

# Chromatography Essentials

HPLC | Flash | TLC | GC | SPE





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## Grace® HPLC Column Solutions

### Address Today's Separation Challenges

This catalog features Grace's leading HPLC column technologies. You will find innovative chemistries, unsurpassed reliability, and hardware configurations that optimize your method requirements for speed, sensitivity, resolution or sample loading. Discover how our select range of small molecule columns, biomolecule-based offerings and ion chromatography technologies address your toughest separation challenges.

#### Grace® Featured Column Families:

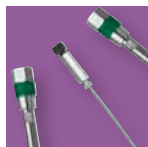
**VisionHT®** — Unique chemistries in sub2 to 10µm particles maximize performance and speed for UHPLC and HPLC.



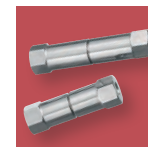
**Everest®** — High capacity for complex peptide mapping and proteomics applications.



**Alltima™ HP** — Premium quality, exceptionally stable columns, without phase bleed.



**ProZap™** — High-speed protein and peptide separations.



**Prevail™** — Compatible with 100% aqueous to 100% organic mobile phases.



**Vydac® TP** — Popular, industry-standard bioseparations columns.



**GraceSmart™** — High quality HPLC columns at an exceptional value.



**Alltech® IC** — Wide variety for the separation of organic and inorganic anions and cations.



**Vydac® MS** — Unique selectivity and recovery for protein isolation and characterization.



#### Grace Expertise and Product Ownership

Grace has been manufacturing silica and bonding it with unique chemistries for more than three decades. Our combined media production, column packing, and sub2µm particle expertise uniquely positions us to solve the challenges of modern chromatography laboratories. Partner with Grace and be assured our consistent, reliable chromatography products adhere to strict quality standards.























- Certified in ISO 9001, 14000 and 13485 procedures
- FDA 21 CFR 820 for medical devices
- Full traceability from base silica to final product
- Extensive process control to ensure highest reproducibility
- Experienced global technical support and sales teams

#### Additional Column Brands Available

While this catalog focuses on Grace leading HPLC columns, other popular brands are still available. Visit our website for a comprehensive listing.

- |                       |                       |
|-----------------------|-----------------------|
| <b>Alltima™</b>       | <b>Genesis®</b>       |
| <b>Adsorbosphere™</b> | <b>Grom™ Sil</b>      |
| <b>Allsphere™</b>     | <b>Grom™ Sapphire</b> |
| <b>Apex™</b>          | <b>Macrosphere™</b>   |
| <b>Apollo™</b>        | <b>Platinum™</b>      |
| <b>Brava™</b>         | <b>ProSphere™</b>     |
| <b>Denali®</b>        | <b>Vydac® SP</b>      |
| <b>Econosphere™</b>   |                       |

## HPLC Column Hardware Formats

HPLC Column Hardware Formats								
Format		i.d. (mm)	Length (mm)	System Compatibility	Description	Advantage	Brand Availability	
UHPLC			1 2	20 30 50 100 150 250	UHPLC system, LC/MS	Ultra-low dead volume hardware, pressure rated to 18,000psig, allows 2–7X faster linear velocities.	Packed with sub2µm media, this hardware delivers the fastest separations with maximum efficiency. Extremely low sample dispersion offers best sensitivity.	VisionHT®
Capillary			0.075 0.150 0.300 0.500	50 100 150 250	Capillary systems, LC/MS	Highly specialized columns packed in small diameter fused silica tubing.	High-sensitivity and sample-limited applications.	Alltima™ HP Vydac® MS Everest®
Expedite™			2.1 4.6	10 20	Low volume, high-throughput (HTP) systems	Extremely short, low-volume columns that prevent sample diffusion.	High-throughput and rapid resolution LC/MS applications packed with highly efficient 1.5µm media.	VisionHT® Alltima™ HP Prevail™ ProZap™
Microbore			2.1	50 100 150	Standard HPLC optimized for low volume	2.1mm diameter analytical columns requiring low volume systems.	Low solvent consumption and improved sensitivity compared to traditional 4.6mm columns.	VisionHT® Alltima™ HP Prevail™ GraceSmart™ Vydac® MS Everest® IC
Solvent Reducer			3	100 150 250	Standard HPLC	3mm diameter analytical columns suitable for use on conventional HPLC.	50% solvent savings compared to traditional 4.6mm columns. No need to optimize system for low volume.	VisionHT® Alltima™ HP Prevail™ Vydac® MS Vydac® TP
Analytical			4.6	50 100 150 250	Standard HPLC	Conventional 4.6mm i.d. with industry standard port configurations.	Most common, traditional hardware format.	VisionHT® Alltima™ HP Prevail™ GraceSmart™ Vydac® MS Everest® Vydac® TP IC
Rocket™			7	33 53	Standard HPLC	Large 7mm i.d. balances column volume with conventional LC system volume, and allows faster mobile phase flow rates.	Ultra-fast separations on conventional HPLC systems. Unique hardware geometry reduces peak broadening and delivers excellent peak shapes. 5mL/min max flow rate reduces analysis time up to 80% compared to traditional analytical columns.	VisionHT® Alltima™ HP Prevail™
Preparative			10 22	50 100 150 250	Preparative LC	Large i.d. increases loading.	Packed under high pressure for high efficiency LC purifications.	VisionHT® Vydac® MS Vydac® TP
Capillary Guard			0.150 0.300	10		Guard system with reusable holder and disposable cartridges.	Protects capillary columns and prolongs life.	Alltima™ HP Vydac® MS Everest®
UHPLC Guard			1 2	5		Integral and stand-alone options.	Protects UHPLC column investment, and prolongs life.	VisionHT®
All-Guard™			2.1 4.6	7.5		Guard system with reusable holder and disposable cartridges.	Protects analytical and microbore columns and prolongs life.	VisionHT® Alltima™ HP Prevail™ Vydac® MS Everest® Vydac® TP

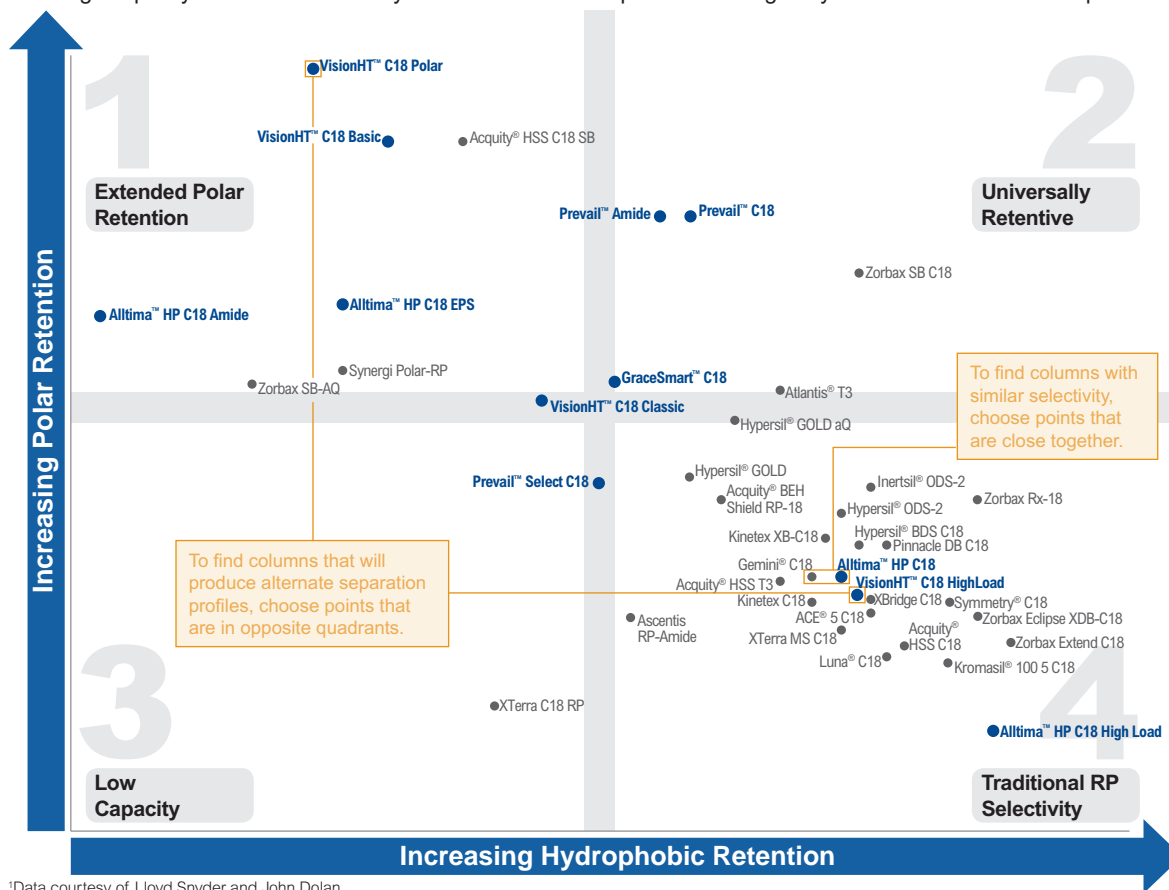
## HPLC Phase Specifications and Usage

Columns for Small Molecules								
Brand	Phase	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	Endcapped	Chromatographic Properties	Application/Benefit	USP L-code
VisionHT®	C18 HighLoad	120	220	11	Yes	Ultra high-purity silica, fully bonded.	General purpose for broad range compounds, classic selectivity, high-capacity for hydrophobic compounds.	L1
	C18 Basic	120	220	5	Proprietary	Ultra-high purity silica. Controlled silica surface exposure gives dual mode separation with polar and non-polar analytes.	Alternate reversed-phase selectivity. High polar retention especially with compounds having two or more polar groups. Excellent sensitivity and peak shape for basic compounds, without the need for acidified mobile phases.	L1
	C18 Classic	100	200	6	Yes	Lower carbon load. Slight silica exposure.	Reversed-phase separations with reduced bonding optimized for speed. Some additional polar retention.	L1
	C18 Polar	100	200	5	No	High silica exposure, low carbon load. Uniform coverage of inert vicinal silanols.	Unique polar selectivity. Low carbon load gives fastest reversed-phase elution times while retaining polar compounds longer.	L1
	HILIC	120	220	—	No	Polar phase with shorter equilibration times. Shipped in ACN/Water.	Peak reversal compared to reversed-phase. Ideal for very polar compounds with high organic mobile phases for improved sensitivity by MS.	L3
	Silica	120	220	—	No	Traditional normal phase for use in 100% organic mobile phases.	For isomeric separation of non-aqueous compatible compounds by absorption chromatography.	L3
Alltima™ HP	C18	190	200	12	Yes	Classic reversed-phase retention and selectivity.	Routine applications.	L1
	C18 EPS	190	200	4	Yes	Greater retention and enhanced peak symmetry for polar compounds. Alternate selectivity to traditional reversed-phases.	Reversed-phase applications where C18 is too retentive.	L1
	C18 Hi-Load	100	450	24	Yes	Highest carbon load for superior retention and loadability.	High resolution for complex samples.	L1
	C18 AQ	100	450	20	Yes	100% water wetttable.	Applications requiring high aqueous mobile phases.	L1
	C18 Amide	190	200	12	Yes	Polar-embedded phase with extremely low bleed. Compatible with microbore.	Basic compounds in neutral to alkaline pH, MS applications.	L1
	C8	190	200	8	Yes	Lower capacity compared to C18 phases.	Reversed-phase applications where C18 is too retentive.	L7
	Cyano	190	200	4	Yes	Extremely stable, long life and reproducible.	Ideal for basic drug analysis.	L10
	Silica	100	450	—	No	Highly polar phase.	General purpose normal phase applications.	L3
	HILIC	120	230	—	No	Hydrophilic interaction chromatography uses small amounts of water for increased sensitivity with microbore applications.	Very polar analytes that cannot be retained by reversed-phase.	L3
Prevail™	C18 Select	110	350	17	Yes	Stable in 100% aqueous to 100% organic mobile phases.	Same benefits as Prevail™ C18, but less retentive for polar compounds.	L1
	C18	110	350	15	Yes	Stable in 100% aqueous to 100% organic mobile phases.	Flexibility to switch between varied mobile phase conditions to suit a variety of applications. Excellent sensitivity for microbore applications.	L1
	C8	110	350	8	Yes	Stable C8 phase.	Use for highly hydrophobic compounds that retain too strongly on C18.	L7
	Phenyl	110	350	7	Yes	Lowest hydrophobic capacity.	Selective for aromatic compounds in a variety of mobile phase conditions.	L11
	Cyano	110	350	—	Yes	General purpose cyano suitable for normal or reversed-phase use.	Rugged normal phase applications.	L10
	Amino	110	350	—	No	Stable in 100% aqueous to 100% organic mobile phases.	Use for carbohydrates or as a weak anion exchanger.	L8
	Silica	110	350	—	No	Highly polar phase.	General purpose normal phase applications.	L3
	Organic Acid	110	350	—	Yes	Highly efficient silica-based, acid-stable.	Separate common organic acids with unsurpassed resolution, speed and sensitivity. Lower cost than polymeric columns.	—
	Carbohydrate ES	—	—	—	No	Extremely stable hybrid phase.	Excellent for mono- and oligosaccharides and sugar alcohols.	—
GraceSmart™	C18	120	220	10	Yes	High purity silica with monomeric C18 bonding offers classical reversed-phase selectivity.	Excellent value for general purpose, routine applications.	L1

Columns for Large Molecules / Life Science								
Brand	Phase	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	End-capped	Chromatographic Properties	Application/Benefit	USP L-code
Vydac <sup>®</sup> MS	218MS C18	300	60–110	8	Yes	Polymeric bonding, highest hydrophobic interaction and unique geometric selectivity.	Use for simple enzymatic digests (<12 proteins) or biomolecules 0–5K MW.	L1
	238MS C18	300	70	4	Yes	Monomeric bonding offers increased peptide interaction and generally yields higher peak counts.	Use for same applications as 218MS, but offers different C18 selectivity.	L1
	208MS C8	300	70	5	Yes	Lower hydrophobicity is better for larger biomolecules.	Ideal for biomolecules 5–10K MW.	L7
	214MS C4	300	70–110	3	Yes	Lower capacity than C18 or C8, suitable for hydrophobic proteins or when minimal organic is desired.	Ideal for biomolecules >10K MW, undenatured intact proteins, antibodies, oligonucleotides, human growth hormone.	L26
	219MS Diphenyl	300	70	4	Yes	Lowest capacity, aromatic functional groups.	Highly selective for proteins with aromatic side chains.	L11
Everest <sup>®</sup>	238EV C18	300	70–110	6	Yes	Maximum surface coverage for highest resolution of complex samples.	Complex enzymatic digests (>12 proteins).	L1
ProZap <sup>™</sup>	C18	500	59	3	Yes	Sub2µm, 500Å wide pore.	Ideal for fast, intact protein or peptide analysis.	L1
Vydac <sup>®</sup> TP	218TP C18	300	60–110	8	Yes	First generation polymeric C18 media with unique selectivity.	Small polypeptides 4–5K MW, enzymatic digest fragments, natural and synthetic peptides, multi-ring compounds.	L1
	238TP C18	300	60–110	4	Yes	First generation monomeric C18 media.	Use for same applications at 218TP, but offers different C18 selectivity.	L1
	208TP C8	300	60–110	5	Yes	Less hydrophobic than C18TP media.	Polypeptides 10–20K MW.	L7
	214TP C4	300	60–110	3	Yes	First generation C4 media.	Glycoproteins, hemoglobin variants, histones, insulin variants, membrane proteins.	L26
	219TP Diphenyl	300	60–110	4	Yes	Lowest capacity first generation diphenyl media.	Polypeptides with aromatic side chains, large hydrophobic proteins, membrane-spanning peptides, lipid peptides, fusion proteins from inclusion bodies.	L11

## Reversed-Phase Column Comparisons

Based on the widely accepted work and test procedures of Drs Lloyd Snyder and John Dolan<sup>1, 2, 3</sup>, Grace developed this tool to show relative selectivity comparisons for commercially available columns. This graph plots the indicators for hydrophobicity versus the cation exchange capacity at pH 7. Hydrophobicity is often the primary analyte interaction and indicates overall capacity. The cation exchange capacity measures secondary interactions that take place and can greatly influence the retention of polar analytes.



<sup>1</sup>Data courtesy of Lloyd Snyder and John Dolan.

<sup>2</sup>The "Hydrophobic-subtraction" Model of Reversed-phase Column Selectivity", L.R. Snyder, J.W. Dolan and P.W. Carr, *J. Chromatogr. A*, 1060 (2004) 77–116.

<sup>3</sup>A New Look at the Selectivity of Reversed-phase HPLC Columns", L.R. Snyder, J.W. Dolan and P.W. Carr, *Anal. Chem.*, 79 (2007) 3255–3262.

# Application-Based Column Selection

Use this chart to identify a suitable column for your application. Traditional choice columns are well matched to the application. Alternative choice columns can provide different selectivity when the traditional choice column does not work.

**Legend:**  
■ Traditional Choice  
● Alternative Choice

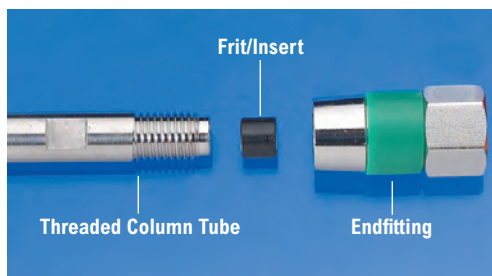
hplc columns

Application-Based Column Selection																					
Column	Pharmaceutical			Neutraceutical / Natural Products			Food & Beverage				Environmental		Biopharmaceutical/ Life Science								
	Acidic	Basic	Neutral	Herbal Medicines	Vitamins	Dietary Supplement	Carbohydrates	Lipids	Organic Acids	Food Safety	Agricultural Chemicals	Industrial/Aromatics	Simple Enzymatic Digests (<12 proteins)	Complex Enzymatic Digests (>12 proteins)	Proteins, Peptides, Biomolecules			Undenatured, Intact Proteins	Antibodies	Oligonucleotides	
															0-5K MW	5-10K MW	>10K MW				
VisionHT® C18 HighLoad	●	●	■	■	■	■			●	■		●	■	■	■						
VisionHT® C18 Basic		■	●	●		●			●				●*	●*	●*						
VisionHT® C18 Classic											■										
VisionHT® C18 Polar	■	■	●	●	●	●				■	■										
VisionHT® Silica								●													
Alltima™ HP C18			■	■	■			■	■												
Alltima™ HP C18 EPS	■		●	●	●	●			●	■											
Alltima™ HP C18 Hi-Load	●	●	■	■	■	■		■	●			●									
Alltima™ HP C18 AQ	■							■													
Alltima™ HP C18 Amide		■				●															
Alltima™ HP C18 Cyano		●									●										
Prevail™ C18 Select					■																
Prevail™ C18			■	■	■						●										
Prevail™ Phenyl											■										
Prevail™ Organic Acid								■													
Prevail™ Carbohydrate ES							■														
GraceSmart™ C18	■		■	■	■				■	■											
Vydac® 218MS C18												■		■							
Vydac® 238MS C18												●		■							
Vydac® 208MS C8															■						
Vydac® 214MS C4																	■	■	■	■	■
Vydac® 219MS Diphenyl															●	●	●		●		
Everest® 238EV C18													■								■
ProZap™ C18															■	■	■	■	■	■	■
Vydac® 218TP C18												■		■							
Vydac® 214TP C4																	■	■			■

\*For UHPLC applications.

## Empty HPLC Hardware

### Stainless Steel Analytical Column Hardware



Stainless steel analytical columns come complete with the threaded tube, two 2µm industry standard frit/inserts, and two stainless steel endfitting nuts. Optional 0.5µm porosity frit/inserts are also available.

Adapters and sealing rings are available for slurry packing. The packing adapter comes with a 1/4" precolumn tube to connect to 1/4" slurry reservoirs.

Stainless Steel Analytical Column Hardware Specifications	
<b>Material:</b>	316 Stainless Steel
<b>Max. Temperature:</b>	100°C
<b>Max. Pressure:</b>	10,000psig
<b>Thread Type:</b>	10-32 UNF (CPI Standard Ports)
<b>Typical Use:</b>	Analytical HPLC Columns

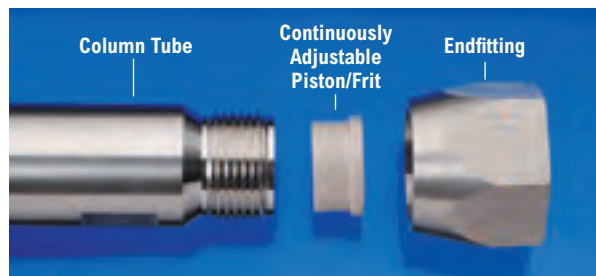
Stainless Steel Analytical Hardware and Accessories		
Description	2.1mm i.d. Part No.	4.6mm i.d. Part No.
<i>Complete Columns</i>		
50mm	<b>65175</b>	<b>65150</b>
100mm	<b>65176</b>	<b>65152</b>
150mm	<b>65177</b>	<b>65154</b>
250mm	<b>65178</b>	<b>65156</b>
300mm	—	<b>65158</b>
<i>Replacement Parts</i>		
Endfitting (ea)	<b>75001</b>	<b>75001</b>
Frit/Insert, 2µm (5/pk)	<b>75028</b>	<b>75020</b>
Frit/Insert, 0.5µm (5/pk)	—	<b>75021</b>

## Stainless Steel Frits

Stainless Steel Frit Specifications	
<b>Material:</b>	316 Stainless Steel
<b>Max. Temperature:</b>	500°C
<b>Max. Pressure:</b>	10,000psig
<b>Typical Use:</b>	Column Inlet/Outlet

Stainless Steel Frits				
Frit Diameter	Total Diameter	Thickness	Porosity	25/pk Part No.
1/4" (6.350mm)	1/4" (6.350mm)	0.031" (0.79mm)	0.5µm	<b>720825</b>
1/4" (6.350mm)	1/4" (6.350mm)	0.031" (0.79mm)	2.0µm	<b>721025</b>
1/4" (6.350mm)	1/4" (6.350mm)	0.063" (1.59mm)	2.0µm	<b>716525</b>
3/8" (9.525mm)	3/8" (9.525mm)	0.031" (0.79mm)	2.0µm	<b>721425</b>

### Stainless Steel Preparative Column Hardware



The easy-to-use preparative format has threaded endfittings and a continuously adjustable piston/frit. The piston/frit extends column life by compressing the packed bed to remove voids.

Stainless Steel Preparative Column Hardware Specifications	
<b>Material:</b>	316 Stainless Steel, PEEK
<b>Max. Temperature:</b>	100°C
<b>Max. Pressure:</b>	8000psig
<b>Thread Type:</b>	10-32 UNF (CPI Standard Ports)
<b>Typical Use:</b>	Prep HPLC Columns

Stainless Steel Preparative Hardware and Accessories			
i.d.	Length	Qty.	Part No.
<i>Complete Columns</i>			
7mm	100mm	ea	<b>96500</b>
7mm	250mm	ea	<b>96501</b>
10mm	100mm	ea	<b>96510</b>
10mm	250mm	ea	<b>96511</b>
22mm	70mm	ea	<b>96524</b>
22mm	100mm	ea	<b>96520</b>
22mm	250mm	ea	<b>96521</b>
22mm	500mm	ea	<b>96522</b>
<i>Replacement Piston/Frit, 2µm</i>			
7mm	—	ea	<b>96507</b>
10mm	—	ea	<b>96517</b>
22mm	—	ea	<b>96527</b>

## Encased Metal-Free Frits

Encased Metal-Free PEEK Frit Specifications	
<b>Material:</b>	PEEK
<b>Max. Temperature:</b>	100°C
<b>Max. Pressure:</b>	10,000psig
<b>Typical Use:</b>	Column Inlet/Outlet

Encased Metal-Free PEEK Frits				
Frit Diameter	Total Diameter	Thickness	Porosity	5/pk Part No.
<i>PEEK Frits with PEEK Ring</i>				
0.181" (4.6mm)	1/4" (6.4mm)	0.063" (1.59mm)	5µm	<b>68152</b>
0.181" (4.6mm)	1/4" (6.4mm)	0.063" (1.59mm)	10µm	<b>69027</b>

### technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)  
 Online: [www.discoverysciences.com](http://www.discoverysciences.com)



## VisionHT® Columns

### One Platform for UHPLC, HPLC and PREP

- Easy method transfer between UHPLC, HPLC and preparative chromatography
- Broad selectivity range—unique complementary phase chemistries
- Maximize speed and resolution with sub 2µm on any LC system



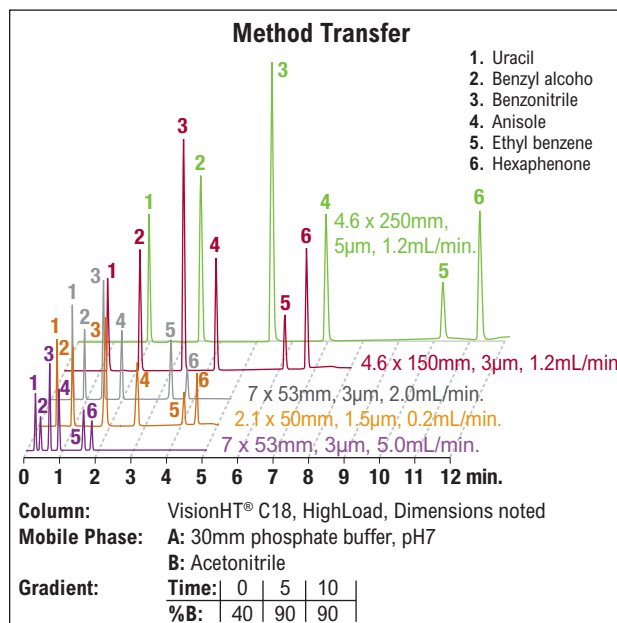
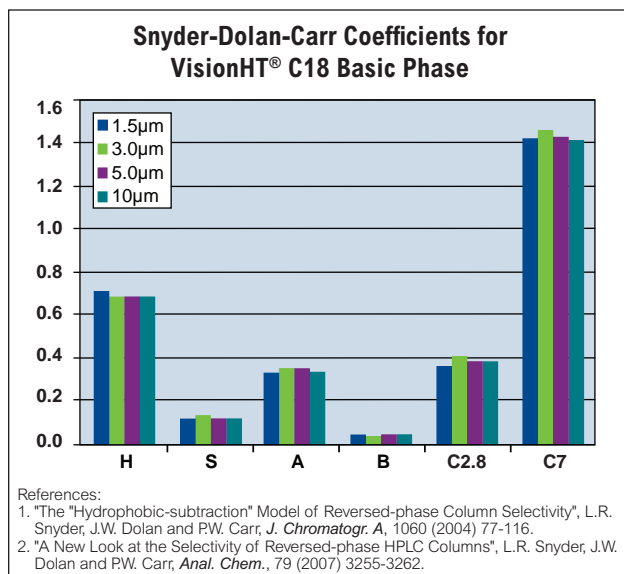
Separate complex samples with excellent resolution with VisionHT® high performance columns. They are available with 1.5, 3, 5 and 10µm particle sizes and six different phase selectivities spanning the full polarity spectrum. The same base silica and bonding chemistries are used across all particle sizes therefore offering simple method transfer between UHPLC, HPLC and preparative systems.

VisionHT® Phase Specifications							
Phase	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	Endcapped	Chromatographic Properties	Application/Benefit	USP L-code
C18 HighLoad	120	220	11	Yes	Ultra-high purity silica, fully bonded.	General purpose for broad range compounds, classic selectivity, high-capacity for hydrophobic compounds.	L1
C18 Basic	120	220	5	Proprietary	Ultra-high purity silica. Controlled silica surface exposure gives dual mode separation with polar and non-polar analytes.	Alternate reversed-phase selectivity. High polar retention especially with compounds having two or more polar groups. Excellent sensitivity and peak shape for basic compounds, without the need for acidified mobile phases.	L1
C18 Classic	100	200	6	Yes	Lower carbon load. Slight silica exposure.	Reversed-phase separations with reduced bonding optimized for speed. Some additional polar retention.	L1
C18 Polar	100	200	5	No	High silica exposure, low carbon load. Uniform coverage of inert vicinal silanols.	Unique polar selectivity. Low carbon load gives fastest reversed-phase elution times while retaining polar compounds longer.	L1
HILIC	120	220	—	No	Polar phase with shorter equilibration times. Shipped in ACN/Water.	Peak reversal compared to reversed-phase. Ideal for very polar compounds with high organic mobile phases for improved sensitivity by MS.	L3
Silica	120	220	—	No	Traditional normal phase for use in 100% organic mobile phases.	For isomeric separation of non-aqueous compatible compounds by absorption chromatography.	L3

### Simple Method Transfer

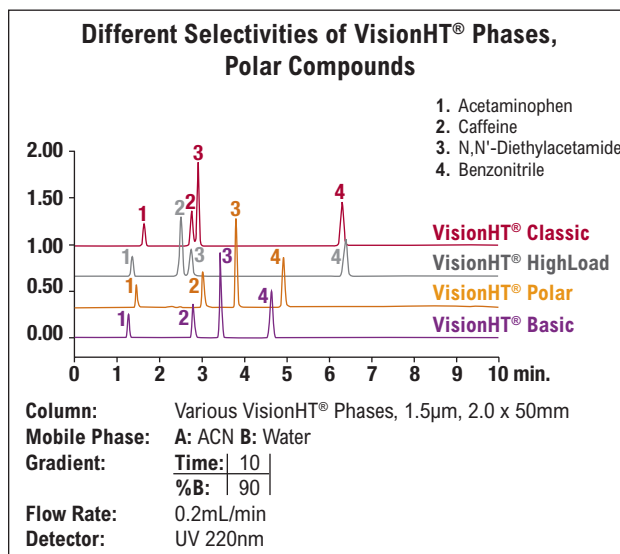
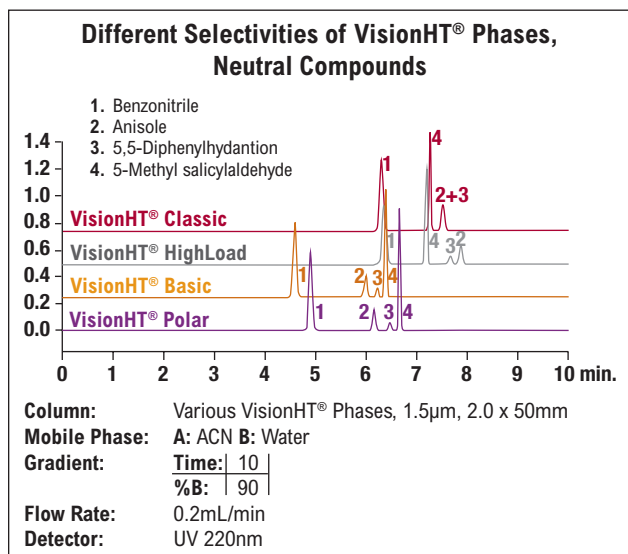
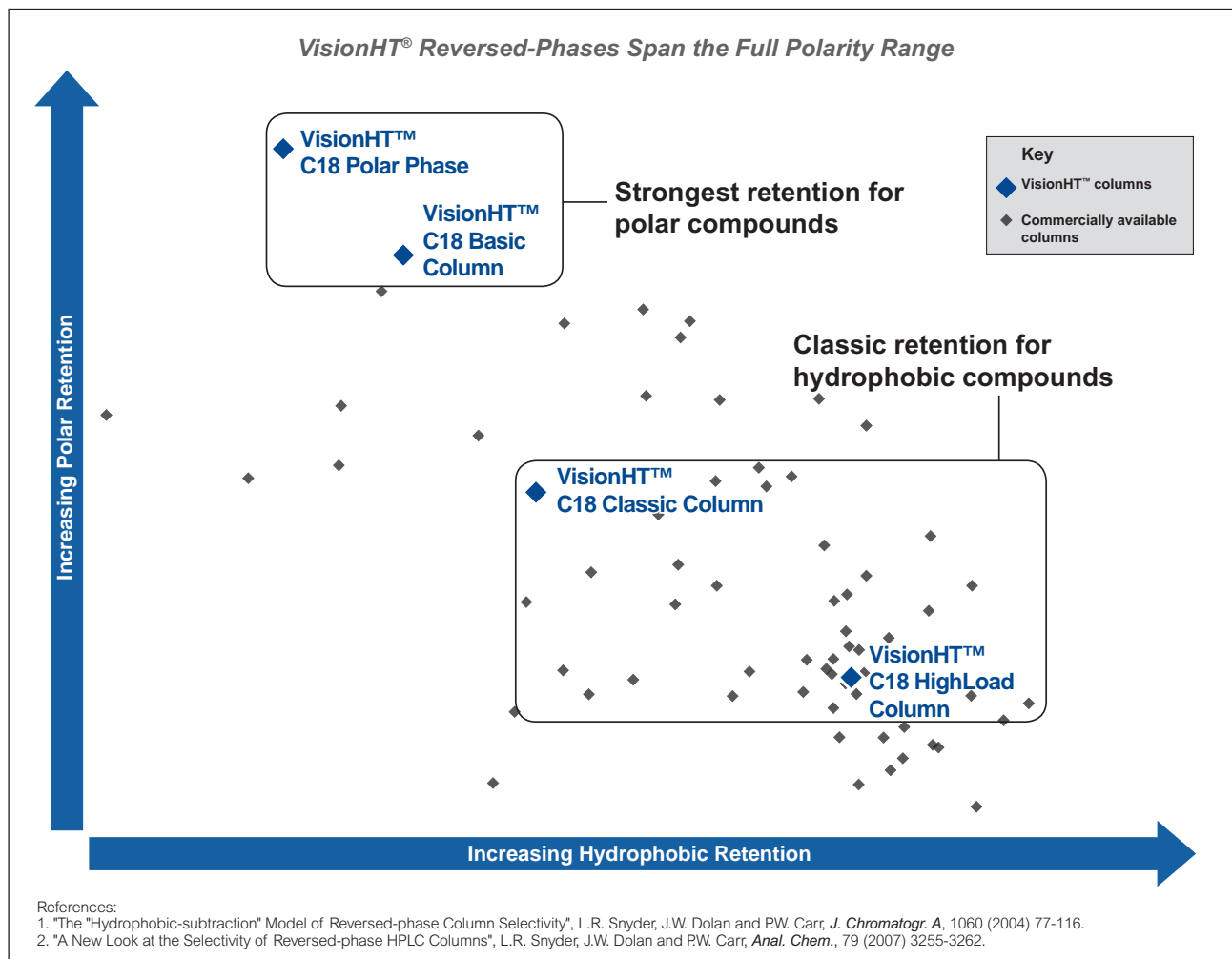
Optimizing and transferring methods between HPLC, UHPLC and preparative systems is not a simple and intuitive task. However, when the same base silica and bonding is available in sub-2, 3, 5, and 10µm particles and in a variety of column formats, methods can be more easily transferred across system types and between laboratories, improving efficiency and productivity.

### Identical Selectivity Across All Particle Sizes



## Broad Selectivity Range

Four reversed-phase column chemistries offer complementary selectivity. The unique VisionHT™ C18 Polar and Basic phases retain polar compounds while the C18 HighLoad has a more traditional reversed-phase selectivity. Using phases with orthogonal selectivity gives confidence that if one phase does not produce the separation the other will.

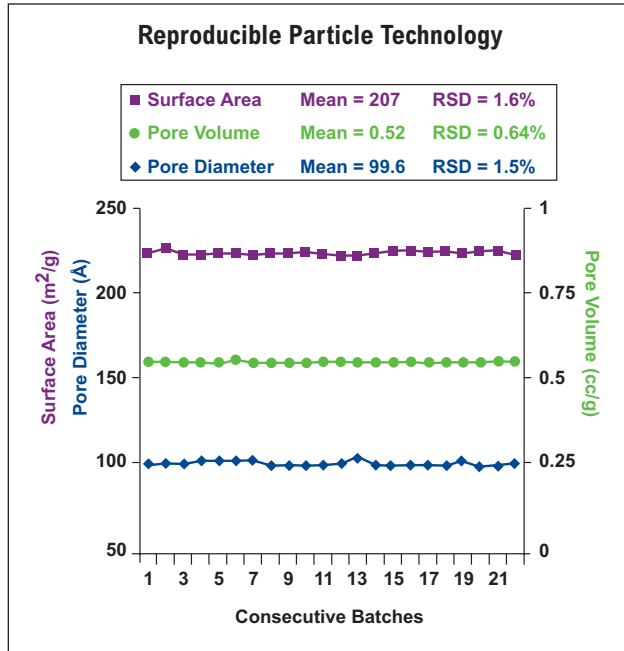


# hplc columns & accessories

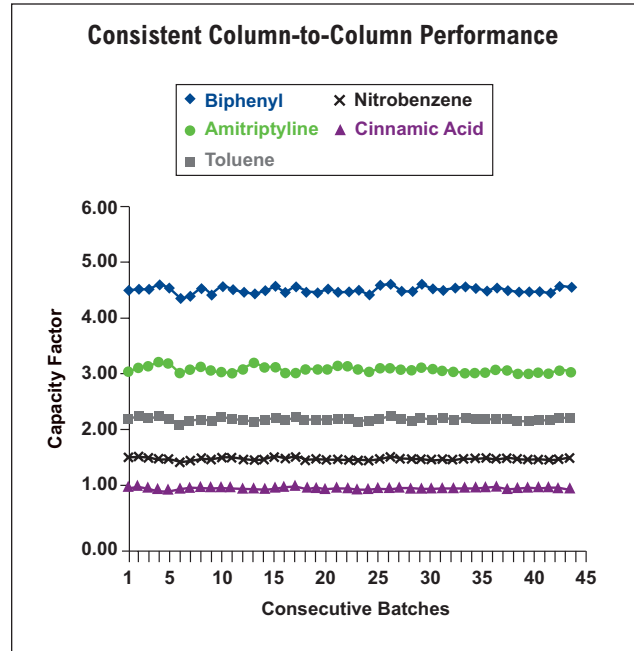
hplc columns

## Consistent and Reliable Performance

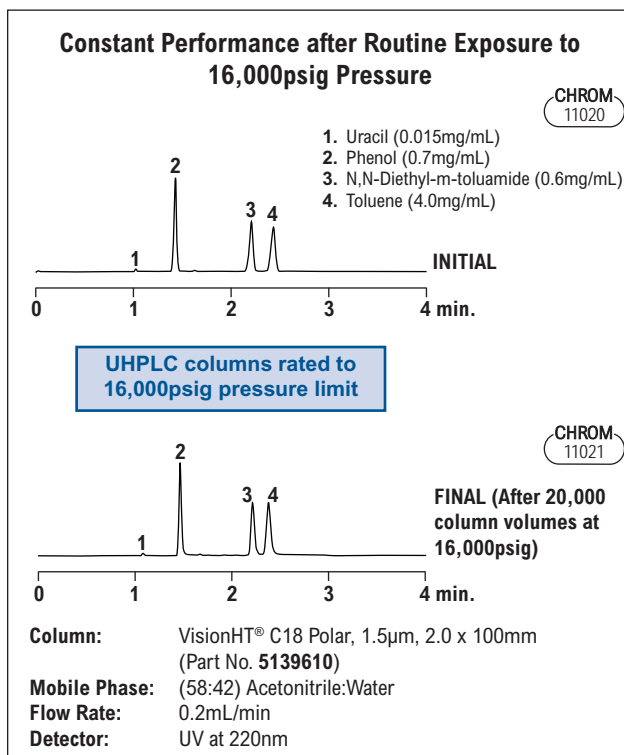
Ultra-high mechanical strength silica and robust bonding chemistry minimize variations in capacity and selectivity. Media consistency combined with reproducible column packing methods delivers reliable performance and long column lifetime.



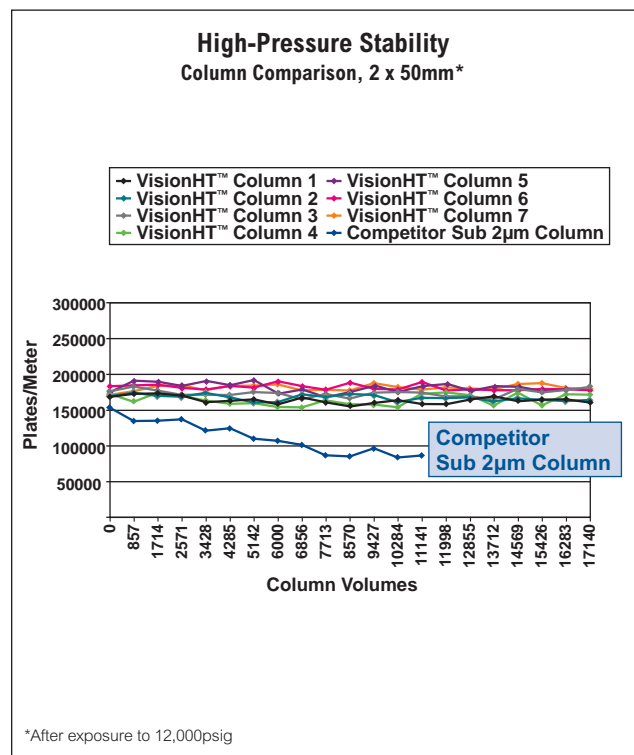
VisionHT<sup>®</sup> silica's surface area, pore volume, and pore diameter are highly reproducible.



VisionHT<sup>®</sup> media and advance packing methods produce columns with highly consistent capacity and selectivity.



Before and after chromatograms show a consistent level of performance after exposure to 16,000psig pressures for 20,000 column volumes.



Competitive columns lose performance over time under high-pressure conditions while VisionHT<sup>®</sup> columns remain stable.

## Method Development Ultra MD® Kits — Experience Broad Selectivity Range of the VisionHT™ Phases

Ultra MD® kits include 4 phases with orthogonal selectivity to enable fast and efficient method development for the separation of very polar to very hydrophobic compounds.

### VisionHT® Column Ultra MD® Kits

Description	Phases	Dimensions	Part No.
Ultra MD® Kit 1	C18 Classic, C18 Polar, C18 HighLoad, C18 Basic	2 x 100mm	5142692
Ultra MD® Kit 2	C18 Classic, C18 Polar, C18 HighLoad, C18 Basic	2 x 50mm	5142693
Ultra MD® Kit 3	C18 Classic, C18 Polar, C18 HighLoad, C18 Basic	1 x 50mm	5142691

## VisionHT® Guard Columns — Protect Your Column to Minimize Downtime and Reduce Cost



Couple the zero-dead volume integral guard directly to any VisionHT™ column, with no loss in efficiency.

hplc columns

### VisionHT® Columns

Format		i.d. (mm)	Length (mm)	Particle Size (µm)	C18 HighLoad Part No.	C18 Basic Part No.	C18 Classic Part No.	C18 Polar Part No.	HILIC Part No.	Silica Part No.
UHPLC	U	1	20	1.5	5142540	5141902	5139555	5139556	5141910	—
		1	30	1.5	5142541	5141903	5139559	5139601	5141912	—
		1	50	1.5	5142542	5141904	5139603	5139604	—	5141921
		1	100	1.5	5142543	5141905	5139607	5139608	—	5141923
		2	20	1.5	5142544	5141906	5139557	5139558	5141916	—
		2	30	1.5	5142545	5141907	5139600	5139602	5141917	—
		2	50	1.5	5142546	5141908	5139605	5139606	5141919	5141922
		2	100	1.5	5142547	5141909	5139609	5139610	5141920	5141924
		2	150	1.5	5148861	5148862	5148863	5148864	5149010	—
		Expedite™	E	2.1	20	1.5	5151986	5152009	5152043	5152077
4.6	20			1.5	5151985	5152008	5152042	5152076	—	—
Microbore	M	2.1	50	3	5151981	5152004	5151948	5152072	5152091	—
		2.1	100	3	5151980	5152003	5151947	5152071	—	—
		2.1	150	3	5151979	5152002	5151946	5152070	5152090	5152116
Solvent Reducer	SR	3	100	3	5151978	5152001	5152025	5152069	—	—
		3	150	3	5151977	5152000	5152024	5152068	—	—
		3	250	3	5151975	5151998	5152022	5152066	5152089	5152115
		3	150	5	5151976	5151999	5152023	5152067	—	—
Analytical	A	4.6	50	3	5151973	5151996	5152020	5152064	5152087	5152113
		4.6	100	3	5151972	5151995	5152019	5152063	—	—
		4.6	150	3	5151971	5151994	5152018	5152062	5152086	5152112
		4.6	150	5	5151970	5151993	5152017	5152061	5152085	5152111
		4.6	250	5	5151920	5151921	5152016	5152060	5152084	—
Rocket™	R	7	33	1.5	5151984	5152007	—	5152075	5152110	—
		7	53	3	5151983	5152006	5152040	5152074	5152093	—
		7	53	1.5	5151982	5152005	5151949	5152073	5152092	—
Preparative	P	10	150	5	5151987	5152010	5152044	5152078	—	—
		10	250	5	5151988	5152011	5152045	5152079	—	—
		22	150	5	5151989	5152012	5152046	5152080	—	—
		22	250	5	5151990	5152013	5152047	5152081	—	—
		22	250	10	5151991	5152014	5152048	5152082	—	—
Capillary	G	1	5	1.5	5142549	5141953	5141950	5141951	5141955	5141957
Guard*		2	5	1.5	5142548	5141952	5141594	5141595	5141954	5141956
All-Guard™ <sub>3pk</sub> **	G	2.1	7.5	3	5155906	5155908	5155907	5155909	5155911	5155912
		4.6	7.5	5	5155900	5155902	5155901	5155903	5155904	5155905

\*Requires Capillary holder, Part No. 3118351.

\*\*Requires All-Guard™ Holder, Part No. 80101.

### more info

For detailed information on column formats, see page 3.

### technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)

Online: [www.discoverysciences.com](http://www.discoverysciences.com)

## Alltima™ HP Columns

### Stability, Purity and Performance

- Better peak symmetry—high-purity silica eliminates peak tailing problems
- Long column life—exceptional column stability minimizes downtime and reduces cost
- Ideal for microbore or critical analysis—low to no detectable column bleed
- Multiple selectivity options—optimizes retention, resolution and analysis time

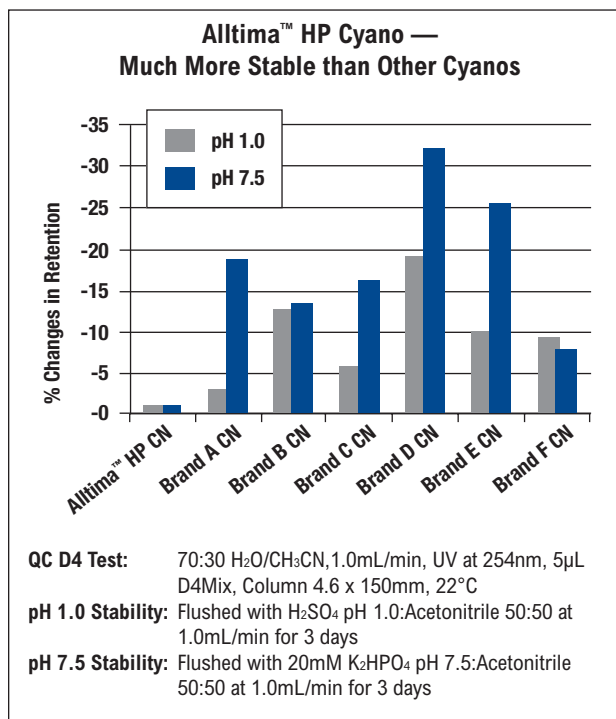
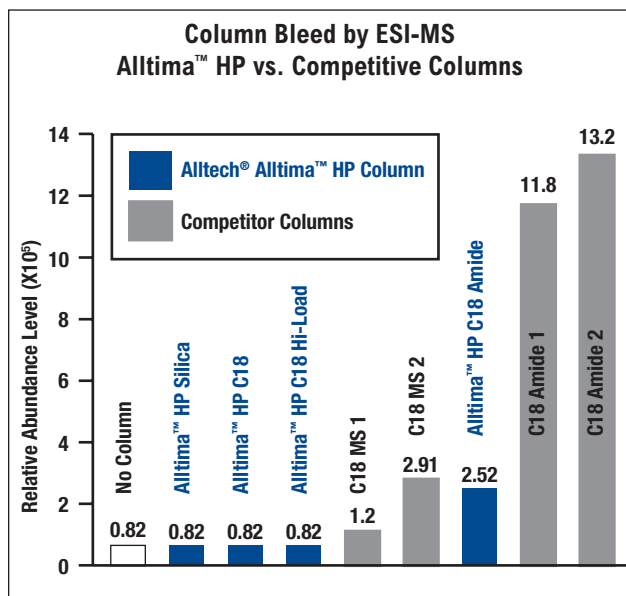


Alltima™ HP columns combine our best phase chemistries with high-purity silica. The result is one product family with the selectivity and performance needed to help overcome your most challenging separation needs.

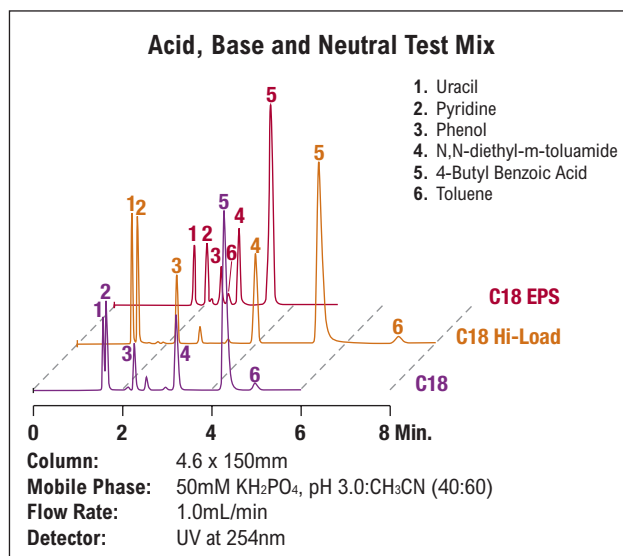
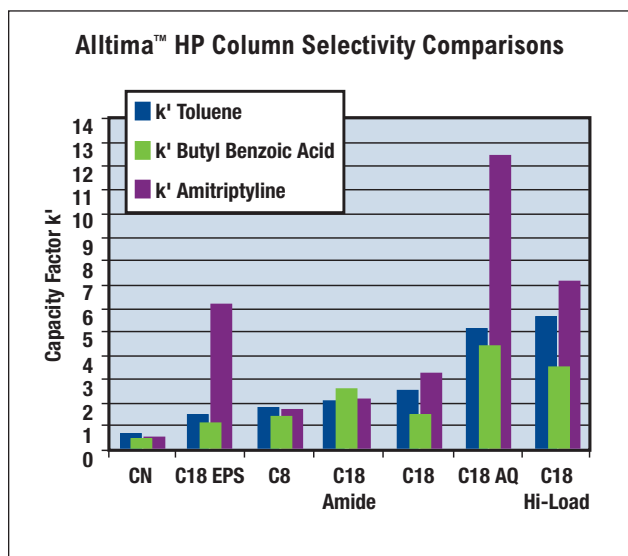
Alltima™ HP Phase Specifications							
Phase	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	Endcapped	Chromatographic Properties	Application/Benefit	USP L-code
C18	190	200	12	Yes	Classic reversed-phase retention and selectivity.	Routine applications.	L1
C18 EPS	190	200	4	Yes	Greater retention and enhanced peak symmetry for polar compounds. Alternate selectivity to traditional reversed-phases.	Reversed-phase applications where C18 is too retentive.	L1
C18 Hi-Load	100	450	24	Yes	Highest carbon load for superior retention and loadability.	High resolution for complex samples.	L1
C18 AQ	100	450	20	Yes	100% water wettable.	Applications requiring high aqueous mobile phases.	L1
C18 Amide	190	200	12	Yes	Polar-embedded phase with extremely low bleed. Compatible with microbore.	Basic compounds in neutral to alkaline pH, MS applications.	L1
C8	190	200	8	Yes	Lower capacity compared to C18 phases.	Reversed-phase applications where C18 is too retentive.	L7
Cyano	190	200	4	Yes	Extremely stable, long life and reproducible.	Ideal for basic drug analysis.	L10
Silica	100	450	—	No	Highly polar phase.	General purpose normal phase applications.	L3
HILIC	120	230	—	No	Hydrophilic interaction chromatography uses small amounts of water for increased sensitivity with microbore applications.	Very polar analytes that cannot be retained by reversed-phase.	L3

### The Alltima™ HP Column Family Demonstrates Low Bleed

Alltima™ HP columns are among the lowest-bleed columns available, making them ideal for microbore applications. The C18 amide polar-embedded phase and the cyano phase have significantly lower column bleed than competitive columns.



## Selectivity Options in One Product Family



### Alltima™ HP Columns

Format	i.d. (mm)	Length (mm)	Particle Size (µm)	C18 Part No.	C18AQ Part No.	EPS C18 Part No.	C18 Hi-Load Part No.	C18 Amide Part No.	C8 Part No.	CN Part No.	Silica Part No.	HILIC Part No.
Capillary <b>C</b>	0.15	50	3	22153	22560	—	22190	22255	22479	—	—	22515
	0.15	100	3	22154	22561	—	—	—	22480	—	—	22516
	0.15	150	3	22155	22562	—	—	—	22481	—	—	22517
	0.3	50	3	22156	22563	—	22193	22258	22482	—	—	22518
	0.3	100	3	22157	22564	—	—	—	22483	—	—	22519
	0.3	150	3	22158	22565	—	—	—	22484	—	—	22520
Expedite™ <b>E</b>	2.1	20	1.5	—	—	—	—	—	—	—	—	86471
	2.1	10	3	—	—	—	—	—	—	—	—	86473
	2.1	20	3	87674	—	87710	87692	87728	87746	—	—	—
	4.6	10	3	87675	87815	—	—	—	—	—	—	—
	4.6	20	3	87676	87816	—	87694	—	87748	—	—	—
Microbore <b>M</b>	2.1	50	3	87504	—	87508	87506	87510	87512	87514	—	86461
	2.1	100	3	87669	—	87705	87687	87723	87741	—	—	—
	2.1	150	3	87670	87810	87706	87688	87724	87742	87760	87788	86463
	2.1	150	5	87681	87821	87717	—	87735	87753	87781	87799	86465
	2.1	250	5	87682	87822	87718	87700	87736	—	—	87802	—
Solvent Reducer <b>SR</b>	3	150	3	87601	—	87604	87610	87607	87613	87616	87619	—
	3	150	5	87602	—	—	87611	87608	87614	—	87620	—
	3	250	5	87603	—	87606	87612	87609	87615	87618	87621	—
Analytical <b>A</b>	4.6	50	3	87826	87832	87833	87827	87829	—	87825	87831	—
	4.6	100	3	87667	87807	87703	87685	87721	87739	87757	—	—
	4.6	150	3	87668	87808	87704	87686	87722	87740	87758	87786	86462
	4.6	150	5	87679	87819	87715	87697	87733	87751	87769	87797	86464
	4.6	250	5	87680	87820	87716	87698	87734	87752	87780	87798	86466
Rocket™ <b>R</b>	7	53	1.5	—	—	—	—	—	—	—	—	—
	7	33	3	87671	87811	—	—	87725	—	87761	87789	86469
	7	53	3	87672	87812	87708	87690	—	87744	87762	87790	86470
Guard*3pk <b>G</b>	2.1	7.5	5	87683	87823	87719	87701	87737	87755	87783	87803	86479
	3	7.5	—	87622	—	—	87624	87625	87627	87626	—	—
	4.6	7.5	5	87684	87824	—	87702	87738	87756	87784	87804	86480

\*Requires All-Guard™ Holder, Part No. 80101.

### more info

For detailed information on column formats, see page 3.

### technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)  
 Online: [www.discoverysciences.com](http://www.discoverysciences.com)

## Prevail™ Columns

### Stable from 100% Organic to 100% Aqueous

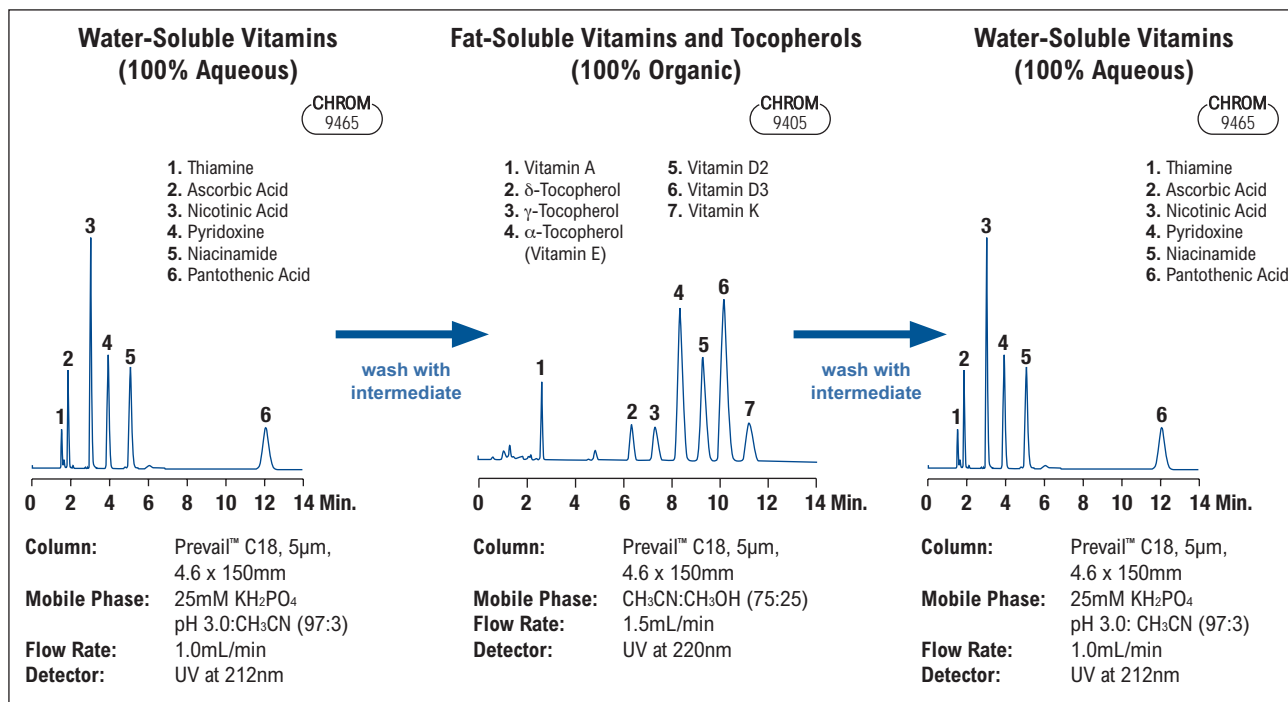
- Exceptional bonded phase stability for long column life
- Excellent sensitivity with microbore and ELSD applications



Prevail™ HPLC columns offer exceptional versatility for difficult separations. Traditional reversed-phase packings experience bonded phase collapse under highly aqueous (>95%) conditions. Prevail™ bonded phases remain fully extended in 100% aqueous and offer a high carbon load for exceptional retention at 100% organic. Retain both polar and non-polar compounds simply by adjusting the mobile phase.

Prevail™ Phase Specifications							
Phase	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	Endcapped	Chromatographic Properties	Application/Benefit	USP L-code
C18 Select	110	350	17	Yes	Stable in 100% aqueous to 100% organic mobile phases.	Same benefits as Prevail™ C18, but slightly more retentive.	L1
C18	110	350	15	Yes	Stable in 100% aqueous to 100% organic mobile phases.	Flexibility to switch between varied mobile phase conditions to suit a variety of applications. Excellent sensitivity for microbore applications.	L1
C8	110	350	8	Yes	Stable C8 phase.	Use for highly hydrophobic compounds that retain too strongly on C18.	L7
Phenyl	110	350	7	Yes	Lowest hydrophobic capacity.	Selective for aromatic compounds in a variety of mobile phase conditions.	L11
Cyano	110	350	—	Yes	General purpose cyano suitable for normal or reversed-phase use.	Rugged normal phase applications.	L10
Amino	110	350	—	No	Stable in 100% aqueous to 100% organic mobile phases.	Use for carbohydrates or as a weak anion exchanger.	L8
Silica	110	350	—	No	Highly polar phase.	General purpose normal phase applications.	L3
Organic Acid	110	350	—	Yes	Highly efficient silica-based, acid-stable.	Separate common organic acids with unsurpassed resolution, speed and sensitivity. Lower cost than polymeric columns.	—
Carbohydrate ES	—	—	—	No	Extremely stable hybrid phase.	Excellent for mono- and oligosaccharides and sugar alcohols.	—

### Switch Between 100% Aqueous and 100% Organic Mobile Phases on the Same Column



## Prevail™ Carbohydrate ES Columns

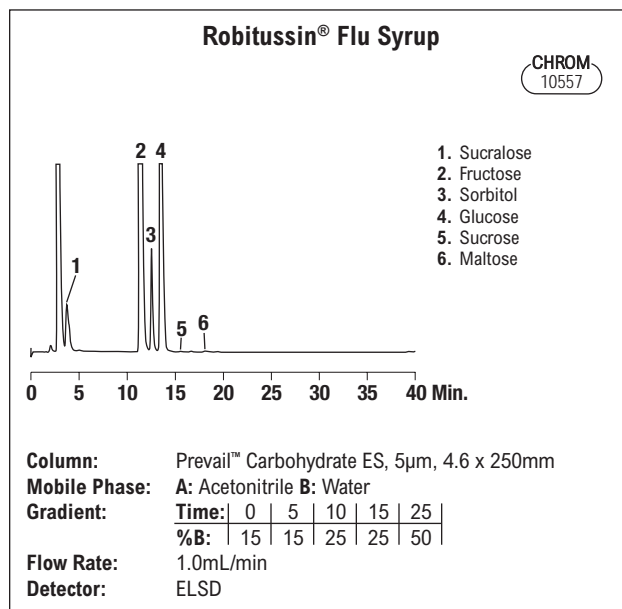
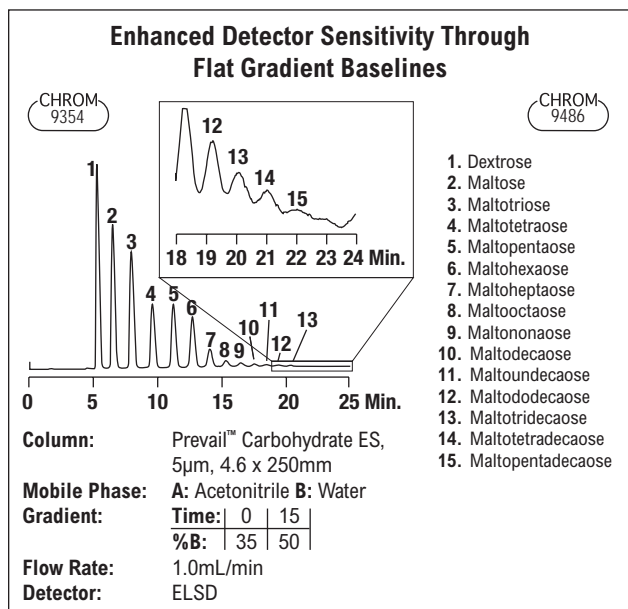
- Longer column life—hybrid phase has the ruggedness of silica with the stability of a polymer
- Quieter baselines compared to traditional amino carbohydrate columns, even with gradients
- Reduce run times with more mobile phase choices
- Compatible with gradient ELSD applications

### Quiet Gradient Baselines

Prevail™ Carbohydrate ES columns are excellent for isocratic separations with common detectors, but the column's real power shows with the ELSD and a solvent gradient. Enjoy the powerful selectivity, reduced run times and efficient peaks from gradients while seeing the quiet, stable baselines that maximize sensitivity.

### Better Resolution and Peak Shape

Prevail™ Carbohydrate ES columns are versatile enough for mono- and oligosaccharides and sugar alcohols. They produce single peaks for reducing sugars at ambient temperatures, eliminating the need for column heating.



### Prevail™ Columns

Format	i.d. (mm)	Length (mm)	Particle Size (µm)	C18 Part No.	C18 Select Part No.	C8 Part No.	Phenyl Part No.	CN Part No.	Amino Part No.	Silica Part No.	Organic Part No.	Carbohydrate ES Part No.
Expedite™	2.1	10	3	43861	—	—	—	—	—	43841	—	—
	2.1	20	3	43827	—	—	—	—	—	43826	—	—
	4.6	10	3	43878	—	—	—	—	—	43858	—	—
	4.6	20	3	43804	—	—	—	—	—	43816	—	—
Microbore	2.1	50	3	43818	99309	—	—	—	—	43868	—	—
	2.1	100	3	43871	99312	—	—	—	—	43805	88648	—
	2.1	150	3	99200	99313	99212	—	99243	—	—	—	—
	2.1	150	5	99206	—	99218	99237	—	—	99273	—	—
	2.1	250	5	—	99311	—	—	—	—	—	—	—
Solvent Reducer	3	150	3	99322	99315	99325	—	99338	—	99341	—	—
	3	150	5	99320	99316	—	99326	99329	—	99339	—	—
	3	250	5	99321	99317	99324	99327	99330	—	99340	—	—
Analytical	4.6	50	3	43829	—	43922	—	43924	43926	43842	—	—
	4.6	100	3	99202	99302	99214	—	99245	99257	—	—	—
	4.6	150	3	99204	99303	99216	—	99247	99259	99271	88655	—
	4.6	50	5	43903	—	—	—	—	—	—	—	—
	4.6	150	5	99208	99300	99224	99239	99251	99263	99275	88640	35102
Rocket™	4.6	250	5	99210	99301	99229	—	99253	99265	99277	88645	35101
	7	33	3	99280	99304	—	—	—	—	—	—	—
	7	53	3	99279	99305	—	—	—	—	—	50755	—
Guard*	7	53	5	—	—	—	—	—	—	—	—	35104
	2.1	7.5	5	96682	96690	99128	99130	99131	—	99133	—	—
	3	7.5	5	99350	99119	—	99352	99353	—	99354	—	—
	4.6	7.5	5	99286	96455	99287	99288	99289	99290	99291	96429	96435

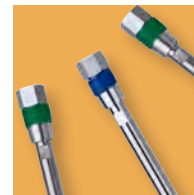
\*Requires All-Guard™ Holder, Part No. 80101.



## GraceSmart™ Columns

High Quality at Exceptional Value

- High purity phases
- Efficient and reproducible separations
- Classic reversed-phase selectivity

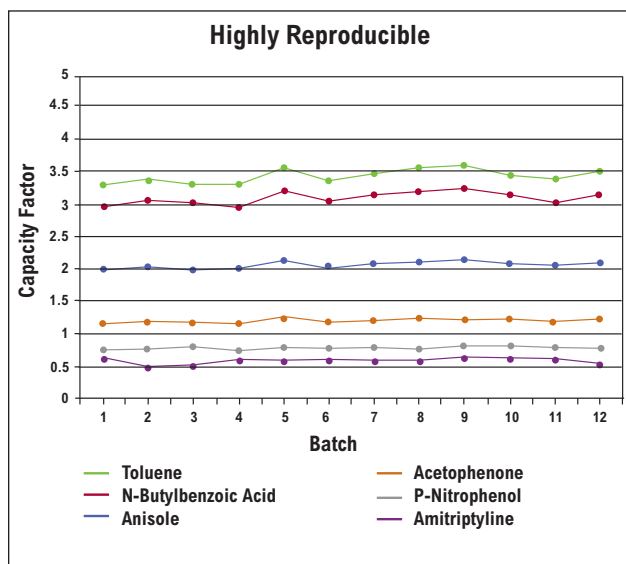


GraceSmart™ HPLC phases use high purity silica and are monomerically bonded with uniform coverage. This translates into symmetrical peaks for acids/bases and predictable reversed-phase selectivity. Whether for routine analysis or new method development, use GraceSmart™ columns to get premium performance at an exceptional value.

GraceSmart™ Phase Specifications						
Phase	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	Endcapped	Chromatographic Properties	Application/Benefit
C18	120	220	10	Yes	High purity silica with monomeric C18 bonding offers classical reversed-phase selectivity.	Excellent value for general purpose, routine applications.

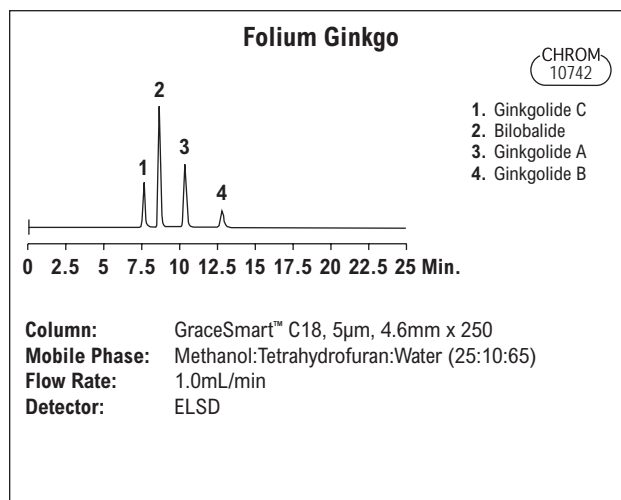
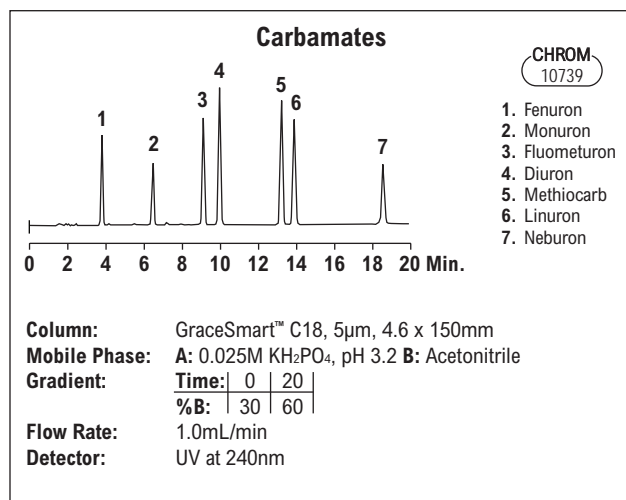
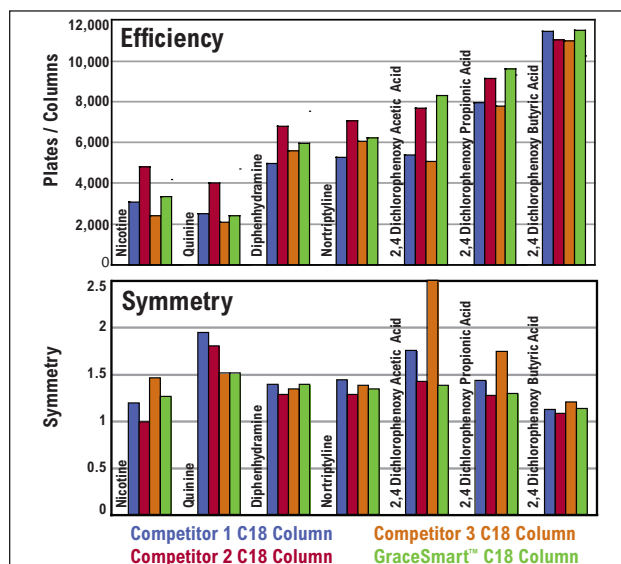
### Consistent and Reproducible

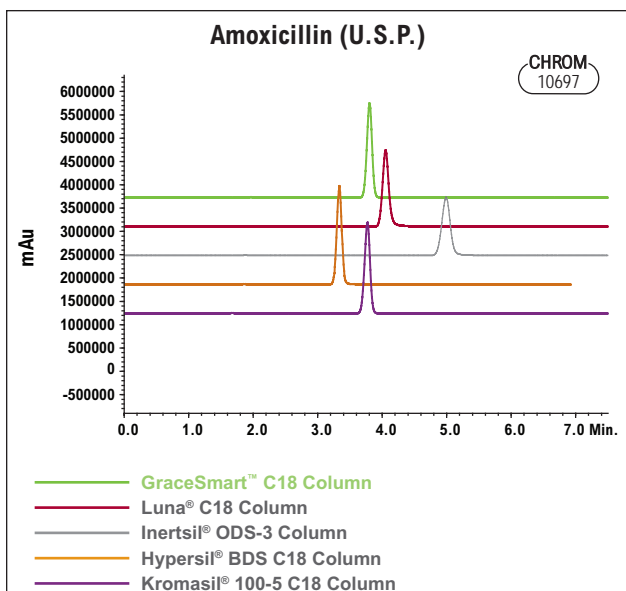
Our tightly controlled silica synthesis and bonding keep capacity factor and selectivity variations to a minimum for acidic, basic, and neutral compounds.



### Competitive Performance

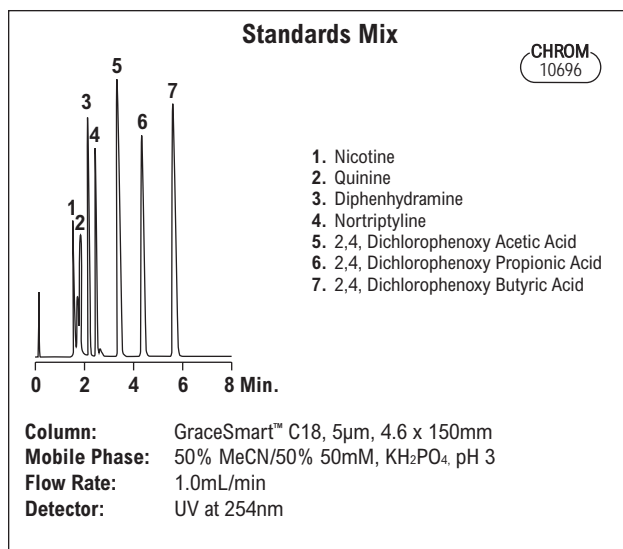
GraceSmart™ columns show similar or better efficiency and asymmetries for challenging base and acid components in comparison to industry leading columns.





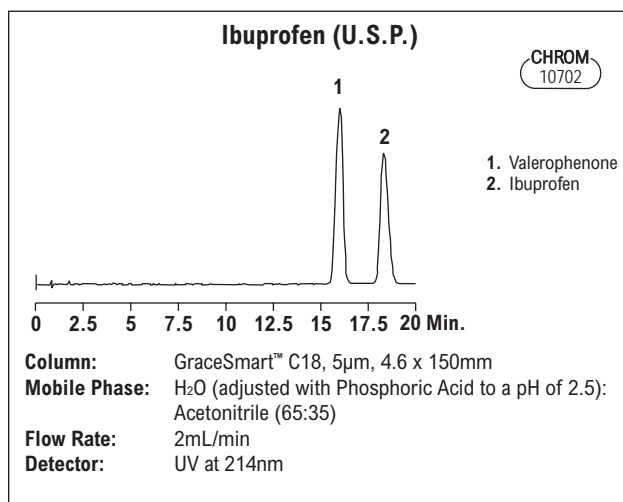
**Column:** GraceSmart™ C18, 5µm, 4.6 x 250mm  
**Mobile Phase:** Isocratic, 0.05N Monobasic Potassium Phosphate pH 5:Acetonitrile (96:4)  
**Flow Rate:** 1.5mL/min  
**Detector:** UV at 230nm

	USP Spec	GraceSmart™ C18	Luna® C18	Inertsil® ODS-3	Hypersil® BDS C18	Kromasil® 100-5 C18
Ret. Time (min)	N/A	3.800	4.050	4.988	3.333	3.768
Theoretical plates	≥1700	8543	7216	6230	7049	7680
Tailing Factor	≤2.5	1.015	1.180	1.041	1.034	0.979
k'	1.1 ≤ k' ≤ 2.8	1.2	1.6	2.3	0.99	1.6



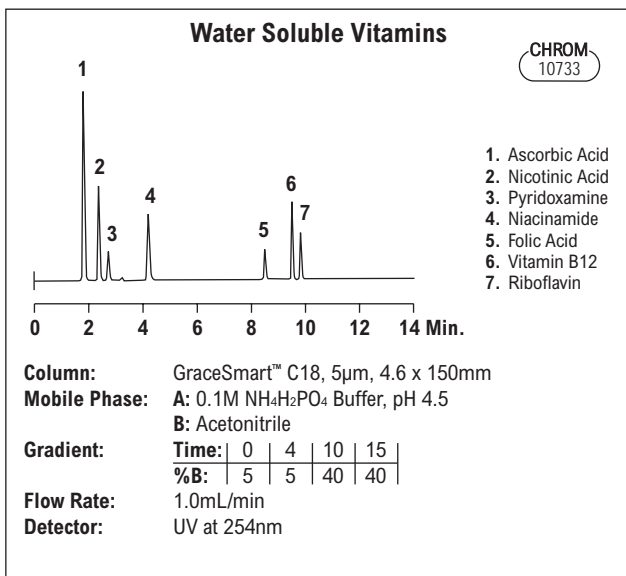
1. Nicotine
2. Quinine
3. Diphenhydramine
4. Nortriptyline
5. 2,4, Dichlorophenoxy Acetic Acid
6. 2,4, Dichlorophenoxy Propionic Acid
7. 2,4, Dichlorophenoxy Butyric Acid

**Column:** GraceSmart™ C18, 5µm, 4.6 x 150mm  
**Mobile Phase:** 50% MeCN/50% 50mM, KH<sub>2</sub>PO<sub>4</sub>, pH 3  
**Flow Rate:** 1.0mL/min  
**Detector:** UV at 254nm



1. Valerophenone
2. Ibuprofen

**Column:** GraceSmart™ C18, 5µm, 4.6 x 150mm  
**Mobile Phase:** H<sub>2</sub>O (adjusted with Phosphoric Acid to a pH of 2.5): Acetonitrile (65:35)  
**Flow Rate:** 2mL/min  
**Detector:** UV at 214nm



1. Ascorbic Acid
2. Nicotinic Acid
3. Pyridoxamine
4. Niacinamide
5. Folic Acid
6. Vitamin B12
7. Riboflavin

**Column:** GraceSmart™ C18, 5µm, 4.6 x 150mm  
**Mobile Phase:** A: 0.1M NH<sub>4</sub>H<sub>2</sub>PO<sub>4</sub> Buffer, pH 4.5  
 B: Acetonitrile  
**Gradient:** Time: 0 | 4 | 10 | 15 |  
 %B: 5 | 5 | 40 | 40 |  
**Flow Rate:** 1.0mL/min  
**Detector:** UV at 254nm

### GraceSmart™ Columns

Format	i.d. (mm)	Length (mm)	Particle Size (µm)	C18 Part No.
Microbore <b>M</b>	2.1	50	3	5141756
	2.1	100	3	5141755
	2.1	150	3	5141754
	2.1	150	5	5138811
	2.1	250	5	5138813
Analytical <b>A</b>	4.6	50	3	5141811
	4.6	100	3	5141753
	4.6	150	3	5141752
	4.6	150	5	5138812
	4.6	250	5	5138810

### more info

For detailed information on column formats, see page 3.

### technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)  
 Online: [www.discoverysciences.com](http://www.discoverysciences.com)

## Vydac® MS Columns

### Unsurpassed Resolution, Sensitivity and Recovery for Biomolecules

- Unique selectivity reveals peaks otherwise masked by other C18 columns
- Excellent peak shape with little or no TFA
- High protein recoveries make scale-up easy

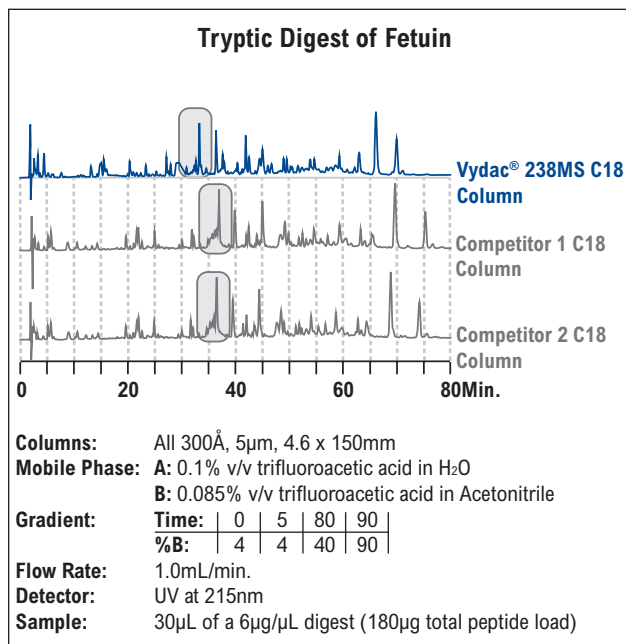


Vydac® MS columns are the latest development in the ongoing effort to provide the best reversed-phase HPLC columns for biomolecules. A proprietary surface treatment and bonding process give Vydac® MS columns truly unique selectivity. A variety of reversed-phases makes this product line suitable for small peptides to large intact, undenatured proteins.

Vydac® MS Phase Specifications							
Phase	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	Endcapped	Chromatographic Properties	Application/Benefit	USP L-code
218MS C18	300	60–110	8	Yes	Polymeric bonding, highest hydrophobic interaction and unique geometric selectivity.	Use for simple enzymatic digests (<12 proteins) or biomolecules 0–5K MW.	L1
238MS C18	300	70	4	Yes	Monomeric bonding offers increased peptide interaction and generally yields higher peak counts.	Use for same applications as 218MS, but offers different C18 selectivity.	L1
208MS C8	300	70	5	Yes	Lower hydrophobicity is better for larger biomolecules.	Ideal for biomolecules 5–10K MW.	L7
214MS C4	300	70–110	3	Yes	Lower capacity than C18 or C8, suitable for hydrophobic proteins or when minimal organic is desired.	Ideal for biomolecules >10K MW, undenatured intact proteins, antibodies, oligonucleotides, human growth hormone.	L26
219MS Diphenyl	300	70	4	Yes	Lowest capacity, aromatic functional groups.	Highly selective for proteins with aromatic side chains.	L11

### Unique Selectivity

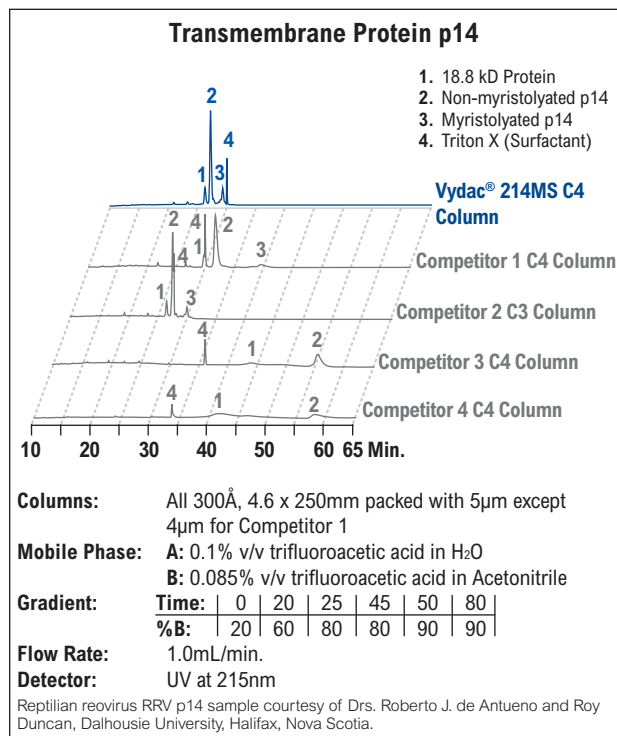
Improved selectivity for peptides on the Vydac® MS columns results in better primary structure definition and easier identification of degradation products and other protein characteristics.



Sample components interfere with the separation of peptides on the Competitor 1 and 2 columns, appearing as a chromatographic “hump”. The unique selectivity of Vydac® MS columns solves separation problems.

### Unsurpassed Recovery and Peak Symmetry

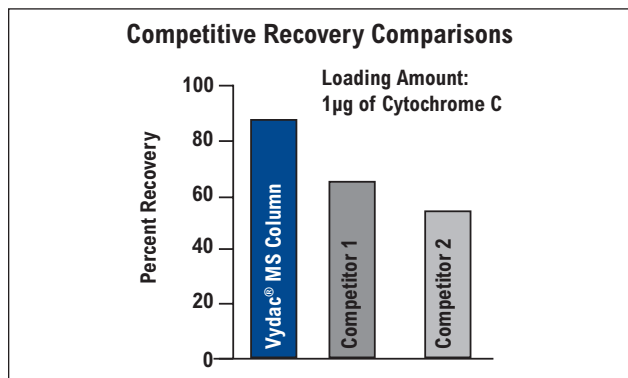
Many proteins are bound to the cell membrane and are very hydrophobic. Although hydrophobic proteins are particularly difficult to separate, Vydac® MS columns provide excellent recovery and peak shape for these molecules.



The Vydac® column provides better performance for this highly hydrophobic membrane protein (RRV p14) and its fatty acid modified (myristoylated) form.

## High Protein Recovery

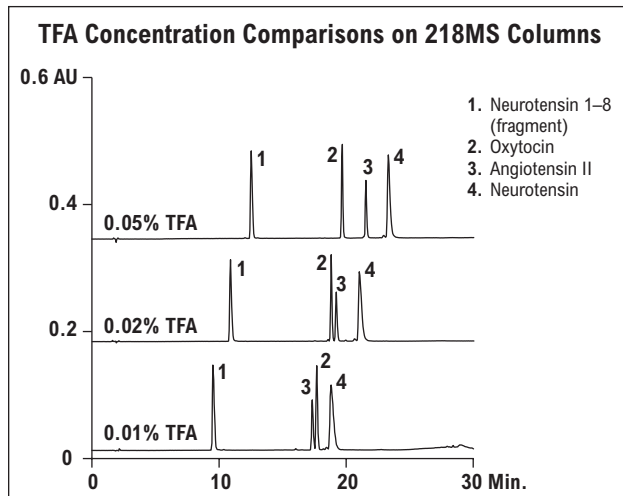
Unique surface chemistry reduces adsorption of proteins for higher recoveries and increases mass loading, which makes Vydac® MS columns ideal for preparative chromatography.



Vydac® MS C4 column provides more than 20% better recovery for Cytochrome C.

## Excellent Peak Shape with Little or No TFA

TFA is UV absorbent and contributes background at low UV wavelengths. It is additionally problematic with electrospray MS where it interferes with ion generation and reduces MS sensitivity.



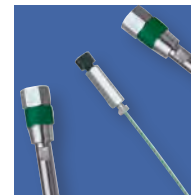
## Vydac® MS Columns

Format	i.d. (mm)	Length (mm)	Particle Size (µm)	218MS (C18) Part No.	238MS (C18) Part No.	208MS (C8) Part No.	214MS (C4) Part No.	219MS (diphenyl) Part No.	Holder Part No.
Capillary <b>C</b>	0.075	100	3	5106100	—	—	—	—	—
	0.075	150	3	5106079	—	—	—	—	—
	0.15	250	3	5106087	—	—	—	—	—
	0.3	250	3	5106084	—	—	—	—	—
	0.5	250	3	5106093	—	—	—	—	—
	0.075	50	5	218MS5.07505	238MS5.07505	208MS5.07505	214MS5.07505	—	—
	0.075	100	5	218MS5.07510	238MS5.07510	208MS5.07510	214MS5.07510	—	—
	0.075	150	5	218MS5.07515	238MS5.07515	208MS5.07515	214MS5.07515	—	—
	0.075	250	5	218MS5.07525	238MS5.07525	208MS5.07525	214MS5.07525	—	—
	0.15	50	5	218MS5.1505	238MS5.1505	208MS5.1505	214MS5.1505	—	—
	0.15	100	5	218MS5.1510	238MS5.1510	208MS5.1510	214MS5.1510	—	—
	0.15	150	5	218MS5.1515	238MS5.1515	208MS5.1515	214MS5.1515	—	—
	0.15	250	5	218MS5.1525	238MS5.1525	208MS5.1525	214MS5.1525	—	—
	0.3	50	5	218MS5.305	238MS5.305	208MS5.305	214MS5.305	—	—
	0.3	100	5	218MS5.310	238MS5.310	208MS5.310	214MS5.310	—	—
	0.3	150	5	218MS5.315	238MS5.315	208MS5.315	214MS5.315	—	—
	0.3	250	5	218MS5.325	238MS5.325	208MS5.325	214MS5.325	—	—
	0.5	50	5	218MS5.505	238MS5.505	208MS5.505	214MS5.505	—	—
	0.5	100	5	218MS5.510	238MS5.510	208MS5.510	214MS5.510	—	—
	0.5	150	5	218MS5.515	238MS5.515	208MS5.515	214MS5.515	—	—
0.5	250	5	218MS5.525	238MS5.525	208MS5.525	214MS5.525	—	—	
Microbore <b>M</b>	2.1	50	5	218MS5205	238MS5205	208MS5205	214MS5205	—	—
	2.1	100	5	218MS5210	238MS5210	208MS5210	214MS5210	219MS5210	—
	2.1	150	5	218MS5215	238MS5215	208MS5215	214MS5215	—	—
	2.1	250	5	218MS52	238MS52	208MS52	214MS52	—	—
Solvent Reducer <b>SR</b>	3	250	5	218MS53	—	—	214MS53	—	—
Analytical <b>A</b>	4.6	50	5	218MS5405	—	—	214MS5405	—	—
	4.6	100	5	218MS5410	238MS5410	—	214MS5410	—	—
	4.6	150	5	218MS5415	238MS5415	208MS5415	214MS5415	219MS5415	—
	4.6	250	5	218MS54	238MS54	208MS54	214MS54	—	—
Preparative <b>P</b>	10	150	5	—	—	—	214MS51015	—	—
	10	250	5	218MS510	—	—	214MS510	—	—
	10	250	10	218MS1010	—	—	214MS1010	—	—
	22	150	10	218MS102215	—	—	214MS102215	—	—
	22	250	10	218MS1022	—	—	214MS1022	—	—
Guard <b>G</b>	2.1	7.5	5	218GD52MS	238GD52MS	208GD52MS	214GD52MS	—	80101
	4.6	7.5	5	218GD54MS	238GD54MS	208GD54MS	214GD54MS	—	80101
Prep Guard <b>G</b>	10	10	5	218GCC510	—	—	214GCC510	—	2101342
	20	10	5	—	—	—	214GCC520	—	3110650
	30	30	10	218GCC1530	—	—	214GCC1530	—	3117320

## Vydac® Everest™ Columns

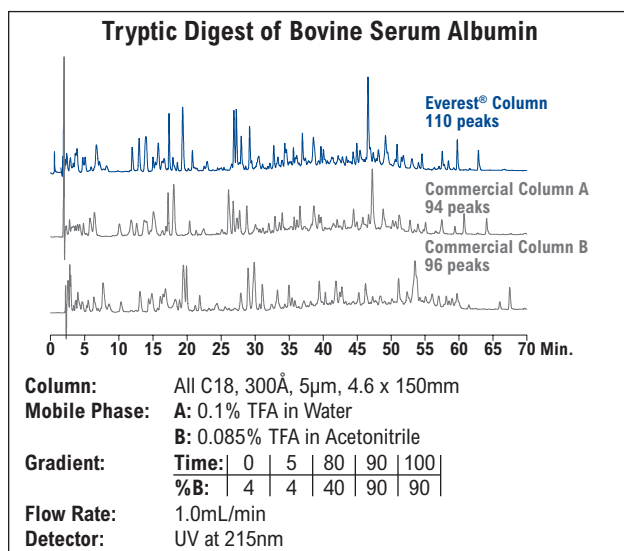
### High Resolution for Complex Peptide Digests

- Exceptionally high peak counts for better characterization
- Unique selectivity for both hydrophilic and hydrophobic peptides
- Excellent sensitivity with little or no TFA in the mobile phase



Everest™ columns have unique selectivity and sensitivity, which are the result of bonding technology that improves C18 surface coverage and deactivates residual silanols. Previously, the best 300Å C18 chemistries have had carbon coverage in the 2.8 to 3.6µmol/m<sup>2</sup> range. Everest™ C18 coverage is in excess of 4µmol/m<sup>2</sup> and approximates the theoretical limit based on surface area. This increased shielding of the base silica increases column life and reduces the amount of TFA required to shield the silica.

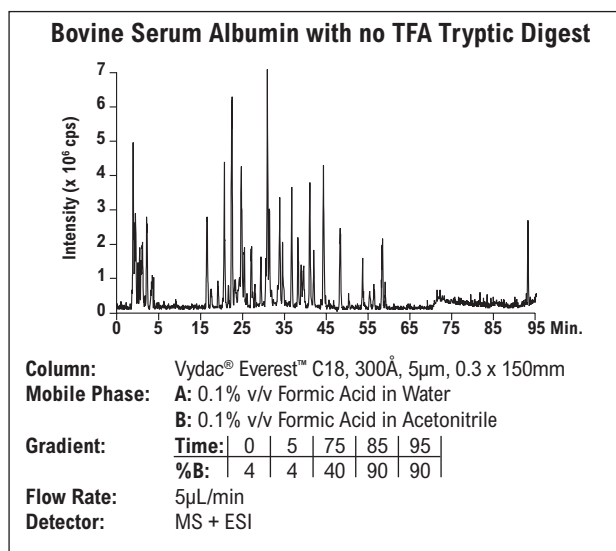
Vydac® Everest™ Phase Specifications							
Phase	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	Endcapped	Chromatographic Properties	Application/Benefit	USP L-code
238EV C18	300	70–110	6	Yes	Maximum surface coverage for highest resolution of complex samples.	Complex enzymatic digests (>12 proteins).	L1



Everest™ columns outperform competitor columns by providing higher-resolution separations (average of 17% higher peak counts than competitor columns tested).

#### Vydac® Everest™ Columns

Format	i.d. (mm)	Length (mm)	Particle Size (µm)	238EV (C18) Part No.
Capillary <b>C</b>	0.075	50	5	238EV5.07505
		100	5	238EV5.07510
	0.075	150	5	238EV5.07515
		0.15	100	5
	0.15	150	5	238EV5.1515
		0.15	250	5
	0.3	50	5	238EV5.305
		0.3	100	5
	0.3	150	5	238EV5.315
		0.3	250	5
	0.5	150	5	238EV5.515
		1	50	5
	1		150	5
		1	250	5
Microbore <b>M</b>	2.1		50	5
		100	5	238EV5210
	2.1	150	5	238EV5215
		2.1	250	5
Analytical <b>A</b>	4.6	50	5	238EV5405
		4.6	150	5
	4.6	250	5	238EV54



The Everest™ column performs exceptionally well with no TFA in the mobile phase, ensuring excellent microbore sensitivity.

#### Vydac® Everest™ Guard Columns

Format	i.d. (mm)	Length (mm)	Particle Size (µm)	238EV (C18) Part No.	Holder Part No.
Capillary <b>G</b>	0.3	10	5	238EV5C0130	GR-3710A
Guard					
Guard <b>G</b>	2.1	7.5	5	238GD52EV	80101
		4.6	7.5	5	238GD54EV

#### more info

For detailed information on column formats, see page 3.

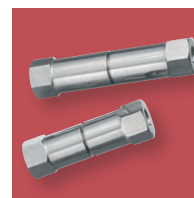
#### technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)  
Online: [www.discoverysciences.com](http://www.discoverysciences.com)

## Vydac® ProZap™ C18 Columns

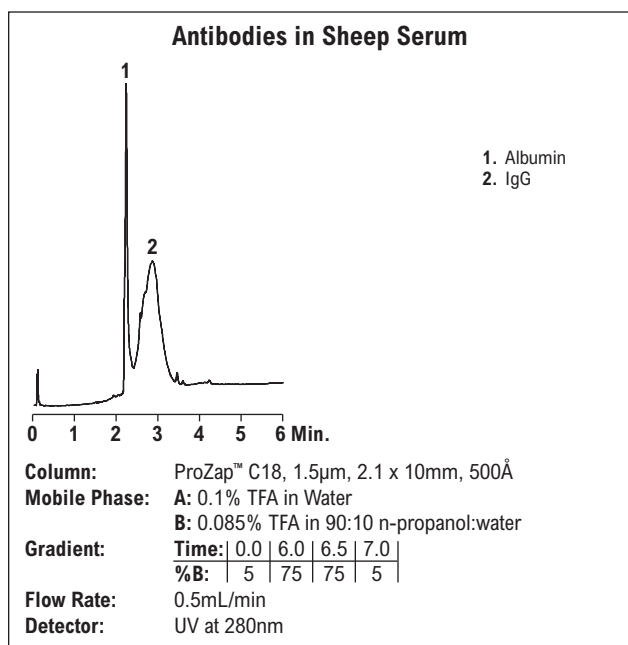
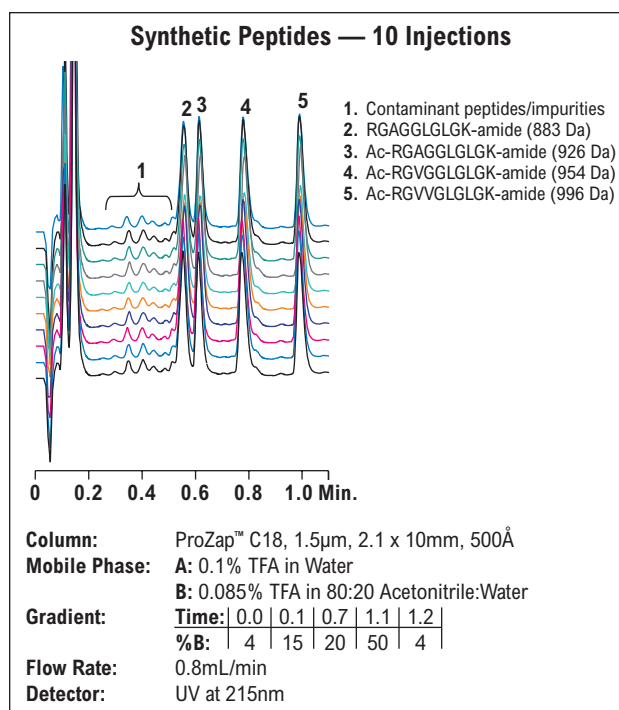
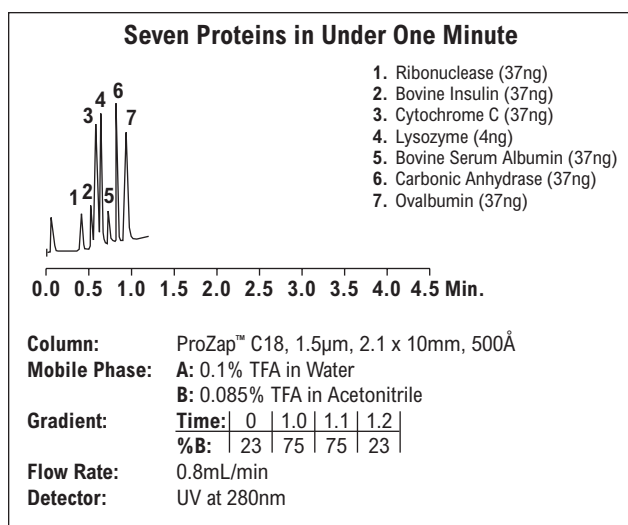
### Ultra Fast Protein and Peptide Separations

- Ten times faster bioseparations than traditional columns
- Ultra-high efficiency 1.5µm packing
- For use with conventional HPLC systems



The combination of ProZap™ 1.5µm, 500Å packings and short Expedite™ hardware delivers not only faster sample throughput, but also low back pressures suitable for conventional LC systems. Under gradient conditions, longer columns only increase run time and do not increase resolution. Proteins adsorb at the head of the column and then desorb with the critical mobile phase concentration. Since proteins do not interact with the full length of the packed bed, short columns are sufficient for full resolution. Separate proteins of broad molecular weight ranges in less than one minute.

Vydac® ProZap™ C18 Phase Specifications							
Phase	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	Endcapped	Chromatographic Properties	Application/Benefit	USP L-code
C18	500	59	3	Yes	Sub2µm, 500Å wide pore.	Ideal for fast, intact protein or peptide analysis.	L1



### Vydac® ProZap™ Columns

Format	i.d. (mm)	Length (mm)	Particle Size (µm)	Part No.
Expedite™	2.1	10	1.5	<b>35585</b>
	2.1	20	1.5	<b>35587</b>
	4.6	10	1.5	<b>35586</b>
	4.6	20	1.5	<b>35588</b>

### more info

For detailed information on column formats, see page 3.

## Vydac® TP Columns

### The Industry Standard for Polypeptide Separations

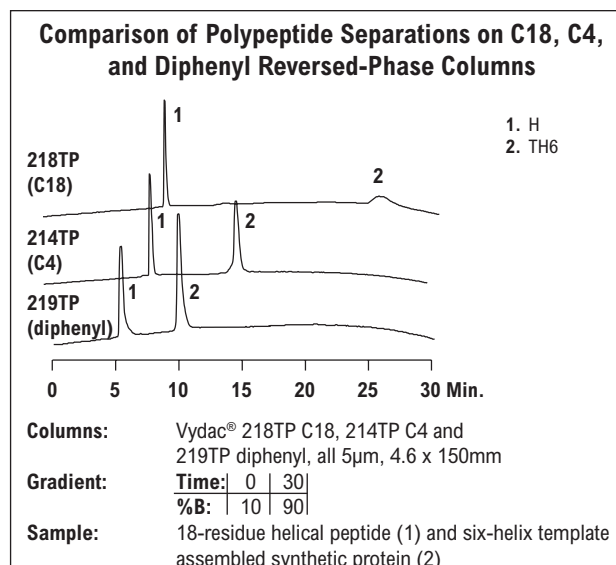
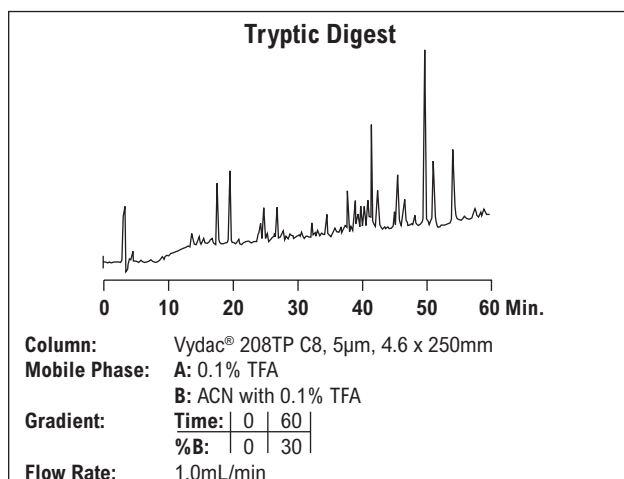
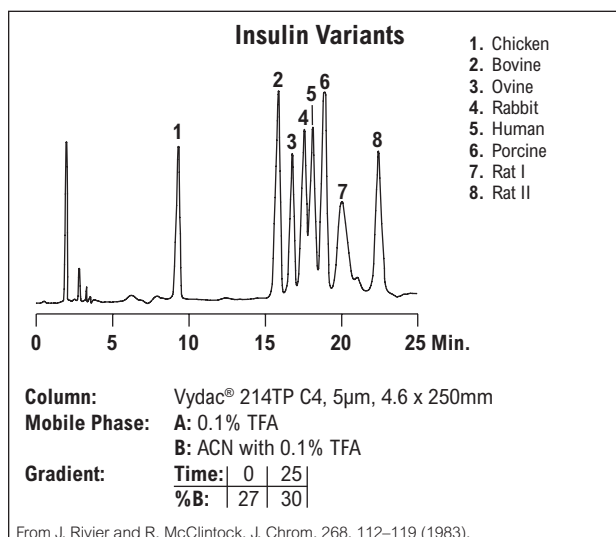
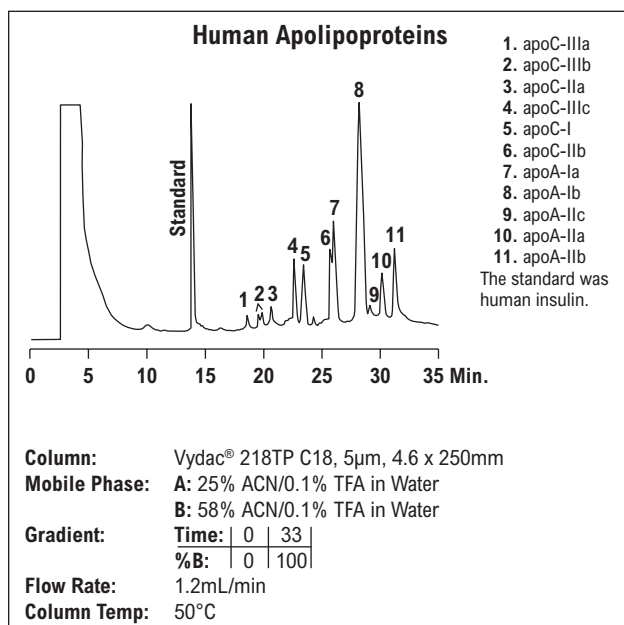
- Exceptionally long column lifetime and negligible phase leaching
- Reliable protein purifications, scalable from analytical to preparative scale



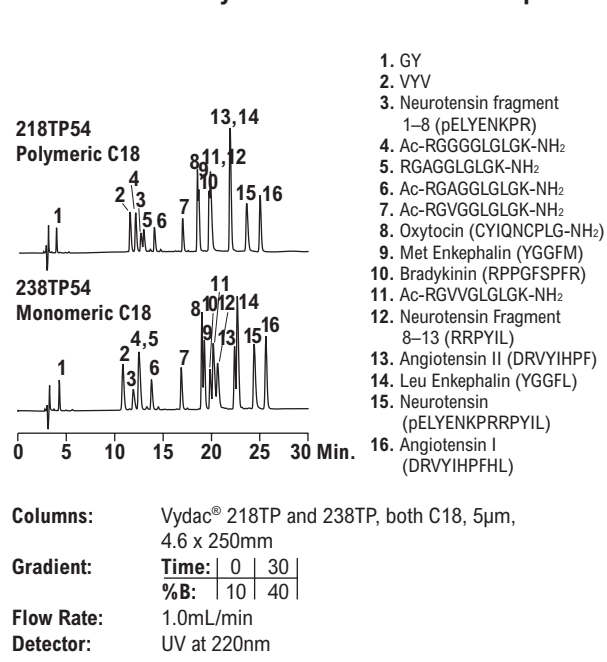
The 300Å pores of TP silica provides polypeptides complete access to the interior of the silica. The unique process by which we manufacture Vydac® TP silica results in high purity with carefully controlled characteristics. It is the standard that has defined large pore HPLC silica for polypeptide separations for nearly two decades.

Vydac® TP Phase Specifications							
Phase	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	Endcapped	Chromatographic Properties	Application/Benefit	USP L-code
218TP C18	300	60–110	8	Yes	First generation polymeric C18 media with unique selectivity.	Small polypeptides 4–5K MW, enzymatic digest fragments, natural and synthetic peptides, multi-ring compounds.	L1
238TP C18	300	60–110	4	Yes	First generation monomeric C18 media.	Use for same applications at 218TP, but offers different C18 selectivity.	L1
208TP C8	300	60–110	5	Yes	Less hydrophobic than C18TP media.	Polypeptides 10–20K MW.	L7
214TP C4	300	60–110	3	Yes	First generation C4 media.	Glycoproteins, hemoglobin variants, histones, insulin variants, membrane proteins.	L26
219TP Diphenyl	300	60–110	4	Yes	Lowest capacity first generation diphenyl media.	Polypeptides with aromatic side chains, large hydrophobic proteins, membrane-spanning peptides, lipid peptides, fusion proteins from inclusion bodies.	L11

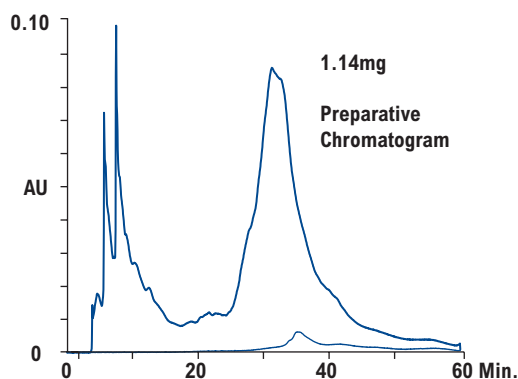
hplc columns



## Monomeric and Polymeric Bonded Phases Comparison



## Purification of a Lipid Peptide



**Column:** Vydac® 219TP Diphenyl, 5µm, 4.6 x 250mm

**Mobile Phase:** A: 29% n-propanol/0.5% HOAc/70.5% water  
B: 61% n-propanol/0.5% HOAc/38.5% water

**Gradient:** Time: | 0 | 6 | 30 |  
%B: | 0 | 0 | 100 |

**Flow Rate:** 0.75mL/min

**Detector:** UV at 280nm

Sample courtesy of Dr. Don Diamond (City of Hope National Medical Center, Duarte, Calif.). For a complete description of this method development, request Vydac® Application Note #9802.

A synthetic peptide containing 25 amino acid residues and two attached fatty acids was difficult to purify because of its limited solubility and tendency to aggregate. The lower retention of the Vydac® 219TP54 diphenyl reversed-phase column was useful for purification of this peptide after it was found to be retained so strongly that it could not be eluted from a C4 reversed-phase.

## Vydac® TP Columns

Format	i.d. (mm)	Length (mm)	Particle Size (µm)	218TP (C18) Part No.	238TP (C18) Part No.	208TP (C8)	214TP (C4)	219TP (Diphenyl) Part No.
Nano <b>C</b>	1	50	5	218TP5105	238TP5105	208TP5105	214TP5105	219TP5105
	1	100	5	218TP5110	238TP5110	208TP5110	214TP5110	—
	1	150	5	218TP5115	238TP5115	208TP5115	214TP5115	219TP5115
	1	250	5	218TP51	238TP51	208TP51	214TP51	219TP51
Microbore <b>M</b>	2.1	50	5	218TP5205	238TP5205	208TP5205	214TP5205	219TP5205
	2.1	100	5	218TP5210	—	208TP5210	214TP5210	219TP5210
	2.1	150	5	218TP5215	238TP5215	208TP5215	214TP5215	219TP5215
	2.1	250	5	218TP52	238TP52	208TP52	214TP52	219TP52
Solvent Reducer <b>SR</b>	3	150	5	218TP5315	238TP5315	—	214TP5315	219TP5315
	3	250	5	218TP53	238TP53	208TP53	214TP53	219TP53
Analytical <b>A</b>	4.6	50	3	—	238TP3405	208TP3405	214TP3405	—
	4.6	100	3	218TP3410	238TP3410	208TP3410	214TP3410	—
	4.6	50	5	218TP5405	238TP5405	208TP5405	214TP5405	219TP5405
	4.6	100	5	218TP5410	238TP5410	208TP5410	214TP5410	219TP5410
	4.6	150	5	218TP5415	238TP5415	208TP5415	214TP5415	219TP5415
	4.6	250	5	218TP54	238TP54	208TP54	214TP54	219TP54
Preparative <b>P</b>	10	150	5	218TP51015	—	—	214TP51015	—
	10	250	5	218TP510	238TP510	208TP510	214TP510	219TP510
	22	50	5	218TP52205	—	—	214TP52205	—
	10	150	10	218TP101015	—	—	214TP101015	—
	10	250	10	—	—	208TP1010	214TP1010	—
	22	150	10	218TP102215	—	—	214TP102215	—
	22	250	10	218TP1022	—	208TP1022	214TP1022	219TP1022
	25	250	10	218TP1025	—	—	—	—
	—	—	—	—	—	—	—	—
Guard* <b>G</b>	2.1	7.5	5	218GD52	238GD52	208GD52	214GD52	219GD52
	4.6	7.5	5	218GD54	238GD54	208GD54	214GD54	219GD54

\*Requires All-Guard™ Holder, Part No. 80101.

## more info

For detailed information on column formats, see page 3.

## technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)  
Online: [www.discoverysciences.com](http://www.discoverysciences.com)



## Alltech® IC Columns

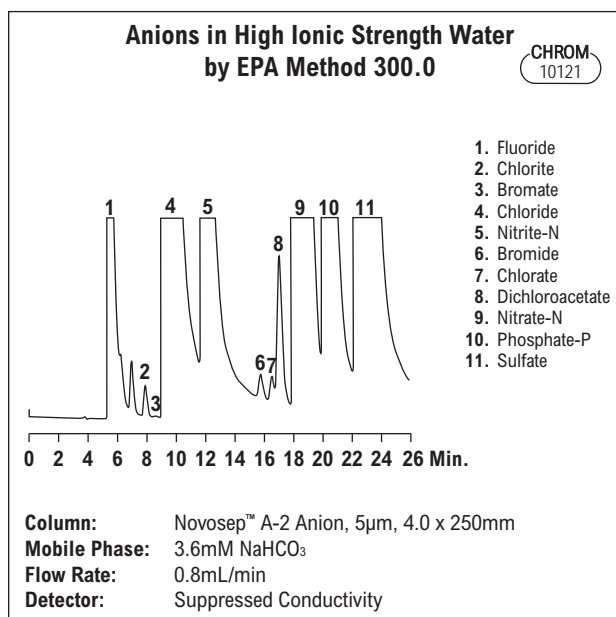
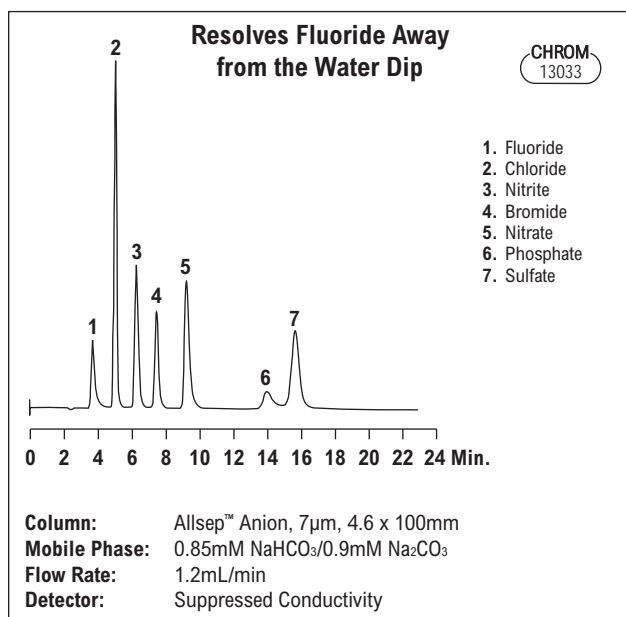
### Separate Organic and Inorganic Anions and Cations

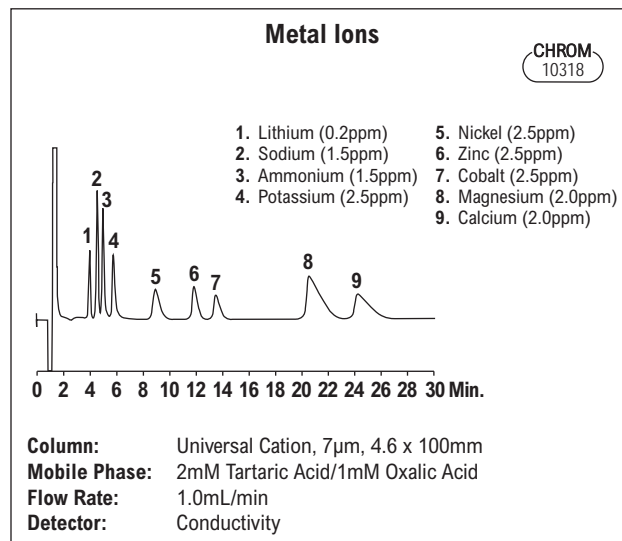
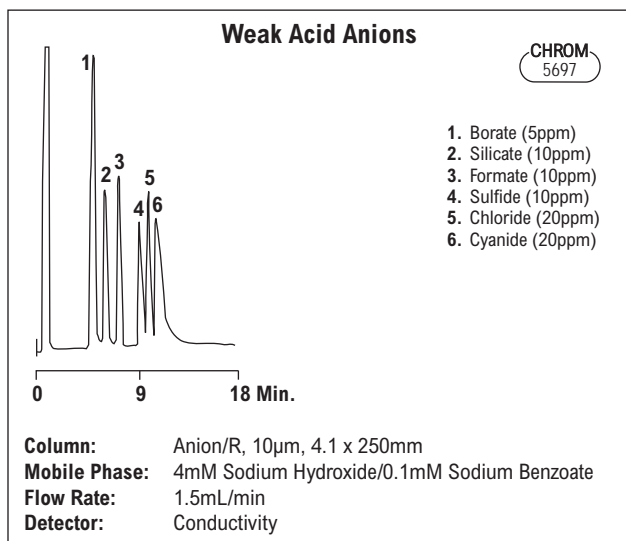
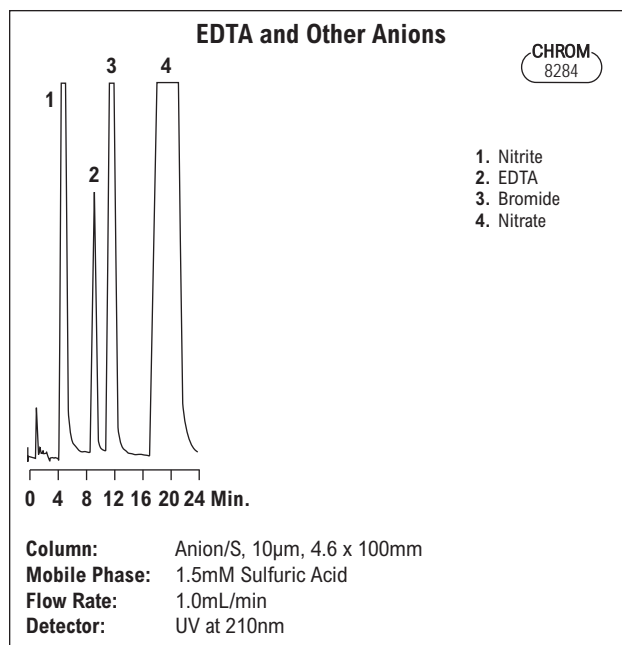
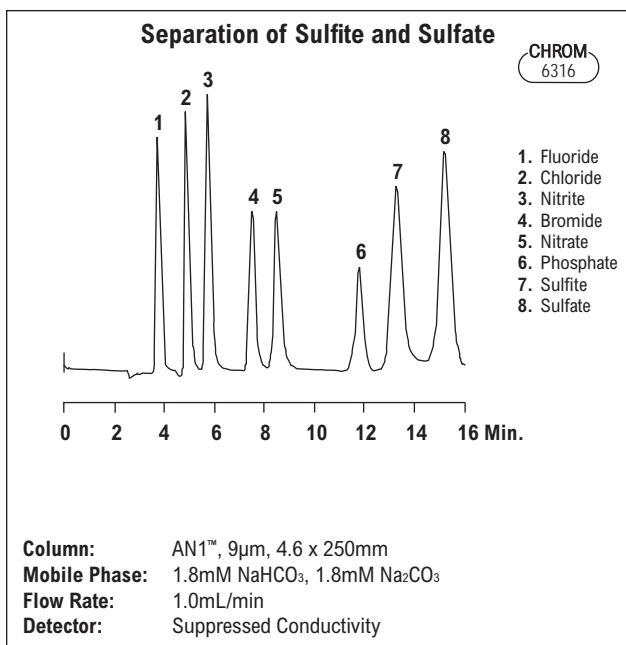
- Meets various EPA method requirements
- Columns available for both suppressed and non-suppressed conductivity
- Polymer-based columns have broad pH applicability



hplc columns

Alltech® Ion Chromatography Phase Specifications							
Phase	Base Material	Functional Group	pH Range	Organic Modifier Limitations	Application/Benefit	EPA Method	Conductivity Mode
<i>Anion Columns</i>							
Allsep™ Anion	Methacrylate	Quaternary ammonium	2–10	0–100%	Meets requirements for EPA method 300.0 part A. Use for inorganic anions, weak and strong acid ions, metal complexes and organic acids	300.0 part A	suppressed and non-suppressed
Novosep™ A-2	Polyvinyl alcohol	Quaternary ammonium	3–12	0–10%	Ideal for separation of seven common anions plus three oxyhalide anions in one run. Meets multiple EPA method requirements.	300.0, 300.1, 317.0, 326.0	suppressed
AN1™	Polystyrene-divinylbenzene	Dimethyl ethanol ammonium	2–13	0	Use for inorganic anions, weak and strong acid ions, and organic acids.	—	suppressed and non-suppressed
Anion/S	Silica	Quaternary ammonium	2–6	0–100%	Use for inorganic anions with the exception of fluoride. Silica-based for symmetrical peak shapes.	—	non-suppressed
Anion/R	Polystyrene-divinylbenzene	Trimethyl ammonium	2–12	0–100%	Larger dimensions ideal for high-resolution separations. Use for inorganic anions, weak and strong acid ions.	—	non-suppressed
<i>Cation Columns</i>							
Universal Cation	Silica, 7µm	Polybutadiene/maleic acid copolymer	2–7	0–100%	Separates Group I and II cations in one isocratic run. Separates transition metals without post-column reaction.	300.7	suppressed and non-suppressed
Universal Cation HR	Silica, 3µm	Polybutadiene/maleic acid copolymer	2–7	0–100%	For high resolution applications.	300.7	suppressed and non-suppressed
<i>Specialty Columns</i>							
Anion Exclusion	Polystyrene-divinylbenzene	Sulfonate	2–12	<10% acetonitrile, no methanol, <5% ethanol	Use for organic acids and weak acid anions. Add small amounts of acetonitrile to decrease retention of hydrophobic molecules.	—	non-suppressed
Surfactant C18	Silica, 5µm	C18	2–7	0–100%	Use for long chain or aromatic surfactants such as xylene sulfonate and dodecyl benzene sulfonate.	—	non-suppressed





## Alltech® Ion Chromatography Columns

Format	i.d. (mm)	Length (mm)	Allsep™ Anion Part No.	Novosep™ A-2 Part No.	AN1™ Part No.	Anion/S Part No.	Anion/R Part No.	Universal Cation Part No.	Universal Cation HR Part No.	Anion Exclusion Part No.	Surfactant C18 Part No.
Analytical <b>A</b>	4.6	50	51214	—	—	—	—	—	—	—	—
	4.6	100	51200	—	—	—	269031**	27100	23100	—	—
	4.6	150	51208	—	—	—	—	—	—	—	—
	4.6	250	—	51410†	38140	269001**	269029**	—	—	—	269091
	7.8	100	—	—	—	—	—	—	—	269068	—
	7.8	300	—	—	—	—	—	—	—	269006	—
Rocket™ <b>R</b>	7.0	53	—	—	—	—	—	23109	—	—	—
Metal Free	4.6	100	51207	—	—	—	—	—	—	—	—
	4.6	150	51209	—	—	—	—	27106	—	—	—
	4.6	250	—	—	38140	—	—	—	—	—	—
Guard* <b>G</b>	4.6	7.5	—	—	—	—	—	27109	23115	38117	38123
	4.5	50	38109	38109	38145	38109	38109	—	—	—	—

\*Requires All-Guard™ Holder, Part No. 80101.

\*\*These columns are 4.1mm i.d.

†These columns are 4.0mm i.d.

## more info

For detailed information on column formats, see page 3.

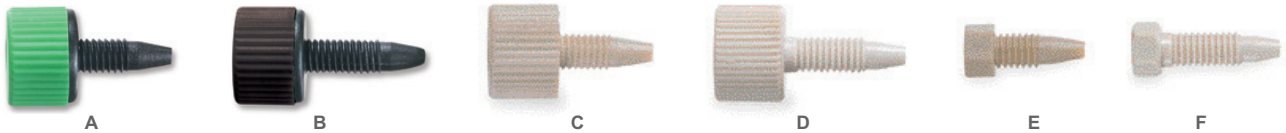
# hplc columns & accessories

## High-Pressure Fittings

### One-Piece High-Pressure Fittings

- Soft grip elastomer cushion makes hand-tightening comfortable
- PEEK or Graph-Tite™ material is inert and biocompatible
- One-piece integrated ferrule eliminates handling small pieces
- Fittings with No-Slip™ feature stay on tubing between connections

One-Piece Fitting Specifications	
<b>Material:</b>	PEEK or Graph-Tite™ (Carbon-Reinforced PEEK)
<b>Max. Temperature:</b>	100°C
<b>Max. Pressure:</b>	5000psig
<b>Thread Type:</b>	10-32 UNF
<b>Typical Use:</b>	1/16" o.d. Tubing Connections



### One-Piece High-Pressure Fittings, 10/pk

Graphic	Length	Color	Material	Standard Part No.	No-Slip™ Part No.
<i>Soft Grip One-Piece Fittings</i>					
<b>A</b>	Short	Black	Graph-Tite™	<b>40501</b>	<b>40511</b>
<b>B</b>	Long	Black	Graph-Tite™	<b>40506</b>	<b>40516</b>
<i>Finger-Tight™ One-Piece Fittings</i>					
<b>C</b>	Short	Natural	PEEK	<b>32233</b>	<b>32293</b>
<b>D</b>	Long	Natural	PEEK	<b>32235</b>	—
<i>Hex-Head One-Piece Fittings</i>					
<b>E</b>	Short	Natural	PEEK	<b>32236</b>	—
<b>E</b>	Short	Black	Graph-Tite™	<b>32347</b>	—
<b>F</b>	Long	Natural	PEEK	<b>32238</b>	—

### Valco® High-Pressure Fittings

Valco® Fittings Specifications	
<b>Material:</b>	316 Stainless Steel, 303 Stainless Steel, PEEK
<b>Max. Temperature:</b>	500°C (SS) 100°C (PEEK)
<b>Max. Pressure:</b>	10,000psig (SS) 8000psig (PEEK)
<b>Typical Use:</b>	High-Pressure Tubing Connections

### Valco® Nuts, Ferrules and Unions

Graphic	Description	Qty.	Part No.
<b>A</b>	1/16" Stainless Steel Nut	10	<b>306121</b>
<b>B</b>	1/16" (Type 316) Stainless Steel Ferrule	10	<b>30646</b>
<b>C</b>	1/16" PEEK Ferrule	10	<b>30661</b>
<b>D</b>	1/16" Internal Union 0.25mm Bore	ea	<b>30713</b>
<b>D</b>	1/16" Internal Union 0.50mm Bore	ea	<b>30714</b>
<b>D</b>	1/16" Internal Union 1/16" Bore	ea	<b>45835</b>

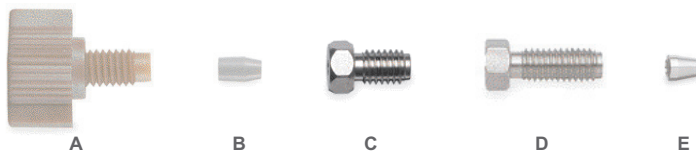


### Two Piece High-Pressure Fittings

Two-Piece Fitting Specifications	
<b>Material:</b>	Wing-Nut: PEEK Hex-Head: 300 Stainless Steel
<b>Max. Temperature:</b>	Wing-Nut: 100°C Hex-Head: 500°C
<b>Max. Pressure:</b>	Wing-Nut: 6000psig Hex-Head: 10,000psig
<b>Thread Type:</b>	10-32 UNF
<b>Typical Use:</b>	1/16" o.d. Tubing Connections

### Two-Piece Fittings

Graphic	Description	Qty.	Part No.
<i>Two-Piece PEEK Wing-Nut Fitting with Ferrule</i>			
<b>A</b>	Natural	10	<b>32326</b>
<i>Two-Piece PEEK Wing-Nut Fittings Replacement Ferrules</i>			
<b>B</b>	Ferrules	10	<b>32335</b>
<i>Two-Piece Stainless Steel Hex-Head Fittings</i>			
<b>C</b>	1/16" Nut, Short	5	<b>206085</b>
<b>D</b>	1/16" Nut, Long	5	<b>286335</b>
<i>Two-Piece Stainless Steel Hex-Head Replacement Ferrule</i>			
<b>E</b>	1/16" Ferrules	5	<b>286075</b>



## Low-Pressure Fittings

### Flange-Free™ Low-Pressure Fittings

- Convenient ferrule eliminates need for flanging
- Compatible with all 1/4-28 UNF ports

### Flanged Tubing Low-Pressure Fittings

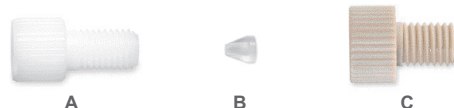
- Use with 1/8" or 1/16" flanged tubing
- Easily tighten without a tool

Flanged-Free™ Tubing Fitting Specifications	
<b>Material:</b>	PEEK, Kel-F®, ETFE
<b>Maximum Temperature:</b>	100°C
<b>Maximum Pressure:</b>	1/8" 500psig, 1/16" 1000psig
<b>Thread Type:</b>	1/4-28 UNF
<b>Typical Use:</b>	1/16" or 1/8" o.d. Tubing Connection

Flanged Tubing Fitting Specifications	
<b>Material:</b>	PEEK with Stainless Steel Washers
<b>Maximum Temperature:</b>	100°C
<b>Maximum Pressure:</b>	Limited by Tubing Strength
<b>Thread Type:</b>	1/4-28 UNF
<b>Typical Use:</b>	Low-Pressure Plumbing

### Low-Pressure Fittings, 10/pk

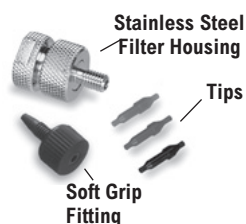
Graphic	Description	Material	1/16" o.d. Tubing Part No.	1/8" o.d. Tubing Part No.
<i>Flange-Free™ Finger-Tight™ Nuts</i>				
<b>A</b>	Natural	PEEK	<b>37065</b>	<b>37075</b>
<i>Flange-Free™ Ferrules</i>				
<b>B</b>	Ferrules	Kel-F®	<b>201152</b>	<b>201251</b>
<b>B</b>	Ferrules	ETFE	<b>20240</b>	<b>20242</b>
<i>Flanged Tubing Fittings (washer included)</i>				
<b>C</b>	Natural	PEEK	<b>37165</b>	<b>37175</b>



## Prefilters

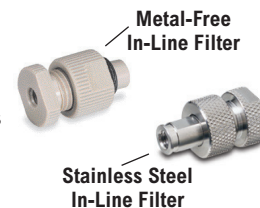
### Direct-Connect™ Filter Kit

- Threads into column inlet for minimal dead volume
- Interchangeable tips connect to all column formats
- Inexpensive replaceable filter elements



### In-Line Filter Kit

- Available in metal-free or 316 stainless steel
- Comes with connecting fittings
- Replaceable filter element



### Universal Mini Filters†

- Low volume direct-connect design
- Ideal for LC/MS applications
- Depth filter for greater capacity without band spreading



†Patent #5, 525, 503; #5,730,943; #5,911,954.

### Rheodyne® Column In-Line Filter Kit

- Use 3mm filter kit for 4.6mm columns
- Use 1.5mm filter kit for 1 and 2mm columns
- Includes one holder, one filter, three fittings and two connecting tubes 6cm x 0.007" i.d.



### Prefilters

Description	Material	Max. Temperature.	Max. Pressure	Thread Type	Porosity	Qty.	Part No.
<i>Direct-Connect™ Filter Kit and Replacement Parts</i>							
Direct Connect Filter Kit	316 SS, PTFE, and Kel-F®	100°C	5000psig	10-32 UNF	2.0µm	ea	<b>28689</b>
Housing	316 Stainless Steel	100°C	5000psig	10-32 UNF	—	ea	<b>27005</b>
Filter	Stainless Steel	100°C	5000psig	10-32 UNF	2.0µm	5/pk	<b>28640</b>
<i>In-Line Filter Kit</i>							
Metal-Free Filter Kit*	PEEK, PAT®, and Graph-Tite™	100°C	5000psig	10-32 UNF	2.0µm	ea	<b>68250</b>
Stainless Steel Filter Kit**	316 SS and Graph-Tite™	100°C	5000psig	10-32 UNF	2.0µm	ea	<b>27000</b>
<i>Universal Mini Filters</i>							
Mini Filter 1.2µL Internal Volume	316 Stainless Steel	100°C	7000psig	10-32 UNF	0.5µm	5/pk	<b>77166</b>
Mini Filter 1.2µL Internal Volume	316 Stainless Steel	100°C	7000psig	10-32 UNF	2.0µm	5/pk	<b>77167</b>
Mini Filter 0.3µL Internal Volume	316 Stainless Steel	100°C	7000psig	10-32 UNF	1.0µm	5/pk	<b>77168</b>
<i>Rheodyne® Column In-Line Filter Kits and Replacement Parts</i>							
3mm Filter Diameter Kit	316 Stainless Steel	500°C	7000psig	10-32 UNF	0.5µm	ea	<b>7335RV</b>
3mm Filter Element	316 Stainless Steel	500°C	7000psig	10-32 UNF	0.5µm	ea	<b>7335-010</b>

\*Includes PEEK holder, PAT® filter, and two soft grip fittings.

\*\*Includes 316 stainless steel holder, stainless steel filter, and two soft grip fittings.

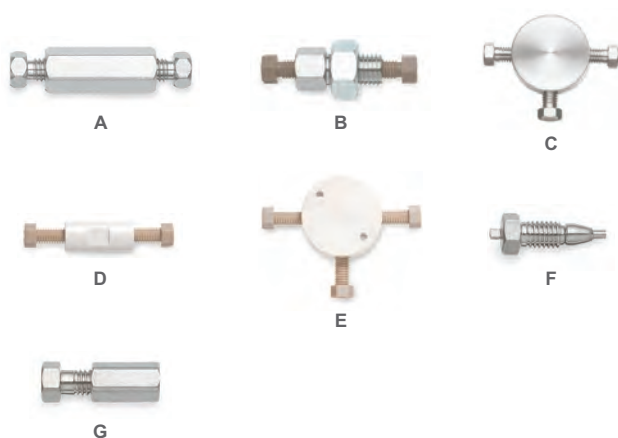
## Adapters

### High-Pressure Adapters, Plugs, and Caps

High-Pressure Adapters, Plugs and Caps Specifications	
<b>Material:</b>	300 Stainless Steel, PEEK
<b>Max. Temperature:</b>	300 Stainless Steel: 500°C PEEK: 100°C
<b>Max. Pressure:</b>	300 Stainless Steel: 10,000psig with Stainless Steel Ferrules PEEK: 8000psig
<b>Thread Type:</b>	10-32 UNF
<b>Typical Use:</b>	1/16" o.d. Tubing

#### Adapters, Plugs, and Caps

Graphic	Description	Bore	Qty.	Part No.
<i>Stainless Steel Adapters</i>				
<b>A</b>	Union, Female	0.012"	ea	<b>28627</b>
<b>A</b>	Union, Waters	0.012"	ea	<b>97332</b>
<b>B</b>	Bulkhead Union	—	ea	<b>31505</b>
<b>C</b>	Tee	—	ea	<b>28629</b>
<i>PEEK Adapters</i>				
<b>D</b>	Union	0.010"	ea	<b>32141</b>
<b>E</b>	Tee	0.010"	ea	<b>32143</b>
<i>Stainless Steel Plugs</i>				
<b>F</b>	Standard (7000psig)	—	ea	<b>30631</b>
<i>Stainless Steel Cap</i>				
<b>G</b>	Standard	—	ea	<b>30606</b>



### One-Piece Couplers

One-Piece PEEK couplers have a non-wetted color-coded POM handle. Stop depth of the tip is fixed and provides a reliable connection when used with matching port configurations.



#### One-Piece Column Couplers

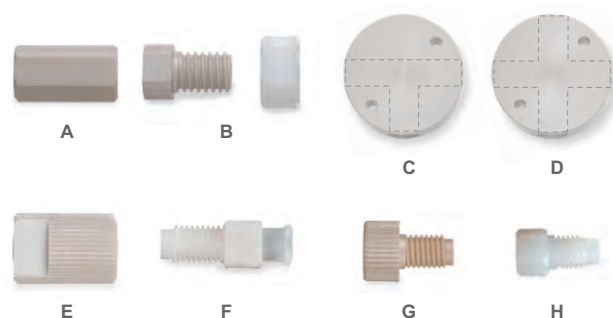
Port Configuration	Color	Part No.
Female	Black	<b>28191</b>
Waters®	Red	<b>28192</b>
Male	Red	<b>28193</b>
Valco®	Blue	<b>28194</b>

### Low-Pressure Adapters and Plugs

- Chemically inert
- 1/4-28 threaded ports
- For use with Flange-Free™ or flanged fittings

#### 1/4-28 Low-Pressure Adapters and Plugs

Graphic	Description	Material	Qty.	Part No.
<i>Unions</i>				
<b>A</b>	Union	PEEK	ea	<b>20088</b>
<b>B</b>	Bulkhead Union	PEEK	ea	<b>31506</b>
<i>Tees</i>				
<b>C</b>	0.8mm Bore Tee	PEEK	ea	<b>20058</b>
<b>C</b>	1.5mm Bore Tee	PEEK	ea	<b>20023</b>
<i>Crosses</i>				
<b>D</b>	0.8mm Bore Cross	PEEK	ea	<b>20059</b>
<b>D</b>	1.5mm Bore Cross	PEEK	ea	<b>20025</b>
<i>Male 1/4-28 Adapters</i>				
<b>E</b>	Male 1/4-28 to Male Luer	ETFE	ea	<b>20019</b>
<b>F</b>	Male 1/4-28 to Female Luer	ETFE	ea	<b>20055</b>
<i>Plugs</i>				
<b>G</b>	Natural	PEEK	10	<b>37185</b>
<b>H</b>	White	Kel-F®	5	<b>20089</b>



### Easy-Flange™ Tool

- Uses mechanical force to form flanges—no electricity or heat required
- Forms perfect flanges on 1/16" to 1/8" o.d. PTFE or thin-walled PEEK tubing
- Completely portable—use it anywhere in your lab



#### Easy-Flange™ Tool

Description	Part No.
Easy-Flange™ Flanging Tool*	<b>35900</b>
<i>Replacement Parts</i>	
Clean-Cut™ Tubing Cutter	<b>35902</b>

\*Includes: Clean-Cut™ tubing cutter and insert disks Part No. 35908, 35907, 35906, 35910, 35920.

## Valves and Sample Loops

### Rheodyne® Model 7725i Analytical Injectors

- "Make-Before-Break" (MBB) switching for uninterrupted flow
- Wider port angles provide improved fitting access
- Position sensing switch option
- Capable of injecting volumes from 1µL to 5mL with high precision



### Rheodyne® Model 7010 Analytical Injectors

- Rear-loading valves
- High volumetric precision
- Low volume flow passages
- Loop-Filler port accommodates needles from 0.018" to 0.028" diameter



#### Analytical Sample Injectors

Description	Version	Part No.
7725i, Includes a 20µL PEEK Sample Loop	SS	<b>77251</b>
7010, Includes a 20µL Sample Loop	SS	<b>7010RV</b>

### Rheodyne® Manual Switching Valves

Rheodyne® HPLC switching valves offer an endless variety of ways to simplify switching and injecting. Standard valves are supplied with 0.024" internal flow passages and are suitable for use with analytical and semi-preparative applications.



#### Rheodyne® Manual Switching Valves

Description	Version	Bore	Part No.
<i>2-Position Valves</i>			
6-Port	SS	Standard	<b>7000RV</b>
3-Way	SS	Standard	<b>7030RV</b>
<i>Multi-Position Valves</i>			
6-Position 6-Port	SS	Standard	<b>7060RV</b>

### Rheodyne® Replacement Parts

#### Replacement Parts for Rheodyne® Injectors

Description	Part No.
Rotor Seal for 7010	<b>7010-039</b>
Stator for 7010/7125	<b>7010-040</b>
Rotor Seal for 7125/7126/7725/7725i	<b>7125-047</b>
ETFE Rotor Seal for 9010	<b>90100510</b>
Stator for 7725/7725i	<b>7725010</b>
Stator Face Assembly for 7725/7725i	<b>77250260</b>
Rotor Seal (Polyimide) for 8125	<b>8125038</b>
ETFE Rotor Seal for 9125	<b>9125-082</b>

#### technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)  
 Online: [www.discoverysciences.com](http://www.discoverysciences.com)

### Rheodyne® Sample Loops

#### Metal Sample Loops

- Square cut and burr free tubing for flush connection to the valve
- Includes unswaged fittings and ferrules
- Coiled and configured for specific valves



#### Metal-Free Sample Loops

- PEEK construction is inert and biocompatible
- Flexible tubing makes them easy to use
- Includes versatile RheFlex® fittings



#### Sample Loops—Analytical Injectors

Description	Metal	Metal	Metal	PEEK
	7725/7725i Part No.	7125/7010 Part No.	8125/8126 Part No.	9000/9725 Part No.
5µL	<b>7725020</b>	<b>70-20SL</b>	—	<b>9055020</b>
10µL	<b>7725021</b>	<b>70-21SL</b>	—	<b>9055021</b>
20µL	<b>7725022</b>	<b>70-22SL</b>	—	<b>9055022</b>
50µL	<b>7725023</b>	<b>70-23SL</b>	—	<b>9055023</b>
100µL*	<b>7725024</b>	<b>70-24SL</b>	<b>7725024</b>	<b>9055024</b>
200µL*	<b>7725025</b>	<b>70-25SL</b>	<b>7725025</b>	<b>9055025</b>
500µL*	<b>7725026</b>	<b>70-26SL</b>	<b>7725026</b>	<b>9055026</b>
1mL*	<b>7725027</b>	<b>70-27SL</b>	<b>7725027</b>	<b>9055027</b>
2mL*	<b>7725028</b>	<b>70-28SL</b>	<b>7725028</b>	<b>9055028</b>
5mL*	<b>7725029</b>	<b>70-29SL</b>	<b>7725029</b>	<b>9055029</b>

\*Also compatible with Part No. 8125/8126.

### Rheodyne® RheBuild® Kits for Injection Valves

#### Rheodyne® RheBuild® Kit Specifications

Model	Includes
7125, 7126, 7725, 7725i, 7726	Standard Rotor Seal, Stator Face Assembly, Isolation Seal, Needle Guide, Needle Port Cleaner, 2 Hex Keys and Instructions
7010, 7000	Standard Rotor Seal, Isolation Seal, 2 Hex Keys and Instructions

#### Rheodyne® RheBuild® Kits

Description	Part No.
7125, 7126	<b>10457</b>
7725, 7725i, 7726	<b>10461</b>
7010, 7000	<b>10471</b>

# hplc columns & accessories

## Mobile Phase Management

### Solvent Filtration Apparatus

The solvent filtration apparatus rapidly filters and degasses HPLC and IC mobile phases.

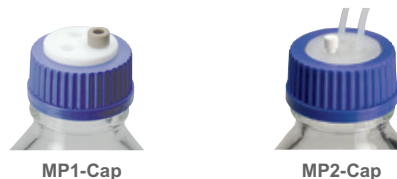


#### Solvent Filtration Apparatus

Description	Part No.
<i>Solvent Filtration Apparatus</i>	
1L Flask, 300mL Funnel, 47mm Filter Support, 47mm Clamp, 0.2µm Nylon Filters 100/pk	<b>2001</b>
2L Flask, 500mL Funnel, 47mm Filter Support, 47mm Clamp, 0.2µm Nylon Filters 100/pk	<b>2003</b>
<i>Replacement Parts and Accessories</i>	
2L Flask (For 2003)	<b>350066</b>
300mL Glass Funnel (For 2001)	<b>350064</b>
500mL Glass Funnel (For 2003)	<b>350067</b>
47mm Fritted Base Support (For 2001)	<b>350065</b>
47mm Fritted Base Support (For 2003)	<b>350068</b>
47mm Nylon Filter Membranes, 0.2µm, 100/pk	<b>2034</b>

### Mobile Phase Caps

- Most economical way to helium sparge and deliver HPLC mobile phases
- MP1-Cap has three 1/4-28 threaded ports with through-holes\*; tubing may be pushed through or connected with flanged fittings
- MP2-Cap has three unthreaded holes\* for tubing insertion \*(2x1/8" and 1x1/16")



#### Mobile Phase Caps\*

Description	Qty.	Thread Size	Part No.
MP1-Cap	ea	GL-45	<b>955664</b>
MP2-Cap	ea	GL-45	<b>955665</b>

\*Not intended for build-up of helium environment.

### Vacuum Filtration System

- Eliminate solvent transfer steps with direct filtration
- Interchange funnels and in-line filter cap handle any filtration volume
- Durable polypropylene construction



Filter Funnel System



In-Line Filtration System

#### Vacuum Filtration Systems

Description	Part No.
1L Filter Funnel System Includes: Base, Adapter Kit, Mesh Filter Support, 1L Funnel	<b>6409</b>
2L Filter Funnel System Includes: Base, Adapter Kit, Mesh Filter Support, 2L Funnel	<b>6429</b>
In-Line Filtration System Includes: Base, Adapter Kit, Mesh Filter Support, In-Line Filter Cap	<b>6407</b>
Replacement Mesh Filter Support, 47mm Stainless Steel	<b>6421</b>

### 316 Stainless Steel Slip-On Inlet Filter

- Economical mobile phase inlet filtration
- Maximum temperature 500°C



#### 316 Stainless Steel Slip-On Inlet Filters

Description	Porosity	Qty.	Part No.
For 0.062" (1.5mm) i.d.	2µm	5	<b>28861</b>
For 0.062" (1.5mm) i.d.	10µm	5	<b>28863</b>

### Metal-Free Inlet Filter

- Ideal for IC or biochromatography applications
- PEEK body with replaceable polyethylene filter elements
- Maximum temperature 100°C



#### Metal-Free Inlet Filters

Description	Porosity	Qty.	Part No.
For 1/8" o.d.	20µm	ea	<b>32170</b>
For 1/16" o.d.	20µm	ea	<b>32171</b>
Replacement Filter Elements	20µm	5	<b>32173</b>

# Reveleris® X2 Flash Chromatography System

Grace has revolutionized flash chromatography by combining decades of experience in silica gel and evaporative light scattering detection technologies to create the Reveleris® X2 flash chromatography system.

Patented RevealX™ detection technology accelerates purification by simultaneous peak collection, triggered by UV and Evaporative Light Scattering Detection (ELSD).



U. S. Patents Nos. 8,115,930  
8,305,581  
8,305,582  
8,314,934

## Visit Our Website to Learn More:

- Detailed specifications and system information
- Service and support program information
- Application notes and technical articles
- Product information

[www.discoverysciences.com/flashchromatography.aspx](http://www.discoverysciences.com/flashchromatography.aspx)

## technical assistance

Contact Tech Support: Email: [instrumentservice@grace.com](mailto:instrumentservice@grace.com)  
Online: [www.discoverysciences.com](http://www.discoverysciences.com)

## CONFIDENCE

### Maximize Purity and Recovery of your Target with RevealX™ Detection Technology

- Synchronized detection and fraction collection from up to 4 detector signals (ELSD/UV/Vis)
- Detects the widest range of compounds
- Maximizes recoveries with only 50ul/min maximum sent to ELSD

## FLEXIBILITY

### Purify a Broad Range of Sample Types with Selectable High/Low Detection Sensitivity

- Detect chromophores, nonchromophores, and visible sample components from mg to kg quantities
- Purify complex samples from discovery through process R&D
- Easily switch between normal-phase and reversed-phase applications

## SIMPLICITY

### One-Screen Programming and Run Control with Intuitive Windows® Interface, Accelerates System Set-up

- Quickly modify run parameters on a large 12" single screen display
- Edit gradients in real time, using click and drag or table
- Auto-recognition of cartridges and trays reduces set-up time and the risk of potential errors

#### Reveleris® X2 Flash Chromatography System

Description	Part No.
Reveleris® X2 Flash Chromatography System	<b>5164931</b>
Reveleris® X2 Flash Chromatography System UV/Vis <i>Optional Upgrade</i>	<b>5167301</b>
Reveleris® X2 Navigator™ Feature <i>Optional Upgrade</i>	<b>5156620</b>



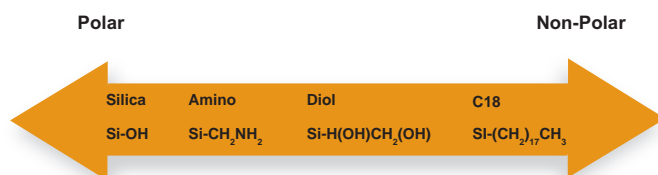
## Flash Chromatography

Flash chromatography is a simple, often automated, low to medium pressure liquid purification technique used to rapidly isolate desired compounds or reaction intermediates from simple or complex mixtures. Purifying these important components at sufficient quantity and purity can be challenging when performing a flash separation using bare silica. Selecting an appropriately bonded stationary phase with suitable alternate mobile phases may be necessary since:

- Mixtures vary in complexity, including the number of components, compound class, polarity, and molecular weight, etc.
- Bare silica may not be the optimal stationary phase for the compounds due to lack of retention, solubility, poor peak shape and compound stability, etc.

### Selecting the Optimum Stationary Phase

Media phases differ in polarity according to the graphic below and changing stationary phases is a powerful tool to achieving successful flash separations.



### Media Selection Guide

Phase Selection Guide				
Compound Class	Si	C18	Amino	Diol
Alkaloids	X	X	X	
Amino Acids		X		
Aromatics	X	X	X	X
Carbohydrate		X	X	
Drug Intermediates	X		X	
Basic Drug Products		X	X	X
Flavonoids		X		
Glycosides		X	X	X
Isomers		X		X
Lipids		X		X
Lignans	X	X		
Polyphenols		X		X
Saponins	X	X		
Steroids		X		
Tannins		X		
Terpenes	X	X		X
Vitamins	X	X	X	X
Xanthenes		X	X	X
Peptides <5000mw	X	X		
Oligonucleotides <5000mw		X		
Nucleosides/tides		X		
Pegylated		X		X
Secondary Metabolites		X		

### Tips

- For compound classes for which multiple media options are indicated, phase preference is further determined by the extent of sample component acidic/basic nature and overall polarity.
- For maximum resolution, reversed-phase C18 using aqueous mobile phase is often selected as the primary option, especially for polar samples having a strong affinity for silica.
- For difficult purifications of closely-related compounds, smaller particle media packings or higher pressure techniques may need to be employed to achieve separation.
- Larger, sensitive or charged molecules may require lower flow and pressures common for ion exchange, size exclusion or affinity chromatographic techniques (vaccines, DNA, intact proteins, and peptides >5KDa).

## Grace® Flash Cartridges

Get the most out of your flash applications by choosing Grace® flash cartridges, the only flash cartridges designed by a silica expert for ideal chromatographic performance. Grace has balanced small particle size media with high loading capacity and efficient packing methods to produce the perfect flash cartridge.

### Why Do Grace® Cartridges Perform Better?

#### 1. Small Particle Size

A smaller particle size increases resolution. Tighter particle size distribution and minimal fines keep back pressure low.

#### 2. High Purity Silica

Grace's 30 years of chromatography experience combined with 80 years of silica manufacturing expertise has allowed Grace to produce optimized silica designed for flash chromatography.

#### 3. Efficient Column Packing

A tightly packed silica bed increases cartridge efficiency and prevents voids and channeling that cause poor resolution. Flash chromatography, like HPLC, benefits greatly from optimized packing procedures.

#### 4. Strict Quality Control

Grace flash cartridges are characterized with more than 15 tests from the silica to the packed cartridges to ensure consistent lot-to-lot performance. A quality assurance certificate is provided with each box of cartridges.

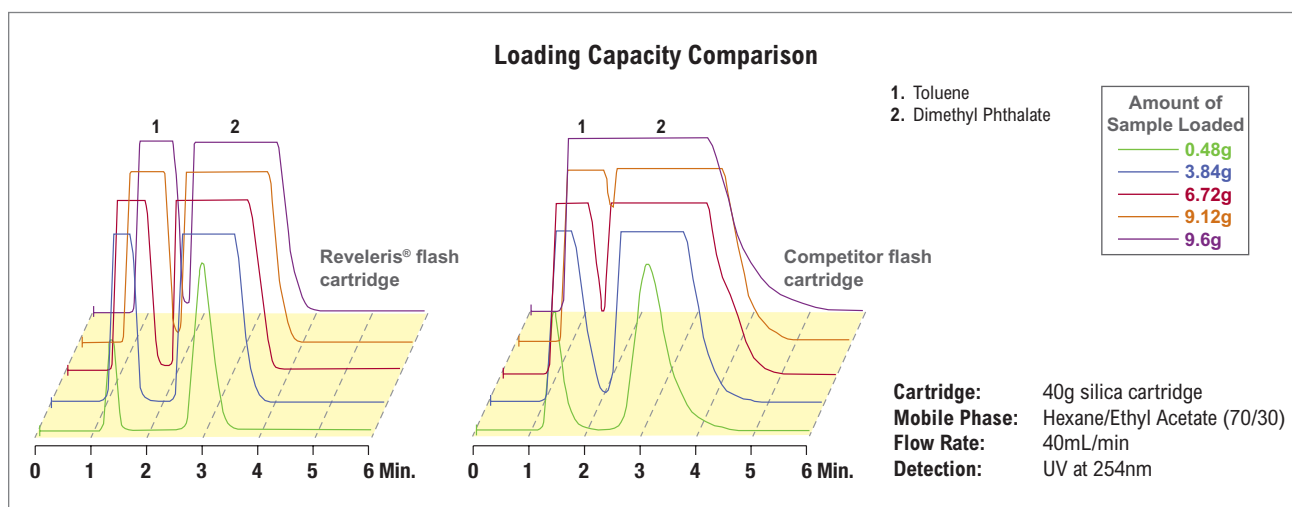
## Reveleris® Flash Cartridges

- Superior resolution
- Increased loading capacity
- High pressure (200 psig/14bar)\*
- Auto-recognition by Reveleris® flash system

The silica packed in Reveleris® cartridges is specifically designed to increase cartridge efficiency and therefore resolution of closely eluting compounds, in some cases greater than two times better resolving power over typical packings. Greater efficiency enables more peaks to be baseline resolved and results in increased sample purity as well as decreased fraction volumes. Additionally, by increasing sample loads on a given cartridge size and elevated pressure capability, sample throughputs and yields increase and overall purification costs are lowered.



Luer design is compatible with most systems.



The Reveleris® flash cartridge maintains baseline resolution up to 9.12g, while a leading competitor cartridge only maintains resolution to 3.8g of load.

### Unique Chemistries for Challenging Applications

While silica is the most popular choice for flash applications, other chemistries bring unique properties that can help resolve complex samples.

Chemistry	Ideal For
Silica	Conventional applications, polar compounds
Silica HP	High resolution for complex or difficult to purify samples
Reversed-Phase (C18)	Non-polar compounds
C18-WP	High resolution wide pore media for large molecule purification; ideal for peptides, proteins, lipids
Amino	Better peak shapes with polar and basic compounds; ideal for carbohydrates
Diol	Alternate selectivity for a variety of polarity types; ideal for lipids

#### Reveleris® Cartridges (up to 200psig\*)

Cartridge Size	Qty.	Silica Part No.	Silica HP Part No.
Silica 4g	20	5146130	5170200
Silica 12g	20	5146131	5170201
Silica 24g	15	5165730	5170202
Silica 40g	15	5176132	5170203
Silica 80g	12	5146133	—
Silica 120g	10	5146134	—
Silica 220g*	15	5165750	—
Silica 330g*	4	5146135	—

#### Reveleris® Bonded Flash Cartridges (up to 200psig\*)

Cartridge Size	Qty.	Amino Part No. +	Diol Part No.	C18 Part No.	C18-WP Part No.
4g	ea	5157330	5157335	5152990	5169482
12g	ea	5157331	5157336	5152103	5169483
40g	ea	5157332	5157337	5152104	5169484
80g	ea	5157333	5157338	5152105	—
120g	ea	5157334	5157339	5152991	—
330g	ea	—	—	5164430	—

\*Also available in packages of 10.

\*220g and 330g have a pressure rating of 100 psig.

#### more info

Visit [www.discoverysciences.com/FlashChromatography/ApplicationNotes.aspx](http://www.discoverysciences.com/FlashChromatography/ApplicationNotes.aspx) to browse the latest applications using Reveleris® flash cartridges.

## GraceResolv™ Flash Cartridges

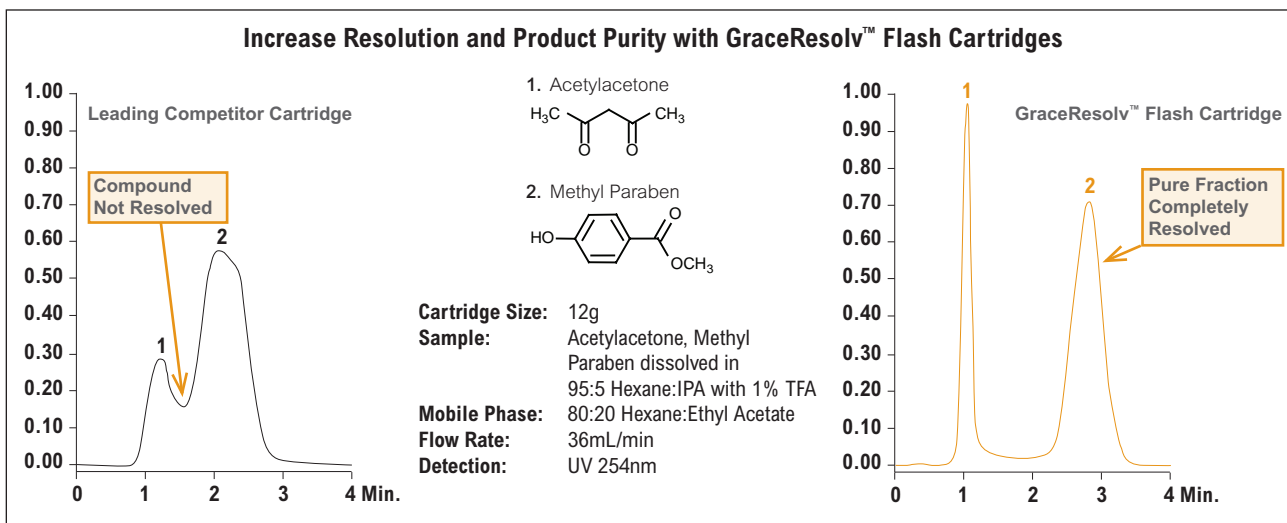
- Choice of luer slip or lock outlet connection
- Universal luer fitting
- Higher resolution
- Increased loading capacity
- Reproducible performance
- Silica cartridge sizes 4g–1500g



GraceResolv™ cartridges are packed with a grade of Davisil® silica designed to help maximize performance of today's flash instruments.

GraceResolv™ LOK cartridges include a luer lock outlet and offer the same great performance benefits of GraceResolv™ cartridges. GraceResolv™ LOK cartridges are offered for use with instruments requiring both luer lock inlet and outlet connections. The cartridges are supplied with an adapter that allows connection to systems using a luer slip outlet for maximum flexibility.

Luer design is compatible with most systems.



### GraceResolv™ Flash Cartridges

Cartridge Size	Qty.	GraceResolv™ Part No.	GraceResolv™ LOK Part No.
Silica 4g	20	5154063	5171340
Silica 12g	20	5154064	5171343
Silica 24g	15	5155963	5171341
Silica 40g	15	5154065	5171344
Silica 80g	12	5154066	5171345
Silica 120g	10	5154067	5171346
Silica 220g	6	5155964	5171347
Silica 330g	4	5154068	5171348
Silica 750g	4	5155971	-
Silica 1500g	3	5155972	-

### more info

For additional information about flash chromatography, including application notes and technical posters, visit our website.

### technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)  
 Online: [www.discoverysciences.com](http://www.discoverysciences.com)

## Flash Accessories and TLC

### Solid Loaders

- High pressure design
- Easy to use
- Ideal for low solubility loading



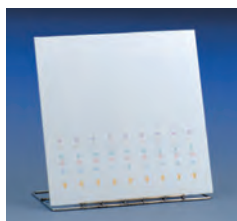
#### Solid Loaders

Description	Qty.	Part No.
Empty 3g	100	<b>5142050</b>
Empty 15g	100	<b>5142051</b>
Empty 40g	50	<b>5147808</b>
Silica 3g	20	<b>5152371</b>
Silica 15g	16	<b>5142034</b>
Silica 40g	12	<b>5147772</b>
Adjustable 3g Plunger	ea	<b>5148510</b>
Adjustable 15g Plunger	ea	<b>5148511</b>
Adjustable 40g Plunger	ea	<b>5148512</b>
3g Frit Insertion Rod	ea	<b>5162931</b>
15g Frit Insertion Rod	ea	<b>5162902</b>
40g Frit Insertion Rod	ea	<b>5162901</b>

### Reveleris® Method Development TLC Plates and C18 Scouting Columns

One of the first steps in scale-up of flash chromatography separations is to optimize the mobile phase.

Two methods are commonly used to determine the optimum mobile phase composition. Resulting data is used to automatically generate flash gradient profiles in the Reveleris® Navigator™ software. For normal phase purifications, thin layer chromatography (TLC) plates made with the same high purity silica as used in the Reveleris® and GraceResolv™ cartridges are used to ensure the same selectivity and allow simple scale-up. For reversed-phase applications, Reveleris® C18 scouting columns are the perfect method development tool to optimize mobile phase choice.



#### Flash TLC Plates

Description	Size	Qty.	Part No.
GraceResolv™ Silica TLC Plates	20 x 20cm	25	<b>8618900</b>
Reveleris® Silica TLC Plates	20 x 20cm	25	<b>8621250</b>
Reversed-Phase C18 TLC Plate	10 x 20cm	25	<b>8625320</b>
Silica Aluminum-backed TLC Plates (UV254)	20 x 20cm	25	<b>8628490</b>
Silica Aluminum-backed TLC Plates (no UV)	20 x 20cm	25	<b>8628492</b>

### Reveleris® C18 HPLC Columns

#### Reveleris® C18 HPLC Columns\*

Description	Size	Qty.	Part No.
C18 HPLC Column	4.6 x 50mm	3	<b>5156381</b>
C18 HPLC Column	4.6 x 150mm	3	<b>5156382</b>
C18 HPLC Column	4.6 x 250mm	3	<b>5156383</b>

\*For use with Reveleris® Navigator™ Software.

### Reveleris® Flash Chromatography System Verification Kits

- Kits include 10 tubes with preabsorbed test mix and five 12g flash cartridges

#### Reveleris® System Verification Kits

Description	Part No.
<i>Reveleris® System Verification Kit</i>	
High Concentration Flash Test Mix	<b>5157882</b>
<i>Reveleris® iES System Verification Kit</i>	
Low Concentration Flash Test Mix	<b>5157883</b>

### Flash Cartridge Kits

- Optimized for specific application areas
- Method development packs

#### Flash Cartridge Kits

Description	Part No.
<i>Reveleris® Silica Cartridge Select Pack</i>	
(2) 4g Si, (2) 12g Si, (2) 40g Si	<b>5158903</b>
<i>Radiochem Flash Kit</i>	
(3) 4g Si, (3) 4g C18, (3) 4g Diol, (10) 3g Loaders	<b>5157384</b>
<i>Impurity Isolation Flash Kit</i>	
(2) 12g C18, (2) 12g Diol, (1) 120g C18, (1) 120g Diol	<b>5157386</b>
<i>Natural Product Flash Kit</i>	
(3) 12g C18, (3) 12g Si, (3) 3g Loaders	<b>5157388</b>
<i>Carbohydrate Flash Kit</i>	
(3) 12g C18, (3) 12g Amino	<b>5157385</b>
<i>Lipid Flash Kit</i>	
(3) 12g Si, (3) 12g C18, (3) 12g Diol	<b>5157387</b>

### Flash System Adapters

#### Flash System Adapters

Description	Part No.
<i>Reveleris® Flow Diverting Bypass Kit</i>	
Bypasses the Column Position to Connect Large Cartridges to the Reveleris® Flash System	<b>5164530</b>
Includes Bypass Tube (Part No. <b>8627100</b> ), Fittings, and Tubing	
<i>GraceResolv™ 750g Flash Cartridge Adapter Kit</i>	
Adapts GraceResolv™ 750g Cartridge to the Reveleris® Flash System	<b>5157890</b>
Also Requires Flow Diverting Bypass Kit (Part No. <b>5164530</b> )	
<i>GraceResolv™ 1500g Flash Cartridge Adapter Kit</i>	
Adapts GraceResolv™ 1500g Cartridge to the Reveleris® Flash System	<b>5156862</b>
Also Requires Flow Diverting Bypass Kit (Part No. <b>5164530</b> )	

## TLC Plates

### Adsorbosil® Soft Layer TLC Plates

- Contains no organic binders
- Sample zones are easy to remove for further analysis

#### Soft Layer Adsorbosil® Prekotes TLC Plates

Description	Size	Layer Thickness	Qty.	Part No.
<i>Soft Layer Prekotes, Glass-Backed</i>				
<b>Conventional</b>				
Adsorbosil®-Plus	20 x 20cm	250µm	25	<b>16384</b>
Adsorbosil®-Plus P*	20 x 20cm	250µm	25	<b>16376</b>
Adsorbosil®-Plus 1	20 x 20cm	250µm	25	<b>16330</b>
Adsorbosil®-Plus 1 P*	20 x 20cm	250µm	25	<b>16322</b>

\*P = With Fluorescent Indicator, 254 wavelength.

### Macherey-Nagel TLC Plates

- 60Å pore size, 5 to 17µm particle size
- Binder is organic, stable in most organic solvents and aggressive detection reagents

#### Macherey-Nagel TLC Plates

Description	Size	Layer Thickness	Qty.	Part No.
<i>Silica Gel Plates, Glass-Backed</i>				
<b>Conventional Layers, Silica Gel 60</b>				
SIL G-25	5 x 10cm	250µm	50	<b>809017</b>
SIL G-25	5 x 20cm	250µm	100	<b>809011</b>
SIL G-25	20 x 20cm	250µm	25	<b>809013</b>
SIL G-25 UV254	5 x 20cm	250µm	100	<b>809021</b>
SIL G-25 UV254	20 x 20cm	250µm	25	<b>809023</b>
SIL G-25 UV254+366	20 x 20cm	250µm	25	<b>809123</b>
<i>Polyester-Backed TLC Plates</i>				
<b>Silica Gel 60</b>				
SIL G	20 x 20cm	250µm	25	<b>805013</b>
SIL G/UV254	4 x 8cm	250µm	50	<b>805021</b>
SIL G/UV 254	20 x 20cm	250µm	25	<b>805023</b>
SIL N-HR/UV254	20 x 20cm	200µm	25	<b>804023</b>

#### more info

For additional information about flash chromatography, including application notes and technical posters, visit our website.

### Analtech Uniplates™ TLC Plates

#### Silica Gel H and HF Uniplates™ TLC Plates

- Soft Layer
  - Contains no organic binder
  - Contains no calcium sulfate binder
- Hard Layer
  - Contains an organic binder
  - 80% water resistant
  - Visualization by charring up to 150°C

#### Silica Gel H and HF Uniplates™ TLC Plates

Description	Layer Thickness	Qty.	H Part No.	HF* Part No.
<i>Soft Layer, No Binders</i>				
<b>Conventional</b>				
20 x 20cm	250µm	25	<b>710011</b>	<b>720011</b>
10 x 20cm	250µm	25	<b>710021</b>	<b>7200210</b>
<i>Hard Layer, Organic Binder</i>				
<b>Conventional</b>				
20 x 20cm	250µm	25	<b>746011</b>	<b>747011</b>
10 x 20cm	250µm	25	<b>746021</b>	<b>747021</b>

\*F-Fluorescent Indicator, 254nm.

#### Silica Gel G and GF Uniplates™ TLC Plates

- Calcium Sulfate Binder
- Contains no organic binder

#### Silica Gel G and GF Uniplates™ TLC Plates

Description	Layer Thickness	Qty.	G Part No.	GF* Part No.
<i>Soft Layer, No Binders</i>				
<b>Conventional</b>				
20 x 20cm	250µm	25	<b>701011</b>	<b>702011</b>
10 x 20cm	250µm	25	<b>701021</b>	<b>702021</b>

\*F-Fluorescent Indicator, 254nm.

#### technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)  
Online: [www.discoverysciences.com](http://www.discoverysciences.com)

## TLC Accessories

### TLC Tanks and Storage

#### Latch-Lid TLC Tank

- Unique latching device assures tight seal between lid and tank
- No messy "grease" seals



#### Latch-Lid Tank

Description	Size	Part No.
Latch-Lid Tank/Lid Unit	10 x 10cm Plates	<b>7542</b>
Latch-Lid Tank/Lid Unit	20 x 20cm Plates	<b>7536</b>

#### Multiple Plate Development Rack

- Saves time and money



#### Multiple Plate Development Rack

Description	Size	Part No.
Anodized Aluminum Rack	20 x 20cm Plates	<b>17051</b>
Anodized Aluminum Rack	10 x 10cm Plates	<b>17053</b>

### Preval® Sprayers

#### Compressed Gas Sprayer

Compressed Gas Sprayers provide a constant pressure and uniform distribution of fine mist on your TLC plate. The pressure unit contains difluoroethane. Unit sprays up to 16oz of liquid.

**Caution:** Wetted parts are made of polypropylene or nylon. Do not store with dip tube immersed in reagent.



#### Compressed Gas Sprayer

Description	Qty.	Part No.
Complete Spray Unit with Glass Jar	3	<b>14654</b>
Replacement Glass Jar with Lid	6	<b>14655</b>
Replacement Compressed Gas Unit	6	<b>14657</b>

### Spraying Accessories

#### Disposable Spray Box

- Heavy duty cardboard with disposal bag provided

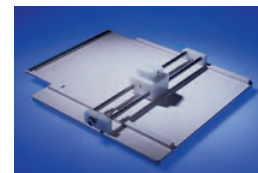


#### TLC Spray Supports

Description	Qty.	Part No.
Disposable Spray Box	5	<b>16408</b>

### TLC Plate Cutter

- Scores coated glass plates at any position
- Compact, portable, and easy to operate



The TLC plate cutter has a high-quality carbide scriber mounted into a movable plastic head. It is designed to produce optimal scoring on the glass surface of 20 x 20cm TLC plates with a total thickness (glass + coating) of 2mm. A smaller template is included with the unit for ease in cutting 10 x 10cm plates.

#### TLC Plate Cutter

Description	Qty.	Part No.
TLC Plate Cutter	ea	<b>7535</b>
Replacement Scribers	ea	<b>7565</b>
Replacement Scribers	3	<b>7575</b>

### Sample Applicators

#### Uncalibrated Disposable Micropipettes

Uncalibrated disposable glass micropipettes are intended for rapid qualitative sample application on TLC plates. Thick walls make these pipettes strong and easy to handle. Overall length is about three inches. Capacity is approximately 2–8 $\mu$ L.



#### Uncalibrated Disposable Micropipettes

Description	Qty.	Part No.
Glass Micropipettes	300	<b>7616</b>
Glass Micropipettes	1440	<b>17203</b>

#### Drummond® Wiretrol® Micropipettes

- Combines the accuracy of a microsyringe with the ease and economy of a disposable pipette



#### Drummond® Wiretrol® Micropipettes

Description/Capacity	Qty.	Part No.
1.0 to 5.0 $\mu$ L (Calibrated)	100	<b>3842</b>

# Grace® GC Capillary Column Families

- Alltech® Heliflex® Column — High-Performance, Widest Selection of Phases
- Alltech® Econo-Cap™ Column — Best Value, Popular Phases

Grace offers two lines of capillary columns to suit every application and budget; Alltech® Heliflex® and Alltech® Econo-Cap™. Heliflex® columns are Grace's premium line of individually tested capillary columns. Econo-Cap™ columns are batch tested to dramatically reduce the price without sacrificing quality. Both the Heliflex® and Econo-Cap™ column lines are manufactured under identical conditions using the same high-quality polyimide coated fused silica and immobilized stationary phases. In addition each are mounted on a rugged cage.



### tech tip

Our GC capillary columns are temperature rated and the test certificate that you receive with your column will indicate the minimum and maximum operating temperatures. In some cases we will list two maximum temperatures – one for isothermal conditions and a higher one for temperature programmed method.

## Alltech® Standard Phase Cross Reference

Standard Phase Cross Reference			
Composition	Alltech® Phases	USP Designation	Similar Phases
100% Dimethylpolysiloxane	AT™-1ms	G1, G2, G38	DB-1ms, HP-1ms, Rtx®-1ms, CP-Sil 5CB low-bleed/ms phases
100% Dimethylpolysiloxane	AT™-1ht, AT™-1, EC™-1	G1, G2, G38	007-1, CP-Sil 5CB, DB-1, DB-1ht, HP-1, HP-101, OV™-1, RSL-150, RSL-160, Rtx®-1, SE-30™, SPB™-1, SPB™-Sulfur, ULTRA-1, SP-2100, BP-1, DC-200, PE-1, ZB-1 phases
5% Phenyl equivalent Polysilphenylene-Siloxane	AT™-5ms		DB-5ms, Rtx®-5 Sil ms, BPX™-5, 007-5ms, HP-5ms phases
(5% Phenyl)-95% methylpolysiloxane	AT™-5, EC™-5	G27, G36	007-2, CP-Sil 8CB, DB-5, DB-5.625, DB-5ht, HP-5, HP-5ms, OV™-5, PTE-5, PTE-5QTM, PAS-5, RSL-200, Rtx®-5, Rtx®-5ms, SAC-5, SE™-54, SPB™-5, ULTRA-2, XTI-5, SE™-52, BP-5, PE-2, ZB-5 phases
(20% Phenyl)-80% methylpolysiloxane	AT™-20, EC™-20	G28, G32	007-7, Rtx®-20, SPB™-20, VOCOL™, PE-7 phases
(35 Phenyl)-65% Methylpolysiloxane	AT™-35ms, AT™-35	G42	DB-35ms, Rtx®-35, SPB™-35, SUP-HERB™, MDN-35, BPX™-35, 007-11, DB-35, DB-35ms, HP-35, RSL-300, Rtx®-35, SPB™-35, SPB™-608, OV™-11, PE-35, SUP-HERB™ phases
(50 Phenyl)-50% methylpolysiloxane	AT™-50	G3	DB-17ms, H5-50+, Rtx®-50, SP-2250, SPB™-50, SPB™-17, BPX™-50, DB-17ht, Rtx®-65TG, BPX™-50, CP-TAB-CB, 007-17, DB-17, DB-17ht, HP-17, HP-50+, Rtx®-50, SP-50, SP-2250, SPB™-50, CP-Sil 24CB, PE-17, ZB-50 phases
(6% Cyanopropylphenyl)-94% methylpolysiloxane	AT™-624	G43	DB-624, HP-624, Rtx®-624, SPB™-624, 007-624, ZB-624 phases
(14% Cyanopropylphenyl)-86% methylpolysiloxane	AT™-1701		007-1701, CP-Sil 19CB, DB-1701, HP-1701, OV™-1701, PAS-1701, Rtx®-1701, SPB™-1701, BP-10, ZB-1701 phases
Trifluoropropylmethyl polysiloxane	AT™-210	G6	DB-210, RSL-400, Rtx®-200, OV™-202, OV™-210, OV™-215, QF-1, SP-2401 phases
Polyethyleneglycol	AT™-WAXms, AT™-WAX, AT™-AquaWax, EC™-WAX	G14, G15, G16, G20, G39	DB-WAX, Rtx®-WAX, Supelcowax™-10, 007-CW, Carbowax® 20M, CP-Wax 52CB, DB-WAXetr, DB-WAX, Rtx®-WAX, HP-20M, HP-Wax, Innowax™, Omegawax™, Stabilwax®, Supelcowax®-10, Superox® II, BP-20, ZB-WAX phases
Polyethyleneglycol Acid Modified	AT™-1000, EC™-1000, AT™-AquaWax-DA	G25, G35	007-FFAP, CP-Wax 58CB, DB™-FFAP, HP™-FFAP, Nukol™, OV™-351, SP-1000, Stabilwax®-DA, Superox®-FA, BP-21 phases

## Alltech® Specialty Phase Cross Reference

Specialty Phases Cross Reference		
Composition	Alltech® Phases	Similar Phases
EPA Method 502.2	AT™-502.2	007-624, 007-502, DB-502.2, DB-VRX, HP-624, HP-VOC, MST-502.2, MXT-624, MXT-Volatiles, OV™-624, Rtx®-502.2, Rtx®-624, Rtx™-Volatiles, VOCOL™ phases

## Heliflex® Capillary Columns

- High-performance individually tested columns
- 7" rugged cage
- Most complete selection of phases
- Custom columns available to suit your specific application

Heliflex® capillary columns are manufactured from the highest quality polyimide coated synthetic fused silica. They are mounted on a rugged, wear-resistant cage. Each Heliflex® column is individually tested to guarantee column performance and comes with a test chromatogram, instruction manual, capillary end caps and a free ceramic column cutter.



### Heliflex® Standard Capillary GC Columns

Length	i.d.	Film	AT™-1 Part No.	AT™-5 Part No.	AT™-20 Part No.	AT™-35 Part No.	AT™-1701 Part No.	AT™-Wax Part No.	AT™-1000 Part No.
10m	0.32mm	0.10µm	<b>16868</b>	—	—	—	—	—	—
10m	0.53mm	0.25µm	<b>16840</b>	—	—	—	—	—	—
10m	0.53mm	1.20µm	—	—	—	—	—	—	<b>975110</b>
10m	0.53mm	2.65µm	—	<b>16853</b>	—	<b>16877</b>	—	—	—
15m	0.32mm	0.25µm	—	<b>13887</b>	—	—	—	—	—
15m	0.32mm	1.00µm	—	<b>13710</b>	—	—	—	—	—
15m	0.53mm	0.15µm	<b>13945</b>	—	—	—	—	—	—
15m	0.53mm	1.00µm	—	—	—	—	—	<b>13904</b>	<b>13873</b>
15m	0.53mm	1.20µm	<b>935115</b>	<b>955115</b>	—	—	—	<b>9951152</b>	<b>975115</b>
15m	0.53mm	1.50µm	—	<b>13906</b>	—	—	—	—	—
25m	0.25mm	0.20µm	<b>932525</b>	<b>952525</b>	—	—	—	—	<b>972525</b>
25m	0.53mm	1.20µm	—	—	—	<b>965125</b>	—	—	—
30m	0.25mm	0.25µm	<b>13638</b>	<b>13656</b>	—	—	<b>13686</b>	<b>136462</b>	<b>13783</b>
30m	0.25mm	0.50µm	—	—	—	—	—	<b>136472</b>	—
30m	0.25mm	1.00µm	<b>13639</b>	<b>13657</b>	—	—	—	—	—
30m	0.32mm	0.25µm	<b>13640</b>	<b>13658</b>	—	—	<b>13690</b>	<b>136482</b>	—
30m	0.32mm	0.30µm	<b>933230</b>	—	—	—	—	—	<b>973230</b>
30m	0.32mm	0.50µm	—	—	—	—	—	<b>136522</b>	—
30m	0.32mm	1.00µm	<b>13641</b>	<b>13659</b>	—	—	<b>13691</b>	<b>137382</b>	—
30m	0.32mm	3.00µm	<b>13702</b>	—	—	—	—	—	—
30m	0.32mm	5.00µm	<b>16838</b>	—	—	—	—	—	—
30m	0.53mm	0.50µm	—	<b>14045</b>	—	—	—	<b>14111</b>	—
30m	0.53mm	1.00µm	<b>13515</b>	<b>13798</b>	—	—	—	<b>13907</b>	<b>13877</b>
30m	0.53mm	1.20µm	<b>935130</b>	<b>955130</b>	<b>13932</b>	—	<b>13830</b>	<b>9951302</b>	<b>975130</b>
30m	0.53mm	1.50µm	<b>13908</b>	<b>13909</b>	—	—	—	—	—
30m	0.53mm	2.00µm	—	—	—	—	—	—	—
30m	0.53mm	2.65µm	—	<b>16857</b>	—	<b>16878</b>	—	—	—
30m	0.53mm	5.00µm	<b>16843</b>	<b>16859</b>	—	—	—	—	—
50m	0.25mm	0.20µm	<b>932550</b>	—	—	—	—	—	—
50m	0.32mm	0.30µm	—	—	—	—	—	—	<b>973250</b>
60m	0.25mm	0.25µm	—	<b>13676</b>	—	—	—	<b>136942</b>	—
60m	0.25mm	1.00µm	<b>13667</b>	—	—	—	—	—	—
60m	0.32mm	0.10µm	—	—	—	—	—	—	—

(continued on next page)



## Heliflex® Capillary Columns (continued)

Heliflex® Standard Capillary GC Columns

Length	i.d.	Film	AT™-1 Part No.	AT™-5 Part No.	AT™-Wax Part No.	AT™-1000 Part No.
60m	0.32mm	0.25µm	—	<b>13678</b>	—	—
60m	0.32mm	0.30µm	—	—	—	<b>973260</b>
60m	0.32mm	0.50µm	—	—	<b>136972</b>	—
60m	0.32mm	5.00µm	<b>13704</b>	—	—	—
60m	0.53mm	1.00µm	—	—	<b>13929</b>	<b>13879</b>
60m	0.53mm	5.00µm	<b>13810</b>	—	—	—

## Heliflex® AT™ -ms and HT Capillary GC Columns

- Ms grade columns are low bleed phases suitable for use with Mass spectrometers or other sensitive detectors
- AT™-1HT columns are rated to a higher maximum temperature for use with high boiling components

Heliflex® AT™-ms and HT Capillary GC Columns

Length	i.d.	Film	AT™-1ms Part No.	AT™-1HT Part No.	AT™-5ms Part No.	AT™-Wax ms Part No.
15m	0.25mm	0.10µm	—	<b>16367</b>	—	—
15m	0.25mm	0.25µm	—	—	<b>15801</b>	—
30m	0.25mm	0.10µm	—	<b>16368</b>	—	—
30m	0.25mm	0.25µm	<b>15897</b>	—	<b>15807</b>	<b>12604</b>
60m	0.25mm	0.25µm	—	—	<b>15891</b>	<b>12605</b>
60m	0.32mm	0.25µm	—	—	<b>15896</b>	—

\*With 5m integral uncoated guard.

## AT™ Special Capillary GC Columns

AT™ Special Capillary GC Columns

Length	i.d.	Film	AT™-50 Part No.	AT™-210 Part No.	AT™-AquaWax Part No.	AT™-AquaWax-DA Part No.
30m	0.25mm	0.25µm	—	—	<b>12437</b>	<b>14537</b>
30m	0.32mm	0.25µm	<b>13858</b>	—	<b>12439</b>	<b>14539</b>
30m	0.53mm	0.50µm	<b>13991</b>	—	—	—
30m	0.53mm	1.00µm	<b>13878</b>	—	—	<b>14543</b>
30m	0.53mm	1.20µm	—	<b>985130</b>	—	—
60m	0.25mm	0.25µm	—	—	<b>12447</b>	<b>14547</b>
60m	0.32mm	0.25µm	—	—	<b>12449</b>	—

## Other Heliflex® AT™ Capillary GC Columns

Other Heliflex® AT™ Capillary GC Columns

Phase	Length	i.d.	Film	Part No.
AT™-624	30m	0.32mm	1.80µm	<b>13756</b>
AT™-624	30m	0.32mm	3.00µm	<b>13780</b>
AT™-624	30m	0.53mm	3.00µm	<b>16889</b>
AT™-624	60m	0.53mm	3.00µm	<b>13800</b>
AT™-624	75m	0.53mm	3.00µm	<b>13937</b>
AT™-502.2	60m	0.32mm	1.80µm	<b>13790</b>
AT™-502.2	60m	0.53mm	3.00µm	<b>13793</b>
AT™-Amino Acid	25m	0.53mm	1.20µm	<b>16864</b>

### Custom Capillary Columns — Part No. 5133046

To inquire about the possibility of a custom capillary column, contact your local Grace office with the following information:

1. Stationary phase required
2. Length and Internal Diameter
3. Film Thickness required

## Alltech® Econo-Cap™ Capillary Columns

- Best value in capillary columns
- Batch tested to dramatically reduce price
- Ideal for aggressive applications
- Available in the most popular phases

We've taken our most popular capillary columns and perfected the manufacturing procedure to the point that reproducibility is assured. This allows us to test these columns in batches instead of individually, while still offering a guarantee. Batch testing significantly reduces cost in production without sacrificing quality.

Each Econo-Cap™ capillary column comes with a copy of the batch test results, an instruction manual, and capillary end caps.



Econo-Cap™ Capillary GC Columns

Length	i.d.	Film	Qty.	EC™-1 Part No.	EC™-5 Part No.	EC™-Wax Part No.	EC™-1000 Part No.
15m	0.53mm	1.20µm	ea	—	—	<b>19653</b>	<b>19684</b>
30m	0.25mm	0.25µm	ea	<b>19652</b>	<b>19647</b>	<b>19655</b>	—
30m	0.25mm	0.25µm	6/pk	<b>196526</b>	<b>196476</b>	<b>196556</b>	—
30m	0.32mm	0.25µm	ea	<b>19651</b>	<b>19646</b>	<b>19654</b>	—
30m	0.32mm	0.25µm	6/pk	—	<b>196466</b>	<b>196546</b>	<b>196856</b>
30m	0.53mm	1.20µm	ea	<b>19656</b>	<b>19657</b>	<b>19659</b>	—
30m	0.53mm	1.20µm	6/pk	—	<b>196576</b>	<b>196596</b>	<b>196886</b>

### technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)  
Online: [www.discoverysciences.com](http://www.discoverysciences.com)

## GC Packed Columns

These columns are 6' x 1/8" o.d. 304 premium grade, precleaned stainless steel (unless otherwise indicated). Each column is made with preconditioned, pretested packing and comes complete with fittings, packing quality control chromatogram, column tags, and conditioning instructions.

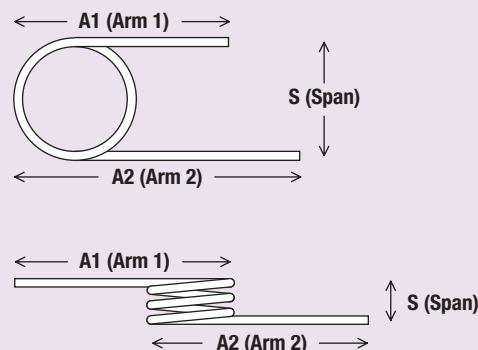
### Popular GC Packed Columns

Description	Column Dimensions	Part No.
Alumina F1, 60/80	5' x 1/8" SS Tubing	5664PC
10% Carbowax® 20M on Chromosorb® W-AW, 80/100	6' x 1/8" SS Tubing	12005PC
10% Carbowax® 20M on Chromosorb® W-HP, 80/100	6' x 1/8" SS Tubing	12106PC
0.20% Carbowax® 1500 on Graphpac™-GC, 80/100	6' x 1/8" SS Tubing	8546PC
Chromosorb® 107, 80/100	6' x 1/8" TFE Tubing	9783
Chromosorb® 750, 80/100	4' x 1/8" SS Tubing	14480
Gas Chrom™ 220, 80/100	6' x 1/8" SS Tubing	2484PC
Hayesep® D, 80/100	6' x 1/8" SS Tubing	14487
Hayesep® D, 100/120	20' x 1/8" Ni Tubing	27082PC
Hayesep® D, 100/120	30' x 1/8" SS Tubing	27083PC
Hayesep® D, 100/120	10' x 1/8" SS Tubing	28301PC
Hayesep® DB, 100/120	30' x 1/8" SS Tubing	2836PC
Hayesep® Q, 80/100	8' x 1/8" SS Tubing	28010PC
Hayesep® Q, 80/100	6' x 1/8" SS Tubing	2801PC
Hayesep® Q, 100/120	6' x 1/8" SS Tubing	14489
Hayesep® P, 60/80	8' x 1/8" SS Tubing	2803PC
Hayesep® P, 80/100	6' x 1/8" SS Tubing	2804PC
Hayesep® T, 60/80	3' x 1/8" SS Tubing	14491
Hayesep® T, 80/100	6' x 1/8" SS Tubing	2813PC
Molecular Sieve 5A (washed), 60/80	6' x 1/8" SS Tubing	14494
Molecular Sieve 5A (washed), 80/100	6' x 1/8" SS Tubing	5605PC
Molecular Sieve 5A (washed), 80/100	10' x 1/8" SS Tubing	14495
Molecular Sieve 13X (washed), 80/100	3' x 1/8" SS Tubing	14492
Molecular Sieve 13X (washed), 80/100	6' x 1/8" SS Tubing	5773PC
Molecular Sieve 13X (washed), 80/100	10' x 1/8" SS Tubing	14493
Porapak® P, 80/100	6' x 1/8" SS Tubing	14499
Porapak® Q, 60/80	6' x 1/8" SS Tubing	2700PC
Porapak® Q, 80/100	12' x 1/8" SS Tubing	27012PC
Porapak® Q, 80/100	6' x 1/8" SS Tubing	2701PC
Porapak® Q, 100/120	6' x 1/8" SS Tubing	2702PC
Porapak® QS, 80/100	6' x 1/8" SS Tubing	2719PC
Porapak® T, 80/100	6' x 1/8" SS Tubing	2713PC
10% SE-30 on Chromosorb® W-HP, 80/100	6' x 1/8" SS Tubing	12423PC
Silica Gel Grade 12, 60/80	18' x 1/8" SS Tubing	5651PC
Silica Gel Grade 12, 80/100	8' x 1/8" SS Tubing	14530
10% Silar™ 10C on Chromosorb® W-HP, 100/120	6' x 1/8" SS Tubing	12430PC
Tenax® TA, 60/80	4' x 1/8" SS Tubing	14538
Tenax® TA, 60/80	6' x 1/8" SS Tubing	4900PC
Tenax® TA, 80/100	6' x 1/8" SS Tubing	4901PC
Unibeads™ 2S, 60/80	6' x 1/8" SS Tubing	2760PC
Unibeads™ 3S, 60/80	6' x 1/8" SS Tubing	14541
10% Silicone UCW-98 on Chromosorb® W-HP, 80/100	6' x 1/8" SS Tubing	8493PC

### Custom Packed Columns — Part No. 5133045

Custom Packed GC Columns are available in a variety of tubing types including stainless steel, PTFE, and Deactiglas® tubing (silane treated glass).

Contact your local Grace office to request a quote. Please include your desired tubing, stationary phase, loading, and support. We may request additional information about your instrument or dimensions of existing columns.

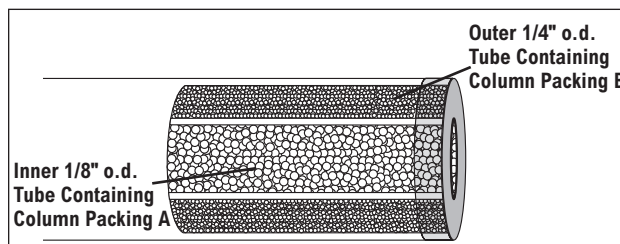


## Alltech® CTR Concentric Packed Columns

### For Gas Analysis

- CTR I is ideal for separating O<sub>2</sub>, N<sub>2</sub>, CH<sub>4</sub>, CO, and CO<sub>2</sub> at ambient conditions
- CTR III is ideal for argon analysis in the presence of O<sub>2</sub>
- Useful where two separate chromatographic runs are required to analyze one sample
- Individually tested

A CTR column is essentially a column within a column. This permits you to use two different packings for the analysis of your sample. The diagram shows the construction of the CTR column.



Cut-away view of CTR column.

### technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)  
Online: [www.discoverysciences.com](http://www.discoverysciences.com)

### CTR Columns

Description	Temp. Limit	Part No.
CTR III Argon Analysis Column	275°C	8725

## GC Packings and Supports

## Pretested GC Packings

Description	Temp. Limit	Qty.	Part No.
Alumina F-1, 60/80	300°C	100g	5664
1% AT™-1000 on Carbowax 1, 60/80	250°C	15g	1733
5% Carbowax® 20M on Chromosorb® W-HP, 80/100	60-225°C	20g	16147
10% Carbowax® 20M on Chromosorb® W-AW, 80/100	60-225°C	20g	12005
10% Carbowax® 20M on Chromosorb® W-HP, 80/100	60-225°C	20g	12106
Molecular Sieve 5A (washed), 60/80	350°C	50g	5604
Molecular Sieve 5A (washed), 80/100	350°C	50g	5605
Molecular Sieve 13X (washed), 60/80	350°C	50g	57730
Molecular Sieve 13X (washed), 80/100	350°C	50g	57732
3% OV™-1 on Chromosorb® W-HP, 80/100	100-350°C	20g	12716
3% OV™-17 on Chromosorb® W-HP, 100/120	20-350°C	20g	12017
3% OV™-17 on Chromosorb® W-HP, 80/100	20-350°C	20g	12719
Porapak® PS, 100/120	250°C	15g	16224
Porapak® Q, 100/120	250°C	15g	16228
Silica Gel Grade 12, 60/80	350°C	100g	5651
Silica Gel Grade 12, 80/100	350°C	100g	5653
Tenax® TA, 60/80	350°C	10g	04916
Tenax® TA, 80/100	350°C	10g	04917
Tenax® GR, 60/80	350°C	10g	4937
Unibeads™ 1S, 60/80	200°C	25g	2752
Unibeads™ 2S, 60/80	200°C	25g	2760
Unibeads™ 3S, 60/80	200°C	25g	2764
Unibeads™ 3S, 80/100	200°C	25g	2766



Pretested packings are supplied with a test chromatogram.

## Custom Coated Packings — Part No. 5133048

To request a quote on a custom coated packing, contact your local Grace office with the following information:

Please call us with:

1. Solid support required
2. Mesh size
3. Stationary phase and % loading

## GC Supports — Chromosorb® Diatomite Supports

Description	Mesh	Qty.	Part No.
Chromosorb® A-NAW	20/30	454g	2431
Chromosorb® P-NAW	30/60	454g	2304
	45/60	454g	2305
	60/80	454g	2306
	80/100	454g	2307
Chromosorb® P-AW	100/120	454g	2308
	30/60	454g	2314
	60/80	454g	2316
Chromosorb® P-AW-DMCS	80/100	454g	2317
	80/100	454g	2325
	100/120	454g	2326
Chromosorb® W-NAW	30/60	150g	23331
	45/60	150g	23341
	80/100	150g	23361
Chromosorb® W-AW	30/60	150g	23451
	60/80	150g	23471
	80/100	150g	23601
Chromosorb® W-AW-DMCS	80/100	150g	23601
	80/100	150g	23651
	100/120	150g	23661
Chromosorb® 750 (AW-DMCS)	80/100	100g	2400
Chromosorb® T (Non-Diatomite)	30/60	225g	24371

## Chromosorb® Diatomite Supports Specifications

Chromosorb® Diatomite Supports Series	Type	Surface Area	Packed Density	Recommended Liquid Phase Load
A	Flux-calcined	2.7m <sup>2</sup> /g	0.48g/cc	25%
G	Flux-calcined	0.5m <sup>2</sup> /g	0.58g/cc	5%
P	Calcined	4.0m <sup>2</sup> /g	0.47g/cc	30%
W	Flux-calcined	1.0m <sup>2</sup> /g	0.24g/cc	15%
750*	Flux-calcined	0.75m <sup>2</sup> /g	0.40g/cc	12%
T**	PTFE	7–8m <sup>2</sup> /g	0.42g/cc	12%

\*Chromosorb® 750 support material is the most inert and highly efficient in the series. This support material is acid-washed, DMCS treated, and carefully screened.

\*\*Chromosorb® T is a non-diatomite support useful for the analysis of polar compounds such as water, hydrazine, sulfur dioxide, etc.

## Chromosorb® Diatomite Supports Treatment Specifications

Abbreviation	Treatments
NAW	Untreated (non-acid washed)
AW	Acid washed (HCl is used)
DMCS	Dimethyldichlorosilane (silanized)
HP	High performance QC tested (acid washed, silanized, flux-calcined)

## GC Supports — Molecular Sieves

Molecular sieves are synthetic alkali metal aluminosilicates with various cations. They are used for the separation of fixed gases and drying of liquid or gas streams. They can be reactivated by heating at 250°C for 12 hours; 300°C for 4 hours; or 350°C for 2 hours. The washed molecular sieves offered here have been carefully cleaned of dust particles by washing with distilled water. The cleaned product is then activated and sealed in glass jars.

### Molecular Sieves

Description	Mesh	Temp. Limit	Qty.	Part No.
Molecular Sieve 3A (For Drying Applications)	1/16" Pellets	350°C	100g	<b>05254</b>
	60/80	350°C	100g	<b>05307</b>
	80/100	350°C	100g	<b>05308</b>
	100/120	350°C	100g	<b>05309</b>
Molecular Sieve 4A (For Drying Applications)	8/12 Beads	350°C	100g	<b>05256</b>
	1/16" Pellets	350°C	100g	<b>05260</b>
	60/80	350°C	100g	<b>5622</b>
Molecular Sieve 5A (For Drying Applications)	80/100	350°C	100g	<b>5624</b>
	1/8" Pellets	350°C	100g	<b>05264</b>
	1/16" Pellets	350°C	100g	<b>5633</b>
Molecular Sieve 13X (For Drying Applications)	80/100	350°C	100g	<b>5630</b>
	8/12 Beads	350°C	100g	<b>05268</b>
	1/16" Pellets	350°C	100g (1KG)	<b>05272 (05273)</b>
Washed Molecular Sieve 5A (For Chromatography Applications)	40/60	350°C	100g	<b>5634</b>
	60/80	350°C	100g	<b>5636</b>
	80/100	350°C	100g	<b>5638</b>
	40/60	300°C	50g	<b>5602</b>
Washed Molecular Sieve 13X (For Chromatography Applications)	60/80	300°C	50g	<b>5604</b>
	80/100	300°C	50g	<b>5605</b>
	40/60	300°C	50g	<b>57728</b>
	60/80	300°C	50g	<b>57730</b>
	80/100	300°C	50g	<b>57732</b>
	100/120	300°C	50g	<b>57734</b>

## GC Supports — Other GC Supports

### GC Supports

Description	Mesh	Temp. Limit	Qty.	Part No.	Comments
T-Port-F	80/100	150°C	50g	<b>2449</b>	TFE support for very polar compounds.
Activated Alumina F-1	60/80	300°C	100g	<b>5664</b>	Useful for light hydrocarbon analyses.
	80/100	300°C	100g	<b>5666</b>	Useful for light hydrocarbon analyses.
Glass Beads — Regular	60/80	—	125g	<b>5420</b>	Can support loadings of up to 0.5%.
	100/120	—	125g	<b>5424</b>	Can support loadings of up to 0.5%.
Glass Beads — DMCS Treated	80/100	—	125g	<b>5428</b>	Can support loadings of up to 0.5%.
	100/120	—	125g	<b>5430</b>	Can support loadings of up to 0.5%.
Silica Gel Grade 12	40/60	—	100g (1KG)	<b>5650 (05532)</b>	Used for analysis of fixed gases and light hydrocarbons.
	60/80	—	100g (1KG)	<b>5651 (05533)</b>	Used for analysis of fixed gases and light hydrocarbons.
	80/100	—	100g (1KG)	<b>5653 (05534)</b>	Used for analysis of fixed gases and light hydrocarbons.
	100/120	—	100g (1KG)	<b>5655 (05535)</b>	Used for analysis of fixed gases and light hydrocarbons.
Silica Gel Grade 15	35/60	—	100g (1KG)	<b>5648 (05545)</b>	Used for analysis of fixed gases and light hydrocarbons.
Unibeads™ 1S 22Å	60/80	—	25g	<b>2752</b>	Spherical porous polymer beads.
	80/100	—	25g	<b>2758</b>	Spherical porous polymer beads.
Unibeads™ 2S 60Å	60/80	—	25g	<b>2760</b>	Comparable to Porasil A.
	80/100	—	25g	<b>2762</b>	Comparable to Porasil A.
Unibeads™ 3S 100Å	60/80	—	25g	<b>2764</b>	Comparable to Porasil B.
	80/100	—	25g	<b>2766</b>	Comparable to Porasil B.

## GC Supports — Graphitized Carbon Blacks

### Graphitised Carbon Blacks

Description	Mesh	Temp. Limit	Qty.	Part No.	Comments
Carbograph™ 1	60/80	>500°C	10g	<b>1722</b>	Equivalent to Carbopack™ B Support.
	80/120	>500°C	10g	<b>1724</b>	Equivalent to Carbopack™ B Support.
Carbograph™ 2-TD	20/40	>500°C	15g	<b>1745</b>	Equivalent to Carbopack™ C Support — Suitable for thermal desorption work.
Carbograph™ 2	60/80	>500°C	10g	<b>1726</b>	Equivalent to Carbopack™ C Support.
	80/100	>500°C	10g	<b>1728</b>	Equivalent to Carbopack™ C Support.
Carbograph™ 1-SC	40/60	225°C	10g	<b>1734</b>	Similar to Carbopack™ BHT Support.
Graphpac™-GC Uncoated	60/80	—	15g	<b>8536</b>	Average surface area of 10-13 m <sup>2</sup> /g — Unique separation properties.

## GC Supports — Porous Polymers

### Porous Polymers

Description	Mesh	Temp. Limit	Qty.	Part No.
Tenax® TA (GC)	20/35	350°C	10g	<b>04914</b>
	20/35	350°C	100g	<b>049141</b>
	35/60	350°C	10g	<b>04915</b>
	35/60	350°C	100g	<b>049151</b>
	60/80	350°C	10g	<b>04916</b>
	60/80	350°C	100g	<b>049161</b>
	60/80	350°C	500g	<b>049162</b>
	80/100	350°C	10g	<b>04917</b>
	80/100	350°C	100g	<b>049171</b>
	Tenax® GR	20/35	350°C	10g
20/35		350°C	100g	<b>49331</b>
35/60		350°C	10g	<b>4935</b>
60/80		350°C	10g	<b>4937</b>
60/80		350°C	500g	<b>49372</b>
80/100		350°C	10g	<b>4939</b>
Hayesep® A	80/100	165°C	75cc	<b>2819</b>
	100/120	165°C	75cc	<b>2820</b>
	120/140	165°C	75cc	<b>2821</b>
Hayesep® D	60/80	290°C	75cc	<b>2828</b>
	80/100	290°C	75cc	<b>2829</b>
	100/120	290°C	75cc	<b>2830</b>
Hayesep® DB	100/120	290°C	75cc	<b>2836</b>
Hayesep® N	80/100	165°C	75cc	<b>2816</b>
Hayesep® P	60/80	250°C	75cc	<b>2803</b>
Hayesep® Q	60/80	275°C	75cc	<b>2800</b>
	80/100	275°C	75cc	<b>2801</b>
Hayesep® R	60/80	250°C	75cc	<b>2806</b>
	80/100	250°C	75cc	<b>2807</b>
Hayesep® T	80/100	165°C	75cc	<b>2813</b>
Porapak® Q	50/80	250°C	26g	<b>2700</b>
	80/100	250°C	26g	<b>2701</b>
	100/120	250°C	26g	<b>2702</b>
Porapak® P	50/80	250°C	20g	<b>2703</b>
	80/100	250°C	20g	<b>2704</b>
Porapak® R	80/100	250°C	24g	<b>2707</b>
	100/120	250°C	24g	<b>2708</b>
Porapak® S	50/80	250°C	26g	<b>2709</b>
	80/100	250°C	26g	<b>2710</b>
Porapak® T	80/100	190°C	31g	<b>2713</b>
Porapak® N	50/80	190°C	29g	<b>2715</b>
	80/100	190°C	29g	<b>2716</b>
	100/120	190°C	29g	<b>2717</b>
Porapak® PS	80/100	250°C	20g	<b>2722</b>
	100/120	250°C	20g	<b>2723</b>

### GC Supports — Chromosorb® Century Series — Porous Polymers

Chromosorb® 101	60/80	275/325°C*	50g	<b>2405</b>
Chromosorb® 102	80/100	250/300°C*	50g	<b>2409</b>
Chromosorb® 106	60/80	250/275°C*	50g	<b>2420</b>
Chromosorb® 107	80/100	250/275°C*	50g	<b>2424</b>

\*Isothermal/temp. program.

### Tenax®-TA (GC) Polymer

Tenax®-TA porous polymer is based on 2,6-Diphenyl-p-phenylene Oxide. It has replaced Tenax®-GC polymer and can be used as a packing and as a trapping material. Both the EPA and NIOSH specify the use of Tenax® polymer in their standard methods. It is particularly useful for the analysis of high boiling compounds such as alcohols, polyethylene glycols, diols, phenols, monoamines and diamines, ethanolamines, aldehydes, ketones and chlorinated aromatics.

### Tenax®-GR Polymer

Tenax®-GR polymer contains 23% graphitized carbon as an integral part of the material. This is not an admixture; the graphitized carbon is co-precipitated with the Tenax® polymer. The resulting material gives higher breakthrough volumes for most materials, yet is less water retentive than Tenax®-TA polymer. When using this material for packing GC columns, better peak symmetry is observed. Surface area is 24.1m<sup>2</sup>/g.

### Hayesep® Porous Polymer

- Pre-purified porous polymers for GC
- Less bleed and shrinkage than other porous polymers
- Cleaned and conditioned to 200°C (165°C for N & T)

Hayesep® polymers were developed to solve room temperature separation of N<sub>2</sub>, O<sub>2</sub>, Ar and CO; ppm H<sub>2</sub>O in the presence of HCl, Cl<sub>2</sub>, etc. The Hayesep® D polymer series better separates the fixed gases to the C<sub>2</sub> hydrocarbons.

### Porapak® Packings






Porapak® GC packings are cross-linked polymers that can be used directly in GC columns without a stationary phase coating. Acetone washing of Porapak® GC packings improves their performance.

Porapak® GC Packing Specifications			
Series	Polymer Composition	Surface Area	Polarity
Q	DVB*/Ethylvinylbenzene	500–600m <sup>2</sup> /g	Slightly Polar
P	DVB*/Styrene	100–200m <sup>2</sup> /g	Non-Polar
R	DVB*/Vinyl pyrrolidinone	450–600m <sup>2</sup> /g	Mod. Polar
S	DVB*/Vinyl pyridine	300–450m <sup>2</sup> /g	Mod. Polar
T	EGDM**	225–350m <sup>2</sup> /g	Polar
N	DVB*/Vinyl pyrrolidinone	250–350m <sup>2</sup> /g	Very Polar

\*Divinylbenzene.

\*\*Ethylene glycol dimethacrylate.

# Septa

Chromatogram Cross Reference Guide		
Actual Size Drawing	Measurement	
	1/4" (6mm)	Shimadzu*, SRI* Chromatographs
	3/8" (9.5mm)	Antek, Finnigan 9100, 9600, Gow-Mac, Agilent 5700, 5880 & 5900, IBM, Packard 427-433, Pye-Unicam (early models), Varian (except capillary injector), Tracor 550, 560 Chromatographs
	7/16" (11mm)	Carle, Agilent 5890, 6850, 6890, P-E Sigma, 900, 990, 3920, 8300, 8400, 8500 Autosys, Varian (capillary injector), SPI, Varian 1078/1079 Chromatographs
	1/2" (12.5mm)	Fisons/Carlo Erba, Finnigan 9500, Agilent 5750 and earlier models, Packard 409-421, Tracor 220, 222, 540 Chromatographs
	21/32" (17mm)	Fisons/Carlo Erba 8000 Series, CE TRACE GC Chromatographs

\*Use cylindrical plug septa.

## Microsep® Low-Bleed PTFE-Lined Septa

- Maximum temperature of 250°C
- Off-white silicone septa with yellow PTFE backing



### Microsep® Low-Bleed PTFE-Lined Septa

Size (o.d.)	Qty.	Part No.
3/8" (9.5mm)	2 x 50	<b>78001</b>
7/16" (11mm)	2 x 50	<b>78011</b>
1/2" (12.5mm)	2 x 50	<b>78041</b>

## General Purpose Blue Septa

- Maximum temperature of 250°C
- Lifetime of up to 150 injections
- Suitable for most GC analysis



### General Purpose Blue Septa

Size (o.d.)	Qty.	Part No.
1/4" (6mm)	100	<b>6512</b>
3/8" (9.5mm)	100	<b>6514</b>
7/16" (11mm)	100	<b>6518</b>
1/2" (12.5mm)	100	<b>6520</b>
12" x 12" Sheet	ea	<b>6528</b>

## XLB Septa

- Maximum temperature to 350°C
- Extremely low bleed
- Superior resealing properties
- Soft, easily penetrated by syringe needle



### XLB Septa

Size (o.d.)	Qty.	Part No.
1/4" (6mm)	50	<b>15427</b>
3/8" (9.5mm)	50	<b>15428</b>
7/16" (11mm)	50	<b>15429</b>
1/2" (12.5mm)	50	<b>15430</b>
21/32" (17mm)	50	<b>15039</b>

## ThermoRed Septa

- Maximum temperature of 300°C
- Packed in glass jars under strict QC standards to protect from contaminants



### ThermoRed Septa

Size (o.d.)	Qty.	Part No.
11/32" (9mm)	25	<b>15129</b>
3/8" (9.5mm)	25	<b>15131</b>
7/16" (11mm)	25	<b>15132</b>
1/2" (12.5mm)	25	<b>15141</b>
21/32" (17mm)	25	<b>15133</b>
Plug Type (For Shimadzu® and SRI)	25	<b>15134</b>

## HT-X High-Performance Septa

- Maximum temperature of 350°C
- Long injection life—over 200 injections



### HT-X High-Performance Septa




Size (o.d.)	Qty.	Part No.
3/8" (9.5mm)	50	<b>15492</b>
7/16" (11mm)	50	<b>15493</b>
21/32" (17mm)	50	<b>154941</b>
1/2" (12.5mm)	50	<b>15494</b>
12" x 12" Sheet	ea	<b>15496</b>

# GC Ferrule Selection

Ferrule Properties					
Material	Temp. Limit	Reusability	Resealing Properties	Suitability for Glass	Temp. Prog.
PTFE	250°C	Good	Excellent	Excellent	No
Graphite	450°C	Good	Excellent	Excellent	Yes
Vespe <sup>l</sup>	350°C+	Excellent	Good	Good	Yes
VG1	400°C	Excellent	Good	Excellent	Yes
VG2	400°C	Excellent	Good	Excellent	Yes

What ferrule type do you need?	
Ferrule Type	Use for
<b>0.4mm Hole:</b>	Capillaries with i.d. of 0.10–0.25mm
<b>0.5mm Hole:</b>	Capillaries with i.d. of 0.28–0.35mm
<b>0.8mm Hole:</b>	Capillaries with i.d. of 0.45–0.53mm
<b>NO-HOLE:</b>	As plugs, or drill for special needs.

## PTFE and Graphite Ferrules

Description	Fitting Size	Tubing Size	Qty.	PTFE Part No.	Graphite Part No.
<i>Straight Ferrules</i>					
	1"	1"	2	—	14361
	7/8"	7/8"	2	—	14360
	3/4"	3/4"	2	—	14358
	5/8"	5/8"	2	—	14357
	1/2"	1/2"	10	—	SF-800-G
	3/8"	3/8"	10	SF-600-T	SF-600-G
	1/4"	1/4"	10	SF-400-T	SF-400-G
	3/16"	3/16"	10	SF-300-T	SF-300-G
	1/8"	1/8"	10	SF-200-T	SF-200-G
	1/16"	1/16"	10	SF-100-T	SF-100-G
<i>Reducing Ferrules</i>					
	1/4"	1/16"	10	RF-400/100-T	RF-400/100-G
	1/4"	1/8"	10	RF-400/200-T	RF-400/200-G
	1/4"	3/16"	10	RF-400/300-T	14327
	1/8"	1/16"	10	RF-200/100-T	RF-200/100-G
	1/8"	1.0mm	10	—	14311
	1/8"	0.8mm	10	—	RF-200/0.8-G
	1/8"	0.5mm	10	—	RF-200/0.5-G
	1/8"	0.4mm	10	—	RF-200/0.4-G
	1/16"	1.0mm	10	—	RF-100/1.0-G
	1/16"	0.8mm	10	—	RF-100/0.8-G
	1/16"	0.5mm	10	—	RF-100/0.5-G
	1/16"	0.4mm	10	—	RF-100/0.4-G
	<i>No-Hole Ferrules</i>				
	3/8"	—	10	—	14332
	1/4"	—	10	RF-400/0-T	14328
	1/8"	—	10	RF-200/0-T	14314
	1/16"	—	10	RF-100/0-T	14310
<i>Graphite Ferrules for HPI/Agilent Nuts</i>					
0.5mm Hole	—	—	10	—	1547901
1.0mm Hole	—	—	10	—	1548001

## Vespe<sup>l</sup> and Vespe<sup>l</sup>/Graphite Ferrules

Description	Fitting Size	Tubing Size	Qty.	Vespe <sup>l</sup> Part No.	VG1 Part No.
<i>Straight Ferrules</i>					
	1/4"	1/4"	10	SF-400-V	SF-400-VG1
	1/8"	1/8"	10	SF-200-V	SF-200-VG1
	1/8"	1/8"	10	—	15450
	1/16"	1/16"	10	SF-100-V	SF-100-VG1
<i>Reducing Ferrules</i>					
	1/4"	3/16"	10	RF-400/300-V	400/300-VG1
	1/4"	1/8"	10	RF-400/200-V	400/200-VG1
	1/4"	1/16"	10	RF-400/100-V	400/100-VG1
	1/4"	0.8mm	10	—	400/0.8-VG1
	1/8"	1/16"	10	RF-200/100-V	200/100-VG1
	1/8"	0.8mm	10	—	200/0.8-VG1
	1/8"	0.4mm	10	—	200/0.4-VG1
	1/16"	0.9mm	10	RF-100/0.9-V	100/0.9-VG1
	1/16"	0.8mm	10	RF-100/0.8-V	100/0.8-VG1
	1/16"	0.5mm	10	RF-100/0.5-V	100/0.5-VG1
	1/16"	0.4mm	10	RF-100/0.4-V	100/0.4-VG1
	1/16"	0.3mm	10	—	100/0.3-VG1



## Swagelok® Tube Fittings





Swagelok® tube fittings provide a leak-proof, torque-free seal at all tubing connections and eliminate costly, hazardous leaks in instrumentation and process tubing.

All the action in the fitting moves along the tube axially instead of with a rotary motion. Since no torque is transmitted from the fitting to the tubing, there is no initial strain which might weaken the tubing.

**tech tip**

**CAUTION:** Do not mix or interchange parts of tube fittings made by other manufacturers with Swagelok® tube fitting parts.






**Swagelok® Fittings**

Description	Dimensions	Qty.	Brass Part No.	Qty.	Stainless Steel Part No.
<i>Nuts</i>					
	1/16"	10	<b>55002</b>	10	<b>55199</b>
	1/8"	10	<b>55003</b>	10	<b>55193</b>
	1/4"	10	<b>55005</b>	10	<b>55195</b>
<i>Front Ferrules</i>					
	1/16"	10	<b>55006</b>	10	<b>55196</b>
	1/8"	10	<b>55007</b>	10	<b>55197</b>
	1/4"	10	<b>55013</b>	10	<b>55093</b>
<i>Back Ferrules</i>					
	1/16"	10	<b>55014</b>	10	<b>55094</b>
	1/8"	10	<b>55015</b>	10	<b>55095</b>
	1/4"	10	<b>55017</b>	10	<b>55097</b>
<i>Crosses</i>					
	1/8"	ea	<b>55031</b>	ea	<b>55131</b>
	1/4"	ea	<b>55032</b>	ea	<b>55132</b>

## Parker® Fittings

Most parts are available in brass or stainless steel and should be matched to the tubing, particularly in thermal applications.

**Parker® Fittings**

Description	Dimensions	Qty.	CPI Brass Part No.	Qty.	CPI Stainless Steel Part No.
<i>Nuts</i>					
	1/16"	10/pk	<b>14057</b>	10/pk	—
	1/8"	10/pk	<b>14058</b>	10/pk	<b>14158</b>
	1/4"	10/pk	<b>14059</b>	10/pk	<b>14159</b>
<i>Ferrules</i>					
	1/16"	10/pk	<b>14060</b>	10/pk	<b>141605</b>
	1/8"	10/pk	<b>14061</b>	10/pk	<b>14161</b>
	1/4"	10/pk	<b>14062</b>	10/pk	<b>14162</b>
<i>Tees</i>					
	1/16"	ea	<b>14075</b>	ea	<b>14175</b>
	1/8"	ea	<b>14053</b>	ea	—
	1/4"	ea	<b>14077</b>	ea	<b>14177</b>
<i>Unions</i>					
	1/16"	ea	<b>14063</b>	ea	<b>14163</b>
	1/8"	ea	<b>14065</b>	ea	<b>14165</b>
	1/4"	ea	<b>14068</b>	ea	<b>14168</b>
<i>Reducing Unions</i>					
	1/8" to 1/16"	ea	<b>14064</b>	ea	<b>14164</b>
	1/4" to 1/16"	ea	—	ea	<b>14166</b>
	1/4" to 1/8"	ea	<b>60028</b>	ea	<b>61028</b>
	3/8" to 1/4"	ea	<b>60030</b>	ea	<b>61030</b>





# Moisture Traps

## Remove Moisture from Your Gas System

- Eliminate stationary phase degradation
- Increase column life

Remove moisture from gas cylinders, regulators and gas lines with a Grace moisture trap. In addition to removing H<sub>2</sub>O, most traps (except the ALL-Pure™ moisture trap and the Sodium Sulfate moisture trap) also remove HCl, SO<sub>2</sub>, NO<sub>2</sub>, H<sub>2</sub>S, CO<sub>2</sub>, oil and small aliphatics. Both indicating and non-indicating traps are available. Many traps can be regenerated and are refillable—order refill kits separately.

### In-Line Style Traps\*

	Description	Capacity	Efficiency	Pressure Limit	Fitting	Dimensions (L x o.d.)	Indicator	Part No.	Refill Kit Part No.					
—	Standard Moisture Trap	12mL	<1ppm	100psig	1/8"	13" x 1.25"	Yes	8121	8132					
		31mL			1/4"			8125	8132					
												1/8"	8123	8132
												1/4"	8128	8132
—	Hydro-Purge™ II Trap	22mL	<25ppb	125psig	1/8"	8.6" x 1.5"	Yes	14626	14642					
		36mL	<20ppb		1/4"			14625	14642					
											1/8"	14628	14642	
											1/4"	14627	14642	
	Glass Moisture Trap	16mL	<10ppb	125psig	1/8"	12.25" x 1.5"	Yes	7214	7218					
					1/4"			7216	7218					
	ALL-Pure™ Moisture Trap†	35mL	<1ppb	1000psig	1/8"	22.5" x 1.5"	No	7034	—†					
					1/4"			7036	—†					
	High-Pressure Gas Drier†	27mL	<1ppm	1800psig	1/4"	11.5" x 1.5"	No	8113	—†					
					1/8"			7207	7202					
	BIG Moisture Trap	130mL	<5ppb	250psig	1/4"	17.5" x 2.4"	No	7209	7202					
					1/2"			7211						
					1/4"			7211						
—	Sodium Sulfate Moisture Trap	59mL**	<1ppm	100psig	1/4"	9.0" x 1.5"	Yes	81533	81534					

\*Length is measured from endfitting to endfitting.

\*\*Capacity based on 50% efficiency.






†These traps are disposable.

# Oxygen Traps

## Protect Columns from Oxygen Contamination

Prevent oxidation of column stationary phases with Grace oxygen traps. Use an oxygen trap to help maintain column performance and prolong column life. Choose an indicating trap to easily identify when trap is spent or to use in conjunction with larger capacity traps.

### In-Line Style Traps

	Description	Capacity	Efficiency	Pressure Limit	Fitting	Dimensions (L x o.d.)	Indicator	Part No.
	Oxy-Trap™	133mL	<1ppb	100psig	1/8"	3.5" dia coil	No	4001
					1/4"			4002
—	Large Oxy-Trap™	206mL	<1ppb	100psig	1/4"	3-7/8" dia coil	No	4003*
	Indicating Oxy-Trap™	20mL	<1ppb	100psig	1/4"		16" x .375"	Yes
	Indicating Oxy-Purge®	50mL	<3ppb	100psig	1/8"	9.5" x 1.5"	Yes	14563
					1/4"			14562
	Oxy-Purge® N Trap	156mL	<30ppb	250psig	1/8"	11" x 1.5"	No	14636
					1/4"			14635
	BIG Oxygen Trap	3000mL	<50ppb	250psig	1/8"	17.5" x 2.4"	No	7213
					1/4"			7215
					1/2"			7217
	High-Pressure Oxy-Trap™	456mL	<1ppb	1800psig	1/4"	11.5" x 1.5"	No	8115

\*Reducing ferrules are supplied for installation into 1/8" lines.

# Hydrocarbon, CO<sub>2</sub> and Sulfur Traps

## Eliminate Detector Noise and Increase Baseline Stability

Grace hydrocarbon traps adsorb trace amounts of hydrocarbons and organics from your gas stream. Most traps are packed with activated charcoal and adsorb organic compounds larger than methane.

### A) Alltech® High-Pressure CO<sub>2</sub> Adsorber

- 1800psig pressure limit
- 27mL capacity
- Also removes NO<sub>2</sub>



### B) Sulfur Purifier

- Also removes moisture, oxygen, C<sub>2</sub> and above hydrocarbons, halocarbons and fluoro lubricants



#### In-Line Style Traps\*

Description	Size	Efficiency	Pressure Limit	Fitting	Dimensions (L x o.d.)	Indicator	Part No.	Refill Kit Part No.
— Activated Charcoal Trap	120cc	<100ppb	100psig	1/4"	13" x 1.25"	No	8129 8131	8124
	400cc				14.5" x 2.0"			
— Hydrocarbon Trap	200cc	<20ppb	250psig	1/8" 1/4"	11.5" x 1.5"	No	14634 14633	7200
— Hi-EFF™ Organic Trap	400cc	<100ppb	100psig	1/4"	14.5" x 2"	Yes (for H <sub>2</sub> O only)	81350	81352
— BIG Hydrocarbon Trap	750cc	<15ppb	250psig	1/8"	17.5" x 2.4"	No	7201	7200
				1/4"			7203	
				1/2"			7205	
— ALL-Pure™ Hydrocarbon Trap	—	<3ppb	1000psig	1/8" 1/4"	22.5" x 1.5"	No	7035 7038	—†
— High-Pressure Charcoal Trap	200cc	<100ppb	1800psig	1/4"	11.5" x 1.5"	No	8117	—†
<b>A</b> High-Pressure CO <sub>2</sub> Adsorber	200cc	—	1800psig	1/4"	11.5" x 1.5"	No	8119	—†
<b>B</b> Sulfur Purifier	150cc	<1ppb	300psig	1/8"	21" x 1.5"	No	7006	—†

\*Efficiency applies to compounds >C<sub>4</sub>. Length is measured from endfitting to endfitting.  
†These traps are disposable.

## ALL-Pure™ Gas Purifiers

- One purifier removes multiple contaminants
- Replace three separate purifiers for oxygen, moisture, and hydrocarbons with a single ALL-Pure™ purifier



ALL-Pure™ Gas Purifier Specifications	
<b>Dimensions:</b>	400cc, 21" L x 1.5" o.d. (50.8cm x 3.8cm)
<b>Max. Flow:</b>	500mL/min
<b>Max. Pressure:</b>	1000psig
<b>Max. Temp:</b>	80°C
<b>Mounting:</b>	Purifier must be mounted in vertical position.

Purifier Selectivity and Purity Specifications*						
Purifier	CO	CO <sub>2</sub>	O <sub>2</sub>	H <sub>2</sub> O	Sulfur Compounds	Non-Methane Hydrocarbons
<b>Helium Purifier:</b>	<1	<1	<1	<1	<1	<3
<b>Hydrogen Purifier:</b>	<1	<1	<1	<1	<1	<3
<b>Nitrogen Purifier:</b>	<1	<1	<1	<1	<1	<3
<b>Air Purifier:</b>				<1		<3
<b>Moisture Trap:</b>		<1		<1		
<b>Hydrocarbon Trap:</b>						<3
<b>Oxygen Trap:</b>			<1	<1		

\*Outlet levels listed indicate ppb concentration based on 50ppm nominal inlet concentration level.

#### ALL-Pure™ Gas Purifiers

Description	1/8" Fitting Part No.	1/4" Fitting Part No.
Helium Purifier	7008	7010
Hydrogen Purifier	7026	7028
Nitrogen Purifier	7007	7009
Air Purifier	7029	7031

## Alltech® Gas Purification Cartridge Systems

- Replace spent purifiers without shutting down your system

Alltech® gas purification cartridges allow replacement of spent cartridges in seconds without shutting down your GC system. Simply pull the spent cartridge off the baseplate and push a new one into place. A knurled locking ring keeps the cartridge locked in place. Four different purification cartridges are available. Multiple cartridges and baseplates can be plumbed together to customize a gas purification system for your application. Order each cartridge separately below.



Convenient cartridge baseplate automatically stops gas flow when changing cartridges

#### Gas Purification Cartridge Systems\*

Description	Part No.
Cartridge System Base Unit**	81025
Moisture Trap Cartridge	81005
Organic Trap Cartridge	81010
AT™-Omni Cartridge†	81012
AT™-Indicating Oxy Cartridge††	81015

\*Baseplate must be purchased separately.  
\*\*Reducing ferrules are supplied for installation into 1/8" gas lines. Includes 1/4" fittings.  
†Removes oxygen, moisture, and hydrocarbons.  
††Removes oxygen and small amounts of moisture.

## Deactivated Injection Liners



Description and Length x o.d.	Diagram	5/pk Part No.	25/pk Part No.
<i>Deactivated Injection Liners</i>			
<i>Injection Liners for Agilent Instruments*</i>			
Cup Splitter, 78.5 x 6.3mm		4827	—
Split/Splitless with Deactivated Quartz Wool, 78.5 x 6.3mm o.d., 4mm i.d.		4924	4928
Splitless, 78.5 x 6.3mm o.d., 4mm i.d.		4934	4936
Quartz Splitless, 78.5 x 6.0mm, 2mm i.d.		4963	—
Recessed Gooseneck with Deactivated Quartz Wool, 78.5 x 6.3mm, 4mm i.d.		4960	4961
Recessed Gooseneck, 78.5 x 6.3mm, 2mm i.d.		4938	—
Direct, 78.5 x 6.3mm, 1.5mm i.d.		4968	—
<i>Injection Liners for Varian® Instruments</i>			
Splitter with Deactivated Quartz Wool, 1075/1077, 72 x 6.3mm, 4mm i.d.		4971	—
Baffle Splitter, 1075/1077, 72 x 6.3mm, 4mm i.d.		4978	—
0.8mm SPI 1093/1094, 54 x 4.6mm		4984	—
0.5mm SPI 1093/1094, 54 x 4.6mm		4987	4988
<i>Injection Liners for PerkinElmer® Instruments</i>			
Split/Splitless Autosystem, 92 x 5.8mm, 4mm i.d.		4798	4800
<i>Injection Liners for Shimadzu® Instruments</i>			
Split 17A with Deactivated Quartz Wool, 95.5 x 5.0mm, 3mm i.d.		4750	—
Splitless 17A, 95.5 x 5.0mm, 3mm i.d.		4756	—

## Deactivated SGE FocusLiners

Description and Length x o.d.	Diagram	5/pk Part No.	25/pk Part No.
<i>Deactivated SGE FocusLiners</i>			
<i>for Agilent Instruments*</i>			
FocusLiner, 78.5 x 6.3 x 4mm i.d.		85474	85480
Tapered FocusLiner, 78.5 x 6.3 x 4mm i.d.		85481	85574
<i>for Varian® Injector Models 1078/1079</i>			
FocusLiner, 54 x 5 x 3.4mm i.d.		85437	—
Tapered FocusLiner, 54 x 5 x 3.4mm i.d.		85635	—
<i>for Shimadzu® 17A</i>			
FocusLiner, 95 x 5 x 3.4mm i.d.		85476	—
Tapered FocusLiner, 95 x 5 x 3.4mm i.d.		85483	—
<i>for Shimadzu® 14/15A/16</i>			
Tapered FocusLiner, 99 x 5 x 3.4mm i.d.		85630	—
<i>for PerkinElmer® Autosystem</i>			
FocusLiner, 86.2 x 4 x 2mm i.d.		8618809	—
FocusLiner, 92 x 6.2 x 4mm i.d.		85478	—
Tapered FocusLiner, 92 x 6.2 x 4mm i.d.		85482	—
<i>for ThermoQuest™ Model 8000/TRACE</i>			
FocusLiner, 105 x 8 x 5mm i.d.		85631	—

\*Also compatible with Varian® model CP-1177 Split/Splitless injection port.

# Gas Sampling Bags

## ALTEF Gas Sampling Bags

- High tensile strength resists puncture
- Low permeability minimizes sample loss
- ALTEF is a fluoropolymer that is an alternative to Tedlar® for gas sampling applications

## FEP Gas Sampling Bags

- FEP bags have a 5mil film thickness making them suitable for harsh sampling conditions
- Bags are chemically resistant to the most severe corrosives



### ALTEF and FEP Gas Sampling Bags

Nominal Size	Volume	ALTEF Gas Sampling Bags		FEP Gas Sampling Bag	
		Dual On-Off/Septum Port Part No.	1/4" SS Swagelok® Part No.	Dual On-Off/Septum Port Part No.	1/4" SS Swagelok® Part No.
6" x 6"	0.6L	<b>8629002</b>	<b>8629050</b>	<b>41048</b>	<b>41052</b>
7" x 7"	1.0L	<b>8629004</b>	<b>8629051</b>	<b>41058</b>	<b>41064</b>
9" x 9"	2L	<b>8629005</b>	<b>8629052</b>	<b>41082</b>	<b>41084</b>
12" x 12"	5L	<b>8629006</b>	<b>8629053</b>	<b>41092</b>	<b>41094</b>
12" x 19"	10L	<b>8629008</b>	<b>8629054</b>	<b>41109</b>	<b>41125</b>
18" x 18"	16L	<b>8628899</b>	<b>8628913</b>	<b>41131</b>	<b>41133</b>
24" x 24"	40L	<b>8628910</b>	<b>8628914</b>	<b>41139</b>	<b>41149</b>
24" x 30"	56L	<b>8628911</b>	<b>8628915</b>	<b>41155</b>	<b>41157</b>
30" x 30"	80L	<b>8628912</b>	<b>8628916</b>	—	—

## Combo Valve Gas Sampling Bags

- On/off valve and septum in one fitting
- Save with convenient multi-packs



Combo valve gas sampling bags give the convenience and ease of a barbed on/off valve and a septum port combined into one fitting. The valve fitting features a 3/16" stem, which is suitable for use with most 1/4" tubing, and a sampling port. Bags are available in ALTEF and FEP.

### Combo Valve Gas Sampling Bags

Size	Volume	Port Description	Part No.
<i>ALTEF Gas Sampling Bags</i>			
7 x 7"	1L	2N1	<b>8629056</b>
9 x 9"	2L	2N1	<b>8629057</b>
12 x 12"	5L	2N1	<b>8629058</b>
12 x 19"	10L	2N1	<b>8629059</b>
18 x 24"	25L	2N1	<b>8628917</b>
<i>FEP Gas Sampling Bags</i>			
6 x 6"	0.6L	2N1	<b>41002</b>
6 x 10"	1.2L	2N1	<b>41004</b>
6 x 12"	1.5L	2N1	<b>41006</b>
9 x 9"	2L	2N1	<b>41008</b>

## Cali-5-Bond™ 5-Layer Gas Sampling Bags

- Non-permeable
- Opaque to UV and visible light
- Inert, flexible, tough, and reusable



Cali-5-Bond™ gas sampling bags are constructed from inert 5.5mil thick material made from five layers of film. The layers are comprised of an inner layer of high-density polyethylene, followed by polyamide, an aluminum foil barrier, a polyvinylidene chloride layer and an outer layer of polyester.

Bags are equipped with a barbed on-off valve and silicone septum for easy sampling and can be purged with nitrogen or pure air gas and reused.

### 5-Layer Gas Sampling Bags

Nominal Size	Volume	Port Description	Part No.
<i>Snout-Shaped Gas Sampling Bags</i>			
8 x 15"	2L	Barbed Valve 1" Septa	<b>4150</b>
8 x 27"	5L	Barbed Valve 1" Septa	<b>4152</b>
16 x 16"	10L	Barbed Valve 1" Septa	<b>4186</b>
22 x 24"	22L	Barbed Valve 1" Septa	<b>4154</b>
<i>Pillow-Shaped Gas Sampling Bags</i>			
8 x 8"	1L	Barbed Valve 1" Septa	<b>4188</b>
8 x 11"	2L	Barbed Valve 1" Septa	<b>4190</b>
16 x 19"	15L	Barbed Valve 1" Septa	<b>4192</b>

## SPE Introduction

SPE method development typically contains four steps:

### Step 1: Condition

The conditioning step is composed of two substeps; the first activates the sorbent ligands, the second equilibrates the sorbent bed.

### Step 2: Load

In the load step, sample is applied to the SPE device. Matrix and flow rate are optimized to quantitatively retain target analytes.

### Step 3: Wash

In the wash step, choose a solvent that elutes impurities but retains target analytes. Often the second conditioning solvent is a suitable wash solvent.

### Step 4: Elute

The elution step ideally removes all target analytes with minimal solvent to maximize sensitivity. Sometimes this requires a combination of solvents to break both the primary and secondary interactions.



General Method Development Procedures				
	Step 1—Condition ~ 4 bed volumes	Step 2—Load	Step 3—Wash ~ 6 bed volumes	Step 4—Elute ~ 3 bed volumes
<b>Reversed-Phase Extraction Procedure</b> <b>Mechanism:</b> Bind moderately polar to non-polar compounds from a polar sample matrix.	Methanol followed by water	Process sample at a flow rate of 1–5mL/min	Water or water:methanol (95:5)	Methanol or acetonitrile. May need to add strong acid or base to organic solvent to break secondary interactions.
<b>Normal Phase Extraction Procedure</b> <b>Mechanism:</b> Bind polar compounds from a non-polar sample matrix.	IPA followed by hexane	Process sample at a flow rate of 1–5mL/min	Hexane or hexane:IPA (98:2)	IPA, ethyl acetate, acetone, or hexane:IPA (50:50)
<b>Ion-Exchange Extraction Procedure</b> <b>Mechanism:</b> Bind charged (negative/anionic or positive/cationic) compounds.	Methanol:water (50:50) followed by low ionic strength (0.1M) buffer	Apply slowly; less than or equal to 1mL/min ion exchange kinetics are slower than reversed- or normal phase	Methanol:low ionic strength (0.1M) buffer (10:90)	High ionic strength (0.5M–1.0M) buffer or modify pH such that the analyte is uncharged. May need to add organic to break hydrophobic interactions.

### tech tip

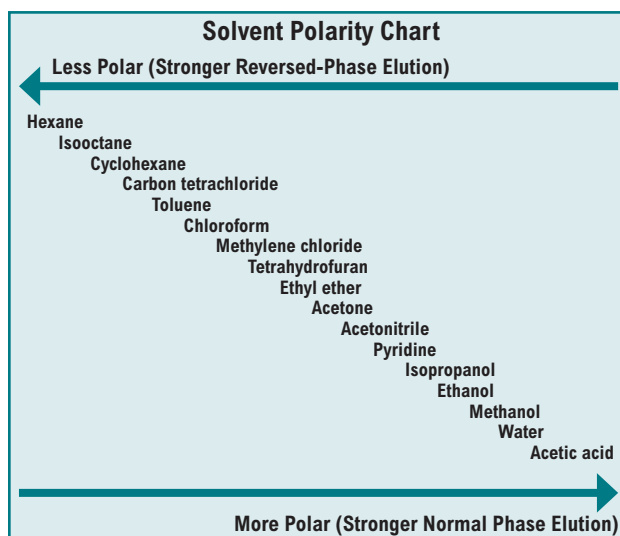
To calculate sorbent bed volume, use 150µL for every 100mg of sorbent.

### tech tip

Retention capacity describes the total amount that an SPE sorbent will bind. This includes all compounds retained—analytes of interest as well as the contaminants.

### tech tip

The minimum elution volume recommended in the bed size chart above will offer best sensitivity, but more solvent may be required depending on the application.



## SPE Sorbent Specifications

Reversed-Phase (Non-Polar) Sorbent Specifications							
Packing	Base	% Carbon	End-capped	Average Particle Size	Pore Size	Features	Benefits
Prevail™ C18	Silica	11.0%	Yes	50µm	60Å	100% water wettable	Hydrophilic/hydrophobic retention. Phase remains active even when completely dry. Can omit preconditioning step.
Standard C18	Silica	6.0%	Yes	50µm	60Å	Low carbon load C18	General purpose phase.
High-Flow C18	Silica	8.0%	Yes	100µm	60Å	Large particle	Less flow resistance for faster flow rates of large volume sample.
High-Capacity C18	Silica	17.0%	Yes	50µm	60Å	High carbon load	Maximum capacity phase.
Large Pore C18	Silica	14.0%	Yes	50µm	150Å	Larger than average pore size	Ideal for compounds >1500MW.
Octyl (C8)	Silica	4.5%	Yes	50µm	60Å	Less hydrophobic than C18	Less retention of highly hydrophobic compounds. Use when C18 is too retentive.

Normal Phase (Polar) Sorbent Specifications							
Packing	Base	% Carbon	End-capped	Average Particle Size	Pore Size	Features	Benefits
Silica (SI)	Silica	—	—	50µm	60Å	Highly polar surface	Most common polar phase.
Aminopropyl (NH <sub>2</sub> )	Silica	5.0%	No	50µm	60Å	Polar phase with slight anion exchange properties	Ideal for carbohydrates or generally with analyses containing hydroxyl functional groups.
Cyanopropyl (CN)	Silica	6.0%	Yes	50µm	60Å	Unique selectivity	Can be used in normal phase or reversed-phase modes.
Diol (2OH)	Silica	4.0%	No	50µm	60Å	Polar surface with minor hydrophobic retention	Wets easily and offers more reproducibility.
Florisil® (FL)	Magnesium Silicate	—	—	75–150µm	60Å	Highly polar surface	Referenced in many EPA methods. Ideally suited for pesticides and metals.
Florisil®-PR (FL-PR)	Magnesium Silicate	—	—	75–150µm	60Å	Specifically tested for chlorinated pesticides	Ensures most inert batches suitable for highly active compounds.
Alumina Neutral (AL-N)	Aluminum Oxide	—	—	130µm	100Å	Alumina washed with neutral surface	Interacts with highly aromatic compounds and neutral hydroxyls.

Specialty Sorbent Specifications				
Packing	Base	Average Particle Size	Additional Information	Benefits
Carbograph	Graphitized Carbon	38–125µm	—	Retains polar organics in aqueous matrices. Ideally suited for acid, base-neutral extraction of pesticides and herbicides.
SCX	Styrene-DVB	50µm	Hydrogen counter ion retains cations; exchange capacity 2.0 meq/mL	Removes/concentrates basic compounds.
SAX	Styrene-DVB	50µm	Acetate counter ion retains anions; exchange capacity 1.0 meq/mL	Removes/concentrates acidic compounds.

## Maxi-Clean™ SPE Cartridges

- Same bed dimensions as 4mL SPE columns
- Process a single cartridge by syringe or multiple cartridges by vacuum
- Stack different cartridges for multi-step extractions

### Maxi-Clean™ Reversed-Phase Cartridges

Packing	Bed Weight	Qty.	Part No.
Prevail™ C18	300mg	50	<b>605926</b>
	500mg	50	<b>605929</b>
	900mg	50	<b>605942</b>
Standard C18	300mg	50	<b>20926</b>
	300mg	100	<b>20928</b>
	600mg	50	<b>20934</b>
	600mg	100	<b>20936</b>
	900mg	50	<b>20942</b>
900mg	100	<b>20944</b>	
High-Capacity C18	300mg	50	<b>20945</b>
Large Pore C18	300mg	100	<b>22012</b>
	600mg	100	<b>22017</b>
	900mg	100	<b>220215</b>
Octyl (C8)	300mg	50	<b>20950</b>
	600mg	50	<b>20958</b>
	900mg	50	<b>20966</b>

### Maxi-Clean™ Drying Cartridges

Packing	Bed Weight	Qty.	Part No.
Sodium Sulfate	3g	100	<b>219001</b>

### Maxi-Clean™ Normal Phase Cartridges

Packing	Bed Weight	Qty.	Part No.
Silica (Si)	300mg	50	<b>20974</b>
	300mg	100	<b>20976</b>
	600mg	50	<b>20982</b>
	600mg	100	<b>20984</b>
	900mg	50	<b>20990</b>
900mg	100	<b>20992</b>	
Aminopropyl (NH <sub>2</sub> )	300mg	50	<b>210044</b>
	300mg	100	<b>210046</b>
	900mg	100	<b>210047</b>
Florisil® (FL)	300mg	50	<b>210054</b>
	300mg	100	<b>210056</b>
	900mg	50	<b>210057</b>
	900mg	100	<b>210061</b>
Florisil®-PR (FL-PR)	300mg	50	<b>210074</b>
	300mg	100	<b>210076</b>
	900mg	50	<b>210079</b>
	900mg	100	<b>210075</b>
Alumina Neutral (AL-N)	300mg	25	<b>210095</b>
	1800mg	25	<b>210098</b>



### tech tip

#### What is a Maxi-Clean™ cartridge?

A Maxi-Clean™ cartridge is an alternative format for SPE. It uses the same high-quality packing materials as the Extract-Clean™ columns but has a polypropylene housing with both a female luer inlet and a male luer outlet tip. This allows use of positive pressure from a syringe or negative pressure from a vacuum manifold. 20µm polyethylene frits are placed at each end of the sorbent bed. The packing material is packed and compressed to improve or optimize flow characteristics.

### more info

For more information about SPE, visit our website.

### related products

Looking for vacuum manifolds?  
See page 62 for vacuum manifolds to process samples.



### technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)  
Online: [www.discoverysciences.com](http://www.discoverysciences.com)



# Extract-Clean™ SPE Columns

General Purpose SPE Columns with a Broad Selection of Phases and Sizes



### Extract-Clean™ Reversed-phase SPE Columns

Bed Weight	Column Size	Qty.	Standard C18 Part No.	High-Capacity C18 Part No.	Prevail™ C18 Part No.	High-Flow C18 Part No.	C8 Part No.
50mg	1.5mL	100	<b>204900</b>	—	—	—	—
100mg	1.5mL	100	<b>205000</b>	<b>255100</b>	<b>605001</b>	—	<b>206000</b>
200mg	4.0mL	50	<b>205150</b>	<b>255200</b>	—	—	<b>206150</b>
500mg	4.0mL	50	<b>205250</b>	<b>255300</b>	<b>605250</b>	<b>215250</b>	<b>206250</b>
500mg	8.0mL	30	<b>205350</b>	<b>255350</b>	<b>605350</b>	—	<b>206350</b>
1000mg	8.0mL	30	<b>205430</b>	<b>255430</b>	<b>605430</b>	<b>215430</b>	—
2000mg	8.0mL	30	<b>205450</b>	—	—	—	—
2000mg	15mL	30	<b>205462</b>	<b>255440</b>	—	—	—
5000mg	25mL	20	<b>225450</b>	<b>255450</b>	—	—	—
10,000mg	75mL	16	<b>235410</b>	<b>255460</b>	—	—	—

### Extract-Clean™ Normal Phase SPE Columns

Bed Weight	Column Size	Qty.	Silica Part No.	Aminopropyl Part No.	Florisil® Part No.	Cyanopropyl Part No.	Diol Part No.
50mg	1.5mL	100	<b>209062</b>	—	—	—	—
100mg	1.5mL	100	<b>209000</b>	<b>211000</b>	<b>204500</b>	—	<b>208000</b>
200mg	4.0mL	50	<b>209150</b>	<b>211025</b>	—	<b>209450</b>	<b>208150</b>
500mg	4.0mL	50	<b>209250</b>	<b>211150</b>	<b>204650</b>	<b>209550</b>	<b>208250</b>
500mg	8.0mL	30	<b>209200</b>	<b>211256</b>	—	<b>209650</b>	—
1000mg	8.0mL	30	<b>209100</b>	<b>211153</b>	<b>207930</b>	—	—
2000mg	8.0mL	30	<b>209202</b>	—	—	—	—
2000mg	15mL	30	<b>209362</b>	—	<b>207962</b>	—	—
5000mg	25mL	20	<b>22935</b>	—	—	—	—
10,000mg	75mL	16	<b>239310</b>	—	—	—	—

### Extract-Clean™ Ion Exchange SPE Columns

Bed Weight	Column Size	Qty.	SCX Part No.	SAX Part No.
100mg	1.5mL	100	<b>209800</b>	<b>209600</b>
200mg	4.0mL	50	<b>209825</b>	<b>209625</b>
500mg	4.0mL	50	<b>209950</b>	<b>209750</b>
1000mg	8.0mL	30	<b>209930</b>	<b>209850</b>



#### related products

Looking for vacuum manifolds? See page 62 for vacuum manifolds to process samples.

#### technical assistance

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Online: [www.discoverysciences.com](http://www.discoverysciences.com)

## Specialty SPE Columns

### Carbograph SPE Columns

- Graphitized carbon retains polar organics in aqueous matrices
- Acid, base-neutral extraction of pesticides and herbicides
- 100m<sup>2</sup>/g surface area



### Carbograph SPE Columns

Bed Weight	Column Size	Qty.	Part No.
150mg	4.0mL	50	<b>210142</b>
300mg	8.0mL	30	<b>210101</b>
500mg	8.0mL	30	<b>210150</b>
1000mg	15mL	20	<b>210121</b>

### Phase Separator SPE Columns

Hydrophobic membrane allows fast and simple separation of organic and aqueous mixed samples.



### Phase Separator Columns

Column Size	Qty.	Part No.
4.0mL	100	<b>205289</b>
8.0mL	100	<b>205389</b>
25mL	100	<b>205589</b>

### Filter Columns

Filter columns are SPE reservoirs with two frits at the outlet end. They remove particulate matter down to 20µm from samples.

### Filter Columns

Description	Qty.	Part No.
1.5mL Filter Columns	100	<b>211101</b>
4.0mL Filter Columns	50	<b>211104</b>
8.0mL Filter Columns	50	<b>211108</b>
75.0mL Filter Columns	50	<b>210775</b>

## Vydac® BioSelect SPE Columns

### For Extraction, Concentration and Clean-up of Biological Samples

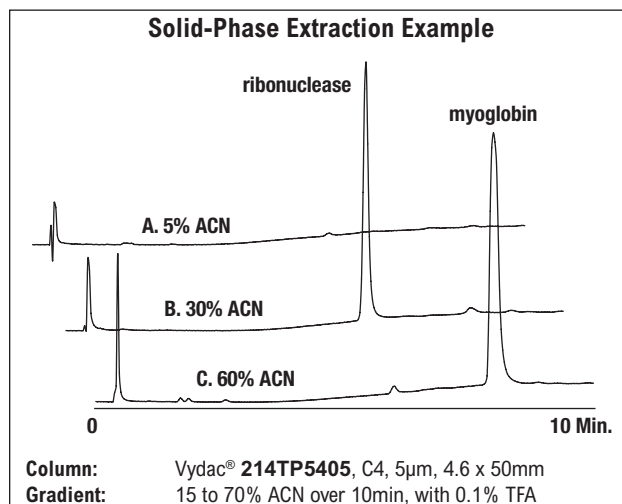
Vydac® BioSelect SPE columns use the same media as Vydac® 300Å TP reversed-phase HPLC columns, giving Vydac® SPE columns similar selectivity and recovery.

#### Applications:

- Desalting of polypeptide solutions
- Concentration of proteins and peptides
- Removal of HF and cleavage products from cleavage solutions
- Removal of lipids and strongly bound proteins

### Vydac® BioSelect SPE Columns

	Column Size	Pk	Part No.
C4, 13µm	1mL	50	<b>214SPE1000</b>
	3mL	50	<b>214SPE3000</b>
C18, 13µm	1mL	50	<b>218SPE1000</b>
	3mL	50	<b>218SPE3000</b>



A 3mL SPE column was conditioned with 1mL of ACN followed by 1mL of 5% ACN/0.1% TFA. Ribonuclease and myoglobin (100mg each) were then loaded in 30% ACN/0.1% TFA. The column was washed with 1mL of 5% ACN/0.1% TFA to remove weakly bound compounds, then 1mL of 30% ACN/0.1% TFA followed by 1mL of 60% ACN/0.1% TFA. HPLC analysis of the 5% ACN wash (A) revealed only a small amount of ribonuclease. Most of the ribonuclease eluted in the 30% ACN wash (B). The myoglobin eluted almost entirely in the 60% ACN wash (C).

# GracePure™ SPE Specifications

- Ideal for cost-conscious labs
- Concise offering of popular sorbents

GracePure™ SPE products have a concise offering of sorbents suitable for a variety of applications. Whether pharmaceutical or petrochemical, these products deliver the selectivity and high recovery you expect.



Reversed-phase (Non-Polar) Sorbents Specifications										
Sorbent	Support	% Carbon	Endcapping	Surface Area	Particle Size	Pore Size	Feature	Benefit	Application Type	
C18-Max	Silica	17.1%	Yes	518m <sup>2</sup> /g	50µm	60Å	Polymerically bonded 17% carbon load	Highest binding capacity, best for complex samples or structurally diverse analytes.	Drugs and their metabolites in serum and plasma, pesticides	
C18-Aq	Silica	12.5%	Yes	518m <sup>2</sup> /g	50µm	60Å	Hydrophilic endcapping	Water-wettable C18 ideal for aqueous samples. Phase remains active even when completely dry.	Desalting proteins, pharmaceuticals, hormones, pesticides, organics in water	
C18-Low	Silica	6.5%	Yes	518m <sup>2</sup> /g	50µm	60Å	Least hydrophobic C18 phase	C18 phase that easily releases very hydrophobic compounds.	Surfactants, oils, antibiotics	
C18-Fast	Silica	7.0%	Yes	518m <sup>2</sup> /g	100µm	60Å	Large 100µm particle	Process large volume (>500mL) or viscous samples with fast flow rates.	Aniline, pesticides, haloethers, phthalate esters, EPA 3620, 3610	

Normal Phase (Polar) Sorbents Specifications										
Sorbent	Support	% Carbon	Endcapping	Surface Area	Particle Size	Pore Size	Feature	Benefit	Application Type	
Silica	Silica	N/A	N/A	518m <sup>2</sup> /g	50µm	60Å	Most polar phase	Able to differentiate between structurally similar compounds.	Aflatoxins, pesticides, steroids, structural isomers	
Amino	Silica	4.3%	No	518m <sup>2</sup> /g	50µm	60Å	Dual retention	Retains polar compounds, or can act as a weak anion exchanger. Easily releases strong acids when SAX binds too strongly.	Carbohydrates, dyes, lipids, mycotoxins, strong acids	
Florisil®	Magnesium Silicate	N/A	No		120µm	60Å	Alternates polar phase	Large particle size processes large sample sizes quickly.	Environmental	

Ion-Exchange Sorbents Specifications										
Sorbent	Support	Exchange Capacity	Counter Ion	Particle Size	Feature	Benefit	Application Type			
Anion-X	8% cross-linked styrene-divinylbenzene	1.5meq/g	Acetate form	50µm	Tetramethyl ammonium functional group on polymer base material	pH range from 1–14, with excellent exchange capacity.	Anionic compounds: organic acids, fatty acids			
Cation-X	8% cross-linked styrene-divinylbenzene	2.4meq/g	Hydrogen form	50µm	Benzene sulfonic acid functional group on polymer base material	pH range from 1–14, with excellent exchange capacity.	Cationic compounds: amines, amino acids			

## technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)  
 Online: [www.discoverysciences.com](http://www.discoverysciences.com)

## GracePure™ SPE Columns

**Base Material Properties**

GracePure™ base silicas are characterized multiple ways to ensure that the starting point for every batch of media is consistent.

**Sorbent Characterization**

Tight specifications promise clean and reproducible sorbent performance. An HPLC chromatogram offers a detailed look at selectivity that is not possible with recovery tests alone.

**Component Tests**


GC/FID shows that GracePure™ tubes are constructed from a highly inert grade of polypropylene to prevent extractable contamination. Polyethylene frits are thoroughly washed in organic solvent, which also eliminates extractables.

**Manufacturing Control**

GracePure™ SPE products are packed and assembled using custom-designed, precision equipment. Every manufacturing batch is guaranteed to have less than 2% bed weight variation and uniform flow rates.

**Quality Assurance Certificate**  
**Solid Phase Extraction**

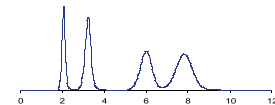
Sorbent Lot Number: 051200123  
Finished Good Lot Number: 1234567  
Part Number: 5138764  
Description: GracePure™ C18-Low, 6.0mL/1000mg



GRACE

Base Material Properties		
Parameter	Value	Test
Surface Area	525m <sup>2</sup> /gram	ASAP 2400 Analyzer
Pore Diameter	66Å	ASAP 2400 Analyzer
Pore Volume	0.8cm <sup>3</sup> /gram	ASAP 2400 Analyzer
Average Particle Size	53µ	Malvern Mastersizer-S

Sorbent Characterization		
Parameter	Value	Test
Phase Type	Octadecyl	HPLC Test
Encapsulated	Yes	LECO CHN-900 Analyzer
Carbon Load	6.5%	LECO CHN-900 Analyzer
Ion Exchange Capacity	N/Ameq/mL	Titration
Fines	0.72NTU	Micro 100 Turbidometer
Sorbent Purity	Pass	GC/FID Test
Surface Coverage	2.00_mol/m <sup>2</sup>	Calculation Based on %C
pH	4.0	pH Meter



Test Probe	Relative Retention	alpha
Uracil		
Phenol	Tol/PH	4,00
Diethyltoluamide	Tol/DET	1,30
Toluene		

**Column Dimension:** 150mm x 4,6mm  
**Flow:** 1,0mL/min  
**Temperature:** 30°C  
**Mobile Phase:** Acetonitrile:Water (40:60)  
**Detector:** UV @ 254nm

Manufacturing Components & Control Tests		
Parameter	Value	Test
Tube Purity	Pass	GC/FID Test
Frit Purity	Pass	GC/FID Test
Visual Inspection	Pass	Cognex Vision System
Sorbent Weight	Pass	Mass Balance Scale
Flowrate	Pass	Pressure vs Airflow Measurement

Grace Davison Discovery Sciences
www.discoverysciences.com

**GracePure™ Reversed-Phase SPE Columns**

Sorbent	Bed Weight	Column Volume	Qty.	Part No.
C18-Max	50mg	1mL	100pk	<b>5141484</b>
	100mg	1mL	100pk	<b>5138765</b>
	500mg	3mL	50pk	<b>5138766</b>
	500mg	6mL	30pk	<b>5138767</b>
	1000mg	6mL	30pk	<b>5138768</b>
	2000mg	20mL	20pk	<b>5141525</b>
	5000mg	20mL	20pk	<b>5141524</b>
C18-Aq	50mg	1mL	100pk	<b>5141486</b>
	100mg	1mL	100pk	<b>5138774</b>
	500mg	3mL	50pk	<b>5138775</b>
	1000mg	6mL	30pk	<b>5138776</b>
	2000mg	12mL	30pk	<b>5141482</b>
	5000mg	20mL	20pk	<b>5141523</b>
C18-Low	100mg	1mL	100pk	<b>5138760</b>
	200mg	3mL	50pk	<b>5138761</b>
	500mg	3mL	50pk	<b>5138762</b>
	500mg	6mL	30pk	<b>5138763</b>
	1000mg	6mL	30pk	<b>5138764</b>
	5000mg	20mL	20pk	<b>5141526</b>
C18-Fast	500mg	3mL	50pk	<b>5138758</b>
	1000mg	6mL	30pk	<b>5138759</b>
	5000mg	20mL	20pk	<b>5141527</b>

**GracePure™ Normal Phase SPE Columns**

Sorbent	Bed Weight	Column Volume	Qty.	Part No.
Silica	100mg	1mL	100pk	<b>5138777</b>
	200mg	3mL	50pk	<b>5138778</b>
	500mg	3mL	50pk	<b>5138779</b>
	500mg	6mL	30pk	<b>5138781</b>
	1000mg	6mL	30pk	<b>5138782</b>
	2000mg	12mL	30pk	<b>5138783</b>
	5000mg	20mL	20pk	<b>5138780</b>
Amino	1000mg	60mL	16pk	<b>5138784</b>
	500mg	3mL	50pk	<b>5138752</b>
	1000mg	6mL	30pk	<b>5138753</b>
Florisil®	500mg	3mL	50pk	<b>5141522</b>
	1000mg	6mL	30pk	<b>5141520</b>
	2000mg	12mL	30pk	<b>5141521</b>

**GracePure™ Ion-Exchange SPE Columns**

Sorbent	Bed Weight	Column Volume	Qty.	Part No.
Anion-X	100mg	1mL	100pk	<b>5138754</b>
	500mg	3mL	50pk	<b>5138755</b>
	1000mg	3mL	50pk	<b>5141487</b>
Cation-X	100mg	1mL	100pk	<b>5138769</b>
	500mg	3mL	50pk	<b>5138770</b>
	1000mg	3mL	50pk	<b>5141488</b>

**more info**

For more information about SPE, visit our website.

# IC-SPE Cartridges

- Eliminate matrix interferences before ion chromatography
- Seven chemistries solve specific problems

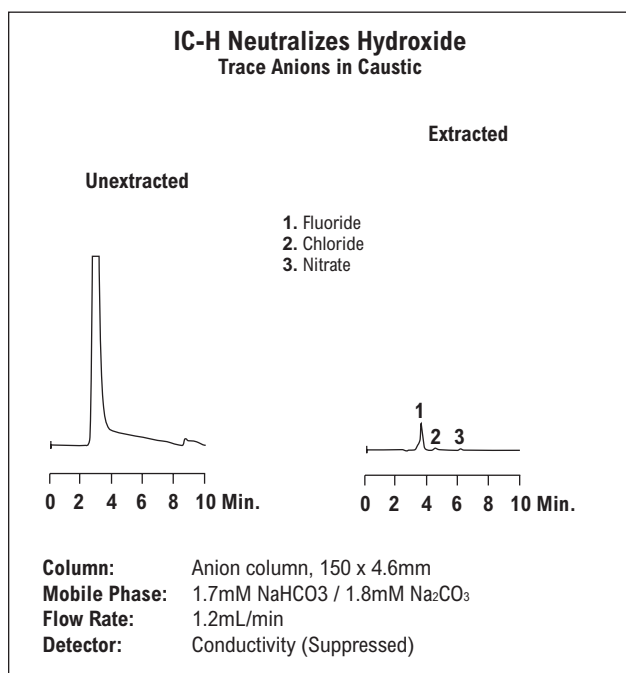
The most difficult part of many IC applications is eliminating interfering components from the sample matrix. These interferences may co-elute or mask peaks of interest, overload the column, or shorten the column life by binding irreversibly to the column packing. The unique ion-exchange SPE cartridge eliminates many of these interferences<sup>1,2</sup>.



<sup>1</sup>R. Saari-Nordhaus, J.M. Anderson, Jr., and I.K. Henderson, *Am. Lab.* August (1990) 19.  
<sup>2</sup>I.K. Henderson, R. Saari-Nordhaus, and J.M. Anderson, Jr., *J. Chromatogr.* 546 (1991) 61.

Ion Chromatography Sorbent Specifications							
Packing	Base	Counter Ion	Particle Size	Molecular Exclusion Limit	Exchange Capacity	Retains	Applications
IC-OH	Styrene-DVB	Hydroxide	50µm	1000 Daltons	1.0meq/mL	Anions	Exchanges anions for hydroxide. May be used to remove or concentrate anions from sample and to increase pH of acidic samples. Removes cations that form insoluble hydroxide salts.
IC-H	Styrene-DVB	Hydronium	50µm	1000 Daltons	2.0meq/mL	Cations	Exchanges cations for H <sup>+</sup> . May be used to remove or concentrate cations from sample and to reduce pH of basic samples.
IC-Ag	Styrene-DVB	Silver	50µm	1000 Daltons	2.0meq/mL	Chloride Iodide Bromide	Removes excess halides through formation of Ag-halide salts.
IC-Ba	Styrene-DVB	Barium	50µm	1000 Daltons	2.0meq/mL	Sulfate	Removes excess sulfate through formation of BaSO <sub>4</sub> .
IC-Na	Styrene-DVB	Sodium	50µm	1000 Daltons	2.0meq/mL	Cations	Exchanges cations for Na <sup>+</sup> . May be used to remove or retain cations from sample without changing the pH of the sample.
IC-Chelate	Styrene-DVB	Sodium	50µm	1000 Daltons	0.4meq/mL	Polyvalent metal ions	Exchanges transition metals and divalent cations for Na <sup>+</sup> . May be used to remove or retain divalent cations and transition metals from sample.
IC-RP	Polystyrene	—	550µm	—	—	Hydrophobic components	Removes surfactants, organic acids and other organic substances. Inorganic ions pass through.

spe



### Ion Chromatography Maxi-Clean™ Cartridges

Packing	Bed Weight	Qty.	Part No.
IC-OH	0.5mL	50	<b>30262</b>
IC-OH	1.5mL	25	<b>30254</b>
IC-H	0.5mL	50	<b>30264</b>
IC-H	1.5mL	25	<b>30256</b>
IC-Ag	0.5mL	50	<b>30266</b>
IC-Ag	1.5mL	25	<b>30258</b>
IC-Ba	0.5mL	50	<b>30268</b>
IC-Ba	1.5mL	25	<b>30261</b>
IC-Na	0.5mL	50	<b>30270</b>
IC-Na	1.5mL	25	<b>30263</b>
IC-Chelate	0.5mL	50	<b>30250</b>
IC-Chelate	1.5mL	25	<b>30265</b>
IC-RP	0.5mL	50	<b>30260</b>
IC-RP	1.5mL	25	<b>30252</b>

## Reservoirs and Frits

Select empty reservoirs and loose frits to pack your own custom SPE columns.



### Bulk Reservoirs and Frits

Description	Qty.	Part No.
<i>SPE Empty Reservoirs, Polypropylene</i>		
1.5mL	100	<b>210001</b>
4.0mL	100	<b>210104</b>
8.0mL	100	<b>210208</b>
15.0mL	100	<b>210315</b>
25.0mL	100	<b>210425</b>
75.0mL	50	<b>210575</b>
<i>Polyethylene Frits for Extract-Clean™ Reservoirs</i>		
For 1.5mL Reservoir	100	<b>211401</b>
For 4.0mL Reservoir	100	<b>211404</b>
For 8.0mL Reservoir	100	<b>211408</b>
For 15.0mL Reservoir	100	<b>211412</b>
For 25.0mL Reservoir	100	<b>211416</b>
For 75.0mL Reservoir	100	<b>211775</b>

## Syringe Adapters

Syringe adapters fit the tops of SPE columns allowing attachment of any male luer device. This lets you process an Extract-Clean™ column with a syringe or add an empty reservoir to increase sample volume capacity.

### Syringe Adapters

Description	Qty.	Part No.
Syringe Adapters for 1.5, 4.0, and 8.0mL Columns	15	<b>210705</b>
Syringe Adapters for 75mL Columns	5	<b>210709</b>

### technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)  
Online: [www.discoverysciences.com](http://www.discoverysciences.com)

## Adapters and Caps

- Inlet caps fit SPE devices as indicated
- Outlet caps fit any column or cartridge with a male luer tip



### Caps

Description	Qty.	Part No.
Inlet Caps for 1.5mL	50	<b>220000</b>
Inlet Caps for 4.0mL	50	<b>220301</b>
Inlet Caps for 8.0mL	50	<b>220600</b>
Inlet Caps for 15.0mL	50	<b>221200</b>
Inlet Caps for 25.0mL	50	<b>221006</b>
Inlet Caps for 75.0mL	50	<b>227503</b>
Outlet Caps for Male Luers	50	<b>220710</b>

## Bulk SPE Packings

The same high-quality material we use to manufacture our Extract-Clean™ and Maxi-Clean™ SPE products.



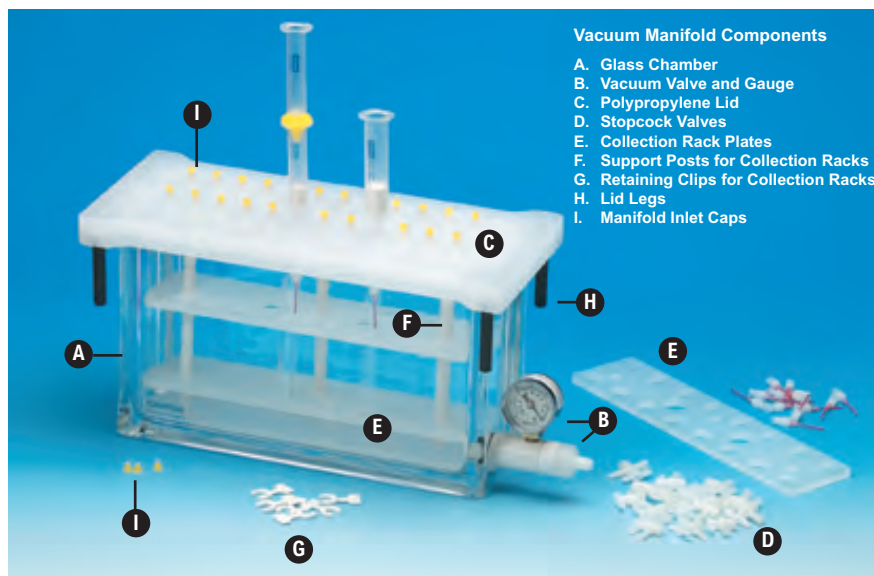
### Bulk SPE Packings

Description	Qty.	Part No.
<i>Reversed-phase</i>		
Prevail™ C18 Silica (11%)	100g	<b>211505</b>
C18 (6%)	100g	<b>211502</b>
C18 (17%)	100g	<b>211503</b>
<i>Normal Phase</i>		
Silica	100g	<b>211512</b>
Aminopropyl	100g	<b>211516</b>
Florisil® Silica	227g	<b>5618</b>
Florisil®-PR Silica	227g	<b>5615</b>
<i>Ion-Exchange</i>		
SCX (Cation Exchange)	100g	<b>211520</b>
SAX (Anion Exchange)	100g	<b>211510</b>
Carbograph 1 SPE 120/400 Mesh	25g	<b>1769</b>

# SPE Vacuum Manifolds

- 12- and 24-port manifolds
- Glass chamber for visual monitoring
- Accepts standard male luer SPE devices

Vacuum manifolds process multiple samples simultaneously, saving time and effort. Additional accessories and replacement parts, as well as stainless steel or PTFE needles are available separately.



## 12-Port Manifold

- For up to 12 samples
- Also includes one waste container



## 24-Port Manifold

- Process up to 24 samples



### 12-Port and 24-Port Manifold and Accessories

Description	12-Port Part No.	Qty.	24-Port Part No.	Qty.
Vacuum Manifold	<b>210351</b>	ea	<b>210224</b>	ea
<i>Replacement Parts</i>				
Lid, Gaskets, and Stopcocks	<b>212001</b>	ea	<b>211224</b>	ea
Vacuum Gauge, Valve, and Glass Chamber	<b>212304</b>	ea	<b>210324</b>	ea
Collection Rack	<b>212518</b>	ea	<b>210424</b>	ea
Gaskets	<b>212112</b>	2	<b>210724</b>	2
One-Way Stopcocks	<b>213112</b>	12	<b>211524</b>	24
Drying Attachment - 1/4" barb	<b>212100</b>	ea	<b>212124</b>	ea
Waste Container	<b>210033</b>	2	—	—

### Replacement Parts for All Size Manifolds

Description	Qty.	Part No.
Vacuum Gauge and Valve	ea	<b>212203</b>
Retaining Clips for Collections Racks	12	<b>212912</b>
Female Luer Inlet	2	<b>212002</b>
Female Luer Inlet	24	<b>212302</b>
Male Luer Outlet	2	<b>212120</b>
Male Luer Outlet	24	<b>212320</b>
Caps for Lid Inlets	50	<b>211234</b>
Lid Legs, Black	4	<b>410510</b>
Collection Rack Posts	3	<b>410410</b>
3/8" i.d., 7/8" o.d.* Tygon® Vacuum Tubing	10'	<b>6472</b>

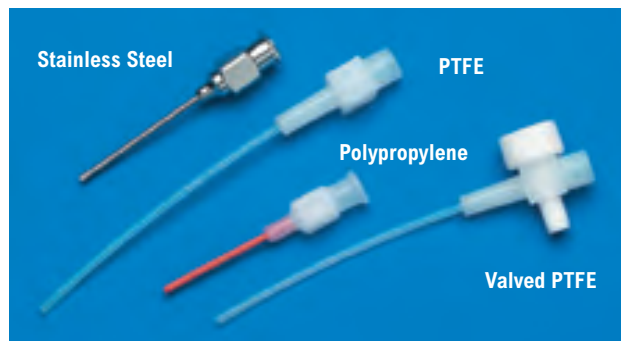
\*Use with Vacuum Gauge and Valve displayed above.

## Manifold Needles

PTFE needles are disposable and eliminate cross contamination. Stainless steel and polypropylene needles are also available.

### Manifold Needles

Description	Qty.	Part No.
PTFE Needles	100	<b>412410</b>
PTFE Needles	500	<b>412450</b>
Valved PTFE Needles	25	<b>411525</b>
Valved PTFE Needles	50	<b>411550</b>
Stainless Steel Needles	12	<b>212400</b>
Stainless Steel Needles	24	<b>210824</b>
Polypropylene Needles	12	<b>212412</b>
Polypropylene Needles	24	<b>210924</b>



## Filtration

### Choose from a Variety of Membranes and Devices for All Your Sample Filtration Needs

- Nylon is hydrophilic and has good solvent resistance
- PVDF is hydrophilic, highly solvent resistant, and low protein binding
- PTFE is hydrophobic with exceptional solvent resistance
- Regenerated Cellulose is hydrophilic with exceptional solvent resistance and low protein binding

### Syringe Filters

Syringe Filter Specifications				
Diameter	Max. Temp.	Max. Pressure	Hold-Up Volume	Typical Sample Volume
4mm	100°C	75psig	Less than 15µL	Up to 1mL
13mm	60°C	100psig	Less than 10µL	Up to 5mL
17mm	100°C	115psig	Less than 25µL	Up to 50mL
25mm	60°C	100psig	Less than 50µL	Up to 50mL
30mm	100°C	90psig	Less than 115µL	Up to 100mL



#### Syringe Filters

Diameter	Pore Size	Qty.	Nylon Part No.	PVDF Part No.	PTFE Part No.	Regenerated Cellulose Part No.
4mm	0.2µm	100	2091	2227	2394	656100
4mm	0.45µm	100	2092	2228	2395	656102
13mm	0.2µm	100	2166	2647	2164	—
13mm	0.45µm	100	2167	2648	2165	—
17mm	0.2µm	100	62163	62130	62118	62119
17mm	0.45µm	100	62177	62209	62136	62125
25mm	0.2µm	100	2045	2223	2089	—
25mm	0.45µm	100	2047	2224	2090	—
30mm	0.2µm	100	62145	62193	62189	62199
30mm	0.45µm	100	62147	62195	62191	62167

### Centrifuge Filter Tubes



#### Centrifuge Filter Tubes

Size	Max. Sample Volume	Max. G-Force	Pore Size	Qty.	Nylon Part No.	PVDF Part No.	Regenerated Cellulose Part No.
2mL	850µL	10,000xG	0.2µm	100	24137	24142	24148
2mL	850µL	10,000xG	0.45µm	100	24139	24144	24150
50mL	25mL	2,500xG	0.2µm	50	24156	24160	—
50mL	25mL	2,500xG	0.45µm	50	24158	24162	—

#### related products

Looking for pre-cut filter membrane discs?  
Visit our website.



#### more info

Visit our website for a chemical compatibility chart by filter membrane type.



# Alltech® 3300 ELSD

## Sensitive, Universal HPLC Detection

Detection of difficult compounds has never been easier.

### Sensitive

- Low noise and excellent baseline stability
- Low nanogram detection limits

### Easy to Use

- Step-by-step method wizard automates detector setup
- Easy access to parts requiring cleaning or maintenance

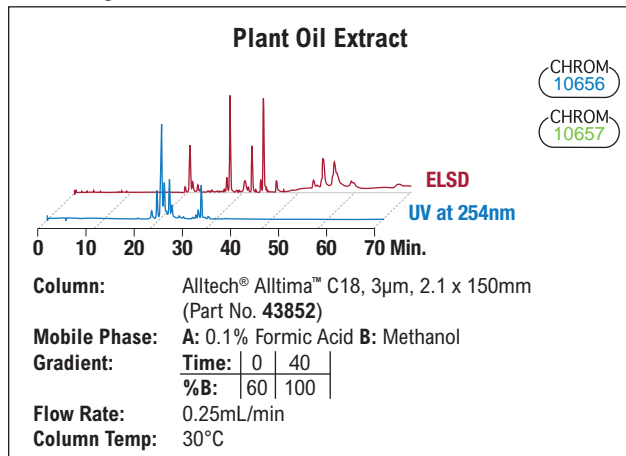
### Small Footprint

- Small footprint minimizes bench space requirements  
11.6" H x 10.3" W x 19.5" D (29.5cm H x 26.2cm W x 49.5cm D)

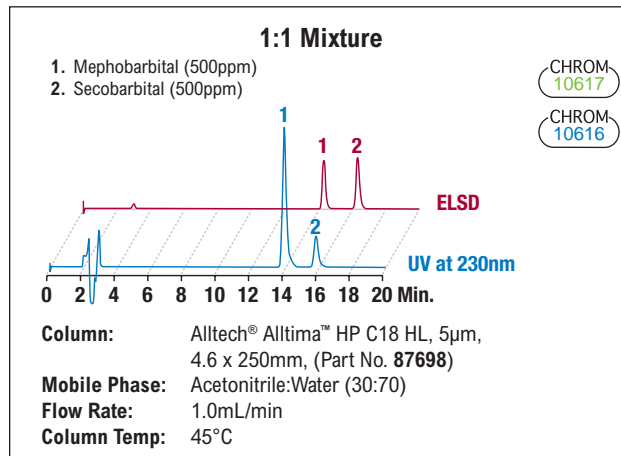


## Universal Detection for a Broad Range of HPLC Applications

ELSD shows what may be missing from your UV chromatogram



ELSD obtains a more accurate representation of sample mass than UV/Vis



equipment

### Alltech® 3300 ELSD\*

Description	Part No.
3300 ELSD 110V–240V	5135834

\*Patent pending.

## Service and Support

Our dedicated technical support professionals provide you with the comprehensive support you need, including a complete line of service options.

### Services for the Alltech® 3300 ELSD

Description	Part No.
Installation and Training	INSTALL
<i>Qualification</i>	
IQ/OQ at Customer Site	Q330010
IQ/OQ/PQ at Customer Site	Q330030

Alltech® ELSDs are designed and manufactured in accordance with the following standards: EN6101-1 + A2:95, EN555011: 1998, FCC CFR 47 Part 15: 2001, EN 61326: 1998, EN 6100-3-2: 1995 + A14:2000 and EN61000-3-3: 1995

### 3300 ELSD Specifications

<b>Light Source:</b>	Laser diode with collimating optics, 650nm, 30mW output, class IIIB
<b>Detector Element:</b>	Silicon photodiode
<b>Temperature Range:</b>	Ambient to 120°C in 1°C increments
<b>Nebulizer Gas:</b>	Nitrogen preferred; Calibrated to 4.0L/min
<b>Inlet Pressure:</b>	60–80psig
<b>Typical Operating Range:</b>	1.0–2.0L/min
<b>Flow Control:</b>	Digital Mass Flow Control
<b>Mobile Phase Flow Rate:</b>	To 3.0mL/min
<b>Analog Output:</b>	1V or 10mV full scale
<b>Communications:</b>	<i>Inputs:</i> TTL/contact closure for auto zero, gas shutoff, start, and standby <i>Outputs:</i> Contact Closure for pump shutdown in error conditions, general events <i>Data Ports:</i> USB, RS232, Ethernet
<b>User Interface:</b>	Full-color Microsoft Windows®-based Graphical LCD with alphanumeric keypad
<b>Power Requirements:</b>	120/240V, 50/60Hz
<b>Dimensions:</b>	11.6" H x 10.3" W x 19.5" D (29.5cm H x 26.2cm W x 49.5cm D)
<b>Weight:</b>	30lb (16kg)
<b>IEC/FDA Classification:</b>	Class 1 Laser Product; Complies with 21 CFR Subpart J
<b>Manufacturing Standards:</b>	Meets all applicable safety and EMC certifications; CE, UL, and CSA certified
<b>Warranty:</b>	1 year parts and labor

## Alltech® ELSD Nitrogen Generator

- Simplifies ELSD operation
- Produces a continuous supply of high purity nitrogen from compressed air
- Replaces inconvenient nitrogen cylinders
- Requires no electricity



The Alltech® ELSD nitrogen generator has a small, compact footprint that fits easily on the lab bench next to your ELSD or mounts on the wall nearby.

ELSD Nitrogen Generator Specifications	
<b>Nitrogen Purity:</b>	99%
<b>Nitrogen Flow:</b>	4L/min
<b>Min./Max. Operating Pressure:</b>	60/125psig
<b>Dimensions:</b>	16.1" H x 10.7" W x 13.4" D (40.9cm H x 27.2cm W x 34.0cm D)
<b>Weight:</b>	42.5lb (19.3kg)
<i>Compressed Air Requirements:</i>	
<b>Purity:</b>	Free of water, compressor oil (0.01mg/m <sup>3</sup> ), hydrocarbons, and particulates (<0.1µm)
<b>Temperature:</b>	60°F (15°C)–110°F (43°C)
<b>Compressor Outlet Pressure:</b>	90–145psig
<b>Compressed Air Flow:</b>	43L/min minimum

Alltech® ELSD Nitrogen Generator	
Description	Part No.
ELSD Nitrogen Generator	<b>600150</b>
Maintenance Kit	<b>600151</b>

Accessories	
Description	Part No.
50ft 1/4" o.d. PTFE Tubing	<b>3136</b>
1/4" Brass Nuts, 10/pk	<b>14059</b>
1/4" Brass Ferrules, 10/pk	<b>14062</b>
1/4"–1/4" MPT Brass Male Connection	<b>11639</b>
1/8"–1/4" MPT Brass Male Connection	<b>11635</b>
Single-Stage Pressure Regulator, 0–200psig	<b>81892</b>

JUN-Air® Air Compressor with Dryer Model	
Description	Part No.
JUN-Air® Air Compressor with Dryer Model OF302-25BD2	<b>89239</b>

### more info

For more information about gas generators, visit our website.

## Parker Domnick Hunter® G3110 High Purity Nitrogen Generator

- Integral oil free compressor
- No house air required



High Purity Nitrogen Generator Specifications	
<b>Nitrogen Purity:</b>	>99.9%
<b>Nitrogen Flow:</b>	4L/min
<b>Min./Max. Operating Pressure:</b>	72.5psig
<b>Dimensions:</b>	34.4" H x 13.6" W x 26.1" D (87.4cm H x 34.5cm W x 66.3cm D)
<b>Weight:</b>	185.2 lb (84 kg)

Parker Domnick Hunter® G3110 High Purity Nitrogen Generator	
Description	Part No.
High Purity Nitrogen Generator	<b>8626253</b>

Accessories	
Description	Part No.
50ft 1/4" o.d. PTFE Tubing	<b>3136</b>
1/4" Brass Nuts, 10/pk	<b>14059</b>
1/4" Brass Ferrules, 10/pk	<b>14062</b>
1/4"–1/4" MPT Brass Male Connection	<b>11639</b>
1/8"–1/4" MPT Brass Male Connection	<b>11635</b>
Single-Stage Pressure Regulator, 0–200psig	<b>81892</b>

### more info

For more information about maintenance kits, contact your Grace office.

### technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)  
Online: [www.discoverysciences.com](http://www.discoverysciences.com)

## Hydrogen Generators for GC Applications

Parker Balston® Hydrogen Generator Specifications						
Model	H2PEM-100	H2PEM-165	H2PEM-260	H2PEM-510	H2-150	H2-300
Flow (cc/min):	100	165	260	510	150	300
Use:	Fuel Gas				Fuel and Carrier	
Max. Number of FIDs:	2	4	6	12	3	6
Max. Number of Injectors/FIDs:	N/A				1	2
Purity:	99.9995%				99.99999%	
Water Quality:	DI Water				NaOH Solution	
Purifier Type:	Dessicant				Palladium	
Regenerative Purifier:	No				No	
Maximum Pressure (psig):	100				60	
Dimensions (H x W x D):	17.1" x 13.5" x 17.9" (43.5cm x 34.2cm x 45.6cm)				22" x 12" x 13" (58cm x 30cm x 33cm)	
Weight:	40lb (18kg)				58lb (26kg)	

### Parker Balston® Hydrogen Generators

Description	Part No.
H2PEM-100, 110/220V	8619101
H2PEM-165, 110/220V	8619102
H2PEM-260, 110/220V	8619103
H2PEM-510, 110/220V	8619104
H2-150, 220V	80113
H2-300, 110V	80112
H2-300, 220V	80115



## Parker HydroGen Mate® DI Water System

### Economically Provide DI Water to Your Hydrogen Generator

- Removes organics, phosphates, chlorine, and most ionizable constituents
- Quick and easy installation
- Easy-fill dispensing nozzle
- No electrical requirements

The Parker HydroGen Mate® DI water system provides high purity deionized water to all types of Parker hydrogen generators. The system is ready to install and includes prefiltration, two DI resin exchange cartridges, dispensing nozzle and a final filter.

### Parker HydroGen Mate® DI Water System

Description	Part No.
Complete DI Water System	8619043
Maintenance Kit*	8619044

\*Includes two replacement cartridges and one replacement final filter.



### more info

For more information about gas generators, visit our website.

# HPLC Pumps

## Alltech® Model 426 and 301 HPLC Pumps



Both pumps are available in stainless steel or biocompatible PEEK.

HPLC Pump Specifications		
Model	301 HPLC Pump	426 HPLC Pump
Flow Range:	0.01–10mL/min	0.01–10mL/min
Isocratic/Gradient:	Isocratic	Isocratic
Pressure Monitoring:	No	Yes
Max. Operating Pressure:	6000psig (SS), 5000psig (PEEK)	6000psig (SS), 5000psig (PEEK)
Flow Precision:	0.2% RSD	0.2% RSD
Flow Accuracy:	±2.0%	±2.0%
Dimensions:	6" H x 11" W x 18" D (15cm H x 26cm W x 46cm D)	6" H x 11" W x 18" D (15cm H x 26cm W x 46cm D)
Weight:	30lb (14kg)	30lb (14kg)
Warranty:	3-year parts, excluding seals, check valves and pulse dampener; 1-year labor	3-year parts, excluding seals, check valves and pulse dampener; 1-year labor
Drivers:	EZChrom Elite	EZChrom Elite

### more info

For more information about additional pumps, visit our website.

### technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)  
 Online: [www.discoverysciences.com](http://www.discoverysciences.com)

### Low-Cost, High-Performance Isocratic Pumps

#### Both Pumps Feature:

- Built-in pulse dampener and rapid refill for pulse-free operation
- Self-flushing pump head for longer seal-life
- Automatic prime/purge system for easy priming
- Wide flow range for broad HPLC work, including semi-preparative applications
- EZChrom driver and cables included

#### The Model 426 has These Additional Features:

- User-settable upper and lower pressure limits
- Pressure monitoring on the LCD
- Interfacing features for convenient pump control

### Alltech® Model 426 and 301 HPLC Pumps

Description	Part No.
<i>Model 426 HPLC Pump</i>	
PEEK, 85–265VAC, 47–63Hz	<b>426150</b>
Stainless Steel, 85–265VAC, 47–63Hz	<b>426250</b>
<i>Model 301 HPLC Pump</i>	
PEEK, 85–265VAC, 47–63Hz	<b>301150</b>
Stainless Steel, 85–265VAC, 47–63Hz	<b>301250</b>

### Alltech® Model 426 and 301 HPLC Replacement Parts

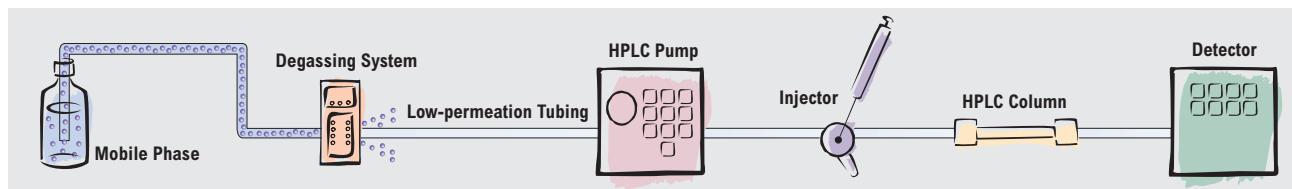
Description	Part No.
Pump Head Kit, PEEK	<b>120800</b>
Pump Head Kit, Stainless Steel	<b>120799</b>
Piston Seal Kit	<b>120680</b>
Piston	<b>121486</b>
Check Valve Kit, PEEK	<b>60141</b>
Check Valve Kit, Stainless Steel	<b>120679</b>

Note: All replacement parts contain parts for one pump head only.

# Alltech® On-Line Degassing Systems

- Advanced degassing technology
- Product range meets every need and budget
- Upgrade capabilities available

Flow rate instability and baseline noise are the likely result of dissolved air in the mobile phase. Eliminate these problems with the Alltech® on-line degassing system. Unlike helium sparging, degassing online does not require extra mobile phase preparation steps. Save time and avoid the expense, inconvenience and hazards associated with helium tanks.



Eliminate extra mobile phase preparation steps by degassing online.

## Choice of Two Degasser Families:

### Elite™ Degasser Family

In addition to the key degassing components, the Elite™ family incorporates a vacuum sensor, validation output and a four-year warranty. The sensor not only detects and alerts you to leaks, it also communicates with the vacuum pump. If a change in vacuum is detected due to mobile phase flow rate changes, the pump can compensate by changing its speed. The validation output records vacuum level to satisfy ISO and system validation requirements.

### Select Degasser Family

The Select family has identical degassing efficiency to the Elite™ line since it contains the same key components. However, by omitting the vacuum sensor and validation output, and applying the industry standard one-year warranty, the Select family is available at an economical price.

Specification	Elite™ Degasser Family	Select Degasser Family
<b>Membrane Type:</b>	PTFE AF	PTFE AF
<b>Vacuum Pump Type:</b>	Continuous-run, self-adjusting speed	Continuous-run, one-speed
<b>Low-permeation Fittings and Tubing:</b>	Yes	Yes
<b>Vacuum Sensor:</b>	Yes	No
<b>Validation Output:</b>	Yes (5mVDC/1mm Hg)	No
<b>Warranty:</b>	4-year	1-year
<b>Flow Range Choices:</b>		
<b>Micro:</b>	0–1mL/min, 195µL internal volume	0–1mL/min, 195µL internal volume
<b>Analytical:</b>	0–5mL/min, 480µL internal volume	0–5mL/min, 480µL internal volume
<b>Semi-prep:</b>	0–10mL/min, 925µL internal volume	0–10mL/min, 925µL internal volume
<b>Universal Power Supply:</b>	Yes	Yes
<b>Dimensions:</b>	5" H x 3" W x 10" D (13cm H x 8cm W x 25cm D)	5" H x 3" W x 10" D (13cm H x 8cm W x 25cm D)

### On-Line Degassing Systems

Description	Elite™ Family Part No.	Select Family Part No.
<i>Micro, 0–1mL/min, 195µL Internal Volume</i>		
2 Channel	590507	590500
4 Channel	590508	590501
<i>Analytical, 0–5mL/min, 480µL Internal Volume</i>		
1 Channel	590509	590502
2 Channel	590510	590503
3 Channel	590511	590504
4 Channel	590512	590505
<i>Semi-prep, 0–10mL/min, 925µL Internal Volume</i>		
1 Channel	590517	590514
2 Channel	590513	590506
3 Channel	590518	590515
4 Channel	590519	590516

### Channel Upgrade Kits\*

Description	Part No.
Micro, 0–1mL	590520
Analytical, 0–5mL	590521
Semi-prep, 0–10mL	590522

\*Includes degassing channel, vacuum tubing, mounting screw, identification sticker, and instructions.

### Face Plates\*

Description	Part No.
For 1 Channel	590506A
For 2 Channel	590506B
For 3 Channel	590506C
For 4 Channel	590506D

\*To replace an existing degassing channel, only a channel upgrade kit is necessary. To add more channels, a new face plate is also required.

### Upgrade Labor Charge\*

Description	Part No.
Labor	590525

\*Channel upgrade kit and face plate must be ordered separately.

# Hamilton® Syringes

## 1000 Series Gastight® Syringes

Gas and Liquid Tight, 1mL to 100mL

- PTFE-tipped plungers
- Replaceable barrels and plungers



### Hamilton® 1000 Series Gastight® Syringes

Model	Volume	Gauge	Pt. Style	Repl. Needle Part No.	Part No.
<i>Removable Needle Syringes (RN), 2" Needle Length</i>					
1001	1.0mL	22	2	7779-01	81330
1002	2.5mL	22	2	7779-01	81430
1005	5.0mL	22	2	7779-01	81530
1010	10.0mL	22	2	7779-01	81630
<i>PTFE Luer Lock Syringes (TLL), 2" Needle Length</i>					
1001	1.0mL	—	—	*	81320
1002	2.5mL	—	—	*	81420
1005	5.0mL	—	—	*	81520
1010	10.0mL	—	—	*	81620
1025	25.0mL	—	—	*	82520
1050	50.0mL	—	—	*	85020
1100	100.0mL	—	—	*	86020

\*Visit our website for a complete listing of replacement needles.

## 1700 Series Gastight® Syringes

Gas and Liquid Tight, 10µL to 500µL

- PTFE-tipped plungers
- Replaceable barrels and plungers



### Hamilton® 1700 Series Gastight® Syringes

Model	Volume	Gauge	Pt. Style	Repl. Needle Part No.	Part No.
<i>Removable Needle Syringes (RN), 2" Needle Length</i>					
1701	10µL	26s	2	7758-02	800300
1702	25µL	22s	2	7758-03	80230
1705	50µL	22s	2	7758-03	80930
1710	100µL	22s	2	7758-03	81030
1725	250µL	22s	2	7779-03	81130
1750	500µL	22	2	7779-01	81230
<i>PTFE Luer Lock Syringes (TLL) Without Slots</i>					
1725	250µL	—	—	*	81120
1750	500µL	—	—	*	81220
<i>For Rheodyne®, Valco® VISF-2, Beckman®/Altax, SSI (RNR) Valves, 2" Needle Length</i>					
1705	50µL	22s	3	7770-01	80965
1710	100µL	22s	3	7770-01	81065
1725	250µL	22	3	7780-04	81165
1750	500µL	22	3	7780-04	81265

\*Visit our website for a complete listing of replacement needles.

## SampleLock™ Syringes

- 1000 and 1700 Series syringes with twist valve



### Hamilton® SampleLock™ Syringes

Model	Volume	Gauge	Pt. Style	Repl. Needle Part No.	Part No.
<i>SampleLock™ Syringes, 2" Needle Length</i>					
1705	50µL	22s	2	7779-03	80956
1710	100µL	22s	2	7779-03	81056
1001	1mL	22	2	7779-01	81356
1005	5mL	22	2	7779-01	81556
1025	25mL	22	2	7779-01	863260

## 700 Series Microliter™ Syringes

General Purpose Syringe, 5µL to 500µL



- Plungers are not interchangeable or replaceable
- Accurate to 1% of the syringe volume

### Hamilton® 700 Series Microliter™ Syringes

Model	Volume	Gauge	Pt. Style	Repl. Needle Part No.	Qty.	Part No.
<i>Cemented Needle Syringes (N), 2" Needle Length</i>						
75	5µL	26s	2	—	ea	87900
	5µL	26s	3	—	ea	87919
701	10µL	26s	2	—	ea	80300
	10µL	26s	3	—	ea	803830
	10µL	26s	5	—	ea	80339
702	25µL	22s	2	—	ea	80400
	25µL	22s	3	—	ea	80465
	25µL	22s	5	—	ea	80439
705	50µL	22s	2	—	ea	80500
	50µL	22s	3	—	ea	80565
710	100µL	22s	3	—	ea	80665
725	250µL	22s	2	—	ea	80700
	250µL	22s	3	—	ea	80765
750	500µL	22	2	—	ea	80800
	500µL	22	3	—	ea	80865
<i>Removable Needle Syringes (RN), 2" Needle Length</i>						
75	5µL	26s	2	7758-02	ea	87930
701	10µL	26s	2	7758-02	ea	80330
705	50µL	22s	2	7758-03	ea	80530
710	100µL	22s	2	7758-03	ea	80630
750	500µL	22	2	7779-01	ea	808301
<i>Luer Tip Syringes (LT)</i>						
701	10µL	—	—	*	ea	80301
705	50µL	—	—	*	ea	80501
710	100µL	—	—	*	ea	80601
725	250µL	—	—	*	ea	80701

\*Visit our website for a complete listing of replacement needles.

## Save Money on Model 701 with Multi-Packs

- Economical—syringes cost less in six packs
- Easy identification—six numbered dots provide quick syringe identification



### Hamilton® 700 Series Six-pack Syringes (2" Needle Length)

Model	Volume	Gauge	Pt. Style	Repl. Needle Part No.	Qty.	Part No.
<i>Cemented Needle Syringes (N), 2" Needle Length</i>						
701N	10µL	26s	2	—	6	80366
701RN	10µL	26s	2	7758-02	6	80336

## Autosampler Syringes

For the Agilent 7673 and 7683 Autosamplers

- Standard needle length is 1.71"

### Syringes for the Agilent 7673 and 7683 Autosamplers

Model	Volume	Gauge	Pt. Style	Qty.	Part No.
<i>Cemented Needle Syringes (ASN)</i>					
75	5µL	23s	AS	6	87990
	5µL	26s	AS	6	87989
	5µL	23s-26s	AS	ea	87993
	5µL	23s-26s	AS	6	87994
701	10µL	23s	AS	ea	803871
	10µL	23s	AS	6	803901
	10µL	23s	2	ea	80398
	10µL	26s	AS	ea	803871
	10µL	23s-26s	AS	ea	80393
	10µL	23s-26s	AS	6	803911

syringes

# SGE® Syringes

## Plunger Protection Syringes

**General Purpose Syringes with Reinforced Plunger, 5µL and 10µL**

- Includes certificate of conformance to NIST

### SGE® Plunger Protection Syringes

Volume	Gauge	Length	Pt. Style	Repl. Needle Part No.	Qty.	Part No.
<i>Fixed Needle Syringes</i>						
5µL	26	5cm	2	—	ea	<b>85184</b>
10µL	26	5cm	2	—	ea	<b>85056</b>
10µL	26	5cm	2	—	6	<b>85190</b>
10µL	26	5cm	2	—	10	<b>85400</b>
<i>Removable Needle Syringes</i>						
5µL	26	5cm	2	<b>85272</b>	ea	<b>85186</b>
10µL	26	5cm	2	<b>85294</b>	ea	<b>85050</b>
10µL	26	5cm	2	<b>85294</b>	6	<b>85194</b>

## Micro Syringes

- Plunger-in-needle, 0.5µL to 5µL
- Liquid and gas tight to 650 atmospheres\*

### SGE® Microvolume Syringes

Volume	Gauge	Length	Pt. Style	Repl. Needle/Plunger Part No.	Part No.
<i>Standard Barrel—8mm o.d.</i>					
0.5µL	23	7cm	1	—	<b>85028</b>
0.5µL	23	7cm	2	<b>85235</b>	<b>85209</b>
1µL	23	5cm	1	<b>85268</b>	<b>85000</b>
1µL	23	7cm	1	<b>85284</b>	<b>85030</b>
1µL	23	7cm	2	<b>85243</b>	<b>85211</b>
1µL	26	7cm	1	<b>85245</b>	<b>85213</b>
5µL	23	5cm	1	—	<b>85215</b>
5µL	23	7cm	1	—	<b>85032</b>
<i>Standard Barrel with Repeating Adapter</i>					
1µL	23	5cm	1	<b>85268</b>	<b>85223</b>
1µL	23	7cm	1	<b>85284</b>	<b>85225</b>
1µL	26	7cm	1	<b>85245</b>	—
5µL	23	5cm	1	—	<b>85229</b>
5µL	23	7cm	1	—	<b>85231</b>

\*Use a repeating adapter to prevent plunger blow-out at elevated pressures.

## Gas Tight Syringes

**Gas and Liquid Tight, 10µL to 10mL**



### SGE® Gas Tight Syringes, Needles included

Volume	Gauge	Length	Pt. Style	Repl. Needle Part No.	Part No.
<i>Removable Needle</i>					
10µL	26	5cm	2	<b>85294</b>	<b>85004</b>
25µL	25	5cm	2	<b>85274</b>	<b>85331</b>
50µL	25	5cm	2	<b>85274</b>	<b>85070</b>
100µL	25	5cm	2	<b>85274</b>	<b>85072</b>
250µL	25	5cm	2	<b>85274</b>	<b>85074</b>
500µL	25	5cm	2	<b>85274</b>	<b>85076</b>
1mL	23	5cm	2	<b>85276</b>	<b>85078</b>
2.5mL	23	5cm	2	<b>85276</b>	<b>85117</b>
5mL	23	5cm	2	—	<b>85086</b>
10mL	23	5cm	2	—	<b>85090</b>

### more info

For more information about additional syringes and adapters, visit our website.



## Autosampler Syringes



### SGE® Autosampler Syringes

Volume	Gauge	Pt. Style	Repl. Needle Part No.	Qty.	Part No.
<i>For Agilent 7673 Autosamplers</i>					
<i>Fixed Needle</i>					
5µL	23	1	—	ea	<b>85014</b>
5µL	23	1	—	6	<b>85140</b>
5µL	26	1	—	ea	<b>85136</b>
5µL	26	1	—	6	<b>85138</b>
10µL	23	1	—	ea	<b>85144</b>
10µL	23	1	—	6	<b>85036</b>
10µL	26	1	—	ea	<b>85142</b>
10µL	26	1	—	6	<b>85034</b>
<i>For PerkinElmer® Autosystem</i>					
<i>Fixed Needle</i>					
5µL	23	1	—	ea	<b>85069</b>
5µL	26	1	—	ea	<b>85067</b>
50µL	23	1	—	ea	<b>85419</b>
<i>Gas Tight Fixed Needle</i>					
5µL	23	1	—	ea	<b>85160</b>
5µL	26	1	—	ea	<b>85158</b>
<i>Removable Needle</i>					
0.5µL	23	1	—	ea	<b>85156</b>
0.5µL	26	1	85306	ea	<b>85154</b>
<i>For Shimadzu® Autosamplers</i>					
<i>Models AOC14 and 17—Removable Needle</i>					
0.5µL	26	1	—	ea	<b>85166</b>
10µL	26	1	85316	ea	<b>85172</b>
<i>For Varian® Autosamplers</i>					
<i>Model 8000—Removable Needle</i>					
10µL	25	5	—	ea	<b>85176</b>
<i>Models 8035, 8100, 8200—Removable Needle</i>					
10µL	25	5	85173	ea	<b>85180</b>
<i>For CTC/Fisons AS200 and AS800 Autosamplers</i>					
<i>Fixed Needle (50mm)</i>					
10µL	26	1	—	ea	<b>85297</b>
25µL	26	1	—	ea	<b>85401</b>
<i>Fixed Needle (80mm)</i>					
10µL	26	1	—	ea	<b>85398</b>
<i>Gas Tight Fixed Needle (50mm)</i>					
10µL	23	1	—	ea	<b>85399</b>
25µL	23	1	—	ea	<b>85402</b>

## Guided Plunger Syringes

**Extended Barrel Syringes, 5µL and 10µL**

- Reinforced plunger



### SGE® Guided Plunger Syringes

Volume	Gauge	Length	Pt. Style	Repl. Needle Part No.	Part No.
<i>Fixed Needle Syringes</i>					
5µL	26	5cm	2	—	<b>85022</b>
10µL	26	5cm	2	—	<b>85038</b>
<i>Removable Needle Syringes</i>					
5µL	26	5cm	2	85272	<b>85016</b>
10µL	26	5cm	2	85294	<b>85018</b>
10µL	26	7cm	2	85163	<b>85159</b>

## Color-Coded PEEK Tubing

- Chemically inert and biocompatible
- High strength polymer replaces stainless steel
- Easy to cut with razor blade or tubing cutters

PEEK tubing is the ideal metal-free tubing. Its mechanical strength, chemical resistance, and biocompatibility make it appropriate for a wide variety of high pressure LC applications. Tubing is color-coded to indicate i.d.

### PEEK Tubing Specifications








<b>Material:</b>	PEEK
<b>Maximum Temperature:</b>	100°C
<b>Maximum Pressure:</b>	Varies by Size, See Order Block
<b>Typical Use:</b>	High-Pressure Plumbing

### Striped PEEK Tubing

- No dye contacts fluid path



#### Striped PEEK Tubing

Color	o.d.	i.d.	Max. Pressure	Length	Striped Part No.
 Red	1/16"	0.005"	7,000psig	10' (3.05m)	<b>35714</b>
				50' (15.25m)	<b>35715</b>
 Yellow	1/16"	0.007"	7,000psig	10' (3.05m)	<b>35712</b>
				50' (15.25m)	<b>35713</b>
 Blue	1/16"	0.010"	5,000psig	10' (3.05m)	<b>35702</b>
				50' (15.25m)	<b>35703</b>
 Orange	1/16"	0.020"	5,000psig	10' (3.05m)	<b>35708</b>
				50' (15.25m)	<b>35709</b>
 Green	1/16"	0.030"	4,000psig	10' (3.05m)	<b>35710</b>
				50' (15.25m)	<b>35711</b>
 Grey	1/16"	0.040"	3,000psig	10' (3.05m)	<b>35705</b>
				50' (15.25m)	<b>35707</b>
 Black	1/16"	0.055"	1,000psig	10' (3.05m)	<b>35741</b>
				50' (15.25m)	<b>35742</b>









### Solid Color PEEK Tubing

- Entire tube is colored for faster identification



#### Solid Color PEEK Tubing

Color	o.d.	i.d.	Max. Pressure	Length	Solid Part No.
 Red	1/16"	0.005"	7,000psig	10' (3.05m)	<b>35720</b>
				50' (15.25m)	<b>35721</b>
 Yellow	1/16"	0.007"	7,000psig	10' (3.05m)	<b>35722</b>
				50' (15.25m)	<b>35723</b>
 Blue	1/16"	0.010"	5,000psig	10' (3.05m)	<b>35728</b>
				50' (15.25m)	<b>35729</b>
 Orange	1/16"	0.020"	5,000psig	10' (3.05m)	<b>35726</b>
				50' (15.25m)	<b>35727</b>
 Green	1/16"	0.030"	4,000psig	10' (3.05m)	<b>35724</b>
				50' (15.25m)	<b>35725</b>
 Natural	1/8"	0.062"	5,000psig	10' (3.05m)	<b>35716</b>
				50' (15.25m)	<b>35717</b>
	1/8"	0.080"	3,000psig	10' (3.05m)	<b>35718</b>
				50' (15.25m)	<b>35719</b>

## Flex-Connect™ PEEK Tubing




- Self-adjusting length
- Will not bend or kink
- Chemically inert and biocompatible
- Includes two 1-piece hex-head fittings

### Striped Flex-Connect™ Tubing

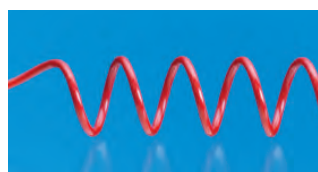
- No dye contacts fluid path



#### Striped Flex-Connect™ PEEK Tubing

Color	o.d.	i.d.	Max. Pressure	Size Range*	Striped Part No.
 Blue	1/16"	0.010"	5,000psig	2–10cm	<b>35872</b>
				5–25cm	<b>35874</b>
				10–50cm	<b>35875</b>
				15–75cm	<b>35876</b>
 Orange	1/16"	0.020"	4,000psig	2–10cm	<b>35882</b>
				5–25cm	<b>35884</b>
				10–50cm	<b>35885</b>
				15–75cm	<b>35886</b>
 Green	1/16"	0.030"	4,000psig	2–10cm	<b>35892</b>
				5–25cm	<b>35894</b>
				10–50cm	<b>35895</b>
				15–75cm	<b>35896</b>

\*Size range indicates where coil is completely retracted and pulled to a comfortable distance. Excludes 6" straight piece on each end.






### Solid Color Flex-Connect™ Tubing

- Entire tube is colored for fast identification of i.d.



#### Solid Color Flex-Connect™ PEEK Tubing

Color	o.d.	i.d.	Max. Pressure	Size Range*	Solid Part No.
 Blue	1/16"	0.010"	5,000psig	2–10cm	<b>35822</b>
				5–25cm	<b>35824</b>
				10–50cm	<b>35825</b>
				15–75cm	<b>35826</b>
 Orange	1/16"	0.020"	4,000psig	2–10cm	<b>35832</b>
				5–25cm	<b>35834</b>
				10–50cm	<b>35835</b>
				15–75cm	<b>35836</b>
 Green	1/16"	0.030"	4,000psig	2–10cm	<b>35842</b>
				5–25cm	<b>35844</b>
				10–50cm	<b>35845</b>
				15–75cm	<b>35846</b>

\*Size range indicates where coil is completely retracted and pulled to a comfortable distance. Excludes 6" straight piece on each end.



## Low-Pressure Tubing

### PTFE Tubing

- Maximum inertness



PTFE Tubing Specifications	
<b>Material:</b>	PTFE
<b>Maximum Temperature:</b>	100°C
<b>Maximum Pressure:</b>	Varies by Size, See Order Block
<b>Typical Use:</b>	Low Pressure Plumbing

### PTFE Tubing

o.d.	i.d.	Max. Pressure	Length	Part No.
1/16"	0.007"	1,600psig	10' (3.05m)	<b>35677</b>
1/16"	0.007"	1,600psig	50' (15.25m)	<b>35678</b>
1/16"	0.010"	1,500psig	10' (3.05m)	<b>20064</b>
1/16"	0.010"	1,500psig	50' (15.25m)	<b>35669</b>
1/16"	0.020"	1,200psig	10' (3.05m)	<b>20033</b>
1/16"	0.020"	1,200psig	50' (15.25m)	<b>35668</b>
1/16"	0.030"	900psig	10' (3.05m)	<b>20031</b>
1/16"	0.030"	900psig	50' (15.25m)	<b>35670</b>
1/16"	0.040"	600psig	10' (3.05m)	<b>20106</b>
1/16"	0.040"	600psig	50' (15.25m)	<b>3132</b>
1/8"	0.063"	900psig	10' (3.05m)	<b>20063</b>
1/8"	0.063"	900psig	50' (15.25m)	<b>35671</b>
1/8"	0.100"	300psig	10' (3.05m)	<b>20096</b>
1/8"	0.100"	300psig	50' (15.25m)	<b>3134</b>
0.160"	0.125"	300psig	10' (3.05m)	<b>35667</b>
0.160"	0.125"	300psig	50' (15.25m)	<b>35674</b>
1/4"	0.125"	900psig	50' (15.25m)	<b>3136</b>

### Low Permeation Tubing

- Eliminates regassing without sacrificing inertness
- Flexible, convenient, and versatile
- Easy to install and use



This low-pressure tubing has a double wall to prevent mobile phase regassing. The inert inner PTFE wall carries the mobile phase. The non-wetted outer wall is made from a translucent, flexible polymer with extremely low gas permeability. This low permeation tubing cuts regassing rates to negligible levels, while preserving PTFE's chemical resistance, visibility, and handling properties. Use with low permeation fittings kit.

### Low Permeation Tubing Specifications

<b>Material:</b>	PTFE, Proprietary Non-Wetted Outer Layer
<b>Maximum Temperature:</b>	100°C
<b>Maximum Pressure:</b>	900psig
<b>Typical Use:</b>	Low-Pressure Plumbing

### Low Permeation Tubing

o.d.	i.d.	Length	Part No.
1/8"	1.5mm	10'	<b>47100</b>
1/8"	1.5mm	50'	<b>47102</b>

### Low Permeation Fittings Kit

Description	Part No.
1/4-28 Low Permeation Fittings Kit*	<b>47120</b>

\*Includes 10 nuts, 10 ferrules, 10 inserts.

### tech tip

#### Choosing a tubing material for GC analysis.

A number of options are available for packed column tubing. The most inert material is glass, which should be used for active compounds. Glass-lined tubing and AT™ Steel provide the inert surface of glass combined with the mechanical strength of a metal column.

Metal tubing provides an economical and rugged column for suitable application. Passivated nickel tubing can frequently be used with active compounds such as phenols and amines. Stainless steel tubing is recommended for hydrocarbon, fixed gas, and solvent analyses where column inertness is less of a concern.

PTFE tubing is extremely inert, but due to temperature limitations and poor column efficiency, PTFE is generally only recommended for the analysis of corrosive gases which are too reactive for glass.

### related products

See page 75 for the Clean-cut tubing cutter designed to make clean square cuts on PEEK tubing.



### technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)  
Online: [www.discoverysciences.com](http://www.discoverysciences.com)

# Stainless Steel Tubing

## Hi-EFF™ Tubing

Hi-EFF™ grade stainless steel tubing is specially tempered for easy bending and is washed with acetone to remove any residual materials. Type 316 is recommended for plumbing LC systems.



## Stainless Steel Tubing

This stainless steel tubing is the same high quality as the Hi-EFF™ tubing grade, but has not been washed with acetone.

### Hi-EFF™ and Standard Stainless Steel Tubing Specifications

<b>Material:</b>	300 Series Stainless Steel
<b>Maximum Temperature:</b>	500°C
<b>Maximum Pressure:</b>	Varies according to i.d.
<b>Typical Use:</b>	High-Pressure Plumbing

### Stainless Steel Tubing

		o.d.	i.d.	10ft (3m)* Part No.	25ft (7.5m)* Part No.	50ft (15m)* Coil Part No.	200ft (60m)* Coil Part No.
<i>Hi-EFF™</i>	<i>Type 316 Stainless Steel</i>	1/8" (3.18mm)	0.085" (2.16mm)	—	<b>5141342</b>	<b>30109</b>	—
		1/4" (6.35mm)	0.210" (5.33mm)	—	<b>5141343</b>	<b>30309</b>	—
	<i>Type 304 Stainless Steel</i>	1/8" (3.18mm)	0.085" (2.16mm)	—	<b>5141344</b>	<b>30106</b>	—
		1/4" (6.35mm)	0.210" (5.33mm)	—	<b>5141345</b>	<b>30306</b>	—
<i>Standard</i>	<i>Type 316 Stainless Steel</i>	1/32" (0.79mm)	0.004" (0.10mm)	<b>5141386</b>	<b>5141321</b>	<b>30212</b>	—
		1/16" (1.59mm)	0.007" (0.18mm)	<b>5141385</b>	<b>5141322</b>	<b>30142</b>	—
			0.010" (0.25mm)	<b>5141384</b>	<b>5141323</b>	<b>3005</b>	<b>30052</b>
			0.020" (0.51mm)	<b>5141383</b>	<b>5141324</b>	<b>3002</b>	<b>300220</b>
			0.030" (0.76mm)	<b>5141382</b>	<b>5141325</b>	<b>3000</b>	<b>300020</b>
			0.040" (1.02mm)	<b>5141381</b>	<b>5141326</b>	<b>3003</b>	—
	<i>Type 304 Stainless Steel</i>		0.050" (1.27mm)	<b>5141380</b>	<b>5141327</b>	<b>3004</b>	—
		1/8" (3.18mm)	0.085" (2.16mm)	—	<b>5141410</b>	<b>3010</b>	<b>30108</b>
		1/4" (6.35mm)	0.210" (5.33mm)	—	<b>5141412</b>	<b>3030</b>	—

\*Meters based on closest estimate.

## AT™ Steel — Activity Tested Steel Tubing

*Delivers the Strength of Stainless Steel and the Inertness of Deactivated Fused Silica*

- Flexible and strong
- Maximum temperature limit of 340°C–350°C

A combination of chemical vapor deposition techniques and silicone chemistries transforms durable stainless steel tubing into a chromatographically inert material. AT™ Steel activity tested steel tubing is suitable for sample loops, transfer lines and capillary and packed GC columns.

AT™ steel tubing may be cut with standard tubing cutters or high speed wheel cutters and can be rinsed with common solvents to remove particulates and contamination that have built up during use.



### AT™ Steel Tubing

i.d.	6ft Length Part No.	25ft Length Part No.	50ft Length Part No.	100ft Length Part No.
<i>1/16" o.d. Tubing</i>				
0.010"	<b>11060</b>	<b>11061</b>	<b>11062</b>	<b>11063</b>
0.020"	<b>11064</b>	<b>11065</b>	<b>11066</b>	<b>11067</b>
0.030"	<b>11068</b>	<b>11069</b>	<b>11070</b>	<b>11071</b>
0.040"	<b>11072</b>	<b>11073</b>	<b>11074</b>	—
<i>1/8" o.d. Tubing</i>				
0.085"	<b>11076</b>	<b>11077</b>	<b>11078</b>	—

## Straight Stainless Steel Tubing

- Type 304 stainless steel
- 6ft or 10ft lengths



### Straight Stainless Steel Tubing

o.d.	i.d.	Length	Qty.	Part No.
1/8" (3.18mm)	0.085" (2.16mm)	6ft	10	<b>30106ST</b>
1/8" (3.18mm)	0.085" (2.16mm)	10ft	10	<b>301010ST</b>
1/4" (6.35mm)	0.210" (5.33mm)	6ft	10	<b>30306ST</b>
1/4" (6.35mm)	0.210" (5.33mm)	10ft	10	<b>303010ST</b>

## PTFE-Coated Stainless Steel Tubing

- Must be preconditioned at 250°C for three hours



### PTFE-Coated Stainless Steel Tubing

o.d.	i.d.	Length	Part No.
1/8" (3.18mm)	0.085" (2.16mm)	50ft	<b>3142</b>
1/4" (6.35mm)	0.210" (5.33mm)	50ft	<b>3144</b>

## Stainless Steel Tubing

### Glass-Lined Stainless Steel Tubing (GLT)

- Flow lines for corrosives
- GC/MS interfaces
- Capillary column connections



#### Glass-Lined Stainless Steel Tubing

o.d.	i.d.	Length	Part No.
1/16" (1.59mm)	0.5mm	180cm	<b>3164</b>
1/4" (6.35mm)	4.0mm	180cm	<b>3149</b>

### PTFE-Lined Stainless Steel Tubing

- Ideal for use with reactive chemicals and for trace quantities of water
- Use with PTFE ferrules



#### PTFE-Lined Stainless Steel Tubing

o.d.	i.d.	Length	Part No.
1/8" (3.18mm)	0.070" (1.78mm)	6ft	<b>3152</b>
1/8" (3.18mm)	0.070" (1.78mm)	10ft	<b>3154</b>
1/4" (6.35mm)	0.180" (4.57mm)	6ft	<b>3156</b>

## Metal Tubing

### Aluminum Tubing

- Economical choice for GC gas lines



#### Aluminum Tubing

o.d.	i.d.	Length	Part No.
1/8" (3.18mm)	0.065" (1.65mm)	50ft	<b>3090</b>
3/16" (4.76mm)	0.128" (3.25mm)	50ft	<b>3100</b>
1/4" (6.35mm)	0.190" (4.83mm)	50ft	<b>3110</b>
3/8" (9.53mm)	0.315" (8.00mm)	50ft	<b>3120</b>

## Polymeric Tubing

- Maximum inertness



### PFA (Perfluoroalkoxy) Tubing

#### PFA (Perfluoroalkoxy) Tubing

o.d.	i.d.	Length	Part No.
1/16" (1.59mm)	0.030" (0.76mm)	25ft	<b>45734</b>
1/8" (3.18mm)	0.062" (1.57mm)	25ft	<b>45735</b>
1/4" (6.35mm)	0.156" (3.96mm)	25ft	<b>45736</b>

### FEP (Fluorinated Ethylene Polypropylene) Tubing

#### FEP (Fluorinated Ethylene Polypropylene) Tubing

o.d.	i.d.	Length	Part No.
1/16" (1.59mm)	0.030" (0.76mm)	25ft	<b>45739</b>
1/8" (3.18mm)	0.062" (1.57mm)	25ft	<b>45740</b>
1/4" (6.35mm)	0.156" (3.96mm)	25ft	<b>45741</b>

### Polypropylene Tubing

#### Polypropylene Tubing

o.d.	i.d.	Length	Part No.
1/8" (3.18mm)	0.080" (2.03mm)	50ft	<b>3203</b>
1/8" (3.18mm)	0.080" (2.03mm)	100ft	<b>3201</b>

### Copper Tubing

- Economical choice for GC gas lines



#### Copper Tubing

o.d.	i.d.	Length	Part No.
1/8" (3.18mm)	0.065" (1.65mm)	50ft	<b>3040</b>
3/16" (4.76mm)	0.128" (3.25mm)	50ft	<b>30509</b>
1/4" (6.35mm)	0.190" (4.83mm)	50ft	<b>30609</b>
3/8" (9.53mm)	0.315" (8.00mm)	50ft	<b>30709</b>

### Nickel Tubing

- Pure nickel 200, more inert than stainless steel
- Acid washed and rinsed for additional inertness



#### Nickel Tubing

o.d.	i.d.	Part No.
<i>50-Foot Coil</i>		
1/16" (1.59mm)	0.040" (1.02mm)	<b>3085</b>
1/8" (3.18mm)	0.083" (2.11mm)	<b>3080</b>



#### related products

##### Need fittings?

See pages 47–48 for GC fittings.

#### technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)  
Online: [www.discoverysciences.com](http://www.discoverysciences.com)

## PEEKsil™ Tubing

- Inert fused silica bonded to PEEK
- Square cut and polished tubing ends for zero dead volume connections
- Ideal for plumbing micro, capillary and nano LC systems



SGE's PEEKsil™ tubing maintains the easy handling and convenience of PEEK tubing, but offers the tight i.d. tolerances that can only be offered with fused silica. Each PEEKsil™ tubing end is cut to an exact 90° angle and polished smooth to ensure a true zero dead volume connection. Tubing is color-coded to identify i.d. It is the ideal choice for plumbing capillary and micro LC systems where conventional 1/16" or 1/32" fittings are used.

PEEKsil™ Tubing Specifications	
<b>Material:</b>	Fused Silica-Lined PEEK
<b>Maximum Temperature:</b>	100°C
<b>Typical Use:</b>	Plumbing Capillary LC Systems
<b>Maximum Pressure:</b>	15,000psig

### PEEKsil™ Tubing, 1/16 o.d.

Color	i.d. (mm)	Length			
		10cm 5/pk Part No.	15cm 5/pk Part No.	20cm 5/pk Part No.	50cm 2/pk Part No.
Orange	0.025	226	227	228	229
Natural	0.050	252	254	253	250
Black	0.075	291	292	293	294
Red	0.100	302	304	303	300
Purple	0.150	231	232	233	234
Yellow	0.175	352	354	353	350
Blue	0.200	403	406	404	401
Grey	0.300	416	417	418	419

## Flex-wrap Tubing Wrap

- Holds parallel tubing or wiring together
- Ideal for gradient pumps or purging-gas lines
- Chemically inert 100% PTFE



### Flex-wrap Tubing Wrap, 10ft

Color	1/8"–1/2" Part No.
Blue	35913
Orange	35914
Black	35916
White	35917

### related products

Need high-pressure fittings?  
See pages 26–27.



## Tubing Cutters

### Rotary Tubing Cutter

- Cuts 1/32" to 1/8" o.d. tubing burr-free
- Leaves tubing i.d. open
- Works with metal and glass-lined tubing



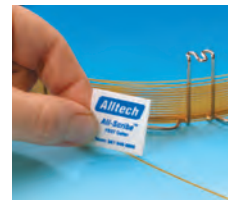
### Plier-type Tubing Cutters

- Cuts 1/16" o.d. tubing
- Ideal for cutting tubing in tight places
- Cuts metal or plastic tubing



### Ceramic Fused Silica Cutter

- Cleanly cuts fused silica tubing
- Small enough to keep handy in your pocket
- Just score and snap



### Electric Tubing Cutter

- Cut 1/16", 1/8" and 1/4" o.d. tubings with internal diameters as small as 0.008"
- Requires no lubricant or cutting fluid
- Assures square and burr-free cuts



### Clean-cut Tubing Cutter

- Use with PTFE, ETFE polymer, polyolefin, PEEK
- Make clean, square cuts without deforming inner diameters
- Cuts 1/32" to 1/8" o.d.



### Plastic Tubing Cutter

- Ideal for PEEK, ETFE polymer and other plastic tubing
- Cuts any size up to 1/4" o.d.



### Tubing Cutters

Description	Qty.	Part No.
<i>Rotary Tubing Cutter</i>	ea	3165
Replacement Cutting Wheels	3	3167
<i>Plier-Type Tubing Cutter</i>	ea	3169
<i>Ceramic Fused Silica Cutter</i>	5	3194
<i>Electric Tubing Cutter 110–120/220–240VAC, 50/60Hz</i>	ea	10-0200
<i>Replacement Parts and Accessories</i>		
Dressing Tool for 1/8" and 1/4" o.d. Tubing	ea	10-0118
Replacement Cutting Wheels	3	10-0124
Replacement Dressing Tool for 1/16" o.d. Tubing	ea	10-0116
<i>Clean-Cut™ Tubing Cutter</i>	ea	35902
Replacement Blade	ea	35903
<i>Plastic Tubing Cutter</i>	ea	3206
Replacement Blade	ea	3214

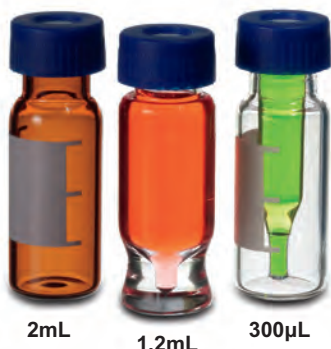
# LC Certified Vials

We understand how a bad vial can disrupt productivity in your lab. It is for this reason that we set out to deliver a vial that can give peace of mind and help you stay focused on your results.

We trace each piece of the vial, cap and septa manufacturing to ensure they are of the highest grade. The manufacturing process is constantly monitored to maintain a contaminant free environment all the way through to the kit packaging.

### Benefits

- Helps ensure peaks are from your sample, not your vial
- Designed to high tolerances for optimal functioning



### LC Certified 12x32mm Screw Thread Autosampler Vial Kit with Blue 9mm Bonded PTFE/Silicone Cap, 100/pk

Description	Non-Slit Septa Part No.	Pre-Slit Septa Part No.
2mL Clear with Marking Spot	8625312	8625313
2mL Amber with Marking Spot	8625314	8625315
1.2mL Ultra Recovery Clear*	—	8625341
300µL Limited Volume Fused Glass Insert Clear with Marking Spot	8625342	8625343

\*For precision extractions with less than 2µL dead volume.

#### Instrument Compatibility\*

Agilent	Gilson®	Shimadzu®	Varian®
Beckman®	Hitachi®	Spark®	Waters®
Dynatech®	PerkinElmer™	Thermo®	

\*Using 12x32mm autosampler vials.

### Certificate of Analysis

- Material specifications as set by international standards (USP, EP, ASTM, ISO)
- HPLC test data from batch tested assembled vials & caps

**Grace Davison Discovery Sciences**  
**Vial Certificate of Analysis**

7500 Grace Drive • Columbia, MD 21044, U.S.A. • U.S. Toll Free: 888.395.9294 • International Tel: 847.282.2100  
Fax: 847.948.1078 • Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com) • Web: [www.discoverysciences.com](http://www.discoverysciences.com)

GRACE

<b>Part Number:</b>	Grace Quality
<b>Description:</b>	ISO 9001
<b>Lot Number:</b>	14001
	13485
	cGMP compliant

---

**Glass Material**  
The glass below is certified to meet the standards of the USP XXVI, The National Formulary XXII for Type I, II, & III glass, under "Physical Test-Glass Containers", as well as the ASTM E-438 specification for Type I, II, & III glass A & B. Clear vials are Type 33 expansion glass, Amber vials are Type 51.

Dimensional Characteristics of Vial	
Height	32mm +/-0.5mm
I.D. Neck*	6.045mm +/-0.255mm
O.D. at Body	11.65mm +/-0.25mm

\*Not applicable to fused inserts

Cap Septum	
Material	PTFE / Silicone
Dimension	9mm
Physical Test	Seal and Bond Strength Test
Chemical Test	Level II GC headspace

---

HPLC Chemical Test of Vial and Cap Assembly	
Tested & Conforms to Grace Method	105

Testing performed by HPLC with a Grace VisionHT™ C18 5µm Column (Part 5151993) Using the proprietary protocol of Grace Method 105 (75/25/0.1-ACN/H2O/TFA)

QC Approval: \_\_\_\_\_  
Date: \_\_\_\_\_

F408 01/10

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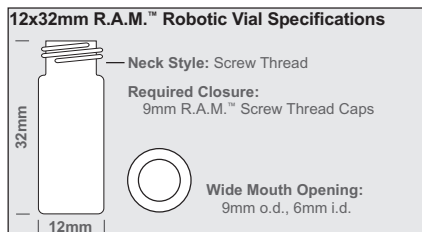
vials

### technical assistance

Contact Tech Support: Email: [discoverysciences@grace.com](mailto:discoverysciences@grace.com)  
Online: [www.discoverysciences.com](http://www.discoverysciences.com)

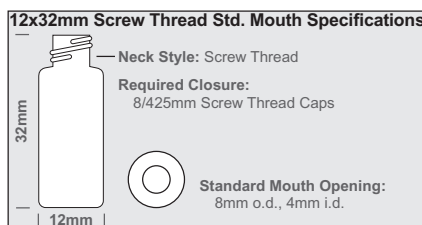
# Screw Thread Vials

- Variety of styles for virtually every autosampler
- Economical kits simplify ordering



## 12x32mm R.A.M.™ Robotic Screw Thread Vials, 100/pk

Description	Part No.
<i>Vials</i>	
Clear	95386
Amber	95388
Clear with White Graduated Marking Spot	88540
Amber with White Graduated Marking Spot	95531
<i>Limited Volume Vials</i>	
100µL Polypropylene Vials	90273
100µL PMP (TPX) Vials	95096
<i>Vial Kits</i>	
Clear Vials, 9mm Cap, PTFE/Silicone Septa	89145
<i>9mm R.A.M.™ Open-Hole Caps</i>	
Black Cap, PTFE/Silicone Septa	95324
Blue Cap, PTFE/Silicone Septa	95360
Blue Cap, PTFE/Butyl Septa	95308
Black Cap, PTFE/Silicone/PTFE Septa	95328
<i>Septa for 9mm R.A.M.™ Caps</i>	
PTFE/Silicone—40mil	88705

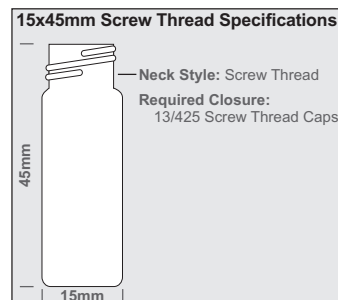


## 12x32mm Screw Thread Standard Mouth Vials, 100/pk

Description	Part No.
<i>Vials</i>	
Clear	95191
Amber	95194
Clear with White Graduated Marking Spot	98068
Amber with White Graduated Marking Spot	98078
<i>Limited Volume Vials</i>	
1.1mL Glass Tapered Bottom, Requires Sleeve	74135
100µL Polypropylene Vials	12962
100µL PMP (TPX) Microvials	12970
200µL Glass Insert in Clear Plastic Vial	98220
<i>Vial Kits</i>	
Clear Vials, Black 8/425 Caps, PTFE Septa—10mil	98533
Clear Vials, Black 8/425 Caps, PTFE/Silicone Septa—45mil	95175
Amber Vials, Black 8/425 Caps, PTFE/Silicone Septa—45mil	95179
Clear Vials, Flush-Fit 8/425 Caps, PTFE/Silicone Septa	895175
<i>Preassembled 8/425 Polypropylene Open-Hole Caps</i>	
Black Flush-Fit Cap, PTFE/Silicone Septa	980611
Black Cap, PTFE/Silicone Septa	98061
Black Cap, PTFE/Silicone Septa with Slit	97018
Black Cap, Unlined	73044
<i>Solid 8/425 Top Caps</i>	
Black Polypropylene Cap, PTFE Septa	98063
<i>Septa for 8/425 Caps</i>	
Red PTFE/White Silicone—5/55mil	73048
PTFE/Silicone with Slit—5/40mil	98088

## 12x32mm Screw Thread Wide Mouth Vials, 100/pk

Description	Part No.
<i>Vials</i>	
Clear	98133
Amber	98135
Clear with White Graduated Marking Spot	98291
Amber with White Graduated Marking Spot	98622
<i>Limited Volume Vials</i>	
500µL Polypropylene Vials	98310
750µL Polypropylene Vials	98099
<i>Vial Kits</i>	
Clear Vials, Black 10/425 Caps, PTFE Septa	98891
Clear Vials, Black 10/425 Caps, PTFE/Silicone Septa	98893
Amber Vials, Black 10/425 Caps, PTFE Septa	98274
Amber Vials, Black 10/425 Caps, PTFE/Silicone Septa	98281
<i>Preassembled 10/425 Open-Hole Caps</i>	
Black Cap, PTFE/Silicone Septa with Slit	97013
Black Cap, PTFE/Silicone Septa	5134180
Black Cap, Bonded Interseal PTFE/Silicone Septa	70411
<i>Solid Polypropylene 10/425 Top Caps with Septa</i>	
Black Cap, PTFE Septa	98124
<i>Septa for 10/425 Caps</i>	
Red PTFE/White Silicone—5/55mil	98141
PTFE/Silicone with Slit—5/55mil	98021



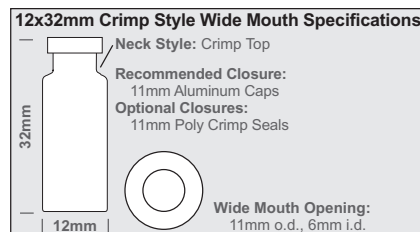
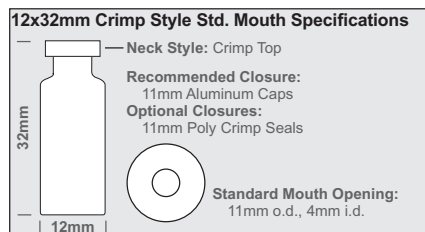
## 15x45mm Screw Thread Vials, 100/pk

Description	Part No.
<i>Vials</i>	
Clear	98110
Amber	98120
Clear with White Graduated Marking Spot	97084
<i>Limited Volume Vials</i>	
2.5mL Polypropylene Vials	98091
300µL Plastic Vial with Glass Insert	98251
<i>Vial Kits</i>	
Clear Vials, Open-Hole Caps, PTFE Septa—10mil	98000
Amber Vials, Open-Hole Caps, PTFE Septa—10mil	98004
Clear Vials, Open-Hole Caps, PTFE/Silicone Septa—10/50mil	98008
Amber Vials, Open-Hole Caps, PTFE/Silicone Septa—10/50mil	98014
<i>Preassembled 13/425 Open-Hole Caps</i>	
Black Cap, PTFE/Silicone Septa—65mil	98610
Black Cap, PTFE/Silicone Septa with Slit—60mil	97017
<i>Solid 13/425 Top Caps with Septa</i>	
Solid Black Cap with PTFE/F217 Septa	98430
Solid Green Phenolic Cap with PTFE Septa	98209
Solid White Cap with Interseal PTFE/Silicone Bonded Septa	99031
<i>Septa for 13/425 Caps</i>	
Red PTFE/Silicone—5/55mil	98846
PTFE/White Silicone—10/90mil	98219

vials

# Crimp Top Vials

- Work with most autosamplers
- Variety of closure styles
- Economical kits simplify ordering



## 12x32mm Crimp Style Standard Mouth Vials, 100/pk

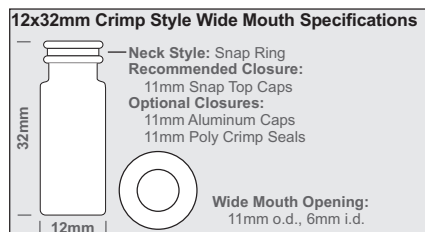
Description	Part No.
<i>Vials</i>	
Clear	66002
Amber	95221
Clear, White Graduated Marking Spot	98073
Amber, White Graduated Marking Spot	98077
<i>Limited Volume Vials</i>	
300µL Polypropylene Microvial	12990
<i>Vial Kits</i>	
Clear Vials, 11mm Aluminum Seals, PTFE/Butyl Septa	95161
Amber Vials, 11mm Aluminum Seals, PTFE/Silicone Septa	98368
<i>11mm Aluminum Caps*</i>	
Silver Cap, PTFE/Silicone Septa—3/37mil	98740
Silver Cap, PTFE/Silicone/PTFE Septa—2/36/2mil	94855
Silver Cap, PTFE/Red Rubber Septa—40mil	8610761
Red Cap, PTFE/Red Rubber Septa—40mil	98051
Blue Cap, PTFE/Red Rubber Septa—40mil	98053
<i>Septa for 11mm Aluminum Seals</i>	
PTFE/Silicone—5/55mil	98009

\*Caps can also be used with 12x32mm Crimp Style Wide Mouth Vials.

## 12x32mm Crimp Style Wide Mouth Vials, 100/pk

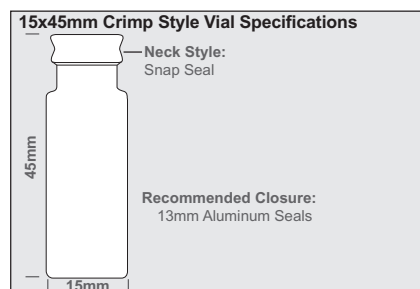
Description	Part No.
<i>Vials</i>	
Clear	98213
Amber	98245
Clear, White Graduated Marking Spot	98001
Amber, White Graduated Marking Spot	98003
<i>Limited Volume Vials</i>	
1.1mL Glass Tapered Bottom Vial, Requires Sleeve	74145
300µL Clear Glass LVI Vial, White Marking Spot	95240
300µL Amber Glass LVI Vial, White Marking Spot	95268
<i>Vial Kits</i>	
Clear Vials, 11mm Aluminum Seals, PTFE/Silicone Septa	98419
Amber Vials, 11mm Aluminum Seals, PTFE/Silicone Septa	98434
<i>11mm Poly Crimp Seals*</i>	
Clear Seal, PTFE/Silicone Septa with Starburst	95335
Clear Seal, PTFE/Silicone Septa	95234
Red Seal, PTFE/Silicone Septa	95293
Clear Seal, PTFE Septa—10mil	95230
Blue Seal, PTFE Septa—10mil	95235

\*Seals can also be used with 12x32mm Crimp Style Standard Mouth Vials.



## 12x32mm Snap Ring Style Wide Mouth Vials, 100/pk

Description	Part No.
<i>Vials</i>	
Clear	98030
Amber	98095
<i>Limited Volume Vials</i>	
300µL Glass Insert in Clear Glass Vial	98086
750µL Polypropylene Vial	98050
750µL TPX (PMP) Vial	72015
500µL Polypropylene Vial	98842
100µL Polypropylene Vial	12960
100µL TPX (PMP) Microvial	12968
<i>Vial Kits</i>	
Clear Vials, 11mm Snap Top Caps, PTFE/Silicone Septa with Split	98465
<i>11mm Snap Top Caps</i>	
Clear Cap, Polyethylene Septa—10mil	98170
Clear Cap, PTFE/Silicone Septa—10mil	98034
Clear Cap, PTFE/Silicone Septa with Slit	98168
Clear Cap, PTFE/Silicone Septa with Starburst	98252
Clear Cap, PTFE/Red Rubber Septa—40mil	98038
Clear Cap, PTFE Septa—10mil	98032



## 15x45mm Snap Seal Crimp Style Vials, 100/pk

Description	Part No.
<i>Vials</i>	
Clear	98040
Amber	98097
<i>13mm Aluminum Seals</i>	
Silver Seal, PTFE/Silicone Septa	98283
Silver Seal, PTFE/Silicone/PTFE Septa	98596
Silver Seal, White PTFE/Butyl Septa	98776
Gold Seal, Pharma-Fix Septa	6687
<i>13mm Septa for Aluminum Seals</i>	
PTFE/Silicone—10/90mil	98793

### more info

Looking for a hand crimper? Visit our website for crimpers, decappers and other accessories.



## Headspace Vials

- Crimp top and screw thread styles available
- Choice of vial sizes from 5mL to 27mL



Flat Top,  
Flat Bottom,  
20mL

Flat Top,  
Round Bottom,  
20mL

Bevel Top,  
Flat Bottom,  
20mL



Bevel Top,  
Round Bottom,  
20mL

Screw Top,  
Flat Bottom,  
20mL

### Headspace Vials

Description	100/pk Part No.
<i>Flat Top, Flat Bottom, Clear Glass, Long Neck</i>	
22.5x75.5mm, 20mL Vials	6636
22.5x46mm, 10mL Vials	6655
<i>Flat Top, Round Bottom, Clear Glass</i>	
22.5x75.5mm, 20mL Vials for CTC PAL, Long Neck	97188
22.5x75.5mm, 20mL Vials for SPME**	99097
<i>Bevel Top, Flat Bottom, Clear Glass</i>	
23x75mm, 20mL Vials	99136
23x46mm, 10mL Vials	98792
22x38mm, 6mL Vials	99132
<i>Bevel Top, Round Bottom, Clear Glass</i>	
23x75.5mm, 20mL Vials	98788
22x38.25mm, 5mL Vials	99056
<i>Shimadzu® Headspace Vials</i>	
30x60mm, 27mL, Clear Vials	98093
<i>Tekmar® Headspace Vials</i>	
18x50mm, 9mL, Clear Vials, 125/pk*	98098*
18x65mm, 12mL, Clear Vials, 125/pk*	98104*
<i>Screw Thread Headspace Vials for CTC PAL***</i>	
20mL Clear	99065
20mL Amber	99068
10mL Clear	99070
10mL Amber	99078

\*Correct quantity specified in description.

\*\*SPME Vial has thicker glass top so cap with thinner septum will crimp tightly.

\*\*\*New units only. Older models have weak magnets.

## 20mm Seals and Septa for Headspace Vials

- 20mm crimp top seals with assembled liners
- Magnetic seals to allow automatic pick up
- Polyethylene snap caps for use without crimping tools

### 20mm Polyethylene Seal



### Types of Aluminum Seals



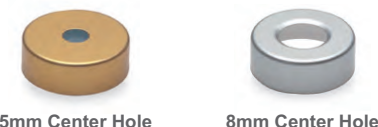
Center Hole

Pressure  
Release (PR)

Center Tear-Off

Tear-Away

### Magnetic Caps



5mm Center Hole

8mm Center Hole

### 20mm Seals and Septa for Headspace Vials

Description	Qty.	Part No.
<i>Polyethylene Seal</i>		
with PTFE/Silicone Septum—5/45mil	100	95586
<i>Aluminum Seals, Open Center Hole with Septa</i>		
Seal, PTFE/Silicone Septum—10/50mil	100	95756
Seal, PTFE/Silicone Septum—125mil	100	95587
Seal, PTFE/Chlorobutyl Septum	100	95584
Seal, Aluminum/Silicone Septum	100	98687
Seal, Black Butyl Rubber Septum	100	98683
<i>Specialty Seals with Septa</i>		
Seal with Pharma-Fix Septum	100	8611035
PR Seal, PTFE/Silicone Septum—118mil	100	95581
PR Seal, PTFE/Gray Butyl Septum—118mil	100	95590
Magnetic, 5mm Center, PTFE/Silicone Septum—118mil	100	95594
Magnetic, 8mm Center, PTFE/Silicone Septum—118mil	100	95139
Magnetic, 5mm Center, PTFE/Gray Butyl Septum—118mil	100	95592
Magnetic Seal for SPME Vial, PTFE/Silicone Septum 1.5mm	100	99102
<i>Aluminum Seals without Septa</i>		
Standard Seals, 10mm Center Hole	100	6638
Tear-Away Seals, Silver	144	66501
Tear-Off Seals, Gold	100	8623952
Tear-Off Seals, Green	100	8623953
Tear-Off Seals, Red	100	8623951
Tear-Off Seals, Blue	100	8623955
Magnetic Tinplate Seal, 5mm Center	100	98532
<i>Septa for 20mm Aluminum Seals</i>		
Red Silicone Septum	72	98536
PTFE/Silicone Septum—10/90mil	72	95313
PTFE/Gray Butyl Septum	72	98540
<i>Stoppers for 20mm Crimp Top Vials</i>		
Natural Rubber Stoppers	72	95304
Butyl Rubber Stoppers	72	95305
<i>Magnetic Screw Thread Caps with Septa for Screw Thread Headspace Vials</i>		
White PTFE/Blue Silicone Septum, 1.3mm	100	99071
PTFE/Red Butyl Septum, 1.6mm	100	99073
Blue PTFE/White Silicone Septum, 1.5mm	100	99076



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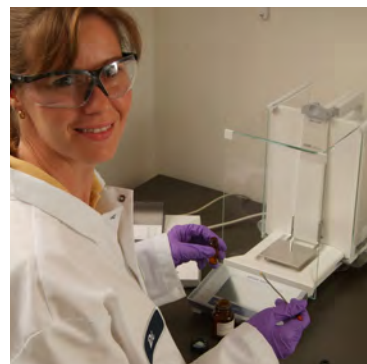
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