inlets of guard columns to extend their life and reduce replacement costs of those items.

To evaluate the dispersion associated with ColumnShield filters, isocratic separations of a mixture of substituted aromatic compounds (benzyl alcohol, benzonitrile, nitrobenzene, anisole and 1-chloronitrobenzene) were performed with and without filters using a 4.6 x 50 mm, 2.7 µm HALO C18 column with CH_3CN/water mobile phase at 2.0 mL/min. Minimal effects on efficiency were observed (Table 4), except for very early-eluting benzyl alcohol (k = 0.65).

Table 4 ColumnShield Filters Have Minimal Impact of Efficiency

	benzyl alcohol	benzonitrile	nitrobenzene	anisole	1-C1-NO2-benzene
	k=0.65	**k=1.9**	**k=2.5**	**k=3.1**	**k=4.3**
Plate Count without ColumnShield	8403	9341	9583	9219	9010
Plate Count with ColumnShield	7603	9244	9376	9171	9008
% Change with ColumnShield	-9.5%	-1.0%	-2.2%	-0.5%	-0.03%

Pre-column Filter Selection Chart

Maximum Pressure	HPLC/UHPLC Column ID	HPLC/UHPLC Column Length	Pre-column Filter
1000 bar	1.0 to 4.6 mm	30 to 250 mm	UltraShield, WW, WP
400 bar	1.0 to 4.6 mm	50 to 250 mm	ColumnShield

Ordering Information

UltraShield

Item Description	Part Number
UltraShield Pre-column Filter, 0.5 µm porosity stainless steel filter element, Parker port, Parker male, 5/pkg	MMUS-1505
UltraShield Pre-column Filter, 0.5 µm porosity stainless steel filter element, Parker port, Parker male, 10/pkg	MMUS-1510
UltraShield WW Pre-column Filter, 0.5 µm porosity stainless steel filter element, Waters port, Waters male, 5/pkg	MMUS-1505WW
UltraShield WW Pre-column Filter, 0.5 µm porosity stainless steel filter element, Waters port, Waters male, 10/pkg	MMUS-1510WW
UltraShield WP Pre-column Filter, 0.5 µm porosity stainless steel filter element, Waters port, Parker male, 5/pkg	MMUS-1505WP
UltraShield WP Pre-column Filter, 0.5 µm porosity stainless steel filter element, Waters port, Parker male, 10/pkg	MMUS-1510WP

ColumnShield

Item Description	Part Number
ColumnShield Pre-column Filter, 0.5 µm porosity titanium filter element, 5/pkg	MMPF-205
ColumnShield Pre-column Filter, 0.5 µm porosity titanium filter element, 10/pkg	MMPF-210

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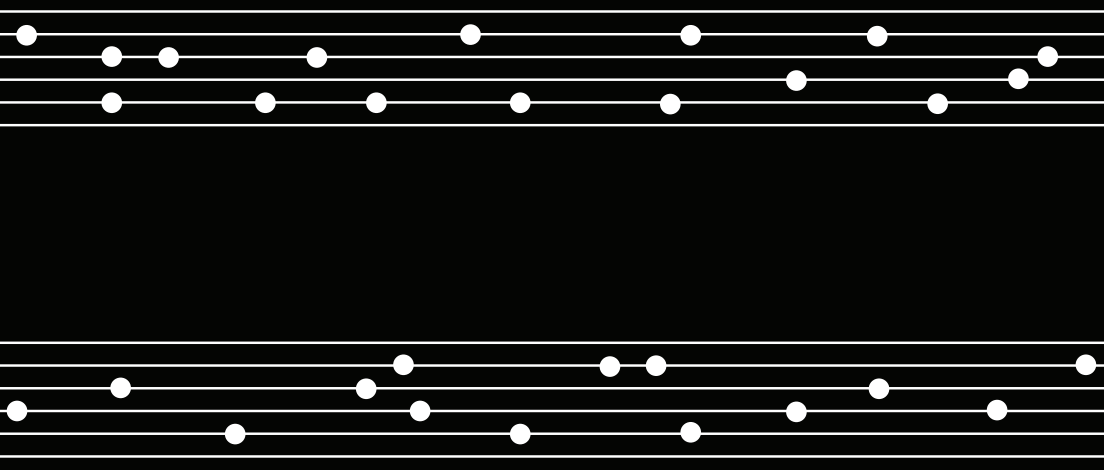
SMARTER CHROMATOGRAPHY

For more information or to place an order, call MAC-MOD at 1-800-441-7508 or visit www.mac-mod.com



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