

How to Choose the Right LC Guard Column: **Protect Your Column and Enhance Performance**

Pairing your LC column with a guard is a quick, cost-effective way to protect and maximize the lifetime of your analytical column. Explore our selection of LC guards and learn how to choose the best guard column for your analysis.



Select Guards
Now Available with
INERT COATING

Improve Performance while Protecting Your LC Column

How to Find the Right Guard Fast



Restek Guards Offer Premium Protection

Guard columns serve as a safeguard to your analysis by preventing unwanted materials from reaching your analytical column, thereby extending column lifetimes and keeping unwanted impurities from showing up in your chromatography. A guard column consists of a holder and cartridge (and sometimes a filter) and installs easily in front of the analytical column to protect it from strongly retained impurities and particulates. Restek offers three guard column configurations—EXP, Roc, and Trident (direct and in-line)—that are each designed to match one of our LC column families for your unique analysis. We also offer a premium inert coating for many of our guards that is especially useful in the analysis of metal-sensitive compounds. Choose the right guard column for your analysis using the steps below.

Step 1:

Choose an LC Guard System: EXP, Roc, or Trident (direct and in-line)

The first step in finding the right guard column is choosing among our various guard systems: EXP, Roc, or Trident (direct or in-line). Which system to choose depends largely on your technique and analytical column. For example, if you're performing UHPLC, using a smaller particle column that generates high back pressure, so you need a holder to accommodate that pressure. If you're employing traditional HPLC using a legacy column, you will want a holder that houses a legacy cartridge to match. Choose the best option for your analysis among our various guard systems shown in the table below.

Find the Right LC Guard System for Your Analysis
EXP Holders and Cartridges <ul style="list-style-type: none">• Built to withstand high back pressures of UHPLC instruments (rated to 20,000 psi [1400+ bar]).• Designed for use with Raptor and Force LC columns.
Roc Holders and Cartridges <ul style="list-style-type: none">• Specifically designed for use with Roc HPLC columns.
Trident Direct Holders and Cartridges <ul style="list-style-type: none">• Available in three levels of protection.• Designed for use with legacy HPLC columns (Ultra, Pinnacle II, Pinnacle DB, Allure, Viva).
Trident In-Line Holders and Cartridges <ul style="list-style-type: none">• Requires a coupler to attach to the analytical column.• Designed for use with legacy HPLC columns (Ultra, Pinnacle II, Pinnacle DB, Allure, Viva).

Simple Particulate Protection: While a guard cartridge is the best choice for analytical column protection, it will add some retention delay because it is a packed bed. For protection from particulates with a negligible amount of additional dead volume, choose an UltraLine in-line filter or an UltraShield filter, both of which are suitable for UHPLC pressures and can be used alone or in combination with a phase-matched guard column.



Step 2:

Choose a Packing to Match Your Column

Once you've determined which guard column system is right for you, the next step is choosing an LC guard cartridge with the packing and dimensions that best match your analytical column. To obtain maximum protection without compromising selectivity or efficiency, you should select an LC guard cartridge that contains the same packing material—both stationary phase and silica—as your analytical column. For example, the best LC guard column to use with a Raptor Biphenyl 2.7 μm analytical column is a Raptor Biphenyl 2.7 μm guard cartridge. Use the guard packing and dimension tables on pages 4 and 5 for Step 2, 3, and 4 in choosing the right guard for your analysis.

Step 3:

Select the Correct Inner Diameter Based on Your Column Diameter

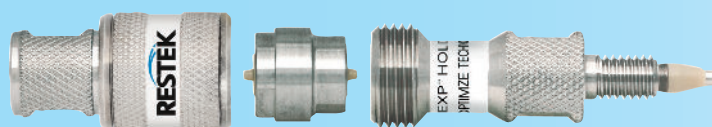
In addition to choosing a guard cartridge packing that matches your analytical column, it's important to select an LC guard cartridge with a proper inner diameter (ID). A good general rule is that the LC guard column cartridge ID should be the same as, or one size smaller than, the ID of the analytical column. For example, a 4.0 mm ID guard cartridge should be used with a 4.6 or 4.0 mm ID analytical column, while a 2.1 mm ID guard cartridge is recommended for 3.2, 3.0, and 2.1 mm ID analytical columns.

Step 4:



Consider Inert Coating

Analyzing metal-sensitive compounds? We offer a premium inert coating on our most popular guard columns to provide additional protection against unwanted interactions between your analytes and the stainless-steel surfaces in your guard column. Pair your inert guard with an inert column for maximum benefits! Learn more about our inert technology at www.restek.com/inert.

EXP Holders



- Raptor Guard Cartridges
- Force Guard Cartridges
- UltraShield Filters


Column Family	Column Particle Size	Guard Cartridge Phases	Available Inert Phases
	1.8 µm (UHPLC)	Raptor UHPLC guards: C18, ARC-18, Biphenyl, FluoroPhenyl	Raptor Inert 2.7 µm guards: C18, ARC-18, Biphenyl, HILIC-Si
	2.7 µm	Raptor 2.7 µm guards: C18, C8, ARC-18, Biphenyl, FluoroPhenyl, HILIC-Si, Polar X	Raptor Inert 2.7 µm guards: C18, ARC-18, Biphenyl, HILIC-Si
	5 µm	Raptor 5 µm guards: C18, ARC-18, Biphenyl, FluoroPhenyl	
	1.8 µm (UHPLC)	Raptor UHPLC guard cartridge in matching phase for maximum protection, or 0.2 µm UltraShield filter for clean samples when minimal dead volume is desired [†]	
	3 µm	Force 5 µm guards: C18, Biphenyl, FluoroPhenyl	Force Inert 5 µm guards: C18, Biphenyl
	5 µm	Force 5 µm guards: C18, Biphenyl, FluoroPhenyl	Force Inert 5 µm guards: C18, Biphenyl

[†]Raptor UHPLC cartridges are packed with Raptor particles, but they are compatible with any UHPLC column so they can be used with matching phases of 1.8 µm Force and 1.9 µm Pinnacle DB UHPLC columns.

ROC Holders



- Roc Guard Cartridges

Column Family	Column Particle Size	Column Phases	Guard Cartridge Phases
	3 µm	C18, C8, Phenyl-Hexyl, Cyano, Silica	Roc 5 µm guards: C18, C8, Phenyl-Hexyl, Cyano, Silica
	5 µm	C18, C8, Phenyl-Hexyl, Cyano, Silica	Roc 5 µm guards: C18, C8, Phenyl-Hexyl, Cyano, Silica

Trident Holders



- Ultra Guard Cartridges
- Pinnacle DB Guard Cartridges
- Pinnacle II Guard Cartridges
- Viva Guard Cartridges
- Allure Guard Cartridges

Column Family	Column Particle Size	Column Phases	Guard Cartridge Phases
Ultra	3 μ m	C18, C8, C4, C1, Biphenyl, Aromax, Aqueous C18, PFP Propyl, Cyano, IBD, Amino, Silica, Quat, Carbamate	Ultra 5 μ m guards: C18, C8, C4, C1, Biphenyl, Aromax, Aqueous C18, PFP Propyl, Cyano, IBD, Amino, Silica, Quat, Carbamate
	5 μ m	C18, C8, C4, C1, Biphenyl, Aromax, Aqueous C18, PFP Propyl, Cyano, IBD, Amino, Silica, Quat, Carbamate	Ultra 5 μ m guards: C18, C8, C4, C1, Biphenyl, Aromax, Aqueous C18, PFP Propyl, Cyano, IBD, Amino, Silica, Quat, Carbamate
Pinnacle DB	1.9 μ m	C18, C8, Biphenyl, Aqueous C18, PFP Propyl, Cyano, IBD, Silica, PAH	Raptor UHPLC guard cartridge in matching phase for maximum protection, or 0.2 μ m UltraShield filter for clean samples when minimal dead volume is desired
	3 μ m	C18, C8, Biphenyl, Aqueous C18, PFP Propyl, Silica	Pinnacle DB 5 μ m guards: C18, C8, Biphenyl, Aqueous C18, PFP Propyl, Silica
	5 μ m	C18, C8, Biphenyl, Aqueous C18, PFP Propyl, Cyano, Silica	Pinnacle DB 5 μ m guards: C18, C8, Biphenyl, Aqueous C18, PFP Propyl, Cyano, Silica
Pinnacle II	4 μ m	PAH	Pinnacle II 4 μ m guards: PAH
Viva	3 μ m	C18	Viva 5 μ m guards: C18
	3 μ m	C18, C8, C4, Biphenyl, PFP Propyl, Silica	Viva 5 μ m guards: C18, C8, C4, Biphenyl, PFP Propyl, Silica
Allure	5 μ m	Organic Acids, AK, Silica	Allure 5 μ m guards: Organic Acids, AK, Silica

Raptor UHPLC cartridges are packed with Raptor particles, but they are compatible with any UHPLC column so they can be used with matching phases of 1.8 μ m Force and 1.9 μ m Pinnacle DB UHPLC columns.

Note: Trident direct holders are available in three configurations, so you can select the level of protection that is best for your application. For more details, review our Trident brochure. Trident in-line filters are also available.



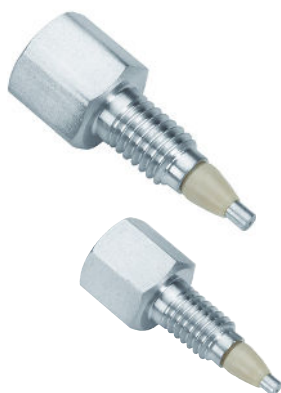
UltraLine UHPLC In-Line Filter

- In-line design installs easily with standard fittings.
- Cost-effective protection for UHPLC systems.
- Reliable way to extend column lifetime.
- Leak tight to 15,000 psi (1,034 bar).
- Replaceable 0.5 µm stainless steel frit in stainless steel body.

Specifications:

Inlet/Outlet: Female/Female 10-32
 Port Geometry: Parker (1/16 CPI)
 Material: Stainless steel housing
 Filter: 0.5 µm stainless steel, 0.125" W x 0.062" T, 5 µL volume
 Pressure Rating: 15,000 psig (1,034 bar)
 Wrench Flat: 3/8"

Description	qty.	cat.#
UltraLine UHPLC In-Line Filter (In-Line Assembly with Filter)	ea.	24993
UltraLine Replacement Filters	5-pk.	24994



UltraShield UHPLC PreColumn Filter

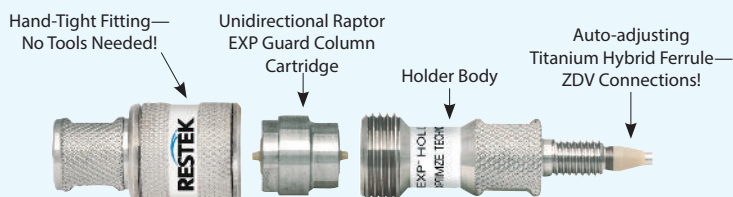
- Cost-effective protection for UHPLC systems.
- Reliable way to filter out particulates and extend column lifetime.
- Minimize extra column volume and maximize UHPLC sample throughput vs. guard cartridges.
- Connects easily to any column with Parker-style ports; not compatible with Waters columns.
- Leak tight to 15,000 psi (1,034 bar).
- 0.5 µm or 0.2 µm stainless steel frit in a stainless steel body with PEEK ferrule.

Specifications:

Inlet/Outlet: Female/Male 10-32
 Port Geometry: Parker (1/16 CPI)
 Material: stainless steel, PEEK ferrule
 Filter: 0.5 µm or 0.2 µm stainless steel
 Pressure Rating: 15,000 psig (1,034 bar)
 Wrench Flat: 5/16"

Description	Filter Porosity	qty.	cat.#
UltraShield UHPLC PreColumn Filter	0.5 µm frit	ea.	24995
		5-pk.	24996
		10-pk.	24997
UltraShield UHPLC PreColumn Filter	0.2 µm frit	ea.	25809
		5-pk.	25810
		10-pk.	25811

EXP Holders and Cartridges



EXP Direct Connect Holder

Description	qty.	cat.#
EXP Direct Connect Holder for EXP Guard Cartridges (includes hex-head fitting & 2 ferrules)	ea.	25808

Maximum holder pressure: 20,000 psi (1,400 bar)

Raptor EXP Guard Column Cartridges

Description	Particle Size	qty.	5 x 2.1 mm cat.#	5 x 3.0 mm cat.#	5 x 4.6 mm cat.#
Raptor C18 EXP Guard Column Cartridge	UHPLC	3-pk.	9304U0252	9304U0253	
Raptor C18 EXP Guard Column Cartridge	2.7 µm	3-pk.	9304A0252	9304A0253	9304A0250
Raptor C18 EXP Guard Column Cartridge	5 µm	3-pk.	930450252	930450253	930450250
Raptor C8 EXP Guard Column Cartridge	2.7 µm	3-pk.	9303A0252	9303A0253	9303A0250
Raptor Polar X EXP Guard Column Cartridge	2.7 µm	3-pk.	9311A0252		
Raptor ARC-18 EXP Guard Column Cartridge	UHPLC	3-pk.	9314U0252	9314U0253	
Raptor ARC-18 EXP Guard Column Cartridge	2.7 µm	3-pk.	9314A0252	9314A0253	9314A0250
Raptor ARC-18 EXP Guard Column Cartridge	5 µm	3-pk.	931450252	931450253	931450250
Raptor Biphenyl EXP Guard Column Cartridge	UHPLC	3-pk.	9309U0252	9309U0253	
Raptor Biphenyl EXP Guard Column Cartridge	2.7 µm	3-pk.	9309A0252	9309A0253	9309A0250
Raptor Biphenyl EXP Guard Column Cartridge	5 µm	3-pk.	930950252	930950253	930950250
Raptor FluoroPhenyl EXP Guard Column Cartridge	UHPLC	3-pk.	9319U0252	9319U0253	
Raptor FluoroPhenyl EXP Guard Column Cartridges	2.7 µm	3-pk.	9319A0252	9319A0253	9319A0250
Raptor FluoroPhenyl EXP Guard Column Cartridges	5 µm	3-pk.	931950252	931950253	931950250
Raptor HILIC-Si EXP Guard Column Cartridge	2.7 µm	3-pk.	9310A0252	9310A0253	9310A0250

Maximum cartridge pressure: 1,034 bar/15,000 psi* (UHPLC), 600 bar/8,700 psi (2.7 µm); 400 bar/5,800 psi (5 µm)

* For maximum lifetime, recommended maximum pressure for UHPLC particles is 830 bar/12,000 psi.

Force EXP Guard Column Cartridges

Description	qty.	5 x 2.1 mm cat.#	5 x 3.0 mm cat.#	5 x 4.6 mm cat.#
Force Biphenyl EXP Guard Column Cartridge	3-pk.	962950252	962950253	962950250
Force C18 EXP Guard Column Cartridge	3-pk.	963450252	963450253	963450250
Force FluoroPhenyl EXP Guard Column Cartridge	3-pk.	963950252	963950253	963950250

Maximum cartridge pressure: 600 bar/8,700 psi.

Hybrid Ferrule U.S. Patent No. 8201854, EXP Holders U.S. Patent No. 8696902, EXP2 Wrench U.S. Patent No. D766055. Other U.S. and Foreign Patents Pending. The EXP, Free-Turn, and the Opti- prefix are registered trademarks of Optimize Technologies, Inc.

Raptor Inert EXP Guard Column Cartridges

Description	Particle Size	qty.	5 x 2.1 mm cat.#	5 x 3.0 mm cat.#
Raptor Inert C18 EXP Guard Column Cartridge	2.7 µm	3-pk.	9304A0252-T	9304A0253-T
Raptor Inert Biphenyl EXP Guard Column Cartridge	2.7 µm	3-pk.	9309A0252-T	9309A0253-T
Raptor Inert ARC-18 EXP Guard Column Cartridge	2.7 µm	3-pk.	9314A0252-T	9314A0253-T
Raptor Inert HILIC-Si EXP Guard Column Cartridge	2.7 µm	3-pk.	9310A0252-T	

Force Inert EXP Guard Column Cartridges

Description	Particle Size	qty.	5 x 2.1 mm cat.#	5 x 3.0 mm cat.#
Force Inert C18 EXP Guard Column Cartridge	2.7 µm	3-pk.	963450252-T	963450253-T
Force Inert Biphenyl EXP Guard Column Cartridge	2.7 µm	3-pk.	962950252-T	962950253-T





Roc LC Guard Column Holder

- Protect your Roc LC columns with minimal effect on retention, peak shape, or efficiency.
- Requires separate guard column cartridges (available from Restek).

Description	qty.	cat.#
Roc LC Guard Column Holder for 10 x 4.0 mm Roc Guard Cartridges	ea.	25812



Roc LC Guard Column Cartridges

- Protect your Roc LC columns with minimal effect on retention, peak shape, or efficiency.

Description	qty.	10 x 4.0 mm cat.#
Roc C8 Guard Cartridge	3-pk.	953350210
Roc C18 Guard Cartridge	3-pk.	953450210
Roc Cyano Guard Cartridge	3-pk.	953650210
Roc Phenyl-Hexyl Guard Cartridge	3-pk.	953550210
Roc Silica Guard Cartridge	3-pk.	953050210



Keep Your LC Work Flowing with Restek Maintenance Supplies

Restek is a 100% employee-owned company and the last major independent provider of chromatography supplies in the industry. We proudly work with every analyst to keep any make or model of LC up and running its best, and our line of 100% guaranteed LC instrument replacement parts meets and often exceeds the original instrument manufacturer's performance. For seals, valves, lamps, and many more OEM-equivalent supplies, visit www.restek.com/LCacc

Trident LC Column Protection System

Redesigned to be more rugged and easier to use!

- Match your needs with three levels of protection: filter only, cartridge only, or filter and cartridge.
- Durable metal tip with replaceable PEEK ferrule means easy installation onto column without tools.
- Improved thread design and materials create an optimal seal that releases and reseals easily, allowing multiple installations without galling and binding.
- Easy-to-remove cap frit simplifies filter replacement.
- Direct connection eliminates tubing and connectors that increase system volume and leak potential.
- Low-dead-volume design has negligible effect on chromatography.

Unlike “one size fits all” guard systems, the Trident LC column protection system gives you the power to select just the right level of protection for your work. With three levels of protection and a variety of guard cartridges and cap frits, you can select the best combination to match your specific analytical needs. Choose a filter alone to remove particulate matter, a guard cartridge alone to remove irreversibly adsorbed compounds, or both a filter and a guard cartridge for maximum protection. The economical, leak-free design provides a highly versatile combination of convenience, economy, and reliability.

The foundation of the Trident LC column protection system is a reusable direct connect holder that easily attaches to any HPLC column with standard 10-32 thread ports.* The holder's durable metal tip and replaceable PEEK ferrule allow a leak-tight seal onto the column to be made quickly and easily without tools. Guard cartridges are available in both 2.1 and 4.0 mm IDs, and the redesigned holder houses either size securely. Because the holder components are machined from specialized materials that will not gall or bind, an optimal seal is created that will withstand rigorous repeated use when installed according to instructions. The holder has also been designed for easy removal of the cap frit, allowing you to replace the cap frit filter in just seconds.

Finally, since the Trident LC column protection system is engineered to be exceptionally low dead volume, it has minimal effect on retention, peak shape, and efficiency. Protect your analytical column and preserve method chromatography with a Trident LC column protection system.



Description	qty.	cat.#	qty.	cat.#
Level 1: Filter Holder Only Includes: filter holder; cap frit filter (4 mm, 2.0 µm); and PEEK ferrule	ea.	27470	4-pk.	27471
Level 2: Cartridge Holder Only Includes: cartridge holder and PEEK ferrule	ea.	27472	4-pk.	27473
Level 3: Filter Holder and Cartridge Holder Power Pack Includes: filter holder; cap frit filter (4 mm, 2.0 µm); cartridge holder; and PEEK ferrule	ea.	27474	4-pk.	27475

* Fittings on all LC columns have 10-32 threads; however, seat depth varies. An improper seat will yield a poor connection and may affect chromatography. While all Restek LC columns will provide a zero-dead-volume connection when used with a properly installed Trident LC column protection system, analysts should consult the manufacturer for non-Restek column connections. A detailed discussion about port configurations can be found at www.restek.com/Pages/faq_lc

Trident HPLC In-Line Guard Cartridge Holders

A Trident in-line guard cartridge holder can be used with almost any HPLC column by connecting it with a short piece of 1/16" tubing, appropriate nuts and ferrules, or finger-tight fittings. The system can be used with Restek columns, or with columns from other manufacturers. Holders are available for 10 mm guard cartridges. Purchase with or without a prefilter, which provides added protection against the particles that can shorten the lifetime of the guard cartridge.



Description	qty.	cat.#
Holder for 10 mm guard cartridge	ea.	25021
Holder with filter for 10 mm guard cartridge	ea.	25040
Frit-Type In-Line Filter, 2.0 µm	ea.	25041
Replacement Cap Frit Filters: 4 mm 2.0 µm**	5-pk.	25022
Replacement Cap Frit Filters: 4 mm 0.5 µm	5-pk.	25023
Replacement Cap Frit Filters: 2 mm 2.0 µm**	5-pk.	25057
Replacement Cap Frit Filters: 2 mm 0.5 µm	5-pk.	25990

**Standard porosity.

Ultra Guard Cartridges

Particle size: 5 µm spherical

Pore size: 100 Å



Description	3-pk. (10 x 2.1mm)	3-pk. (10 x 4.0mm)
Ultra Amino Guard Cartridge		910750210
Ultra Aqueous C18 Guard Cartridge	917850212	917850210
Ultra Aromax Guard Cartridge	912750212	912750210
Ultra Biphenyl Guard Cartridge	910950212	910950210
Ultra C1 Guard Cartridge	910150212	910150210
Ultra C4 Guard Cartridge	910250212	910250210
Ultra C8 Guard Cartridge	910350212	910350210
Ultra C18 Guard Cartridge	917450212	917450210
Ultra Carbamate Guard Cartridge	917750212	917750210
Ultra Cyano Guard Cartridge	910650212	910650210
Ultra IBD Guard Cartridge	917550212	917550210
Ultra PFP Propyl Guard Cartridge	917950212	917950210
Ultra Silica Guard Cartridge	910050212	910050210
Ultra Quat Guard Cartridge	918150212	918150210

Pinnacle DB Guard Cartridges

Particle size: 5 µm spherical

Pore size: 140 Å



Description	3-pk. (10 x 2.1mm)	3-pk. (10 x 4.0mm)
Pinnacle DB Aqueous C18 Guard Cartridge	941850212	941850210
Pinnacle DB Biphenyl Guard Cartridge	940950212	940950210
Pinnacle DB C18 Guard Cartridge	941450212	941450210
Pinnacle DB C8 Guard Cartridge	941350212	941350210
Pinnacle DB Cyano Guard Cartridge	941650212	941650210
Pinnacle DB PFP Propyl Guard Cartridge	941950212	941950210
Pinnacle DB Silica Guard Cartridge	941050212	941050210

Pinnacle II PAH Guard Cartridges

Particle size: 4 µm spherical

Pore size: 110 Å

Description	3-pk. (10 x 2.1mm)	3-pk. (10 x 4.0mm)
Pinnacle II PAH Guard Cartridge	921950212	921950210

Viva Guard Cartridges

Particle size: 5 µm spherical

Pore size: 300 Å

Description	3-pk. (10 x 2.1mm)	3-pk. (10 x 4.0mm)
Viva C18 Guard Cartridge	951450212	951450210
Viva C8 Guard Cartridge	951350212	951350210
Viva C4 Guard Cartridge	951250212	951250210
Viva Biphenyl Guard Cartridge	951650212	951650210
Viva PFP Propyl Guard Cartridge	951950212	951950210
Viva Silica Guard Cartridge	951050212	951050210



Allure Guard Cartridges

Particle Size: 5 µm spherical

Pore Size: 60 Å

Description	3-pk. (10 x 2.1mm)	3-pk. (10 x 4.0mm)
Allure AK Guard Cartridge		915950210
Allure Organic Acids Guard Cartridge	916550212	916550210
Allure Silica Guard Cartridge	916050212	916050210

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