Prep | Flash | TLC

Ako nás možno kontaktovať:

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Preparative Chromatography Introduction

Grace® Key Column Families

Scalable Solutions: Silica and Hardware

Grace, the foremost name in silica material science, manufactures a range of completely scaleable preparative chromatography columns. To help select the appropriate column for your application, we describe key column families and highlight unique phases within these families. Each column family highlighted is also scalable to bulk media and available in ton quantities for process scale applications.

Grace's silica based media is packed in proprietary column hardware that extends media lifetime and ensures high column efficiencies at the preparative scale. An overview of preparative column hardware can be found on pages 150–151.

GraceAlpha™

A New Silica Generation

GraceAlpha™ combines increased column efficiencies and resolution with high loading capacity. A new silica (patent pending) makes this possible by combining a high-porosity surface, with a dense core, increasing mass transfer while yielding a mechanically robust particle.

Applications: Peptides and small molecules (<2000 molecular weight)

Differentiated Phases: C18, C8, and Silica

Specifications: High purity spherical silica, monomerically bonded, endcapped, 120Å pores

Formats: Analytical, Prep, Bulk Media

Vydac® MS

The best Vydac® media from the leader in peptide and protein separations for over twenty-five years

Vydac® MS columns provide unique selectivity and exceptional protein recovery. Higher recoveries and yield under overloaded preparative conditions makes this column the leader in preparative reversed-phase protein purifications.

Applications: Large molecules and proteins (>2000 molecular weight)

Differentiated Phases: C18, C8, and C4

Specifications: Spheroidal silica, polymerically and monomerically bonded, endcapped, 300Å pore size

Formats: Capillary, LC/MS, Expedite™, Rocket™, Solvent-Reducer, Analytical, Prep, Bulk Media

Column Packing and Operation

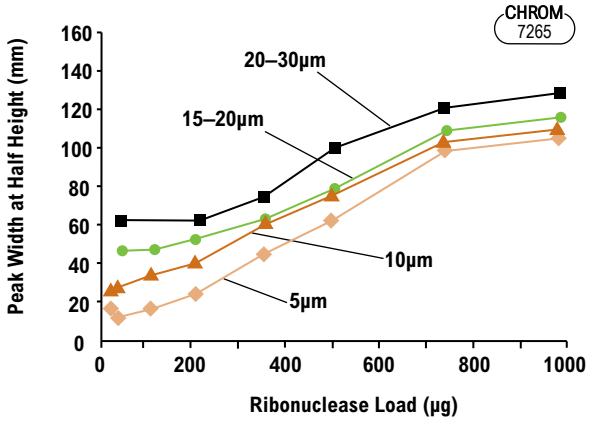
It is generally accepted that the most reliable packing method for high-performance preparative columns involve axial compression of the adsorbent slurry in the column by a sliding piston driven by hydraulic or pneumatic force. However, reliable performance and maximum column life are obtained only if axial compression force is maintained continuously on the column bed during use. The patented MODcol® Spring™ Column and MultiPacker® instrument now make it easy and convenient for scientists to reproducibly pack any media in a completely portable dynamic axial compression column.

Adsorbent Particle Sizes

Because small-diameter narrow-particle-range adsorbents generally are expensive, it is more economical to use less expensive larger diameter materials in preparative columns. This is often possible because the objectives of preparative separations differ from those of analytical separations. Speed and sensitivity may be less important than product purity in preparative chromatography. This allows preparative columns to be operated at lower flow rates with gradient profiles altered in order to compensate for the less efficient mass transfer of larger adsorbent particles. To simplify method development and scale-up, Grace provides a range of adsorbent sizes and grades with identical bonded-phase chemistry.

Protein Loading Capacity of RP-HPLC Materials of Different Particle Size

Although peak widths are much narrower with small particle materials at low sample loads, there is little difference in peak widths at high loads, where the column is "overloaded", allowing larger particles to be used with minimal decrease in performance.



Column Materials: Vydac® 214TP, 5µm; Vydac® 214TP, 10µm; Vydac® 214TP, 15–20µm; Vydac® 214TP, 20–30µm

Eluent: 24–95% ACN in 0.1% aqueous TFA over 30min at 1.5mL/min

Protein: Ribonuclease

Preparative Chromatography Introduction

Preparative Scale Up

Step 1: Method Optimization

The analytical method is optimized to increase the alpha and achieve maximum loadability. The most common ways to optimize the method are through altering selectivity by mobile phase manipulation or by altering the stationary phase.

Step 2: Loading Study

Once the analytical method is developed the method loadability should be tested to determine the capacity of the stationary phase. The sample load will be determined by the complexity of the sample mixture as well as the stationary phase being used.

Step 3: Mass Determination

The total mass that is needed from the purification should be determined prior to starting the campaign. The total mass needed can be used to balance the necessary throughput, purity, and yield required from the separation.

Step 4: The Scale-up Factor

The column size needed for the purification can be calculated based on the output requirements.

D = diameter L = length

$$Load_{final} = Load_{initial} \times \frac{(D_{final})^2 L_{final}}{(D_{initial})^2 L_{initial}}$$

The sample load scale-up equation determines the loading capacity of the larger preparative column from the loading capacity of the analytical column.

Step 5: Linear Velocity

When the column dimensions are changed to optimize a separation, or to scale a separation to a preparative or narrow-bore application, the mobile phase flow rate should be adjusted proportionally to cross-sectional area of the column to maintain consistent linear velocity and retention times. See table below for common flow rate conversions (**Table 1**).

$$Flow\ Rate_{final} = Flow\ Rate_{initial} \times \frac{(D_{final})^2}{(D_{initial})^2}$$

Step 6: Run Time and Gradient

Run Time (prep) = Run Time (analytical) x L (analytical)/L (prep)

The run time determined by the equation can be used to predict the elution time for the compound of interest. To retain the resolution obtained on an analytical column while increasing column diameter, the gradient shape must be maintained by keeping the ratio of the gradient volume to the column volume constant.

Table 1: Common Linear Scale-up Velocity Equivalencies

Equivalent Linear Velocity Table Relative to 4.6mm i.d. Flow Rates								
Column Diameter (mm i.d.)	1.0	2.1	4.6	10.0	21.5	25	50	100
Equivalent Flows (mL/min)	0.047	0.208	1.0	4.7	21.8	29.5	118	473
Equivalent Flows (mL/min)	0.095	0.416	2.0	9.4	43.6	59.0	236	946
Equivalent Flows (mL/min)	0.142	0.625	3.0	14.1	65.4	88.5	354	1,419

related products
For analytical HPLC columns,
see pages 24–110.

7110

related products
For flash cartridges,
see pages 184–187.


7278

Preparative Column Hardware

Grace offers a variety of column formats to provide the best solution at each stage of scale-up. All of our columns employ radial flow slots to distribute sample and mobile phase evenly over the head of the column for sharp, narrow peaks. Each column is constructed with 316SS, is rated to 2000psig and uses inert PTFE o-rings and seals.

Unique radial flow slot design.

Preparative Column Hardware

Column Name	Available Inner Diameters	Attributes	
Prep Guard Column	7mm	• Direct connect to Alltech® brand columns	
Prep Guard Cartridge 	10, 20, 30mm	• Holder and inexpensive replaceable cartridge protects and extends column lifetime	
Threaded Column	7, 10, 22mm	• Packed under high pressure for high efficiency • Inexpensive and disposable	
Flanged Column	25, 30, 50, 100mm	• Good flow distribution for excellent peak shape • Robust material of construction to enable repacking	
Spring™ Column 	25, 50, 100mm	• Dynamic axial compression for extended column lifetime • High efficiency axial packing • Easily repacked	
Axial SFC Column	25, 50mm	• Rated to 5000psig for use with SFC • High efficiency axial packing • Easily repacked	

tech tip

30mm i.d. guards can be used with column i.d.s up to 50mm when packed with a larger particle size than the column being protected.

related products

Large process scale columns (DAC and flanged) up to 1 meter i.d. are available. See Peak Biotech columns on page 171 for more information.

Spring™ Column Overview

best seller

Dynamic Axial Compression Column

- Continuous axial compression prevents void formation, assures long column life
- Use anywhere, just like a standard HPLC column
- Packed under axial compression for high efficiency

The World's Most Innovative Preparative Column

Inside every Spring™ Column unit there is a mechanical spring that stores energy, maintaining axial compression force on the packed bed. This patented technology is the only mobile dynamic axial compression column available that prevents void formation. (U.S. Patents No. 5893971, 5951873, 6036855).

Spring™ Columns are available pre-packed with most Grace® adsorbents. Spring™ Column hardware assures the longest column life and the best performance for your prepacked preparative column needs.

Grace® Multipacker® packing stations together with empty Spring™ Column hardware provide the option of packing your own Spring™ Column units in house, with any high-performance preparative adsorbent of your choice. Multipacker® stations are surprisingly affordable when compared to other axial compression packing systems and have the advantage of not requiring a dedicated packing station for each preparative HPLC location.

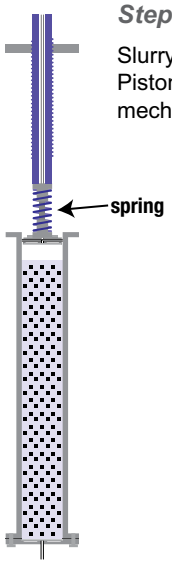
related product

Experience the cost savings and convenience of packing your own Spring™ Columns with the Multipacker® instrument. See pages 172 and 173.

more info

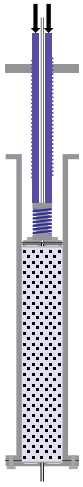
For Spring™ Column ordering information, see pages 162–165.

Spring™ Column Packing



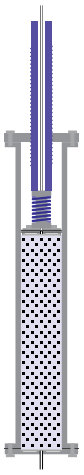
Step 1

Slurry in column. Piston and compression mechanism in place.



Step 2

Apply axial compression force. Force compresses spring and moves piston to pack adsorbent bed.



Step 3

Lock compression mechanism. Remove external force. Spring remains compressed, maintains axial force on piston and packed bed.

GraceAlpha™ Columns

new

A New Silica Generation

- High-porosity surface increases mass transfer and results in increased column efficiencies and loading capacity
- Dense core and highly spherical shape yield mechanically robust particle
- Proprietary bonding technology gives unique selectivity and increased resolution

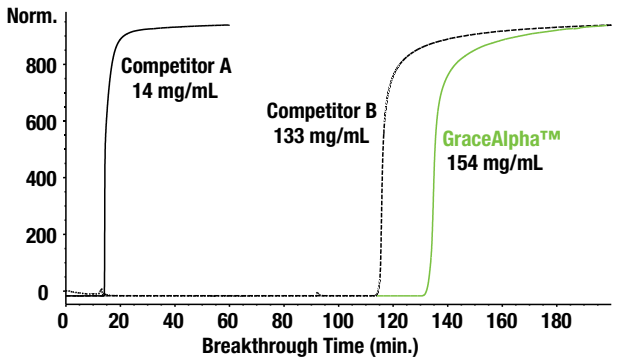
GraceAlpha™ Performance

Outstanding Loading Capacity

GraceAlpha™ silica has a high-porosity exterior yielding higher loading capacities than conventional silicas.

Insulin Frontal Loading Capacity on C8 Columns with 0.1% TFA

Insulin loading capacity is 16 to 1000% higher recovery on the GraceAlpha™ C8 column.

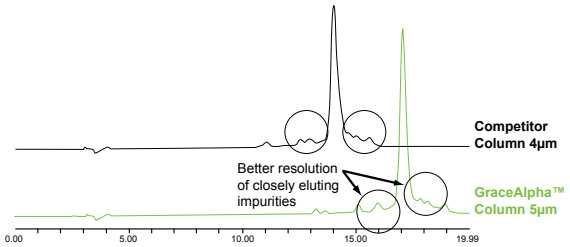


High Resolution and Recovery

GraceAlpha™ columns increase purity and yield of synthetic peptides with superior resolution of impurities due to higher mass transfer and optimized C18 and C8 bonding chemistry.

Crude 20-AA Synthetic Peptide

The target peptide is better resolved from impurities, with 33% higher recovery, on the GraceAlpha™ column.



Columns: All C18, 4.6 x 250mm
Mobile Phase: **A:** 0.1% TFA in Water, **B:** 0.1% TFA in Acetonitrile
Gradient:

Time:	0	20
%B:	20	40

Flow Rate: 1.0mL/min

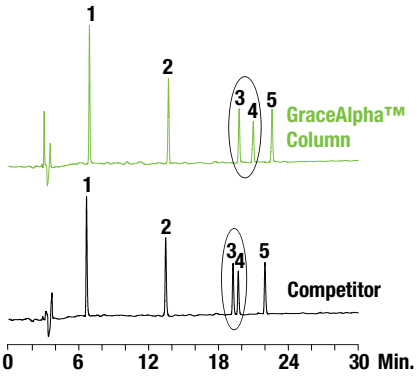
Data courtesy of: Biopeptide Inc.

Unique Selectivity

Proprietary bonding chemistry provides unique selectivity that yields advantages not seen in other C18 and C8 phases.

Peptide Standard Mixture

The GraceAlpha™ column offers selectivity advantages.



1. GY (238 Da)
2. VYV (379 Da)
3. Met Enkephalin (YGGFM, 573 Da)
4. Angiotensin II (DRVYIHPF, 1045 Da)
5. Leu Enkephalin (YGGFL, 555 Da)

Columns: All C18, 5µm, 4.6 x 250mm
Mobile Phase: **A:** 0.1% TFA in Water, **B:** 0.085% TFA in Acetonitrile
Gradient:

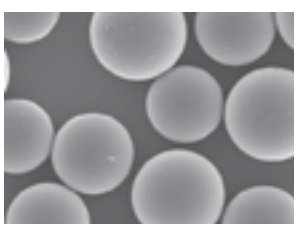
Time:	0	30	35	40
%B:	10	40	90	90

Flow Rate: 1.0mL/min
Detector: UV at 225nm
Column Temp.: 25°C

Resolution (USP)*

Peptide Peak	GraceAlpha™ Column	Competitor
1	42.0	35.7
2	32.2	28.3
3	6.0	2.3
4	7.4	11.3

*Resolution is based on the next adjacent peak.



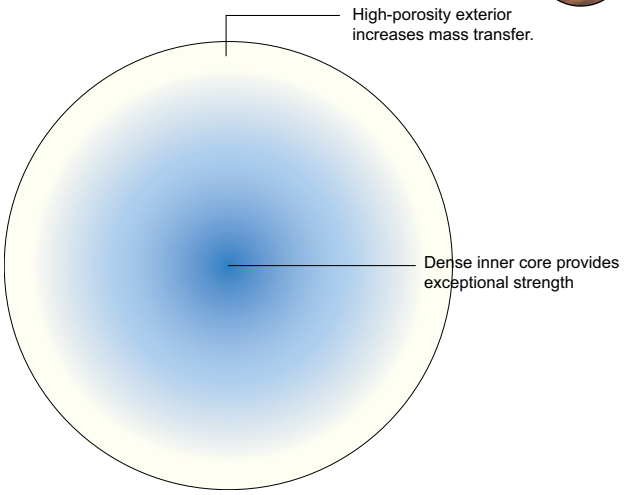
7250

related products

GraceAlpha™ bulk media is also available for scale-up. See page 176 for more information.

GraceAlpha™ Silica

GraceAlpha™ (patent pending) is built on a completely new silica platform that incorporates over 80 years of silica technology at Grace to produce the ultimate in chromatographic performance.



Extreme Porosity

The base silica particle has an extremely high porosity at its surface that increases mass transfer leading to higher efficiencies and superior loading capacity. The high porosity structure has the increased benefit of adding an elastic quality to the silica surface allowing the particles to flex and exhibit a spring like effect when packed into a column. This further stabilizes the packed bed preventing voids from forming and allows the particles to pack tighter, yielding higher efficiencies in packed beds.

Dense Core

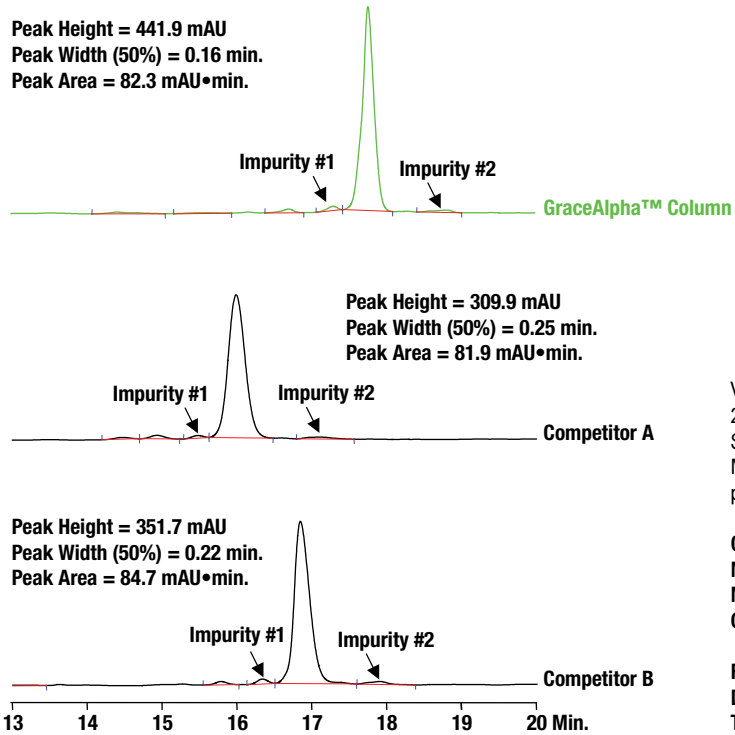
Typically the high porosity structure would result in a weak particle prone to breaking, but the GraceAlpha™ particle combines the high porosity outer region with a dense inner core that results in a particle that resists breaking and forming fines that contribute to high backpressures.

GraceAlpha™ Silica Specifications	
Pore Size:	120Å
Pore Volume:	0.95mL/g
Surface Area:	325m²/g
Chemical Purity:	<10ppm: Ca, Na, Fe, Al

GraceAlpha™ Phases			
Phase	**Particle Sizes**	**Carbon Load**	**Endcapped**
C18	5, 10, 15, 20µm	15%	Yes
C8	5, 10, 15, 20µm	10%	Yes
Silica	5, 10, 15, 20µm	—	—

Vasoactive Intestinal Peptide

The VIP peptide is better resolved from impurities on the GraceAlpha™ column.



Column	Resolution	
	Impurity #1	Impurity #2
GraceAlpha™ Column	1.71	2.93
Competitor A Column	1.48	2.27
Competitor B Column	1.59	2.66

Vasoactive Intestinal Peptide (VIP)
28-amino acid peptide
Sequence: HSDAVFTDNYTRLRKQMAVKKYLNSILN-amide
MW = 3325.8
pI = 9.8 (basic peptide)

Columns: All C18, 5µm, 4.6 x 250mm
Mobile Phase: **A:** 0.1% TFA in Water
Mobile Phase: **B:** 0.085% TFA in Acetonitrile
Gradient:

Time:	0	30	35	40
%B:	20	40	90	90

Flow Rate: 1.0mL/min
Detector: UV at 225nm
Temperature: 25°C

Sample courtesy of Essam Refai, Med. Lic. Karolinska Institutet, Stockholm, Sweden.

GraceAlpha™ Columns

new

GraceAlpha™ Columns

Packing	Format	i.d. x Length	Part No.
C18, 5µm	Analytical	4.6 x 150mm	**5140743**
	Analytical	4.6 x 250mm	**5140702**
	Prep—Threaded	10 x 150mm	**5141840**
	Prep—Threaded	10 x 250mm	**5141841**
	Prep—Threaded	22 x 50mm	**5141773**
	Prep—Threaded	22 x 100mm	**5141842**
	Prep—Threaded	22 x 150mm	**5141843**
	Prep—Threaded	22 x 250mm	**5141845**
	Prep—Spring	25 x 150mm	**5142081**
	Prep—Spring	25 x 250mm	**5142082**
	Prep—Flanged	30 x 50mm	**5142497**
	Prep—Flanged	30 x 100mm	**5142501**
	Prep—Flanged	30 x 150mm	**5142504**
	Prep—Flanged	30 x 250mm	**5142507**
	Prep—Spring	50 x 50mm	**5142083**
	Prep—Spring	50 x 100mm	**5142085**
C18, 10µm	Analytical	4.6 x 150mm	**5140744**
	Analytical	4.6 x 250mm	**5140701**
	Prep—Threaded	10 x 150mm	**5141865**
	Prep—Threaded	10 x 250mm	**5140892**
	Prep—Threaded	22 x 50mm	**5141866**
	Prep—Threaded	22 x 100mm	**5141867**
	Prep—Threaded	22 x 150mm	**5141868**
	Prep—Threaded	22 x 250mm	**5141071**
	Prep—Spring	25 x 150mm	**5142086**
	Prep—Spring	25 x 250mm	**5142087**
	Prep—Flanged	30 x 50mm	**5142499**
	Prep—Flanged	30 x 100mm	**5142502**
	Prep—Flanged	30 x 150mm	**5142505**
	Prep—Flanged	30 x 250mm	**5142508**
	Prep—Spring	50 x 50mm	**5142088**
	Prep—Spring	50 x 100mm	**5142089**
	Prep—Spring	50 x 150mm	**5142090**
	Prep—Spring	50 x 250mm	**5142091**
	Prep—Spring	100 x 50mm	**5142093**
	Prep—Spring	100 x 100mm	**5142094**
	Prep—Spring	100 x 150mm	**5142095**
	Prep—Spring	100 x 250mm	**5142096**
C18, 15µm	Analytical	4.6 x 150mm	**5141058**
	Analytical	4.6 x 250mm	**5141059**
	Prep—Threaded	10 x 150mm	**5141860**
	Prep—Threaded	10 x 250mm	**5141861**
	Prep—Threaded	22 x 50mm	**5141862**
	Prep—Threaded	22 x 100mm	**5141863**
	Prep—Threaded	22 x 150mm	**5141864**
	Prep—Threaded	22 x 250mm	**5141070**
	Prep—Spring	25 x 150mm	**5142097**
	Prep—Spring	25 x 250mm	**5142098**
	Prep—Flanged	30 x 50mm	**5142464**
	Prep—Flanged	30 x 100mm	**5142503**
	Prep—Flanged	30 x 150mm	**5142506**
	Prep—Flanged	30 x 250mm	**5142500**
	Prep—Spring	50 x 50mm	**5142099**
	Prep—Spring	50 x 100mm	**5142100**
	Prep—Spring	50 x 150mm	**5142101**
	Prep—Spring	50 x 250mm	**5142102**
	Prep—Spring	100 x 50mm	**5142103**
	Prep—Spring	100 x 100mm	**5142104**
	Prep—Spring	100 x 150mm	**5142105**
	Prep—Spring	100 x 250mm	**5142106**

GraceAlpha™ Columns (continued)

Packing	Format	i.d. x Length	Part No.
C8, 5µm	Analytical	4.6 x 150mm	**5140740**
	Analytical	4.6 x 250mm	**5140704**
	Prep—Threaded	10 x 150mm	**5141870**
	Prep—Threaded	10 x 250mm	**5141871**
	Prep—Threaded	22 x 50mm	**5141872**
	Prep—Threaded	22 x 150mm	**5141873**
	Prep—Threaded	22 x 250mm	**5141874**
	Prep—Spring	25 x 150mm	**5142107**
	Prep—Spring	25 x 250mm	**5142108**
	Prep—Flanged	30 x 150mm	**5142491**
	Prep—Flanged	30 x 250mm	**5142494**
	Prep—Spring	50 x 50mm	**5142109**
	Prep—Spring	50 x 100mm	**5142110**
C8, 10µm	Analytical	4.6 x 150mm	**5140742**
	Analytical	4.6 x 250mm	**5140703**
	Prep—Threaded	10 x 150mm	**5141876**
	Prep—Threaded	10 x 250mm	**5140891**
	Prep—Threaded	22 x 50mm	**5141878**
	Prep—Threaded	22 x 150mm	**5141879**
	Prep—Threaded	22 x 250mm	**5141880**
	Prep—Spring	25 x 150mm	**5142120**
	Prep—Spring	25 x 250mm	**5142121**
	Prep—Flanged	30 x 150mm	**5142492**
	Prep—Flanged	30 x 250mm	**5142495**
	Prep—Spring	50 x 150mm	**5142122**
	Prep—Spring	50 x 250mm	**5142123**
	Prep—Spring	100 x 150mm	**5142124**
	Prep—Spring	100 x 250mm	**5142125**
C8, 15µm	Analytical	4.6 x 150mm	**5141055**
	Analytical	4.6 x 250mm	**5141057**
	Prep—Threaded	10 x 150mm	**5141881**
	Prep—Threaded	10 x 250mm	**5141882**
	Prep—Threaded	22 x 50mm	**5141883**
	Prep—Threaded	22 x 150mm	**5141884**
	Prep—Threaded	22 x 250mm	**5141885**
	Prep—Spring	25 x 150mm	**5142128**
	Prep—Spring	25 x 250mm	**5142129**
	Prep—Flanged	30 x 150mm	**5142493**
	Prep—Flanged	30 x 250mm	**5142496**
	Prep—Spring	50 x 150mm	**5142130**
	Prep—Spring	50 x 250mm	**5142131**
	Prep—Spring	100 x 150mm	**5142132**
	Prep—Spring	100 x 250mm	**5142133**

related products

20µm phases can be custom ordered packed in Spring™ columns or bulk media.

GraceAlpha™ Columns

GraceAlpha™ Columns

Packing	Format	i.d. x Length	Part No.
Silica, 5µm	Analytical	4.6 x 150mm	**5142615**
	Analytical	4.6 x 250mm	**5142614**
	Prep—Threaded	10 x 150mm	**5142592**
	Prep—Threaded	10 x 250mm	**5142594**
	Prep—Threaded	22 x 150mm	**5142595**
	Prep—Threaded	22 x 250mm	**5142596**
	Prep—Spring	25 x 150mm	**5142663**
	Prep—Spring	25 x 250mm	**5142664**
	Prep—Flanged	30 x 150mm	**5142490**
	Prep—Flanged	30 x 250mm	**5142467**
	Prep—Spring	50 x 50mm	**5142665**
	Prep—Spring	50 x 100mm	**5142666**
Silica, 10µm	Analytical	4.6 x 150mm	**5142613**
	Analytical	4.6 x 250mm	**5142612**
	Prep—Threaded	10 x 150mm	**5142567**
	Prep—Threaded	10 x 250mm	**5142568**
	Prep—Threaded	22 x 150mm	**5142569**
	Prep—Threaded	22 x 250mm	**5142590**
	Prep—Spring	25 x 150mm	**5142667**
	Prep—Spring	25 x 250mm	**5142668**
	Prep—Flanged	30 x 150mm	**5142465**
	Prep—Flanged	30 x 250mm	**5142468**
	Prep—Spring	50 x 150mm	**5142669**
	Prep—Spring	50 x 250mm	**5142670**
	Prep—Spring	100 x 150mm	**5142671**
	Prep—Spring	100 x 250mm	**5142672**
Silica, 15µm	Analytical	4.6 x 150mm	**5142611**
	Analytical	4.6 x 250mm	**5142610**
	Prep—Threaded	10 x 150mm	**5142617**
	Prep—Threaded	10 x 250mm	**5142564**
	Prep—Threaded	22 x 150mm	**5142565**
	Prep—Threaded	22 x 250mm	**5142566**
	Prep—Spring	25 x 150mm	**5142673**
	Prep—Spring	25 x 250mm	**5142674**
	Prep—Flanged	30 x 150mm	**5142466**
	Prep—Flanged	30 x 250mm	**5142469**
	Prep—Spring	50 x 150mm	**5142675**
	Prep—Spring	50 x 250mm	**5142676**
	Prep—Spring	100 x 150mm	**5142677**
	Prep—Spring	100 x 250mm	**5142678**

Guard Cartridges and Holder

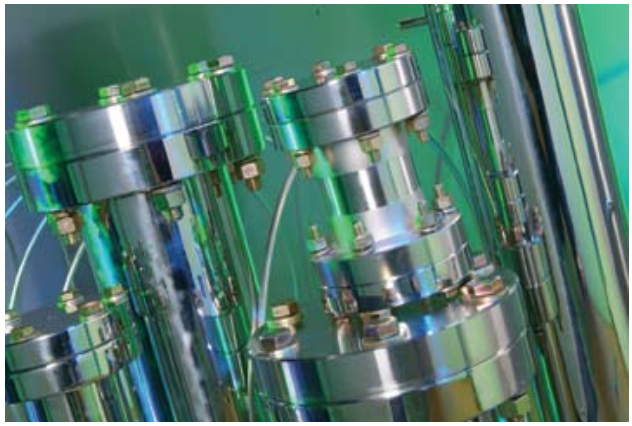
Format	i.d. x Length	Qty.	Part No.
Prep—Guard Holder	10 x 10mm	ea	**2101342**
Prep—Guard Holder	20 x 10mm	ea	**3110650**
Prep—Guard Holder	30 x 30mm	ea	**3117320**
C18, 5µm			
Prep—Guard Cartridge	10 x 10mm	ea	**5142000**
Prep—Guard Cartridge	20 x 10mm	2/pk	**3118151**
Prep—Guard Cartridge	30 x 30mm	ea	**3118225**
C18, 10µm			
Prep—Guard Cartridge	10 x 10mm	ea	**5142001**
Prep—Guard Cartridge	20 x 10mm	2/pk	**3118220**
Prep—Guard Cartridge	30 x 30mm	ea	**3118226**
C18, 15µm			
Prep—Guard Cartridge	10 x 10mm	ea	**5142002**
Prep—Guard Cartridge	20 x 10mm	2/pk	**3118221**
Prep—Guard Cartridge	30 x 30mm	ea	**3118227**
C8, 5µm			
Prep—Guard Cartridge	10 x 10mm	ea	**5142003**
Prep—Guard Cartridge	20 x 10mm	2/pk	**3118222**
Prep—Guard Cartridge	30 x 30mm	ea	**3118240**
C8, 10µm			
Prep—Guard Cartridge	10 x 10mm	ea	**5142004**
Prep—Guard Cartridge	20 x 10mm	2/pk	**3118223**
Prep—Guard Cartridge	30 x 30mm	ea	**3118241**
C8, 15µm			
Prep—Guard Cartridge	10 x 10mm	ea	**5142005**
Prep—Guard Cartridge	20 x 10mm	2/pk	**3118224**
Prep—Guard Cartridge	30 x 30mm	ea	**3118242**
Silica, 5µm			
Prep—Guard Cartridge	10 x 10mm	ea	**5142616**
Prep—Guard Cartridge	20 x 10mm	2/pk	**3118620**
Prep—Guard Cartridge	30 x 30mm	ea	**3118622**
Silica, 10µm			
Prep—Guard Cartridge	10 x 10mm	ea	**5142617**
Prep—Guard Cartridge	20 x 10mm	2/pk	**3118623**
Prep—Guard Cartridge	30 x 30mm	ea	**3118624**
Silica, 15µm			
Prep—Guard Cartridge	10 x 10mm	ea	**5142618**
Prep—Guard Cartridge	20 x 10mm	2/pk	**3118625**
Prep—Guard Cartridge	30 x 30mm	ea	**3118626**

tech tip

30mm i.d. guards can be used with column i.d.s up to 50mm when packed with a larger particle size than the column being protected.

more info

A guard holder must be purchased separately from the guard cartridge for first-time use. Guard holders can then be reused.



Vydac® MS 300Å Columns

High Protein Recovery

- Unique Selectivity for exceptional resolution of proteins and peptides
- High protein recovery improves yield

A patented surface chemistry reduces adsorption of proteins on the silica surface which means higher recoveries and better resolution.

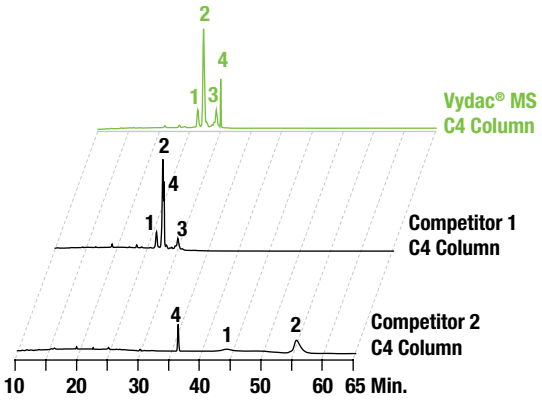
Vydac® MS 300Å Silica Specifications	
Pore Size:	300Å
Pore Volume:	0.5mL/g
Surface Area:	90m²/g

Vydac® MS Phases			
Phase	**Particle Sizes**	**Carbon Load**	**Endcapped**
C4	5, 10, 15µm	3%	Yes
C8	5, 10, 15µm	5%	Yes
C18	5, 10, 15µm	8%	Yes

Improved Resolution and Yield

The Vydac® column provides better separation and recovery for a highly hydrophobic membrane protein (RRV p14) and its fatty acid modified (myristolyated) form, a component of a potentially new vaccine delivery system.

Transmembrane Protein p14 on 300Å C4 Columns



1. 18.8 kD Protein
2. Non-myristoylated p14
3. Myristoylated p14
4. Triton® X (Surfactant)

Column	Peak Area	
	Peak 2	Peak 3
MS C4	182	41
Competitor 1	171	33
Competitor 2	124	Not Detected

Columns: Vydac® MS C4 column **214MS54**, Competitor 1 C4, Competitor 2 C4 (all 300Å, 4.6 x 250mm packed with 5µm except 4µm for Competitor 1)
Flow Rate: 1.0mL/min
Eluent: **A:** 0.1% v/v TFA in Water
B: 0.085% v/v TFA in Acetonitrile

Gradient:

Vydac®, Comp. 1:	**Time:**	0	20	25	45		
	%B:	20	60	80	80		
Comp. 2:	**Time:**	0	20	25	45	50	80
	%B:	20	60	80	80	90	90

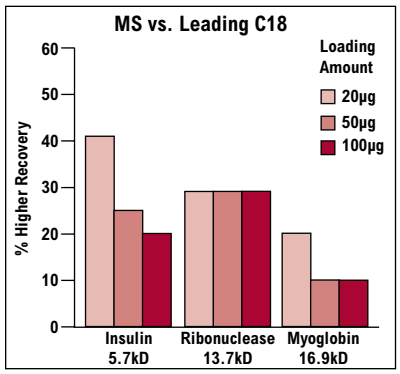
Detector: UV at 215nm
Column Temp: Ambient, 25°C
Injection Vol: 50µL

Reptilian reovirus RRV p14 sample courtesy of Drs. Roberto J. de Antueno and Roy Duncan, Dalhousie University, Halifax, Nova Scotia.

Recovery of Proteins: MS vs. Leading Columns

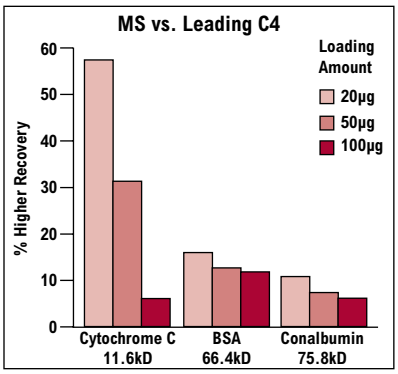
MS C18 recovery:

- Up to 41% higher at low sample load
- Up to 29% higher at high sample load



MS C4 recovery:

- Up to 57% higher at low sample load
- Up to 12% higher at high sample load



Column: C18 Columns (300Å, 5µm, 4.6 x 150mm): Vydac® **238MS** vs. leading protein/peptide C18
C4 Columns (300Å, 5µm, 4.6 x 150mm): Vydac® **214MS** vs. leading protein/peptide C4
Flow Rate: 1.0mL/min.
Eluent: **A:** 0.1% v/v TFA in Water, **B:** 0.085% v/v TFA in Acetonitrile
Temperature: 25°C
Detector: UV at 280nm
Gradient:

C18 Columns =

Time:	0	15	20	
%B:	20	80	80	

C4 Columns =

Time:	0	12	15	20
%B:	20	60	80	80

Vydac® MS 300Å Columns

Vydac® MS 300Å Columns

Packing	Format	i.d. x Length	Part No.
C4, 5µm	Analytical	4.6 x 250mm	**214MS54**
	Prep—Threaded	10 x 150mm	**214MS51015**
	Prep—Threaded	10 x 250mm	**214MS510**
	Prep—Threaded	22 x 50mm	**214MS52205**
	Prep—Threaded	22 x 100mm	**214MS52205**
C4, 10µm	Analytical	4.6 x 250mm	**214MS104**
	Prep—Threaded	10 x 150mm	**214MS101015**
	Prep—Threaded	10 x 250mm	**214MS1010**
	Prep—Threaded	22 x 150mm	**214MS102215**
	Prep—Threaded	22 x 250mm	**214MS1022**
	Prep—Flanged	30 x 150mm	**214MS103015**
	Prep—Flanged	30 x 250mm	**214MS1030**
C4, 15µm	Analytical	4.6 x 250mm	**214MS154**
	Prep—Threaded	10 x 150mm	**214MS151015**
	Prep—Threaded	10 x 250mm	**214MS1510**
	Prep—Threaded	22 x 150mm	**214MS152215**
	Prep—Threaded	22 x 250mm	**214MS1522**
	Prep—Flanged	30 x 150mm	**214MS153015**
	Prep—Flanged	30 x 250mm	**214MS1530**
	Prep—Flanged	50 x 150mm	**214MS155015**
	Prep—Flanged	50 x 250mm	**214MS1550**
	Prep—Flanged	100 x 150mm	**214MS1510015**
	Prep—Flanged	100 x 250mm	**214MS15100**
C8, 5µm	Analytical	4.6 x 250mm	**208MS54**
	Prep—Threaded	10 x 150mm	**208MS51015**
	Prep—Threaded	10 x 250mm	**208MS510**
	Prep—Threaded	22 x 50mm	**208MS52205**
	Prep—Threaded	22 x 100mm	**208MS52205**
C8, 10µm	Analytical	4.6 x 250mm	**208MS104**
	Prep—Threaded	10 x 150mm	**208MS101015**
	Prep—Threaded	10 x 250mm	**208MS1010**
	Prep—Threaded	22 x 150mm	**208MS102215**
	Prep—Threaded	22 x 250mm	**208MS1022**
	Prep—Flanged	30 x 150mm	**208MS103015**
	Prep—Flanged	30 x 250mm	**208MS1030**
C8, 15µm	Analytical	4.6 x 250mm	**208MS154**
	Prep—Threaded	10 x 150mm	**208MS151015**
	Prep—Threaded	10 x 250mm	**208MS1510**
	Prep—Threaded	22 x 150mm	**208MS152215**
	Prep—Threaded	22 x 250mm	**208MS1522**
	Prep—Flanged	30 x 150mm	**208MS153015**
	Prep—Flanged	30 x 250mm	**208MS1530**
	Prep—Flanged	50 x 150mm	**208MS155015**
	Prep—Flanged	50 x 250mm	**208MS1550**
	Prep—Flanged	100 x 150mm	**208MS1510015**
	Prep—Flanged	100 x 250mm	**208MS15100**
C18, 5µm	Analytical	4.6 x 250mm	**218MS54**
	Prep—Threaded	10 x 150mm	**218MS51015**
	Prep—Threaded	10 x 250mm	**218MS510**
	Prep—Threaded	22 x 50mm	**218MS52205**
	Prep—Threaded	22 x 100mm	**218MS52205**
C18, 10µm	Analytical	4.6 x 250mm	**218MS104**
	Prep—Threaded	10 x 150mm	**218MS101015**
	Prep—Threaded	10 x 250mm	**218MS1010**
	Prep—Threaded	22 x 150mm	**218MS102215**
	Prep—Threaded	22 x 250mm	**218MS1022**
	Prep—Flanged	30 x 150mm	**218MS103015**
	Prep—Flanged	30 x 250mm	**218MS1030**

Vydac® MS 300Å Columns (continued)

Packing	Format	i.d. x Length	Part No.
C18, 15µm	Analytical	4.6 x 250mm	**218MS154**
	Prep—Threaded	10 x 150mm	**218MS151015**
	Prep—Threaded	10 x 250mm	**218MS1510**
	Prep—Threaded	22 x 150mm	**218MS152215**
	Prep—Threaded	22 x 250mm	**218MS1522**
	Prep—Flanged	30 x 150mm	**218MS153015**
	Prep—Flanged	30 x 250mm	**218MS1530**
	Prep—Flanged	50 x 150mm	**218MS155015**
	Prep—Flanged	50 x 250mm	**218MS155015**
	Prep—Flanged	100 x 150mm	**218MS1510015**
	Prep—Flanged	100 x 250mm	**218MS15100**

Guard Cartridges and Holder

Format	i.d. x Length	Qty.	Part No.
Prep—Guard Holder	10 x 10mm	ea	**2101342**
Prep—Guard Holder	20 x 10mm	ea	**3110650**
Prep—Guard Holder	30 x 30mm	ea	**3117320**
C4, 5µm			
Prep—Guard Cartridge	10 x 10mm	ea	**214GCC510**
Prep—Guard Cartridge	20 x 10mm	2/pk	**214GCC520**
C4, 10µm–15µm			
Prep—Guard Cartridge	10 x 10mm	ea	**214GCC1010**
Prep—Guard Cartridge	20 x 10mm	2/pk	**214GCC1520**
Prep—Guard Cartridge	30 x 30mm	ea	**214GCC1530**
C8, 5µm			
Prep—Guard Cartridge	10 x 10mm	ea	**208GCC510**
Prep—Guard Cartridge	20 x 10mm	2/pk	**208GCC520**
C8, 10µm–15µm			
Prep—Guard Cartridge	10 x 10mm	ea	**208GCC1010**
Prep—Guard Cartridge	20 x 10mm	2/pk	**208GCC1520**
Prep—Guard Cartridge	30 x 30mm	ea	**208GCC1530**
C18, 5µm			
Prep—Guard Cartridge	10 x 10mm	ea	**218GCC510**
Prep—Guard Cartridge	20 x 10mm	2/pk	**218GCC520**
C18, 10µm–15µm			
Prep—Guard Cartridge	10 x 10mm	ea	**218GCC1010**
Prep—Guard Cartridge	20 x 10mm	2/pk	**218GCC1520**
Prep—Guard Cartridge	30 x 30mm	ea	**218GCC1530**

related products

Analytical columns and bulk media also available, please refer to pages 85–87 and 177, respectively.

7110

more applications

To view our complete searchable chromatogram database visit www.discoverysciences.com/chromdb/

Vydac® TP Columns

300Å RP Protein Purification Pioneer

- Trusted for over 25 years, Vydac® TP provides reliable, high resolution of proteins and large peptides
- Available in a wide range of bonding chemistries for alternative selectivity

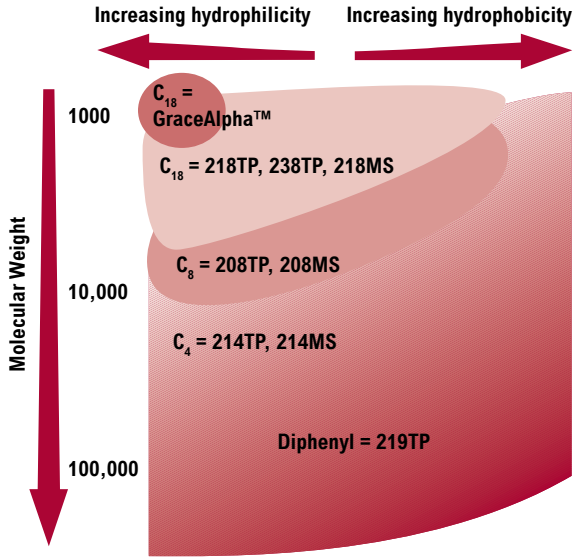
Referenced in over 9000 patents, Vydac® TP is the 300Å phase to which all others are compared. It is relied upon in numerous commercial scale protein purifications and, like other Grace® prep columns, is completely scalable to ton quantities.

Vydac® TP 300Å Silica	
Pore Size:	300Å
Pore Volume:	0.6mL/g
Surface Area:	90m²/g

Vydac® TP Phases			
Phase	**Particle Sizes**	**Carbon Load**	**Endcapped**
C4	5, 10, 10–15, 15–20µm	3%	Yes
C8	5, 10, 10–15, 15–20µm	5%	Yes
C18	5, 10, 10–15, 15–20µm	8%	Yes
Diphenyl	5, 10, 10–15, 15–20µm	4%	Yes

Column Selection for Polypeptides

The reversed-phase column for a polypeptide separation should be selected based on the hydrophobicity of the polypeptide being chromatographed and molecular weight as a secondary consideration.



Diphenyl columns (219TP, 219MS) are recommended for the separation of:

- Polypeptides with aromatic side chains
- Large, hydrophobic proteins
- Lipid peptides
- Membrane-spanning peptides
- Fusion proteins from inclusion bodies

C4 columns (214TP, 214MS) are recommended for the separation of:

- Polypeptides larger than 4000–5000 MW
- Very hydrophobic polypeptides of any size

C8 columns (208TP, 208MS) are recommended for the separation of:

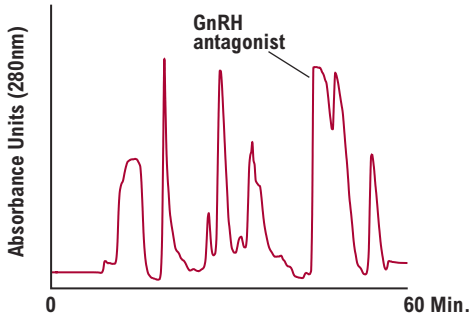
- Polypeptides up to 10,000–20,000 MW
- Enzymatic digest fragments
- Natural and synthetic peptides

C18 columns (218TP, 218MS, 238TP) are recommended for the separation of:

- Peptides less than 4000–5000 MW
- Enzymatic digest fragments
- Natural and synthetic peptides

Purification of Synthetic Peptide

128mg of a synthetic peptide, GnRH antagonist, was purified to 99.7% purity by combining the optimum fractions. 1.2g of synthesis mixture was loaded onto a 5 x 30cm column packed with Vydac® C18 (218TP), 15–20µm and eluted with a gradient of acetonitrile in water containing triethylammonium phosphate.



more info

For more protein and peptide chromatograms, see our applications section.

related products

Analytical columns and bulk media also available, please refer to pages 70–71 and 177, respectively.

more applications

To view our complete searchable chromatogram database visit www.discoverysciences.com/chromdb/

Vydac® TP Columns

Vydac® TP Columns

Packing	Format	i.d. x Length	Part No.
C4 (214TP), 5µm	Analytical	4.6 x 250mm	**214TP54**
	Prep—Threaded	10 x 50mm	**214TP51005**
	Prep—Threaded	10 x 100mm	**214TP51010**
	Prep—Threaded	10 x 150mm	**214TP51015**
	Prep—Threaded	10 x 250mm	**214TP510**
	Prep—Threaded	22 x 50mm	**214TP52205**
	Prep—Threaded	22 x 100mm	**214TP52205**
C4 (214TP), 10µm	Analytical	4.6 x 250mm	**214TP104**
	Prep—Threaded	10 x 150mm	**214TP101015**
	Prep—Threaded	10 x 250mm	**214TP1010**
	Prep—Threaded	22 x 150mm	**214TP102215**
	Prep—Threaded	22 x 250mm	**214TP1022**
	Prep—Flanged	25 x 250mm	**214TP1025**
	Prep—Flanged	30 x 250mm	**214TP1030**
	Prep—Flanged	50 x 250mm	**214TP1050**
C4 (214TP), 10–15µm	Analytical	4.6 x 250mm	**214TP10154**
	Prep—Threaded	10 x 150mm	**214TP10151015**
	Prep—Threaded	10 x 250mm	**214TP101510**
	Prep—Threaded	22 x 150mm	**214TP10152215**
	Prep—Threaded	22 x 250mm	**214TP101522**
	Prep—Flanged	25 x 250mm	**214TP101525**
	Prep—Flanged	30 x 250mm	**214TP101530**
	Prep—Flanged	50 x 250mm	**214TP101550**
	Prep—Flanged	100 x 250mm	**214TP1015100**
	Prep—Flanged	100 x 500mm	**214TP101510050**
C4 (214TP), 15–20µm	Analytical	4.6 x 250mm	**214TP15204**
	Prep—Threaded	10 x 150mm	**214TP15201520**
	Prep—Threaded	10 x 250mm	**214TP152010**
	Prep—Threaded	22 x 150mm	**214TP15202215**
	Prep—Threaded	22 x 250mm	**214TP152022**
	Prep—Flanged	25 x 250mm	**214TP152025**
	Prep—Flanged	30 x 250mm	**214TP152030**
	Prep—Flanged	50 x 250mm	**214TP152050**
	Prep—Flanged	100 x 250mm	**214TP1520100**
	Prep—Flanged	100 x 500mm	**214TP152010050**
C8 (208TP), 5µm	Analytical	4.6 x 250mm	**208TP54**
	Prep—Threaded	10 x 250mm	**208TP510**
	Prep—Threaded	22 x 100mm	**208TP52205**
C8 (208TP), 10µm	Analytical	4.6 x 250mm	**208TP104**
	Prep—Threaded	10 x 250mm	**208TP1010**
	Prep—Threaded	22 x 250mm	**208TP1022**
	Prep—Flanged	25 x 250mm	**208TP1025**
	Prep—Flanged	30 x 250mm	**208TP1030**
	Prep—Flanged	50 x 250mm	**208TP1050**
C8 (208TP), 10–15µm	Analytical	4.6 x 250mm	**208TP10154**
	Prep—Threaded	10 x 250mm	**208TP101510**
	Prep—Threaded	22 x 250mm	**208TP101522**
	Prep—Flanged	25 x 250mm	**208TP101525**
	Prep—Flanged	30 x 250mm	**208TP101530**
	Prep—Flanged	50 x 250mm	**208TP101550**
	Prep—Flanged	100 x 250mm	**208TP1015100**
C8 (208TP), 15–20µm	Analytical	4.6 x 250mm	**208TP15204**
	Prep—Threaded	10 x 250mm	**208TP152010**
	Prep—Threaded	22 x 250mm	**208TP152022**
	Prep—Flanged	25 x 250mm	**208TP152025**
	Prep—Flanged	30 x 250mm	**208TP152030**
	Prep—Flanged	50 x 250mm	**208TP152050**
	Prep—Flanged	100 x 250mm	**208TP1520100**
C18 (218TP), 5µm	Analytical	4.6 x 250mm	**218TP54**
	Prep—Threaded	10 x 50mm	**218TP51005**
	Prep—Threaded	10 x 100mm	**218TP51010**
	Prep—Threaded	10 x 150mm	**218TP51015**
	Prep—Threaded	10 x 250mm	**218TP510**
	Prep—Threaded	22 x 50mm	**218TP52205**
	Prep—Threaded	22 x 100mm	**218TP52205**

Vydac® TP Columns (continued)

Packing	Format	i.d. x Length	Part No.
C18 (218TP), 10µm	Analytical	4.6 x 250mm	**218TP104**
	Prep—Threaded	10 x 150mm	**218TP101015**
	Prep—Threaded	10 x 250mm	**218TP1010**
	Prep—Threaded	22 x 150mm	**218TP102215**
	Prep—Threaded	22 x 250mm	**218TP1022**
	Prep—Flanged	25 x 250mm	**218TP1025**
	Prep—Flanged	30 x 250mm	**218TP1030**
	Prep—Flanged	50 x 250mm	**218TP1050**
C18 (218TP), 10–15µm	Analytical	4.6 x 250mm	**218TP10154**
	Prep—Threaded	10 x 150mm	**218TP10151015**
	Prep—Threaded	10 x 250mm	**218TP101510**
	Prep—Threaded	22 x 150mm	**218TP10152215**
	Prep—Threaded	22 x 250mm	**218TP101522**
	Prep—Flanged	25 x 250mm	**218TP101525**
	Prep—Flanged	30 x 250mm	**218TP101530**
	Prep—Flanged	50 x 250mm	**218TP101550**
	Prep—Flanged	100 x 250mm	**218TP1015100**
	Prep—Flanged	100 x 500mm	**218TP101510050**
C18 (218TP), 15–20µm	Analytical	4.6 x 250mm	**218TP15204**
	Prep—Threaded	10 x 150mm	**218TP15201520**
	Prep—Threaded	10 x 250mm	**218TP152010**
	Prep—Threaded	22 x 150mm	**218TP15202215**
	Prep—Threaded	22 x 250mm	**218TP152022**
	Prep—Flanged	25 x 250mm	**218TP152025**
	Prep—Flanged	30 x 250mm	**218TP152030**
	Prep—Flanged	50 x 250mm	**218TP152050**
	Prep—Flanged	100 x 250mm	**218TP1520100**
	Prep—Flanged	100 x 500mm	**218TP152010050**
C18 (238TP), 5µm	Analytical	4.6 x 250mm	**238TP54**
	Prep—Threaded	10 x 250mm	**238TP510**
C18 (238TP), 10µm	Analytical	4.6 x 250mm	**238TP104**
	Prep—Threaded	10 x 250mm	**238TP1010**
	Prep—Threaded	22 x 250mm	**238TP1022**
	Prep—Flanged	25 x 250mm	**238TP1025**
	Prep—Flanged	30 x 250mm	**238TP1030**
	Prep—Flanged	50 x 250mm	**238TP1050**
C18 (238TP), 10–15µm	Analytical	4.6 x 250mm	**238TP10154**
	Prep—Threaded	10 x 250mm	**238TP101510**
	Prep—Threaded	22 x 250mm	**238TP101522**
	Prep—Flanged	25 x 250mm	**238TP101525**
	Prep—Flanged	30 x 250mm	**238TP101530**
	Prep—Flanged	50 x 250mm	**238TP101550**
	Prep—Flanged	100 x 250mm	**238TP1015100**
C18 (238TP), 15–20µm	Analytical	4.6 x 250mm	**238TP15204**
	Prep—Threaded	10 x 250mm	**238TP152010**
	Prep—Threaded	22 x 250mm	**238TP152022**
	Prep—Flanged	25 x 250mm	**238TP152025**
	Prep—Flanged	30 x 250mm	**238TP152030**
	Prep—Flanged	50 x 250mm	**238TP152050**
	Prep—Flanged	100 x 250mm	**238TP1520100**
Diphenyl (219TP), 5µm	Analytical	4.6 x 250mm	**219TP54**
	Prep—Threaded	10 x 250mm	**219TP510**
Diphenyl (219TP), 10µm	Analytical	4.6 x 250mm	**219TP104**
	Prep—Threaded	10 x 250mm	**219TP1010**
	Prep—Threaded	22 x 250mm	**219TP1022**
	Prep—Guard Col.	25 x 30mm	**219TP102503**
	Prep—Flanged	25 x 250mm	**219TP1025**
	Prep—Flanged	30 x 250mm	**219TP1030**
	Prep—Flanged	50 x 250mm	**219TP1050**

Vydac® TP Columns

Vydac® TP Columns

Packing	Format	i.d. x Length	Part No.
Diphenyl (219TP), 10–15µm	Analytical	4.6 x 250mm	**219TP10154**
	Prep—Threaded	10 x 250mm	**219TP101510**
	Prep—Threaded	22 x 250mm	**219TP101522**
	Prep—Guard Col.	25 x 30mm	**219TP10152503**
	Prep—Flanged	25 x 250mm	**219TP101525**
	Prep—Flanged	30 x 250mm	**219TP101530**
	Prep—Flanged	50 x 250mm	**219TP101550**
	Prep—Flanged	100 x 250mm	**219TP1015100**
Diphenyl (219TP), 15–20µm	Analytical	4.6 x 250mm	**219TP15204**
	Prep—Threaded	10 x 250mm	**219TP152010**
	Prep—Threaded	22 x 250mm	**219TP152022**
	Prep—Guard Col.	25 x 30mm	**219TP15202503**
	Prep—Flanged	25 x 250mm	**219TP152025**
	Prep—Flanged	30 x 250mm	**219TP152030**
	Prep—Flanged	50 x 250mm	**219TP152050**
	Prep—Flanged	100 x 250mm	**219TP1520100**

Guard Cartridges and Holder

Format	i.d. x Length	Qty.	Part No.
Prep—Guard Holder	10 x 10mm	ea	**2101342**
Prep—Guard Holder	20 x 10mm	ea	**3110650**
Prep—Guard Holder	30 x 30mm	ea	**3117320**
C4 (214TP), 5µm			
Prep—Guard Cartridge	10 x 10mm	ea	**214GCC510**
Prep—Guard Cartridge	20 x 10mm	2/pk	**214GCC520**
C4 (214TP), 10µm			
Prep—Guard Cartridge	10 x 10mm	ea	**214GCC1010**
Prep—Guard Cartridge	20 x 10mm	2/pk	**214GCC1520**
Prep—Guard Cartridge	30 x 30mm	ea	**214GCC1530**
C4 (214TP), 10–15µm			
Prep—Guard Cartridge	10 x 10mm	ea	**214GCC101510**
Prep—Guard Cartridge	20 x 10mm	2/pk	**214GCC1520**
Prep—Guard Cartridge	30 x 30mm	ea	**214GCC1530**
C4 (214TP), 15–20µm			
Prep—Guard Cartridge	10 x 10mm	ea	**214GCC152010**
Prep—Guard Cartridge	20 x 10mm	2/pk	**214GCC1520**
Prep—Guard Cartridge	30 x 30mm	ea	**214GCC1530**
C8 (208TP), 5µm			
Prep—Guard Cartridge	10 x 10mm	ea	**208GCC510**
Prep—Guard Cartridge	20 x 10mm	2/pk	**208GCC520**

Guard Cartridges and Holder (continued)

Format	i.d. x Length	Qty.	Part No.
C8 (208TP), 10µm			
Prep—Guard Cartridge	10 x 10mm	ea	**208GCC1010**
Prep—Guard Cartridge	20 x 10mm	2/pk	**208GCC1520**
Prep—Guard Cartridge	30 x 30mm	ea	**208GCC1530**
C8 (208TP), 10–15µm			
Prep—Guard Cartridge	10 x 10mm	ea	**208GCC101510**
Prep—Guard Cartridge	20 x 10mm	2/pk	**208GCC1520**
Prep—Guard Cartridge	30 x 30mm	ea	**208GCC1530**
C8 (208TP), 15–20µm			
Prep—Guard Cartridge	10 x 10mm	ea	**208GCC152010**
Prep—Guard Cartridge	20 x 10mm	2/pk	**208GCC1520**
Prep—Guard Cartridge	30 x 30mm	ea	**208GCC1530**
C18 (218TP), 5µm			
Prep—Guard Cartridge	10 x 10mm	ea	**218GCC510**
Prep—Guard Cartridge	20 x 10mm	2/pk	**218GCC520**
C18 (218TP), 10µm			
Prep—Guard Cartridge	10 x 10mm	ea	**218GCC1010**
Prep—Guard Cartridge	20 x 10mm	2/pk	**218GCC1520**
Prep—Guard Cartridge	30 x 30mm	ea	**218GCC1530**
C18 (218TP), 10–15µm			
Prep—Guard Cartridge	10 x 10mm	ea	**218GCC101510**
Prep—Guard Cartridge	20 x 10mm	2/pk	**218GCC1520**
Prep—Guard Cartridge	30 x 30mm	ea	**218GCC1530**
C18 (218TP), 15–20µm			
Prep—Guard Cartridge	10 x 10mm	ea	**218GCC152010**
Prep—Guard Cartridge	20 x 10mm	2/pk	**218GCC1520**
Prep—Guard Cartridge	30 x 30mm	ea	**218GCC1530**
C18 (238TP), 5µm			
Prep—Guard Cartridge	10 x 10mm	ea	**238GCC510**
C18 (238TP), 10µm			
Prep—Guard Cartridge	10 x 10mm	ea	**238GCC1010**
C18 (238TP), 10–15µm			
Prep—Guard Cartridge	10 x 10mm	ea	**238GCC101510**
C18 (238TP), 15–20µm			
Prep—Guard Cartridge	10 x 10mm	ea	**238GCC152010**
Diphenyl (219TP), 5µm			
Prep—Guard Cartridge	10 x 10mm	ea	**219GCC510**
Diphenyl (219TP), 10µm			
Prep—Guard Cartridge	10 x 10mm	ea	**219GCC1010**
Diphenyl (219TP), 10–15µm			
Prep—Guard Cartridge	10 x 10mm	ea	**219GCC101510**
Diphenyl (219TP), 15–20µm			
Prep—Guard Cartridge	10 x 10mm	ea	**219GCC152010**

Purification of a Lipid Peptide

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 retentivity 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.

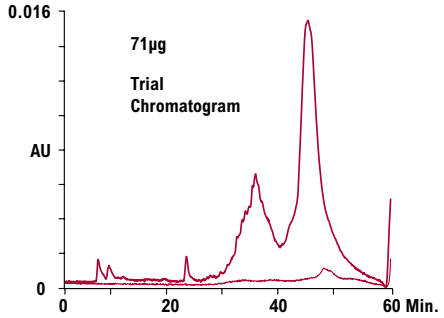
Column: Vydac® 219TP54 (diphenyl, 5µm, 4.6mm i.d. x 250mm)
Flow: 0.75mL/min
Detector: UV at 280nm

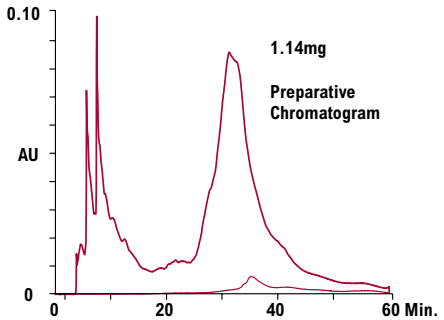
Trial Chromatogram
Sample: 250µL of 8:1 diluted peptide solution = 71µg
Eluent: **A**: 5% n-propanol/0.5% HOAc/94.5% water
B: 85% n-propanol/0.5% HOAc/14.5% water
Gradient: 0 to 100% **B** in 30min

Preparative Chromatogram
Sample: 1.5mL of 3:1 diluted peptide solution = 1.14mg (applied as three 500µL injections at 1.5min intervals)
Eluent: **A**: 29% n-propanol/0.5% HOAc/70.5% water
B: 61% n-propanol/0.5% HOAc/38.5% water
Gradient: Hold 100% **A** for 6min, then 0 to 100% **B** in 30min

In each chromatogram the fine trace is a post-run blank.

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.





Alltech® Prep Columns

- Packed with identical media to analytical columns
- Additional dimensions may be custom ordered

Econosphere™ Columns

Packing	Format	i.d. x Length	Part No.
C18, 10µm	Prep—Threaded	10 x 100mm	**28157**
	Prep—Threaded	10 x 250mm	**28085**
	Prep—Threaded	22 x 250mm	**28001**
C8, 10µm	Prep—Threaded	10 x 100mm	**28159**
	Prep—Threaded	10 x 250mm	**28087**
	Prep—Threaded	22 x 250mm	**28003**
Silica, 10µm	Prep—Threaded	10 x 100mm	**28167**
	Prep—Threaded	10 x 250mm	**28095**
	Prep—Threaded	22 x 250mm	**28057**

Macrosphere™ Columns

Packing	Format	i.d. x Length	Part No.
GPC 60Å	Prep—Threaded	7.5 x 300mm	**88175**
GPC 100Å	Prep—Threaded	7.5 x 300mm	**88177**
GPC 150Å	Prep—Threaded	7.5 x 300mm	**88179**
GPC 300Å	Prep—Threaded	7.5 x 300mm	**88181**

Alltima™ Columns

Packing	Format	i.d. x Length	Part No.
C18, 5µm	Prep—Threaded	7 x 150mm	**81123**
	Prep—Threaded	7 x 250mm	**81129**
	Prep—Threaded	10 x 150mm	**81102**
	Prep—Threaded	10 x 250mm	**88063**
	Prep—Threaded	22 x 150mm	**81106**
	Prep—Threaded	22 x 250mm	**81105**
C18, 10µm	Prep—Threaded	10 x 150mm	**81107**
	Prep—Threaded	10 x 250mm	**88334**
	Prep—Threaded	22 x 150mm	**81108**
	Prep—Threaded	22 x 250mm	**88335**
C8, 5µm	Prep—Threaded	7 x 150mm	**81132**
	Prep—Threaded	7 x 250mm	**81133**
	Prep—Threaded	10 x 150mm	**81109**
	Prep—Threaded	10 x 250mm	**88081**
	Prep—Threaded	22 x 150mm	**81112**
	Prep—Threaded	22 x 250mm	**81110**
C8, 10µm	Prep—Threaded	10 x 150mm	**81114**
	Prep—Threaded	10 x 250mm	**88336**
	Prep—Threaded	22 x 150mm	**81115**
	Prep—Threaded	22 x 250mm	**81110**
Silica, 5µm	Prep—Threaded	7 x 150mm	**81135**
	Prep—Threaded	7 x 250mm	**81136**
	Prep—Threaded	10 x 150mm	**81117**
	Prep—Threaded	10 x 250mm	**81116**
	Prep—Threaded	22 x 150mm	**81119**
	Prep—Threaded	22 x 250mm	**81118**
Silica, 10µm	Prep—Threaded	10 x 150mm	**81121**
	Prep—Threaded	10 x 250mm	**88338**
	Prep—Threaded	22 x 150mm	**81125**
	Prep—Threaded	22 x 250mm	**88339**

Platinum™ Columns

Packing	Format	i.d. x Length	Part No.
EPS C18, 5µm	Prep—Threaded	10 x 150mm	**82083**
	Prep—Threaded	22 x 150mm	**82093**
	Prep—Threaded	22 x 250mm	**82095**

Prosphere™ HP

Packing	Format	i.d. x Length	Part No.
C18-AQ, 5µm	Prep—Threaded	10 x 100mm	**35572**
	Prep—Threaded	22 x 100mm	**35573**

related products

Please refer to pages 44–49, 54–57, and 96–97 for more information on media characteristics and analytical column offerings.

Apollo™ Columns

Packing	Format	i.d. x Length	Part No.
C18, 5µm	Prep—Threaded	7 x 150mm	**36530**
	Prep—Threaded	7 x 250mm	**36541**
	Prep—Threaded	10 x 150mm	**36531**
	Prep—Threaded	10 x 250mm	**36543**
	Prep—Threaded	22 x 150mm	**36526**
	Prep—Threaded	22 x 250mm	**36537**
C8, 5µm	Prep—Threaded	7 x 150mm	**36546**
	Prep—Threaded	7 x 250mm	**36547**
	Prep—Threaded	10 x 150mm	**36548**
	Prep—Threaded	10 x 250mm	**36549**
	Prep—Threaded	22 x 150mm	**36550**
	Prep—Threaded	22 x 250mm	**36551**
Phenyl, 5µm	Prep—Threaded	7 x 150mm	**36525**
	Prep—Threaded	7 x 250mm	**36539**
	Prep—Threaded	10 x 150mm	**36527**
	Prep—Threaded	10 x 250mm	**36532**
	Prep—Threaded	22 x 150mm	**36535**
	Prep—Threaded	22 x 250mm	**36528**
Silica, 5µm	Prep—Threaded	7 x 150mm	**36542**
	Prep—Threaded	7 x 250mm	**36529**
	Prep—Threaded	10 x 150mm	**36533**
	Prep—Threaded	10 x 250mm	**36540**
	Prep—Threaded	22 x 150mm	**36534**
	Prep—Threaded	22 x 250mm	**36524**

Prevail™ Columns

Packing	Format	i.d. x Length	Part No.
Carbohydrate ES, 5µm	Prep—Threaded	7 x 100mm	**35103**
	Prep—Threaded	10 x 250mm	**35115**
	Prep—Threaded	20 x 300mm	**35215**
C18, 5µm	Prep—Threaded	10 x 150mm	**99293**
	Prep—Threaded	10 x 250mm	**99294**
	Prep—Threaded	22 x 150mm	**99296**
	Prep—Threaded	22 x 250mm	**99297**

6286

Connect with Direct-Connect™ Coupler.

6285

Connect In-Line with Fittings and Tubing.

Prep-Guard™ Accessories

Description	Part No.
Direct-Connect™ Column Coupler	**28195**
In-Line Connector	**9549**

Alltech® Prep Guards™

Packing	Format	i.d. x Length	Part No.
Econosphere™ Guards			
C18, 10µm	Prep—Guard™	7 x 33mm	**970209**
C8, 10µm	Prep—Guard™	7 x 33mm	**970223**
Silica, 10µm	Prep—Guard™	7 x 33mm	**970210**
Alltima™ Guards			
C18, 10µm	Prep—Guard™	7 x 33mm	**970203**
C8, 10µm	Prep—Guard™	7 x 33mm	**970227**
Silica, 10µm	Prep—Guard™	7 x 33mm	**970204**
Platinum™ Guard			
EPS C18, 5µm	Prep—Guard™	7 x 33mm	**970216**
Prosphere™ HP Guard			
C18-AQ, 5µm	Prep—Guard™	7 x 33mm	**35584**
Apollo™ Guards			
C18, 5µm	Prep—Guard™	7 x 33mm	**970205**
C8, 5µm	Prep—Guard™	7 x 33mm	**96463**
Phenyl, 5µm	Prep—Guard™	7 x 33mm	**96430**
Silica, 5µm	Prep—Guard™	7 x 33mm	**970206**
Prevail™ Guards			
Carbohydrate ES, 5µm	Prep—Guard™	7 x 33mm	**35105**
C18, 5µm	Prep—Guard™	7 x 33mm	**970211**

Spring™ Column Hardware

For Use with Multipacker® Packing Instruments

- High-efficiency axial compression packing mechanism
- Extend media lifetime
- Mobile Dynamic Axial Compression (DAC) column
- Easily packed by end-user with a Multipacker® instrument

The Spring™ Column hardware described in this section is designed to be used in conjunction with Multipacker® instruments. Please see page 172 for information on the Multipacker® product line.

Spring™ Column units are also available prepacked and ready-to-use. However, prepacked Spring™ Column units are not user-serviceable and must be returned to Grace for repacking, unless the customer owns a Multipacker® packing system.

How to Order Spring™ Column Hardware for Use with Multipacker® Instruments

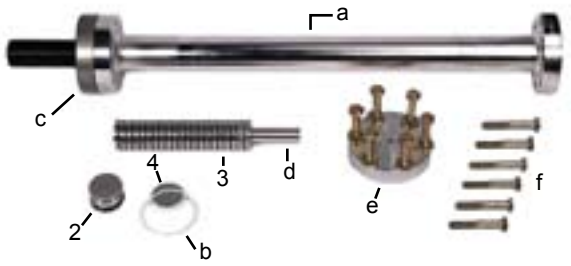
Spring™ Columns can be ordered as a complete kit, as seen on page 163, or customized selecting the options that best suit your needs. Components for customization can be found on page 164. Spring™ Columns are offered in two lengths, 40cm and 70cm. A 40cm column body can accommodate up to a 15cm length packed bed and the 70cm column body can accommodate up to a 30cm length packed bed.

Each complete Spring™ Column assembly consists of five components. For customized columns, one of each component below needs to be ordered:

1. The Base Spring™ Column Parts Kit includes:
   a. Column Body
   b. All Seals and O-rings
   c. Locking Mechanism
   d. Guide Tube
   e. Endplate
   f. Assembly Hardware
   g. Packing Spacers (for 70cm length columns)—not pictured
2. A Ready-to-Use Piston Assembly consisting of the piston body, piston frit, PTFE sleeve and O-ring. The piston assembly can be ordered with a 1µm, 2µm, or 5µm frit porosity.
3. A Spring Kit. Choose the appropriate pressure range for your needs. Spring force must exceed the operating pressure of the column in order to maintain axial compression force.
4. An Outlet Frit. Choose 1µm, 2µm, or 5µm frit porosity. For 101mm i.d. columns, the outlet frit is identical to the piston assembly (#2).
5. Tubing and Connectors. Choose tubing with an outer diameter and bore that suits your needs.

The guides on the following pages will help you select the combination of options appropriate to your needs. For further assistance, call Grace Technical Support.

Base Spring Colum Parts Kit



related products

Refer to page 172 for more information on the Multipacker® packing stations used to pack Spring™ Column hardware.

technical assistance

Contact Tech Support: Phone: 1.800.255.8324
Email: contact.alltech@grace.com
Online: www.discoverysciences.com

Spring™ Column Hardware

Complete Spring™ Column Hardware Kits

Complete hardware kits are available under single catalog numbers for standard 25mm i.d, 50mm i.d, and 101mm i.d. Spring™ Column units, as shown below.

Complete kits are provided with 2µm frits and 1000 to 2000psig springs. Different combinations are possible by building a custom Spring™ Column on page 164.

Individual components and replacement parts are listed on the following two pages.

Complete Spring™ Column Hardware Kits

		Includes:	Part No.
Column Dimensions	Part No.	Description	
25mm i.d.			
25mm i.d. x 40cm, Non-Water-Jacketed	SA2002-025040 AS2002-025A09 AF0000-C02502 AS2002-025A03 AS2002-025A07	Base Column Parts Kit*, 40cm long column, for bed lengths up to 15cm Piston Assembly with 2µm frit Outlet Frit, 2µm Spring Kit for packing pressures from 1000 to 2000psig 1/16" o.d., 0.040" i.d. Connecting Tube and Fittings	**SC2002-025040**
25mm i.d. x 70cm, Non-Water-Jacketed	SA2002-025070 AS2002-025A09 AF0000-C02502 AS2002-025A03 AS2002-025A07	Base Column Parts Kit*, 70cm long column, for bed lengths up to 30cm Piston Assembly with 2µm frit Outlet Frit, 2µm Spring Kit for packing pressures from 1000 to 2000psig 1/16" o.d., 0.040" i.d. Connecting Tube and Fittings	**SC2002-025070**
50mm i.d.			
50mm i.d. x 40cm, Non-Water-Jacketed**	SA2002-050040 AS2002-050A01 AF0000-B05002 AS2002-050A03 AS2002-050A07 AS2002-050A09	Base Column Parts Kit*, 40cm long column, for bed lengths up to 15cm Piston Assembly with 2µm frit Outlet Frit, 2µm Spring Kit for packing pressures from 1000 to 2000psig 1/16" o.d., 0.040" i.d. Connecting Tube and Fittings 1/8" o.d., 0.060" i.d. Connecting Tube and Fittings	**SC2002-050040**
50mm i.d. x 70cm, Non-Water-Jacketed**	SA2002-050070 AS2002-050A01 AF0000-B05002 AS2002-050A03 AS2002-050A07 AS2002-050A09	Base Column Parts Kit*, 70cm long column, for bed lengths up to 30cm Piston Assembly with 2µm frit Outlet Frit, 2µm Spring Kit for packing pressures from 1000 to 2000psig 1/16" o.d., 0.040" i.d. Connecting Tube and Fittings 1/8" o.d., 0.060" i.d. Connecting Tube and Fittings	**SC2002-050070**
101mm i.d.			
101mm i.d. x 40cm, Water-Jacketed	SA4004-101040 2 x AS4004-101A06 AS4004-101A03 AS2002-050A08	Base Column Parts Kit*, 40cm long column, for bed lengths up to 15cm Piston Assembly with 2µm frit Spring Kit for packing pressures up to 2000psig 1/8" o.d., 0.060" i.d. Connecting Tube and Fittings	**SC4004-101040**
101mm i.d. x 70cm, Water-Jacketed	SA4004-101070 2 x AS4004-101A06 AS4004-101A03 AS2002-050A08s	Base Column Parts Kit*, 70cm long column, for bed lengths up to 30cm Piston Assembly with 2µm frit Spring Kit for packing pressures up to 2000psig 1/8" o.d., 0.060" i.d. Connecting Tube and Fittings	**SC4004-101070**

NOTE:
Spring™ Column units are designed to be easily serviceable. A full array of components and replacement parts are available. Please consult the listings on the following two pages as well as the column manuals for details.
*See page 162 for listing of components included in Base Column Parts Kit.
**Two sizes of connecting tubing provided.

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Spring™ Column Hardware

Spring™ Column Components

Experienced Spring™ Column users can build customized Spring™ Column units by individually selecting the components that best meet their needs. A total of five components is needed to assemble a complete Spring™ Column.

Spring™ Column Units

Column Dimensions	Description	Part No.
25mm i.d.		
1. Base Parts Kit	Non-Water-Jacketed Kit, 40cm long, for bed lengths up to 15cm	**SA2002-025040**
	Water-Jacketed Kit, 40cm long, for bed lengths up to 15cm	**SA2002-W25040**
	Non-Water-Jacketed Kit, 70cm long, for bed lengths up to 30cm	**SA2002-025070**
	Water-Jacketed Kit, 70cm long, for bed lengths up to 30cm	**SA2002-W25070**
2. Piston Assembly	Piston Assembly with 1µm frit	**AS2002-025A01**
	Piston Assembly with 2µm frit	**AS2002-025A09**
	Piston Assembly with 5µm frit	**AS2002-025A02**
3. Spring Kit	Spring Kit for packing pressures from 1000 to 2000psig	**AS2002-025A03**
	Spring Kit for packing pressures from 500 to 900psig	**AS2002-025A04**
	Spring Kit for packing pressures up to 400psig	**AS2002-025A05**
4. Outlet Frit	Outlet Frit, 1µm	**AF0000-C02501**
	Outlet Frit, 2µm	**AF0000-C02502**
	Outlet Frit, 5µm	**AF0000-C02503**
5. Tubing and Connectors	1/16" o.d., 0.020" i.d. Connecting Tube and Fittings	**AS2002-025A06**
	1/16" o.d., 0.040" i.d. Connecting Tube and Fittings	**AS2002-025A07**
50mm i.d.		
1. Base Parts Kit	Non-Water-Jacketed Kit, 40cm long, for bed lengths up to 15cm	**SA2002-050040**
	Water-Jacketed Kit, 40cm long, for bed lengths up to 15cm	**SA2002-W50040**
	Non-Water-Jacketed Kit, 70cm long, for bed lengths up to 30cm	**SA2002-050070**
	Water-Jacketed Kit, 70cm long, for bed lengths up to 30cm	**SA2002-W50070**
2. Piston Assembly	Piston Assembly with 1µm frit	**AS2002-050A01**
	Piston Assembly with 2µm frit	**AS2002-050A11**
	Piston Assembly with 5µm frit	**AS2002-050A02**
3. Spring Kit	Spring Kit for packing pressures from 1000 to 2000psig	**AS2002-050A03**
	Spring Kit for packing pressures from 500 to 900psig	**AS2002-050A05**
	Spring Kit for packing pressures up to 400psig	**AS2002-050A06**
4. Outlet Frit	Outlet Frit, 1µm	**AF0000-B05001**
	Outlet Frit, 2µm	**AF0000-B05002**
	Outlet Frit, 5µm	**AF0000-B05003**
5. Tubing and Connectors	1/16" o.d., 0.040" i.d. Connecting Tube and Fittings	**AS2002-050A07**
	1/8" o.d., 0.060" i.d. Connecting Tube and Fittings	**AS2002-050A08**
	1/8" o.d., 0.085" i.d. Connecting Tube and Fittings	**AS2002-050A09**
101mm i.d.		
1. Base Parts Kit	Non-Water-Jacketed Kit, 40cm long, for bed lengths up to 15cm	**SA4004-N10140**
	Water-Jacketed Kit, 40cm long, for bed lengths up to 15cm	**SA4004-101040**
	Non-Water-Jacketed Kit, 70cm long, for bed lengths up to 30cm	**SA4004-N10170**
	Water-Jacketed Kit, 70cm long, for bed lengths up to 30cm	**SA4004-101070**
2. Piston Assembly (Need Qty. 2)	Piston Assembly with 1µm frit	**AS4004-101A01**
	Piston Assembly with 2µm frit	**AS4004-101A06**
	Piston Assembly with 5µm frit	**AS4004-101A02**
3. Spring Kit	Spring Kit for packing pressures from 1000 to 2000psig	**AS4004-101A03**
	Spring Kit for packing pressures from 500 to 900psig	**AS4004-101A04**
	Spring Kit for packing pressures up to 400psig	**AS4004-101A05**
4. Tubing and Connectors	1/8" o.d., 0.060" i.d. Connecting Tube and Fittings	**AS2002-050A08**
	1/8" o.d., 0.085" i.d. Connecting Tube and Fittings	**AS2002-050A09**

more info

For a listing of the individual parts included in the kits and assemblies above, please refer to page 162.

tech tip

Selecting the correct frit porosity ensures particles are retained in the column while contributing minimally to backpressure. See the recommendation below.

Particle Size	Recommended Frit Porosity
<5µm	**1µm**
5–10µm	**2µm**
>10µm	**5µm**

Spring™ Column Hardware

Repack Kits for Spring™ Columns

Popular frit porosities, 2µm and 5µm, are available bundled with the appropriate replacement consumables needed when repacking. 1µm frits are available below in the replacement parts list.

The 25 and 50mm i.d. repack kits contain consumable parts for three repacks. The 101mm i.d. repack kits contain parts for one repack.

Repack Kits for Spring™ Column Modules

		Includes:		Part No.
Column Dimensions	Qty.	Part No.	Description	
25mm i.d.				
With 2µm Frits	3	AF0000-C02502	Outlet Frit, 2µm	**AS2002-025A16**
	3	AH0000-R025A1	Outlet O-ring Set	
	3	AF0000-D02501	Outlet Disperser Frit	
	3	AS2002-025A14	Piston Frit Replacement Kit*, 2µm	
With 5µm Frits	3	AF0000-C02503	Outlet Frit, 5µm	**AS2002-025A17**
	3	AH0000-R025A1	Outlet O-ring Set	
	3	AF0000-D02501	Outlet Disperser Frit	
	3	AS2002-025A13	Piston Frit Replacement Kit*, 5µm	
50mm i.d.				
With 2µm Frits	3	AF0000-B05002	Outlet Frit, 2µm	**AS2002-050A18**
	3	AH0000-R050A1	Outlet O-ring Set	
	3	AF0000-D05001	Outlet Disperser Frit	
	3	AS2002-050A16	Piston Frit Replacement Kit*, 2µm	
With 5µm Frits	3	AF0000-B05003	Outlet Frit, 5µm	**AS2002-050A19**
	3	AH0000-R050A1	Outlet O-ring Set	
	3	AF0000-D05001	Outlet Disperser Frit	
	3	AS2002-050A15	Piston Frit Replacement Kit*, 5µm	
101mm i.d.				
With 2µm Frits	2	AS4004-101A18	Piston Frit Replacement Kit*, 2µm	**AS4004-101A20**
	2	AS4004-101011	Piston O-ring	
	2	AS4004-101012	PTFE Sleeve	
With 5µm Frits	2	AS4004-101A17	Piston Frit Replacement Kit*, 5µm	**AS4004-101A21**
	2	AS4004-101011	Piston O-ring	
	2	AS4004-101012	PTFE Sleeve	

*Components of the Piston Frit Replacement Kit are listed below.

Replacement Parts for Spring™ Columns

In addition to the repack kits listed above, a full array of individual component replacement parts may be ordered from the list below.

Spring™ Column Replacement Parts

Description	For 25mm i.d.	For 50mm i.d.	For 101mm i.d.
Top Restraint	—	—	**AS4004-101008**
Bottom Restraint	—	—	**AS4004-101009**
Piston Top	—	—	**AS4004-101010**
Piston O-ring	**AS2002-025011**	**AS2002-050011**	**AS4004-101011**
Guide Tube	**AS2002-025013**	**AS2002-050013**	**AS4004-101013**
Column Body, 40 cm Long Non-Water-Jacketed	**FS2002-025040**	**FS2002-050040**	**AS4004-N10140**
Column Body, 70 cm Long Non-Water-Jacketed	**FS2002-025070**	**FS2002-050070**	**AS4004-N10170**
Column Body, 40 cm Long Water-Jacketed	**FS2002-W25040**	**FS2002-W50040**	**AS4004-101040**
Column Body, 70 cm Long Water-Jacketed	**FS2002-W25070**	**FS2002-W50070**	**AS4004-101070**
Outlet Disperser Frit	**AF0000-D02501**	**AF0000-D05001**	—
Outlet Frit, 1µm	**AF0000-C02501**	**AF0000-B05001**	—
Outlet Frit, 2µm	**AF0000-C02502**	**AF0000-B05002**	—
Outlet Frit, 5µm	**AF0000-C02503**	**AF0000-B05003**	—
Outlet O-ring Set	**AH0000-R025A1**	**AH0000-R050A1**	—
Replacement Bolts, Nuts, and Washers for Non-Water-Jacketed Column	**AS2002-025A08**	**AS2002-050A10**	—
Replacement Bolts, Nuts, and Washers for Water-Jacketed Column	**AS2002-025A11**	**AS2002-050A13**	—
Threaded Spacer for 40cm Long Column	**AS2002-025000**	**AS2002-050000**	**AS4004-101000**
Threaded Spacer for 70cm Long Column	**AS2002-025001**	**AS2002-050001**	**AS4004-101001**
Threaded Flange	**AS2002-025002**	**AS2002-050002**	**AS4004-101002**
Packing Spacer	**AS2002-025003**	**AS2002-050003**	**AS4004-101003**
Unpacking Spacer for 40cm Long Columns	**AS2002-025004**	**AS2002-050004**	**AS4004-101004**
Unpacking Spacer for 70cm Long Columns	**AS2002-025005**	**AS2002-050005**	**AS4004-101005**
Piston	**AS2002-025007**	**AS2002-050007**	**AS4004-101007**
Piston Frit Replacement Kit (Piston O-ring, 1µm Double Density Frit, PTFE Sleeve), 1µm	**AS2002-025A12**	**AS2002-050A14**	**AS4004-101A16**
Piston Frit Replacement Kit (Piston O-ring, 2µm Double Density Frit, PTFE Sleeve), 2µm	**AS2002-025A14**	**AS2002-050A16**	**AS4004-101A18**
Piston Frit Replacement Kit (Piston O-ring, 5µm Double Density Frit, PTFE Sleeve), 5µm	**AS2002-025A13**	**AS2002-050A15**	**AS4004-101A17**
PTFE Sleeve	**AS2002-025010**	**AS2002-050010**	**AS4004-101012**

Axial SFC Column Hardware

For Use with Multipacker® Packing Instruments

7413

- High efficiency packing mechanism
- Rated to 5000psig for SFC
- Easily packed by end-user with Multipacker® instrument

Grace Axial SFC Columns are design-related to Spring™ Column axial compression columns. They are packed with the same, easy-to-use Multipacker® packing systems but are designed with the requirements of supercritical fluid chromatography in mind. Custom seals, suitable for use with supercritical CO_2 at pressures up to 5000psig, are manufactured specially for Grace. The axial compression packing mode is still employed. However, the internal spring axial compression has been omitted because of the high pressures typical in SFC systems and the low visosity of the mobile phase, which makes void formation less likely.

Axial SFC Column Hardware Specifications	
Wet Surfaces:	Electropolished Type 316 Stainless Steel, PTFE
Column Body:	Electropolished Type 316 Stainless Steel
Piston:	Electropolished Type 316 Stainless Steel
Threaded Spacer:	Type 6061 Aluminum
Endplate:	Electropolished Type 316 Stainless Steel
Bolting Hardware:	Grade 8, qualified for pressure vessels
Frits:	Passivated Sintered Type 316 Stainless Steel
O-ring Seals:	PTFE
Lip Seals:	Turcon®
Backup Ring:	Bronze
Pressure Rating:	5000psig (345 bar)
Max. Temperature:	135°C (275°F)

Rugged SFC Sealing System

The sealing materials for axial SFC columns have been chosen for their compatibility with modified supercritical carbon dioxide typically employed in SFC systems. The seal system is rated for continuous operation at pressures of up to 5000psig (345 bar).

Piston

A pure PTFE O-ring primary seal and a Turcon® spring-loaded lip secondary seal comprise the sealing mechanism for the piston.

7405

7406

Column Outlet

The column outlet seals system is composed of a Turcon® spring-loaded lip seal and a bronze backup ring.

7407

7408

related products

Refer to page 172 for more information on the Multipacker® packing stations used to pack Axial SFC column hardware.

7403

Axial SFC Column Hardware

Complete Axial SFC Column Hardware Kits

Complete hardware kits are available under single catalog numbers for standard 25mm i.d. and 50mm i.d. water-jacketed axial SFC columns, as shown below. Individual components and replacement parts are listed on the following two pages.

Axial SFC Columns

		Includes:	Part No.
Column Dimensions	Part No.	Description	
25mm i.d.			
25mm i.d. x 40cm, Water-Jacketed	AY2002-W25040 AY2002-025A01 AF0000-C02501 AS2002-025A07	Base Column Parts Kit*, 40cm long column, for bed lengths up to 15cm Piston Assembly with 1µm frit Outlet Frit, 1µm 1/16" o.d., 0.020" i.d. Connecting Tube and Fittings	**SY2002-W25040**
25mm i.d. x 70cm, Water-Jacketed	AY2002-W25070 AY2002-025A01 AF0000-C02501 AS2002-025A07	Base Column Parts Kit*, 70cm long column, for bed lengths up to 30cm Piston Assembly with 1µm frit Outlet Frit, 1µm 1/16" o.d., 0.020" i.d. Connecting Tube and Fittings	**SY2002-W25070**
50mm i.d.			
50mm i.d. x 40cm, Water-Jacketed	AY2002-W50040 AY2002-050A01 AF0000-B05001 AS2002-050A07	Base Column Parts Kit*, 40cm long column, for bed lengths up to 15cm Piston Assembly with 1µm frit Outlet Frit, 1µm 1/8" o.d., 0.060" i.d. Connecting Tube and Fittings	**SY2002-W50040**
50mm i.d. x 70cm, Water-Jacketed	AY2002-W50070 AY2002-050A01 AF0000-B05001 AS2002-050A07	Base Column Parts Kit*, 70cm long column, for bed lengths up to 30cm Piston Assembly with 1µm frit Outlet Frit, 1µm 1/8" o.d., 0.060" i.d. Connecting Tube and Fittings	**SY2002-W50070**

*See page 162 for listing of components included in Base Column Parts Kit.

more info

Supercritical Fluid Chromatography (SFC)

Supercritical fluids, first discovered in 1879, have been used for extraction applications since the 1950s. The 1980s saw an increase in their use as mobile phases for supercritical fluid chromatograpy (SFC). The mobile phase most commonly used in SFC is supercritical CO_2.

Supercritical CO_2 as a mobile phase provides high solubility and high column loading for many substances. In addition, CO_2 and other supercritical fluids have very low viscosity which enables faster separations and extractions. Collection of concentrated product is also facilitated by the ready evaporation of the mobile phase under ambient conditions.

SFC today is just another type of high-performance chromatography, either normal or reversed phase, ideally suited for the analysis of thermally labile molecules with low or moderate molecular weight.

Any molecule that will dissolve in methanol or a less polar solvent is a good candidate for SFC. Many strong bases that are difficult to separate by other techniques separate rapidly and efficiently with good peak shape in SFC.

This technique in recent times has attracted new applications in drug discovery and drug purification because of its speed of separation and simplicity of fraction collection.

SFC requires columns with hardware and seals designed to withstand higher operating pressures. Grace's Axial SFC columns are designed to meet these requirements and offer in addition the advantage of a long-life column prepared using proven axial compression packing techniques.

technical assistance

Contact Tech Support: Phone: 1.800.255.8324 (North America)
Email: contact.alltech@grace.com
Online: www.discoverysciences.com

Axial SFC Column Components

How to Order Axial SFC Columns

Axial SFC columns can be ordered as a complete kit, as seen on page 167, or customized selecting the options that best suit your needs, as shown below. Axial SFC columns are offered in two lengths, 40cm and 70cm. A 40cm column body can accommodate up to a 15cm length packed bed and the 70cm column body can accommodate up to a 30cm length packed bed.

7413

Each complete column consists of four components:

1. The Base Spring™ Column Parts Kit includes:
   a. Column Body Axial SFC
   b. All Seals and O-rings
   c. Locking Mechanism
   d. Guide Tube
   e. Endplate
   f. Assembly Hardware
   g. Packing Spacers (for 70cm length columns)
2. A Ready-to-Use Piston Assembly consisting of the piston body, piston frit, PTFE sleeve, and piston seal. The piston assembly can be ordered with a 1µm or 5µm frit porosity.
3. An Outlet Frit. Choose 1µm or 5µm frit porosity.
4. Tubing and Connectors. Choose tubing with an outer diameter and bore that suits your needs.

Experienced Axial SFC Column users can build customized Axial SFC Columns by individually selecting the components that best meet their needs.

Axial SFC Columns

Column Dimensions	Description	Part No.
25mm i.d.		
1. Base Parts Kit	Non-Water-Jacketed Axial SFC Column Kit, 40cm long, for bed lengths up to 15cm	**AY2002-025040**
	Water-Jacketed Axial SFC Column Kit, 40cm long, for bed lengths up to 15cm	**AY2002-W25040**
	Non-Water-Jacketed Axial SFC Column Kit, 70cm long, for bed lengths up to 30cm	**AY2002-025070**
	Water-Jacketed Axial SFC Column Kit, 70cm long, for bed lengths up to 30cm	**AY2002-W25070**
2. Piston Assembly	Piston Assembly with 1µm frit	**AY2002-025A01**
	Piston Assembly with 5µm frit	**AY2002-025A02**
3. Outlet Frit	Outlet Frit, 1µm	**AF0000-C02501**
	Outlet Frit, 5µm	**AF0000-C02503**
4. Tubing and Connectors	1/16" o.d., 0.020" i.d. Connecting Tube and Fittings	**AF2002-025A06**
	1/16" o.d., 0.040" i.d. Connecting Tube and Fittings	**AF2002-025A07**
50mm i.d.		
1. Base Parts Kit	Non-Water-Jacketed Axial SFC Column Kit, 40cm long, for bed lengths up to 15cm	**AY2002-050040**
	Water-Jacketed Axial SFC Column Kit, 40cm long, for bed lengths up to 15cm	**AY2002-W50040**
	Non-Water-Jacketed Axial SFC Column Kit, 70cm long, for bed lengths up to 30cm	**AY2002-050070**
	Water-Jacketed Axial SFC Column Kit, 70cm long, for bed lengths up to 30cm	**AY2002-W50070**
2. Piston Assembly	Piston Assembly with 1µm frit	**AY2002-050A01**
	Piston Assembly with 5µm frit	**AY2002-050A02**
3. Outlet Frit	Outlet Frit, 1µm	**AF0000-B05001**
	Outlet Frit, 5µm	**AF0000-B05003**
4. Tubing and Connectors	1/16" o.d., 0.040" i.d. Connecting Tube and Fittings	**AF2002-050A07**
	1/8" o.d., 0.060" i.d. Connecting Tube and Fittings	**AF2002-050A08**
	1/8" o.d., 0.085" i.d. Connecting Tube and Fittings	**AF2002-050A09**

more info
For a listing of the individual parts included in the kits and assemblies above, please refer to page 166.

Axial SFC Column Components

Repack Kits for Axial SFC Columns

Each repack kit contains consumable parts for one column repack.

Repack Kit for Spring™ Columns

	Includes:		Part No.
Column Dimensions	Part No.	Description	
25mm i.d.			
With 1µm Frits	AF0000-C02501	Outlet Frit, 1µm	**AY2002-025A14**
	AH0000-R025A2	Seal Ring Set for Axial SFC Column Outlet	
	AF0000-D02501	Outlet Disperser Frit	
	AY2002-025A12	Piston Frit Replacement Kit*, 1µm	
With 5µm Frits	AF0000-C02503	Outlet Frit, 5µm	**AY2002-025A15**
	AF0000-D02501	Outlet Disperser Frit	
	AH0000-R025A2	Seal Ring Set for Axial SFC Column Outlet	
	AY2002-025A13	Piston Frit Replacement Kit*, 5µm	
50mm i.d.			
With 1µm Frits	AF0000-B05001	Outlet Frit, 1µm	**AY2002-050A12**
	AH0000-R050A2	Seal Ring Set for Axial SFC Column Outlet	
	AF0000-D05001	Outlet Disperser Frit	
	AY2002-050A14	Piston Frit Replacement Kit*, 1µm	
With 5µm Frits	AF0000-B05003	Outlet Frit, 5µm	**AY2002-025A15**
	AF0000-D05001	Outlet Disperser Frit	
	AH0000-R050A2	Seal Ring Set for Axial SFC Column Outlet	
	AY2002-050A15	Piston Frit Replacement Kit*, 5µm	

*Components of the Piston Frit Replacement Kit are listed below.

Replacement Parts for Axial SFC Columns

In addition to the repack kits listed above, a full array of replacement parts may be ordered from the list below.

Spring™ Column Replacement Parts

Description	For 25mm i.d.	For 50mm i.d.
Outlet Disperser Frit	**AF0000-D02501**	**AF0000-D05001**
Outlet Frit, 1µm	**AF0000-C02501**	**AF0000-B05001**
Outlet Frit, 5µm	**AF0000-C02503**	**AF0000-B05003**
Seal Ring Set for Axial SFC Column Outlet	**AH0000-R025A2**	**AH0000-R050A2**
Replacement Bolts, Nuts, and Washers for Non-Water-Jacketed Column	**AY2002-025A08**	**AY2002-050A10**
Replacement Botls, Nuts, and Washers for Water-Jacketed Column	**AY2002-025A11**	**AY2002-050A13**
Threaded Spacer for 40cm Long Column	**AS2002-025000**	**AS2002-050000**
Threaded Spacer for 70cm Long Column	**AS2002-025001**	**AS2002-050001**
Threaded Flange	**AS2002-025002**	**AS2002-050002**
Packing Spacer	**AS2002-025003**	**AS2002-050003**
Unpacking Spacer for 70cm Long Columns	**AS2002-025005**	**AS2002-050005**
Piston	**AY2002-025007**	**AY2002-050007**
Piston Frit Replacement Kit, 1µm; Piston O-ring, spring-loaded seal, PTFE sleeve, 1µm Double-Density Frit	**AY2002-025A12**	**AY2002-050A14**
Piston Frit Replacement Kit, 5µm; Piston O-ring, spring-loaded seal, PTFE sleeve, 5µm Double-Density Frit	**AY2002-025A13**	**AY2002-050A15**
Piston Seal for Axial SFC Column	**AY2002-025011**	**AY2002-050011**
PTFE Sleeve	**AS2002-025010**	**AS2002-050010**

Empty MODcol® Flanged Columns

- Robust 316 stainless steel construction
- Double seals prevent leaks
- Novel flow distribution ensures high chromotographic performance

Modular in construction and manufactured to the highest standards, these patented stainless steel columns are known for durability and their special leakproof seal system. A uniform approach to the design of MODcol® column components is used across the MODcol® preparative, semi-preparative and industrial column product lines.

All MODcol® flanged columns are constructed from high-quality 316 stainless steel alloy and electro-polished to provide the highest possible corrosion protection and chemical inertness. The flanged construction is rugged and conservatively rated at 2000psig. Column closure is achieved with high-strength bolts and heavy-duty endplates that are engineered to provide long product life. The simplicity of this design, without threads or other parts that can wear out, makes the hardware reusable and repackable.

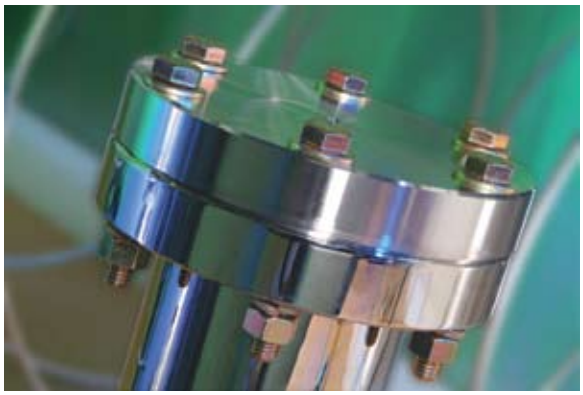
Each empty column kit comes with the following:

- One column body
- One pair of end plates
- Frits, o-rings, and tubing connectors

related products

Custom packing of MODcol® Flanged Columns is available.
Refer to page 174.

Sizes other than those listed are available on a custom basis. Please contact Grace for assistance.



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Empty MODcol® Flanged Column Kits (Complete)

i.d.	Length					
	5cm Part No.	10cm Part No.	15cm Part No.	25cm Part No.	30cm Part No.	50cm Part No.
25mm	**FA0000-025005**	**FA0000-025010**	**FA0000-025015**	**FA0000-025025**	**C**	**C**
30mm	**FA0000-030005**	**FA0000-030010**	**FA0000-030015**	**FA0000-030025**	**C**	**C**
50mm	**FA0000-050005**	**FA0000-050010**	**FA0000-050015**	**FA0000-050025**	**FA0000-050030**	**FA0000-050050**
101mm	**—**	**FA0000-101010**	**FA0000-101015**	**FA0000-101025**	**FA0000-101030**	**FA0000-101050**

C = available as a custom order.

Parts for MODcol® Flanged Columns

i.d.	Assembly Hardware Part No.	Seal Rings/O-Rings (set) Part No.	Disperser Frits (pair) Part No.	Bed-Support Frits (pair)* Part No.
25mm	**AH0000-A02501**	**AH0000-R025A1**	**AF0000-D025A1**	**AF0000-B025Ax**
30mm	**AH0000-A03001**	**AH0000-R030A1**	**AF0000-D030A1**	**AF0000-B030Ax**
50mm	**AH0000-A05001**	**AH0000-R050A1**	**AF0000-D050A1**	**AF0000-B050Ax**
101mm	**AH0000-A10101**	**AH0000-R101A1**	**AF0000-D101A1**	**AF0000-B101Ax**

*When specifying the part number for flanged column frits, please indicate the desired porosity by substituting the trailing "x" with: "1" for 1µm, "2" for 2µm, "3" for 5µm, "4" for 10µm.

MODcol® Mobile Column Stand, Holder, and Tray

i.d.	Part No.
101mm	**A00000-101000**

Stainless Steel Tubing, Fittings, and Connectors

Description	Part No.
1/16" o.d., 0.020" i.d. Connecting Tube and Fittings*	**AS2002-025A06**
1/16" o.d., 0.040" i.d. Connecting Tube and Fittings*	**AS2002-025A07**
1/8" o.d., 0.060" i.d. Connecting Tube and Fittings**	**AS2002-050A08**
1/8" o.d., 0.085" i.d. Connecting Tube and Fittings**	**AS2002-050A09**

*1 union, 1 nut, 1 ferrule, and 2 plugs. Compatible with flanged and spring columns up to 25mm i.d.
**1 union, 1 nut, 1 ferrule, 2 plugs, and 2 female reducers 1/8" to 1/16." Compatible with flanged and spring columns of 30mm i.d. and greater.

Process Scale Columns and Systems by Peak Biotech A/S

Grace is a global distributor of Peak Biotech A/S columns and systems. This partnership with Peak extends Grace's column line to provide customers a completely scalable solution, from pre-packed prep columns to bulk chromatography adsorbents and process scale columns and systems. The coordination between bulk media and process column manufacturer reduces scale-up risk. Peak's products are of the highest quality, and are trusted throughout the pharmaceutical and biotech industry.

Dynamic Axial Compression Columns: 50–1000mm i.d.

Features:

- Easy packing and unpacking
- Uniform distribution system
- Removable frit design for easy cleaning or replacement
- High performance and reproducibility
- Leak detection system
- No sealing adjustment needed
- Scalable
- Mobile construction up to 300mm
- Ergonomic working positions

Column Specifications:	
Diameters:	From 50–1000mm
Pressure Rated:	To 100 bar
Sealing Materials:	PTFE and PEEK
Material of Construction:	1.4404, 1.4435, SS316L, SAF2205
Construction Code:	PED or ASME

High-Pressure Chromatography Systems

Features:

- Gradient performance with high accuracy
- Fully automated, CFR Part 11 and GAMP 4 compliant
- Mobile construction
- Complete unit, tested and documented
- Compact and reliable
- Flexible control
- Easy maintenance
- Sanitary design

System Specifications:	
Flow Rates:	6–5000L/h for medium pressure
Flow Rates:	6–1000L/h for high pressure
Pressure Rating:	0–20 bar and 0–80 bar
Gradient Loop:	Feedback for NIR, mass or conductivity
Inlets:	4 buffer inlets, 1 product and 5 fractions
Sealing Material:	PTFE
Material of Construction:	1.4404, 1.4435, SS316L

Software Control

Features:

- Based on Siemens™ PCS 7
- Fully automated
- CFR Part 11 compliant
- GAMP 4 compliant
- Programmed according to S88 standard
- Fully tested and validated
- Flexible control

ordering information

Contact your Grace sales representative or customer service to review the column and system options and custom build your Peak Biotech system.

related products

Also available from Peak Biotech:

- Slurry Handling Equipment
- Ultra-sonic Baths
- Buffer Systems
- Tanks
- Flanged Columns / mech. compress columns
- Low and medium pressure columns
- Low and medium pressure systems

Multipacker® Packing Stations

- Axial packing for high efficiency
- Identicle, high performing columns every time
- Easy to use
- Pack multiple columns on demand
- Economically priced

Multipacker® instruments are easy-to-use high-performance packing stations specifically designed for packing Spring™ Columns. Three separate instruments are available for packing 25mm i.d., 50mm i.d., and 101mm i.d. columns. Their ease of operation and short cycle times provide a self-contained versatile column-packing solution.

Spring™ Column hardware offers outstanding convenience and flexibility when used with Multipacker® instruments. The ability to vary bed length continuously up to 30cm and the advantages of the Spring-driven axial compression mechanism provide a high-performance adaptive solution for both product development and process chromatography. Furthermore, compared to traditional column packing processes, Spring™ Column packing requires significantly less adsorbent per column because the bed is formed from the entire quantity of adsorbent introduced into the column, without wastage. More columns can be packed from the same batch of medium, reducing concerns about lot-to-lot variations. Also, because adsorbent requirements are reduced, the cost of a Multipacker® instrument is recovered quickly.

Once packed, Spring™ Column units are independent and maintain axial compression when used separately from the Multipacker® instrument. Consequently, one Multipacker® instrument can be used to maintain an entire fleet of Spring™ Column modules. For the first time, chromatographers have the ability to pack columns on demand and quickly respond to in-house column needs.

Multipacker® instruments provide several unique advantages. You have the ability to pack columns when and where they are needed. You save money with every column packed and less adsorbent is required. You have control of bed length and column volume, and columns can easily be unpacked, with recovery of adsorbent, and repacked in a matter of minutes.

A Multipacker® axial-compression system is able to pack columns at low pressures, so less robust media can be protected from damage and their performance preserved. Reduced mechanical damage to adsorbent with a Multipacker® instrument makes it the perfect match for delicate, non-silica-based media.

Unlike column-packing systems that use awkward hand pumps and can require hours for column packing, Spring™ Column packing takes only minutes and operates with the push of a button. Multipacker® instruments use modular construction that makes them lightweight and easily assembled or disassembled. Key components are produced using advanced aluminum casting techniques that reduce manufacturing costs and provide high strength and reliability.

25 and 50mm i.d. Multipacker® Instruments.

technical assistance

Contact Tech Support: Phone: 1.800.255.8324 (North America)
Email: contact.alltech@grace.com
Online: www.discoverysciences.com

related products

Refer to pages 162–169 for more information on Spring™ Columns for use with Multipacker® packing stations.

Multipacker® Packing Stations

The World's Most Innovative Preparative Column Packing System

Multipacker® Series 2002 Instrument for 25mm i.d. Spring™ Column Modules
Part No.
IM2002-025IM1

Multipacker® Series 2002 Instrument for 50mm i.d. Spring™ Column Modules
Part No.
IM2002-050IM1

Multipacker® Series 2002 Two-Instrument Bundle for 25mm i.d. and 50mm i.d. Spring™ Column Modules
Part No.
IM2002-025050

Multipacker® Instrument for 101mm i.d. Spring™ Column Modules
Part No.
IM2002-101IM1

more info

For a short web animation and video demonstration, visit the MODcol® section of our website at www.discoverysciences.com/modcol.

related products

Multipacker® instruments require Spring™ Column hardware, purchased separately, for column packing. See listing on pages 162–169.

7404

101mm Multipacker® Instrument.

Column Packing Services

- Experience packing hundreds of types of media, Grace and non-Grace media
- Packing service available for Spring™ Columns and Flanged Column hardware
- Column Efficiency Report (CER) provided with each column

Since 1982 Grace's MODcol® division has successfully packed thousands of preparative columns with hundreds of different media. Proven proprietary procedures together with quality hardware allow Grace to provide preparative columns with high efficiency, excellent resolution and low backpressure.

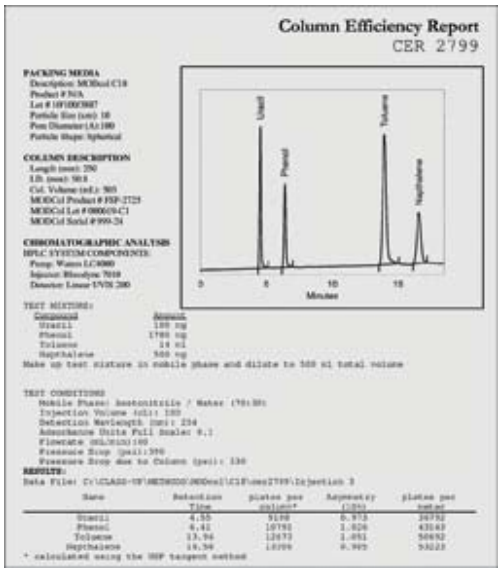
The result of each packing is validated and presented to the customer in the form of a Column Efficiency Report (CER). This report summarizes the product, the testing protocol, and presents the chromatographic data in a graphical and tabular format that is easy to understand. Only when the customer approves the result is the column shipped.

Grace supplies end users with the world's only ready-to-use axial compression system, the prepacked Spring™ Column unit. Empty Spring™ Column hardware can be ordered and, combined with media purchased from Grace or supplied by the end user and the packing services shown below, delivered as a ready-to-use product. Grace packs Spring™ Column units using the Multipacker® instruments described earlier in this section. Purchasing a prepacked Spring™ Column unit is a great way to evaluate the performance of this novel product under real-world conditions. Unpacking and repacking the Spring™ Column unit must be done by Grace or on a user's own Multipacker® instrument.

Each custom-packed Spring™ Column unit is validated as described above.

Please note that the 40cm long Spring™ Column body can accommodate bed lengths up to15cm, and the 70cm-long Spring™ Column body can accommodate a maximum bed length of 30cm. For intermediate beds, please specifiy the length to be packed by modifying the last two digits of the part number shown, e.g., for a 50mm i.d. x 40cm Spring™ Column unit packed to a bed height of 12cm, specify part number **PS0000-050412**. For information concerning the amount of media that will be required to pack a particular bed length please call your local sales person, distributor, or Grace technical support.

Column Efficiency Report (CER)



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technical assistance

Contact Tech Support: Phone: 1.800.255.8324 (North America)
Email: contact.alltech@grace.com
Online: www.discoverysciences.com

Column Packing Services for Flanged Columns

i.d.	Length					
	5cm	10cm	15cm	25cm	30cm	50cm
25mm	**PA0000-025005**	**PA0000-025010**	**PA0000-025015**	**PA0000-025025**	**C**	**C**
30mm	**PA0000-030005**	**PA0000-030010**	**PA0000-030015**	**PA0000-030025**	**C**	**C**
50mm	**PA0000-050005**	**PA0000-050010**	**PA0000-050015**	**PA0000-050025**	**PA0000-050030**	**PA0000-050050**
101mm	**—**	**PA0000-101010**	**PA0000-101015**	**PA0000-101025**	**PA0000-101030**	**PA0000-101050**

C = available as custom.

Column Packing Services for Spring™ Column and Axial SFC Column

Column i.d.	Bed Length				
	5cm	10cm	15cm	25cm	30cm
25mm x 40cm	**PS0000-025405**	**PS0000-025410**	**PS0000-025415**	**—**	**—**
25mm x 70cm	**PS0000-025705**	**PS0000-025710**	**PS0000-025715**	**PS0000-025725**	**PS0000-025730**
50mm x 40cm	**PS0000-050405**	**PS0000-050410**	**PS0000-050415**	**—**	**—**
50mm x 70cm	**PS0000-050005**	**PS0000-050710**	**PS0000-050715**	**PS0000-050725**	**PS0000-050730**
101mm x 40cm	**PS0000-101405**	**PS0000-101410**	**PS0000-101415**	**—**	**—**
101mm x 70cm	**PS0000-101005**	**PS0000-101710**	**PS0000-101715**	**PS0000-101725**	**PS0000-101730**

Bulk Chromatographic Media Introduction

Grace–The Foremost Name in Silica Materials Science

Davison Chemical, forerunner of the Grace Davison Silica Products business, was founded in Baltimore, Maryland in 1832. Silica gel, was patented in 1919 and in the early 1920s Davison commercialized silica gel and began developing many new applications such as air drying, refrigeration, and packaging desiccants. Grace Davison has continued to expand applications for silica and has long been recognized for superior technical service, strong applications technology, and global customer support.

Quality, Consistency, and Proven Performance

Grace Davison's materials science expertise assures high-quality and consistency in its silica-based media products. Our bulk adsorbents are used to purify a number of FDA approved biopharmaceuticals and we provide regulatory support data for GMP applications.

All of our plants are ISO-9001 certified and our Hesperia, California plant is compliant with the IPEC-PQG GMP guidelines.

Unmatched Capacity, Global Reach, Expert Support

Our global presence and manufacturing capacity enables us to supply hundreds of tons of silica every year to some of the largest biotechnology and pharmaceutical manufacturing facilities. When you rely on Grace, you can count on consistent product quality, timely delivery and expert technical support.

Grace Key Bulk Media Families

Scalable Solutions: Silica and Hardware

Grace manufactures a range of completely scalable silica media. To help select the appropriate media for your applicaiton, we describe key media families and highlight unique phases within these families. Each family highlighted is available up to ton quantities for process scale applications.

Grace also provides a range of columns and skid systems from preparative to process scale that ensure optimal performance of our media (pages 162–174). Please contact your Grace sales representative to discuss a complete solution for your preparative or process scale needs.

GraceAlpha™

A new silica generation.

GraceAlpha™ combines increased column efficiencies and resolution with high loading capacity. A new silica (patent pending) makes this possible by combining a high-porosity surface, with a dense core, increasing mass transfer while yielding a mechanically robust particle.

Applications: High purity spherical silica suitable for peptides and small molecules (<2000 molecular weight)

Differentiated Phases: C18, C8, and Silica

Specifications: High purity spherical silica, monomerically bonded, endcapped, 120Å pores, 5µm–20µm

Formats: Analytical, Prep, Bulk Media

Vydac® MS

The best Vydac® media from the leader in peptide and protein separations for over 25 years.

Vydac® MS columns provide unique selectivity and exceptional protein recovery. Higher recoveries and yield under overloaded preparative conditions makes this column the leader in preparative reversed-phase protein purifications.

Applications: High purity spheroidal silica suitable for large molecules and proteins (>2000 molecular weight)

Differentiated Phases: C18, C8, C4

Specifications: Spheroidal silica, polymerically and monomerically bonded, endcapped, 300Å pore size, 10µm–30µm

Formats: Capillary, Microbore, Expedite™, Rocket™, Solvent-Reducer, Analytical, Prep, Bulk Media

Davisil®

Excellent mechanical and structural properties, Davisil® silica are globally recognized for their consistency and reliability.

The Davisil® silica line offers a range of pore diameters from 30Å to 2500Å with high surface area and narrow particle size distributions to offer the chromatographer the ultimate in selection and performance.

Applications: Economical granular silica for small molecules to large biomolecules

Differentiated Phases: Silica, C18, Cyano, Diol, Amino

Specifications: Granular silica, 30–2500Å pore sizes, 10µm–2000µm particle sizes

Format: Bulk Media

GraceAlpha™ Media

new

A New Silica Generation

- Increased loading capacity
- High resolution
- High efficiency DAC packing
- Produced in facility complaint to IPEC-PQG GMP guidelines
- Ultimately reproducible
- Mechanically strong

GraceAlpha™ Silica Specifications	
Pore Size:	120Å
Pore Volume:	0.95mL/g
Surface Area:	325m²/g
Chemical Purity:	<10ppm: Ca, Na, Fe, Al
Particle Shape:	Spherical

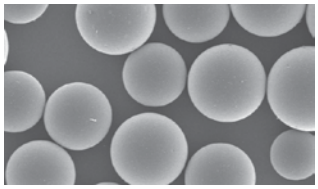
GraceAlpha™ Phases			
Phase	**Particle Sizes**	**Carbon Load**	**Endcapped**
C18	5, 10, 15, 20µm	15%	Yes
C8	5, 10, 15, 20µm	10%	Yes
Silica	5, 10, 15, 20µm	—	—

GraceAlpha™ Media

Particle Size	Bonding Chemistry	Part No.
5µm	C18	**3118572**
	C8	**3118573**
	Silica	**3118523**
10µm	C18	**3118571**
	C8	**3118575**
	Silica	**3118522**
15µm	C18	**3118570**
	C8	**3118574**
	Silica	**3118521**
20µm	C18	**Available Upon Request**
	C8	**Available Upon Request**
	Silica	**Available Upon Request**

more info

Refer to pages 152–155 for additional GraceAlpha™ application data.



7250

DAC Column Packing Study

GraceAlpha™ Demonstrates Superior Efficiency and Mechanical Strength

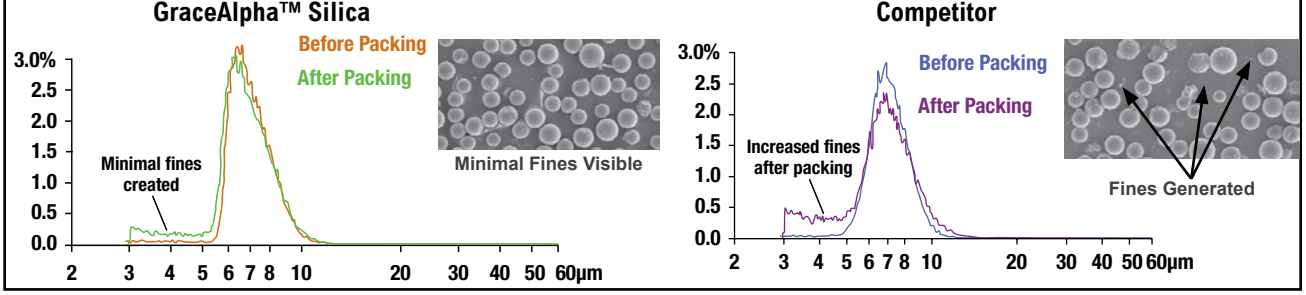
Experimental:
GraceAlpha™ C18 silica and a leading 100Å pore size competitor were packed under identical conditions in a Spring™ Column to evaluate particle strength and column efficiency under dynamic axial compression (DAC) conditions. Standard slurry and packing conditions were used (**Table 1**). Particle size measurements were taken before and after packing to measure particle breakage. Particles were sampled from the piston end of the column where most breakage occurs. Scanning electron microscopy (SEM) was then used to visually confirm the particle size analysis.

Table 1—Packing Conditions	
Hardware Dimension:	25mm i.d. x 400mm L Spring™ Column
Spring Strength:	1000-2000psig springs
Packing Pressure:	1500psig
Silica:	60g of 10µm silica
Packing Solvent Used:	150mL isopropanol

Table 2—Column Efficiency (biphenyl)	
GraceAlpha™	50,909 plates/meter
Competitor	40,264 plates/meter

Results:
Both columns were well packed with good efficiencies (**Table 2**). GraceAlpha™ showed a 25% greater efficiency; likely due to the elastic nature of its outer shell that allows optimal arrangement of particles under DAC conditions. Particle size analysis and SEM photos (**Figure 1**) both confirm the robust nature of the GraceAlpha™ particles that resists breakage.

Figure 1:
Particle size analysis by Beckman® Coulter of silica before and after DAC packing, and SEM of silica sampled from the piston after DAC packing.



Vydac® Media

300Å RP Protein Purification Pioneer

Pioneered by Grace and produced by a unique process based on purified oranosilicate starting materials, Vydac® silicas are well defined, high purity, totally porous separation media that meet the most demanding needs of preparative and process scale users. Proven in over two decades of applications for protein, peptide, and nucleic acid separations, Vydac® 300Å reversed-phase media have excellent selectivity and reproducibility. Bulk Vydac® adsorbents incorporate bonded phase chemistries identical to those in Vydac® brand analytical and prep HPLC columns, thereby assuring economical method development and reliable, dependable scale-up for preparative and process chromatographic applications.

Vydac® TP 300A Silica Specifications	
Pore Size:	300Å
Pore Volume:	0.6mL/g
Surface Area:	90m²/g
Particle Shape:	Spheroidal

Vydac® 300Å Media

	MS			TP					
Bonded Chemistry	Butylsilane C4 214MS	Octylsilane C8 208MS	Octadecylsilane C18 218MS	Butylsilane C4 214TP	Octylsilane C8 208TP	Octadecylsilane C18 218TP	Octadecylsilane C18 monomeric 238TP	Diphenylsilane 219TP	Silica 101TP
10–15µm Particles	**214MSB1015**	**208MSB1015**	**218MSB1015**	**214TPB1015**	**208TPB1015**	**218TPB1015**	**238TPB1015**	**219TPB1015**	**101TPB1015**
15–20µm Particles	**214MSB1520**	**208MSB1520**	**218MSB1520**	**214TPB1520**	**208TPB1520**	**218TPB1520**	**238TPB1520**	**219TPB1520**	**101TPB1520**
20–30µm Particles	**214MSB2030**	**208MSB2030**	**218MSB2030**	**214TPB2030**	**208TPB2030**	**218TPB2030**	**238TPB2030**	**219TPB2030**	**101TPB2030**

Available in 10g increments.

tech tip

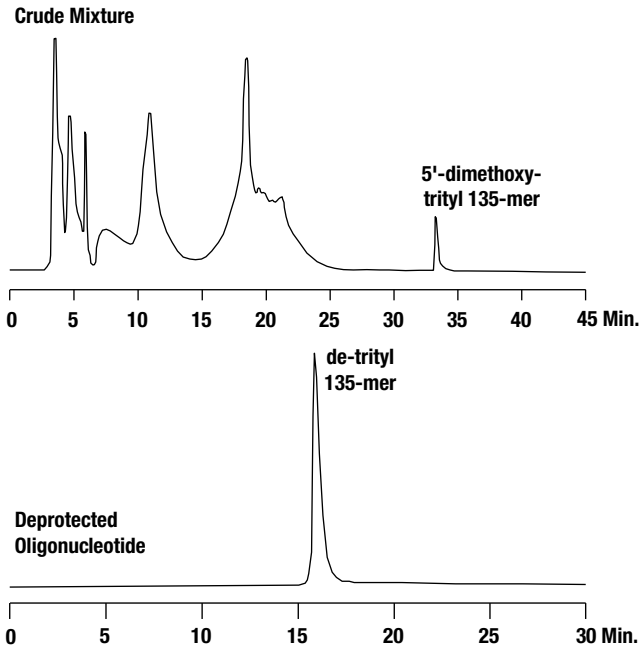
Vydac® MS vs. Vydac® TP

Both phases are based on the same high purity 300Å silica. However, MS undergoes an additional treatment prior to bonding that reduces the residual polar activity of the silica surface. For many applications this results in improved resolution and an increase in protein recovery.

Two-Stage Purification of a Synthetic 135-mer

Although generally recommended for oligonucleotides up to 75 bases, Vydac® 214TP columns have been used to purify much longer synthetic oligonucleotides. Here a 135-mer is purified by two stages of chromatography on a 214TP column—the first with the 5'-dimethoxytrityl protecting group still attached, causing strong retention, and the second after removal of the trityl group.

Column: Vydac® **214TP1010** C4, 10µm,10 x 250mm
Flow Rate: 5mL/min
Mobile Phase: **A:** 0.1 M Triethylammonium Acetate, pH 7.0
B: Acetonitrile
Gradient: **Crude:** 0 to 60% **B** from 5 to 40min
Deprotected: 0 to 20% **B** from 5 to 25min
Detector: UV at 260nm

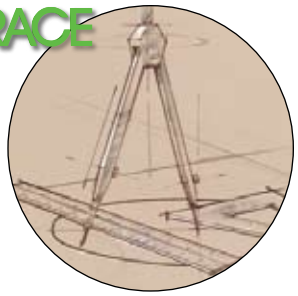


Data courtesy of Joseph Kosmoski and Dr. Michael Smerdon, Dept. of Biochemistry and Biophysics, Washington State University, Pullman, WA, USA

related products

Looking for Vydac® analytical columns?
See pages 84–95.

Davisil® Media



- High surface area
- Tight particle size distribution
- Wide range of pore sizes (30–2500Å) and particle sizes (10–2000µm) available
- Relied on for over 25 years

Recognized worldwide as media of high purity, Davisil® silica is the cornerstone of Grace's offering of silica media products. Consisting of irregularly shaped particles with excellent mechanical and structural properties, Davisil® silicas are versatile, consistent, and reliable. They are ideal for HPLC, solid phase extraction, flash chromatography, and scale-up to industrial process applications.

Higher Performance

Davisil® silica's chemical and structural properties are optimized for chromatographic performance. Tight control of these properties from raw material to finished product distinguishes Davisil® silica from the competition.*

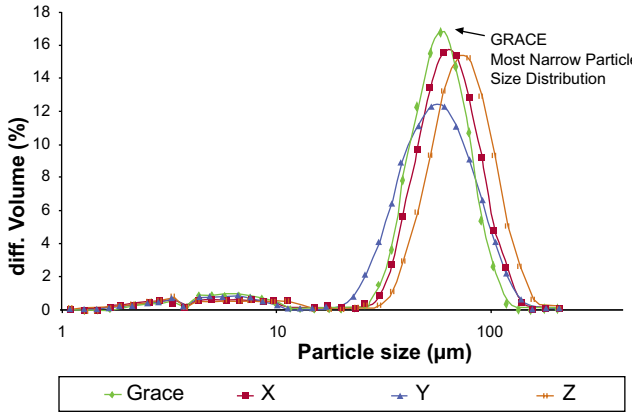
High Surface Area for Increased Loading Capacity

Company	Surface Area	Bulk Density	Surface Area of 1L Column
Grace	550m²/g	420g/L	231,000m²/L
X	515m²/g	430g/L	221,450m²/L
Y	460m²/g	430g/L	197,800m²/L
Z	450m²/g	450g/L	189,000m²/L

High Purity Silica to Reduce Unwanted Interactions and Contamination

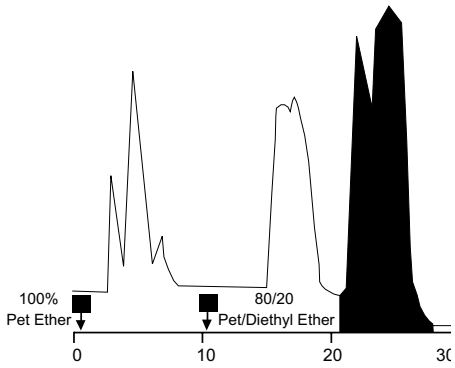
Company	Mg	Ca
Grace	25ppm	19ppm
X	27ppm	207ppm
Y	119ppm	793ppm
Z	212ppm	1775ppm

Tight Particle Size Distribution to Optimize Efficiency and Pressure Drop



*All comparative data generated on chromatographic silica labeled 60Å, 40–63µm.

Synthetic Intermediate Purification



Sample:	1g Reaction Products
Column:	50 x 500mm
Column Packing:	Davisil® LC60Å 20–45µm
Mobile Phase:	See Chromatogram
Flow Rate:	175mL/min (535cm/hr)
Detection:	UV at 254nm

Davisil® silica purification of a schiff base from a crude reaction mixture containing aldehyde, amine and other by-products. The good separation and loading capacity shown at the pilot scale allowed scale-up to a 300mm diameter column producing over 90g of purified product per run.

Global Technical Support

To assist customers, Grace offers advice, assistance or laboratory trials for intended process-scale use. Our field representatives can arrange for such support when required, as well as discuss our ability to customize grades tailored to your requirements.

Davisil® Media

Greater Selection

A wide range of Davisil® silica grades are available to meet your performance and economic requirements. The selection guide in this catalog will help you choose the best grade for your application.

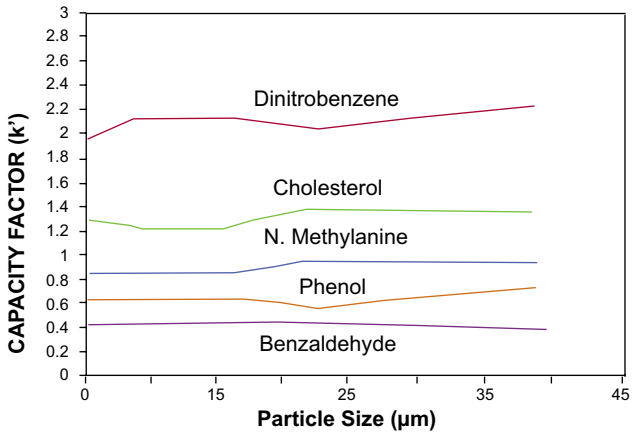
- Available in both normal phase bare silica and various bonding chemistries (C18, Amino, Diol, Cyano) for alternative selectivity
- Wide selection of distinct pore diameters (30–2500Å) for separation of various MW sizes
- Available from 500g to multi-ton quantities

DAVISIL® Silica

Look for this icon on products from Grace using Davisil® silica, such as TLC plates and SPE/ Flash cartridges, to experience the same great performance.

Predictable Scale-Up

Today we manufacture hundreds of tons of Davisil® chromatographic silica per year in multi-ton lots. Our manufacturing is at scale, so your manufacturing can be at scale. In scaling up, you can be confident that Davisil® chromatographic silica will yeild consistent performance as particle size is increased.



Uniform capacity (k') and selectivity (k') factors across all particle sizes for predictable scale-up.

Davisil® normal-phase silica functions through hydrophilic interactions, with more polar compounds generally retained longer. This makes it ideally suited for purification of:

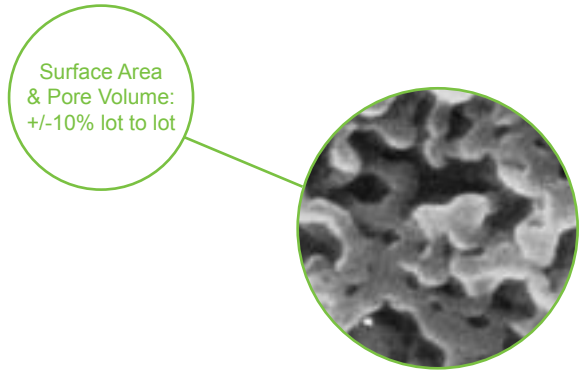
Chemical Synthesis Intermediates

Oils and Fats

Natural Products (vitamins, flavors, fragrances, etc.)

Unbeatable Product Reliability

Manufactured for over 25 years, Davisil® chromatographic silica is one of the world's most widely used chromatography sorbents.



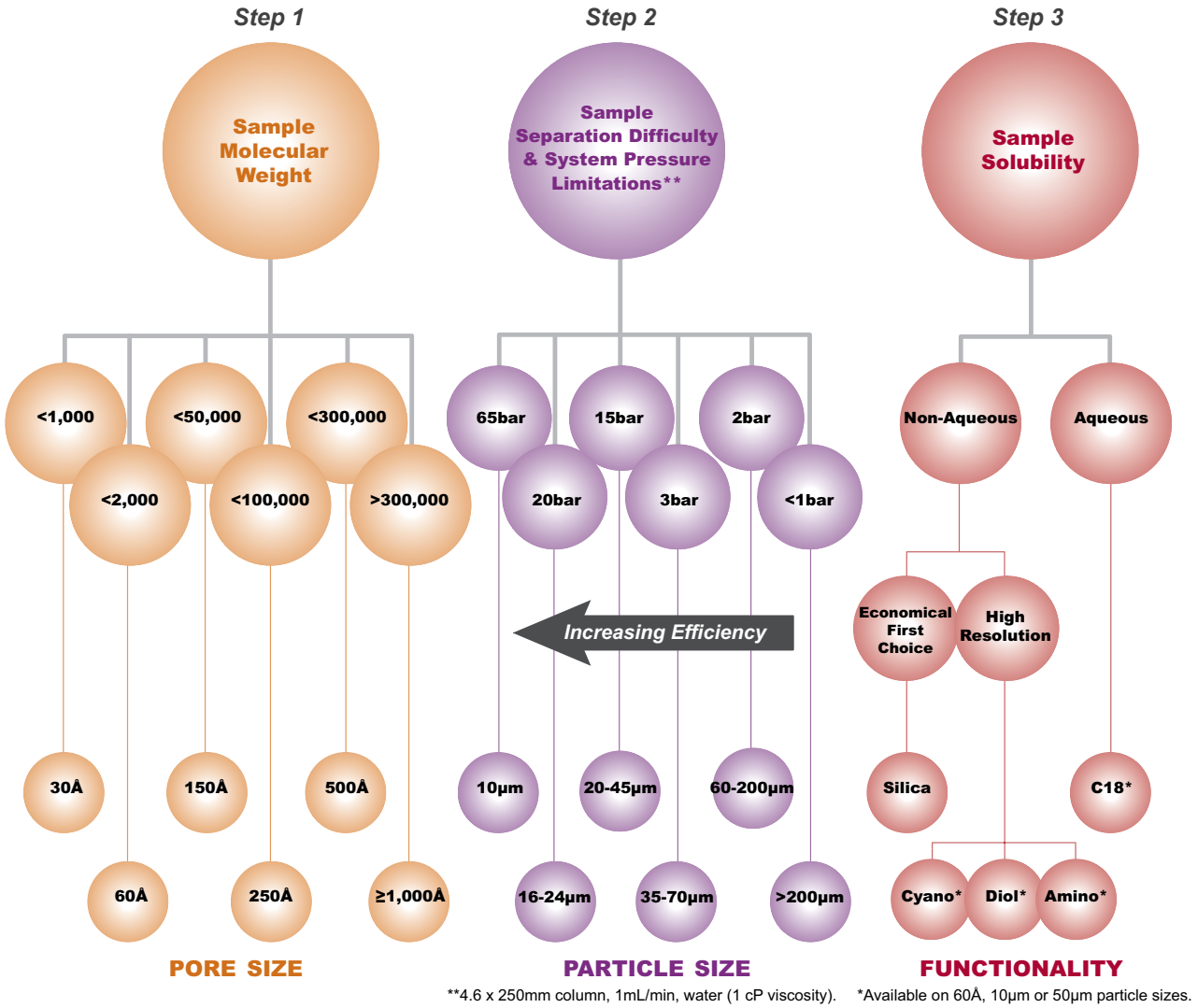
Produced at two ISO-9001 certified facilities under strict QC controls from raw material to finished product insures high lot-to-lot reproducibility.

Davisil® Media

Selection Guide

Many types of column packings are suitable for a given application. The diagram below is intended for general guidance to the chromatographer. By following each of the three paths in sequence, the proper packing media is selected.

It should be noted that Grace offers other media to complement the Davisil® packings in many of these applications.



**4.6 x 250mm column, 1mL/min, water (1 cP viscosity).

*Available on 60Å, 10µm or 50µm particle sizes.

Typical Physical and Chemical Characteristics

Exact specifications for each grade are available for download at: www.discoverysciences.com/prep.

Characteristics								
Nominal Pore Size	30Å	60Å	150Å	250Å	500Å	1000Å	1500Å	2500Å
Surface Area (m^2/g)	700	550	330	285	80	40	25	17
Pore Volume (ml/g)	0.4	0.9	1.2	1.8	1.1	1.1	1.1	1.1
pH (5% suspension)	4	7.3	7.3	7.5	8.0	9.0	9.0	9.0
H_2O (weight %)†	<6%	<6%	<6%	<6%	<6%	<6%	<6%	<6%
Bulk Density (kg/m^3)	720	530	350	210	370	370	370	370

†Moisture content (% H_2O) can be tailored (increased or decreased) to meet customer requirements.

Davisil® Media

Below is a listing of our more popular Davisil® silica grades.
For a complete listing request brochure 538.

Unbonded Silica

APS	Particle Size	Davisil® Silica Grade	Pk Size	Part No.
30Å	50–100µm	921	25kg	**5101737**
	75–150µm	923[1]	25kg	**5138973**
			5lb	**5139002**
			72 x 10g	**5139003**
			576 x 10g	**5139001**
	75–700µm	12[2]	25kg	**5139180**
	250–500µm	15[3]	25kg	**5101744**
60Å	10µm	710NW	20kg	**5136220**
	16–20µm	631	25kg	**5101778**
	40–63µm	LC60Å 40–63µm	25kg	**5054993**
			5kg	**5098468**
			1kg	**5134312**
	60–200µm	LC60Å 60–200µm	25kg	**5007446**
			5kg	**5134295**
			1kg	**5134311**
	200–500µm	LC60Å 200–500µm	25kg	**5022298**
150Å	16–24µm	LC150Å 16–24µm	25kg	**5018962**
	35–70µm	LC150Å 35–70µm	25kg	**5057993**
			5kg	**5134294**
			1kg	**5134299**
	60–200µm	LC150Å 60–200µm	25kg	**5134770**
			5kg	**5134293**
			1kg	**5134298**
250Å	40–63µm	LC250Å 40–63µm	15kg	**5134301**
			2.5kg	**5134292**
	60–200µm	LC250Å 60–200µm	15kg	**5134300**
			2.5kg	**5134291**
500Å	35–70µm	XWP500Å 35–70µm	20kg	**5030057**
			5kg	**5108711**
	90–130µm	XWP500Å 90–130µm	20kg	**5058842**
			5kg	**5134305**
	100–300µm	XWP500Å 100–300µm	20kg	**5057050**
1000Å	16–24µm	XWP1000Å 16–24µm	20kg	**5134302**
			5kg	**5016756**
	35–70µm	XWP1000Å 35–70µm	20kg	**5034754**
			5kg	**5134304**
	90–130µm	XWP1000Å 90–130µm	20kg	**5093501**
			5kg	**5134303**
1500Å	16–24µm	XWP1500Å 16–24µm	18kg	**5070159**
	90–130µm	XWP1500Å 90–130µm	18kg	**5045916**
2500Å	90–130µm	XWP2500Å 90–130µm	5kg	**5107451**

ASTM or EPA Method

[1]Grade 923 ASTM D1319: Petroleum Products by FIA
ASTM D2549: Aromatics/Non-Aromatics from Oils
EPA Method 1664: N-Hexane Extraction Method
[2]Grade 12 ASTM D2007: Rubber Extender/ Processing Oils
[3]Grade 15 EPA Method 601/624: Purgeable Halocarbons

Bonded Silica

APS	Bonded Phase	Particle Size	Davisil® Silica Grade	Pk Size	Part No.
60Å	C18	10µm	710NC18E	250g	**5135418**
				1kg	**5135305**
		35–60µm	633NC18E	250g	**5135414**
				1kg	**5134095**
	Cyano	10µm	710NCNE	250g	**5135419**
				1kg	**5134223**
		35–60µm	633NCNE	250g	**5135415**
				1kg	**5134224**
	Diol	10µm	710N2OH	250g	**5135417**
				1kg	**5135303**
		35–60µm	633N2OH	250g	**5135413**
				1kg	**5135302**
	Amino	10µm	710NNH2	250g	**5135420**
				1kg	**5134682**
		35–60µm	633NNH2	250g	**5135416**
				1kg	**5134096**

related products

Matching Davisil® Silica TLC plates for easy method development.

Davisil® Silica TLC Plates

Description	Layer Thickness	Qty.	Part No.
Hard Layer, Organic Binder, Fluorescent Indicator, 254nm			
Scored, 4, 5 x 20cm Sections			
20 x 20cm	250µm	25	**8617580**
Scored, 8, 2.5 x 10cm Sections			
10 x 20cm	250µm	25	**8617610**

related products

Column Hardware and Packing Equipment also available.
See pages 162–174.

related products

Looking for additional TLC products?
See pages 188–198.

Stainless Steel Tubing and Fittings

Tubing and Fitting Kits for MODcol® Flanged and Spring™ Columns

Tubing and Fitting Kits

Description	Part No.
1/16" o.d., 0.020" i.d. Connecting Tube and Fittings*	**AS2002-025A06**
1/16" o.d., 0.040" i.d. Connecting Tube and Fittings*	**AS2002-025A07**
1/8" o.d., 0.060" i.d. Connecting Tube and Fittings**	**AS2002-050A08**
1/8" o.d., 0.085" i.d. Connecting Tube and Fittings**	**AS2002-050A09**

*1 union, 1 nut, 1 ferrule, and 2 plugs. Compatible with flanged and Spring™ Columns up to 25mm i.d.
**1 union, 1 nut, 1 ferrule, 2 plugs, and 2 female reducers 1/8" to 1/16." Compatible with flanged and Spring™ Columns of 30mm i.d. and greater.

Valco® High-Pressure Fittings

Valco® Fitting Specifications	
Material:	316 Stainless Steel
Max. Temperature:	500ºC
Max. Pressure:	10,000psig
Typical Use:	High-Pressure Tubing Connections

Valco® Nuts and Ferrules


5431

A


5697

B

Valco® Nuts and Ferrules

Graphic	Description	Qty.	Part No.
Stainless Steel Nuts			
A	1/16" Nut	10	**306121**
A	1/8" Nut	10	**306151**
Stainless Steel Ferrules			
B	1/16" (Type 316)	10	**30646**
B	1/8" (Type 316)	10	**30647**

Valco® Unions


5511

G


5512

H

5520

I


5521

J


5550

K

Valco® Unions

Graphic	Size	Bore	Part No.
Internal Unions			
G	1/16"	0.50mm	**30714**
G	1/16"	0.75mm	**30715**
G	1/16"	1/16"	**45835**
G	1/8"	2.0mm	**30718**
G	1/8"	1/8"	**30719**
External Unions			
H	1/8"	2.0mm	**30731**
Internal Reducing Unions			
I	1/8" to 1/16"	0.25mm	**30746**
I	1/8" to 1/16"	0.75mm	**45850**
I	1/4" to 1/8"	1/8"	**30755**
External/Internal Reducing Unions			
J	1/8" to 1/16"	1/16"	**30761**
J	1/4" to 1/8"	2.0mm	**30765**
J	1/4" to 1/8"	1/8"	**30766**
Column Endfittings			
K	1/4" to 1/16"	2.1mm	**45905**
K	1/4" to 1/16"	3.0mm	**45907**

Hi-EFF™ Grade Stainless Steel Tubing


5537

Hi-EFF™ grade stainless steel tubing is especially tempered for easy bending and is washed with acetone to remove any residual materials.

Hi-EFF™ Stainless Steel Tubing Specifications	
Material:	316 Series Stainless Steel
Maximum Temperature:	500°C
Maximum Pressure:	Varies according to i.d.*
Typical Use:	High-Pressure Plumbing

*Request datasheet 3005D for more information.

Hi-EFF™ Grade Stainless Steel Tubing

o.d.	i.d.	Per Ft** Part No.	Per Meter Part No.	50ft Coil Part No.
Type 316 Stainless Steel				
1/8" (3.18mm)	0.085" (2.16mm)	**30105**	**30107**	**30109**
1/4" (6.35mm)	0.210" (5.33mm)	**30307**	**30308**	**30309**

**Minimum tubing order is 3'.

Stainless Steel Tubing

This Stainless Steel Tubing is the same high quality as the Hi-EFF™ grade, but has not been washed with acetone.

Stainless Steel Tubing Specifications	
Material:	316 Series Stainless Steel
Maximum Temperature:	500°C
Maximum Pressure:	Varies according to i.d.*
Typical Use:	High-Pressure Plumbing

*Request datasheet 3005D for more information.

Stainless Steel Tubing

o.d.	i.d.	Per Ft** Part No.	Per Meter Part No.	50ft Coil Part No.	200ft Coil Part No.
Type 316 Stainless Steel					
1/16" (1.59mm)	0.020" (0.51mm)	**3002100**	**300230**	**3002**	**300220**
	0.040" (1.02mm)	**30031**	**30033**	**3003**	—

**Minimum tubing order is 3'.

related products

For additional information on HPLC fittings see pages 112–122, and for tubing information see pages 384–391.

Pumps, Injectors, and Switching Valves

Model 627 Preparative HPLC Pump

6774

Flow rate range of 0.1mL/min to 100.0mL/min.

Ideal for Scale-up Work, Semi-Prep and Preparative HPLC

- Dual piston mechanism for pulse-free operation
- Built-in low dead volume pulse dampener
- Self-flushing pump head for longer seal life
- Isocratic or high-pressure binary gradient

The Model 627 Preparative Pump delivers the accuracy and precision of a standard analytical pump at flow rates up to 100mL/min. Consistent flow rates and pressures minimize the potential for column damage. The 627 pump is available in 316 stainless steel or biocompatible PEEK.

Buy one pump now and upgrade to a binary system later by purchasing a second pump and a high-pressure gradient kit.

Model 627 HPLC Pump Specifications	
Max. Operating Pressure:	4000psig (both SS and PEEK)
Flow Rate Range:	0.1–100.0 mL/min
Flow Rate Precision:	0.5% RSD
Flow Accuracy:	±2.0%
Gradient Mixing Mode:	High-Pressure
Gradient Profiles:	Programmable Multi-step
Gradient Programming:	10 methods with up to 100 lines per method
Dimensions:	6" H x 11" W x 18" D (15cm H x 26cm W x 46cm D)
Weight:	35lb (16kg)
Warranty:	1-year parts, 1-year labor, excluding seals and check valves

Model 627 Preparative Pump

Description	Part No.
Isocratic System	
PEEK, 85-265VAC, 47-63Hz	**627150**
Stainless Steel, 85-265VAC, 47-63Hz	**627250**
Binary Gradient System *(Includes 2 pumps, system controller, mixing tee, tubing and fittings)*	
PEEK, 85-265VAC, 47-63Hz	**627350**
Stainless Steel, 85-265VAC, 47-63Hz	**627450**

Kits and Accessories

Description	Part No.
Accessories	
High-pressure Gradient Kit, PEEK (Includes controller, mixing tee, fittings, and tubing)	**105625**
High-pressure Gradient Kit, Stainless Steel (Includes controller, mixing tee, fittings, and tubing)	**105628**
Replacement Parts	
Piston Seal Kit	**120681**
Piston	**121504**
Check Valve Kit, Stainless Steel	**120679**
Check Valve Kit, Metal-Free	**060141**

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

Rheodyne® Model 3725 Prep-Scale Injectors

- Sample range 100µL to 20mL
- Flow rates from 10 to 800mL/min
- Uses 16-gauge needle
- 1.0mm (0.04") flow passages

5495

These injectors are used with preparative HPLC columns from 1 to 10cm diameter. They have the ease of use and versatility of Rheodyne's analytical-scale sample injectors, plus the capacity for large sample volumes and flow rates.

The Model 3725 Valves are available in stainless steel or PEEK, and with a built-in position sensing switch (Model 3725i-038 or 3725i). Each model is supplied with a 10mL loop and 1/8" fittings must be used. An optional port adapter can be used to connect 1/16" tubing. Suitable for pressures up to 5000psig.

Rheodyne® Prep-Scale Sample Injectors

Description	Version	Part No.
Prep Injection Valves		
Model 3725	PEEK	**37250**
Model 3725-038	SS	**37255**
Model 3725i-038	SS	**37256**
Accessory		
Port Adapter for 1/16" tubing	—	**600760**

Rheodyne® Manual Switching Valves

- Inexpensive manual switching valve
- Wide-bore version for prep

5619

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. Large bore valves with 0.040" internal flow passages are available for use at high flow rates (greater than 50mL/min) 7000psig pressure limit.

A spring detent mechanism included in the six-position selection valve permits full circle rotation in either direction and ensures that the rotor "falls into" each of the six positions at the precise 60° spacing.

Rheodyne® Manual Switching Valves

Description	Version	Bore	Part No.
2-Position Valves			
6-Port*	SS	Standard	**7000RV**
6-Port*	SS	Large Bore	**7000L**
10-Port*	SS	Standard	**7610400**
10-Port*	PEEK	Standard	**7610600**
3-Way	SS	Standard	**7030RV**
3-Way	SS	Large Bore	**7030L**
4-Way	SS	Standard	**7040RV**
4-Way	SS	Large Bore	**7040L**
Multi-Position Valves			
6-Position 6-Port	SS	Standard	**7060RV**
6-Position 6-Port	SS	Large Bore	**7060L**

*5000psig pressure rating for 2-position 6-Port and 10-port.

Flash Chromatography Introduction

The technique of flash chromatography has advanced considerably since it began in the 1970s with self-packed glass columns that relied on gravity for flow. Instrumentation today automates and speeds the purification, and pre-packed disposable cartridges eliminate the time spent packing. However, the one area of flash chromatography that has seen little advancement is the heart of the separation, the silica

Flash Silica Technology

Most cartridges today are packed with the same 40–63µm irregular shaped silica that was used for self-packed glass columns in the 1970s. The benefit of this type of silica is that it is inexpensive and generates low backpressure while providing a marginal level of resolution. Grace, as a silica manufacturer, supplies this same grade of silica to many of the flash manufacturers. However, as a silica manufacturer, and a company with a breadth of chromatography products and knowledge, Grace is advancing the field of flash chromatography by introducing innovative silica and cartridge manufacturing.

GraceResolv™ Silica

Grace developed a new grade of Davisil® silica that dramatically increases resolution and capacity without an increase in backpressure. The silica used in the GraceResolv™ cartridges is smaller in particle size than traditional flash silicas but has a more narrow particle size distribution and very few fine particles. As in HPLC, the smaller particles generate greater efficiencies in the packed column, increasing resolution. The narrow particle size distribution allows the cartridge to be packed with higher efficiencies and the reduction in fines allows all of this to happen without a change in backpressure.

GraceResolv™ silica also undergoes a proprietary process to remove metals from the silica surface. Surface metals cause mixed-mode interactions that lead to peak tailing and a loss of resolution. GraceResolv™ silica has 50% less surface metals than standard irregular silica used today in flash cartridges. This makes a dramatic difference in resolution especially for metal chelator compounds.

GraceResolv™ High-Resolution Flash Cartridges

The advantage of the silica used in our cartridges is guaranteed with a rigorous quality assurance program. Each GraceResolv™ cartridge undergoes over 15 tests, from silica to packed cartridge, to ensure unvarying lot-to-lot performance. A chromatographic test is performed to ensure that the columns are well packed and meet our efficiency, resolution, and peak symmetry specifications.

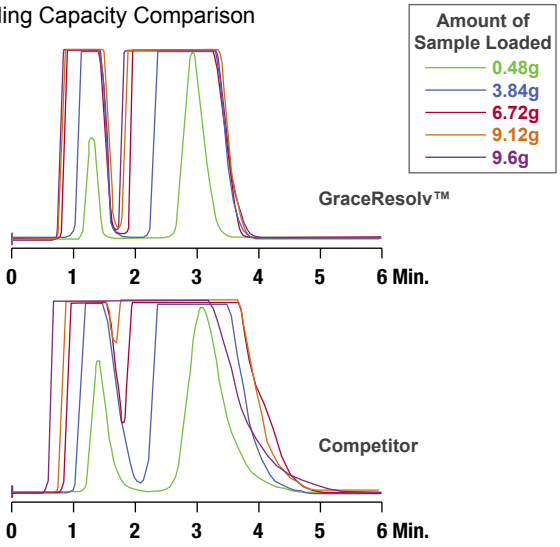
7280

Experiment

Loading Capacity Study

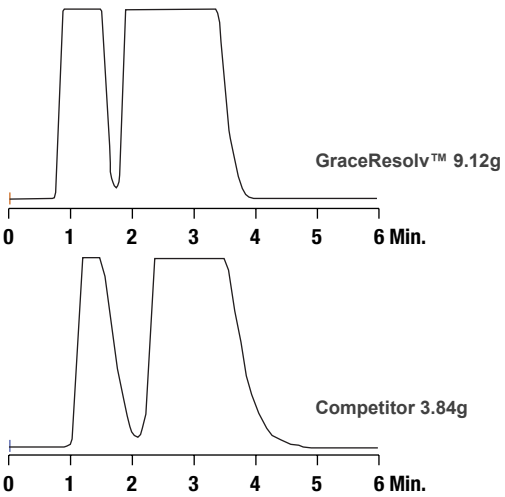
The loading capacity of a GraceResolv™ 40g cartridge and a leading competitor's 40g cartridge were compared using the purification of a sample mixture containing Dimethyl Phthalate and Toluene as an example. The testing determined maximum loading capacity with baseline resolution.

Figure 1.
Loading Capacity Comparison



Cartridge:	40g silica cartridge
Sample:	**Peak 1**: Toluene **Peak 2**: Dimethyl Phthalate
Mobile Phase:	Hexane:Ethyl Acetate (70:30)
Flow Rate:	40mL/min
Detector:	UV at 254nm

Figure 2.
Maximum Loading Capacity with Baseline Resolution



Results

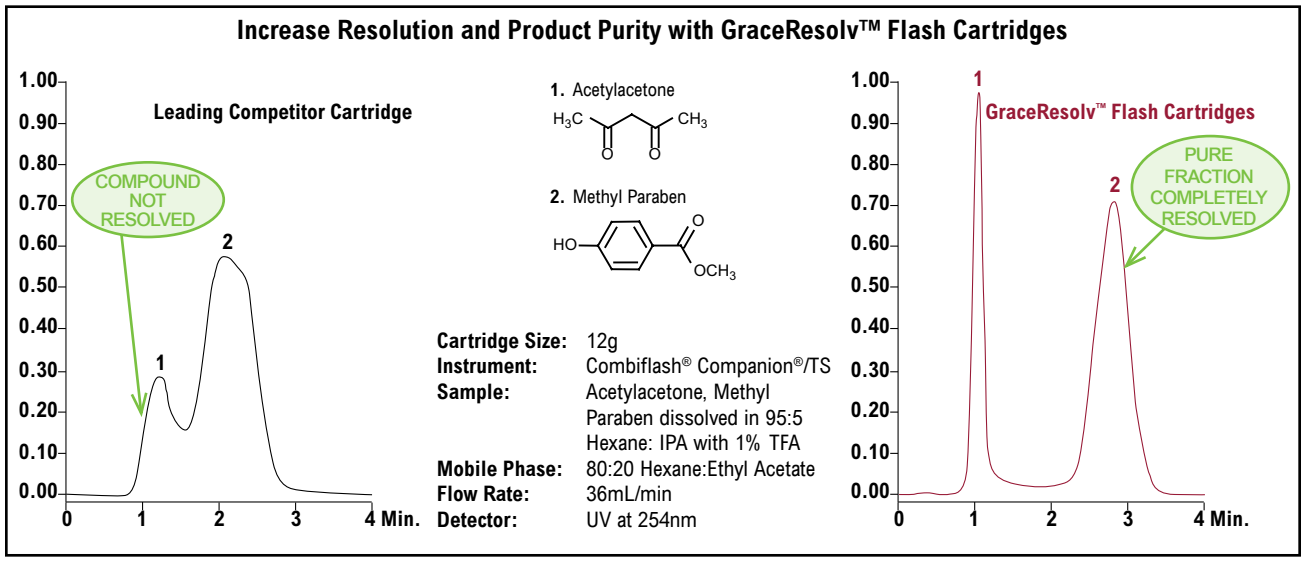
This experiment demonstrates how the improved silica technology in GraceResolv™ cartridges and efficient column packing improve the resolution of the separation and allow higher sample loading at high product purity.

GraceResolv™ High-Resolution Flash Cartridges (patent pending)

- High resolution
- Increased loading capacity
- Reproducible performance
- Compatible with all flash instruments
- Novel silica

DAVISIL® Silica

Grace's 30 years of chromatography experience combined with 80 years of silica manufacturing expertise has yielded the ideal flash cartridge, GraceResolv™. GraceResolv™ cartridges are packed with a new grade of Davisil® silica designed to maximize performance of today's flash instruments.



What Gives GraceResolv™ Cartridges Their Superior Performance?

1. Small Particle Size

A smaller particle size increases resolution. Tighter particle size distribution and minimal fines keep backpressure low. See **Figure 1**.

2. High Purity Silica

Grace's flash silica undergoes a proprietary process to reduce metals from the silica surface by over 50%. Metals cause peak tailing and reduce resolution especially for metal chelator compounds.

Percentage of Metal Content				
Silica	Fe_2O_3	Na_2O	Al_2O_3	SO_4
GraceResolv™	0.001	0.01	0.02	0.001
Competitive Standard	0.005	0.07	0.05	0.01

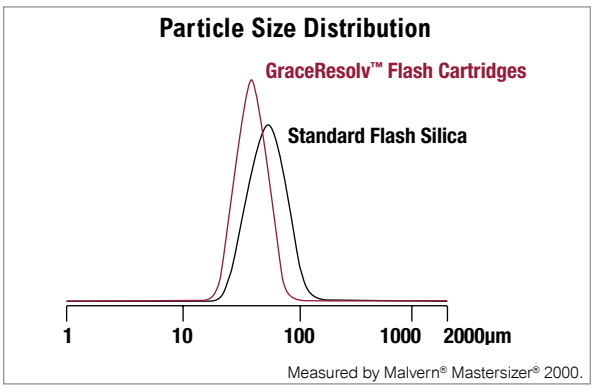


Figure 1

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. See **Figure 2**.

4. Strict Quality Control

GraceResolv™ cartridges are characterized with over 15 tests, from the silica to the packed cartridge, to ensure unvarying lot-to-lot performance. A quality assurance certificate is provided with each box of cartridges.

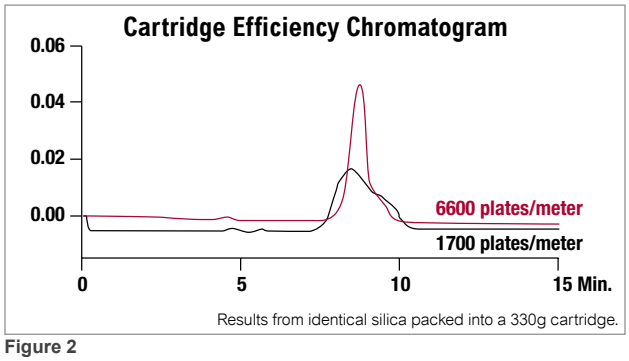


Figure 2

GraceResolv™ Silica Cartridges—Luer Endfittings

Directly Connect to Isco® Systems

GraceResolv™ Cartridges—Luer Endfittings

GraceResolv™ Cartridges—Luer Endfittings

Cartridge Size	Qty.	Part No.
GraceResolv™ 4g	20/pk	**8618502**
GraceResolv™ 12g	20/pk	**8618522**
GraceResolv™ 40g	15/pk	**8618521**
GraceResolv™ 80g	12/pk	**8618520**
GraceResolv™ 120g	10/pk	**8618509**
GraceResolv™ 330g	4/pk	**8618523**

Solid Loaders

	Empty*		Silica Filled	
Description	Qty.	Part No.	Qty.	Part No.
Luer Slip Solid Loader—Isco® Compatible				
5g (12mL cartridge)	100/pk	**5142050**	20/pk	**5142035**
25g (60mL cartridge)	100/pk	**5142051**	16/pk	**5142034**
Luer Lock Solid Loader—Biotage® Compatible				
5g (12mL cartridge)	100/pk	**8618941**	20/pk	**8618942**
25g (60mL cartridge)	100/pk	**8618943**	16/pk	**8618944**

*Empty solid loaders come with two 20µm frits.

Luer Lock Solid Loader

Luer Slip Solid Loader

Adapters to Connect to Biotage® Systems

Support Rings

Adapters

Adjustable Plunger

Support Rings

Description	Part No.
Pack contains adapters for five sizes (4, 12, 40, 80, 120g)	**8618945**

Adapters

Description	Part No.
Male and female luer solvent line connectors	**8618940**

Adjustable Plunger

Description	Part No.
5g (12mL cartridge)	**8619011**
25g (60mL cartridge)	**8619010**

tech tip

To connect a GraceResolv™ cartridge to a Biotage® instrument, simply connect the adapters to the inlet and outlet side of the cartridge and attach to the instrument's tubing. The cartridge then fits on the Biotage® instrument with the appropriate support ring.

If needed, a luer lock solid loader can also be used with the adjustable plunger.

GraceResolv™ Silica Cartridges—SPE Style

Directly Connect to FlashMaster™ Systems

GraceResolv™ Cartridges—SPE Style 7349

GraceResolv™ Cartridges—SPE Style

Cartridge Size	Qty.	Part No.
GraceResolv™ 5g/25mL	20/pk	**8618508**
GraceResolv™ 10g/70mL	16/pk	**8618507**
GraceResolv™ 25g/150mL	10/pk	**8618506**
GraceResolv™ 50g/150mL	10/pk	**8618505**
GraceResolv™ 70g/150mL	10/pk	**8618504**
GraceResolv™ 100g/276mL	12/pk	**8618503**

GraceResolv™ Silica TLC Plates and Tanks

- TLC plates use the same silica as the GraceResolv™ cartridges for direct method development
- Plates are pre-scored in 5 x 20cm sections for easy size customization

TLC Plates 5369

Rectangular TLC Tank 5346

GraceResolv™ Silica TLC Plates

Description	Thickness	Qty.	Part No.
Hard Layer, Organic Binder, Fluorescent Indicator, 254nm			
20 x 20cm (Scored into four 5 x 20cm sections)	250µm	25	**8618900**

Rectangular TLC Tanks with Glass Lid

Description	Part No.
Standard Tank for 20 x 20cm Plates, (27x24x7cm), (10.5x10x3")	**2108359**

more info

Additional TLC accessories and Davisil® silica grades are available from Grace. Refer to the TLC section on pages 188–198 and Media section on pages 175–181.

Davisil® Bulk Silica

Standard flash grade silica available for solid loading, scale-up to large-scale process applications, and self-packing of flash cartridges.

7115

Davisil® Bulk Silica

APS	Particle Size	Davisil® Grade	Pk Size	Part No.
60Å	40–63µm	LC60Å 40–63µm	25 kg	**5054993**
			5 kg	**5098468**
			1 kg	**5134312**
	60–200µm	LC60Å 60–200µm	25 kg	**5007446**
			5 kg	**5134295**
			1 kg	**5134311**
150Å	35–70µm	LC150Å 35–70µm	25 kg	**5057993**
			5 kg	**5134294**
			1 kg	**5134299**
	60–200µm	LC150Å 60–200µm	25kg	**5134770**
			5 kg	**5134293**
			1 kg	**5134298**

Davisil® Bulk Bonded Silica

APS	Bonded Phase	Particle Size	Davisil® Grade	Pk Size	Part No.
60Å	C18	35–70µm	633NC18E	250g	**5135414**
				1kg	**5134095**
	Cyano	35–70µm	633NCNE	250g	**5135415**
				1kg	**5134224**
	Diol	35–70µm	633N2OH	250g	**5135413**
				1kg	**5135302**
	Amino	35–70µm	633NNH2	250g	**5135416**
				1kg	**5134096**

TLC Introduction

Thin Layer Chromatography to Preparative Chromatography

One of the first steps in scale-up of preparative liquid chromatography separations is selection of an appropriate mobile phase. Two methods are commonly used to determine the proper mobile phase composition: Thin Layer Chromatography (TLC) or High Performance Liquid Chromatography (HPLC). The use of TLC will be discussed here to deal with the successful correlation between the TLC separation to the preparative silica column.

TLC is a liquid-solid adsorption technique where the mobile phase ascends the thin layer of stationary phase coated onto a backing support such as glass by capillary action. There is a similar relationship to column chromatography where the solvent travels down through the column's adsorbent. The similar relationship allows TLC to be a rapid method for determining solvent composition for preparative separations.

Steps for Method Development

Choose Stationary Phase

Choose a scalable TLC plate, preferably that has an identical media as the preparative column. Choose between normal and reverse phase based on sample polarity and solubility.

Choose a Mobile Phase

Criteria for Choosing a Preparative Solvent

- Solubility
- Affinity
- Resolution

1. Solubility
Many solvent systems provide the minimal solubility for the sample, but to elute a sample from a column the mobile phase must have a greater solubility for the sample, as the sample concentration is usually very high. When possible, it is best to dissolve the sample in the mobile phase. The first step in solvent selection is determination of the solubility of the sample. The desired mobile phase would provide the greatest solubility, while providing affinity for the sample on the stationary phase.

Solvent Solubility Screening Table

Water
Methanol
Ethanol
Acetone
Diethyl Ether
Ethyl Acetate
Dichloromethane
Toluene
Chloroform
Cyclohexane
Petroleum Ether
Hexane

↑ Increasing Polarity

2. Affinity
To achieve a separation, the sample must have a relatively equal affinity for the solvent and the packing material. If the sample has a higher affinity for the stationary phase than the solvent, the sample will remain at the origin (R_f value will be too low).

3. Resolution
Resolution is improved by optimizing the affinity between sample, solvent, and support. The optimum solvent for separating two or more compounds will maximize the difference in the compounds. Most TLC and preparative mobile phase systems contain a polar solvent and a chromatographically dissimilar less-polar solvent. As a guide for method development, a substitution in the polar solvent often results in a change in resolution, while a change in the less-polar solvent results primarily in a change in R_f of the sample components. The table below shows some common tendencies of various functional groups to adsorb onto the silica.

Affinity of Functional Groups for Silica Gel

$-NH_2$	Amine
-COOH	Carboxylic Acid
-COH	Alcohol
$-CONH_2$	Amide
-C=O	Carbonyl
$-C=-CO_2R$	Ester
-C-O-C	Ether
-C1	Halocarbons
-CC-	Hydrocarbons

↑ Increasing Affinity

Select Visualization Technique

Once a mobile phase is selected, visualization techniques will need to be determined. Common techniques include SWUV, I_2 /SWUV, I_2 /KI for Nitrogen containing compounds, H_2SO_4/LWUV, H_2SO_4/PMA for non-nitrogen containing compounds.

Perform TLC Analysis

Look up the affinity for the type of compound as well as the solvent strengths to find a starting point for method development or look up a reference from a similar structure, then adjust the mobile phase composition to adjust the R_f. It is common to try 3–6 solvent systems for the first round of method development. Review the results after visualization and adjust the R_f if necessary, increase the separation and evaluate visualization techniques to make sure you are seeing all necessary compounds.

Optimizing TLC Separations for Preparative Separations

The optimum separation of compounds by TLC is usually achieved when R_f values are between 0.3–0.5.

$$R_f = \frac{\text{Distance from origin to center of spot}}{\text{Distance from origin to solvent front}}$$

Generally, adjusting the compound's R_f between 0.3–0.5 is done first for a TLC separation. For scale-up to preparative separations, the TLC solvent system's polarity must be decreased to lower the R_f between 0.15–0.35. This R_f range is optimal for a preparative separation, in terms of sample load, resolution, residence time, and solvent usage.

Determination of Column Volumes (C.V.)
The equation C.V. = 1/ R_f relates the TLC values and the preparative LC column volumes to elute each component. This equation is only a guideline and the relationship between the R_f values and the column volume will vary in use. Generally, the LC column volumes will be equal to or less than the calculated values. The elution volume will also be dependent upon the sample load and solvent used to solubilize the sample.

TLC Plates

Davisil® Silica TLC Plates

- Made with the same Davisil® silica as sold in bulk for easy method development
- Scored to customize to your plate size preference

Davisil® Silica TLC Plates

Description	Layer Thickness	Qty.	Part No.
Hard Layer, Organic Binder, Fluorescent Indicator, 254nm			
Scored, 4, 5 x 20cm Sections			
20 x 20cm	250µm	25	**8617580**
Scored, 8, 2.5 x 10cm Sections			
10 x 20cm	250µm	25	**8617610**

GraceResolv™ Silica TLC Plates

- Made with the same high-purity Davisil® silica as used in the GraceResolv™ flash cartridges for easy method development
- Scored to customize to your plate size preference

GraceResolv™ Silica TLC Plates

Description	Layer Thickness	Qty.	Part No.
Hard Layer, Organic Binder, Fluorescent Indicator, 254nm			
Scored, 4, 5 x 20cm Sections			
20 x 20cm	250µm	25	**8618900**

3179

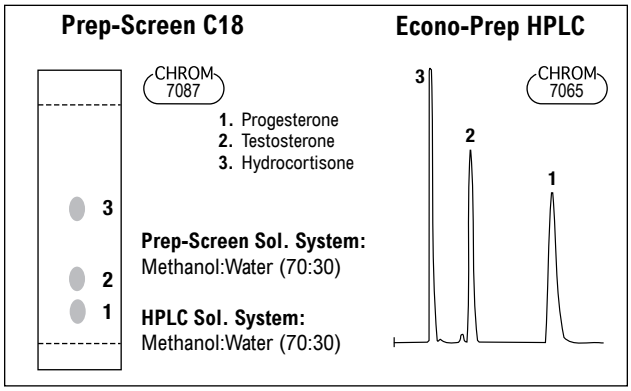
5369

Grace has a large selection of TLC plates to suit your separation needs.

Alltech® Prep-Screen TLC Plates

- Made with the 10–12µm spherical silica gel used for Alltech® prep-HPLC cartridge columns
- Available in both Econosphere™ silica gel and C18 (reversed-phase) bonded versions

Prep-Screen HPTLC Plates help to optimize sample separation parameters for use in preparative HPLC. These plates allow a quick, inexpensive preview of sample traits in various mobile phase systems prior to HPLC analysis. The adsorbent is the same Econosphere™ silica or C18 used in Alltech packed HPLC columns.



Prep Screen HPTLC Plates

Description	Qty.	Part No.
Prep-Screen HPTLC Plates, 10 x 10cm, 200µm Layer		
Silica Gel, 10µm Spherical Adsorbent	10	**16328**
C18, 10µm Spherical Adsorbent	10	**16332**

technical assistance

Contact Tech Support: Phone: 1.800.255.8324 (North America)
Email: contact.alltech@grace.com
Online: www.discoverysciences.com

related products

See pages 194–198 for tanks, sprayers, applicators, and other TLC accessories.

TLC Plates

Alltech® Prekotes

- High purity silica gel for increased sensitivity
- Controlled particle size for faster separations and improved resolution (>80% in 6–15µm range)
- Precoated plates provide convenience and superior layer quality

Adsorbosil®-Plus Silica Gel H (Soft Layer) → **+ $CaSO^4$** → **Adsorbosil®-Plus 1 Silica Gel G (Soft Layer)**

Soft Layer

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

Soft Layer Adsorbosil® Prekotes

Description	Qty.	Part No.
Soft Layer Prekotes, Glass-Backed		
Conventional, 250µm Layer Thickness, 20 x 20cm		
Adsorbosil®-Plus	25	**16384**
Adsorbosil®-Plus P*	25	**16376**
Adsorbosil®-Plus 1	25	**16330**
Adsorbosil®-Plus 1 P*	25	**16322**
Preadsorbent, 250µm Layer Thickness, 20 x 20cm		
Adsorbosil®-Plus 1	25	**16370**
Adsorbosil®-Plus 1 P*	25	**16371**
Preadsorbent/Prechannel, 250µm Layer, 20 x 20cm		
Adsorbosil®-Plus 1	25	**16374**
Adsorbosil®-Plus 1 P*	25	**16375**
Preparative, 500µm Layer Thickness, 20 x 20cm		
Adsorbosil®-Plus 1	25	**16492**

*P = With Fluorescent Indicator, 254 wavelength.

Hard Layer

- Contains a proprietary inorganic binder to add abrasion resistance to layer
- Use when strong charring is required for visualization
- Write on layer with pencil or felt pen
- Sample zones can be removed for further analysis

Hard Layer Adsorbosil® Prekotes

Description	Qty.	Part No.
Hard Layer Prekotes, Glass-Backed		
Conventional, 250µm Layer Thickness, 20 x 20cm		
Adsorbosil®-Plus 1	25	**16324**
Adsorbosil®-Plus 1 P*	25	**16326**
Preadsorbent, 250µm Layer Thickness, 20 x 20cm		
Adsorbosil®-Plus 1	25	**16316**
Adsorbosil®-Plus 1 P*	25	**16317**
Preadsorbent/Prechannel, 250µm Layer, 20 x 20cm		
Adsorbosil®-Plus 1	25	**16380**
Adsorbosil®-Plus 1 P*	25	**16381**

*P = With Fluorescent Indicator, 254 wavelength.

Adsorbosil® HPTLC Plates

- 150µm layer thickness for fast, high resolution separations
- Smooth surface for noise-free densitometry

HPTLC with Organic Binder

- Organic binder makes an abrasion-resistant layer
- Use up to 80% water in the solvent system
- Maximum temp for charring is 150°C

HPTLC with Inorganic Binder

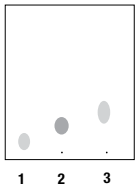
- Allows use of 100% water in the solvent system
- Use when strong charring is required

High-Performance TLC Plates

Description	Qty.	Part No.
Adsorbosil®-Plus Plates with Organic Binder, 10 x 10cm		
Adsorbosil®-Plus HPTLC	25	**16405**
Adsorbosil®-Plus P, HPTLC, F254	25	**16420**
Adsorbosil®-Plus HPTLC with Preadsorbent Zone	25	**16402**
Adsorbosil®-Plus P HPTLC with Preadsorbent Zone, F254	25	**16403**
Adsorbosil®-Plus 1 Plates with Inorganic Binder, 10 x 10cm		
Adsorbosil®-Plus 1 HPTLC	25	**16400**
Adsorbosil®-Plus 1P HPTLC, with F254 UV Indicator	25	**16401**

Reversed-Phase HPTLC Plates

- Coated with non-polar, C18 chemically bonded support
- Cross-linked organic polymer binder makes an abrasion resistant layer and a smooth surface
- Use to separate mixtures of lipophilic components, hydrocarbons, fats and waxes, fat soluble vitamins or steroids



Fatty Acid Separation

1. Methyl Oleate
2. Methyl Linoleate
3. Methyl Linolenate

CHROM-7088

TLC Plate: Adsorbosil® RP HPTLC (Part No. **16314**)
Sol. System: Acetonitrile:Acetic Acid:Water (70:10:1)
Development Time: 25min
Visualization: Iodine Vapor

High-Performance TLC Plates

Description	Qty.	Part No.
Reversed-Phase C18 HPTLC, 150µm Layer Thickness		
Adsorbosil® RP HPTLC, 10 x 10cm	25	**16314**
Adsorbosil® RP HPTLC Plates with F254, 10 x 10cm	25	**16315**
Adsorbosil® RP HPTLC Plates, Prescored, 10 x 20cm	25	**16318**
Adsorbosil® RP HPTLC Plates, Prescored, with F254, 10 x 20cm	25	**16319**

TLC Plates

Macherey-Nagel

Silica Gel Plates

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

Glass-Backed Macherey-Nagel TLC Plates

Description	Size	Layer	Qty.	Part No.
Silica Gel Plates, Glass-Backed				
Conventional Layers, Silica Gel 60				
SIL G-25	5 x 10cm	250µm	50	**809017**
SIL G-25	5 x 20cm	250µm	100	**809011**
SIL G-25	20 x 20cm	250µm	25	**809013**
SIL G-25 UV254	5 x 20cm	250µm	100	**809021**
SIL G-25 UV254	20 x 20cm	250µm	25	**809023**
SIL G-25 UV254+366	20 x 20cm	250µm	25	**809123**
Preparative Layers				
SIL G-100 UV254	20 x 20cm	1000µm	15	**809063**
SIL G-200 UV254	20 x 20cm	2000µm	12	**809083**

Specialty Plates

- **Silica Gel and Cellulose—**Specific for separation of food preservatives
- **Silica Gel—**Specific for aflatoxin analysis
- **Aluminum Oxide—**pH 9 with 60Å pore size, surface area = 200m²/gram

Specialty Plates

Description	Size	Layer	Qty.	Part No.
Specialty Plates, Glass-Backed				
Silica Gel and Cellulose — Mixed Layer				
SILCEL-Mix-25 UV254	20 x 20cm	250µm	25	**810043**
Silica Gel Highly Purified with Gypsum				
SIL G-25 HR	20 x 20cm	250µm	25	**809033**
SIL G-25 HR UV254	20 x 20cm	250µm	25	**809043**
Aluminum Oxide, Basic				
ALOX-25 UV254	20 x 20cm	250µm	25	**807023**
ALOX-100 UV254	20 x 20cm	1000µm	15	**807033**

related products

Performing flash separations?
See GraceResolv™ flash consumable product line on pages 184–187.

ADAMANT™ Silica Layers for TLC

- Increased UV brilliance for increased detection sensitivity
- Extremely hard, dust-free surface
- Optimized particle size distribution for improved separation efficiency
- Ideal for trace analyses

ADAMANT™ Glass-Backed Plates

Description	Size	Layer	Qty.	Part No.
ADAMANT™ UV254	2.5 x 7.5cm	250µm	100	**821005**
ADAMANT™ UV254	10 x 10cm	250µm	25	**821020**
ADAMANT™ UV254	10 x 20cm	250µm	50	**821025**
ADAMANT™ UV254	20 x 20cm	250µm	25	**821030**

Nano-Series HPTLC Plates

- Particle size, 2–10µm
- Higher speed
- Better resolution and sensitivity than regular TLC plates

Nano-SIL HPTLC Plates

Description	Size	Layer	Qty.	Part No.
Nano-Series HPTLC Plates, Glass-Backed				
Silica Gel 60				
Nano-SIL-20	10 x 20cm	200µm	50	**811013**
Nano-SIL-20/UV254	10 x 20cm	200µm	50	**811023**
*Nano-Series HPTLC Plates, Aluminum-Backed**				
Silica Gel 60				
Nano-SIL G	20 x 20cm	200µm	25	**818141**
Nano-SIL G/UV254	20 x 20cm	200µm	25	**818143**

*Do not use with mineral acids or concentrated ammonia.

technical assistance

Contact Tech Support: Phone: 1.800.255.8324 (North America)
Email: contact.alltech@grace.com
Online: www.discoverysciences.com

related products

See pages 194–198 for tanks, sprayers, applicators, and other TLC accessories.

TLC Plates

Macherey-Nagel Polygram® Series

Silica Gel 60

- SIL G and SIL N layers have different binders and show different separation characteristics

Cellulose, Avicel-Microcrystalline

Cellulose MN 300—Native Fibrous Cellulose

- Fibers are 2–20µm in length

Cellulose, Ion-Exchanger

- DEAE carries positive charges at neutral and acidic pH
- Use DEAE to separate proteins, enzymes, and hormones
- Use PEI to analyze nucleic acids

Polyamide 6

- Specific for separation of dansyl and DNP amino acids

Polygram® Flexible-Backed TLC Plates

Description	Size	Layer	Qty.	Part No.
Polyester-Backed TLC Plates				
Silica Gel 60				
SIL G	20 x 20cm	250µm	25	**805013**
SIL G/UV254	4 x 8cm	250µm	50	**805021**
SIL G/UV 254	20 x 20cm	250µm	25	**805023**
SIL N-HR/UV254	20 x 20cm	200µm	25	**804023**
Cellulose Plates				
Cellulose MN 400, Avicel-Microcrystalline Cellulose				
CEL 400	20 x 20cm	100µm	25	**801113**
CEL 400 UV254	20 x 20cm	100µm	25	**801123**
Cellulose MN 300				
CEL 300	20 x 20cm	100µm	25	**801013**
CEL 300 UV254	20 x 20cm	100µm	25	**801023**
Cellulose, Ion-Exchanger				
CEL 300 DEAE	20 x 20cm	100µm	25	**801073**
CEL 300 PEI*	20 x 20cm	100µm	25	**801053**
CEL 300 PEI/UV254	20 x 20cm	100µm	25	**801063**
Specialty Polyester-Backed Plates				
Polyamide 6				
POLYAMIDE 6	20 x 20cm	100µm	25	**803013**
POLYAMIDE 6 UV254	20 x 20cm	100µm	25	**803023**
Aluminum Oxide, Basic, 20µm Particle Size				
ALOX N/UV254	20 x 20cm	200µm	25	**802023**
ALOX N/UV254	4 x 8cm	200µm	50	**802021**
Aluminum Oxide, Basic, pH 9, Aluminum-Backed				
ALOX N	20 x 20cm	200µm	25	**818013**
ALOX N/UV254	20 x 20cm	200µm	25	**818023**

*PEI plates must be refrigerated.

Hybrid Plates

- "Wettable" RP plate
- For both reversed- and normal-phase chromatography
- Determine polarity by eluent selection
- Activate layer at 110–115°C prior to use
- Particle size of 2–10µm for improved separations

Hybrid TLC Plates

Description	Layer	Qty.	Part No.
Silica Gel RP18/UV254s Plates, Aluminum-Backed*			
4 x 8cm	150µm	50	**818144**
5 x 20cm	150µm	50	**818145**
20 x 20cm	150µm	25	**818146**

*Acid-resistant fluorescent indicator.

Chiralplate™†

- Separates optically active isomers based on ligand exchange
- Ready-to-use, requires no solvent pretreatment

†Chiralplate™ was developed in cooperation with Degussa AG, Hanau, Germany.

Chiralplate™ TLC Plates

Description	Layer	Qty.	Part No.
Chiralplate™, Glass-Backed			
5 x 20cm	250µm	50	**811057**
10 x 20cm	250µm	4	**811056**
10 x 20cm	250µm	25	**811055**
20 x 20cm	250µm	25	**811058**

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related products

See pages 194–198 for tanks, sprayers, applicators, and other TLC accessories.

Analtech TLC Plates

Silica Gel H and HF Uniplates™

- 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™

Description	Layer Thickness	Qty.	H Part No.	HF* Part No.
Soft Layer, No Binders				
Conventional				
20 x 20cm	250µm	25	**710011**	**720011**
10 x 20cm	250µm	25	**710021**	**7200210**
Scored, Four 5 x 20cm Sections				
20 x 20cm	250µm	25	**710511**	**720511**
Preparative Uniplates™				
20 x 20cm	500µm	25	**710012**	**720012**
Hard Layer, Organic Binder				
Conventional				
20 x 20cm	250µm	25	**746011**	**747011**
10 x 20cm	250µm	25	**746021**	**747021**
Scored, Four 5 x 20cm Sections or Eight, 2.5 x 10cm Sections				
20 x 20cm	250µm	25	**746511**	**747511**
10 x 20cm	250µm	25	**746521**	**747521**

*F-Fluorescent Indicator, 254nm.

HPTLC Uniplates™

- Smooth surface gives a high signal-to-noise ratio for increased sensitivity and precision
- High resolution separations in five minutes
- Ideal for densitometric scanning

HPTLC Uniplates™

Description	Layer Thickness	Qty.	Part No.
HPTLC Silica Gel with Inorganic Binder			
10 x 10cm, HP-GHL	150µm	25	**756077**
10 x 10cm, HP-GHLF*	150µm	25	**757077**
HPTLC Unibond™ Amvvino (NH_2)			
10 x 10cm, HP-NH_2F	150µm	25	**722077**
HPTLC Unibond™ Cyano (CN)			
10 x 10cm, HP-CNF	150µm	25	**723077**
Reversed-Phase HPTLC Unibond™			
10 x 10cm, HP-RP18	150µm	25	**762077**
10 x 10cm, HP-RP18F	150µm	25	**763077**

*F-Fluorescent Indicator, 254nm.

Silica Gel G and GF Uniplates™

- Calcium Sulfate Binder
- Soft Layer
  - Contains no organic binder
- Hard Layer
  - Contains an inorganic binder
  - 100% water resistant
  - Visualization with strong charring reagents
  - Abrasion resistant

Silica Gel G Uniplates™

Description	Layer Thickness	Qty.	G Part No.	GF* Part No.
Soft Layer, No Binders				
Conventional				
20 x 20cm	250µm	25	**701011**	**702011**
10 x 20cm	250µm	25	**701021**	**702021**
5 x 20cm	250µm	25	**701031**	**702031**
Scored, Four 5 x 20cm Sections				
20 x 20cm	250µm	25	**701511**	**702511**
Preadsorbent				
20 x 20cm	250µm	25	**731011**	**732011**
Preparative Uniplates™, Soft Layer				
Conventional Prep				
20 x 20cm	500µm	25	**701012**	**702012**
20 x 20cm	1000µm	25	**701013**	**702013**
20 x 20cm	1500µm	25	**701014**	**702014**
20 x 20cm	2000µm	25	**701015**	**702015**
Preadsorbent Prep Silica Gel G				
20 x 20cm	500µm	25	**731012**	**732012**
20 x 20cm	1000µm	25	**731013**	**732013**
Hard Layer, Inorganic Binder				
Conventional				
20 x 20cm	250µm	25	**711011**	**721011**
10 x 20cm	250µm	25	**711021**	**721021**
Scored, Four 5 x 20cm Sections				
20 x 20cm	250µm	25	**711511**	**721511**

*F-Fluorescent Indicator, 254nm.

related products

Looking for a fast and easy way to score your own TLC plates?

See our TLC plate cutter on page 196.

3923

TLC Tanks and Storage

Cylindrical TLC Tanks

best seller

- Requires minimal solvent usage
- Glass cylindrical tanks with press-on lids

5341

Cylindrical TLC Tanks

Description	Part No.
Cylindrical TLC Tanks for 5 x 10mm and 4 x 8cm Plates, 2.5" o.d., 5" Height	**17108**
Cylindrical TLC Tanks for 5 x 20cm Plates, 2.5" o.d., 9" Height	**17107**
Cylindrical TLC Tanks for 10 x 20cm Plates, 5" o.d., 9" Height	**17002**

Microslide TLC Tank

- Small glass chamber holds up to 10 microslide plates
- Requires minimal solvent usage

5342

Microslide TLC Tank

Description	Part No.
Microslide Tank	**30020**

Latch-Lid TLC Chromatotank™

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

5350

The unique latching device holds the matching ground glass surfaces of the lid and tank firmly in place to maintain an optimal equilibration atmosphere. The metal components of the Latch-Lid mechanism are made of stainless steel.

Latch-Lid Chromatotank™

Description	Part No.
Standard Latch-Lid Tank/Lid Unit, 10 x 10cm Plates	**7542**
Latch-Lid Tank/Lid Unit, 20 x 20cm Plates	**7536**

Multiple Plate Development Rack

- Saves time and money
- Choice of anodized aluminum or PTFE resin-coated rack
- Sizes available to hold six 20 x 20cm or six 10 x 10cm plates

5349

Multiple Plate Development Rack

Description	Part No.
Anodized Aluminum Rack for 20 x 20cm Plates	**17051**
Anodized Aluminum Rack for 10 x 10cm Plates	**17053**
PTFE-Coated Rack for 20 x 20cm Plates	**17074**
PTFE-Coated Rack for 10 x 10cm Plates	**17077**

Rectangular TLC Tanks

- Unique beveled lip to eliminate sharp edges
- Uniform flat top for maximum lid seal

This Rectangular TLC Tank is a heavy wall, clear glass block with flat surface walls. Lids are polished glass in sizes to match the tank dimensions.

5346

Rectangular TLC Tanks

Description	Part No.
Rectangular Tanks, All Supplied with Glass Lid	
Thinline Tank for 10 x 10cm Plates, (12cm x 11.5m x 6.4cm), (4.75" x 4.5" x 2.5")	**7581**
Standard Tank for 10 x 10cm Plates, (12cm x 11.5cm x 8.6cm), (4.75" x 4.5" x 3.37")	**7550**
Standard Tank for 20 x 20cm Plates, (27cm x 24cm x 7cm), (10.5" x 10" x 3")	**7645**
Standard Tank for 10 x 20cm Plates, (27cm x 13cm x 7cm), (10.5" x 5" x 3")	**7582**
Standard Tank for 5 x 5cm Plates, (17cm x 15cm x 8cm), (7" x 6" x 3")	**7580**

TLC Tank Pads

- Medium weight lint-free pads for TLC tank liners

5345

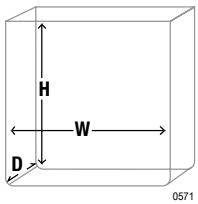
TLC Pads

Description	Part No.
20 x 20cm, Medium Weight, 100/pk	**7630**

tech tip

Rectangular TLC Tank Dimensions

- All are inside dimensions
- Listed as height x width x depth



0571

related products

Need a timer?

See page 265.

6563

Sprayers

Compressed Gas Sprayer

5329

- Replaceable pressure unit
- Refillable sprayer
- Reusable glass or plastic container

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	**14654**
Replacement Glass Jar with Lid	6	**14655**
Disposable Poly Jar with Lid	6	**14656**
Replacement Compressed Gas Unit	6	**14657**

Safety Top Screw Cap Sprayer


5332

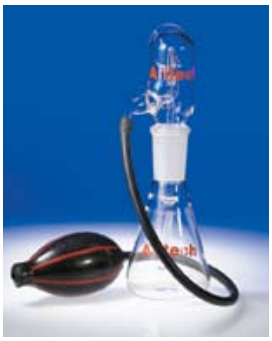
- Made of borosilicate glass
- Autoclavable

Safety Top Sprayers adjust the mist by covering the rear vent hole with a thumb. The atomizer tops are attached to the reservoir flasks with a screw top and o-ring. The screw top delivers a positive seal between sprayer head and reservoir, eliminating the possibility of “blow back”. Remove the screw cap and o-ring prior to autoclaving. Operation of the unit is by low air pressure (5lb).

Safety Top Sprayer with Screw Cap

Description	Qty.	Part No.
10mL	ea	**14540**
50mL	ea	**14545**
125mL	ea	**14550**
250mL	ea	**14555**

Atomizer Sprayer


5331

- Atomizer bulb or compressed gas propellant source

This borosilicate glass sprayer has a rear vent hole that allows full control of mist. It has a 4oz (125mL) reservoir. It is suitable for use with most corrosive liquids.

Atomizer Reagent Sprayer

Description	Qty.	Part No.
Atomizer Reagent Sprayer	ea	**17017**

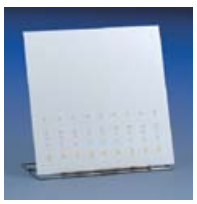
Spraying Accessories

Disposable Spray Box


5367

- Opens easily into 14"L x 14"W x 14"H (35.56cm) unit
- Unique design for spill containment
- Heavy duty cardboard with disposal bag provided

Stainless Steel Spray Support


5369


5407

- Self-draining
- Holds plate above the spraying surface

Polypropylene Spray Stand


5370

- Front edge to hold plate for spraying
- Ideal for use in fume hood

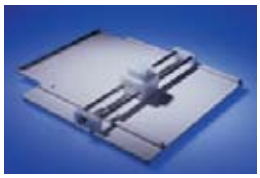
TLC Spray Supports

Description	Qty.	Part No.
Disposable Spray Box	5	**16408**
Stainless Steel Spray Support	ea	**16409**
Polypropylene Spray Stand	ea	**7636**

TLC Accessories

TLC Plate Cutter

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


3923

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	**7535**
Replacement Scribers	1	**7565**
	3	**7575**

tech tip

Note About Sample Applications

Thorough drying of samples is a step that is often ignored but can result in development errors. If a small amount of solute is left on the plate it can interact with the development system and affect the separation.

Many analysts assume the plate is dry when the solvent is no longer visible on the plate (5–10 minutes). However, depending on the volatility of the solvent and the quantity of sample applied, the drying time can be considerably longer. Generally, R_f values decrease as drying time increases until the dry state (stable R_f) is reached.

Plates can absorb moisture from the atmosphere during storage, so prior to sample application, all TLC plates should be heated at 120–130°C for about 30–40 minutes and allowed to cool in a desiccator. This ensures reproducible R_f values.

TLC Spotting Guide

4128

This template fits over a standard 20 x 20cm TLC plate. 1cm divisions allow for accurate sample application. After development, a series of labelled circles and lines on the template helps to estimate areas or to measure distances for R_f calculations.

Spotting Accessories

Description	Qty.	Part No.
TLC Spotting Guide	ea	**7624**

Universal Spotting Template

- Use to cut channels or to spot plates
- Measure R_f values
- Non-slip surface works with any size TLC plates


4130

Spotting Accessories

Description	Qty.	Part No.
Universal Spotting Template	ea	**26270**

TLC Plate Coating Supplies

- Desaga plate coating device and template
- Adsorbosil®-Plus powders and polished glass plates


5384

Plate Coating Supplies

Description	Qty.	Part No.
Desaga Plate Spreading Device and Template		
Plate Spreading Device	ea	**95116**
Plate Spreading Template	ea	**95118**
Polished Glass Plates		
20 x 20cm Plate, 3mm Thick	10	**26080**
Alltech® Adsorbosil® Powders		
Adsorbosil®-Plus 1	1lb	**160201**
Macherey-Nagel Powders		
Cellulose MN 301	1000g	**81605**

TLC Plate Scriber

- Cuts channels in soft and hard layers
- Adjust channel widths in multiples of 1cm
- Made of flexible stainless steel


4132

Spotting Accessories

Description	Qty.	Part No.
TLC Plate Scriber	ea	**17102**

TLC Accessories

Sample Applicators

Drummond® Microcaps

- Accuracy of ±1%

5338

The Drummond® Microcap is a precision bore glass capillary tube that holds a known volume when filled by capillary action. The tube is emptied completely by squeezing the dispenser bulb. (Bulb is included with the unit.)

Drummond® Sample Applicators

Description/Capacity	Qty.	Part No.
Drummond® Microcaps		
0.5µL	100	**3808**
1.0µL	100	**3809**
2.0µL	100	**3810**
3.0µL	100	**3811**
5.0µL	100	**3814**
10.0µL	100	**3820**
15.0µL	100	**3821**
20.0µL	100	**3822**
25.0µL	100	**3823**
50.0µL	100	**3828**
100.0µL	100	**3838**
Drummond® Microcap Accessories		
Microcap Bulbs	6	**3940**

Uncalibrated Disposable Micropipettes

5340

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 2–8µL.

Uncalibrated Disposable Micropipettes

Description	Qty.	Part No.
Glass Micropipettes	300	**7616**
	1440	**17203**

Drummond® Wiretrol® Micropipettes

- Combines the accuracy of a microsyringe with the ease and economy of a disposable pipette
- Accuracy of ±1%
- Color-coded with a permanent calibration line

5286

These unique pipetting devices feature one-handed operation. Each unit contains a vial of 100 micropipettes, dispenser cap, handle, and one stainless steel plunger.

Drummond® Sample Applicators

Description/Capacity	Qty.	Part No.
Drummond® Wiretrol® Micropipettes		
1.0 to 5.0µL (Calibrated)	100	**3842**
3.0µL	100	**3843**
5.0µL	100	**3844**
10.0µL	100	**3845**
20.0µL	100	**3846**
25.0µL	100	**3847**
50.0µL	100	**3849**
100.0µL	100	**3851**

Syringes for Thin Layer Chromatography

- PTFE-coated needle tip (3/4")
- Standard 2" needle length

5283

TLC Syringes

Description/Capacity	Qty.	Part No.
TLC Syringes with PTFE-Coated Needles		
Fixed Needle, Blunt Point		
10µL, 26s ga.	ea	**800500**
25µL, 22s ga.	ea	**802500**
50µL, 22 ga.	ea	**80950**
100µL, 22 ga.	ea	**81050**

technical assistance
Contact Tech Support: Phone: 1.800.255.8324 (North America)
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Online: www.discoverysciences.com

TLC Accessories

UV Viewing Cabinet

- Fixed eyepiece with UV shielded window
- Uses 4- and 6-watt E-series lamps


5352

The UV Viewing Cabinet measures 6.5" H x 9" W x 12" L (16.5cm H x 22.9cm W x 30.5cm L). This cabinet cannot be used for photo systems because of the fixed eyepiece.

UV Viewing Cabinet, Supplied Without Lamps

Description	Part No.
UV Viewing Cabinet, Model CM-10	**80305**

E-Series Ultraviolet Lamps

- Easy to operate
- Choice of intensity, wavelengths, and sizes


5353

The Spectroline® E-Series Lamps can be used as portable units, with UV viewing cabinets, or in photo darkroom cabinets. Lamps with a filter assembly provide maximum fluorescent contrast with the least white light transmission.

E-Series Lamps

Description	Part No.
8-Watt Combo Lamp	
LW, SW, and Filter Assembly, 115V	**80240**
LW, SW, and Filter Assembly, 230V	**80245**
8-Watt Replacement Parts	
LW Replacement Tube	**80242**
SW Replacement Tube	**80244**
Combo Light Replacement Filter	**80246**
6-Watt Combo Lamp	
LW, SW, and Filter Assembly, 115V	**80250**
LW, SW, and Filter Assembly, 230V	**80255**
6-Watt Replacement Parts	
LW Tube Replacement	**80252**
SW Tube Replacement	**80254**
Combo Light Filter Replacement	**80256**
4-Watt Combo Lamp	
LW, SW, and Filter Assembly, 115V	**80270**
LW, SW, and Filter Assembly, 230V	**80275**
4-Watt Replacement Parts	
LW Tube Replacement	**80272**
SW Tube Replacement	**80274**
Combo Light Filter Replacement	**80276**
Lamp Accessories	
UV Lamp Stand	**80218**
UV Lamp Handle (not shown)	**80219**

TLC Sample Recovery Tubes

- Removes samples from TLC plates by suction
- Reusable, all glass construction


5288

Connect a vacuum to one end of the sample recovery tube and pull the sample into the tube. Then pass solvent through the recovery tube to extract the sample.

TLC Sample Recovery Tubes

Description	Qty.	Part No.
0.5–1mL Sample Recovery Tube	ea	**17010**
1–2mL Sample Recovery Tube	ea	**17011**
25–30mL Sample Recovery Tube	ea	**17012**

pH-Fix Universal Indicator Sticks

- Four indicator papers (6 x 5mm) are sealed to each 6 x 85mm stick


5366

pH-Fix Universal Indicator Sticks

Description	Qty.	Part No.
Range 0–14, 1.0pH Units	100	**18147**
Range 4.5–10, 0.5pH Units	100	**18158**
Range 7.0–14, 0.5pH Units	100	**18160**

Adsorbent Scraper

- Blade mounted in “easy-grip” handle

13mm—Scrape Large Areas

6mm—Small Spots, Ideal for Radial Chromatography and Linear HPTLC


0614

2mm—Score Lines, Channels, and Scrape Small Spots

TLC Scrapers

Description	Qty.	Part No.
TLC Scraper Kit: 1 of each type	Kit	**7626**
13mm TLC Scraper	ea	**7627**
Replacement Blades, 13mm	10	**7627B**
6mm TLC Scraper	ea	**7602**
Replacement Blades, 6mm	5	**7602B**
2mm TLC Scraper	ea	**7600**
Replacement Blades, 2mm	5	**7600B**