

HPLC | IC

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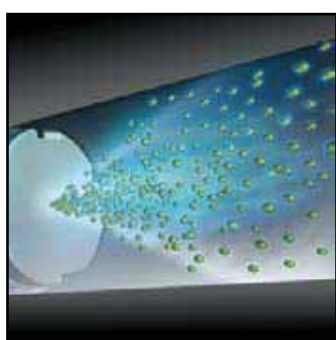
Evaporative Light Scattering Detectors

Leading the Way in ELSD Technology for More Than 20 Years

Alltech has more than 20 years of experience engineering and manufacturing Evaporative Light Scattering Detectors. Our global network of dedicated application chemists and technical support professionals provides you with the comprehensive service and support you need.

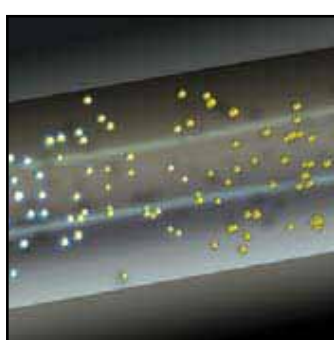
How Does It Work?

ELSDs detect any compound less volatile than the mobile phase using a simple three-step process:



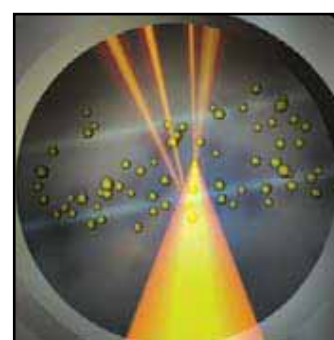
1. Nebulization

Column effluent passes through a needle and mixes with nitrogen gas to form a dispersion of droplets.



2. Evaporation

Droplets pass through a heated "drift tube" where the mobile phase evaporates, leaving a fine mist of dried sample particles in solvent vapor.



3. Detection

The sample particles pass through a cell and scatter light from a laser beam. The scattered light is detected, generating a signal.

Are There Any Limitations?

1. The mobile phase must be volatile.
2. The sample must be less volatile than the mobile phase.

ELSD Advantages Over Other LC Detectors

	ELSD	RI	UV	MS
Sensitivity	●	○	●	●
Gradient Capability	●	○	◐	●
Baseline Stability	●	○	◐	●
Solvent Interference	●	○	○	●
Mass Balance	●	●	○	○

CHART KEY	
Excellent:	●
Good:	◐
Poor:	○

more info

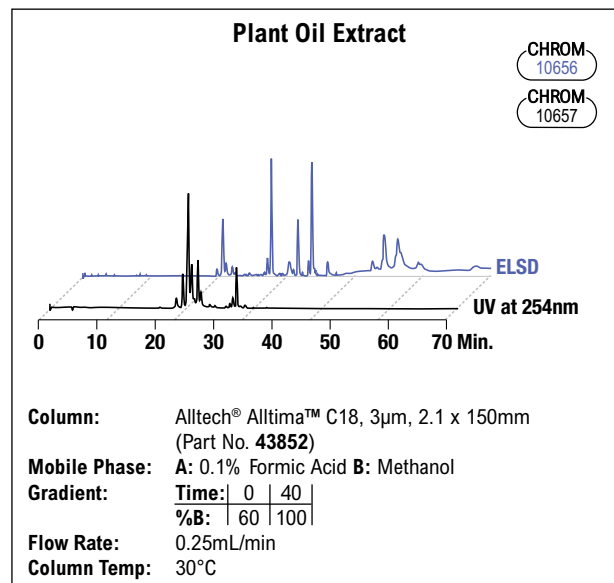
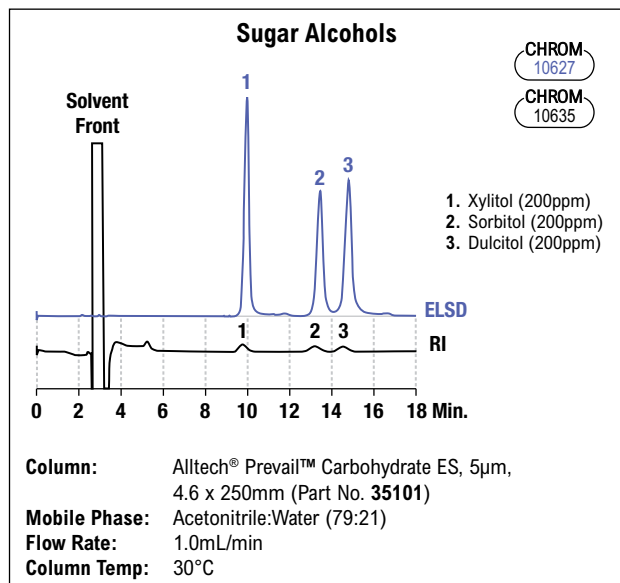
For more information about Evaporative Light Scattering Detection, including applications, literature, and an informational movie, visit www.elsd.com.

analytical hplc

ELSD Advantages Over Other LC Detectors

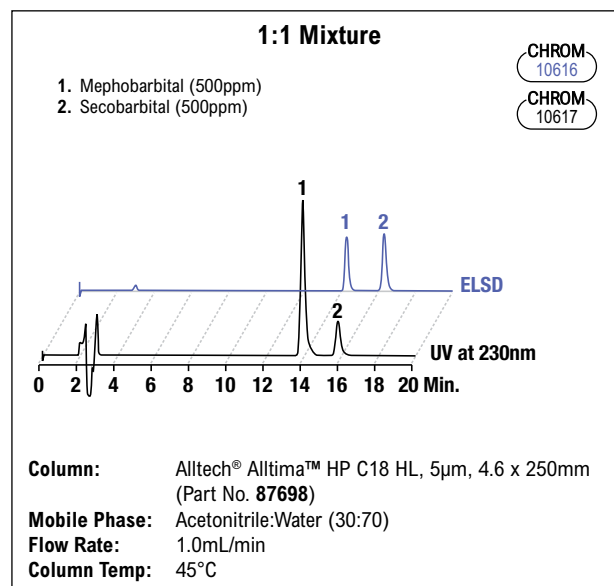
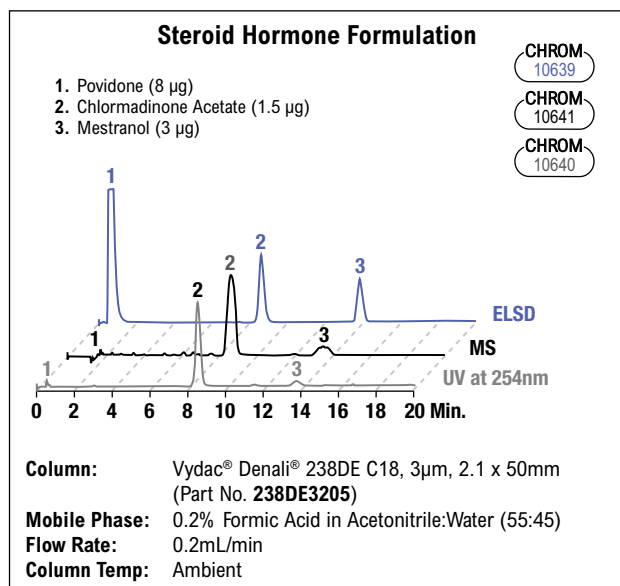
ELSD improves baseline stability and detection sensitivity compared to refractive index (RI).

ELSD shows what may be missing from your UV chromatogram.



Use ELSD in parallel with UV/Vis and MS for maximum structural and concentration information.

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



technical assistance

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

more applications

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



Alltech® 3300 ELSD

High Sensitivity and Ease of Use

Detection of non-volatile compounds has never been easier than with our new, most sensitive ELSD.

Sensitive

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

Simple

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

Small

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



6947b



6967

A Windows®-based user interface makes navigating through menus intuitive and easy. Drivers for Agilent ChemStation and EZChrom Elite/EZStart are available.

Alltech® 3300 ELSD*

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

*Patent pending.

Service and Support

Our dedicated technical support professionals provide you with the comprehensive support you need. Our complete line of service products, including qualification, installation, training, repair service, and preventive maintenance, lets you choose what best meets your needs and budget requirements.

Services for the Alltech® 3300 ELSD

Description	Part No.
Installation and Training	INSTALL
Qualification	
IQ/OQ at Customer Site	Q330010
PQ at Customer Site	Q330020
IQ/OQ/PQ at Customer Site	Q330030

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

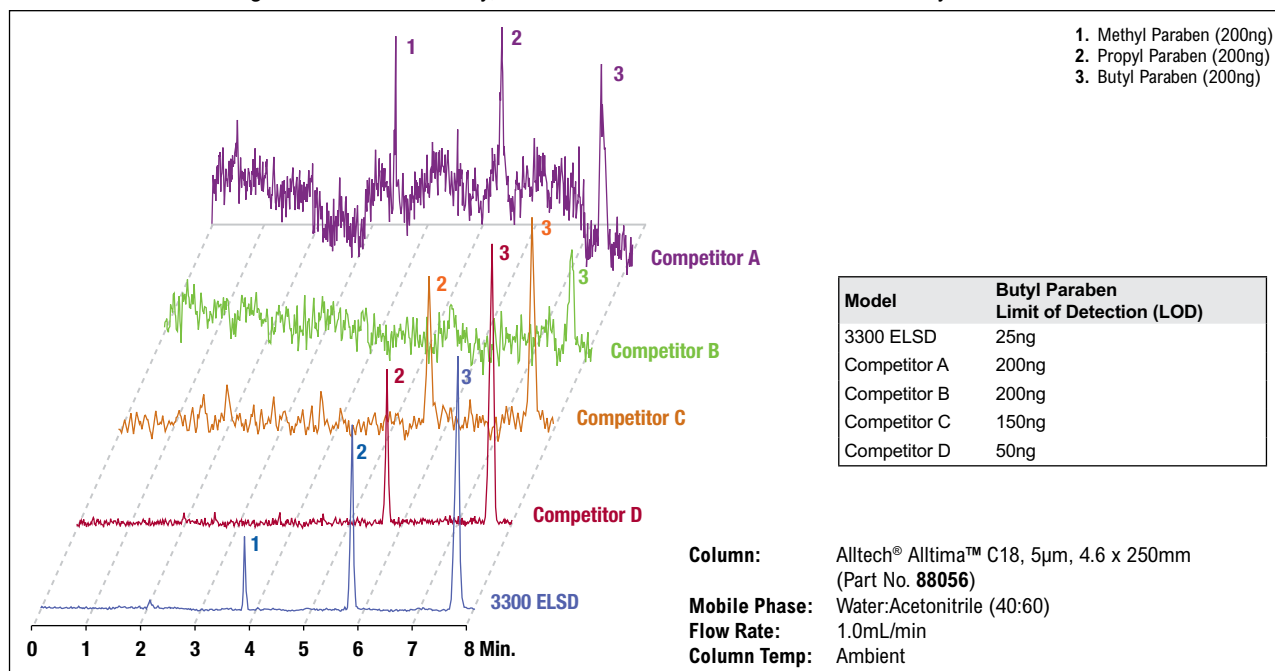
3300 ELSD Specifications

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

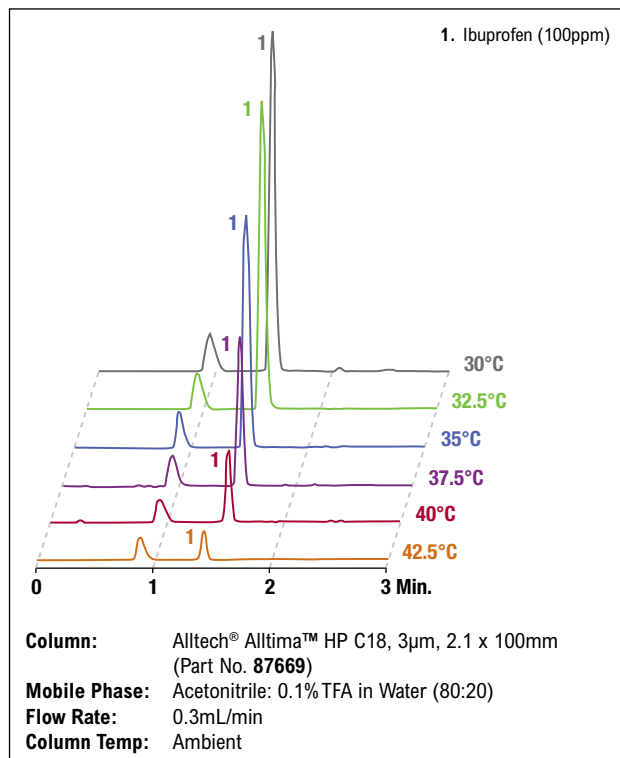
analytical hplc

ELSD Sensitivity and Reproducibility

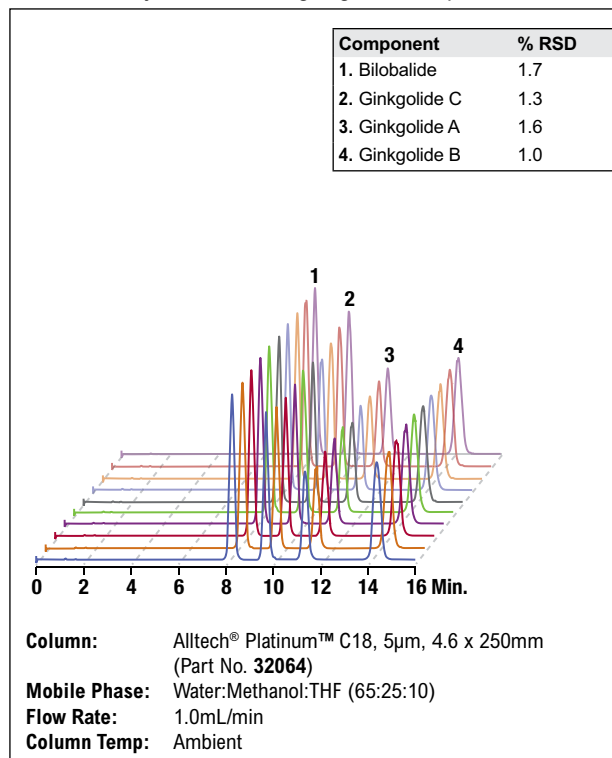
With reduced noise and greater baseline stability, the 3300 ELSD is more SENSITIVE than any other ELSD available.



The 3300 ELSD's near ambient temperature evaporation maximizes SENSITIVITY FOR SEMI-VOLATILES.



The 3300 ELSD is very REPRODUCIBLE as demonstrated by 10 identical injections of four ginkgolide components.



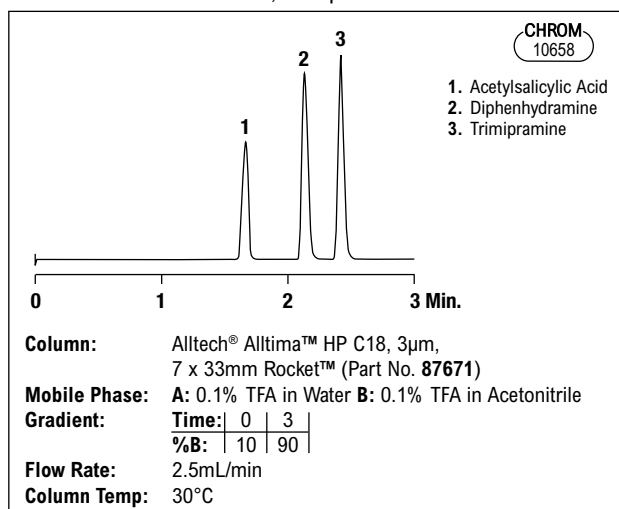
more applications

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

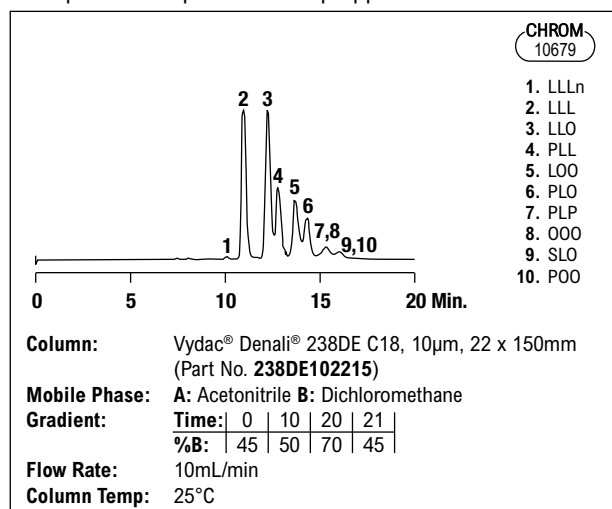


ELSD Performance Benefits

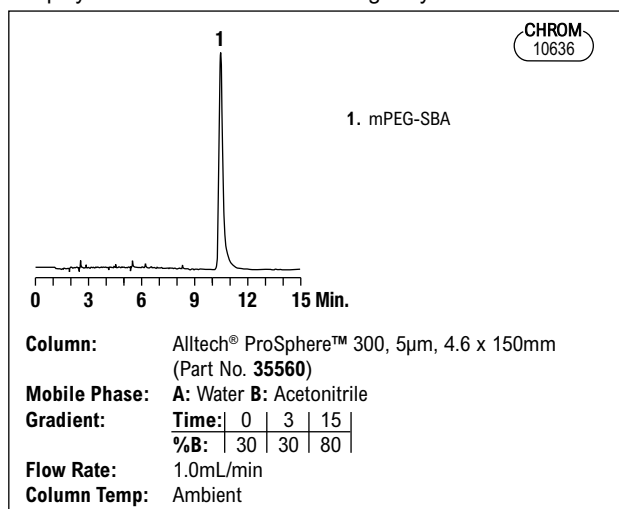
Stable Baselines with Fast, Steep Gradients



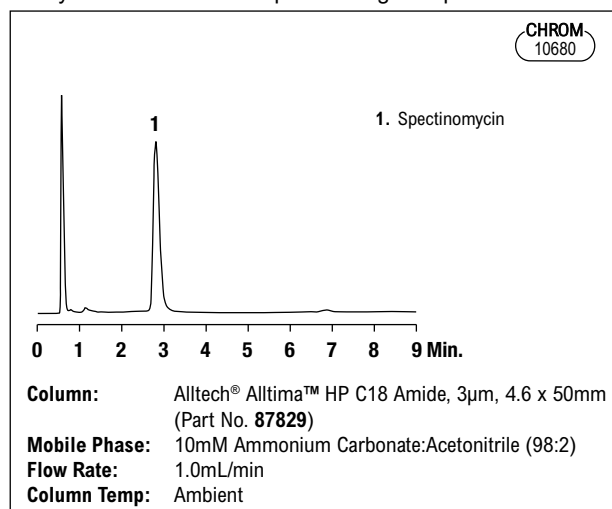
Use ELSD to Trigger Collection of UV Transparent Compounds in Prep Applications



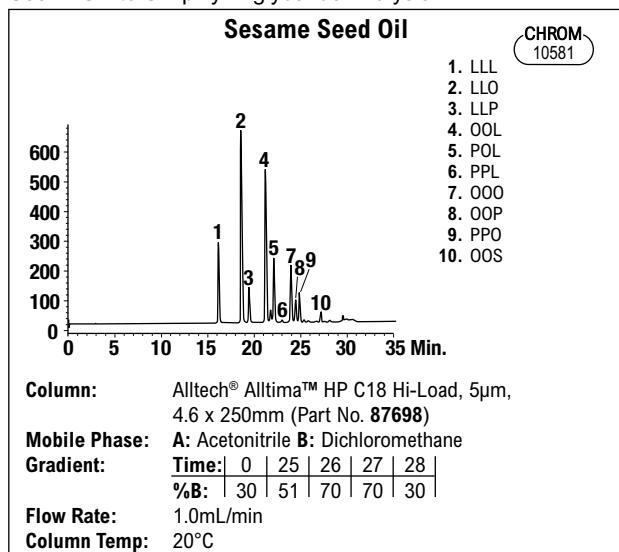
Simplify Detection of Weak Absorbing Polymers



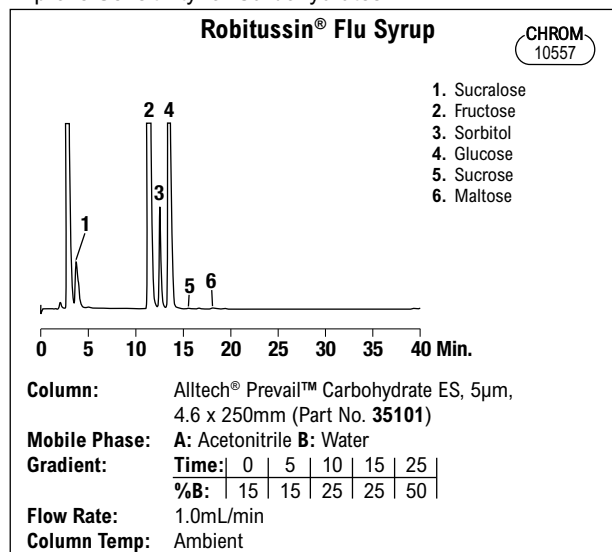
Easily Detect Non-Chromophoric Drug Compounds



Use ELSD to Simplify Triglyceride Analysis



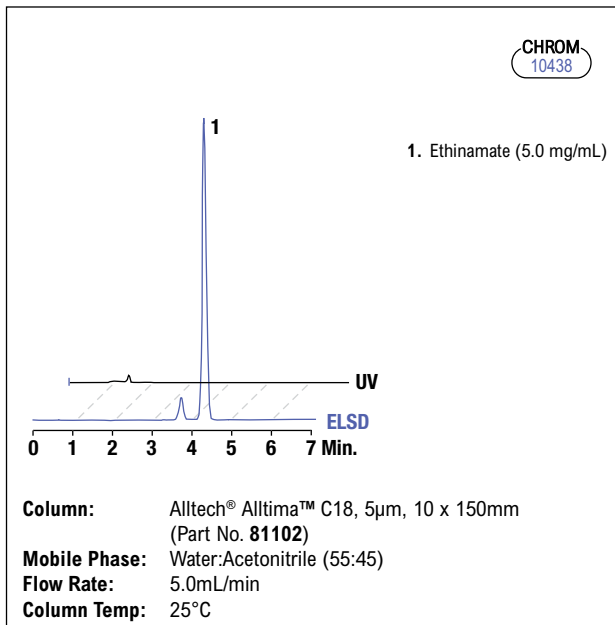
Improve Sensitivity for Carbohydrates



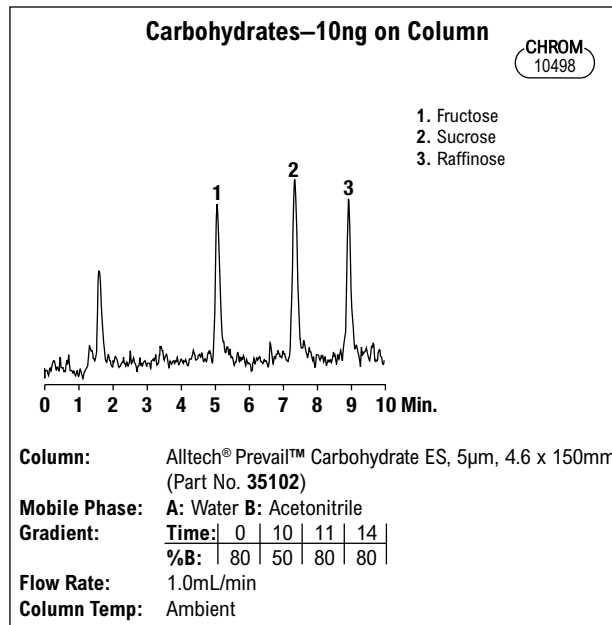
analytical hplc

ELSD Performance Benefits

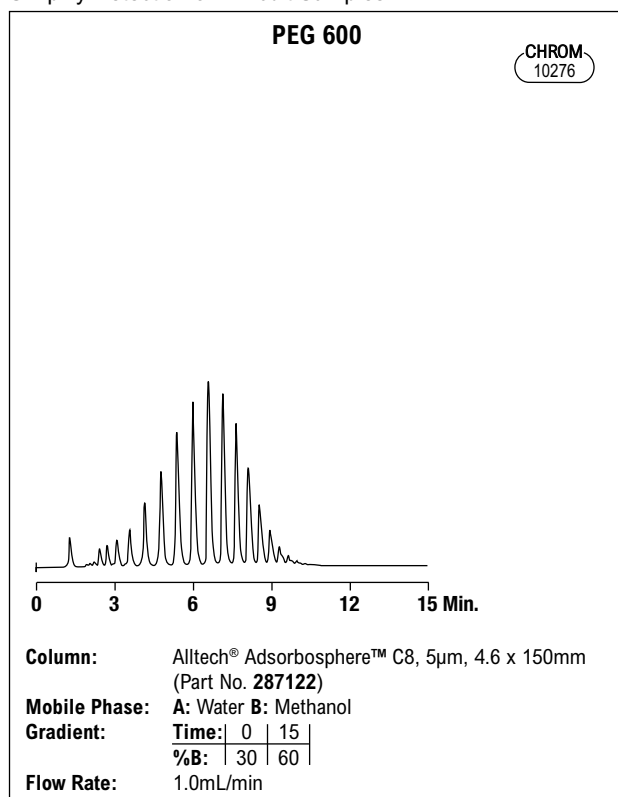
Use ELSD for Triggering Fraction Collection of UV/Vis Transparent Compounds in Preparative Applications



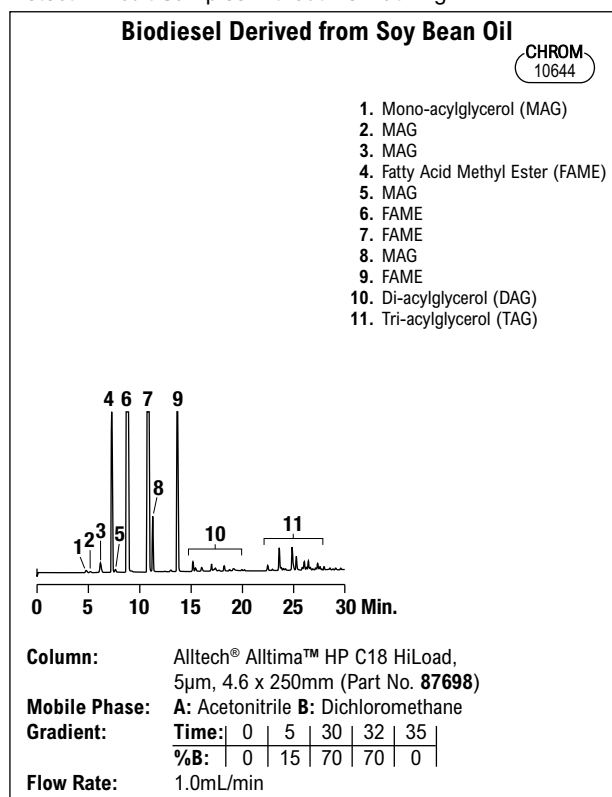
Improve Sensitivity for Carbohydrates



Simplify Detection of Difficult Samples



Detect Difficult Samples without Derivatizing



more info

Interested in ELSD for biodiesel process monitoring? We have a complete solution including equipment, columns, and accessories. Request sheet M181 or call or visit our website for more information.

Alltech® ELSD 800

The Benefits of ELSD for the Price of a UV/VIS or RI Detector

Low Cost, High Performance

The ELSD 800 is an economical alternative to full-featured ELSDs. Now everyone can afford to add universal HPLC detection to any HPLC system to replace or complement existing detectors.

Easy to Use

The ELSD 800 is easy to operate and requires virtually no optimization. The same low temperature and gas flow is used for most applications, including organic and aqueous mobile phases, and gradient methods.

Small and Stackable

The ELSD 800 is small and stackable, minimizing bench space needed, especially when using multiple ELSDs in close proximity.

ELSD 800 Specifications	
Light Source:	Laser diode with collimating optics, 670nm, max output less than 5mW, class IIIA
Detector Element:	Silicon photodiode
Temperature Range:	Ambient to 110°C in 1°C increments
Nebulizer Gas:	Up to 3.0L/min, nitrogen recommended
Inlet Pressure:	15–90psig (1.0–6.0 Bar)
Typical Operating Range:	1.0–3.0L/min
Flow Control:	Fixed orifice with regulated pressure
Mobile Phase Flow Rate:	To 5.0mL/min
Analog Output:	1V or 10mV full scale
Communications:	Outputs: Contact closure for pump shutdown in error conditions
User Interface:	Liquid crystal display and keypad entry of operating parameters
Power Requirements:	120/240V, 50/60Hz
Dimensions:	14.0" H x 13.0" W x 18.0" D (35.6cm H x 33.1cm W x 45.7cm D)
Weight:	20lb (9kg)
Warranty:	1 year parts and labor

*Patent Pending.

Alltech® ELSD 800

Description	Part No.
<i>ELSD 800</i>	
120V	800100
240V	800200



6419K0

ELSD Qualification and Service

Service and Support

Our dedicated technical support professionals provide you with the comprehensive support you need. Our complete line of service products, including qualification, installation, training, repair service, and preventive maintenance, lets you choose what best meets your needs and budget requirements.

Qualification (IQ/OQ/PQ)

Grace makes it easy for you to integrate the ELSD into a qualified HPLC system. Detailed IQ/OQ/PQ procedures are included with the 3300 ELSD to help you perform your own qualification. We also provide the option of on-site qualification.

Qualification Services

Description	Part No.
<i>3300 ELSD</i>	
IQ/OQ at customer site	Q330010
PQ at customer site	Q330020
IQ/OQ/PQ at customer site	Q330030
Re-OQ performed on site	Q330040
Re-OQ/PQ performed on site	Q330050
<i>800 ELSD</i>	
IQ/OQ performed on site	Q80010
PQ performed on site	Q80020
IQ/OQ/PQ performed on site	Q80030
Re-OQ performed on site	Q80040
Re-OQ/PQ performed on site	Q80050
<i>2000ES ELSD</i>	
Re-OQ performed on site	Q60040ES
Re-OQ/PQ performed on site	Q60050ES
<i>2000 ELSD</i>	
Re-OQ performed on site	Q60040
Re-OQ/PQ performed on site	Q60050

Preventive Maintenance and Repair

Grace offers many flexible options for maintenance and repair of your ELSD. These services can be performed at your site or at our facility. Service contracts are available. An annual cleaning and calibration is recommended. Extended warranties can be purchased to provide peace of mind and/or extend the warranty on refurbished instruments.

Preventive Maintenance

Description	Part No.
<i>Preventive Maintenance Visit – Includes replacement of nebulizer, light trap, o-rings, and apertures</i>	600365
<i>Cleaning and NIST Calibration at Grace</i>	
500 ELSD	500361
800 ELSD	800361
2000/2000ES ELSD	600361
3300 ELSD	3300361
<i>Cleaning and NIST Calibration at Customer Site</i>	
500 ELSD	500363
800 ELSD	800363
2000/2000ES ELSD	600363
3300 ELSD	3300363
<i>ELSD Service Agreement – 1-year repair, parts, and labor at Grace repair center, includes annual clean + NIST calibration</i>	
800, 2000/2000ES	600370
3300	3300370

analytical hplc

ELSD Nitrogen Generator

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



The ELSD Nitrogen Generator has a small, compact footprint that fits easily on the lab bench next to your ELSD or mounts on the wall nearby.

Increase productivity, reduce operating costs, and improve lab safety by eliminating nitrogen cylinders. Forget about the need to change the nitrogen cylinder or wondering whether there is enough nitrogen left to finish the run.

The ELSD Nitrogen Generator requires no electricity and has no moving parts. Nitrogen is generated using a proprietary membrane separation technology. Simply connect the generator to your lab's existing compressed air supply or suitable air compressor. The generator separates air into its component gases and only nitrogen flows through to the ELSD.

The ELSD Nitrogen Generator produces a continuous, on demand supply of pure nitrogen at flow rates up to 4L/min. Two ELSDs may be used with one generator as long as your total gas flow rate is less than 4L/min.

more info

For information on air compressors, see page 211.



Water vapor and oxygen permeate through the wall of the membrane quickly. Only nitrogen flows through the fiber bores to the ELSD.

Nitrogen Generator Specifications	
Nitrogen Purity:	99%
Nitrogen Flow:	4L/min
Suspended Liquids:	None
Particles:	<0.01µm
Min/Max Operating Pressure:	60/125psig
Dimension:	16.1" H x 10.7" W x 13.4" D (40.9cm H x 27.2cm W x 34.0cm D)
Weight:	42.5lb (19.3kg)
<i>Compressed Air Requirements:</i>	
Purity:	Free of water, compressor oil (0.01mg/m ³), hydrocarbons, and particulates (<0.1µm)
Temperature:	60°F (15°C)–110°F (43°C)
Compressor Outlet Pressure:	90–145psig
Compressed Air Flow:	43L/min minimum

ELSD Nitrogen Generator	
Description	Part No.
<i>ELSD Nitrogen Generator</i>	600150
<i>Replacement Parts</i>	
50ft 1/4" o.d. PTFE Tubing	3136
1/4" Brass Nuts, 10/pk	14059
1/4" Brass Ferrules, 10/pk	14062
Plug Valve	12128
1/4"—1/4" MPT Brass Male Connection	11639
1/8"—1/4" MPT Brass Male Connection	11635
<i>Accessories</i>	
Single-Stage Pressure Regulator, 0–200psig	81892
<i>Maintenance</i>	
Maintenance Kit	600151
Air Compressor with Dryer Model OF302-25BD2	89239

LC/MS Nitrogen Generators

High Purity Nitrogen from Parker and Domnick Hunter

- Choose from membrane and PSA technologies
- Stand-alone units or models with built-in compressor
- Wide range of flows to meet your needs

LC/MS instrumentation uses nitrogen as purge gas in its nebulizer, and has special nitrogen purity requirements. Parker Balston® nitrogen generators use membrane technology, while Domnick Hunter uses PSA (pressure swing adsorption). Membrane units generally offer quieter operation, while PSA units require lower air flows.

Nitrogen generators used for LC/MS are either fixed or variable purity units. Variable purity units have different nitrogen purities that are dependent on the inlet pressure, outlet pressure, and flow. Many of the variable purity units have available built-in oxygen analyzers to monitor the purity of the gas being provided.



7301

Parker Balston® NitroFlow Lab



7302

Parker Balston® N2 Series



7261

Domnick Hunter® LC/MS30

Model	Parker Balston					Domnick Hunter	
	NitroFlow Lab	N2-14	N2-22	N2-35	N2-45	LCMS30-1	LCMS30-0
Flow (L/min)	30	14	22	35	45	30	30
Air In (L/min)	Built-in Compressor	73	113	171	225	Built-in Compressor	130
Inlet Pressure (PSIG)	N/A	60	60	60	60	N/A	130.5
Outlet Pressure (PSIG)	100	145	145	145	145	102	102
Nitrogen Purity	Up to 99.5%	99%	99%	99%	99%	98%	99%
Method	Membrane	Membrane	Membrane	Membrane	Membrane	PSA	PSA
Dimensions (H x W x D)	31" x 18" x 32" 76cm x 46cm x 81cm	51.5" x 18" x 16.2" 130.8cm x 45.7cm x 41.1cm		67" x 24" x 20" 140cm x 61cm x 50cm		20" x 28" x 32.5" 51cm x 70.5cm x 82.6cm	20" x 28" x 30" 51cm x 70.5cm x 76cm
Weight	285lb (130kg)	75lb (34kg)		250lb (114kg)		284lb (129kg)	298lb (135kg)
110V Part Numbers							
without O ₂ analyzer	80552	80163	80293	8618464	80308	8618461	8618463
with O ₂ analyzer	—	80165	80297	8618466	80311	—	—
220V Part Numbers							
without O ₂ analyzer	80593	80169	80295	8618465	80309	8618462	8618460
with O ₂ analyzer	—	80171	80302	8618467	80312	—	—

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UV Detectors

Thermo UV1000 Single Wavelength UV Detector

- Unique optical design reduces noise
- Programmable wavelength changes
- Flexibility with interchangeable flow cells
- Comes with analytical flow cell and deuterium lamp

The unique dual-beam, forward optical design of the Thermo UV Detector reduces noise and drift by focusing the light beam away from the flow cell walls. Reference and sample beams are monitored at the same length for a wide, linear dynamic range.



7424

Thermo UV2000 Dual Wavelength UV Detector

- Collects up to 20 spectra per run in stand alone mode
- Dual wavelength operation for measuring absorbance ratios
- Automatic lamp shut-down extends lamp life
- Comes with analytical flow cell and tungsten and deuterium lamps

Thermo's UV2000 provides an excellent signal-to-noise ratio for research or routine analysis. Program different wavelengths to improve sensitivity or selectivity of different compounds.

UV1000 Single Wavelength UV Detector Specifications

Wavelength Range:	190–380nm; 190–800nm with optional tungsten lamp
Wavelength Accuracy:	±1.0nm
Wavelength Precision:	±1.0nm
Spectral Bandwidth:	6nm
Noise:	<1.0 x 10 ⁽⁻⁵⁾ AU at 254nm
Drift:	<2 x 10 ⁽⁻⁴⁾ AU/Hour after warm-up
Absorbance Range:	0.0005–3.0 AUFS
Digital Display:	2 x 24 character high-contrast LCD
Power:	100/120/220/240V; 50/60Hz
Dimensions:	14.5" H x 6" W x 18.5" D (37cm H x 15cm W x 47cm D)
Weight:	40lb (18kg)
Warranty:	1 year, 90 days on flowcell
Drivers:	Thermo ChromQuest

UV2000 Dual Wavelength UV Detector Specifications

Wavelength Range:	190–800nm
Wavelength Accuracy:	±1.0nm
Wavelength Precision:	±1.0nm
Spectral Bandwidth:	6nm
Noise:	<2.5 x 10 ⁽⁻⁵⁾ AU at dual 254nm 280nm
Drift:	<2 x 10 ⁽⁻⁴⁾ AU/Hour after warm-up
Absorbance Range:	0.0005–3.0 AUFS
Digital Display:	2 x 24 character high-contrast LCD
Power:	100/120/220/240V; 50/60Hz
Dimensions:	14.5" H x 6" W x 18.5" D (37cm H x 15cm W x 47cm D)
Weight:	40lb (18kg)
Warranty:	1 year, 90 days on flowcell
Drivers:	Thermo ChromQuest

Thermo UV1000 Single Wavelength UV Detector

Description	Part No.
UV1000 Detector with 10mm flow cell, 120/240V	8619058
<i>Optional Accessories</i>	
Analytical 10mm Flow Cell	8619070
Tungsten Lamp for Thermo UV Detectors	8619111
Deuterium Lamp for Thermo UV Detectors	8619110

Thermo UV2000 Dual Wavelength UV Detector

Description	Part No.
UV2000 Detector with 10mm flow cell, 120/240V	8619059
<i>Optional Accessories</i>	
Analytical 10mm Flow Cell	8619070
Tungsten Lamp for Thermo UV Detectors	8619111
Deuterium Lamp for Thermo UV Detectors	8619110

related products

Looking for columns to develop a method?
Alltima™ HP Method Development Kits are available in three different kits with different selectivities. Kits give you three columns for the price of two. See page 39.



Autosamplers

Alltech® 570 Autosampler

- Affordably automate HPLC and IC analysis
- Flushed loop filling maximizes precision and reproducibility
- Partial loop filling minimizes sample waste



Choose between flushed and partial loop filling and stainless steel and PEEK fluid paths.

570 Autosampler Specifications	
Vial Capacity:	96 samples (92 with needle wash), 48 (5mL) vials (optional)
Injection Volume:	Flushed Loop: 5–500µL (dispenser controlled), 5–5000µL (by head space pressure). Partial Loopfill: 10–490µL in steps of 10µL (depending on the loop volume, maximum 50% of the loop volume)
Injections per Vial:	9 Maximum
Needle Wash:	Selectable, 50µL fixed volume between vials
Reproducibility:	Flushed Loop Injections: RSD≤0.5% Partial Loop Injections: RSD≤1.0%
Power:	115 VAC/230 VAC; 50/60 Hz
Dimensions:	11.1" H x 11.8" W x 17.3" D (28cm H x 30cm W x 44cm D)
Weight:	34lb (15.5kg)
Warranty:	1 year

Model 570 Autosampler

Description	Part No.
<i>Flushed Loop Filling</i>	
Stainless Steel	575100
PEEK	575500
<i>Partial Loop Filling</i>	
Stainless Steel	570150
PEEK	570550

Spare Parts for 570 Autosampler

Description	Part No.
Pump Tubing Cassette	575115
Side-Port Sample Needle, 3/pk	575130
Large Volume Option, Field Installable	575165
Air Needle	575125
Sample Drain for Headspace Pressure	575170
Auxiliary and Control I/O Cable	570101
Tubing from Needle to Valve, 10ft	20064
Needle Connection Nut	575175
Needle Connection Ferrule, 10/pk	575185
Standard Vial Tray	575110

Alltech® 580 Autosampler

- Automates sample prep tasks: sample dilution, derivatization, and internal standard addition
- Capable of three different injection techniques
- Large injection volume range for maximum versatility
- Built-in column heater



Multifunctional autosampler improves laboratory efficiency.

580 Autosampler Specifications	
Vial Capacity:	84 (1.5mL) vials + 3 (10mL) vials, 96 (1.5mL) vials (optional), 24 (10mL) vials (optional)
Injection Volume:	1–5000µL in 1µL increments, 5000–7500µL in 1.5µL increments, 7500–10,000µL in 4µL increments
Injections per Vial:	9 maximum
Analysis Time:	9hrs 59min 59sec maximum
Reproducibility:	Full Loop Injections: ≤0.3% RSD, Partial Loop Injections: ≤0.5% RSD, µL Pick-Up Injections(>10µL): ≤1.0%
Carry Over:	<0.05% with needle wash
Column Oven Temp. Range:	Ambient +5°–60°C
Temperature Controlled Zone:	11.8" H x 1" W x 1" D (30cm H x 2.5cm W x 2.5cm D)
Power Requirements:	115 VAC/230 VAC; 50/60Hz
Dimensions:	13.4" H x 11.8" W x 19.7" D (34cm H x 30cm W x 50cm D)
Weight:	33lb (15kg),
Warranty:	1 year

Model 580 Autosampler

Description	Part No.
<i>Model 580 Autosampler</i>	
Standard Tray, SS Valve	580100
Standard Tray, PEEK Valve	580500
<i>Tray Options</i>	
Standard Volume Tray, 84 Vial Capacity, 1.5mL Vials with 3-10mL Vial Positions	580201
Large Volume Tray, 24 Vial Capacity, 10mL Vials	580200
Large Capacity Tray, 96 Vial Capacity, 1.5mL Vial	580265

analytical hplc

Column Heaters

Grace® and Jetstream Models

Grace® 7971R



T254

Grace® 7990R w/Controller



T255

Grace® 7956R w/Controller



T256

Jetstream Plus 2



4298

Specifications

Specifications	• Rugged, reliable, easy-to-use • Precise temperature control above ambient • Temperature cut-out with RS232 interface • Block heater with LED interface	• Controls one or two columns • Independent temperatures • Single and dual output controllers • Long column oven • RS232 interface	• Stabilizes column temperatures • Temperatures range: 0 to 95°C • Ideal for GLP and FDA-regulated analyses • Heater/Chiller with long column oven • RS232 interface	• Peltier column thermostat heats to 85°C and cools to 5°C • Temperature may be fixed or changed via step or linear gradient • Large column compartment holds five columns up to 1" o.d. and 35cm in length	
	Access to Columns	Cover	Cover	Cover	Door
	Temperature Range:	30–99°C	30–75°C	0–95°C	5–85°C
	Column Capacity (Excluding Guards):	1–2, depending on size	1 column per oven	1–2, depending on size	5
	Maximum Column o.d.:	1/2"	1/4"	1/2"	1"
Maximum Column Length:	30cm	30cm	30cm	35cm	
Cavity Dimensions:	1" H x 2" W x 14" L (2.6cm H x 5.1cm W x 35.6cm L)	0.79" H x 0.75" W x 14.2" L (2cm H x 1.9cm W x 36cm L)	0.9" H x 1.7" W x 14.2" L (2.3cm H x 4.2cm W x 36.1cm L)	15.4" H x 3.3" W x 2" L (39.2cm H x 8.5cm W x 5cm L)	
Temperature Accuracy:	±0.5°C	±0.5°C	±0.5°C	±0.2°C	
Temperature Stability:	±0.2°C	±0.2°C	±0.2°C	±0.1°C	
Operating Voltage:	120V/60Hz, 240V/50Hz, 250W	120V/60Hz , 240V/50Hz, 100W	120V/60Hz , 240V/50Hz, 250W	100–245VAC, 50/60 Hz, 100W	
Warranty:	1 year	1 year	1 year	1 year	

Ordering Information

Model	Grace® 7971R	Grace® 7990R w/Controller	Grace® 7956R w/Controller	Jetstream Plus 2
	Part No.	Part No.	Part No.	Part No.
Block heater with one block set and RS232	5135360, 110V 5135361, 220V	—	—	—
Single output controller, long column oven and RS232	—	5109747, 110V 5111660, 220V	—	—
Dual output controller, 2 long column ovens, and RS232 interface	—	5109749, 110V 5111662, 220V	—	—
Heater/Chiller with RS232	—	—	5111646, 110V 5111645, 220V	—
Jetstream 2 Plus Heater/Chiller, 75cm cable	—	—	—	531102, dual voltage
Jetstream 2 Plus Heater/Chiller, 150cm cable	—	—	—	531202, dual voltage

Column Heaters

Alltech® and Eppendorf® Models



	Alltech® 631	Eppendorf® TC-50 Temperature Controller	Eppendorf® CH-30	Eppendorf® CH-430 and CH-460	
	6219	2336	2290	2337	
Specifications	- Microprocessor controlled temperature - Column preheater to improve performance - Available in stainless steel or PEEK flow paths	- Controls any Eppendorf Heater - Adjust temperature in 0.1°C increments - Monitor "set" and "read" on the LED - Remote external ON or OFF feature	- Fits one column up to 1/2" o.d. and 30cm in length - Supports all column lengths to 30cm - Requires TC-50 temperature controller	- Holds four columns and two Rheodyne valves - CH-430 holds columns up to 30cm in length - CH-460 holds columns up to 50cm in length - Ideal for multi-column GPC, sample injection or column switching applications - Adjust temperature in 0.1°C increments - Requires TC-50 temperature controller	
				CH-430	CH-460
Access To Columns	Drawer	Controller	Cover	Cover	Cover
Temperature Range:	Ambient–85°C	Ambient–150°C	Ambient–150°C	Ambient–150°C	Ambient–150°C
Column Capacity (Excluding Guards):	2	NA	1	4	4
Maximum Column o.d.:	1/2"	NA	1/2"	1/2"	1/2"
Maximum Column Length:	30cm	NA	30cm	30cm	50cm
Cavity Dimensions:	1.8" H x 5" W x 16.5" D (5cm H x 13cm W x 42cm D)	3.25" H x 7" W x 8.5" D (8.3cm H x 17.8cm W x 21.6cm D)	3" H x 2.75" W x 19.5" D (7.6cm H x 7cm W x 49.5cm D)	3.5" H x 6.5" W x 21" D (8.9cm H x 16.5cm W x 53cm D)	3.5" H x 6.5" W x 29.5" D (8.9cm H x 16.5cm W x 74.9cm D)
Temperature Accuracy:	±1°C	±1°C	±0.5°C	±0.5°C	±0.5°C
Temperature Stability:	±0.10°C	±0.10°C	±0.2°C	±0.2°C	±0.2°C
Operating Voltage:	110V, 220V	110V, 220V	120V/60Hz, 240V/50Hz 250 watts	120V/60Hz, 240V/50Hz 100 watts	120V/60Hz, 240V/50Hz 250 watts
Inlet Preheaters:	Included	NA	Included	Four sets included	
Heater Element:	Microprocessor controlled	NA	125W vulcanized to heating block	300W (CH-430) or 500W (CH-460) vulcanized to heating block	
Heater Block:	NA	NA	Aluminum, two-part oven	Aluminum, two-part oven	
Sensor:	NA	NA	1000Ω Platinum RTD	1000Ω Platinum RTD	
Thermal Cut-Out:		NA	155°C ±5°C temperature limit	155°C ±5°C temperature limit	
TC-50 Temperature Controller required:	No	NA	Yes	Yes	Yes
Warranty:	1 year	1 year	1 year	1 year	1 year

Ordering Information

Model	Alltech® 631	Eppendorf® TC-50 Temperature Controller	Eppendorf® CH-30*	Eppendorf® CH-430*	Eppendorf® CH-460*
Description	Column Heater, PEEK	Temperature Controllers	Column Heaters	Column Heaters	Column Heaters
	Part No.	Part No.	Part No.	Part No.	Part No.
110V	631100	85910	85975	85980	85971
220V	631200	85911	85976	85981	85972
Description	Column Heater, SS				
110V	631300	—	—	—	—
220V	631400	—	—	—	—

*Eppendorf® column heaters require the TC-50 controller.

analytical hplc

HPLC Pumps

We Have a Pump for Every Need and Budget

Use this pump feature comparison chart to choose the pump that is best for your application, then go to the catalog page for more information.

Model	Catalog Page	Flow Range	Isocratic/Gradient	Pressure Monitoring
301 HPLC Pump	18	0.01 - 10mL/min	isocratic	No
426 HPLC Pump	18	0.01 - 10mL/min	isocratic	Yes
626 HPLC Pump	19	0.001 - 12mL/min	isocratic or binary gradient	Yes
627 Preparative Pump	19	0.01 - 100mL/min	isocratic or binary gradient	Yes
442 Binary Gradient Pump	20	0.001 - 5.000mL/min	binary gradient	Yes
801 Ultra-High Pressure Pump	20	0.001 - 5.000mL/min	isocratic or binary gradient	Yes
727 Quaternary Gradient Pump	21	0.001 - 5.000mL/min	quaternary gradient	Yes

Alltech® 426 and 301 HPLC Pumps



Both pumps are available in stainless steel or biocompatible PEEK.

Low-Cost, High-Performance Isocratic Pumps

Both pumps feature:

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

The Model 426 has these additional features:

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

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

more info

All pumps can be controlled by EZChrom Elite or EZStart chromatography data systems. The driver and cables are included with every pump. If you wish to separately purchase the Driver Kit, please refer to part number **8619000**.

Model 426 and 301 HPLC Pumps

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

Model 426 and 301 HPLC Replacement Parts

Description	Part No.
Pump Head Kit, PEEK	120800
Pump Head Kit, Stainless Steel	120799
Piston Seal Kit	120680
Piston	121486
Check Valve Kit, PEEK	060141
Check Valve Kit, Stainless Steel	120679

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

HPLC Pumps

Alltech® 626 HPLC Pump

**High-Performance
Isocratic or Binary
Gradient Pump**



- Suitable for standard and microflow applications
- Dual-piston mechanism for pulse-free operation
- Built-in low dead volume pulse dampener
- Self-flushing pump head for longer seal life
- EZChrom driver and cables included

The Model 626 Pump is a rugged and reliable component for a basic analytical system, a sophisticated method development system, or for general laboratory or industrial use. It is available in either traditional 316 stainless steel or biocompatible PEEK.

Buy a single 626 Pump for isocratic applications. Add a second 626 pump for high-pressure binary gradients.

626 HPLC Pump Specifications	
Flow Range:	0.001–12mL/min
Fluid Path:	PEEK or Stainless Steel
Isocratic/gradient:	Isocratic or binary gradient
Pressure Monitoring:	Yes
Max. Operating Pressure:	6000psig (SS), 5000psig (PEEK)
Flow Precision:	0.2% RSD
Flow Accuracy:	±2.0%
Dimensions:	6" H x 11" W x 18" D (15cm H x 26cm W x 46cm D)
Weight:	30lb (14kg)
Warranty:	3-year parts, excluding seals, check valves, and pulse dampener; 1-year labor
Gradient Mixing Mode:	High-Pressure
Profiles:	Programmable Multi-step
Gradient Programming:	10 methods with up to 100 lines per method
Drivers:	EZChrom Elite/EZStart

Model 626 HPLC Pump

Description	Part No.
<i>Isocratic System</i>	
PEEK, 85–265VAC, 47–63Hz	626150
Stainless Steel, 85–265VAC, 47–63Hz	626250
<i>Binary Gradient System (Includes 2 pumps, mixing tee, SCU Keypad Controller, tubing, and fittings)</i>	
PEEK, 85–265VAC, 47–63Hz	626350
Stainless Steel, 85–265VAC, 47–63Hz	626450

Accessories and Replacement Parts for Model 626

Description	Part No.
<i>Accessories</i>	
SCU Keypad Controller	726300
High-pressure Gradient Kit, PEEK (Includes controller, mixing tee, fittings, and tubing)	105626
High-pressure Gradient Kit, Stainless Steel (Includes controller, mixing tee, fittings, and tubing)	105624
<i>Replacement Parts</i>	
Piston Seal Kit	160566
Piston	160565
Check Valve Kit, Stainless Steel	120679
Check Valve Kit, PEEK	060141

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

Alltech® 627 Prep Pump

**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
- EZChrom driver and cables included

The Model 627 Preparative Pump delivers the accuracy and precision of a standard analytical pump at flow rates up to 100mL/min.

627 Preparative Pump Specifications	
Flow Range:	0.01–100mL/min
Fluid Path:	PEEK or Stainless Steel
Isocratic/gradient:	Isocratic or binary gradient
Pressure Monitoring:	Yes
Max. Operating Pressure:	4000psig (both SS and PEEK)
Flow Precision:	0.5% RSD
Flow Accuracy:	±2.0%
Dimensions:	6" H x 11" W x 18" D (15cm H x 26cm W x 46cm D)
Weight:	35lb (16kg)
Warranty:	3-year parts, excluding seals, check valves, and pulse dampener; 1-year labor
Gradient Mixing Mode:	High-Pressure
Profiles:	Programmable Multi-step
Gradient Programming:	10 methods with up to 100 lines per method
Drivers:	EZChrom Elite/EZStart

Model 627 Preparative Pump

Description	Part No.
<i>Isocratic System</i>	
PEEK, 85–265VAC, 47–63Hz	627150
Stainless Steel, 85–265VAC, 47–63Hz	627250
<i>Binary Gradient System (Includes 2 pumps, mixing tee, SCU Keypad Controller, tubing, and fittings)</i>	
PEEK, 85–265VAC, 47–63Hz	627350
Stainless Steel, 85–265VAC, 47–63Hz	627450

Accessories and Replacement Parts for Model 627

Description	Part No.
<i>Accessories</i>	
SCU Keypad Controller	726400
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
<i>Replacement Parts</i>	
Piston Seal Kit	120681
Piston	121504
Check Valve Kit, Stainless Steel	120679
Check Valve Kit, Metal-Free	060141

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

related products

Looking for preparative columns and accessories?
See our prep section, pages 148–183.

analytical hplc

HPLC Pumps

Alltech® 442 Binary Gradient Pump



7423

442 Binary Gradient Pump Specifications	
Flow Range:	0.001–10mL/min
Fluid Path:	PEEK or Stainless Steel
Isocratic/gradient:	Binary
Pressure Monitoring:	Yes
Max. Operating Pressure:	6000psig (Stainless Steel) 5000psig (PEEK)
Flow Precision:	0.5% RSD
Flow Accuracy:	±1% of full-scale pressure
Dimensions:	7" H x 10.5" W x 15.25" D (18cm H x 27cm W x 39cm D)
Weight:	24lb (11kg)
Warranty:	3-year parts, excluding seals, check valves, and pulse dampener; 1-year labor
Gradient Mixing Mode:	High-pressure
Profiles:	Programmable Multi-step through EZChrom Elite
Gradient Programming:	0–100% in 0.1% increments
Control:	EZChrom Elite/EZStart or SCU Keypad Controller

Binary Gradient Pumps for Advanced Applications

- Fast and easy setup
- RS232 serial PC interface
- EZChrom driver and cables included

Two high-performance pumps, a pulse dampener, and an offline pressure transducer in a single unit for accurate, reproducible chromatography gradients. With simple setup and reduced maintenance, this pump is an easy way to add gradient capabilities to your HPLC system.

Model 442 Binary Gradient HPLC Pump

Description	Part No.
<i>Model 442 Binary Gradient Pump</i>	
PEEK, 85–265VAC, 47–63Hz	8617782
Stainless Steel, 85–265VAC, 47–63Hz	8617781
<i>Optional Controller</i>	
SCU Keypad Controller	726300

Note: the SCU Keypad Controller is necessary to program gradients if you do not have EZChrom Software.

Replacement Parts for Model 442

Description	Part No.
442 Aqueous Seal Kit 10mL (for 1 head)	8619074
442 Organic Seal Kit 10mL (for 1 head)	8619075
Piston Assembly 10mL (for 1 head)	8619076
PEEK Check Valve Kit (for 1 head)	8619079
Stainless Steel Check Valve Kit (for 1 head)	8619078

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

Alltech® 801 Ultra High-Pressure HPLC Pump



7422

801 High-Pressure Pump Specifications	
Flow Range:	0.001–5.000mL/min
Fluid Path:	Stainless Steel
Isocratic/gradient:	Isocratic
Pressure Monitoring:	Yes
Max. Operating Pressure:	18,000psig
Flow Precision:	0.2% RSD
Flow Accuracy:	<±1% at 1mL/min; 10,000psig; with Methanol
Dimensions:	5.5" H x 10.375" W x 19" D (14cm H x 26.4cm W x 48.3cm D)
Weight:	30lb (13.6kg)
Warranty:	3-year parts, excluding seals, check valves, and pulse dampener; 1-year labor
Profiles:	Programmable Multi-step through EZChrom Elite
Gradient Programming:	0–100% in 0.1% increments
Control:	EZChrom Elite/EZStart or SCU Keypad Controller

Accurate, Even Pressure Up to 18,000psig

- Pressure Capability: 18,000psig
- Automatic pressure calibration
- Advanced recompression software
- EZChrom driver and cables included

The ultra high-pressure digital pump is designed for high-speed, high-pressure chromatography applications. It provides accurate flows under demanding conditions, from normal HPLC pressures up to 18,000psig.

Model 801 High-Pressure HPLC Pump

Description	Part No.
<i>Model 801 High-Pressure Pump</i>	
Stainless Steel, 85–265VAC, 47–63Hz	8618710

Accessories and Replacement Parts for Model 801

Description	Part No.
<i>Accessories</i>	
SCU Keypad Controller	726300
<i>Replacement Parts</i>	
801 Pump Seal Kit 5mL	8619071
Piston Assembly 5mL (for 1 head)	8619077
Stainless Steel Check Valve Kit (for 1 head)	8619078

Note: The SCU Keypad Controller is necessary to program gradients if you do not have EZChrom Software. All replacement parts contain parts for one pump head only.

related products

Looking for columns to use with ultra high-pressure systems? See our VisionHT™ Columns on pages 34–37.

HPLC Pumps

Alltech® 727 Quaternary Gradient HPLC Pump

High-Pressure Quaternary Gradients for Standard or Micro Applications

- EZChrom driver and cables included
- Integrated pulse dampener reduces pulsations and mixes gradients accurately
- Self-flushing pump heads extend seal life
- Easy gradient programming with hand-held control module

The Model 727 Quaternary Gradient Pump combines four high-performance pumps in a single cabinet. The system controller controls each pump independently, for accurate gradients. Flow rates are programmable from 0.001mL/min to 5.000mL/min making it suitable for standard or micro applications. The 727 pump is available in 316 stainless steel or biocompatible PEEK.

727 Quaternary Gradient Pump Specifications	
Max. Operating Pressure:	6000psig (Stainless Steel) 5000psig (PEEK)
Fluid Path:	PEEK or Stainless Steel
Flow Rate Range:	0.001–5.000mL/min
Flow Precision:	0.5% RSD
Flow Accuracy:	±2.0%
Gradient Mixing Mode:	High-pressure Gradient
Profiles:	Programmable Multi-step
Gradient Programming:	0–100% in 0.1% increments
Dimensions:	9" H x 15" W x 20.5" D (23cm H x 38cm W x 52cm D)
Weight:	50lb (23kg)
Warranty:	3-year parts, excluding seals, check valves, and pulse dampener; 1-year labor
Control:	EZChrom Elite/EZStart or SCU Keypad Controller

related products

Looking for a convenient way to order all the essential accessories for system start-up? See page 121 for our HPLC accessory and fitting kits.



Model 727 Quaternary Gradient HPLC Pump

Description	Part No.
<i>Model 727 Quaternary Gradient Pump</i>	
PEEK, 85–265VAC, 47–63Hz	8618931
Stainless Steel, 85–265VAC, 47–63Hz	8618930
<i>Optional Controller</i>	
SCU Keypad Controller	726300

Note: the SCU Keypad Controller is necessary to program gradients if you do not have EZChrom Software.

Replacement Parts for Model 727

Description	Part No.
727 Aqueous Seal Kit 5mL (for 1 head)	8619072
727 Organic Seal Kit 5mL (for 1 head)	8619073
Piston Assembly 5mL (for 1 head)	8619077
PEEK Check Valve Kit (for 1 head)	8619079
Stainless Steel Check Valve Kit (for 1 head)	8619078

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

related products

Looking for pump accessories? See pages 132–135.



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Data Systems

EZStart Chromatography Data System

Affordable, Simple-to-use Chromatography Data System

- PC-based data handling at integrator-like prices
- Optional control of instruments from many vendors
- Upgradeable to EZChrom Elite

Based on the EZChrom Elite software package, EZStart is the ideal solution for laboratories wanting a simple-to-use chromatography data system with comprehensive software features and optional instrument control. It is intended to provide the basic requirements for data acquisition and instrument control from a single workstation.

Operation is Reduced to Three Easy Steps:

- 1. Simple configuration.** Collects data from any instrument generating an analog output using the software's data interface.
- 2. Run in one window.** Set up all runs from a single window using simple wizards.
- 3. Generate graphic reports.** Select from existing templates or customize with the report editor.

Computer Requirements:

- Windows Vista® "Business Edition"
- Windows XP® Professional (SP2) or 2000 Professional (SP4)
- Internet Explorer® 6.0 or 7.0
- Microsoft® .NET version 2.0
- 1.0 GHz CPU minimum
- 512 MB RAM minimum
- 10 GB free disk space
- PCI slots for GPIB, SCSI
- Multiport serial or Ethernet cards may be required

EZStart Software with SS420X Interface

Description	Part No.
120V	1886011
220V	1886211
100V (Japan)	1886311

technical assistance

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

PE Interface Control

- Preserve your investment in existing PE Interface hardware
- Take advantage of advances in computer and software development

EZStart 3.1 with PE Interface Control License allows PerkinElmer Inc's interface boxes to be used as analog to digital converters to interface chromatography detectors to EZStart. Control the PE Turbochrom™, Turbochrom™ EL, TotalChrom®, and ACCESS*CHROM interfaces from EZStart to take advantage of the software benefits while retaining the investment in hardware.

PE Interface Control Software Controls the Following PerkinElmer® Interfaces:

- Series 900 Model 941/941A (RS232 communications)
- Series 900 Models 950/950A, 960/960A, 970/970A (GPIB communications)
- NCI 901/902 (GPIB and RS232 communications)

GPIB PE Interfaces require a GPIB interface card for EZStart (Part No. **111420**, PCI slotted card). Serial PE Interfaces require available RS232 ports.

EZStart Chromatography Data System

Description	Part No.
EZStart 3.1 with PE Interface Control*	1886023
IEEE-488 PCI Card (for PE-Nelson 700 and 900 series intelligent interfaces)**	111420

*One PE interface is required but not included.

**Available PCI slot in PC required.

more info

For more information on EZStart PE Interface Control Software, request sheet M098. Also available on our website.



7241_tech

Data Systems

EZChrom Elite Chromatography Data System

Premier Chromatography Data System for Advanced Needs

Use EZChrom Elite software to create a fully integrated system to control operation, collect and store results, and record all settings.

Multi-vendor instrument control: EZChrom Elite software works with most leading HPLC and GC instruments and components—over 300 vendors are currently represented, and more are added continuously.

Complete data analysis: Full features and ease-of-use to meet your needs today and into the future. Collect chromatography runs and apply a variety of analysis tools including quantitation techniques and calibration curves. You can view the results graphically and generate a variety of outputs for reports.

GLP/GMP features: Complete audit trails and system logs to document and record all changes, user security for access and operational privileges, and electronic signatures and sign-offs.

EZChrom Elite Stand-Alone Package

The EZChrom Elite Stand-Alone software package provides the full functionality of EZChrom Elite software for an individual PC. The stand-alone configurations let you perform all the instrument control and data processing for 1–4 instruments. Each EZChrom Elite Stand Alone package contains the full functionality of EZChrom Elite software.

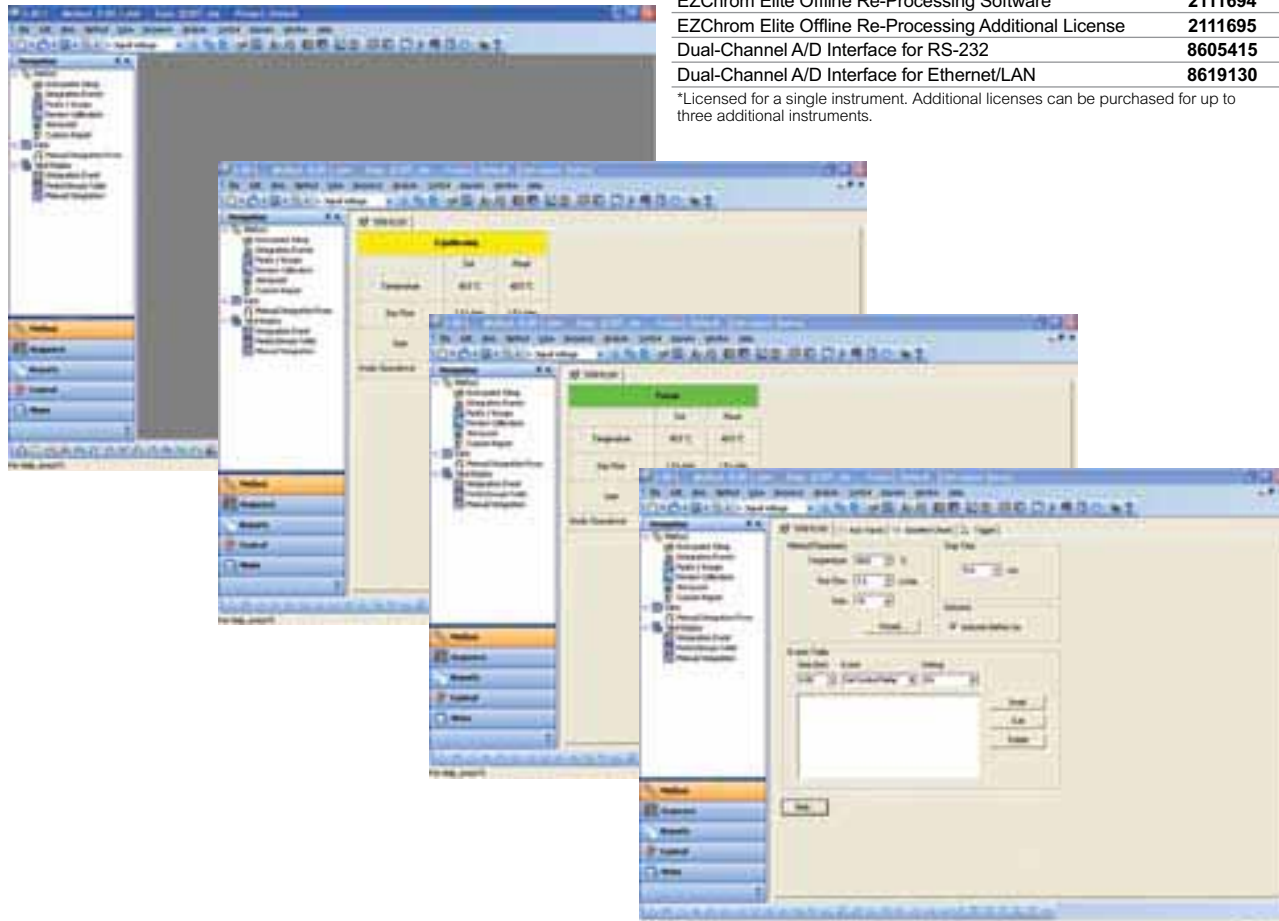
Computer Requirements:

- Windows Vista® “Business Edition”
- Windows XP® Professional (SP2) or 2000 Professional (SP4)
- Internet Explorer® 6.0 or 7.0
- Microsoft® .NET version 2.0
- 1.0 GHz CPU minimum
- 512 MB RAM minimum
- 10 GB free disk space
- PCI slots for GPIB, SCSI
- Multiport serial or Ethernet cards may be required

EZChrom Elite Ordering Information

Description	Part No.
EZChrom Elite Stand-Alone Software*	2111696
EZChrom Elite Stand-Alone Additional License	2111697
EZChrom Elite Offline Re-Processing Software*	2111694
EZChrom Elite Offline Re-Processing Additional License	2111695
Dual-Channel A/D Interface for RS-232	8605415
Dual-Channel A/D Interface for Ethernet/LAN	8619130

*Licensed for a single instrument. Additional licenses can be purchased for up to three additional instruments.



analytical hplc

Analytical HPLC Column Introduction

Grace® Key Column Families

Single-Source Solution for Discovery to Recovery Applications

HPLC is commonly used in a wide range of applications, including drug discovery and purification for the pharmaceutical and biotechnology industries, environmental analysis, forensics, petrochemical analysis, food, cosmetics, and vitamins. The combined premier product lines of Alltech®, Davisil®, Flexit™, Grom™, Jones Chromatography™, Modcol®, and Vydac® create a single-source solution for HPLC columns and accessories from discovery to recovery.

Our column families include reversed-phase, normal-phase, HILIC, ion-exchange, ion-exclusion, size-exclusion, and affinity stationary phases for small- and large-molecule separations, and our column formats maximize their performance. Our product range includes standard and custom columns for analytical separations, preparative phases for scale up, bulk packings that customers can pack in their own columns, and accessories to maintain separation ruggedness and quality.

To help select the appropriate column for your application, we describe key column families and highlight unique phases within these families. Whether the most important factor is analysis speed, column bleed, pH stability, resolution, adjustable selectivity, or analyte molecular weight, Grace offers a column to suit your application.



more info

For information about Grace® analytical hardware formats, see page 31.

more info

For information about prep columns, see pages 148–171.

Column Families Suitable for Small Molecules (<2000 Molecular Weight)

VisionHT™ Ultra High-Pressure Columns

12,000psig pressure-rated columns, with sub 2µm media for high-efficiency, high-speed separations

VisionHT™ columns are optimized for high throughput and ultra high-pressure LC applications. Mechanically stable 1.5µm media and ultra-low volume hardware delivers new separation benefits with excellent stability. A variety of phases available.

Differentiated Phases: C18, C10-B, C18-P, C18-HL, HILIC, Silica

Specifications: Spherical silica, monomerically bonded, proprietary endcapping, 100, 120Å pore size

Formats: Ultra High-Pressure

Alltech® Alltima™ HP Columns

Premium quality, exceptionally stable columns, without phase bleed

Alltech® Alltima™ HP phases are made from high purity silica to eliminate peak tailing. Proprietary bonding eliminates the problem of column bleed for MS and ELSD detection. Full range of phases with pH stability from 1 to 10.

Differentiated Phases: C18 for classic reversed-phase separations, EPS for extended polar selectivity, C18 HiLoad for extra reversed-phase retention, C18 Amide with low bleed, and HILIC.

Specifications: High purity spherical silica, monomerically bonded, endcapped, 100, 120, 190Å pore size

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

Alltech® Prevail™ Columns

Reversed-phase columns for use with 100% organic to 100% aqueous mobile phases

Prevail™ phases are designed for wettability with aqueous and organic mobile phases, and are especially useful for broad gradients. Retain highly polar analytes with aqueous mobile phases as well as hydrophobic analytes in organic mobile phases.

Differentiated Phases: Carbohydrate ES, Organic Acid

Specifications: Spherical silica, monomerically bonded, endcapped, 110Å pore size

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

Analytical HPLC Column Introduction

Column Families Suitable for Small Molecules
(<2000 Molecular Weight) (continued)

Alltech® Platinum™ Columns



Alternate retention and selectivity for polar and nonpolar analytes available in sub 2µm particle sizes

Alltech® Platinum™ phases have a controlled polar silica surface which provides enhanced polar selectivity (EPS) in addition to reversed-phase retention. C18 and EPS C18 columns are a complimentary duo to separate polar and nonpolar analytes.

Differentiated Phases: C18, EPS C18

Specifications: Spherical silica, monomerically bonded, proprietary endcapping, 100Å pore size

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

GraceSmart™ Columns



Classic reversed-phase and premium performance at an exceptional value

GraceSmart™ HPLC phases use high purity silica. Which translates into symmetrical peaks for acids and bases, and predictable reversed-phase selectivity. Whether routine analysis or new method development, use individually tested GraceSmart™ columns to get premium performance at exceptional value.

Differentiated Phases: C18

Specifications: Spherical silica, monomerically bonded, endcapped, 120Å pore size

Format: Analytical

GraceAlpha™ Columns



A New Silica Generation

New silica from Grace with high porosity surface and dense core ideal for scale-up applications. While high porosity surface increases mass transfer results in increased column efficiencies and loading capacity, dense core and highly spherical shape yields mechanically robust particle.

Differentiated Phases: C18, C8, and Silica

Specifications: High purity spherical silica with high porosity surface and dense core

Formats: Analytical, Prep

Column Families Suitable for Large Molecules
(>2000 Molecular Weight)

Vydac® MS Columns



Next generation Vydac® media from the leader in peptide and protein separations

Vydac® MS columns provide unique selectivity and exceptional protein recovery. They require less TFA in the mobile phase for good peak shape, which increases microbore sensitivity of peptides and proteins by reducing "quenching". Vydac® MS columns are also applicable to hydrophobic proteins and peptide mapping.

Differentiated Phases: C18, C8, C4

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

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

Vydac® ProZap™ Columns



High-speed, high-efficiency columns for fast protein analysis

Short 10 and 20mm ProZap™ columns with 1.5µm particles provide high-speed protein and life science separations. Sharp, efficient peaks maximize method sensitivity.

Differentiated Phases: C18

Specifications: Sub 2µm spherical silica, proprietary bonding and endcapping, 500Å pore size

Format: Expedite™

Vydac® Everest® Columns



For peptide separations, peptide mapping and proteomics applications

High-capacity Everest® C18 columns are recommended as the first choice in peptide separations. Everest® offer high capacity to resolve complex samples such as protein digests.

Differentiated Phases: C18

Specifications: Spherical silica, monomerically bonded, endcapped, 300Å pore size

Formats: Capillary, Microbore, Expedite™, Analytical

analytical hplc

HPLC Column Selection

A Comparison of Reversed-Phase Columns

Based on the widely accepted work and data of Drs. Lloyd Snyder and John Dolan.^{1,2} Grace has developed this column selection tool for choosing reversed phase HPLC columns based on peak capacities and column selectivity of polar and nonpolar compounds. Typically, chromatographers choose HPLC columns by comparing physical characteristics, such as surface area and carbon load. Often, this does not provide enough information about selectivity or capacity for adequate column selection. This chart provides a reliable means of choosing HPLC columns based on acidic, basic, and hydrophobic character.

The Snyder/Dolan column test procedure has been described in a series of publications. Based on retention data for a series of standard mixtures and the same separation conditions (50% acetonitrile/buffer; pH 2.8 and 7.0; 35°C), reversed-phase columns are characterized by five column-selectivity parameters: hydrophobicity (H), steric interaction (S*), hydrogen-bond acidity (A), basicity (B), and relative silanol ionization or cation-exchange capacity (C). Here we have chosen to graphically highlight data for H, A, and C, with C results at pH 7.0. Hydrophobicity (H) is often the primary analyte interaction with reversed phase columns and indicates overall capacity. Secondary interactions are often polar interactions with basic analytes. The degree of unprotonated base interaction A and protonated base interaction C with the packing material is measured and represented here.

Directions for Using the Column Chart

The chart lists the columns in descending order of hydrophobic capacity (H). To find similar HPLC columns to test as back-up columns, follow these steps.

- 1) Find the column you are currently using and note neighboring columns which have similar (H) capacity factors.
- 2) Compare the values for interaction of polar compounds (A and C).

If there is more than one choice for a back-up column, then compare your actual sample to the test probes. If your sample is nonpolar, then place more emphasis on hydrophobic values. If your sample is basic (polar), then pay special attention to A and C and determine if your sample will be protonated (A) or unprotonated (C) and place greater emphasis on one of these values.

Key to Chart

- Hydrophobic Indicator
- Hydrogen bonding Indicator—pH 2.8 (Protonated under acidic conditions)
- Cation Exchange Indicator—pH 7.0 (Unprotonated under neutral conditions)

Manufacturer	Column	Selectivity Parameters	
ZirChrom	ZirChrom®-PBD C18	A C	1.284
YMC	J'Sphere® H80 C18	C A	1.132
Restek	Allure® C18	C A	1.116
Phenomenex	Ultracarb® ODS (30)	C A	1.114
YMC	YMC® Pack Pro C18 RS	C A	1.114
Grace (Alltech)	Adsorbosphere™ UHS C18	C A	1.103
ThermoHypersil	Hypersil® BetamaxNeutral C18	C A	1.098
Agilent	Zorbax Extend C18	C A	1.098
Agilent	Zorbax C18	C A	1.089
Beckman	Ultrasphere® ODS	C A	1.085
Grace (Alltech)	Alltima™ HP C18 High Load	C A	1.080
Agilent	Zorbax Rx-C18	C A	1.077
Agilent	Zorbax Eclipse XDB-C18	C A	1.077
Supelco	Ascentis® C18	C A	1.077
Macherey Nagel	Nucleodur® C18 Gravity	C A	1.056
Grace (Grom)	Grom™ Sapphire 110 C18	C A	1.055
Restek	Restek® Ultra C18	C A	1.055
Varian	OmniSpher™ 5 C18	C A	1.055
Grace (Vydac)	Denali® 120 C18	C A	1.052
Waters	Symmetry® C18	C A	1.052
Akzo Nobel	Kromasil® 100-5C18	C A	1.051
Waters	Nova-Pak® C18	C A	1.049
ThermoHypersil	Hypersil® 100 C18	C A	1.048
MacMod/ACT	ACE® 5 C18-HL	C A	1.045
ZirChrom	ZirChrom®-EZ C18	A C	1.040
Grace (Grom)	Grom™ Sil 120 ODS-5 ST	C A	1.035
Dionex	Acclaim® 120 C18	C A	1.032
Waters	Sunfire™ C18	C A	1.031
Agilent	Zorbax Eclipse Plus C18	C A	1.030
Merck	Superspher® 100 RP-18e	C A	1.030
Shiseido	CAPCELL™ C18 AG120	C A	1.030
Grace (Grom)	Grom™ Sil 120 ODS-3 CP	C A	1.029
Waters	Delta-Pak™ C18 100A	C A	1.028
Macherey Nagel	Nucleodur® Isis	C A	1.023
Phenomenex	Prodigy™ ODS (3)	C A	1.023
Phenomenex	Synergi™ Hydro-RP C18	C A	1.022
Phenomenex	Luna™ C18	C A	1.018
Supelco	Supelcoasil™ LC-18	C A	1.018
YMC	YMC® Pro C18	C A	1.015
Phenomenex	Onyx™ Monolithic C18	C A	1.012
Bischoff	ProntoSIL™ SpheriBOND 80-5-ODS2	C A	1.010
Grace (Jones)	Apex™ II C18	C A	1.008
Shiseido	CAPCELL™ C18 UG120	C A	1.007
GL Sciences	Inertsil® ODS-2	C A	1.007

Manufacturer	Column	Selectivity Parameters	
Merck	LiChrospher® 100 RP-18	C A	1.006
Bischoff	ProntoSIL™ 120-5-C18 H	C A	1.005
Shiseido	CAPCELL™ C18 M G	C A	1.005
Grace (Jones)	Genesis® 120 C18	C A	1.005
Bischoff	EU Reference Column C18	C A	1.004
Grace (Alltech)	Allsphere™ ODS2	C A	1.004
Merck	Purospher® STAR RP18e	C A	1.003
Merck	Chromolith® RP18e	C A	1.003
Phenomenex	Luna® C18(2)	C A	1.002
Varian	Pursuit® C18	C A	1.001
MacMod/ACT	ACE® 5 C18	C A	1.000
Tosoh	TSKgel® Super-ODS	C A	0.998
Agilent	Zorbax StableBond 80A C18	C A	0.996
Phenomenex	Prodigy™ ODS(2)	C A	0.995
ThermoHypersil	Hypersil® BDS C18	C A	0.993
Grace (Alltech)	Alltima™ C18	C A	0.993
Grace (Vydac)	Vydac® Everest® C18	C A	0.993
ThermoHypersil	Hypersil® Beta Basic-18	C A	0.993
GL Sciences	Inertsil® ODS-3	C A	0.990
Grace (Alltech)	Adsorbosphere™ C18	C A C	0.989
Phenomenex	Synergi™ Max-RP C18	C A	0.989
Shiseido	CAPCELL™ C18 SG120	C A	0.987
Grace (Jones)	Apex™ I C18	C A C	0.985
ThermoHypersil	Hypersil® ODS-2	C A	0.985
Grace (Alltech)	Alltima™ HP C18	C A	0.985
Waters	Xterra® MS C18	C A	0.984
Waters	Symmetry® 300 C18	C A	0.984
Supelco	Discovery C18	C A	0.984
Supelco	Supelcoasil™ LC-18-DB	C A	0.979
Waters	Spherisorb® S5 ODSB	C A	0.975
ThermoHypersil	Hypersil® Bio Basic-18	C A	0.974
ThermoHypersil	Hypersil® ODS	C A	0.974
Bischoff	ProntoSIL™ 120-5-C18-AQ	C A	0.974
Grace (Jones)	Genesis® 300 C18 C18	C A	0.974
Bischoff	ProntoSIL™ 200-5-C18 AQ	C A	0.974
Agilent	Zorbax C8	C A	0.974
Tosoh	TSK gel® ODS-80Ts	C A	0.971
Waters	Resolve C18	C A	0.968
Phenomenex	Gemini® C18 110A	C A	0.967
Grace (Alltech)	Econosil™ C18	C A	0.966
Phenomenex	Aqua® C18	C A	0.966
YMC	YMC® ODS-AQ C18	C A	0.965
Waters	Spherisorb® ODS-2	C A	0.962
Macherey Nagel	Nucleosil® 100-5-C18 HD C18	C A	0.961

Grace (Jones)	Genesis® 120 AQ C18		0.960
Macherey Nagel	Nucleodur® Pyramid		0.958
Thermo/Hypersil	Hypersil® Elite C18		0.958
Dionex	Acclaim® 300 C18		0.957
Bischoff	ProntoSIL™ 300-5-C18 H		0.956
Waters	Delta-Pak™ C18 300A		0.955
Bischoff	ProntoSIL™ HyperSORB 120 ODS		0.951
Thermo/Hypersil	Hypersil® PAH C18		0.949
Bischoff	ProntoSIL™ 120-5-C18 Agplus		0.947
Phenomenex	Jupiter® 300 C18		0.945
Varian	Polaris® C18-Ether		0.943
Waters	Atlantis® T3 C18		0.941
Tosoh	TSKgel® 80Ts QA		0.940
Grace (Alltech)	Alltima® C18-WP		0.938
Waters	YMC® Hydrosphere C18		0.937
Grace (Alltech)	Brava™ BDS C18		0.938
Bischoff	ProntoSIL™ 60-5 C8 SH		0.929
Varian	Polaris® C18-A		0.928
YMC	J'Sphere® M80 C18		0.926
Agilent	Zorbax Eclipse XDB-C8		0.919
Waters	Atlantis® dC18 b		0.917
Supelco	Ascentis® Express C8		0.915
Thermo	Hypersil® GOLD aQ		0.915
Phenomenex	Selectosil™ C18		0.911
Merck	LiChrosorb® RP-18		0.909
Grace (Vydac)	Vydac® 218TP C18		0.909
Waters	Acquity UPLC® BEH Shield RP18 EP		0.907
Macherey Nagel	Nucleosil® C18		0.906
Agilent	Zorbax StableBond 300A C18		0.905
Grace (Alltech)	Prosphere® C18 300		0.903
Grace (Vydac)	Vydac® 201TP C18		0.901
Supelco	Ascentis® C-8		0.899
Waters	Nova-Pak® C8		0.899
Waters	Symmetry® C8		0.893
YMC	YMC® Pro C8		0.890
Agilent	Zorbax Eclipse Plus C8		0.889
Phenomenex	Luna™ C8(2)		0.889
Grace (Alltech)	Prevail™ C18		0.888
Grace (Alltech)	Prosphere® 100 C18		0.883
Grace (Alltech)	Alltima® AQ EP		0.882
Thermo/Hypersil	Hypersil® GOLD C18		0.881
Phenomenex	Synergi™ Fusion-RP EP		0.879
Phenomenex	Luna™ C8		0.875
Grace (Grom)	Grom™ Sil 120 Octyl-6 MB C8		0.872
Grace (Jones)	Apex™ I C8		0.869
Shiseido	CAPCELL™ C18 A Q		0.867
Macherey Nagel	Nucleosil® 100-5-C8 HD		0.865
Alko Nobel	Kromasil® 100-5C8		0.864
Grace (Jones)	Genesis® 120 EC C8		0.863
Grace (Alltech)	Prevail™ Amide EP		0.862
Macherey Nagel	Nucleosil® ODS		0.860
Restek	Ultra AQ C18		0.857
Waters	Sunfire™ C8		0.856
Waters	Acquity UPLC® BEH C8		0.855
Shiseido	CAPCELL™ PAK C8 UG120		0.854
Waters	Symmetry® Shield C18		0.850
Grace (Alltech)	Alphabond® C18		0.845
Supelco	Ascentis® RP-Amide		0.843
Merck	Purospher® RP-18		0.841
Supelco	Discovery BIO Wide pore C8		0.839
Grace (Grom)	Grom™ Sapphire 110 C8		0.835
Thermo/Hypersil	Hypersil® Beta Basic-8		0.834
Grace (Alltech)	Alltima® HP C8		0.834
Thermo/Hypersil	Hypurity® C8		0.833
Supelco	Discovery C8		0.832
GL Sciences	Inertsil® C8-3 C8		0.830
MacMod/ACT	ACE® 5 C8		0.830
Grace (Jones)	Genesis® 120 C8		0.829
Thermo	Hypersil® GOLD C8		0.825
Phenomenex	Onyx™ Monolithic C8		0.824
Tosoh	TSKgel® Super-Octyl		0.824
Grace (Alltech)	Prevail™ Select C18		0.822
Thermo/Hypersil	Hypersil® Bio Basic-8		0.821
YMC	YMC® Basic C18		0.821
Grace (Alltech)	Econosphere® C18		0.818
Tosoh	TSKgel® Octyl-80Ts		0.814
Whatman	Partisil™ ODS(3)		0.810

References:

1. "The "Hydrophobic-subtraction" Model of Reversed-phase Column Selectivity", L.R. Snyder, J.W. Dolan and P.W. Carr, *J. Chromatogr. A*, 1060 (2004) 77-116.
2. "A New Look at the Selectivity of Reversed-phase HPLC Columns", L.R. Snyder, J.W. Dolan and P.W. Carr, *Anal. Chem.*, 79 (2007) 3255-3262.

Grace® HPLC Packing Material Specifications

Columns for Small Molecules										
Brand	Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	End-capped?	USP L-code
Adsorbosil® <i>Alltech</i>	C18	Silica	Irregular	5, 10µm	60Å	450m²/g	15%	Polymeric	Yes	L1
	C8	Silica	Irregular	5, 10µm	60Å	450m²/g	10%	Polymeric	Yes	L7
	C2	Silica	Irregular	5, 10µm	60Å	450m²/g	No	Polymeric	No	L16
	CN	Silica	Irregular	5, 10µm	60Å	450m²/g	—	Polymeric	Yes	L10
	NH₂	Silica	Irregular	5, 10µm	60Å	450m²/g	—	Polymeric	No	L8
Adsorbosphere™ <i>Alltech</i>	Silica	Silica	Irregular	5, 10µm	60Å	450m²/g	—	Polymeric	No	L3
	C18	Silica	Spherical	3, 5, 10µm	80Å	200m²/g	12%	Monomeric	Yes	L1
	C18 HS	Silica	Spherical	3, 5µm	60Å	350m²/g	20%	Monomeric	Yes	L1
	C18 UHS	Silica	Spherical	5, 10µm	60Å	500m²/g	30%	Monomeric	Yes	L1
	C8	Silica	Spherical	3, 5, 10µm	80Å	200m²/g	8%	Monomeric	Yes	L7
	Phenyl	Silica	Spherical	5µm	80Å	200m²/g	5%	Monomeric	Yes	L11
	Cyano	Silica	Spherical	5µm	80Å	200m²/g	—	Monomeric	Yes	L10
	Cyano-AQ	Silica	Spherical	5µm	120Å	170m²/g	—	Polymeric	No	L10
	Amino (NH₂)	Silica	Spherical	3, 5µm	80Å	200m²/g	—	Polymeric	No	L8
	Silica	Silica	Spherical	5µm	80Å	200m²/g	—	—	No	L3
	SAX	Silica	Spherical	5µm	80Å	200m²/g	—	Monomeric	No	—
	SCX	Silica	Spherical	5µm	80Å	200m²/g	—	Monomeric	Yes	—
Adsorbosphere™ XL <i>Alltech</i>	C18	Silica	Spherical	3, 5µm	90Å	200m²/g	11%	Monomeric	Yes	L1
	C18-B	Silica	Spherical	5µm	90Å	200m²/g	12%	Monomeric	Yes	L1
	C8	Silica	Spherical	3, 5µm	90Å	200m²/g	6%	Monomeric	Yes	L7
	C1 (TMS)	Silica	Spherical	5µm	90Å	200m²/g	—	Monomeric	Yes	L13
	Silica	Silica	Spherical	5µm	90Å	200m²/g	—	—	No	L3
	SAX	Silica	Spherical	5, 10µm	90Å	200m²/g	—	Monomeric	Yes	—
	SCX	Silica	Spherical	5, 10µm	90Å	200m²/g	—	Monomeric	Yes	—
Allsphere™ <i>Alltech</i>	ODS-1	Silica	Spherical	5µm	80Å	220m²/g	7%	Monomeric	Partial	L1
	ODS-2	Silica	Spherical	3, 5µm	80Å	220m²/g	12%	Monomeric	Yes	L1
	C8	Silica	Spherical	3, 5µm	80Å	220m²/g	6%	Monomeric	Yes	L7
	C6	Silica	Spherical	5µm	80Å	220m²/g	4%	Monomeric	Yes	L15
	C1 (TMS)	Silica	Spherical	5µm	80Å	220m²/g	3%	Monomeric	No	L13
	Phenyl	Silica	Spherical	5µm	80Å	220m²/g	3%	Monomeric	Yes	L11
	Cyano	Silica	Spherical	5µm	80Å	220m²/g	3.5%	Monomeric	No	L10
	Amino (NH₂)	Silica	Spherical	5µm	80Å	220m²/g	3%	Monomeric	No	L8
	Silica	Silica	Spherical	3, 5µm	80Å	220m²/g	—	—	No	L3
	SAX	Silica	Spherical	5µm	100Å	220m²/g	4%	Monomeric	No	—
	SCX	Silica	Spherical	5µm	100Å	220m²/g	4%	Monomeric	No	—
Alltima™ HP <i>Alltech</i>	C18	Silica	Spherical	3, 5µm	190Å	200m²/g	12%	Monomeric	Yes	L1
	C18 EPS	Silica	Spherical	3, 5µm	190Å	200m²/g	4%	Monomeric	No	L1
	C18 HiLoad	Silica	Spherical	3, 5µm	100Å	450m²/g	24%	Monomeric	Yes	L1
	C18 AQ	Silica	Spherical	3, 5µm	100Å	450m²/g	20%	Monomeric	Yes	L1
	C18 Amide	Silica	Spherical	3, 5µm	190Å	200m²/g	12%	Monomeric	Yes	L1
	C8	Silica	Spherical	3, 5µm	190Å	200m²/g	8%	Monomeric	Yes	L7
	Cyano	Silica	Spherical	3, 5µm	190Å	200m²/g	4%	Monomeric	Yes	L10
	Silica	Silica	Spherical	3, 5µm	100Å	450m²/g	—	—	No	L3
	HILIC	Silica	Spherical	1.5, 3, 5µm	120Å	230m²/g	—	—	No	L3
Alltima™ <i>Alltech</i>	C18	Silica	Spherical	3, 5, 10µm	100Å	340m²/g	16%	Polymeric	Yes	L1
	C18 LL	Silica	Spherical	5µm	100Å	340m²/g	9%	Polymeric	Yes	L1
	C8	Silica	Spherical	3, 5, 10µm	100Å	340m²/g	9%	Polymeric	Yes	L7
	Phenyl	Silica	Spherical	3, 5µm	100Å	340m²/g	7.5%	Polymeric	Yes	L11
	Cyano	Silica	Spherical	3, 5µm	100Å	340m²/g	—	Polymeric	Yes	L10
	Amino (NH₂)	Silica	Spherical	3, 5µm	100Å	340m²/g	—	Polymeric	No	L8
	Silica	Silica	Spherical	3, 5, 10µm	100Å	340m²/g	—	—	No	L3
AlphaBond™ <i>Alltech</i>	C18	Silica	Irregular	5, 10µm	125Å	300m²/g	10%	Monomeric	Yes	L1
	C8	Silica	Irregular	10µm	125Å	300m²/g	—	Monomeric	Yes	L7
	Phenyl	Silica	Irregular	10µm	125Å	300m²/g	—	Monomeric	Yes	L11
	Cyano	Silica	Irregular	10µm	125Å	300m²/g	—	Monomeric	Yes	L10
	Amino (NH₂)	Silica	Irregular	10µm	125Å	300m²/g	—	Polymeric	No	L8
	Silica	Silica	Irregular	10µm	125Å	300m²/g	—	—	No	L3
Apex™ I JONES	ODS	Silica	Spherical	3, 5, 10µm	100Å	170m²/g	10%	Polymeric	Yes	L1
	C8	Silica	Spherical	3, 5µm	100Å	170m²/g	7%	Monomeric	No	L7
	C8(EC)	Silica	Spherical	3, 5µm	100Å	170m²/g	7%	Monomeric	Yes	L7
	C1	Silica	Spherical	3, 5µm	100Å	170m²/g	2.5%	Monomeric	Yes	L13
	Phe	Silica	Spherical	3, 5µm	100Å	170m²/g	3%	Monomeric	No	L11
	Basic ODS	Silica	Spherical	5µm	100Å	200m²/g	12%	Monomeric	Yes	L1
	PAH	Silica	Spherical	5µm	100Å	170m²/g	—	Monomeric	Yes	—
	CN	Silica	Spherical	3, 5µm	100Å	170m²/g	4%	Monomeric	No	L10
	Amino (NH₂)	Silica	Spherical	3, 5µm	100Å	170m²/g	2%	Monomeric	No	L8
	Carbohydrate	Silica	Spherical	5µm	100Å	170m²/g	—	Monomeric	†	—
	Silica	Silica	Spherical	3, 5, 10µm	100Å	170m²/g	—	—	No	L3
Apex™ II JONES	ODS	Silica	Spherical	3, 5µm	100Å	170m²/g	10.5%	Monomeric	Yes	L1
	Diol	Silica	Spherical	3, 5µm	100Å	170m²/g	3.5%	Monomeric	No	—
	Amino (NH₂)	Silica	Spherical	3, 5µm	100Å	170m²/g	2%	Monomeric	No	L8
	Others—as Apex I	Silica	Spherical	5µm	100Å	170m²/g	—	—	No	—
Apex™ Prepsil JONES	ODS	Silica	Spherical	8, 15µm	130Å	170m²/g	10%	Polymeric	Yes	L1
	C8	Silica	Spherical	8, 15µm	130Å	170m²/g	7%	Monomeric	No	L7
	C8(EC)	Silica	Spherical	8, 15µm	130Å	170m²/g	7%	Monomeric	Yes	L7
	C2	Silica	Spherical	8µm	130Å	170m²/g	2.8%	Monomeric	No	L30
	CN	Silica	Spherical	8µm	130Å	170m²/g	4%	Monomeric	Yes	L10
	Amino (NH₂)	Silica	Spherical	8µm	130Å	170m²/g	2%	Monomeric	Yes	L8
	Silica	Silica	Spherical	8, 15µm	130Å	170m²/g	—	—	No	L3
	Diol	Silica	Spherical	8µm	130Å	170m²/g	3.2%	Monomeric	No	L20

†Proprietary.

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Columns for Small Molecules (continued)										
Brand	Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	End-capped?	USP L-code
Apollo™ <i>Alltech</i>	C18	Silica	Spherical	5µm	100Å	340m²/g	15%	Monomeric	Yes	L1
	C8	Silica	Spherical	5µm	100Å	340m²/g	9%	Monomeric	Yes	L7
	Phenyl	Silica	Spherical	5µm	100Å	340m²/g	8%	Monomeric	Yes	L11
	Silica	Silica	Spherical	5µm	100Å	340m²/g	—	—	No	L3
Brava™ <i>Alltech</i>	C18 BDS	Silica	Spherical	3, 5µm	145Å	185m²/g	8.5%	Monomeric	Yes	L1
	C18 ODS	Silica	Spherical	3, 5µm	130Å	195m²/g	8.5%	Monomeric	Yes	L1
	C8	Silica	Spherical	3, 5µm	130Å	195m²/g	6%	Monomeric	Yes	L7
	C8 BDS	Silica	Spherical	3, 5µm	145Å	185m²/g	5.5%	Monomeric	Yes	L7
	Phenyl	Silica	Spherical	5µm	130Å	195m²/g	—	Monomeric	No	L11
	Cyano	Silica	Spherical	5µm	130Å	195m²/g	—	Monomeric	No	L10
	Cyano BDS	Silica	Spherical	5µm	145Å	185m²/g	—	Monomeric	No	L10
	Amino (NH₂)	Silica	Spherical	5µm	130Å	195m²/g	—	Monomeric	No	L8
	Silica	Silica	Spherical	5µm	130Å	195m²/g	—	—	No	L3
	Amino	Silica	Irregular	10µm	80Å	550m²/g	—	Polymeric	No	—
Carbohydrate <i>Alltech</i>	Cation	Polymer	Spherical	10µm	—	—	—	—	No	—
Denali® <i>VYDAC</i>	238DE C18	Silica	Spherical	3, 5, 10, 15, 20µm	120Å	280-340m²/g	20%	Monomeric	Yes	L1
Econosil™** <i>Alltech</i>	C18	Silica	Irregular	3, 5, 10µm	80Å	200m²/g	10%	Monomeric	Yes	L1
	C8	Silica	Irregular	3, 5, 10µm	80Å	200m²/g	5%	Monomeric	Yes	L7
	CN	Silica	Irregular	5, 10µm	80Å	200m²/g	—	Monomeric	Yes	L10
	NH₂	Silica	Irregular	5, 10µm	80Å	200m²/g	—	Polymeric	No	L8
	Silica	Silica	Irregular	3, 5, 10µm	80Å	200m²/g	—	—	No	L3
Econosphere™** <i>Alltech</i>	C18	Silica	Spherical	3, 5, 10µm	80Å	200m²/g	10%	Monomeric	Yes	L1
	C8	Silica	Spherical	3, 5, 10µm	80Å	200m²/g	5%	Monomeric	Yes	L7
	Cyano	Silica	Spherical	5µm	80Å	200m²/g	—	Monomeric	Yes	L10
	Amino (NH₂)	Silica	Spherical	5µm	80Å	200m²/g	—	Polymeric	No	L8
	Silica	Silica	Spherical	3, 5, 10µm	80Å	200m²/g	—	—	No	L3
	C18	Silica	Spherical	3, 4, 7, 15µm	120Å	300m²/g	18%	Monomeric	Yes	L1
Genesis® 120 <i>JONES</i>	C18 AQ	Silica	Spherical	4, 7µm	120Å	300m²/g	15%	Monomeric	Yes	L1
	C8	Silica	Spherical	3, 4, 7, 15µm	120Å	300m²/g	11%	Monomeric	No	L7
	C8(EC)	Silica	Spherical	3, 4, 7, 15µm	120Å	300m²/g	11%	Monomeric	Yes	L7
	C4	Silica	Spherical	4µm	120Å	300m²/g	6%	Monomeric	Yes	L26
	Phenyl	Silica	Spherical	4µm	120Å	300m²/g	9%	Monomeric	Yes	L11
	CN	Silica	Spherical	3, 4µm	120Å	300m²/g	7%	Monomeric	Yes	L10
	Amino (NH₂)	Silica	Spherical	3, 4µm	120Å	300m²/g	3.5%	Polymeric	No	L8
	Carbohydrate	Silica	Spherical	4µm	120Å	300m²/g	—	Monomeric	No	—
	CN-TCA	Silica	Spherical	4µm	120Å	300m²/g	7%	Monomeric	Yes	—
	Petro-XP	Silica	Spherical	4µm	120Å	300m²/g	—	Monomeric	No	—
	Silica	Silica	Spherical	3, 4, 7, 15µm	120Å	300m²/g	—	—	No	L3
	C18	Silica	Spherical	5, 10, 15, 20µm	120Å	325m²/g	15%	Monomeric	Yes	L1
	C8	Silica	Spherical	5, 10, 15, 20µm	120Å	325m²/g	10%	Monomeric	No	L7
	Silica	Silica	Spherical	5, 10, 15, 20µm	120Å	325m²/g	—	—	No	L3
GraceAlpha® <i>GRACE</i>	C18	Silica	Spherical	3, 5µm	120Å	220m²/g	10%	Monomeric	Yes	L1
GraceSmart™ <i>GRACE</i>	ODS-0 AB (acid/base deactivated)	Silica	Spherical	1.5, 3, 5, 10µm	100Å	200m²/g	11%	Monomeric	Yes	L1
	ODS-2 FE (fully endcapped)	Silica	Spherical	1.5, 3, 5, 10µm	80, 100, 300Å	220, 200, 100m²/g	12, 11, 6%	Monomeric	Yes	L1
	ODS-3 CP (encapsulated)	Silica	Spherical	3, 5, 7, 10µm	120, 300Å	320, 170m²/g	15, 6%	Polymeric	No	L1
	ODS-4 HE (hydrophilic endcapping)	Silica	Spherical	3, 4, 5, 7, 10µm	120, 200Å	300, 200m²/g	16, 11%	Monomeric	Yes	L1
Grom™ Sil <i>CROM</i>	ODS-5 ST (standard)	Silica	Spherical	3, 4, 5, 7, 10µm	60, 120, 200, 300Å	580, 300, 200, 150m²/g	22, 17, 12, 7%	Monomeric	Yes	L1
	ODS-6 NE (non endcapped)	Silica	Irregular	3, 5µm	120Å	300m²/g	17%	Monomeric	No	L1
	ODS-7 pH (pH-stable)	Silica	Irregular	4µm	80Å	510m²/g	22%	Polymeric	No	L1
	Octyl-1 B (base deactivated)	Silica	Spherical	3, 5µm	100Å	200m²/g	6.5%	Monomeric	Yes	L7
	Octyl-2 AB (acid/base deactivated)	Silica	Spherical	3, 5µm	100Å	200m²/g	5%	Monomeric	Yes	L7
	Octyl-3 BA (for bases)	Silica	Spherical	3, 5µm	120Å	300m²/g	9%	Monomeric	Yes	L7
	Octyl-4 FE (fully endcapped)	Silica	Spherical	3, 5, 10µm	80, 100, 300Å	220, 200, 100m²/g	6.6, 6, 3%	Monomeric	Yes	L7
	Octyl-5 CP (encapsulated)	Silica	Spherical	3, 5, 7, 10µm	120, 300Å	320, 170m²/g	10, 5.5%	Polymeric	No	L7
	Octyl-6 MB (monomer binding)	Silica	Spherical	3, 5, 10µm	120, 200, 300Å	300, 200, 150m²/g	10, 7, 4%	Monomeric	Yes	L7
	Hexyl-1 MB (monomeric bonding)	Silica	Spherical	5µm	80, 100Å	220, 200m²/g	4, 4%	Monomeric	Yes	—
	Phenyl-1 FE (fully endcapped)	Silica	Spherical	3, 5, 10µm	120, 300Å	300, 150m²/g	9, 5%	Monomeric	Yes	L11
	Phenyl-2 CP (encapsulated)	Silica	Irregular	5µm	120, 300Å	320, 170m²/g	7, 4%	Polymeric	No	L11
	Phenyl-3 PE (partially endcapped)	Silica	Spherical	3, 5, 10µm	80, 100Å	220, 200m²/g	6.6, 6%	Monomeric	Yes	L11
	Butyl-1 ST (standard)	Silica	Spherical	3, 5µm	120, 300Å	300, 150m²/g	7, 2.5%	Monomeric	No	L26
	Butyl-2 FE (fully endcapped)	Silica	Spherical	3, 5µm	300Å	100m²/g	1, 5%	Monomeric	No	L26
	TMS-1 ST (standard)	Silica	Spherical	3, 5µm	120, 300Å	300, 150m²/g	4%	Monomeric	Yes	L13
	TMS-2 CP (encapsulated)	Silica	Spherical	3, 5µm	120, 300Å	320, 170m²/g	3%	Polymeric	No	L13
	Cyan-1 ST (standard)	Silica	Spherical	3, 5µm	120, 300Å	300, 150m²/g	4.8%	Monomeric	Yes	—
	Cyan-2 PR (cyanopropyl)	Silica	Spherical	3, 5µm	80, 100Å	220, 200m²/g	3.5%	Monomeric	Yes	—
	Cyan-3 CP (encapsulated)	Silica	Spherical	5µm	120Å	320m²/g	4%	Polymeric	No	—
	Amino-1 PR (NH-propyl)	Silica	Spherical	3, 5, 10µm	80, 100Å	220, 200m²/g	2%	Monomeric	Yes	L8
	Amino-2 PA (cross linked Poly-NH₂)	Silica	Spherical	5µm	120Å	300m²/g	—	Polymeric	No	L8
	Amino-3 CP (encapsulated NH-residues)	Silica	Irregular	5µm	80Å	420m²/g	—	Monomeric	Yes	L8
	Amino-4 PR (propylamine bonded to silica)	Silica	Irregular	3, 7µm	300Å	100m²/g	—	Monomeric	No	L8
	Diol	Silica	Spherical	5, 10µm	60, 120, 200, 300Å	580, 300, 200, 150m²/g	—	Monomeric	No	L20
	Normal Phase-1 ST (standard silica)	Silica	Spherical	3, 5, 10µm	80, 100, 1000Å	220, 200m²/g	—	—	No	L3
	Normal Phase-2 SP (spherical silica)	Silica	Spherical	3, 5, 10µm	60, 120, 200, 1000Å	580, 300, 200m²/g	—	—	No	L3
	Normal Phase-3 PV (polyvinylalcohol)	Silica	Spherical	5µm	120Å	300m²/g	—	Polymeric	No	L3
	SEC (size exclusion chromatography)	Silica	Spherical	5, 10µm	60, 120, 200, 300Å	580, 300, 200, 150m²/g	—	—	No	—
	Strong Anion-1	Silica	Spherical	5, 10µm	80, 100Å	220, 200m²/g	—	—	No	—
	Weak Anion-2 (ion exchange)	Silica	Spherical	7µm	300Å	100m²/g	—	—	No	—
	Strong Cation-1 (ion exchange)	Silica	Spherical	5, 10µm	80, 100Å	220, 200m²/g	—	—	No	—

*Available only online.

Brand	Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	End-capped?	USP L-code
Grom™ Sil (cont.) CROM	Weak Cation-2 (ion exchange)	Silica	Spherical	7µm	300Å	100m²/g	—	—	No	
	HIC (hydrophobic interaction chrom.)	Silica	Spherical	7µm	300Å	100m²/g	—	—	No	
	C18	Silica	Spherical	3, 5, 10µm	65, 110Å	500, 270m²/g	23, 16%	Monomeric	Yes	L1
	C8	Silica	Spherical	3, 5, 10µm	65, 110Å	500, 270m²/g	15, 10%	Monomeric	Yes	L7
Grom™ Sapphire CROM	C4	Silica	Spherical	3, 5, 10µm	65, 110Å	500, 270m²/g	10.5, 7%	Monomeric	Yes	L26
	Silica	Silica	Spherical	3, 5, 10µm	65, 110Å	500, 270m²/g	—	—	No	L3
	C18/Cation	Silica	Spherical	5, 7µm	100Å	350m²/g	—	Polymeric	No	—
	C8/Anion	Silica	Spherical	7µm	100Å	350m²/g	—	Polymeric	No	—
Mixed Mode Alltech	C8/Cation	Silica	Spherical	5µm	100Å	350m²/g	—	Polymeric	No	—
	C18	Silica	Spherical	1.5, 3, 5µm	100Å	200m²/g	6%	Monomeric	Yes	L1
	C18 EPS	Silica	Spherical	1.5, 3, 5µm	100Å	200m²/g	5%	Monomeric	No	L1
	C8	Silica	Spherical	1.5, 3, 5µm	100Å	200m²/g	4%	Monomeric	Yes	L7
Platinum™ Alltech	C8 EPS	Silica	Spherical	3, 5µm	100Å	200m²/g	2.5%	Monomeric	No	L7
	Phenyl	Silica	Spherical	3, 5µm	100Å	200m²/g	—	Monomeric	Yes	L11
	Cyano	Silica	Spherical	3, 5µm	100Å	200m²/g	—	Monomeric	No	L10
	Amino (NH₂)	Silica	Spherical	3, 5µm	100Å	200m²/g	—	Monomeric	No	L8
	Silica	Silica	Spherical	3, 5µm	100Å	200m²/g	—	—	No	L3
	SAX	Silica	Spherical	3, 5µm	100Å	200m²/g	—	Monomeric	No	—
	C18 Select	Silica	Spherical	3, 5µm	110Å	350m²/g	17%	Monomeric	Yes	L1
	C18	Silica	Spherical	3, 5µm	110Å	350m²/g	15%	Monomeric	Yes	L1
Prevall™ Alltech	C8	Silica	Spherical	3, 5µm	110Å	350m²/g	8%	Monomeric	Yes	L7
	Phenyl	Silica	Spherical	3, 5µm	110Å	350m²/g	7%	Monomeric	Yes	L11
	Cyano	Silica	Spherical	3, 5µm	110Å	350m²/g	—	Monomeric	Yes	L10
	Amino (NH₂)	Silica	Spherical	3, 5µm	110Å	350m²/g	—	Monomeric	No	L8
	Silica	Silica	Spherical	3, 5µm	110Å	350m²/g	—	—	No	L3
	Organic Acid	Silica	Spherical	3, 5µm	110Å	350m²/g	—	Monomeric	Yes	—
	Carbohydrate ES	Polymer	Spherical	5µm	—	—	—	—	No	—
	101SP Sil	Silica	Spheroidal	5, 10µm	100Å	250–350m²/g	—	unbonded	No	L3
Vydac® SP VYDAC	201SP C18	Silica	Spheroidal	3, 5, 10, 15µm	90Å	250–350m²/g	13%	Monomeric	Yes	L1
	208SP C8	Silica	Spheroidal	5, 10, 15µm	90Å	250–350m²/g	9%	Monomeric	Yes	L7
	C18	Silica	Spherical	1.5µm	100Å	200m²/g	6%	Monomeric	Yes	L1
VisionHT™ GRACE	C-18-B	Silica	Spherical	1.5µm	120Å	220m²/g	5.5%	Monomeric	†	L1
	C18-P	Silica	Spherical	1.5µm	100Å	200m²/g	5%	Monomeric	No	L1
	C18-HL	Silica	Spherical	1.5µm	120Å	220m²/g	11%	Polymeric	†	L1
	HILIC, Silica	Silica	Spherical	1.5µm	120Å	220m²/g	—	—	No	L3

Brand	Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	End-capped?	USP L-code
Genesis® 300 JONES	C18	Silica	Spherical	4, 7µm	300Å	120m²/g	10%	Monomeric	Yes	L1
	C4	Silica	Spherical	4, 7µm	300Å	120m²/g	3%	Monomeric	Yes	L26
	CN	Silica	Spherical	4µm	300Å	120m²/g	3.3%	Monomeric	Yes	L11
Macrosphere™ 300 Alltech	C18	Silica	Spherical	5, 7µm	300Å	100m²/g	10%	Monomeric	Yes	L1
	C8	Silica	Spherical	5, 7µm	300Å	100m²/g	2.2%	Monomeric	Yes	L7
	C4	Silica	Spherical	5, 7µm	300Å	100m²/g	—	Monomeric	Yes	L26
	SAX	Silica	Spherical	7µm	300Å	100m²/g	—	Monomeric	No	—
	WAX	Silica	Spherical	7µm	300Å	100m²/g	—	Monomeric	No	—
	SCX	Silica	Spherical	7µm	300Å	100m²/g	—	Polymeric	No	—
	WCX	Silica	Spherical	7µm	300Å	100m²/g	—	Polymeric	No	—
	GPC 60	Silica	Spherical	7µm	60Å	450m²/g	—	Polymeric	No	L25
Macrosphere™ GPC Alltech	GPC 100	Silica	Spherical	7µm	100Å	350m²/g	—	Polymeric	No	—
	GPC 150	Silica	Spherical	7µm	150Å	200m²/g	—	Polymeric	No	—
	GPC 300	Silica	Spherical	7µm	300Å	100m²/g	—	Polymeric	No	—
	C18	Silica	Spherical	3, 5, 10µm	300Å	120m²/g	9%	Monomeric	Yes	L1
ProSphere™ Alltech	C18-AQ	Silica	Spherical	3, 5µm	100Å	450m²/g	18%	Monomeric	Yes	L1
	C4	Silica	Spherical	3, 5, 10µm	300Å	120m²/g	3%	Monomeric	Yes	L26
	Size-Exclusion 125	Silica	Spherical	4, 5µm	125Å	—	—	—	No	—
	Size-Exclusion 250	Silica	Spherical	4, 5µm	250Å	—	—	—	No	—
	Size-Exclusion 450	Silica	Spherical	8µm	450Å	—	—	—	No	—
	P-HR (reversed phase)	Polymer	Spherical	4µm	140Å	—	—	—	No	—
	C18 ProZap™	Silica	Spherical	1.5µm	500Å	59m²/g	3%	Monomeric	Yes	L1
	214ATP C4	Silica	Spheroidal	5, 10–15µm	300Å	70–110m²/g	3%	Polymeric	Yes	L26
Vydac® ATP VYDAC Vydac® TP VYDAC	101TP Sil	Silica	Spheroidal	5, 10, 10–15, 15–20µm	300Å	70–110m²/g	—	unbonded	No	L3
	201TP C18	Silica	Spheroidal	5, 7, 10, 10–15, 15–20µm	300Å	70–90m²/g	8%	Polymeric	No	L1
	202TP C18	Silica	Spheroidal	3, 5, 10µm	300Å	60–90m²/g	9%	Polymeric	No	L1
	208TP C8	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m²/g	5%	Polymeric	Yes	L7
	214TP C4	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m²/g	3%	Polymeric	Yes	L26
	218TP C18	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m²/g	8%	Polymeric	Yes	L1
	219TP Di-Phe	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m²/g	4%	Polymeric	Yes	
	238TP C18	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m²/g	4%	Monomeric	Yes	L1
	238EV C18	Silica	Spherical	5, 10, 10–15, 15–20µm	300Å	70–110m²/g	6%	Monomeric	Yes	L1
	208MS C8	Silica	Spheroidal	5µm	300Å	70m²/g	5%	Polymeric	Yes	L7
Everest® VYDAC Vydac® MS VYDAC	214MS C4	Silica	Spheroidal	5µm	300Å	70–110m²/g	3%	Polymeric	Yes	L26
	218MS C18	Silica	Spheroidal	3, 5, 10, 10–15µm	300Å	60–110m²/g	8%	Polymeric	Yes	L1
	238MS C18	Silica	Spheroidal	5µm	300Å	70m²/g	4%	Monomeric	Yes	L1
	219MS Di-Phe	Silica	Spheroidal	5µm	300Å	70m²/g	4%	Polymeric	Yes	

*Product information is available at www.discoverysciences.com. †Proprietary.

Grace® HPLC Hardware Formats

Grace Davison Discovery Sciences provides hardware formats to maximize the performance of the phases in our column families for all applications. Choose a hardware format based on your method requirements for speed, sensitivity, and resolution.

Ultra High-Pressure Hardware



7135

Ideally suited for ultra high-pressure systems, this ultra-low volume hardware is pressure rated to 18,000psig, and packed with 1.5µm media to maximize speed and efficiency.

Lengths	Inner Diameters	Pressure Limit	Wetted Surfaces
20, 30, 50, 100mm	1.0, 2.0mm	18,000psig	316 Stainless Steel

Expedite™ MS Hardware



6113

High-speed, low-volume columns for rapid resolution and high-throughput LC/MS applications.

Lengths	Inner Diameters	Pressure Limit	Wetted Surfaces
10, 20mm	2.1, 4.6mm	10,000psig	316 Stainless Steel

Rocket™ Hardware



6904

High-speed, high-resolution columns for high-throughput analysis. Large 7mm i.d. balances column volume with system volume to deliver excellent peak shapes on conventional HPLC instrumentation. Large i.d. also allows fast mobile-phase flow rates which minimizes peak broadening.

Lengths	Inner Diameters	Pressure Limit	Wetted Surfaces
33, 53mm	7mm	10,000psig	316 Stainless Steel

Solvent-Reducer and Microbore Hardware



7345

Smaller diameter columns reduce solvent consumption and increase sensitivity when compared to standard 4.6mm i.d. columns. Use with standard HPLC instrumentation or with MS and ELS detectors.

Lengths	Inner Diameters	Pressure Limit	Wetted Surfaces
50, 100, 150, 250, 300mm	1.0, 2.1, 3.0mm	10,000psig	316 Stainless Steel

Capillary Hardware



7344

For LC/MS and other high-sensitivity and sample-limited applications.

Lengths	Inner Diameters	Pressure Limit	Wetted Surfaces
50, 100, 150, 250, 300mm	0.075, 0.150, 0.3, 0.5, 0.8mm	5000psig	316 Stainless Steel and fused silica

Analytical Hardware



7345

4.6mm i.d. columns for standard HPLC instrumentation, the most commonly used. Analytical columns have industry standard port configurations. Some column families are also available with port configurations for Waters® endfittings.

Lengths	Inner Diameters	Pressure Limit	Wetted Surfaces
30, 50, 100, 150, 250, 300mm	4.6mm	10,000psig	316 Stainless Steel

Metal-Free Hardware



7341

Mechanically strong, metal-free columns offer biocompatibility, and chemical resistance that ion chromatography and biotechnology applications demand.

Lengths	Inner Diameters	Pressure Limit	Wetted Surfaces
50, 100, 150, 250, 300mm	2.1, 4.6mm	5000psig	PEEK

Capillary Guards



6931

Capillary guards offer zero dead-volume with finger-tight connections to maintain column performance. Use them to protective your capillary investment, as enrichment columns, or as short analytical columns.

Lengths	Inner Diameters	Pressure Limit	Wetted Surfaces
5, 10, 20mm	0.3, 0.5mm	5000psig	316 Stainless Steel and fused silica

All-Guard™ Guard Cartridges



6617

Guard system with reusable holder and disposable guard columns to protect analytical columns.

Lengths	Inner Diameters	Pressure Limit	Wetted Surfaces
7.5mm	2.1, 3.0, 4.6mm	5000psig	316 Stainless Steel

more info

Looking for preparative HPLC hardware?
See page 150.

analytical hplc

High Throughput HPLC Introduction

The Benefits of Grace® Small Particles and Formats

Today's laboratories are under greater demand to analyze more samples in less time. To help meet this demand, major product advances have been made to decrease analysis time and increase HPLC throughput. HPLC system advances have greatly reduced the influence of extra column volumes and have extended the range of flow rates and pressure capabilities. In response to this, Grace now offers a wide range of column chemistries and formats appropriate for all types of high throughput systems.

The use of smaller particles offers two main improvements to the chromatographic separation—increased resolution and speed. Resolution is directly proportional to the square root of column efficiency, therefore the higher the efficiency, the narrower the peaks and the greater the resolution between them. Increased speed comes from higher mobile phase flow rates that can be used without loss in efficiency, and higher flow rates mean faster analysis times.

Understanding the type of system currently in use for high throughput separations and then matching the right column configuration is critical to achieving the best high throughput separation. Here we outline the three types of systems currently in use today for high throughput and the recommended HPLC column format for use with that system.

tech tip

Converting Methods From Traditional Column Formats to High Throughput Columns

Convert Between Standard HPLC and VisionHT™ Columns

	Flow Rate
Standard HPLC (4.6mm)	1.0X
VisionHT™ (2.0mm)	2.3X

When adjusting between standard LC conditions to VisionHT™ columns convert flow rates accordingly and then increase flow rate for faster analysis.

Convert Between Standard HPLC Columns and Rocket™ Columns

	Flow Rate
Standard Analytical (4.6mm)	1.0X
Rocket™ Column (7.0mm)	2.3X

Use this conversion of flow rate to transfer methods between Rocket™ column or VisionHT™ columns. Backpressure on standard LC systems should be considered.

System Type 1

Ultra High-Pressure LC System

(>10,000psig pressure limitation)

Examples: Agilent 1200, Waters® Acquity®, Thermo Accela™, Jasco XLC.

Speed from Ultra High-Pressure Systems:

Representing the latest in LC instrumentation technology, ultra high-pressure systems theoretically have the potential to deliver the fastest separations. They have minimal system volume and offer a pressure limit upwards of 12,000psig. This allows the use of columns with sub 2µm particles and 2–7 times traditional flow rates. Sub 2µm particles extend the working range of acceptable mobile phase linear velocities without sacrificing efficiency. Therefore, you can push flow rates and still get equal or better performance.

Suggested Column Format:

VisionHT™ columns are designed for microbore and ultra high-pressure LC systems that have small system volumes to limit peak broadening from sample diffusion. VisionHT™ columns are packed with highly efficient 1.5µm phases that yield taller peaks and increase sensitivity. The column hardware incorporates a low dead volume design to minimize sample diffusion, and maintain peak integrity and efficiency. 12,000psig high-pressure stability allows fast flow rates, decreasing run times 10 fold.

System Type 1

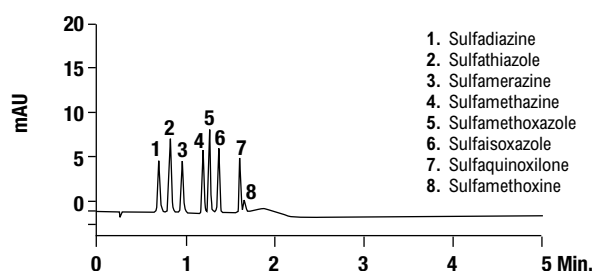
Recommended Column Format:	VisionHT™
Length:	20, 30, 50, 100mm
i.d.:	1.0 and 2.0mm



7135

VisionHT™ Columns for Ultra High-Pressure LC

CHROM-10724



System	Agilent 1200
Mobile Phase:	A: 0.1% Formic Acid B: Methanol
Detector:	UV at 280nm
Temperature:	Ambient

more info

See pages 34–37 for more information on VisionHT™ columns.

System Type 2 Low Volume, High Throughput (HTP) LC System

(<10,000psig Pressure Limitation)

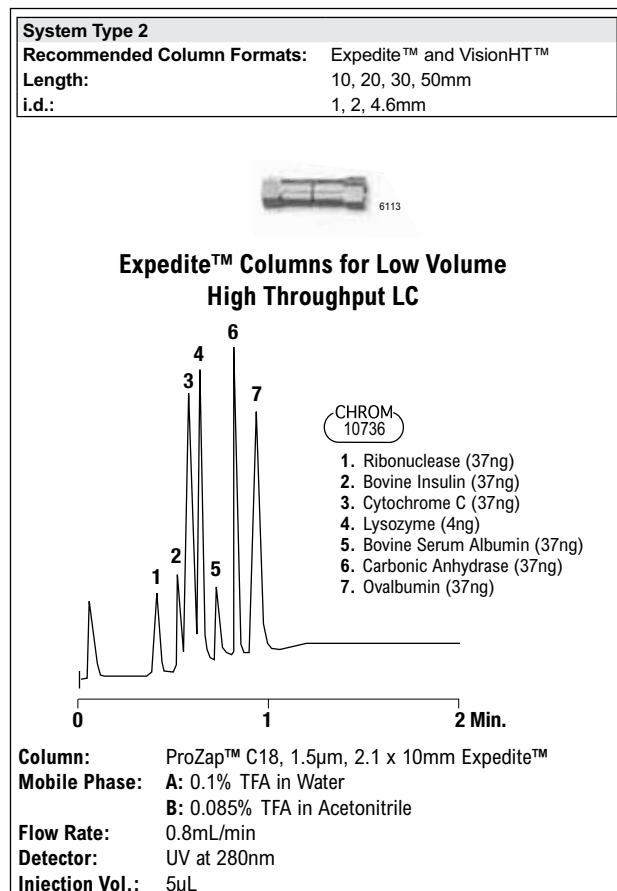
Examples: Shimadzu Prominence® UFLC, Hitachi Ultra, LC Packings UltiMate®, Surveyor Plus

Speed from Low-Volume HTP LC Systems:

These systems concentrate on reducing the cycle time between injections thus allowing more injections per time frame. Typically they employ high-speed gradient pumps, fast autosamplers and a quick detector sampling rates. They are not pressure rated to the extremes of ultra high-pressure systems, but the low system volume allows for short columns of narrow i.d.

Suggested Column Format:

Expedite™ and VisionHT™ columns are designed for microbore high throughput LC systems that have small system volumes. These formats incorporate a low dead volume design so that sample bands do not diffuse within the column hardware, maintaining peak integrity and efficiency. Expedite™ columns are packed with highly efficient 1.5µm or 3µm in very short column lengths to minimize backpressure and reduce analysis times. Though not as fast as ultra high-pressure LC systems these systems and columns balance both speed and backpressure.



more info

Expedite™ columns are available in most popular Alltech® brand phases. See page 24–25 for overview of phases and formats offered.

System Type 3 Traditional LC System

(<5000psi Pressure Limitation)

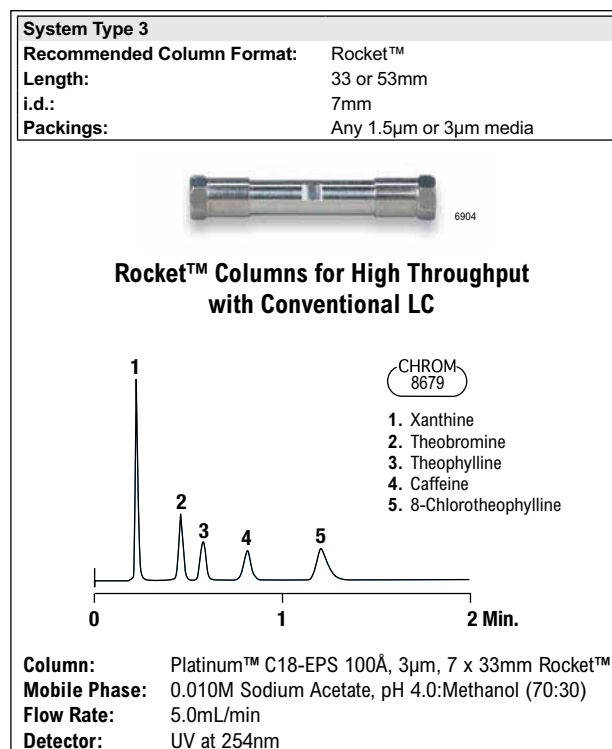
Examples: Agilent 1100, Waters® Alliance®, Thermo Surveyor®, Dionex Ultimate®, Shimadzu Prominence®, Hitachi LaChrom®

Speed from Traditional LC Systems:

To get speed from a traditional LC system, you need to consider the 5000psig pressure limitation, and the typically “large” 2mL system volume. High throughput columns on this system need to deliver a highly efficient separation typically achieved with a small particle packing (≤3µm), but without the high backpressures. The “large” system volume also needs to be balanced with an equally large column volume or the separation will be plagued with extra-column effects.

Suggested Column Format:

Rocket™ columns provide low backpressure and fast analysis times while preserving column efficiency. They are available with both 1.5µm and 3µm packing materials for use on standard HPLC systems with backpressure limits less than 5000psig. The 7mm i.d. allows faster flow rate that “sweep” the extra system volume faster and reduce peak broadening. This larger diameter also means a larger column volume to system volume ratio to minimize the efficiency loss from extra system volume. This benefit is more pronounced over 2.1 and 1mm i.d. columns that have a smaller ratio than 4.6mm i.d. columns and require much lower flow rates for acceptable backpressures. Low flow rates allow more time for sample diffusion within the standard HPLC’s system volume to further degrade the column’s efficiency.



more info

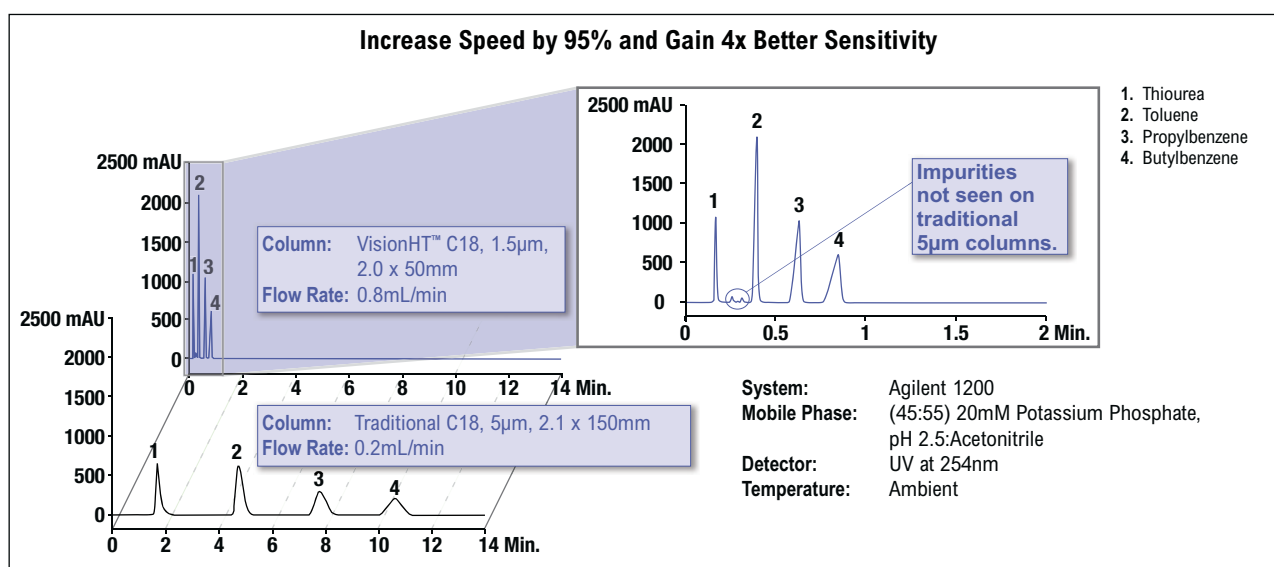
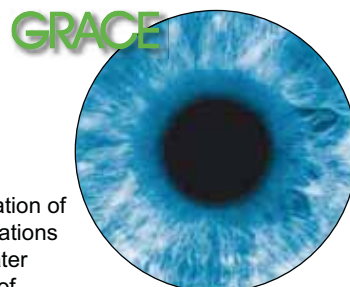
Rocket™ columns are available in most popular Alltech® brand phases. See page 24–25 for overview of phases and formats offered.

Grace® VisionHT™ Ultra High-Pressure Columns

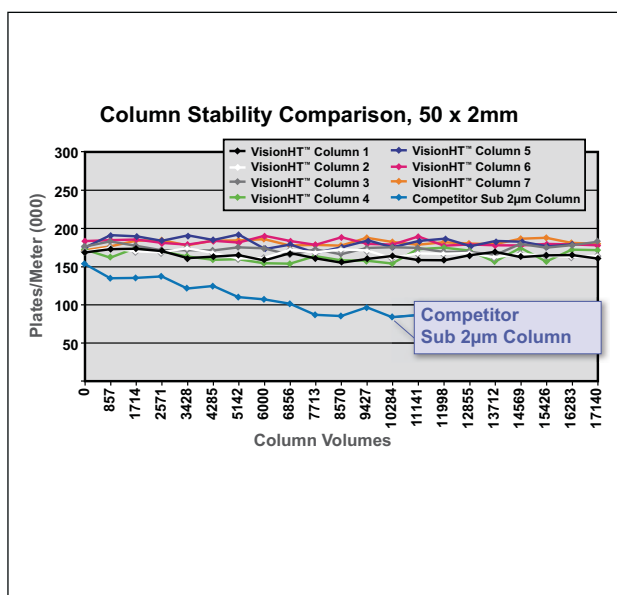
See Separations with Speed and Clarity

- Ultra-fast separations with superior efficiency, sensitivity, and resolution
- Exceptional stability for long column lifetimes
- Comprehensive sub 2µm stationary phase offering
- 12,000psig pressure rating compatible with all ultra high-pressure LC systems

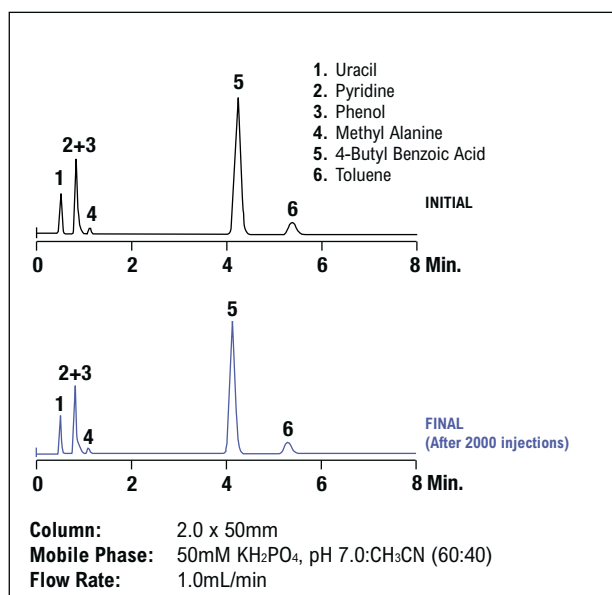
Grace® VisionHT™ columns offer a new level of performance in HPLC. The powerful combination of high-strength 1.5µm media with ultra-low volume hardware, delivers new clarity to your separations and maintains exceptional column lifetime. Complex samples resolve 95% faster with 4x greater sensitivity when compared to traditional 2.1 x 150mm, 5µm columns. And with a wide variety of phases available, the possibilities are endless.



Efficiency and Retention Times Remain Constant after Exposure to 12,000psig and 2000 Injections



High-pressure competitor sub 2µm column lost efficiency at routine 12,000psig pressures. VisionHT™ columns remain stable.



Before and after chromatograms show a constant level of performance after 2000 injections.



Grace® VisionHT™ Ultra High-Pressure Columns

Comprehensive High Purity 1.5µm Selectivity Options

Sub 2µm particles deliver efficiency and speed, but critical to success is having the right stationary phase selectivity. Six VisionHT™ high purity phases are available, each with unique separation benefits. C18-HL, with maximum bonded phase coverage, is ideal for complex hydrophobic samples. Use C18-B for basic compounds at neutral pH, often a requirement for mass spec work in the pharmaceutical industry. Reserve the C18 and C18-P for fastest analysis times. Both offer increased polar interactions to make neutral, non-polar compounds elute faster and retain polar compounds longer. The HILIC and Silica packings are normal phases that typically use near exclusive organic mobile phases; an advantage when seeking highest mass spec sensitivity.

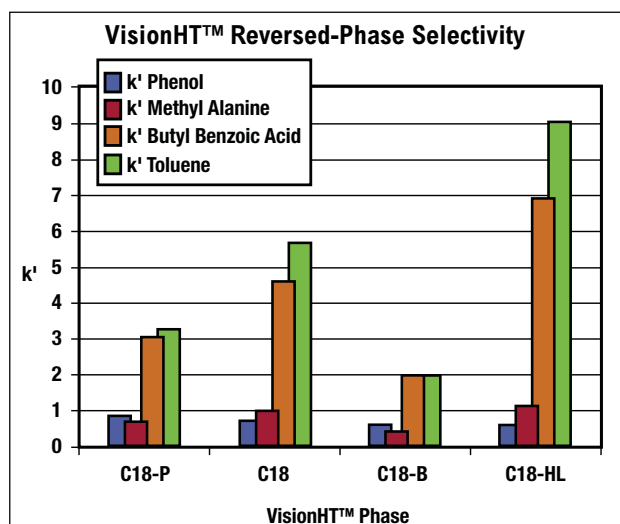
VisionHT™ phases have exceptionally rigid silica structure that withstands routine use of 12,000psig pressure often required in this new technology. Reproducible silica synthesis, bonding and column packing guarantee low bleed and excellent column-to-column consistency.



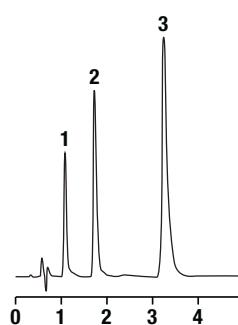
7443

VisionHT™ Phase Specifications									
Packing	Base Material	Particle Size	Carbon Load	Pore Size	Surface Area	Endcapped	pH Range*	Feature	Benefits
C18-HL	Spherical Silica	1.5µm	10%	120Å	220m²/g	Yes	1–10	Fully bonded silica, ultra high purity silica	High capacity for hydrophobic compounds. Good peak symmetry.
C18-B	Spherical Silica	1.5µm	5%	120Å	220m²/g	Proprietary	1–10	High purity silica and unique endcapping.	Improved performance of basic compounds at neutral pH. Better sensitivity and peak shape by mass spec for basic compounds, without the need for acidified mobile phases.
C18	Spherical Silica	1.5µm	6%	100Å	200m²/g	Yes	1–10	Moderate silica exposure	Classic reversed-phase selectivity. Reduced bonding is optimized for speed and sensitivity.
C18-P	Spherical Silica	1.5µm	5%	100Å	200m²/g	No	1–10	High silica exposure, low carbon load	Unique polar selectivity. Low carbon load gives fastest reversed-phase elution times while retaining polar compounds longer.
HILIC	Spherical Silica	1.5µm	NA	120Å	220m²/g	No	2–8	Polar phase with shorter equilibration times. Shipped in ACN/Water.	Peak reversal compared to reversed-phase. Ideal for very polar compounds with high organic mobile phases for improved sensitivity by MS.
Silica	Spherical Silica	1.5µm	NA	120Å	220m²/g	No	2–8	Traditional normal phase for use in 100% organic mobile phases	For isomeric separation of non-aqueous compatible compounds by absorption chromatography.

*Choice of buffer is critical at pH >8.



Separate Highly Basic Components at Neutral pH with Vision HT™ C18-B



1. Phenylephrine
2. Diphenhydramine
3. Amitriptyline

Column: VisionHT™ C18-B, 1.5µm, 2.0 x 50mm
Mobile Phase: 50mM Ammonium Formate pH 7: Methanol (20:80)
Column Temp: 40°C
Flow Rate: 0.2mL/min
Detector: UV at 210nm

technical assistance

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

analytical hplc



Grace® VisionHT™ Ultra High-Pressure Columns

Unique Column Hardware Advantages

You can erode the benefits of sub 2µm media if packed in an inefficient column design. VisionHT™ hardware uses thin screens, instead of traditional frits, to retain media and minimize dead volume. A unique insert combination seals endfittings leak-free to 18,000psig. Various dimensions offer even more flexibility over analysis speed and resolution.

VisionHT™ Hardware Specifications

Dead volume:	<15nL
Wetted materials:	316 Stainless Steel, PTFE
Port Geometry:	10–32, for Industry Standard & Waters® connection
Pressure rating, hardware alone:	18,000psig (1250 bar)
Pressure rating, packed column:	12,000psig (830 bar)
i.d.:	1.0, 2.0mm
Length:	20, 30, 50, 100mm

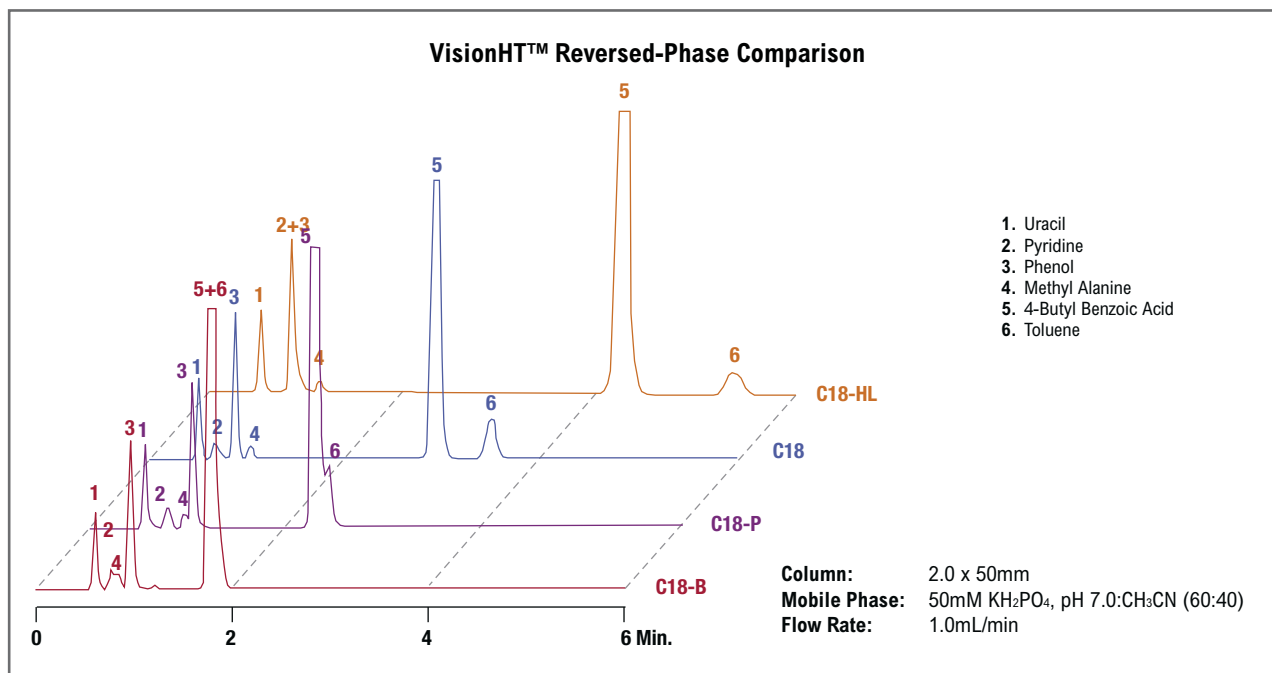


The Best Value for Ultra High-Pressure Method Development—UltraMD Kits!

Whether developing a new method, or improving an existing analysis, the VisionHT™ UltraMD kits can help optimize your separation. Get four reversed-phase columns with varying selectivity for the price of three, and develop your fast LC method fast!

VisionHT™ UltraMD Kits

	Phases	Dimensions	Part No.
<i>UltraMD Kit 1</i>	C18, C18-P, C18-HL, C18-B	2 x 100mm	5142692
<i>UltraMD Kit 2</i>	C18, C18-P, C18-HL, C18-B	2 x 50mm	5142693
<i>UltraMD Kit 3</i>	C18, C18-P, C18-HL, C18-B	1 x 50mm	5142691





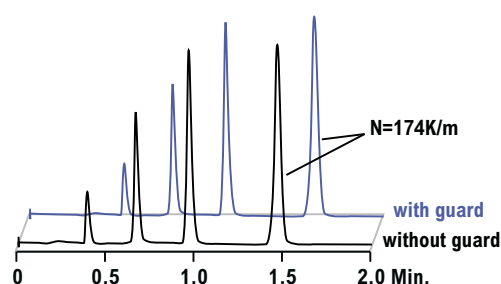
Grace® VisionHT™ Ultra High-Pressure Columns

Protect Your UHPLC Column Investment

The smaller diameters and finer porosity frits required in UHPLC creates a higher likelihood of column and system blockage. Trace contaminants not normally problematic for traditional LC, may now pose backpressure issues. VisionHT™ guards protect your column to minimize down time and reduce cost.

Two guard formats available: Integral and stand-alone. Couple the zero-dead volume integral guard directly to any VisionHT™ column, and realize absolutely no loss in efficiency. Use the stand-alone version to protect other manufacturers' UHPLC columns, or as an on-line enrichment device.

Prevent Column Blockage with Integral Guards



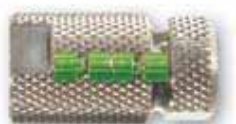
No loss in efficiency.

VisionHT™ Integral Guard System



Replace existing endfitting with the integral guard endfitting. Change guard cartridges as necessary.

Stand-Alone Guard System



In-line guard system expands applications beyond column protection. Use as a sample enrichment device or to protect any UHPLC commercially available column.

VisionHT™ Ultra High-Pressure Columns

Packing	Format	i.d. x Length	Part No.
C18-HL, 1.5µm	Ultra High-Pressure	1 x 20mm	5142540
	Ultra High-Pressure	1 x 30mm	5142541
	Ultra High-Pressure	1 x 50mm	5142542
	Ultra High-Pressure	1 x 100mm	5142543
	Ultra High-Pressure	2 x 20mm	5142544
	Ultra High-Pressure	2 x 30mm	5142545
	Ultra High-Pressure	2 x 50mm	5142546
C18-B, 1.5µm	Ultra High-Pressure	2 x 100mm	5142547
	Ultra High-Pressure	1 x 30mm	5141903
	Ultra High-Pressure	1 x 50mm	5141904
	Ultra High-Pressure	1 x 100mm	5141905
	Ultra High-Pressure	1 x 20mm	5141902
	Ultra High-Pressure	2 x 20mm	5141906
	Ultra High-Pressure	2 x 30mm	5141907
C18, 1.5µm	Ultra High-Pressure	2 x 50mm	5141908
	Ultra High-Pressure	2 x 100mm	5141909
	Ultra High-Pressure	1 x 20mm	5139555
	Ultra High-Pressure	1 x 30mm	5139559
	Ultra High-Pressure	1 x 50mm	5139603
	Ultra High-Pressure	1 x 100mm	5139607
	Ultra High-Pressure	2 x 20mm	5139557
C18-P, 1.5µm	Ultra High-Pressure	2 x 30mm	5139600
	Ultra High-Pressure	2 x 50mm	5139605
	Ultra High-Pressure	2 x 100mm	5139609
	Ultra High-Pressure	1 x 20mm	5139556
	Ultra High-Pressure	1 x 30mm	5139601
	Ultra High-Pressure	1 x 50mm	5139604
	Ultra High-Pressure	1 x 100mm	5139608
HILIC, 1.5µm	Ultra High-Pressure	2 x 20mm	5139558
	Ultra High-Pressure	2 x 30mm	5139602
	Ultra High-Pressure	2 x 50mm	5139606
	Ultra High-Pressure	2 x 100mm	5139610
	Ultra High-Pressure	1 x 20mm	5141910
	Ultra High-Pressure	1 x 30mm	5141912
	Ultra High-Pressure	1 x 50mm	5141913
SL, 1.5µm	Ultra High-Pressure	1 x 100mm	5141914
	Ultra High-Pressure	2 x 20mm	5141916
	Ultra High-Pressure	2 x 30mm	5141917
	Ultra High-Pressure	2 x 50mm	5141919
	Ultra High-Pressure	2 x 100mm	5141920
	Ultra High-Pressure	1 x 50mm	5141921
	Ultra High-Pressure	1 x 100mm	5141923
	Ultra High-Pressure	2 x 50mm	5141922
	Ultra High-Pressure	2 x 100mm	5141924

VisionHT™ Guard Cartridges

Packing	Format	i.d. x Length	Qty.	Part No.
C18HL, 1.5µm	Ultra High-Pressure	1 x 5mm	3/pk	5142549
	Ultra High-Pressure	2 x 5mm	3/pk	5142548
C18 B, 1.5µm	Ultra High-Pressure	1 x 5mm	3/pk	5141953
	Ultra High-Pressure	2 x 5mm	3/pk	5141952
C18, 1.5µm	Ultra High-Pressure	1 x 5mm	3/pk	5141950
	Ultra High-Pressure	2 x 5mm	3/pk	5141594
C18-P, 1.5µm	Ultra High-Pressure	1 x 5mm	3/pk	5141951
	Ultra High-Pressure	2 x 5mm	3/pk	5141595
HILIC, 1.5µm	Ultra High-Pressure	1 x 5mm	3/pk	5141955
	Ultra High-Pressure	2 x 5mm	3/pk	5141954
SL, 1.5µm	Ultra High-Pressure	1 x 5mm	3/pk	5141957
	Ultra High-Pressure	2 x 5mm	3/pk	5141956
Integral Guard Column Holder For VisionHT™				3118351
Stand-Alone Guard Holder				3118350

analytical hplc

Alltech® Alltima™ HP Introduction

High-Stability, High-Purity, High-Performance, Low-Bleed Columns for Demanding Applications

- Better Peak Symmetry—high-purity silica eliminates peak tailing problems
- Long Column Life—exceptional column stability minimizes downtime and reduces cost
- Ideal for Microbore or Critical Analysis—low to no detectable column bleed
- Variety of Phases and Formats—optimizes retention, resolution, and analysis time

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

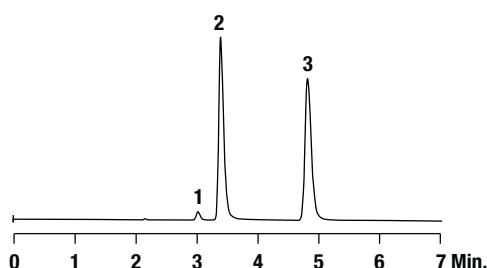
Alltech



Alltech® Alltima™ HP Phase Specifications

Phase	Description	Base	Particle	Particle Size	Pore Size	Surface Area	Carbon Load	Phase	End-capped?	USP
C18	For classic reversed-phase applications	Silica	Spherical	3, 5µm	190Å	200 m²/g	12%	Monomeric	Yes	L1
C18 EPS	Reversed-phase C18 with extended polar selectivity	Silica	Spherical	3, 5µm	190Å	200 m²/g	4%	Monomeric	Yes	L1
C18 HiLoad	Higher carbon load for stronger retention	Silica	Spherical	3, 5µm	100Å	450 m²/g	24%	Monomeric	Yes	L1
C18 AQ	100% water wettable	Silica	Spherical	3, 5µm	100Å	450 m²/g	20%	Monomeric	Yes	L1
C18 Amide	Low bleed polar-embedded phase compatible with microbore	Silica	Spherical	3, 5µm	190Å	200 m²/g	12%	Monomeric	Yes	L1
C8	For reversed-phase applications where C18 is too retentive	Silica	Spherical	3, 5µm	190Å	200 m²/g	8%	Monomeric	Yes	L7
Cyano	Stable, long-life cyano phase	Silica	Spherical	3, 5µm	190Å	200 m²/g	4%	Monomeric	Yes	L10
Silica	For general purpose normal-phase applications	Silica	Spherical	3, 5µm	100Å	450 m²/g	—	—	No	L3
HILIC	Hydrophillic Interaction Chromatography for highly polar analytes	Silica	Spherical	1.5, 3, 5µm	120Å	230 m²/g	—	—	—	L3

Basic Compounds at Neutral pH



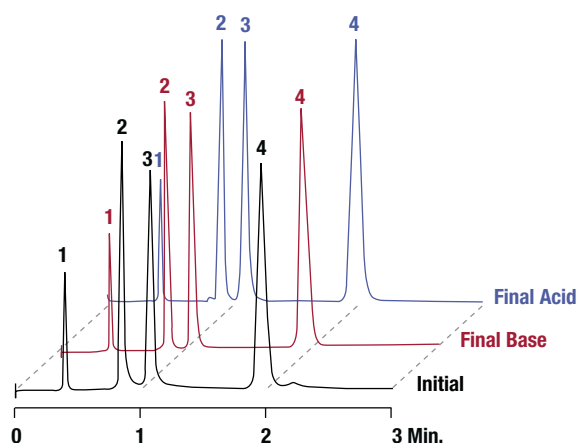
Peak	USP Tailing*
1. Diphenhydramine	1.29
2. Nortriptyline	1.41
3. Amitriptyline	1.27

*Tailing Factor was determined in accordance with USP method.

Column: Alltima™ HP C18, 5µm, 4.6 x 150mm
Mobile Phase: 25mM Potassium Phosphate, pH 7.0:Methanol (15:85)
Flow Rate: 1.0mL/min
Detector: UV at 254nm

The Alltima™ HP phases demonstrate excellent peak symmetry of highly basic analytes at pH 7.0.

Basic Compound Stability at pH1 and pH10



Retention Times	CHROM 10249	CHROM 10250	CHROM 10252
1. Uracil	0.56	0.55	0.55
2. Phenol	0.82	0.81	0.81
3. N,N-Diethyl-m-Toluamide	1.08	1.08	1.08
4. Toluene	1.89	1.88	1.89

Column: Alltima™ HP C18, 5µm, 4.6 x 50mm
Mobile Phase: Acetonitrile:Water (58:42)
Flow Rate: 1.0mL/min
Detector: UV at 254nm

Final Acid: washed with 24,000 column volumes of Acetonitrile:Dilute Sulfuric Acid, pH 1.0 (50:50) at 60°C.

Final Base: washed with 24,000 column volumes of Acetonitrile:Ammonium Hydroxide, pH 10 (50:50) at 20°C.

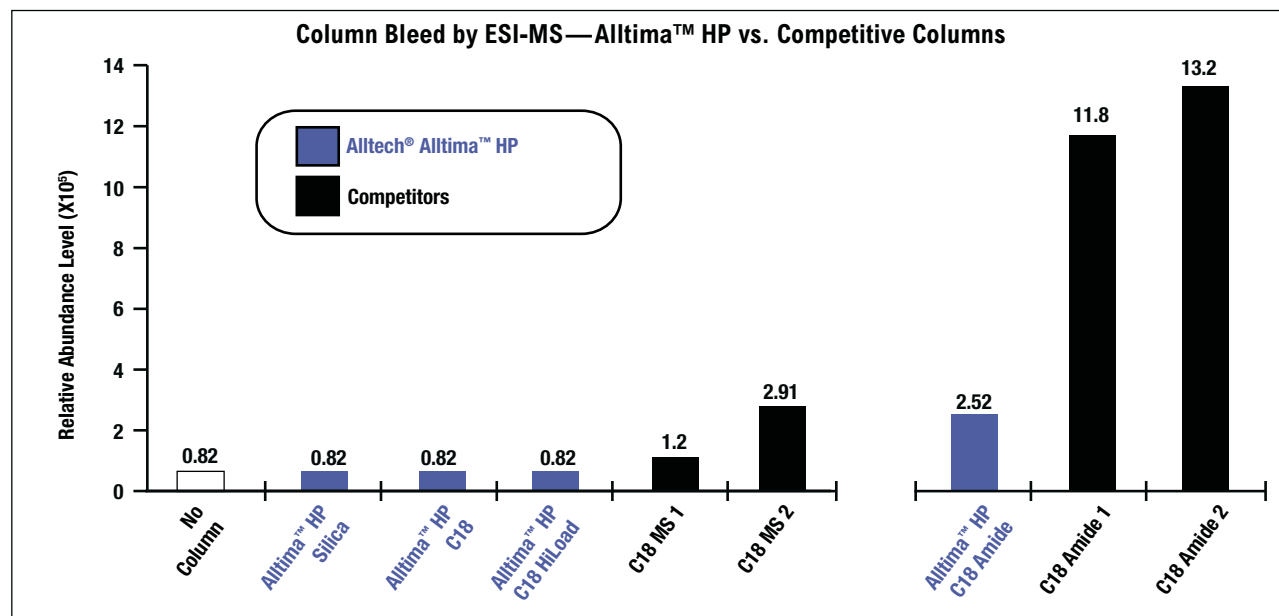
The Alltima™ HP phases demonstrate exceptional stability from pH 1.0 to 10.



Alltech® Alltima™ HP Introduction

The Alltima™ HP Family Demonstrates Low Bleed

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



Alltima™ HP Method Development Kits

best value

Three Different Kits with Different Selectivities

Whether you are developing a new method, or just not satisfied with an existing separation, the Alltima™ HP family can help optimize your separation. Your best value for method development—purchase a kit and receive three columns for the price of two.



Alltima™ HP Method Development Kits

Description	Includes:	i.d. x Length	Part No.
<i>Kit 1—C18 Mix, 3μm</i>			
Expedite™ MS Kit 1	C18, C18 HiLoad, C18 Amide (87674, 87692, 87728)	2.1 x 20mm	87854
Analytical Kit 1	C18, C18 HiLoad, C18 Amide (87668, 87686, 87722)	4.6 x 150mm	87850
Rocket™ Kit 1	C18, C18 HiLoad, C18 Amide (87672, 87690, 87726)	7 x 53mm	87852
<i>Kit 2—Alternate Mix, 3μm</i>			
Expedite™ MS Kit 2	C18 HiLoad, C8, CN (87692, 87746, 87764)	2.1 x 20mm	87864
Analytical Kit 2	C18 HiLoad, C8, CN (87686, 87740, 87760)	4.6 x 150mm	87860
Rocket™ Kit 2	C18 HiLoad, C8, CN (87690, 87744, 87762)	7 x 53mm	87862
<i>Kit 3—Polar Mix, 3μm</i>			
Expedite™ MS Kit 3	C18 EPS, C18 Amide, CN (87710, 87728, 87764)	2.1 x 20mm	87874
Analytical Kit 3	C18 EPS, C18 Amide, CN (87704, 87722, 87758)	4.6 x 150mm	87870
Rocket™ Kit 3	C18 EPS, C18 Amide, CN (87708, 87726, 87762)	7 x 53mm	87872

tech tip

Want high throughput on a conventional (non-ultra high-pressure) system?

Choose the Rocket™ column format—no modifications necessary to your existing HPLC system. Choose Expedite™ columns for low volume and microbore systems. See page 31 for more explanation of the Rocket™ and Expedite™ formats.

Alltech® Alltima™ HP Reversed-Phase Columns

Selectivity Options in One Product Family

C18:

- Classic reversed-phase retention and selectivity

C18 AQ:

- 100% water wettable and high carbon loading for greater mobile phase range

EPS C18:

- Unique selectivity that succeeds when traditional reversed-phase columns fail
- Greater retention and enhanced peak symmetry for polar compounds

C18 HiLoad:

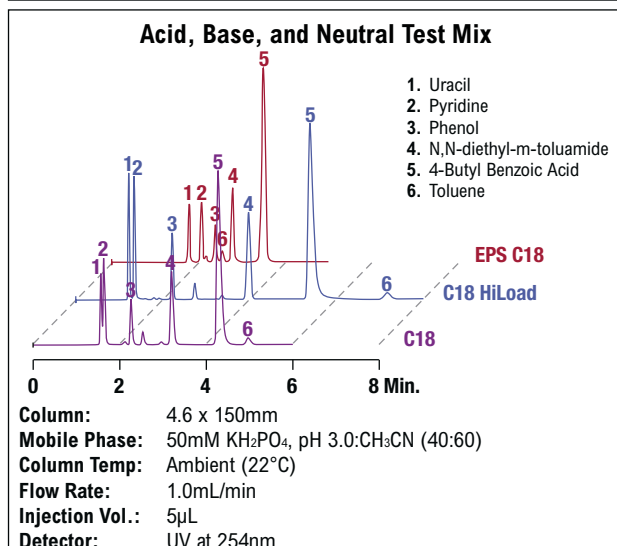
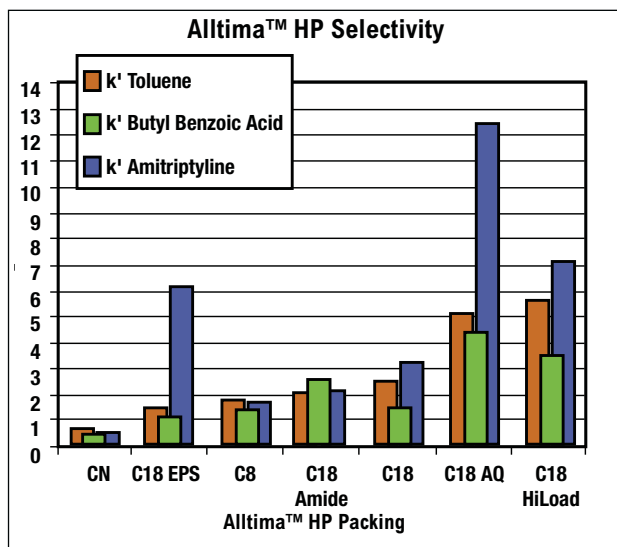
- Superior retention and loadability for resolution of complex samples

C18 Amide:

- The first polar-embedded packing ideal for microbore
- Excellent peak shape without phase bleed
- Ideal for basic compounds in neutral to alkaline pH

C8:

- Less hydrophobic retention than C18



Alltima™ HP HPLC Columns

Packing	Format	i.d. x Length	Part No.
C18, 3µm*	Capillary	0.150 X 50mm	22153
	Capillary	0.150 X100mm	22154
	Capillary	0.150 X150mm	22155
	Capillary	0.300 X 50mm	22156
	Capillary	0.300 X100mm	22157
	Capillary	0.300 X150mm	22158
	Expedite™ MS	2.1 x 10mm	87673
	Expedite™ MS	2.1 x 20mm	87674
	Microbore	2.1 x 50mm	87504
	Microbore	2.1 x 100mm	87669
	Microbore	2.1 x 150mm	87670
	Solvent-Reducer	3.0 x 150mm	87601
	Expedite™ MS	4.6 x 10mm	87675
	Expedite™ MS	4.6 x 20mm	87676
C18, 5µm	Analytical	4.6 x 50mm	87826
	Analytical	4.6 x 100mm	87667
	Analytical	4.6 x 150mm	87668
	Rocket™	7 x 33mm	87671
	Rocket™	7 x 53mm	87672
	Microbore	2.1 x 150mm	87681
	Microbore	2.1 x 250mm	87682
	Solvent-Reducer	3.0 x 150mm	87602
	Solvent-Reducer	3.0 x 250mm	87603
	Analytical	4.6 x 150mm	87679
C18 AQ, 3µm*	Analytical	4.6 x 250mm	87680
	Capillary	0.150 x 50mm	22560
	Capillary	0.150 x 100mm	22561
	Capillary	0.150 x 150mm	22562
	Capillary	0.300 x 50mm	22563
	Capillary	0.300 x 100mm	22564
	Capillary	0.300 x 150mm	22565
	Expedite™ MS	2.1 x 10mm	87813
	Expedite™ MS	2.1 x 20mm	87814
	Microbore	2.1 x 100mm	87809
	Microbore	2.1 x 150mm	87810
	Expedite™ MS	4.6 x 10mm	87815
	Expedite™ MS	4.6 x 20mm	87816
	Analytical	4.6 x 50mm	87832
C18 AQ, 5µm	Analytical	4.6 x 100mm	87807
	Analytical	4.6 x 150mm	87808
	Rocket™	7 x 33mm	87811
	Rocket™	7 x 53mm	87812
	Microbore	2.1 x 150mm	87821
	Microbore	2.1 x 250mm	87822
	Analytical	4.6 x 150mm	87819
	Analytical	4.6 x 250mm	87820
C18 EPS, 3µm	Expedite™ MS	2.1 x 10mm	87709
	Expedite™ MS	2.1 x 20mm	87710
	Microbore	2.1 x 50mm	87508
	Microbore	2.1 x 100mm	87705
	Microbore	2.1 x 150mm	87706
	Solvent-Reducer	3.0 x 150mm	87604
	Expedite™ MS	4.6 x 10mm	87711
	Expedite™ MS	4.6 x 20mm	87712
	Analytical	4.6 x 50mm	87833
	Analytical	4.6 x 100mm	87703
	Analytical	4.6 x 150mm	87704
	Rocket™	7 x 33mm	87707
	Rocket™	7 x 53mm	87708
C18 EPS, 5µm	Microbore	2.1 x 150mm	87717
	Microbore	2.1 x 250mm	87718
	Solvent-Reducer	3.0 x 150mm	87605
	Solvent-Reducer	3.0 x 250mm	87606
	Analytical	4.6 x 150mm	87715
	Analytical	4.6 x 250mm	87716

*Other particle sizes and dimensions are available.



Alltech® Alltima™ HP Reversed-Phase Columns

Alltima™ HP HPLC Columns (continued)

Packing	Format	i.d. x Length	Part No.
C18 Hi-Load, 3μm*	Capillary	0.150 x 50mm	22190
	Capillary	0.300 x 50mm	22193
	Expedite™ MS	2.1 x 10mm	87691
	Expedite™ MS	2.1 x 20mm	87692
	Microbore	2.1 x 50mm	87506
	Microbore	2.1 x 100mm	87687
	Microbore	2.1 x 150mm	87688
	Solvent-Reducer	3.0 x 150mm	87610
	Expedite™ MS	4.6 x 10mm	87693
	Expedite™ MS	4.6 x 20mm	87694
	Analytical	4.6 x 50mm	87827
	Analytical	4.6 x 100mm	87685
	Analytical	4.6 x 150mm	87686
	Rocket™	7 x 33mm	87689
	Rocket™	7 x 53mm	87690
C18 Hi-Load, 5μm	Microbore	2.1 x 150mm	87699
	Microbore	2.1 x 250mm	87700
	Solvent-Reducer	3.0 x 150mm	87611
	Solvent-Reducer	3.0 x 250mm	87612
	Analytical	4.6 x 150mm	87697
	Analytical	4.6 x 250mm	87698
C18 Amide, 3μm*	Capillary	0.150 x 50mm	22255
	Capillary	0.300 x 50mm	22258
	Expedite™ MS	2.1 x 10mm	87727
	Expedite™ MS	2.1 x 20mm	87728
	Microbore	2.1 x 50mm	87510
	Microbore	2.1 x 100mm	87723
	Microbore	2.1 x 150mm	87724
	Solvent-Reducer	3.0 x 150mm	87607
	Expedite™ MS	4.6 x 10mm	87729
	Expedite™ MS	4.6 x 20mm	87730
	Analytical	4.6 x 50mm	87829
	Analytical	4.6 x 100mm	87721
	Analytical	4.6 x 150mm	87722
	Rocket™	7 x 33mm	87725
	Rocket™	7 x 53mm	87726
C18 Amide, 5μm	Microbore	2.1 x 150mm	87735
	Microbore	2.1 x 250mm	87736
	Solvent-Reducer	3.0 x 150mm	87608
	Solvent-Reducer	3.0 x 250mm	87609
	Analytical	4.6 x 150mm	87733
	Analytical	4.6 x 250mm	87734
C8, 3μm*	Capillary	0.150 x 50mm	22479
	Capillary	0.150 x 100mm	22480
	Capillary	0.150 x 150mm	22481
	Capillary	0.300 x 50mm	22482
	Capillary	0.300 x 100mm	22483
	Capillary	0.300 x 150mm	22484
	Expedite™ MS	2.1 x 10mm	87745
	Expedite™ MS	2.1 x 20mm	87746
	Microbore	2.1 x 50mm	87512
	Microbore	2.1 x 100mm	87741
	Microbore	2.1 x 150mm	87742
	Solvent-Reducer	3.0 x 150mm	87613
	Expedite™ MS	4.6 x 10mm	87747
	Expedite™ MS	4.6 x 20mm	87748
	Analytical	4.6 x 50mm	87830
	Analytical	4.6 x 100mm	87739
C8, 5μm	Analytical	4.6 x 150mm	87740
	Rocket™	7 x 33mm	87743
	Rocket™	7 x 53mm	87744
	Microbore	2.1 x 150mm	87753
	Microbore	2.1 x 250mm	87754
	Solvent-Reducer	3.0 x 150mm	87614
	Solvent-Reducer	3.0 x 250mm	87615
	Analytical	4.6 x 150mm	87751
	Analytical	4.6 x 250mm	87752

*Other particle sizes and dimensions are also available.

Alltima™ HP-Guard Cartridges

Packing	i.d. x Length	Qty.	Part No.
C18 Capillary Guard, 3μm**	0.150 x 10mm	ea	22578
	0.300 x 10mm	ea	22579
C18 All-Guard™, 5μm*	2.1 x 7.5mm	3	87683
	3.0 x 7.5mm	3	87622
	4.6 x 7.5mm	3	87684
C18 AQ Capillary Guard, 3μm**	0.150 x 10mm	ea	22638
	0.300 x 10mm	ea	22639
C18 AQ All-Guard™, 5μm*	2.1 x 7.5mm	3	87823
	4.6 x 7.5mm	3	87824
C18 EPS All-Guard™, 5μm*	2.1 x 7.5mm	3	87719
	3.0 x 7.5mm	3	87623
	4.6 x 7.5mm	3	87720
C18 Hi-Load Capillary Guard, 3μm**	0.150 x 10mm	ea	22588
	0.300 x 10mm	ea	22589
C18 Hi-Load All-Guard™, 5μm*	2.1 x 7.5mm	3	87701
	3.0 x 7.5mm	3	87624
	4.6 x 7.5mm	3	87702
C18 Amide Capillary Guard, 3μm**	0.150 x 10mm	ea	22598
	0.300 x 10mm	ea	22599
C18 Amide All-Guard™, 5μm*	2.1 x 7.5mm	3	87737
	3.0 x 7.5mm	3	87625
	4.6 x 7.5mm	3	87738
C8 Capillary Guard, 3μm**	0.150 x 10mm	ea	22648
	0.300 x 10mm	ea	22648
C8 All-Guard™, 5μm*	2.1 x 7.5mm	3	87755
	3.0 x 7.5mm	3	87627
	4.6 x 7.5mm	3	87756
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101
Capillary Guard Cartridge Holder			
Guard Holder for 0.100mm and 0.150mm Guards		ea	GR-3710E
Guard Holder for 0.300mm and 0.500mm Guards		ea	GR-3710A

*All-Guard™ holder required.

**Other particle sizes and dimensions are available.

tech tip

Which guard format should I choose?

Ideally, the guard should have the same or slightly smaller i.d. as the HPLC column. Efficiency will suffer, if the guard i.d. is larger than that of the column.

technical assistance

Contact Tech Support: Phone: 1.800.255.8324 (North America)

Email: contact.alltech@grace.com

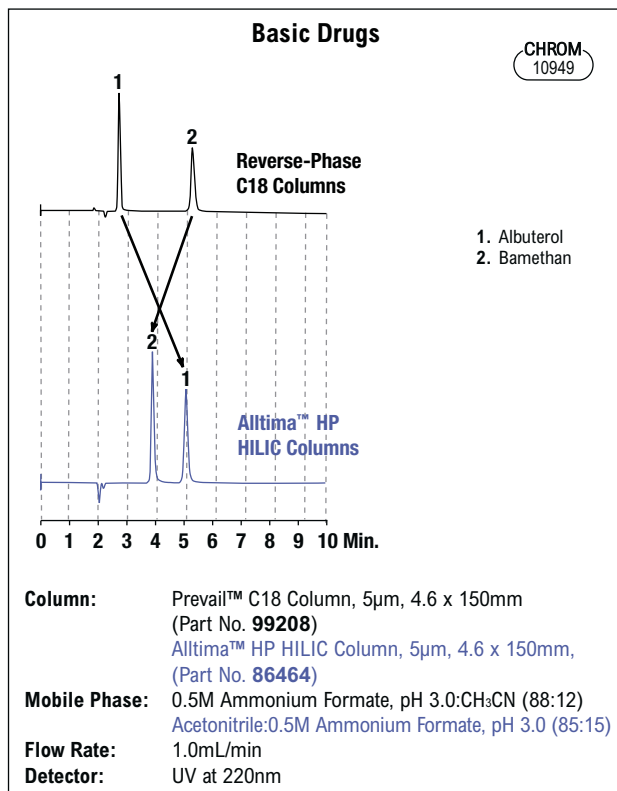
Online: www.discoverysciences.com

Alltech® Alltima™ HP HILIC Columns

Hydrophilic Interaction (HILIC) Columns for Highly Polar Basic Analytes

- Superior retention of highly polar compounds
- Increased sensitivity and lower detection limits with microbore
- Available in 1.5µm particle size

Hydrophilic Interaction Chromatography is ideal for separating and retaining very polar compounds that may not retain on traditional reversed-phase packings. Unlike reversed-phase columns, HILIC columns retain highly polar compounds with only small amounts of water in the mobile phase. These more volatile mobile phases increase sensitivity with microbore applications.



Use Alltima™ HP HILIC's alternate selectivity for greater separation possibilities.

tech tip

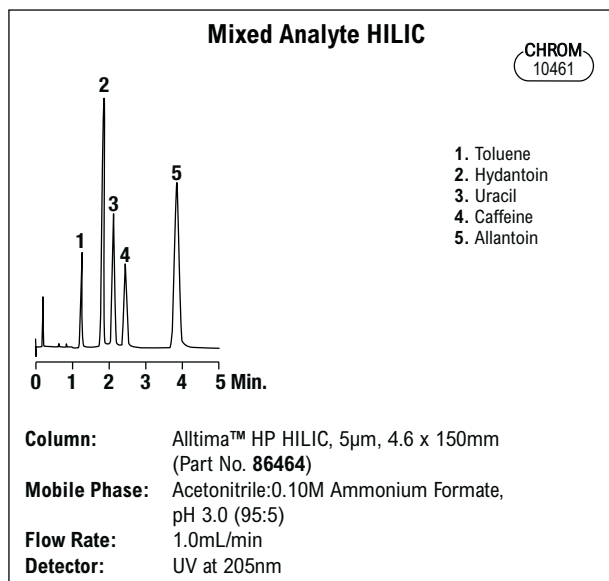
Want high throughput on a conventional (non-ultra high-pressure) system?

Choose the Rocket™ column format—no modifications necessary to your existing HPLC system. Choose Expedite™ columns for low volume and microbore systems. See page 31 for more explanation of the Rocket™ and Expedite™ formats.

Rocket™ Columns



Expedite™ Columns



Alternate selectivity compared to reversed-phase columns allows more separation possibilities.

Alltima™ HP HILIC HPLC Columns

Packing	Format	i.d. x Length	Part No.
HILIC, 1.5µm	Expedite™ MS	2.1 x 20mm	86471
	Expedite™ MS	4.6 x 20mm	86472
	Rocket™	7 x 33mm	86467
	Rocket™	7 x 53mm	86468
HILIC, 3µm*	Capillary	0.150 x 50mm	22515
	Capillary	0.150 x 100mm	22516
	Capillary	0.150 x 150mm	22517
	Capillary	0.300 x 50mm	22518
	Capillary	0.300 x 100mm	22519
	Capillary	0.300 x 150mm	22520
	Expedite™ MS	2.1 x 10mm	86473
	Expedite™ MS	2.1 x 20mm	86475
	Microbore	2.1 x 50mm	86461
	Microbore	2.1 x 150mm	86463
	Expedite™ MS	4.6 x 10mm	86474
	Expedite™ MS	4.6 x 20mm	86476
HILIC, 5µm	Analytical	4.6 x 50mm	86460
	Analytical	4.6 x 150mm	86462
	Rocket™	7 x 33mm	86469
	Rocket™	7 x 53mm	86470
	Microbore	2.1 x 150mm	86465
	Analytical	4.6 x 150mm	86464
	Analytical	4.6 x 250mm	86466

*Other particle sizes and dimensions are available.

Alltima™ HP HILIC Guard Cartridges

Packing	i.d. x Length	Qty.	Part No.
HILIC Capillary Guard, 3µm**	0.150 x 10mm	ea	22658
	0.300 x 10mm	ea	22659
HILIC All-Guard™, 5µm*	2.1 x 7.5mm	3	86479
	4.6 x 7.5mm	3	86480
All-Guard™ Cartridge Holder (Includes Direct-Connect™ Column Coupler)			
Capillary Guard Cartridge Holder			
Guard Holder for 0.100mm and 0.150mm Guards			ea GR-3710E
Guard Holder for 0.300mm and 0.500mm Guards			ea GR-3710A

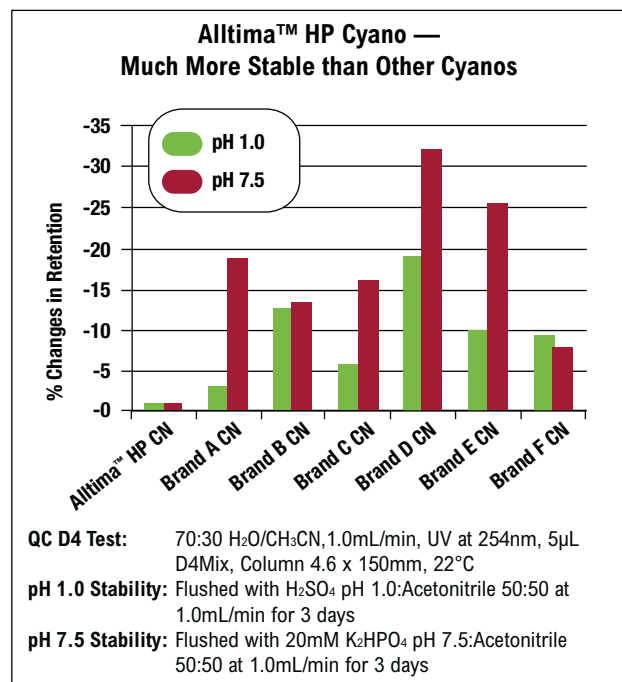
**All-Guard™ holder required.

**Other particle sizes and dimensions are available.



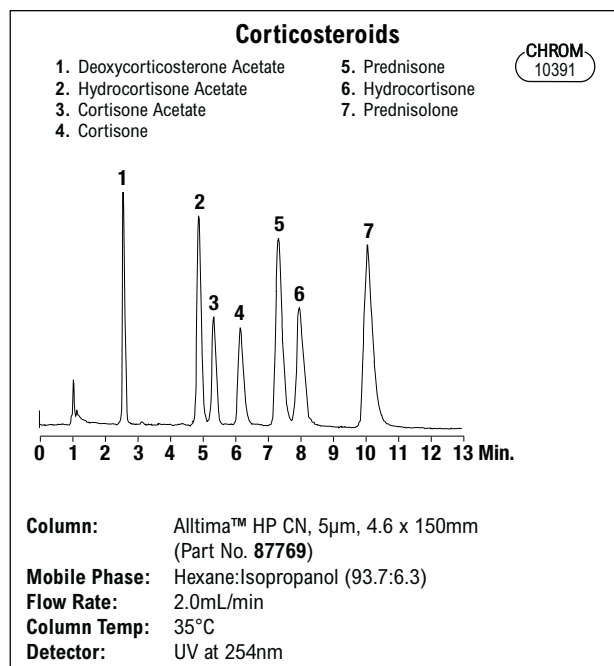
Alltech® Alltima™ HP Normal-Phase Columns

- Cyano:**
- Superior stability
 - More reproducible separations than silica for normal-phase applications
 - Ideal for basic drug analysis
- Silica:**
- Normal phase



Alltima™ HP HPLC Columns

Packing	Format	i.d. x Length	Part No.
Cyano, 3µm	Expedite™ MS	2.1 x 10mm	87763
	Expedite™ MS	2.1 x 20mm	87764
	Microbore	2.1 x 50mm	87514
	Microbore	2.1 x 100mm	87759
	Microbore	2.1 x 150mm	87760
	Solvent-Reducer	3.0 x 150mm	87616
	Expedite™ MS	4.6 x 10mm	87765
	Expedite™ MS	4.6 x 20mm	87766
	Analytical	4.6 x 50mm	87825
	Analytical	4.6 x 100mm	87757
	Analytical	4.6 x 150mm	87758
	Rocket™	7 x 33mm	87761
	Rocket™	7 x 53mm	87762
Cyano, 5µm	Microbore	2.1 x 150mm	87781
	Microbore	2.1 x 250mm	87782
	Solvent-Reducer	3.0 x 150mm	87617
	Solvent-Reducer	3.0 x 250mm	87618
	Analytical	4.6 x 150mm	87769
	Analytical	4.6 x 250mm	87780
Silica, 3µm	Expedite™ MS	2.1 x 10mm	87791
	Expedite™ MS	2.1 x 20mm	87792
	Microbore	2.1 x 50mm	87516
	Microbore	2.1 x 100mm	87787
	Microbore	2.1 x 150mm	87788
	Solvent-Reducer	3.0 x 150mm	87619
	Expedite™ MS	4.6 x 10mm	87793
	Expedite™ MS	4.6 x 20mm	87794
	Analytical	4.6 x 50mm	87831
	Analytical	4.6 x 100mm	87785
	Analytical	4.6 x 150mm	87786
	Rocket™	7 x 33mm	87789
	Rocket™	7 x 53mm	87790



Alltima™ HP HPLC Columns (continued)

Packing	Format	i.d. x Length	Part No.
Silica, 5µm	Microbore	2.1 x 150mm	87799
	Microbore	2.1 x 250mm	87802
	Solvent-Reducer	3.0 x 150mm	87620
	Solvent-Reducer	3.0 x 250mm	87621
	Analytical	4.6 x 150mm	87797
	Analytical	4.6 x 250mm	87798

Alltima™ HP All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
Cyano, 5µm	2.1 x 7.5mm	3	87783
	3.0 x 7.5mm	3	87626
	4.6 x 7.5mm	3	87784
Silica, 5µm	2.1 x 7.5mm	3	87803
	3.0 x 7.5mm	3	87628
	4.6 x 7.5mm	3	87804
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)			ea 80101

*All-Guard™ holder required. Other particle sizes available.

more applications

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



analytical hplc

Alltech® Prevail™ Introduction

Stable from 100% Organic to 100% Aqueous

- Long column life in both highly aqueous and highly organic mobile phases
- Excellent retention and reproducibility of highly polar analytes in 100% aqueous mobile phases
- Strong retention of hydrophobic analytes in 100% organic mobile phases, no concerns of solubility, better sensitivity in microbore and ELSD applications
- No phase collapse
- Specialty phases for specific applications

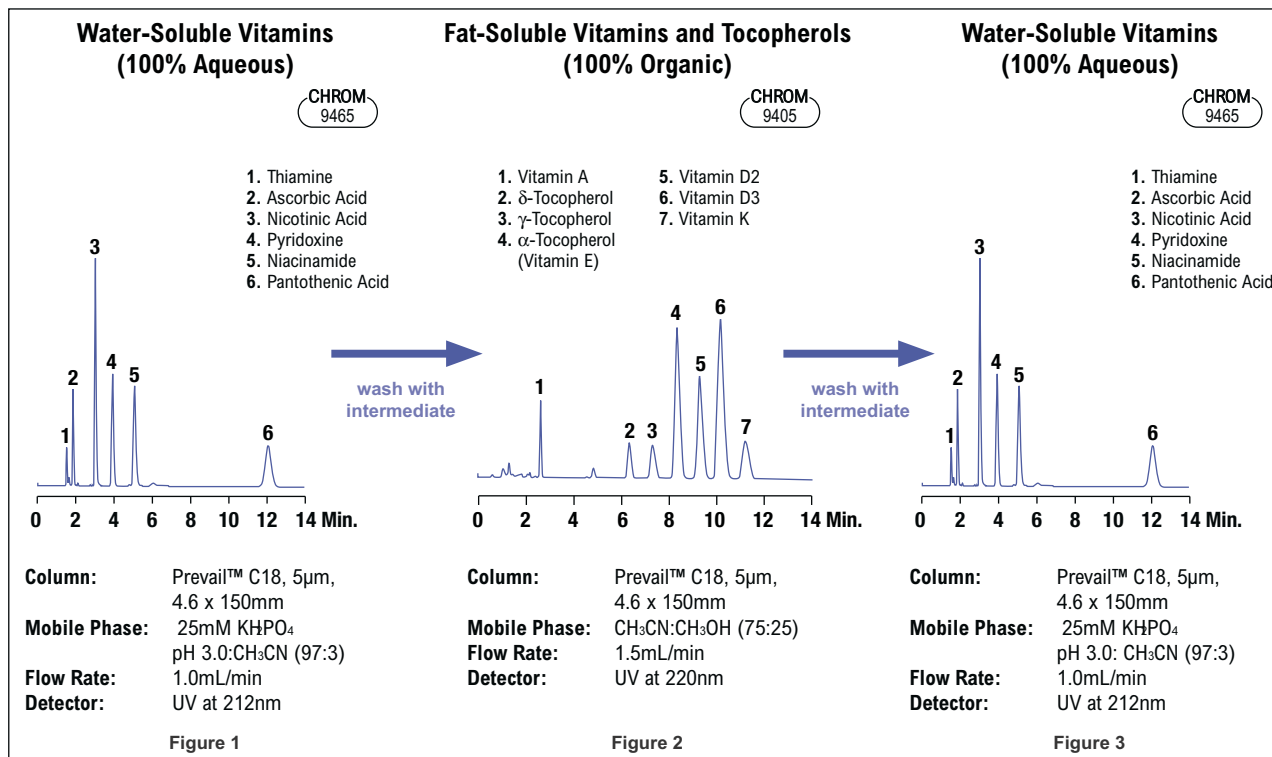
With one **Prevail™ C18** column, retain polar compounds in aqueous mobile phases and hydrophobic compounds in organic mobile phases.



Alltech® Prevail™ Phase Specifications

Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18 Select	Silica	Spherical	3, 5µm	110Å	350m ² /g	17%	Monomeric	Yes	L1
C18	Silica	Spherical	3, 5µm	110Å	350m ² /g	15%	Monomeric	Yes	L1
C8	Silica	Spherical	3, 5µm	110Å	350m ² /g	8%	Monomeric	Yes	L7
Phenyl	Silica	Spherical	3, 5µm	110Å	350m ² /g	7%	Monomeric	Yes	L11
Cyano	Silica	Spherical	3, 5µm	110Å	350m ² /g	—	Monomeric	Yes	L10
Amino (NH ₂)	Silica	Spherical	3, 5µm	110Å	350m ² /g	—	Monomeric	No	L8
Silica	Silica	Spherical	3, 5µm	110Å	350m ² /g	—	—	—	L3
Organic Acid	Silica	Spherical	3, 5µm	110Å	350m ² /g	—	Monomeric	Yes	—
Carbohydrate ES	Polymer	Spherical	5µm	—	—	—	—	—	—

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



Prevail™ Columns have highly stable bonded phases that let you use one column for multiple mobile phase conditions. Even switching between extremes such as near 100% aqueous (Figure 1) to 100% organic conditions (Figure 2), and back to near 100% aqueous (Figure 3) on a routine basis is possible, provided that mobile phases are miscible.



Alltech® Prevail™ Reversed-Phase Columns

Prevail™ HPLC Columns

Packing	Format	i.d. x Length	Part No.
Select C18, 3µm	Microbore	2.1 x 50mm	99309
	Microbore	2.1 x 100mm	99312
	Microbore	2.1 x 150mm	99313
	Solvent-Reducer	3.0 x 150mm	99315
	Analytical	4.6 x 100mm	99302
	Analytical	4.6 x 150mm	99303
Select C18, 5µm	Rocket™	7 x 33mm	99304
	Rocket™	7 x 53mm	99305
	Microbore	2.1 x 150mm	99310
	Microbore	2.1 x 250mm	99311
	Solvent-Reducer	3.0 x 150mm	99316
	Solvent-Reducer	3.0 x 250mm	99317
C18, 3µm	Analytical	4.6 x 150mm	99300
	Analytical	4.6 x 250mm	99301
	Microbore	150µm x 50mm	35762
	Microbore	150µm x 150mm	35764
	Microbore	300µm x 50mm	32831
	Microbore	300µm x 150mm	32832
	Microbore	1.0 x 100mm	43831
	Microbore	1.0 x 150mm	43843
	Expedite™ MS	2.1 x 10mm	43861
	Expedite™ MS	2.1 x 20mm	43827
	Microbore	2.1 x 50mm	43818
	Microbore	2.1 x 100mm	43871
	Microbore	2.1 x 150mm	99200
	Solvent-Reducer	3.0 x 150mm	99322
	Expedite™ MS	4.6 x 10mm	43878
	Expedite™ MS	4.6 x 20mm	43804
	Analytical	4.6 x 50mm	43829
	Analytical	4.6 x 100mm	99202
	Analytical	4.6 x 150mm	99204
	Rocket™	7 x 33mm	99280
	Rocket™	7 x 53mm	99279

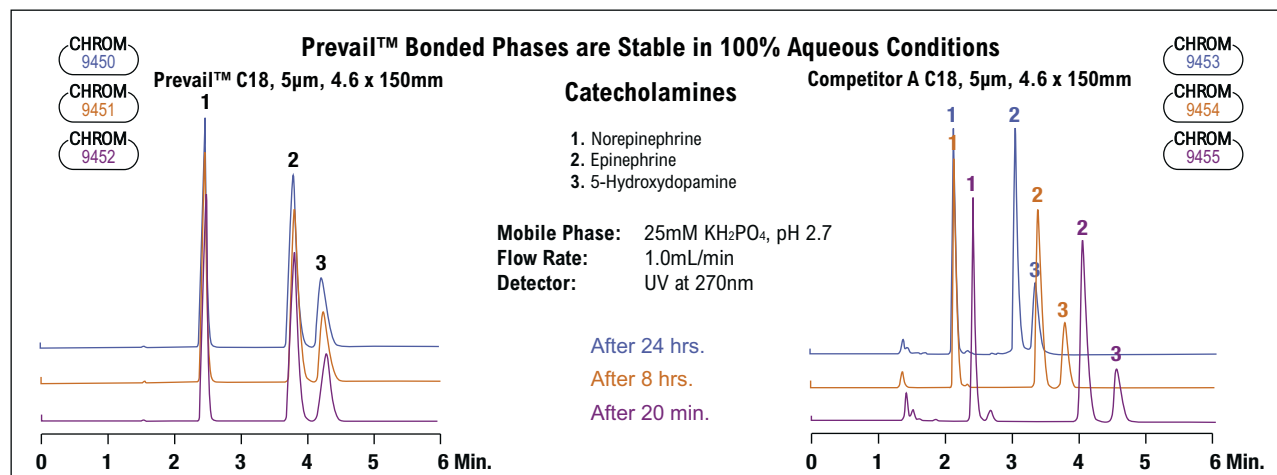
Prevail™ HPLC Columns (continued)

Packing	Format	i.d. x Length	Part No.
C18, 5µm	Microbore	150µm x 50mm	35792
	Microbore	150µm x 150mm	35794
	Microbore	300µm x 50mm	32815
	Microbore	300µm x 150mm	32816
	Microbore	2.1 x 150mm	99206
	Solvent-Reducer	3.0 x 150mm	99320
C8, 3µm	Solvent-Reducer	3.0 x 250mm	99321
	Analytical	4.6 x 50mm	43903
	Analytical	4.6 x 150mm	99208
	Analytical	4.6 x 250mm	99210
	Microbore	2.1 x 150mm	99212
	Solvent-Reducer	3.0 x 150mm	99325
C8, 5µm	Analytical	4.6 x 50mm	43922
	Analytical	4.6 x 100mm	99214
	Analytical	4.6 x 150mm	99216
	Microbore	2.1 x 150mm	99218
	Solvent-Reducer	3.0 x 150mm	99323
	Solvent-Reducer	3.0 x 250mm	99324
Phenyl, 3µm	Analytical	4.6 x 150mm	99224
	Analytical	4.6 x 250mm	99229
	Microbore	1.0 x 100mm	43893
	Microbore	1.0 x 150mm	43859
	Expedite™ MS	2.1 x 10mm	43873
	Expedite™ MS	2.1 x 20mm	43885
	Microbore	2.1 x 50mm	43819
	Microbore	2.1 x 100mm	43872
	Microbore	2.1 x 150mm	99231
	Solvent-Reducer	3.0 x 150mm	99328
	Expedite™ MS	4.6 x 10mm	43887
	Expedite™ MS	4.6 x 20mm	43815
	Analytical	4.6 x 50mm	43869
	Analytical	4.6 x 100mm	99233
Phenyl, 5µm	Analytical	4.6 x 150mm	99235
	Rocket™	7 x 33mm	99282
	Rocket™	7 x 53mm	99281
	Microbore	2.1 x 150mm	99237
	Solvent-Reducer	3.0 x 150mm	99326
	Solvent-Reducer	3.0 x 250mm	99327
	Analytical	4.6 x 150mm	99239
	Analytical	4.6 x 250mm	99241

tech tip

Want high throughput on a conventional (non-ultra high-pressure) system?

Choose the Rocket™ column format—no modifications necessary to your existing HPLC system. Choose Expedite™ columns for low volume and microbore systems. See page 31 for more explanation of the Rocket™ and Expedite™ formats.





Alltech® Prevail™ Normal-Phase Columns

Prevail™ HPLC Columns

Packing	Format	i.d. x Length	Part No.
Cyano, 3µm	Microbore	2.1 x 150mm	99243
	Solvent-Reducer	3.0 x 150mm	99338
	Analytical	4.6 x 50mm	43924
	Analytical	4.6 x 100mm	99245
	Analytical	4.6 x 150mm	99247
Cyano, 5µm	Microbore	2.1 x 150mm	99249
	Solvent-Reducer	3.0 x 150mm	99329
	Solvent-Reducer	3.0 x 250mm	99330
	Analytical	4.6 x 150mm	99251
	Analytical	4.6 x 250mm	99253
Amino, 3µm	Analytical	4.6 x 50mm	43926
	Analytical	4.6 x 100mm	99257
	Analytical	4.6 x 150mm	99259
Amino, 5µm	Analytical	4.6 x 150mm	99263
	Analytical	4.6 x 250mm	99265
Silica, 3µm	Microbore	1.0 x 100mm	43832
	Microbore	1.0 x 150mm	43806
	Expedite™ MS	2.1 x 10mm	43841
	Expedite™ MS	2.1 x 20mm	43826
	Microbore	2.1 x 50mm	43868
	Microbore	2.1 x 100mm	43805
	Microbore	2.1 x 150mm	99267
	Solvent-Reducer	3.0 x 150mm	99341
	Expedite™ MS	4.6 x 10mm	43858
	Expedite™ MS	4.6 x 20mm	43816
	Analytical	4.6 x 50mm	43842
	Analytical	4.6 x 100mm	99269
	Analytical	4.6 x 150mm	99271
	Rocket™	7 x 33mm	99284
	Rocket™	7 x 53mm	99283

Prevail™ HPLC Columns (continued)

Packing	Format	i.d. x Length	Part No.
Silica, 5µm	Analytical	2.1 x 150mm	99273
	Solvent-Reducer	3.0 x 150mm	99339
	Solvent-Reducer	3.0 x 250mm	99340
	Analytical	4.6 x 150mm	99275
	Analytical	4.6 x 250mm	99277

Prevail™ All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
Select C18, 5µm	2.1 x 7.5mm	3	96690
	3.0 x 7.5mm	3	99119
	4.6 x 7.5mm	3	96455
C18, 5µm	2.1 x 7.5mm	3	96682
	3.0 x 7.5mm	3	99350
	4.6 x 7.5mm	3	99286
C8, 5µm	2.1 x 7.5mm	3	99128
	3.0 x 7.5mm	3	99351
	4.6 x 7.5mm	3	99287
Phenyl, 5µm	2.1 x 7.5mm	3	99130
	3.0 x 7.5mm	3	99352
	4.6 x 7.5mm	3	99288
Cyano, 5µm	2.1 x 7.5mm	3	99131
	3.0 x 7.5mm	3	99353
	4.6 x 7.5mm	3	99289
Amino, 5µm	4.6 x 7.5mm	3	99290
	4.6 x 7.5mm	3	99291
Silica, 5µm	2.1 x 7.5mm	3	99133
	3.0 x 7.5mm	3	99354
	4.6 x 7.5mm	3	99291
All-Guard™ Cartridge Holder		ea	80101

*All-Guard™ holder required. Other particle sizes available.

Alltech® Prevail™ Organic Acid Columns

Get Unsurpassed Resolution for Common Organic Acids

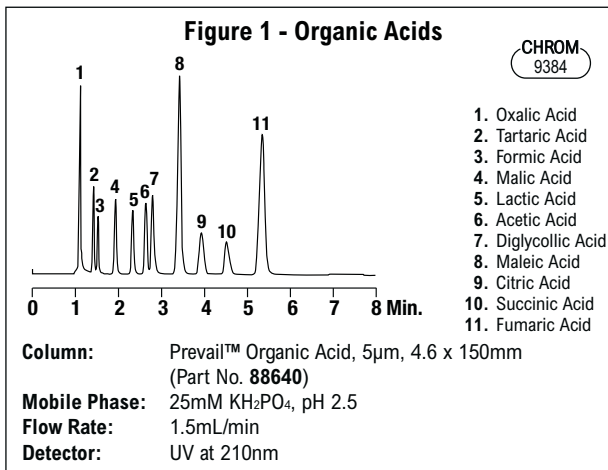
- Acid stable for long column lifetimes
- Silica-based for maximum efficiency and high-resolution
- Short run times and high sample throughput at ambient temperature with Rocket™ format
- Lower cost than polymeric organic acid columns

Prevail™ Organic Acid (OA) columns separate common organic acids with an unsurpassed combination of resolution, speed, sensitivity, and simplicity. A simple acidic phosphate buffer and a Prevail™ OA column at ambient temperature will separate 11 short-chain organic acids in less than 6 minutes.

Use pH to adjust column selectivity. Lowering the mobile phase pH progressively suppresses the ionization of the carboxylic acids, making them more hydrophobic. This gives you the ability to move these peaks relative to other peaks in the chromatogram, and it simplifies method development.

Prevail™ HPLC Columns

Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
OA, 3µm	Microbore	2.1 x 100mm	88648	—
	Analytical	4.6 x 100mm	88650	88750
	Analytical	4.6 x 150mm	88655	88755
	Rocket™	7 x 33mm	99292	—
	Rocket™	7 x 53mm	50755	—
OA, 5µm	Analytical	4.6 x 150mm	88640	88740
	Analytical	4.6 x 250mm	88645	88745



Separate 11 short-chain organic acids in less than six minutes.

Prevail™ All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
Organic Acid, 5µm	4.6 x 7.5mm	3	96429
All-Guard™ Cartridge Holder		ea	80101

*All-Guard™ holder required. Other particle sizes available.



Alltech® Prevail™ Carbohydrate ES Columns

Get Better Retention Times, Longer Column Life, and Improved Baselines Compared to Traditional Amino Carbohydrate Columns

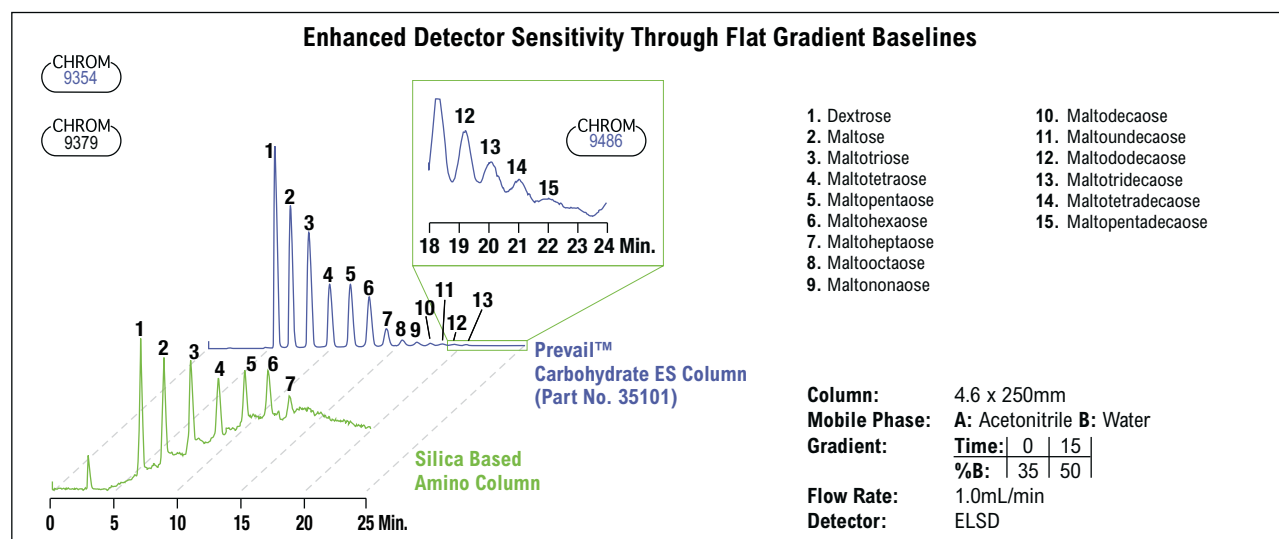
- Longer column life: Hybrid phase has the ruggedness of silica with the stability of a polymer
- Quieter baselines compared to traditional amino carbohydrate columns, even with gradients
- Reduce run times with more mobile phase choices
- Compatible with gradient ELSD applications

Quiet Gradient Baselines

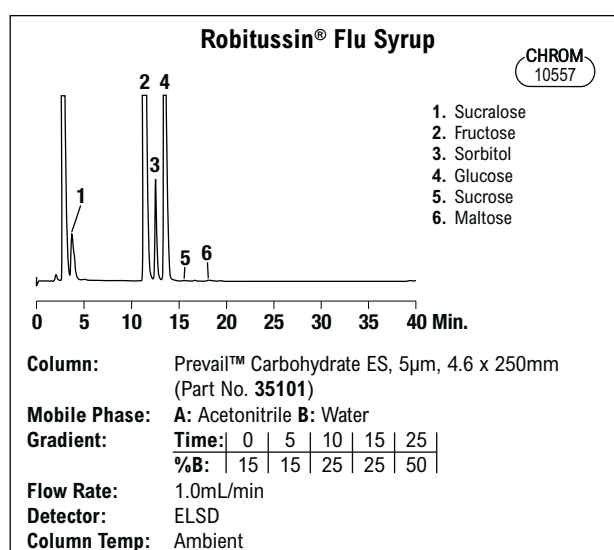
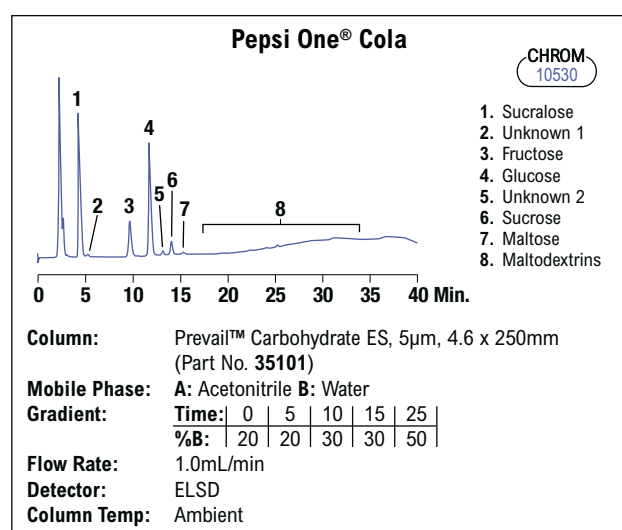
Prevail™ Carbohydrate ES Columns are excellent for isocratic separations with common detectors, but the column's real power shows with the ELSD and a solvent gradient. Enjoy the powerful selectivity, reduced run times, and efficient peaks from gradients while seeing the quiet, stable baselines that maximize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

Better Resolution and Peak Shape

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



Use gradients with a Prevail™ Carbohydrate ES column and the ELSD for shorter run times, better resolution, and greater sensitivity. By comparison, silica-based amino columns give noisy, shifting baselines.



Prevail™ HPLC Columns

Packing	Format	i.d. x Length	Part No.
Carbohydrate ES, 5µm	Analytical	4.6 x 150mm	35102
	Analytical	4.6 x 250mm	35101
	Rocket™	7 x 53mm	35104

Prevail™ All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
Carbohydrate ES, 5µm	4.6 x 7.5mm	3	96435
All-Guard™ Cartridge Holder		ea	80101

*All-Guard™ holder required. Other particle sizes available.

Alltech® Platinum™ Columns

For Challenging Separations

- Unique selectivity
- Better peak shapes with polar analytes
- More separation choices with dual-selectivity
- Excellent stability and reproducibility
- 1.5µm high throughput media for speed and resolution, especially when combined with Rocket™ and Expedite™ hardware



The Platinum™ Column Advantage

Controlled silica exposure is the difference that makes Platinum™ columns unique. Instead of thoroughly covering the silica with bonded phase to hide the silica, the exposure of the silica in Platinum™ columns is controlled to provide a dual mode separation with both polar and non-polar sites exposed to your samples. This extends polar selectivity well beyond what other reversed-phase columns offer and gives separations other columns cannot.

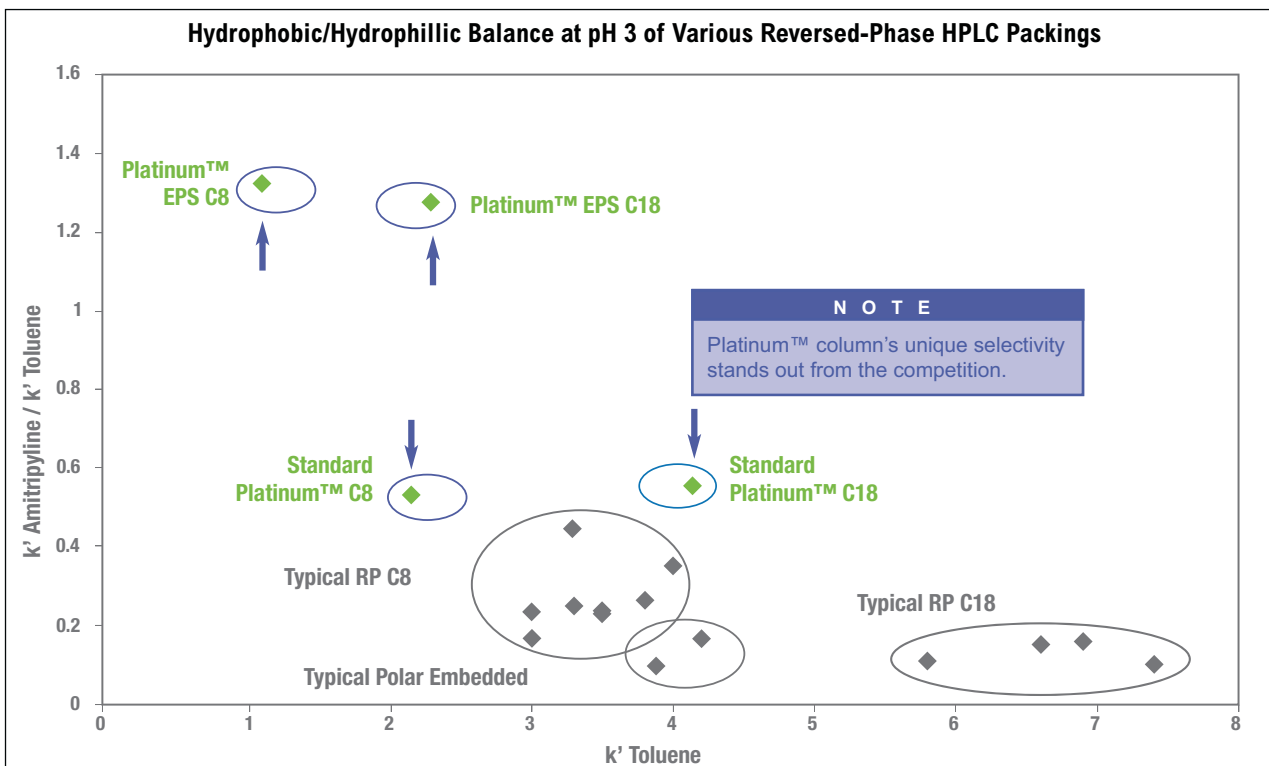
Standard Platinum™ Columns vs Platinum™ EPS Columns

Platinum™ columns come in two varieties offering different levels of silica exposure. Standard Platinum™ has a moderate silica exposure and is best used with neutral and moderately polar compounds. Platinum™ EPS (Extended Polar Selectivity) has a high level of silica exposure and is best used with compounds containing more than two polar functional groups.

Alltech® Platinum™ Phase Specifications

Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18	Silica	Spherical	1.5, 3, 5µm	100Å	200m²/g	6%	Monomeric	Yes	L1
EPS C18	Silica	Spherical	1.5, 3, 5µm	100Å	200m²/g	5%	Monomeric	No	L1
C8	Silica	Spherical	1.5, 3, 5µm	100Å	200m²/g	4%	Monomeric	Yes	L7
EPS C8	Silica	Spherical	3, 5µm	100Å	200m²/g	2.50%	Monomeric	No	L7
Phenyl	Silica	Spherical	3, 5µm	100Å	200m²/g	—	Monomeric	Yes	L11
Cyano	Silica	Spherical	3, 5µm	100Å	200m²/g	—	Monomeric	No	L10
Amino (NH₂)	Silica	Spherical	3, 5µm	100Å	200m²/g	—	Monomeric	No	L8
Silica	Silica	Spherical	3, 5µm	100Å	200m²/g	—	—	—	L3
SAX	Silica	Spherical	3, 5µm*	100Å	200m²/g	—	Monomeric	No	—

Trying to solve difficult separation problems using typical reversed-phase columns often leads to the same result. Choose Platinum™ columns for completely different selectivity. See chart below.

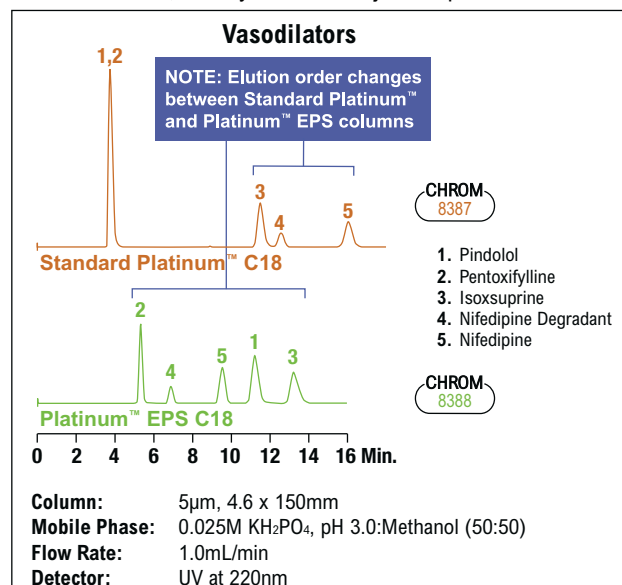


Plotting k' values of different compounds (polar vs. nonpolar) demonstrate the unique selectivity of Platinum™ and Platinum™ EPS columns, compared to conventional reversed-phase columns.



Reverse Elution Order with Standard Platinum™ and Platinum™ EPS Columns

Often, it's preferable when minor components elute before, rather than after, closely retained major components.



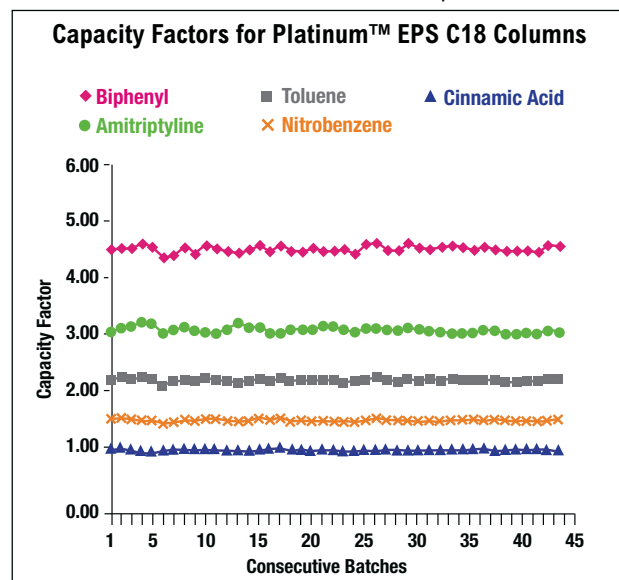
Platinum™ HPLC Columns

Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
C18, 1.5µm	Rocket™	7.0 x 33mm	50527	—
	Rocket™	7.0 x 53mm	50529	—
C18, 3µm	Solvent Reducer	3.0 x 150mm	32794	—
	Analytical	4.6 x 100mm	32007	32009
	Analytical	4.6 x 150mm	32020	32029
	Rocket™	7.0 x 33mm	50525	—
	Rocket™	7.0 x 53mm	50523	—
C18, 5µm	Solvent Reducer	3.0 x 150mm	32793	—
	Solvent Reducer	3.0 x 250mm	32792	—
	Analytical	4.6 x 150mm	32043	32044
	Analytical	4.6 x 250mm	32064	32068
EPS C18, 1.5µm	Rocket™	7.0 x 33mm	50577	—
	Rocket™	7.0 x 53mm	50579	—
EPS C18, 3µm*	Capillary	0.150x 50mm	22300	—
	Capillary	0.150x100mm	22430	—
	Capillary	0.150x150mm	22431	—
	Capillary	0.300x 50mm	22432	—
	Capillary	0.300x100mm	22433	—
	Capillary	0.300x150mm	22434	—
	Solvent Reducer	3.0 x 150mm	32799	—
	Analytical	4.6 x 100mm	32158	32161
	Analytical	4.6 x 150mm	32183	32184
	Rocket™	7.0 x 33mm	50575	—
EPS C18, 5µm	Rocket™	7.0 x 53mm	50573	—
	Solvent Reducer	3.0 x 150mm	32806	—
	Solvent Reducer	3.0 x 250mm	32802	—
	Analytical	4.6 x 150mm	32214	32216
C8, 1.5µm	Analytical	4.6 x 250mm	32246	32247
	Rocket™	7.0 x 33mm	50529	—
C8, 3µm	Rocket™	7.0 x 33mm	50532	—
C8, 5µm	Analytical	4.6 x 150mm	32370	32371
	Analytical	4.6 x 250mm	32375	32376
EPS C8, 3µm	Analytical	4.6 x 150mm	32415	32416
	Rocket™	7.0 x 33mm	50583	—
	Rocket™	7.0 x 53mm	50585	—
EPS C8, 5µm	Analytical	4.6 x 150mm	32420	32421
	Analytical	4.6 x 250mm	32425	32426

*1.5µm and 5µm particles and other dimensions are available.

Platinum™ EPS Columns Have High Polar Compound Capacity

This is important for early eluting polar compounds which are often unresolved on conventional reversed-phase columns.



Platinum™ HPLC Columns (continued)

Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
Phenyl, 3µm	Analytical	4.6 x 150mm	32631	32632
Phenyl, 5µm	Analytical	4.6 x 150mm	32636	32637
	Analytical	4.6 x 250mm	32641	32642
Cyano, 3µm	Rocket™	7.0 x 33mm	50593	—
	Rocket™	7.0 x 53mm	50595	—
Cyano, 5µm	Analytical	4.6 x 150mm	32672	32675
	Analytical	4.6 x 250mm	32681	32682
Amino, 3µm	Analytical	4.6 x 150mm	32706	32707
	Rocket™	7.0 x 53mm	50545	—
Amino, 5µm	Analytical	4.6 x 150mm	32713	32714
	Analytical	4.6 x 250mm	32722	32723
Silica, 3µm	Analytical	4.6 x 150mm	32535	32536
Silica, 5µm	Analytical	4.6 x 150mm	32542	32543
	Analytical	4.6 x 250mm	32549	32550
SAX, 3µm	Analytical	4.6 x 150mm	32952	32953
SAX, 5µm	Analytical	4.6 x 150mm	32944	32946
	Analytical	4.6 x 250mm	32943	32945

Platinum™ Guard Cartridges

Packing	i.d. x Length	Qty.	Part No.
C18 All-Guard™, 5µm*	3.0 x 7.5mm	3	99115
	4.6 x 7.5mm	3	32606
EPS C18, 3µm	0.150 x 10mm	—	22693
Capillary Guard**	0.300 x 10mm	—	22694
EPS C18 All-Guard™, 5µm*	3.0 x 7.5mm	3	99117
	4.6 x 7.5mm	3	32607
C8 All-Guard™, 5µm*	4.6 x 7.5mm	3	32612
EPS C8 All-Guard™, 5µm*	4.6 x 7.5mm	3	32614
Phenyl All-Guard™, 5µm*	4.6 x 7.5mm	3	32619
Cyano All-Guard™, 5µm*	4.6 x 7.5mm	3	32620
Amino All-Guard™, 5µm*	4.6 x 7.5mm	3	32621
Silica All-Guard™, 5µm*	4.6 x 7.5mm	3	32622
SAX All-Guard™, 5µm*	4.6 x 7.5mm	3	32787
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101
Capillary Guard Cartridge Holder			
Guard Holder for 0.100mm and 0.150mm Guards		ea	GR-3710E
Guard Holder for 0.300mm and 0.500mm Guards		ea	GR-3710A

*All-Guard™ holder required.

**1.5µm and 5µm particles and other dimensions are available.

GraceSmart™ Columns

High Quality HPLC Phases at Exceptional Value

- High purity phases
- Efficient and reproducible separations
- General use selectivity
- Exceptional value

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



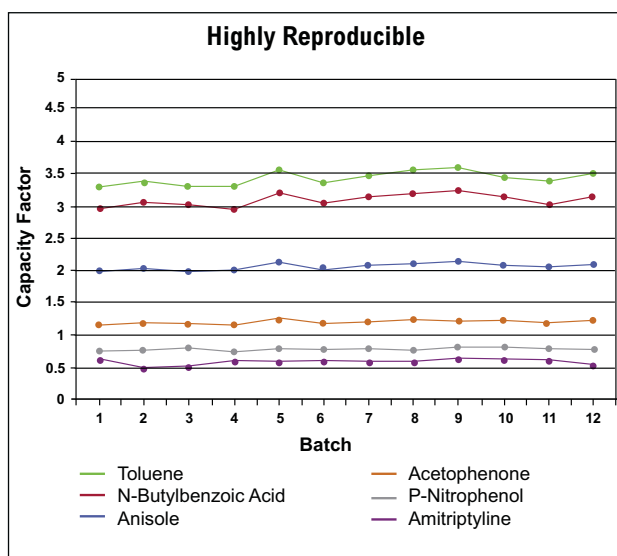
GRACE



GraceSmart™ Phase Specifications				
Phase	Encapping	Surface Area	Pore Size	Particle Size
C18	TMS, non-polar	220m ² /g	120Å	3, 5µm

Reproducible Methods Start with Reproducible Columns

Our tightly controlled silica synthesis and bonding keep capacity factor and selectivity variations to a minimum. The advanced packing methods deliver consistently high column-to-column efficiency. Every column is individually tested and shipped with a quality assurance chromatogram.



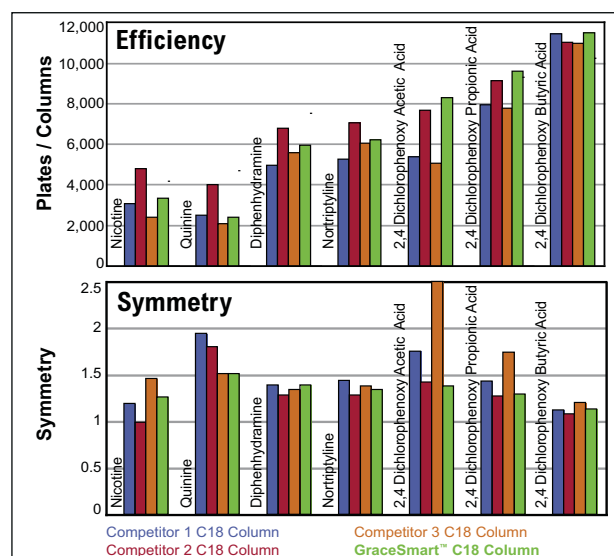
Consistent batch-to-batch capacity for acidic, basic, and neutral compounds.

GraceSmart™ RP18 Columns

Packing	Format	i.d. x Length	Part No.
C18, 5µm	Analytical	4.6 x 150mm	5138812
	Analytical	4.6 x 250mm	5138810
	Analytical	2.1 x 150mm	5138811
	Analytical	2.1 x 250mm	5138813
C18, 3µm	Analytical	4.6 x 150mm	5141752
	Analytical	4.6 x 100mm	5141753
	Analytical	2.1 x 150mm	5141754
	Analytical	2.1 x 100mm	5141755
	Analytical	2.1 x 50mm	5141756
	Analytical	4.6 x 50mm	5141811

Expect Competitive Performance

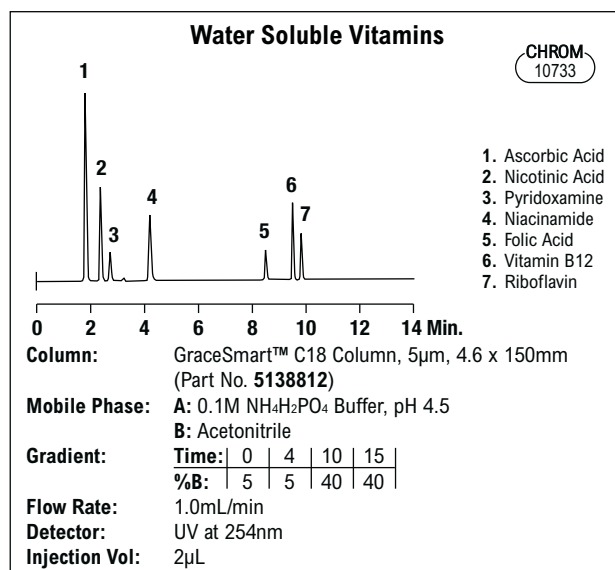
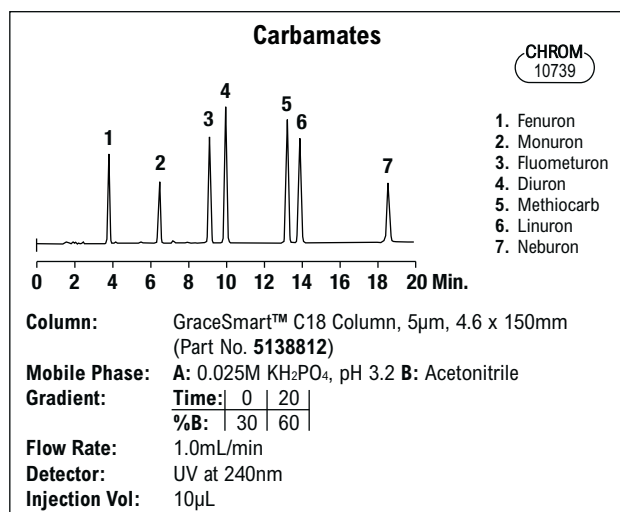
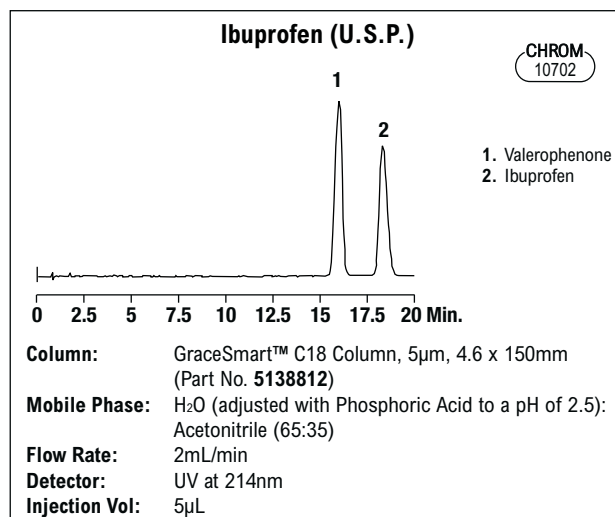
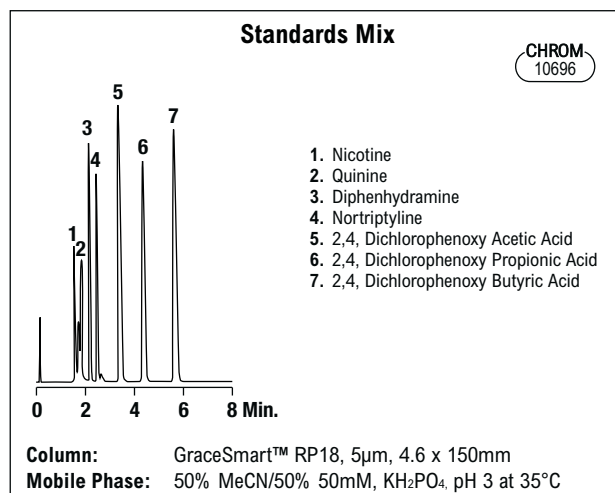
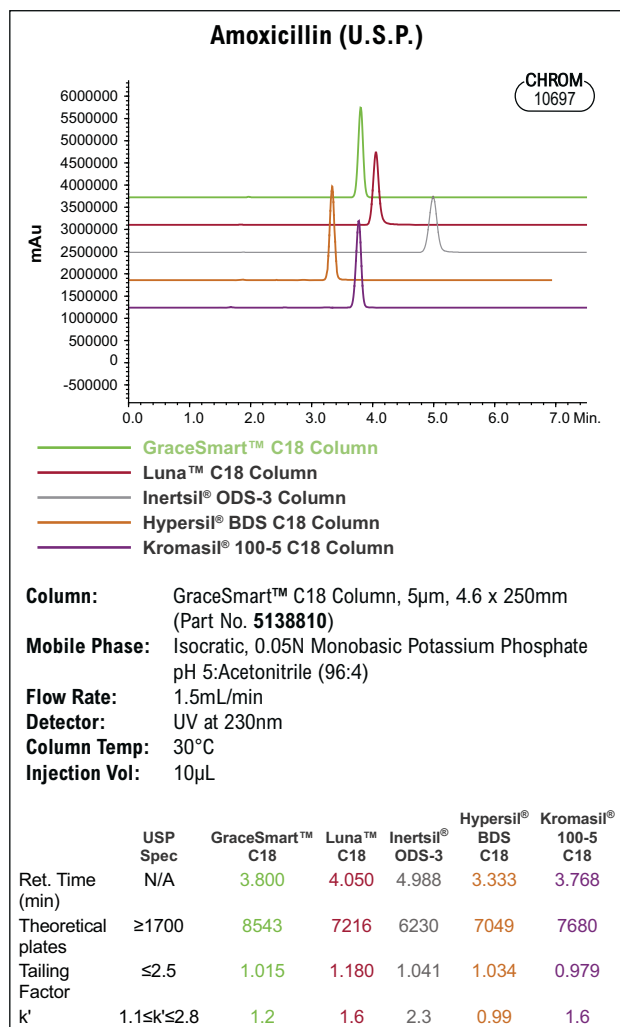
Six sigma techniques and lean manufacturing are key to our cost competitive position, without compromising quality or performance. GraceSmart™ columns show similar or better efficiency and asymmetries for challenging base and acid components in comparison to industry leading columns.



GraceSmart™ columns compare favorably to leading competitor columns.



GraceSmart™ Columns



more applications

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

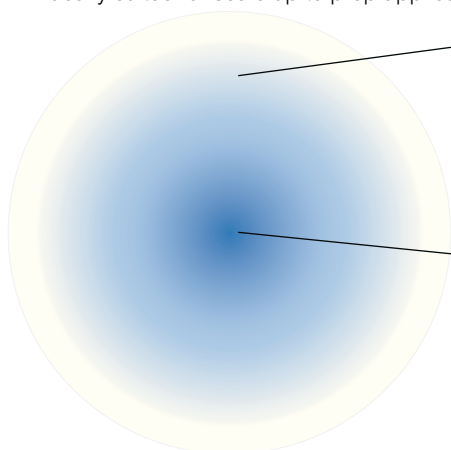


analytical hplc

GraceAlpha™ Columns (Patent Pending)

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 yields mechanically robust particle
- Proprietary bonding technology gives unique selectivity and increased resolution
- Ideally suited for scale up to prep applications



Extreme Porosity

High-porosity exterior increases mass transfer leading to higher efficiencies and superior loading capacity.

The high-porosity structure adds an elastic quality to the silica surface allowing the particles to pack tighter yielding higher efficiencies. It also stabilizes the packed bed preventing voids.

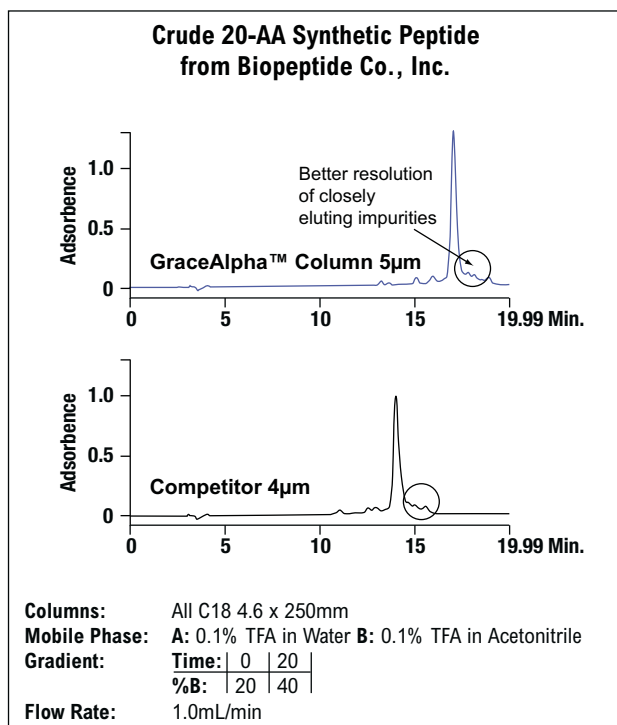
Dense Inner Core

Dense core provides exceptional strength. 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™ Phase Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18	Silica	Spherical	5, 10, 15, 20µm	120Å	325m²/g	15%	Monomeric	Yes	L1
C8	Silica	Spherical	5, 10, 15, 20µm	120Å	325m²/g	10%	Monomeric	—	L7
Silica	Silica	Spherical	5, 10, 15, 20µm	120Å	325m²/g	—	Monomeric	—	L3

High Level of Resolution

GraceAlpha™ offers resolution advantages due to its higher mass transfer and optimized C18 and C8 bonding chemistry.



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

GraceAlpha™ Columns

Packing	i.d. x Length	Part No.
C18, 5µm	4.6 x 150mm	5140743
	4.6 x 250mm	5140702
C18, 10µm	4.6 x 150mm	5140744
	4.6 x 250mm	5140701
C18, 15µm	4.6 x 150mm	5141058
	4.6 x 250mm	5141059
C8, 5µm	4.6 x 150mm	5140740
	4.6 x 250mm	5140704
C8, 10µm	4.6 x 150mm	5140742
	4.6 x 250mm	5140703
C8, 15µm	4.6 x 150mm	5141055
	4.6 x 250mm	5141057
Silica, 5µm	4.6 x 150mm	5140740
	4.6 x 250mm	5140704
Silica, 10µm	4.6 x 150mm	5140742
	4.6 x 250mm	5140703
Silica, 15µm	4.6 x 150mm	5141055
	4.6 x 250mm	5141057

more applications

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



Alltech® Brava™ Columns



If You Like Hypersil® BDS, Try This Lower-Cost Alternative

- BDS phases for acids, bases, and neutrals
- ODS phases for non-polars and lipophilics

Medium-sized pores are ideal for resolution of small- to medium-sized compounds, while its less-retentive nature means less mobile phase consumption.

Alltech



Brava™ Phase Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18 BDS	Silica	Spherical	3, 5µm	145Å	185m ² /g	8.5%	Monomeric	Yes	L1
C18 ODS	Silica	Spherical	3, 5µm	130Å	195m ² /g	8.5%	Monomeric	Yes	L1
C8	Silica	Spherical	3, 5µm	130Å	195m ² /g	6%	Monomeric	Yes	L7
C8 BDS	Silica	Spherical	3, 5µm	145Å	185m ² /g	5.5%	Monomeric	Yes	L7
Phenyl	Silica	Spherical	5µm	130Å	195m ² /g	—	Monomeric	No	L11
Cyano	Silica	Spherical	5µm	130Å	195m ² /g	—	Monomeric	No	L10
Cyano BDS	Silica	Spherical	5µm	145Å	185m ² /g	—	Monomeric	No	L10
Amino (NH ₂)	Silica	Spherical	5µm	130Å	195m ² /g	—	Monomeric	No	L8
Silica	Silica	Spherical	5µm	130Å	195m ² /g	—	—	No	L3

Brava™ HPLC Columns

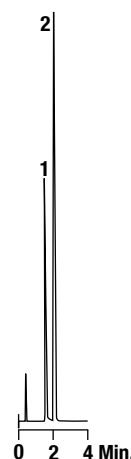
Packing	i.d. x Length	Part No.	Waters® Fittings Part No.
C18 BDS, 3µm	4.6 x 100mm	50910	50911
	4.6 x 150mm	50912	50913
C18 BDS, 5µm	4.6 x 150mm	50914	50915
	4.6 x 250mm	50916	50917
C18 ODS, 3µm	4.6 x 100mm	50957	50959
	4.6 x 150mm	50961	50963
C18 ODS, 5µm	4.6 x 150mm	50965	50967
	4.6 x 250mm	50969	50971
C8 BDS, 3µm	4.6 x 100mm	50918	50919
	4.6 x 150mm	50920	50921
C8 BDS, 5µm	4.6 x 150mm	50922	50923
	4.6 x 250mm	50924	50925
C8, 3µm	4.6 x 100mm	50939	50943
	4.6 x 150mm	50945	50947
C8, 5µm	4.6 x 150mm	50949	50951
	4.6 x 250mm	50953	50955
Phenyl, 5µm	4.6 x 150mm	50978	50979
	4.6 x 250mm	50981	50983
Cyano BDS, 5µm	4.6 x 150mm	50926	50927
	4.6 x 250mm	50928	50929
Cyano, 5µm	4.6 x 150mm	50973	50975
	4.6 x 250mm	50976	50977
Amino, 5µm	4.6 x 150mm	50930	50931
	4.6 x 250mm	50933	50934
Silica, 5µm	4.6 x 150mm	50935	50936
	4.6 x 250mm	50937	50938

Brava™ All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
C18 BDS, 5µm	4.6 x 7.5mm	3	96472
C18 ODS, 5µm	4.6 x 7.5mm	3	96477
C8 BDS, 5µm	4.6 x 7.5mm	3	96473
C8, 5µm	4.6 x 7.5mm	3	96478
Phenyl, 5µm	4.6 x 7.5mm	3	96480
Cyano BDS, 5µm	4.6 x 7.5mm	3	96474
Cyano, 5µm	4.6 x 7.5mm	3	96479
Amino, 5µm	4.6 x 7.5mm	3	96475
Silica, 5µm	4.6 x 7.5mm	3	96476
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

*All-Guard™ holder required. Other particle sizes available.

Metal Chelator

CHROM
10473


1. Pyridine
2. 2, 2' Dipyrldyl

Column: Brava™ C18 BDS, 5µm, 4.6 x 150mm
(Part No. 50914)
Mobile Phase: Acetonitrile:50mM KH₂PO₄ pH 3 (50:50)
Flow Rate: 1.0mL/min
Detector: UV at 254nm

more applications

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



Alltech® Alltima™ Introduction



High-Quality General-Purpose HPLC Columns

- Extensive collection of published applications
- Well suited for microbore applications, stable in popular microbore mobile phases
- Acid and base deactivated symmetrical peaks
- Polymerically bonded and double-endscapped for long column lifetimes
- Analyze acids, bases, and neutrals in one run
- Full range of column dimensions, from microbore to preparative

Alltech

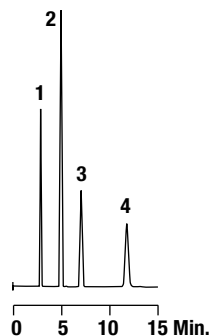


Alltima™ Phase Specifications

Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18	Silica	Spherical	3, 5, 10µm	100Å	340m²/g	16%	Polymeric	Yes	L1
C18 LL	Silica	Spherical	5µm	100Å	340m²/g	9%	Polymeric	Yes	L1
C8	Silica	Spherical	3, 5, 10µm	100Å	340m²/g	9%	Polymeric	Yes	L7
Phenyl	Silica	Spherical	3, 5µm	100Å	340m²/g	7.5%	Polymeric	Yes	L11
Cyano	Silica	Spherical	3, 5µm	100Å	340m²/g	—	Polymeric	Yes	L10
Amino (NH₂)	Silica	Spherical	3, 5µm	100Å	340m²/g	—	Polymeric	No	L8
Silica	Silica	Spherical	3, 5, 10µm	100Å	340m²/g	—	—	—	L3

Basic Drugs

CHROM
8193

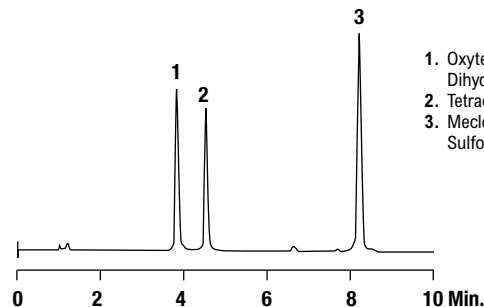


1. Procainamide
2. Acetaminophen
3. Theophylline
4. Caffeine

Column: Alltima™ C8, 5µm, 4.6 x 150mm
Mobile Phase: Methanol:50mM KH₂PO₄, pH 3.0 (20:80)
Flow Rate: 1.0mL/min
Detector: UV at 254nm

Antibacterials

CHROM
8764

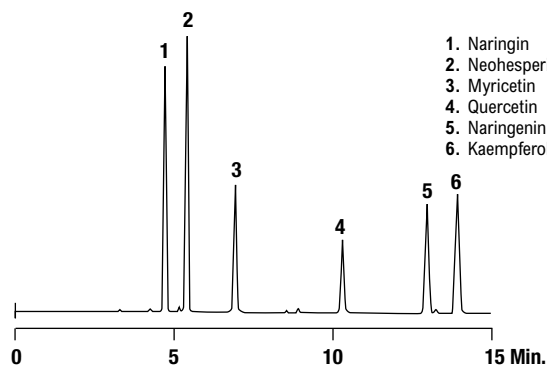


1. Oxytetracycline Dihydrate
2. Tetracycline HCL
3. Meclocycline Sulfosalicylate Salt

Column: Alltima™ C18, 3µm, 4.6 x 100mm
Mobile Phase: A: 50mM KH₂PO₄, pH 3.0 B: CH₃CN
Gradient: Time: 0 | 10
 %B: 15 | 40
Flow Rate: 1.0mL/min
Detector: UV at 254nm

Natural Products

CHROM
8887

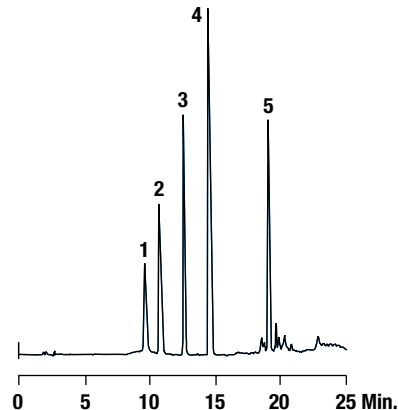


1. Naringin
2. Neohesperidin
3. Myricetin
4. Quercetin
5. Naringenin
6. Kaempferol

Column: Alltima™ C18, 3µm, 4.6 x 100mm
Mobile Phase: A: 50mM KH₂PO₄, pH 2.5 B: CH₃CN
Gradient: Time: 0 | 15
 %B: 20 | 40
Flow Rate: 1.0mL/min
Detector: UV at 280nm

Antihistamines

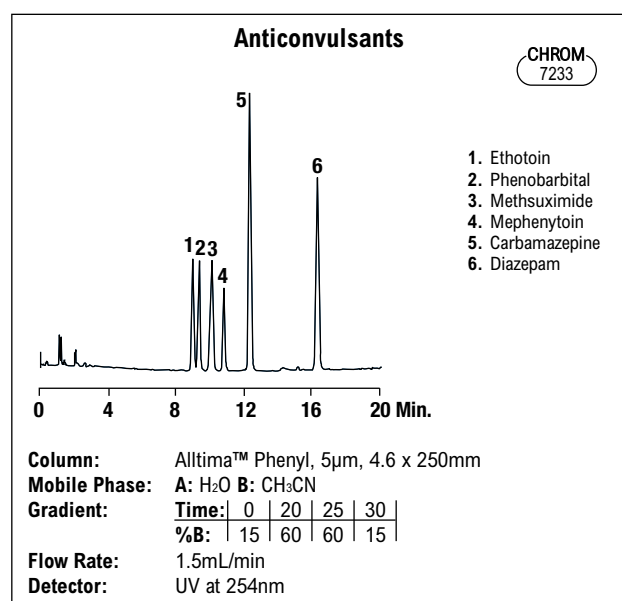
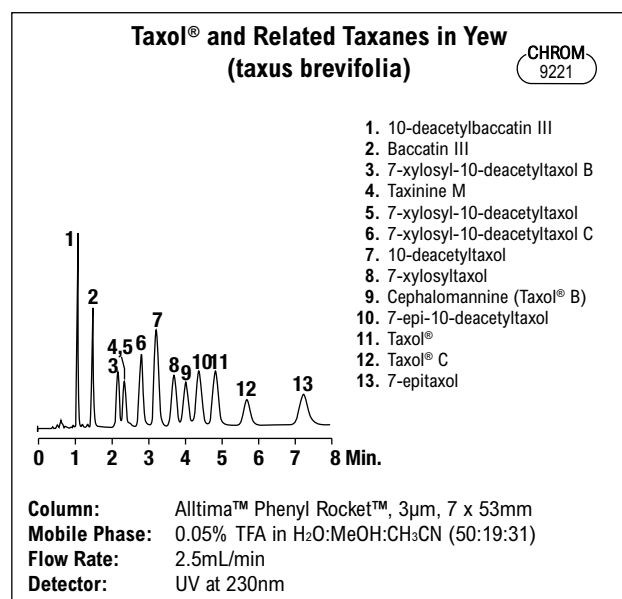
CHROM
7232



1. Tripelennamine
2. Triprolidine
3. Cyclizine
4. Chlorcyclizine
5. Meclizine

Column: Alltima™ C18, 5µm, 4.6 x 250mm
Mobile Phase: A: 50mM KH₂PO₄, pH 3.2 B: CH₃CN
Gradient: Time: 0 | 5 | 20
 %B: 25 | 25 | 70
Flow Rate: 1.3mL/min
Detector: UV at 220nm

Alltech® Alltima™ Reversed-Phase Columns



Alltima™ All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
C18, 5µm	2.1 x 7.5mm	3	96680
	3.0 x 7.5mm	3	96361
	4.6 x 7.5mm	3	96080
C18-LL, 5µm	2.1 x 7.5mm	3	96432
	3.0 x 7.5mm	3	96433
	4.6 x 7.5mm	3	96285
C8, 5µm	2.1 x 7.5mm	3	96441
	3.0 x 7.5mm	3	96362
	4.6 x 7.5mm	3	96081
Phenyl, 5µm	2.1 x 7.5mm	3	96442
	3.0 x 7.5mm	3	96445
	4.6 x 7.5mm	3	96082
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)			ea 80101

*All-Guard™ holder required. Other particle sizes available.

Alltima™ HPLC Reversed-Phase Columns

Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
C18, 3µm	Microbore	1.0 x 100mm	43853	—
	Microbore	1.0 x 150mm	43864	—
	Expedite™ MS	2.1 x 10mm	43836	—
	Expedite™ MS	2.1 x 20mm	43803	—
	Microbore	2.1 x 50mm	43849	—
	Microbore	2.1 x 100mm	43821	—
	Microbore	2.1 x 150mm	43852	—
	Solvent Reducer	3.0 x 150mm	81143	—
	Expedite™ MS	4.6 x 10mm	43837	—
	Expedite™ MS	4.6 x 20mm	43851	—
	Analytical	4.6 x 50mm	81412	—
	Analytical	4.6 x 100mm	81382	81383
	Analytical	4.6 x 150mm	81387	81388
	Rocket™	7 x 33mm	50603	—
C18, 5µm	Rocket™	7 x 53mm	50605	—
	Microbore	1.0 x 150mm	88384	—
	Microbore	1.0 x 250mm	88385	—
	Microbore	2.1 x 150mm	88370	—
	Microbore	2.1 x 250mm	88371	—
	Solvent Reducer	3.0 x 150mm	81140	—
	Solvent Reducer	3.0 x 250mm	81142	—
	Analytical	4.6 x 150mm	88052	88053
	Analytical	4.6 x 250mm	88056	88057
	Analytical	4.6 x 250mm	88307	88308
	C18-LL, 5µm	1.0 x 150mm	88390	—
	Microbore	1.0 x 250mm	88391	—
	Microbore	2.1 x 150mm	88388	—
	Microbore	2.1 x 250mm	88389	—
C18, 10µm	Solvent Reducer	3.0 x 150mm	81144	—
	Solvent Reducer	3.0 x 250mm	81145	—
	Analytical	4.6 x 150mm	88069	88082
	Analytical	4.6 x 250mm	88099	88235
C8, 3µm	Analytical	4.6 x 50mm	81413	—
	Analytical	4.6 x 100mm	81392	81393
	Analytical	4.6 x 150mm	81397	81398
	Rocket™	7 x 33mm	50607	—
	Rocket™	7 x 53mm	50609	—
C8, 5µm	Microbore	1.0 x 150mm	88394	—
	Microbore	1.0 x 250mm	88395	—
	Microbore	2.1 x 150mm	88372	—
	Microbore	2.1 x 250mm	88373	—
	Solvent Reducer	3.0 x 150mm	81146	—
	Analytical	4.6 x 150mm	88072	88073
C8, 10µm	Analytical	4.6 x 250mm	88076	88077
	Analytical	4.6 x 250mm	88317	88318
Phenyl, 3µm	Microbore	1.0 x 100mm	43892	—
	Microbore	1.0 x 150mm	43854	—
	Expedite™ MS	2.1 x 10mm	43809	—
	Expedite™ MS	2.1 x 20mm	43865	—
	Microbore	2.1 x 50mm	43835	—
	Microbore	2.1 x 100mm	43866	—
Phenyl, 5µm	Microbore	2.1 x 150mm	43813	—
	Expedite™ MS	4.6 x 10mm	43883	—
	Expedite™ MS	4.6 x 20mm	43822	—
	Analytical	4.6 x 50mm	81178	—
	Analytical	4.6 x 100mm	81181	88184
	Analytical	4.6 x 150mm	81188	81191
Phenyl, 5µm	Solvent Reducer	3.0 x 150mm	81147	—
	Analytical	4.6 x 150mm	88087	88088
Phenyl, 5µm	Analytical	4.6 x 250mm	88092	88093

analytical hplc

Alltech® Alltima™ C18 Validation Kits

Alltima™ columns have the batch-to-batch and column-to-column reproducibility required for method development. Each kit includes three columns made from three different batches of Alltima™ C18.

Alltima™ C18 Validation Kits

Description	Includes:	i.d. x Length	Part No.
C18, 3µm	3 columns from 3 different batches	4.6 x 100mm	11350
C18, 5µm	3 columns from 3 different batches	4.6 x 150mm	11541
C18, 5µm	3 columns from 3 different batches	4.6 x 250mm	11543

Alltech® Alltima™ Normal-Phase Columns

Alltima™ HPLC Normal-Phase Columns

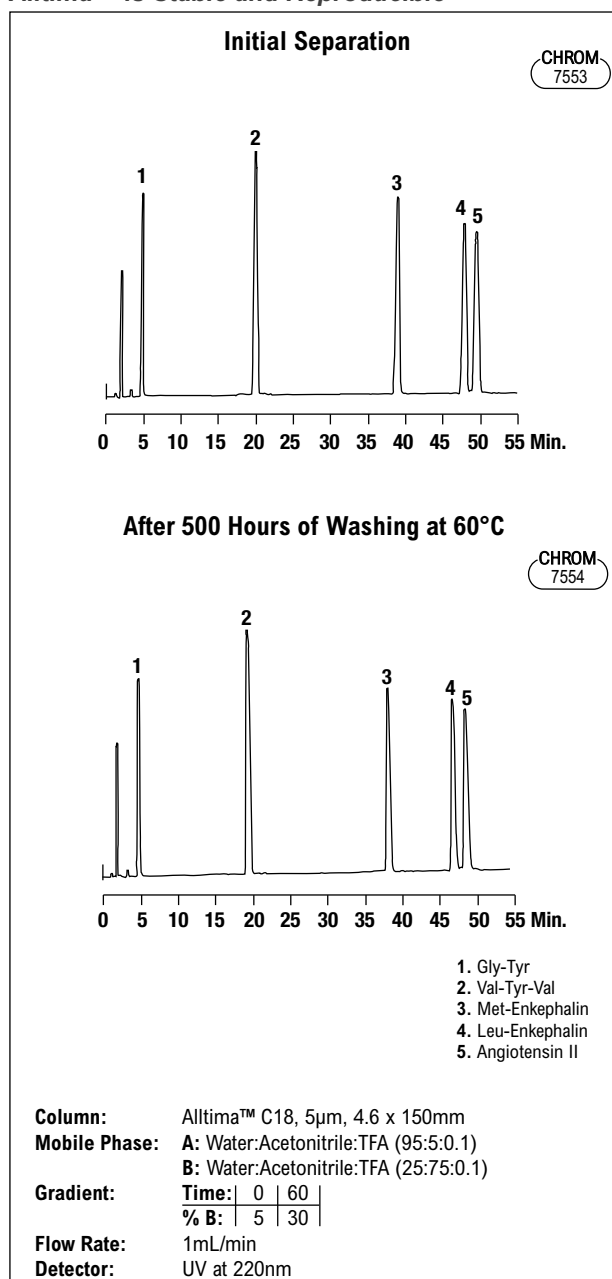
Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
Cyano, 3µm	Analytical	4.6 x 50mm	81179	—
	Analytical	4.6 x 100mm	81182	81186
	Analytical	4.6 x 150mm	81189	81192
Cyano, 5µm	Analytical	4.6 x 150mm	88180	88182
	Analytical	4.6 x 250mm	88189	88191
Amino, 3µm	Analytical	4.6 x 50mm	81180	—
	Analytical	4.6 x 100mm	81183	81187
	Analytical	4.6 x 150mm	81190	81193
Amino, 5µm	Analytical	4.6 x 150mm	88205	88207
	Analytical	4.6 x 250mm	88217	88218
Silica, 3µm	Microbore	1.0 x 100mm	43824	—
	Microbore	1.0 x 150mm	43855	—
	Expedite™ MS	2.1 x 10mm	43891	—
	Expedite™ MS	2.1 x 20mm	43801	—
	Microbore	2.1 x 50mm	43876	—
	Microbore	2.1 x 100mm	43823	—
	Microbore	2.1 x 150mm	43884	—
	Expedite™ MS	4.6 x 10mm	43889	—
	Expedite™ MS	4.6 x 20mm	43886	—
	Analytical	4.6 x 50mm	81414	—
	Analytical	4.6 x 100mm	81404	81405
	Analytical	4.6 x 150mm	81409	81410
Silica, 5µm	Analytical	4.6 x 150mm	88123	88124
	Analytical	4.6 x 250mm	88171	88172
Silica, 10µm	Analytical	4.6 x 250mm	88327	88328

Alltima™ All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
Cyano, 5µm	4.6 x 7.5mm	3	96084
Amino, 5µm	4.6 x 7.5mm	3	96085
Silica, 5µm	2.1 x 7.5mm	3	96450
	4.6 x 7.5mm	3	96083
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

*All-Guard™ holder required. Other particle sizes available.

Alltima™ is Stable and Reproducible



Column capacity and selectivity remained constant after washing an Alltima™ C18 column for 500 hours with 0.5% TFA:Acetonitrile (50:50) at 60°C.

tech tip

Want high throughput on a conventional (non-ultra high-pressure) system?

Choose the Rocket™ column format—no modifications necessary to your existing HPLC system. Choose Expedite™ columns for low volume and microbore systems. See page 31 for more explanation of the Rocket™ and Expedite™ formats.

Alltech® Apollo™ Columns



Economical, High Performance Columns

- Easy scale-up from analytical to prep
- Extended pH stability—1.5 to 10.5

Batch-tested Apollo™ HPLC columns use high purity, base-deactivated silica for powerful separations at an economical price. They are ideal for educational labs or for method development.

Alltech


Apollo™ Phase Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18	Silica	Spherical	5µm	100Å	340m²/g	15%	Monomeric	Yes	L1
C8	Silica	Spherical	5µm	100Å	340m²/g	9%	Monomeric	Yes	L7
Phenyl	Silica	Spherical	5µm	100Å	340m²/g	8%	Monomeric	Yes	L11
Silica	Silica	Spherical	5µm	100Å	340m²/g	—	—	—	L3

Apollo™ HPLC Columns

Packing	Format	i.d. x Length	Part No.
C18, 5µm	Analytical	4.6 x 150mm	36505
	Analytical	4.6 x 250mm	36511
C8, 5µm	Analytical	4.6 x 150mm	36506
	Analytical	4.6 x 250mm	36512
Phenyl, 5µm	Analytical	4.6 x 150mm	36538
	Analytical	4.6 x 250mm	36544
Silica, 5µm	Analytical	4.6 x 150mm	36507
	Analytical	4.6 x 250mm	36513

Apollo™ All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
C18, 5µm	4.6 x 7.5mm	3	96454
C8, 5µm	4.6 x 7.5mm	3	96463
Phenyl, 5µm	4.6 x 7.5mm	3	96430
Silica, 5µm	4.6 x 7.5mm	3	96419
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

*All-Guard™ holder required. Other particle sizes available.

Alltech® Econosphere™ Columns

- Low-cost columns for common chromatography applications
- Acid-washed for low metal content
- Easy scale-up from analytical to prep

Econosphere™ Phase Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18	Silica	Spherical	3, 5, 10µm	80Å	200m²/g	10%	Monomeric	Yes	L1
C8	Silica	Spherical	3, 5, 10µm	80Å	200m²/g	5%	Monomeric	Yes	L7
Cyano	Silica	Spherical	5µm	80Å	200m²/g	—	Monomeric	Yes	L10
Amino (NH₂)	Silica	Spherical	5µm	80Å	200m²/g	—	Polymeric	Yes	L8
Silica	Silica	Spherical	3, 5, 10µm	80Å	200m²/g	—	—	No	L3

Econosphere™ HPLC Columns

Packing	Format	i.d. x Length	Standard Part No.	Waters® Part No.
C18, 3µm	Analytical	4.6 x 50mm	70153	70156
	Analytical	4.6 x 100mm	70154	70157
	Analytical	4.6 x 150mm	70155	70158
	Rocket™	7 x 33mm	50673	—
	Rocket™	7 x 53mm	50675	—
C18, 5µm	Analytical	4.6 x 150mm	70065	70070
	Analytical	4.6 x 250mm	70066	70071
C8, 3µm	Analytical	4.6 x 50mm	70165	70168
	Analytical	4.6 x 100mm	70166	70169
	Analytical	4.6 x 150mm	70167	70170
C8, 5µm	Analytical	4.6 x 150mm	70085	70090
	Analytical	4.6 x 250mm	70086	—
Cyano, 5µm	Analytical	4.6 x 150mm	70025	70030
	Analytical	4.6 x 250mm	70026	70031

Econosphere™ HPLC Columns (continued)

Packing	Format	i.d. x Length	Standard Part No.	Waters® Part No.
Amino, 5µm	Analytical	4.6 x 150mm	70045	70050
	Analytical	4.6 x 250mm	70046	70051
Silica, 3µm	Analytical	4.6 x 50mm	70177	70180
	Analytical	4.6 x 100mm	70178	70181
	Analytical	4.6 x 150mm	70179	70182
Silica, 5µm	Analytical	4.6 x 150mm	70005	70010
	Analytical	4.6 x 250mm	70006	70011

Econosphere™ All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
C18	4.6 x 7.5mm	3	96121
C8	4.6 x 7.5mm	3	96122
Cyano	4.6 x 7.5mm	3	96123
Amino	4.6 x 7.5mm	3	96124
Silica	4.6 x 7.5mm	3	96125
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

*Guard holder required.

Alltech® Adsorbosphere™ Columns

- Reliable performance from rugged, reproducible phases

High temperature bonding for exceptional surface coverage, stability, and reproducibility. Adsorbosphere™ columns are the workhorses of any chromatography lab. Choose from four varieties:

Adsorbosphere™ has a moderate carbon load for common applications.

Adsorbosphere™ HS has a larger surface area and higher carbon load for stronger retention of hydrophobic compounds.

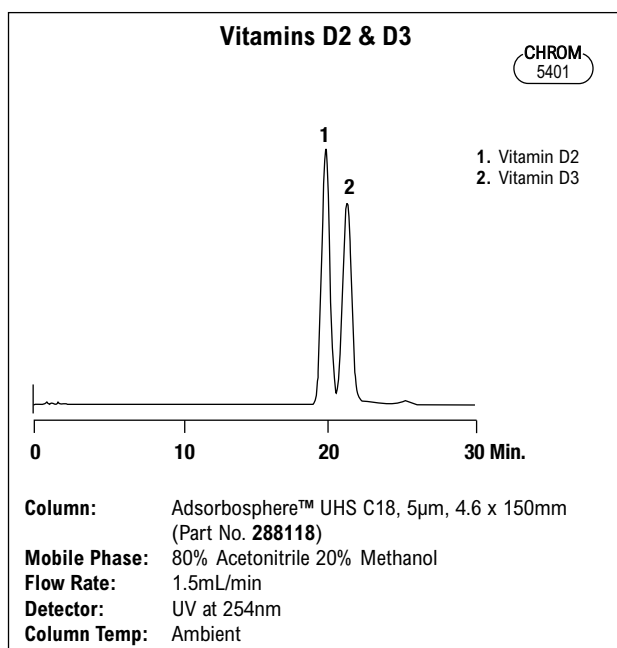
Adsorbosphere™ UHS has the largest surface area and highest carbon load for the highest resolution of hydrophobic compounds.

Adsorbosphere™ XL is a lower-cost, larger pore alternative. C18-B separates strongly basic analytes more efficiently than standard C18.

Alltech



Adsorbosphere™ Phase Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
Adsorbosphere™ C18	Silica	Spherical	3, 5, 10µm	80Å	200m²/g	12%	Monomeric	Yes	L1
Adsorbosphere™ C18 HS	Silica	Spherical	3, 5µm	60Å	350m²/g	20%	Monomeric	Yes	L1
Adsorbosphere™ C18 UHS	Silica	Spherical	5, 10µm	60Å	500m²/g	30%	Monomeric	Yes	L1
Adsorbosphere™ C8	Silica	Spherical	5µm	80Å	200m²/g	8%	Monomeric	Yes	L7
Adsorbosphere™ Phenyl	Silica	Spherical	5µm	80Å	200m²/g	5%	Monomeric	Yes	L11
Adsorbosphere™ Cyano	Silica	Spherical	5µm	80Å	200m²/g	—	Monomeric	Yes	L10
Adsorbosphere™ Cyano-AQ	Silica	Spherical	5µm	120Å	170m²/g	—	Polymeric	No	L10
Adsorbosphere™ Amino (NH₂)	Silica	Spherical	3, 5µm	80Å	200m²/g	—	Polymeric	No	L8
Adsorbosphere™ Silica	Silica	Spherical	5µm	80Å	200m²/g	—	—	—	L3
Adsorbosphere™ SAX	Silica	Spherical	5µm	80Å	200m²/g	—	Monomeric	—	—
Adsorbosphere™ SCX	Silica	Spherical	5µm	80Å	200m²/g	—	Monomeric	Yes	—
Adsorbosphere™ XL C18	Silica	Spherical	3, 5µm	90Å	200m²/g	11%	Monomeric	Yes	L1
Adsorbosphere™ XL C18-B	Silica	Spherical	5µm	90Å	200m²/g	12%	Monomeric	Yes	L1
Adsorbosphere™ XL C8	Silica	Spherical	3, 5µm	90Å	200m²/g	6%	Monomeric	Yes	L7
Adsorbosphere™ XL C1 (TMS)	Silica	Spherical	5µm	90Å	200m²/g	—	Monomeric	Yes	L13
Adsorbosphere™ XL Silica	Silica	Spherical	5µm	90Å	200m²/g	—	—	—	L3
Adsorbosphere™ XL SAX	Silica	Spherical	5, 10µm	90Å	200m²/g	—	Monomeric	Yes	—
Adsorbosphere™ XL SCX	Silica	Spherical	5, 10µm	90Å	200m²/g	—	Monomeric	Yes	—



Adsorbosphere™ HPLC Columns

Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
C18, 3µm	Analytical	4.6 x 100mm	287092	287093
	Rocket™	7 x 33mm	50623	—
	Rocket™	7 x 53mm	50625	—
C18, 5µm	Analytical	4.6 x 150mm	287072	287073
	Analytical	4.6 x 250mm	287062	287063
C18, 10µm	Analytical	4.6 x 250mm	287052	287053
C8, 5µm	Analytical	4.6 x 150mm	287122	287123
	Analytical	4.6 x 250mm	287112	287113
Phenyl, 5µm	Analytical	4.6 x 150mm	287532	287533
	Analytical	4.6 x 250mm	287542	287543
Cyano, 5µm	Analytical	4.6 x 150mm	287202	287203
Cyano-AQ, 5µm	Analytical	4.6 x 150mm	50005	50035
	Analytical	4.6 x 250mm	500050	500060
Amino, 3µm	Analytical	4.6 x 150mm	287282	287283
Amino, 5µm	Analytical	4.6 x 250mm	287242	287243
Silica, 5µm	Analytical	4.6 x 250mm	287012	287013
SAX, 5µm	Analytical	4.6 x 250mm	287512	287513
SCX, 5µm	Analytical	4.6 x 250mm	287472	287473

Adsorbosphere™ HS HPLC Columns

Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
C18 HS, 3µm	Analytical	4.6 x 100mm	28780	28781
	Analytical	4.6 x 150mm	28786	28787
C18 HS, 5µm	Analytical	4.6 x 150mm	28817	28818
	Analytical	4.6 x 250mm	28821	28822

Alltech® Adsorbosphere™ Columns (continued)

Adsorbosphere™ UHS HPLC Columns

Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
C18 UHS, 5µm	Analytical	4.6 x 150mm	288118	288119
C18 UHS, 10µm	Analytical	4.6 x 250mm	288133	288134

Adsorbosphere™ XL HPLC Columns

Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
XL C18, 3µm	Analytical	4.6 x 100mm	20237	20286
	Analytical	4.6 x 150mm	20381	20394
	Rocket™	7 x 33mm	50633	—
	Rocket™	7 x 53mm	50635	—
XL C18, 5µm	Analytical	4.6 x 150mm	20390	20462
	Analytical	4.6 x 250mm	20552	20579
XL C18-B, 5µm	Analytical	4.6 x 150mm	20548	20344
	Analytical	4.6 x 250mm	20247	20627
XL C8, 3µm	Analytical	4.6 x 150mm	20320	20203
XL C8, 5µm	Analytical	4.6 x 150mm	20676	20607
	Analytical	4.6 x 250mm	20383	20460
XL C1, 5µm	Analytical	4.6 x 150mm	20386	20452
	Analytical	4.6 x 250mm	20628	20636
XL Silica, 5µm	Analytical	4.6 x 150mm	20365	20398
	Analytical	4.6 x 250mm	20256	20654
XL SAX, 5µm	Analytical	4.6 x 150mm	20538	20318
	Analytical	4.6 x 250mm	20550	20561
XL SAX, 10µm	Analytical	4.6 x 250mm	20314	20303
XL SCX, 5µm	Analytical	4.6 x 150mm	20525	20531
	Analytical	4.6 x 250mm	20545	20564
XL SCX, 10µm	Analytical	4.6 x 250mm	20719	20684

Adsorbosphere™ All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
Amino, 5µm	4.6 x 7.5mm	3	96044
C18, 5µm	4.6 x 7.5mm	3	96041
C18 HS, 5µm	4.6 x 7.5mm	3	96079
C18 UHS, 5µm	4.6 x 7.5mm	3	82181
C8, 5µm	4.6 x 7.5mm	3	96042
Cyano, 5µm	4.6 x 7.5mm	3	96047
Cyano-AQ, 5µm	4.6 x 7.5mm	3	96048
Phenyl, 5µm	4.6 x 7.5mm	3	96045
Silica, 5µm	4.6 x 7.5mm	3	96046
SAX, 5µm	4.6 x 7.5mm	3	96049
SCX, 5µm	4.6 x 7.5mm	3	96075
XL C18, 5µm	4.6 x 7.5mm	3	96088
XL C18-B, 5µm	4.6 x 7.5mm	3	96089
XL C8, 5µm	4.6 x 7.5mm	3	96090
XL C1, 5µm	4.6 x 7.5mm	3	96093
XL Silica, 5µm	4.6 x 7.5mm	3	96097
XL SAX, 5µm	4.6 x 7.5mm	3	96098
XL SCX, 5µm	4.6 x 7.5mm	3	96099
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

*All-Guard™ holder required. Other particle sizes available.

more info

Looking for Adsorbosil® columns?

Please visit www.discoverysciences.com.

Alltech® Allsphere™ Columns

Try Alltech's lower cost Allsphere™ columns as a replacement for Spherisorb® columns. If you are not satisfied with Allsphere™ as a direct replacement for your Spherisorb® applications, we will refund your money.

Allsphere™ HPLC Columns

Packing	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
ODS-1, 5µm	4.6 x 150mm	778441	778443
	4.6 x 250mm	778364	778357
ODS-2, 3µm	4.6 x 100mm	778487	778489
	4.6 x 150mm	778558	778560
ODS-2, 5µm	4.6 x 150mm	778545	778547
	4.6 x 250mm	778736	778738
C8, 3µm	4.6 x 100mm	778561	778563
	4.6 x 150mm	778609	778611
C8, 5µm	4.6 x 150mm	778571	778573
	4.6 x 250mm	778744	778746
C6, 5µm	4.6 x 150mm	778211	778217
	4.6 x 250mm	778223	778224
Phenyl, 5µm	4.6 x 150mm	778689	778691
	4.6 x 250mm	778752	778754
Cyano, 5µm	4.6 x 150mm	778713	778715
	4.6 x 250mm	778361	778362
Amino, 5µm	4.6 x 150mm	778739	778741
	4.6 x 250mm	778371	778372
Silica, 3µm	4.6 x 100mm	778382	778383
	4.6 x 150mm	778554	778556
Silica, 5µm	4.6 x 150mm	778389	778391
	4.6 x 250mm	778376	778377
SAX, 5µm	4.6 x 250mm	778765	778767
SCX, 5µm	4.6 x 250mm	778188	778189

Allsphere™ All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
ODS-1, 5µm	4.6 x 7.5mm	3	96402
ODS-2, 5µm	4.6 x 7.5mm	3	96403
C8, 5µm	4.6 x 7.5mm	3	96404
C6, 5µm	4.6 x 7.5mm	3	96405
Phenyl, 5µm	4.6 x 7.5mm	3	96406
Cyano, 5µm	4.6 x 7.5mm	3	96408
Amino, 5µm	4.6 x 7.5mm	3	96409
Silica, 5µm	4.6 x 7.5mm	3	96401
SAX, 5µm	4.6 x 7.5mm	3	96410
SCX, 5µm	4.6 x 7.5mm	3	96411
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

*All-Guard™ holder required. Other particle sizes available.

analytical hplc

Grom™ Sil Columns

High-Quality, Wide Variety, HPLC Columns for All Types of Applications

- Highly consistent manufacturing for excellent reproducibility
- 40 different phases to choose from, general purpose to specialty phases
- Wide range of particle sizes from sub 2µm to 10µm
- Available in nano to preparative column formats



High purity spherical silica with high and universal selectivity for broad range of applications. Different phases and bonding technologies give you the power and flexibility

ST = standard bonding with endcapping—high-quality universal column

NE = not endcapped—high polar selectivity

HE = hydrophilic endcapping—increased polar selectivity; pH-stable at high pH, high carbon load and very low silanol activity

CP = possibility to work at high pH

FE = Fully endcapped—maximum silica coverage

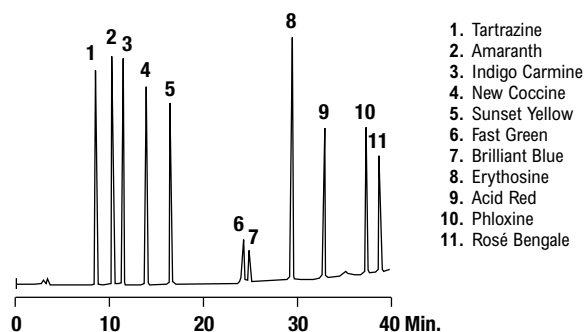
PA = Cross-linked polyamino—better stability

pH = pH stable—use mobile phases up to pH 11

Grom™ Sil Phase Specifications

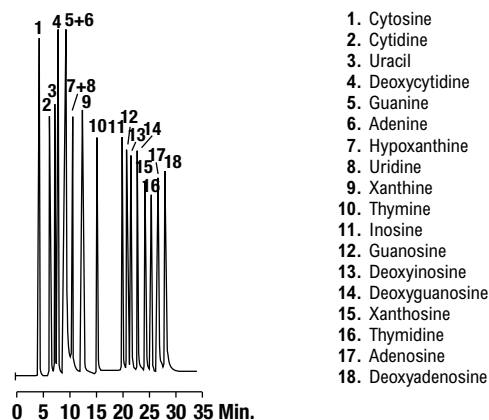
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	End-capped?	USP L-code
ODS-3 CP (encapsulated)	Silica	Spherical	3, 5, 7, 10µm	120, 300Å	320, 170m²/g	15, 6%	Polymeric	No	L1
ODS-4 HE (hydrophilic endcapping)	Silica	Spherical	3, 4, 5, 7, 10µm	120, 200Å	300, 200m²/g	16, 11%	Monomeric	Yes	L1
ODS-5 ST (standard)	Silica	Spherical	3, 4, 5, 7, 10µm	60, 120, 200Å	580, 300, 200m²/g	22, 17, 12%	Monomeric	Yes	L1
ODS-7 pH (pH-stable)	Silica	Irregular	4µm	80Å	510m²/g	22%	Polymeric	No	L1
Octyl-5 CP (encapsulated)	Silica	Spherical	3, 5, 7, 10µm	120, 300Å	320, 170m²/g	10, 5.5%	Polymeric	No	L7
Phenyl-1 FE (fully endcapped)	Silica	Spherical	3, 5, 10µm	120, 300Å	300, 150m²/g	9, 5%	Monomeric	Yes	L11
Phenyl-2 CP (encapsulated)	Silica	Irregular	5µm	120, 300Å	320, 170m²/g	7, 4%	Polymeric	No	L11
Cyano-3 CP (encapsulated)	Silica	Spherical	5µm	120Å	320m²/g	4%	Polymeric	No	—
Amino-2 PA (Crs linked Poly-NH)	Silica	Spherical	5µm	120Å	300m²/g	—	Polymeric	No	L8
Diol	Silica	Spherical	5, 10µm	60, 120, 200Å	580, 300, 200m²/g	—	Monomeric	No	L20

Color Additives—Dyes



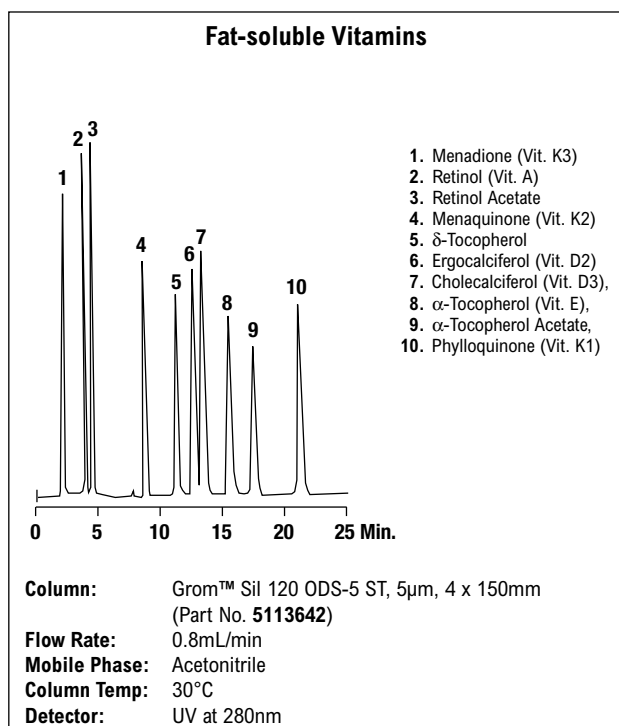
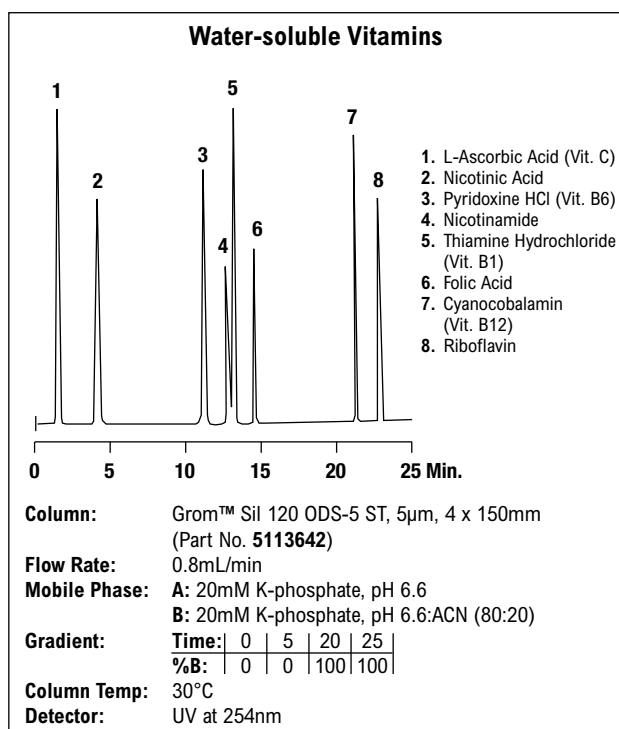
Column: Grom™ Sil 120 ODS-5 ST, 5µm, 4 x 150mm
Flow Rate: 0.8mL/min
Mobile Phase: A: 10mM NH₄-phosphate, pH 6.0:MeOH (90:10)
B: 10mM NH₄-phosphate, pH 6.0:MeOH (20:30)
Gradient: 0–100% B (0–40min, linear), 100% B (40–60min)
Column Temp: 30°C
Detector: UV at 254nm

Nucleosides and Bases



Column: Grom™ Sil 120 ODS-5 ST, 5µm, 4 x 250mm
Flow Rate: 0.5mL/min
Mobile Phase: A: 20mM NH₄-acetate, pH 3.5
B: 20mM NH₄-acetate, pH 3.5:MeOH (90:10)
Gradient: Time: 0 | 5 | 13 | 40
%B: 30 | 30 | 100 | 100
Detector: UV at 260nm, 0.08 AUFS

Grom™ Sil Columns



more applications

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



Grom™ Sil Columns

Packing	Format	i.d. x Length	Part No.
ODS-3 CP, 3μm	Microbore	1 x 60mm	5115722
	Microbore	2 x 125mm	5115672
	Microbore	2 x 250mm	5117056
	Solvent Reducer	3 x 60mm	5113597
	Solvent Reducer	3 x 100mm	5117398
	Solvent Reducer	3 x 150mm	5113602
	Analytical	4 x 60mm	5113598
	Analytical	4.6 x 150mm	5117003
ODS-3 CP, 5μm	Solvent Reducer	3 x 125mm	5113604
	Analytical	4 x 125mm	5115479
	Analytical	4.6 x 250mm	5113609
ODS-4 HE, 10μm	Analytical	4.6 x 250mm	5116144
ODS-4 HE, 3μm	Capillary	0.3 x 150mm	5118148
	Microbore	1 x 50mm	5116060
	Microbore	1 x 150mm	5113619
	Microbore	2 x 100mm	5115975
	Microbore	2 x 125mm	5116880
	Microbore	2 x 150mm	5114808
	Analytical	4 x 50mm	5118892
	Analytical	4 x 60mm	5117386
	Analytical	4 x 125mm	5113618
	Analytical	4.6 x 125mm	5117572
	Capillary	0.1 x 150mm	5117667
	Capillary	0.2 x 250mm	5119092
	Capillary	0.5 x 250mm	5118525
	Microbore	2 x 125mm	5113623
ODS-4 HE, 5μm	Microbore	2 x 150mm	5116012
	Solvent Reducer	3 x 150mm	5117727
	Analytical	4 x 125mm	5115808
	Analytical	4 x 250mm	5113626
	Analytical	4.6 x 150mm	5116777
	Microbore	2 x 60 mm	5117044
	Microbore	2 x 150mm	5118335
	Microbore	2 x 250mm	5116342
ODS-5 ST, 3μm	Analytical	4 x 125mm	5116219
	Analytical	4 x 150mm	5113642
	Analytical	4 x 250mm	5113646
	Analytical	4.6 x 250mm	5113647
ODS-5 ST, 5μm	Capillary	0.3 x 250mm + 10mm Guard Column	5119756
	Microbore	1 x 50mm	5118213
	Microbore	2 x 40mm	5115266
	Solvent Reducer	3 x 150mm	5116956
	Analytical	4.6 x 125mm	5113654
Octyl-5 HE, 3μm	Analytical	4.6 x 150mm	5115840
	Analytical	4.6 x 250mm	5113265
Octyl-5 CP, 5μm	Microbore	2 x 250mm	5117325
	Analytical	4 x 150mm	5117565
Phenyl-1 FE, 5μm	Microbore	2 x 100mm	5113695
	Analytical	4 x 250mm	5113696
Phenyl-2 CP, 5μm	Analytical	4 x 250mm	5116429
Cyano-3 CP, 5μm	Microbore	2 x 125mm	5117410
	Analytical	4.6 x 60mm	5116441
Amino-2 PA, 5μm	Microbore	2 x 250mm	5115469
	Analytical	4 x 250mm	5113466
	Analytical	4.6 x 250mm	5115306
Diol, 5μm	Microbore	2 x 100mm	5117476

more info

For large molecule columns, refer to page 84–97.

analytical hplc

Grom™ Sapphire Column

High Purity for Optimal Performance of Challenging Separations

- Excellent peak shape—Highly symmetrical peaks from high purity silica base
- High speed and high capacity—Range of pore sizes and surface area for improved speed
- Optimized for consistent flow—critical in low volume applications
- Variety of column formats—1.5, 3, and 5µm particles

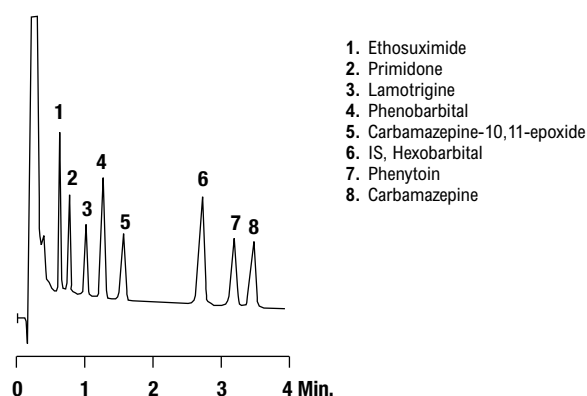


Sapphire Phase Specifications

Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18	Silica	Spherical	3, 5, 10µm	65, 110Å	500, 270m ² /g	23, 16%	Monomeric	Yes	L1
C8	Silica	Spherical	3, 5, 10µm	65, 110Å	500, 270m ² /g	15, 10%	Monomeric	Yes	L7
C4*	Silica	Spherical	3, 5, 10µm	65, 110Å	500, 270m ² /g	10.5, 7%	Monomeric	Yes	L26
Silica*	Silica	Spherical	3, 5, 10µm	65, 110Å	500, 270m ² /g	—	—	No	L3

*Columns available upon request.

Separation of Antiepileptics

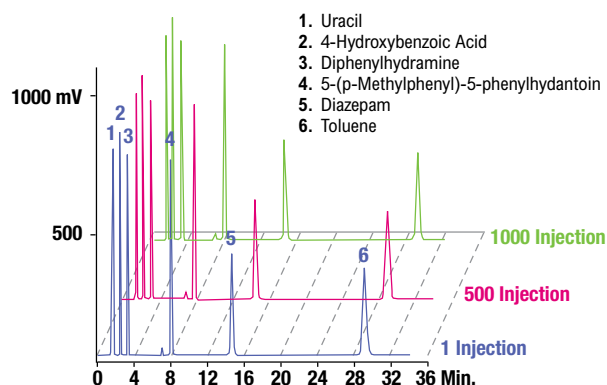


Column: Grom™ Sapphire 110 C18, 5µm, 4 x 53mm (Part No. 5117499)
Flow Rate: 1.5mL/min
Mobile Phase: 50mM Na-phosphate, pH 6.5:MeOH:ACN (62:23:15)
Detector: UV at 204nm

Sapphire HPLC Columns

Packing	i.d. x Length	Part No.
C18, 3µm	0.030 x 150mm	5119303
	0.075 x 150mm	5133239
	0.100 x 100mm	5135280
C18, 5µm	4 x 53mm	5117499
	4 x 125mm	5117505
C8, 5µm	2 x 250mm	5118934

Stability of Grom™ Sapphire Packings (Daldrup)



Column: Grom™ Sapphire 110 C18, 5µm, 4 x 125mm (Part No. 5117505)
Flow Rate: 1mL/min
Mobile Phase: 50mM Na-phosphate, pH 2.3:ACN (58:42)
Column Temp: RT
Detector: UV at 230nm

technical assistance

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

related products

Looking for HPLC column prefilters? See page 111.



related products

Need high-pressure polymeric fittings? See pages 112–114 for our full selection of high-pressure fittings.

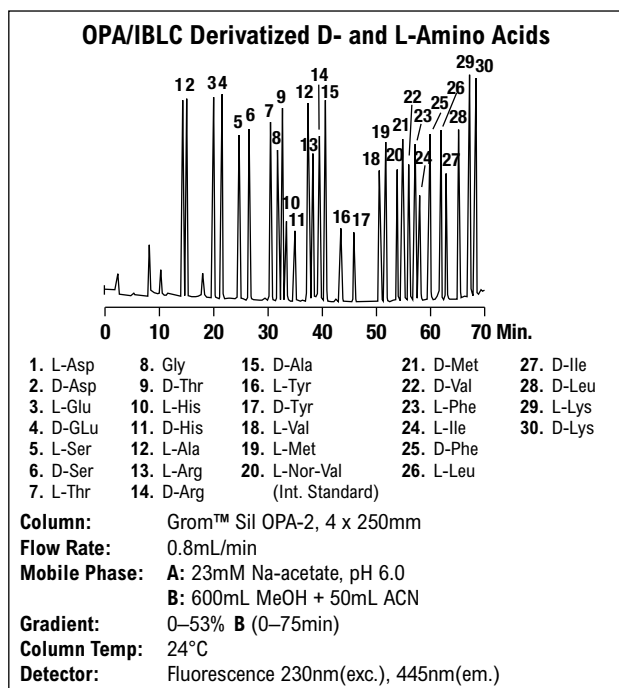


6673

Grom™ Amino Acid Column Kits

Amino Acid Analysis by Precolumn Derivatization Using OPA/IBLC

- High resolution (both optical antipodes of all protein amino acids in a single chromatogram)
- Outstandingly high sensitivity (fMol)
- Extraordinarily long lifetimes of columns

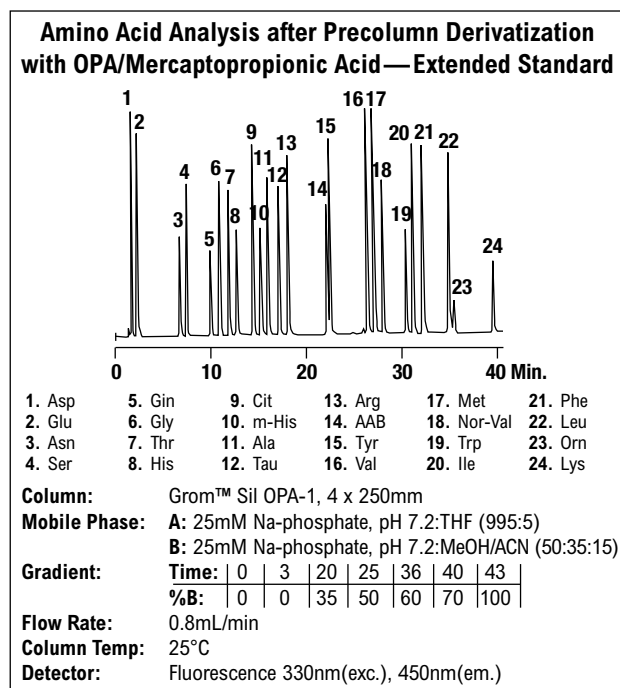


OPA/IBLC Kit

Description	Part No.
Complete kit includes 4.0mm i.d. x 250mm length column, OPA/IBLC derivitization reagents, and detailed working instructions.	987.0000

Amino Acid Analysis by Precolumn Derivatization With OPA/3-MPA

- Highest sensitivity (5–10fMol)
- Short analysis time
- Fully automated derivatization
- Best resolution



OPA/3-MPA Kit

Description	Part No.
Complete kit includes 4.6mm i.d. x 150mm length column, OPA/3-MPA derivitization reagents, and detailed working instructions.	980.0000

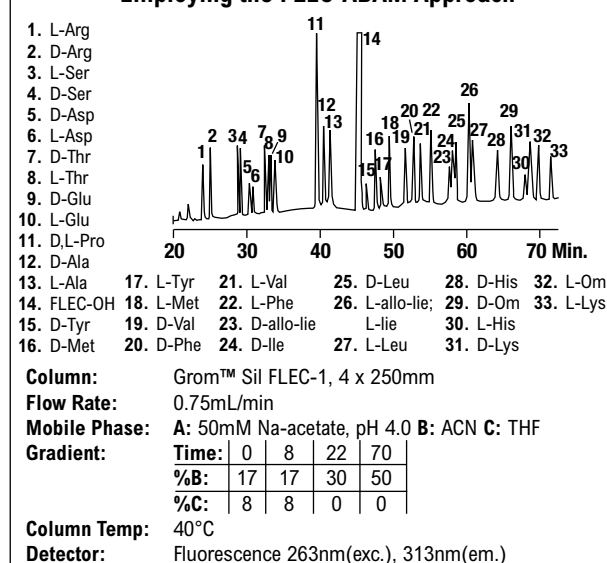
Amino Acid Analysis by Precolumn Derivatization Using FLEC/ADAM

- High resolution and high sensitivity
- Rapid, automated or manual derivatization
- Primary and secondary amines
- Stable derivatives

FLEC/ADAM Kit

Description	Part No.
Complete kit includes 4.0mm i.d. x 250mm length column, FLEC/ADAM derivitization reagents, and detailed working instructions.	984.0000

Separation of a D-, L-Amino Acid Standard by HPLC Employing the FLEC-ADAM Approach



analytical hplc

Jones Genesis® Columns

Genesis® columns use a new generation adsorbent based on high-purity metal-free 120Å spherical silica. Particle size offering includes 3, 4, 7, and 15µm. Genesis® columns exhibit excellent peak symmetry and exceptional pH stability from 1 to 10.

JONES

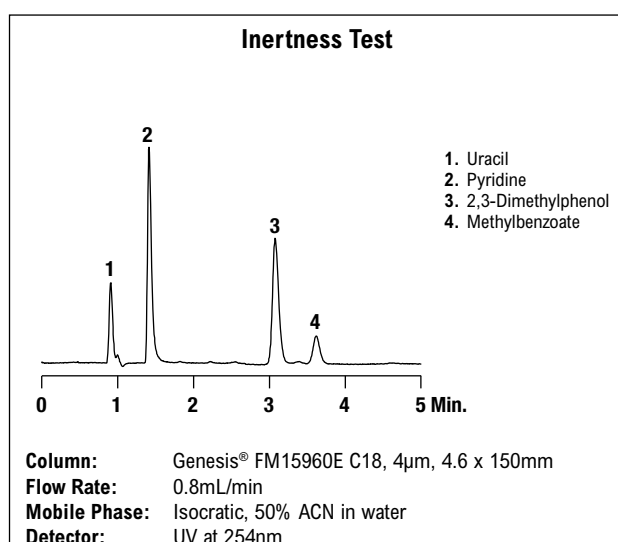


Genesis® Phase Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18	Silica	Spherical	3, 4, 7, 15µm	120Å	300m ² /g	18%	Monomeric	Yes	L1
AQ	Silica	Spherical	4, 7µm	120Å	300m ² /g	15%	Monomeric	Yes	L1
C8	Silica	Spherical	3, 4, 7, 15µm	120Å	300m ² /g	11%	Monomeric	No	L7
C8e/c	Silica	Spherical	3, 4, 7, 15µm	120Å	300m ² /g	11%	Monomeric	Yes	L7
C4	Silica	Spherical	4µm	120Å	300m ² /g	6.3%	Monomeric	Yes	L26
Phe	Silica	Spherical	4µm	120Å	300m ² /g	9.4%	Monomeric	Yes	L11
CN	Silica	Spherical	3, 4µm	120Å	300m ² /g	7%	Monomeric	Yes	L10
Amino (NH ₂)	Silica	Spherical	3, 4µm	120Å	300m ² /g	3.5%	Polymeric	No	L8
Carbohydrate	Silica	Spherical	4µm	120Å	300m ² /g	—	Monomeric	—	—
CN-TCA	Silica	Spherical	4µm	120Å	300m ² /g	7%	Monomeric	Yes	—
Petro-XP	Silica	Spherical	4µm	120Å	300m ² /g	—	Monomeric	—	—
Silica	Silica	Spherical	3, 4, 7, 15µm	120Å	300m ² /g	n/a	n/a	n/a	L3

Genesis® C18 Reversed Phase

- Excellent peak symmetry
- Exceptional stability from pH 1 to 10
- Reduced need for mobile-phase modifiers
- Long column life

Genesis® C18 bonding is monomeric. A unique proprietary end-capping reagent, which is less prone to acid hydrolysis than trimethylsilane, provides freedom from residual silanols and enhanced stability under low-pH operating conditions. Genesis® C18 columns also exhibit superior stability at alkaline pH. The permissible operating range is pH 1–10.

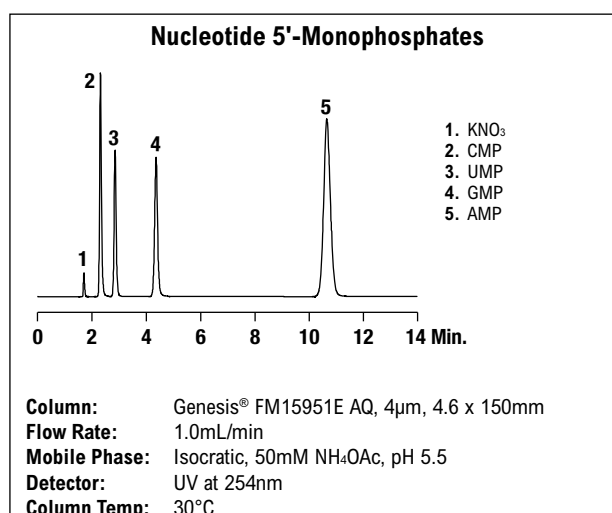


Genesis® AQ Reversed Phase

- Designed for separating hydrophilic and polar compounds
- Stable retention times in 100% aqueous mobile phases
- Rapid equilibration
- Unique reversed-phase selectivity

The Genesis® AQ adsorbent employs an optimum ratio of C18, short (non-TMS) chains, and polar surface groups bonded to high-purity 120Å silica to allow rapid equilibration and provide consistent, reproducible chromatography with stable retention times in 100% aqueous eluents.

Retention on Genesis® AQ is greater for polar analytes but lower for non-polar compounds compared to Genesis® C18. Uracil, which is typically an unretained peak on C18 columns, is well retained on the Genesis® AQ adsorbent. Acids and bases exhibit good peak shapes. Although Genesis® AQ excels with water-rich mobile phases, it can also be used in gradient and isocratic modes with a full spectrum of mobile phases.



Jones Genesis® Columns

Genesis® C8(EC) Reversed Phase

- Excellent peak symmetry
- Exceptional stability from pH 1 to 10
- Reduced need for mobile-phase modifiers
- Long column life

C8(EC) is double-bonded before fully endcapped using a unique proprietary end-capping reagent. It is less prone to acid hydrolysis than trimethylsilane, which provides freedom from residual silanols and enhanced stability under low-pH operating conditions. The bonding is monomeric. Genesis® C8(EC) columns exhibit superior stability at alkaline pH.

Genesis® C8 Reversed Phase

- Non-endcapped
- Suitable for lower pH separations

Genesis® C8 bonding is monomeric. They are suitable for separations under lower pH conditions and may offer selectivity advantages for some samples.

Genesis® Phenyl

- Unique reversed-phase chemistry
- Improve the chromatography of polar aromatic, fatty acids, and basic pharmaceuticals

Genesis® Phenyl columns provide impressive peak symmetry for both acidic and basic compounds.

Genesis® Columns							Genesis® Guards ¹		
	Length:	30mm	50mm	100mm	150mm	200mm	250mm	10mm	20mm
Genesis® AQ									
4µm	1.0mm i.d.	—	FJ5951E	FJ10951E	FJ15951E	—	FJ25951E	FJ1951-2	—
	2.1mm i.d.	FK3951E	FK5951E	FK10951E	FK15951E	FK20951E	FK25951E	FK1951-2	FK2951-2
	3.0mm i.d.	FL3951E	FL5951E	FL10951E	FL15951E	—	FL25951E	FL1951-2	FL2951-2
	4.0mm i.d.	FH3951E	FH5951E	FH10951E	FH15951E	—	FH25951E	FH1951-2	FH2951-2
	4.6mm i.d.	FM3951E	FM5951E	FM10951E	FM15951E	FM20951E	FM25951E	—	—
Genesis® C18									
3µm	1.0mm i.d.	—	FJ5963E	FJ10963E	FJ15963E	—	FJ25963E	FJ1963-2	—
	2.1mm i.d.	FK3963E	FK5963E	FK10963E	FK15963E	FK20963E	FK25963E	FK1963-2	FK2963-2
	3.0mm i.d.	FL3963E	FL5963E	FL10963E	FL15963E	—	FL25963E	—	—
	4.0mm i.d.	FH3963E	FH5963E	FH10963E	FH15963E	—	FH25963E	FH1963-2	FH2963-2
	4.6mm i.d.	FM3963E	FM5963E	FM10963E	FM15963E	FM20963E	FM25963E	—	—
4µm	1.0mm i.d.	—	FJ5960E	FJ10960E	FJ15960E	—	FJ25960E	FJ1960-2	—
	2.1mm i.d.	FK3960E	FK5960E	FK10960E	FK15960E	FK20960E	FK25960E	FK1960-2	FK2960-2
	3.0mm i.d.	FL3960E	FL5960E	FL10960E	FL15960E	—	FL25960E	FL1960-2	FL2960-2
	4.0mm i.d.	FH3960E	FH5960E	FH10960E	FH15960E	—	FH25960E	FH1960-2	FH2960-2
	4.6mm i.d.	FM3960E	FM5960E	FM10960E	FM15960E	FM20960E	FM25960E	—	—
Genesis® C8									
3µm	1.0mm i.d.	—	FJ5968E	FJ10968E	FJ15968E	—	FJ25968E	FJ1968-2	—
	2.1mm i.d.	FK3968E	FK5968E	FK10968E	FK15968E	FL20968E	FK25968E	FK1968-2	FK2968-2
	3.0mm i.d.	FL3968E	FL5968E	FL10968E	FL15968E	—	FL25968E	FL1968-2	FL2968-2
	4.0mm i.d.	FH3968E	FH5968E	FH10968E	FH15968E	—	FH25968E	FH1968-2	FH2968-2
	4µm	1.0mm i.d.	—	FJ5962E	FJ10962E	FJ15962E	—	FJ25962E	FJ1962-2
2.1mm i.d.		FK3962E	FK5962E	FK10962E	FK15962E	FK20962E	FK25962E	FK1962-2	FK2962-2
3.0mm i.d.		FL3962E	FL5962E	FL10962E	FL15962E	—	FL25962E	FL1962-2	FL2962-2
4.0mm i.d.		FH3962E	FH5962E	FH10962E	FH15962E	—	FH25962E	FH1962-2	FH2962-2
4.6mm i.d.		FM3962E	FM5962E	FM10962E	FM15962E	FM20962E	FM25962E	—	—
Genesis® C8(EC)									
3µm	1.0mm i.d.	—	FJ5969E	FJ10969E	FJ15969E	—	FJ25969E	FJ1969-2	—
	2.1mm i.d.	FK3969E	FK5969E	FK10969E	FK15969E	FK20969E	FK25969E	FK1969-2	FK2969-2
	3.0mm i.d.	FL3969E	FL5969E	FL10969E	FL15969E	—	FL25969E	FL1969-2	FL2969-2
	4.0mm i.d.	FH3969E	FH5969E	FH10969E	FH15969E	—	FH25969E	FH1969-2	FH2969-2
	4.6mm i.d.	FM3969E	FM5969E	FM10969E	FM15969E	FM20969E	FM25969E	—	—
4µm	1.0mm i.d.	—	FJ5964E	FJ10964E	FJ15964E	—	FJ25964E	FJ1964-2	—
	2.1mm i.d.	FK3964E	FK5964E	FK10964E	FK15964E	FK20964E	FK25964E	FK1964-2	FK2964-2
	3.0mm i.d.	FL3964E	FL5964E	FL10964E	FL15964E	—	FL25964E	FL1964-2	FL2964-2
	4.0mm i.d.	FH3964E	FH5964E	FH10964E	FH15964E	—	FH25964E	FH1964-2	FH2964-2
	4.6mm i.d.	FM3964E	FM5964E	FM10964E	FM15964E	FM20964E	FM25964E	—	—
Genesis® Phenyl									
4µm	1.0mm i.d.	—	FJ5980E	FJ10980E	FJ15980E	—	FJ25980E	FJ1980-2	—
	2.1mm i.d.	FK3980E	FK5980E	FK10980E	FK15980E	FK20980E	FK25980E	FK1980-2	FK2980-2
	4.0mm i.d.	FH3980E	FH5980E	FH10980E	FH15980E	—	FH25980E	FH1980-2	FH2980-2
	4.6mm i.d.	FM3980E	FM5980E	FM10980E	FM15980E	FM20980E	FM25980E	FH1980-2	FH2980-2

NOTE: Genesis® line is completed by additional phases such as Silica, Phenyl, Cyano, and Amino, for details please check online at www.discoverysciences.com.

¹All Genesis® guards listed are cartridges and require either a stand-alone holder or direct-connect holder for use. Guard cartridges are 2/pk.

Guard Cartridge Holders for Genesis® and Apex™ Guards

	10 mm Stand-Alone	20 mm Stand-Alone	10 mm Direct-Connect	20 mm Direct-Connect
1.0 mm i.d.	F91GPH	—	—	—
2.1 mm i.d.	F9111P	F9112P	F9141P	—
3.0, 4.0, 4.6 mm i.d.	F9111P	F9112P	F9151P	F9152P

Jones Apex™ Reversed-Phase Columns

JONES

Economical Column Line with Maximum Reproducibility and Efficiency

- Conventional 100Å pore size spherical silica
- Uniform-sized particle
- Narrow particle distribution
- Controlled surface area



Apex™ Phase Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
ODS	Silica	Spherical	3, 5, 10µm	100Å	170m ² /g	10%	Polymeric	Yes	L1
ODS II	Silica	Spherical	3, 5µm	100Å	170m ² /g	10.5%	Monomeric	Yes	L1
C8	Silica	Spherical	3, 5µm	100Å	170m ² /g	7%	Monomeric	No	L7
C8(EC)	Silica	Spherical	3, 5µm	100Å	170m ² /g	7%	Monomeric	Yes	L7
C1	Silica	Spherical	3, 5µm	100Å	170m ² /g	2.5%	Monomeric	Yes	L13
Diol	Silica	Spherical	3, 5µm	100Å	170m ² /g	3.5%	Monomeric	No	
Phe	Silica	Spherical	3, 5µm	100Å	170m ² /g	3%	Monomeric	Yes	L11
CN	Silica	Spherical	3, 5µm	100Å	170m ² /g	4%	Monomeric	No	L10
Amino (NH ₂)	Silica	Spherical	3, 5µm	100Å	170m ² /g	2%	Monomeric	No	L8
Amino II (NH ₂)	Silica	Spherical	3, 5µm	100Å	170m ² /g	2%	Monomeric	No	L8
Carbohydrate	Silica	Spherical	5µm	100Å	170m ² /g	—	Monomeric	Proprietary	—
Silica	Silica	Spherical	3, 5, 10µm	100Å	170m ² /g	n/a%	n/a	No	L3

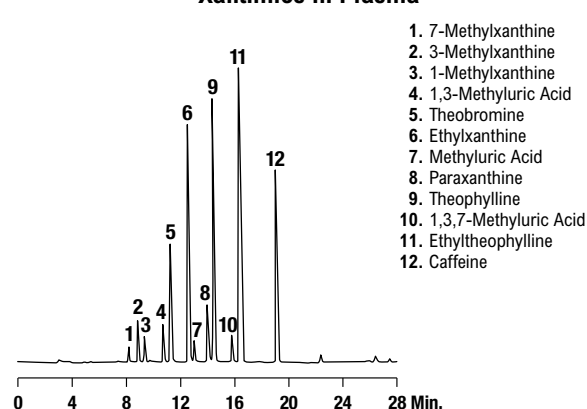
Apex™ HPLC Columns

Packing	Format	i.d. x Length	Part No.
ODS, 3µm	Analytical	4.6 x 50mm	5110394
ODS, 5µm	Analytical	4.6 x 30mm	5109740
	Analytical	4.6 x 50mm	5140902
	Analytical	4.6 x 150mm	5140900
	Analytical	4.6 x 250mm	5140901
ODS II, 3µm	Analytical	4.6 x 100mm	5110994
	Analytical	4.6 x 250mm	5111025
ODS II, 5µm	Analytical	4.6 x 50mm	5109944
	Analytical	4.6 x 100mm	5112992
	Analytical	4.6 x 150mm	5109730
	Analytical	4.6 x 250mm	5109733
C8, 5µm	Analytical	4.6 x 30mm	5112351
	Analytical	4.6 x 150mm	5109921
	Analytical	4.6 x 250mm	5109734
C8(EC), 5µm	Analytical	4.6 x 30mm	5112354
	Analytical	4.6 x 250mm	5109735
Diol, 5µm	Analytical	4.6 x 150mm	5120721
Phenyl, 5µm	Analytical	4.6 x 100mm	5110997
	Analytical	4.6 x 150mm	5110650
	Analytical	4.6 x 250mm	5109934
Cyano, 5µm	Analytical	4.6 x 250mm	5109737
Cyano II, 5µm	Analytical	4.6 x 250mm	5109933
Amino, 5µm	Analytical	4.6 x 150mm	5112313
	Analytical	4.6 x 250mm	5111029
Amino II, 3µm	Analytical	4.6 x 150mm	5111004
Silica, 3µm	Analytical	4.6 x 150mm	5109698
Silica, 5µm	Analytical	4.6 x 250mm	5110044
	Analytical	4.6 x 250mm	5111024

Apex™ Guard Columns

Packings	i.d. x Length	Part No.
ODS, 5µm	4 x 10mm	5110703
ODS II, 5µm	4 x 20mm	5110705
C8, 5µm	4 x 20mm	5112454
C8-EC, 5µm	4 x 10mm	5112425
Cyano, 5µm	4 x 10mm	5111079
Amino, 5µm	4 x 10mm	5111078
	4 x 20mm	5112455
Guard Cartridge Holder	10mm	F9111P
	20mm	F9112P

Xanthines in Plasma



Column: Apex™ ODS II, C18, 5µm, 4.6 x 250mm
Flow Rate: 0.8mL/min
Mobile Phase: A: 10 mM NaOAc, 0.02% THF
B: 10 mM NaOAc, 2.7% THF, 25% ACN
Gradient: Time: 0 | 35
% B: 0 | 70
Column Temp: 50°C
Detector: UV at 273nm

more applications

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



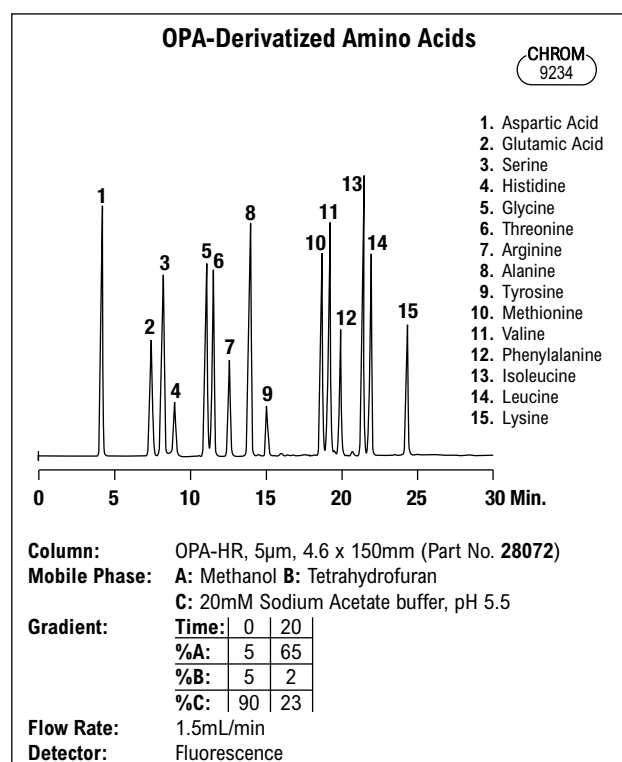
Alltech® OPA Amino Acid Columns

- OPA-HS for high-speed with protein hydrolysates
- OPA-HR for high-resolution with physiological samples

OPA-HS (high-speed) columns are ideal for the study of protein acid hydrolysates with very simple mobile-phase systems.

OPA-HR (high-resolution) columns are ideal for applications that require more resolution than simple hydrolysates.

OPA-HR gives baseline separation of most amino acids found in physiological fluids.



OPA Amino Acid HPLC Columns

Packing	Format	i.d. x Length	Part No.
OPA-HS, 5 μ m	Analytical	4.6 x 100mm	28064
OPA-HR, 5 μ m	Analytical	4.6 x 150mm	28072

Derivatization Reagents

Description	Qty.	Part No.
OPA Crystals	5g	35606

more info

For related products, see our Vydac® line of Life Science columns on pages 85–95.



7110

Alltech® Catecholamine Columns

- For routine analysis of indoles and catecholamines
- Reliable and inexpensive

With this column, easily resolve catecholamines under isocratic conditions at room temperature. A simple monochloroacetic acid mobile phase with varying amounts of sodium octyl sulfate and disodium EDTA controls the elution profile.

Catecholamine HPLC Columns

Packing	Format	i.d. x Length	Part No.
Catecholamine, 3 μ m	Analytical	4.6 x 100mm	28916

All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
Catecholamine, 3 μ m	4.6 x 7.5mm	3	96076
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

*All-Guard™ holder required.

Alltech® Nucleotide-Nucleoside Columns

- Determine both nucleotides and nucleosides with a single column

With this column, separate seven common nucleosides or twelve common nucleotides using a buffer/methanol/tetrabutyl ammonium phosphate gradient.

Nucleotide-Nucleoside HPLC Columns

Packing	Format	i.d. x Length	Part No.
Nucleotide-Nucleoside, 7 μ m	Analytical	4.6 x 250mm	35623

All-Guard™ Cartridges*

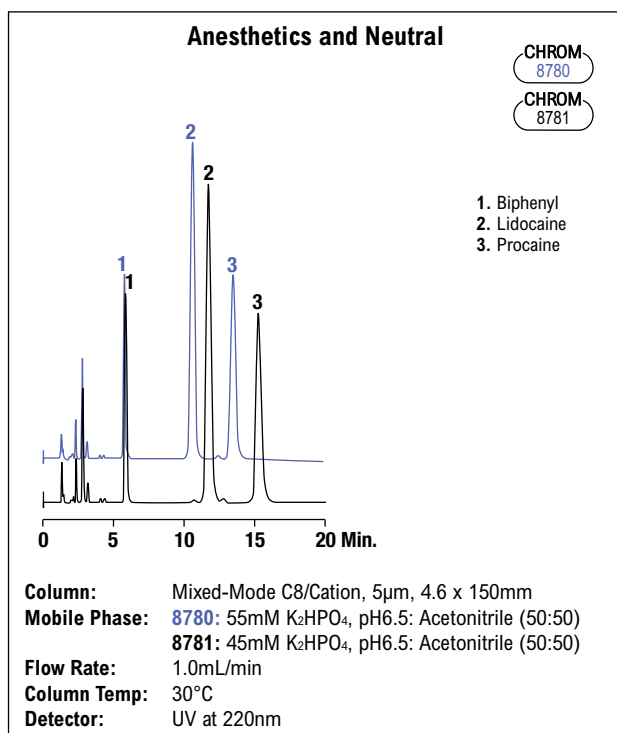
Packing	i.d. x Length	Qty.	Part No.
Nucleotide-Nucleoside, 7 μ m	4.6 x 7.5mm	3	96077
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

*All-Guard™ holder required.

analytical hplc

Alltech® Mixed-Mode Columns

- Separate hydrophobic and ionic species on a single column
- Control ionization with buffer adjustments instead of ion-pair reagents



Changing the buffer concentration affects the capacity of the cationic components lidocaine and procaine, but does not affect the capacity of biphenyl, a neutral component.

Mixed-Mode HPLC Columns

Packing	Format	i.d. x Length	Part No.	Waters® Fittings Part No.
C8/Anion, 7µm	Analytical	4.6 x 150mm	71354	71355
	Analytical	4.6 x 250mm	12369	12370
C8/Cation, 5µm	Analytical	4.6 x 150mm	72568	72569
	Analytical	4.6 x 250mm	71364	71365
C18/Cation, 5µm	Analytical	4.6 x 150mm	72574	72575
	Analytical	4.6 x 250mm	71369	71370

Mixed-Mode All-Guard™ Cartridges*

Packing, 5µm	i.d. x Length	Qty.	Part No.
C8/Anion	4.6 x 7.5mm	3	96147
C8/Cation	4.6 x 7.5mm	3	71379
C18/Cation	4.6 x 7.5mm	3	71380
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

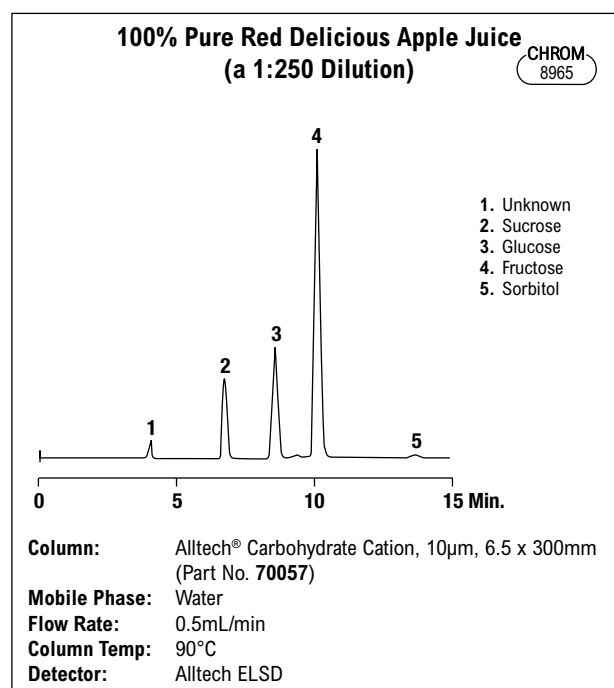
*All-Guard™ holder required. Other particle sizes available.

Alltech® Carbohydrate Cation Columns

- High efficiency separations using only water as the mobile phase
- Sulfonated polystyrene resin in the calcium form
- Column heating required



7110



Carbohydrate Cation HPLC Columns

Packing	Format	i.d. x Length	Part No.
Carbohydrate Cation, 10µm	Analytical	6.5 x 300mm	70057

Carbohydrate Cation All-Guard™ Cartridges

Packing	i.d. x Length	Qty.	Part No.
Carbohydrate Cation Guard Cartridges	4.6 x 7.5mm	3	96109
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)			80101

*All-Guard™ holder required.

more info

For Alltech® Prevail™ Carbohydrate ES columns, see page 47.

related product

Need a column heater?

See pages 16 and 17.



6219

related product

Doing carbohydrate analysis?

Alltech® 3300 ELSD is more sensitive than RI. See pages 5–10.



6947B

Vydac® Venture® Immunoaffinity Columns

Repetitive-Use, Silica-Based Immunoaffinity Columns

Venture® immunoaffinity HPLC columns provide an easy and quick way to purify and concentrate analytes from complex food, environmental, and biological matrices for fast, accurate measurement.

Vydac® Venture® immunoaffinity columns use ICEtech™ (*Inert Coating Enhancement Technology*, U.S. Patent No. 6,802,966) silica processing to eliminate non-specific binding on the silica surface. This enables Venture® columns to be the first affinity matrix to take advantage of silica's rigid porous structure, making direct coupling of the columns with other modes of chromatography, such as reversed-phase HPLC feasible.



Benefits	Features
Rapid Analysis	- No laborious sample preparation procedures - Fast binding kinetics - Wide-pore silica support allows on-line coupling with HPLC for real time direct analysis
Excellent Accuracy and Precision	- Quantitative recovery of analyte from IAC column - High sensitivity due to high volume injection - Precision comparable with conventional HPLC methods
Highly Selective	- Specially treated wide-pore silica eliminates non-specific interactions - Secondary separation reduces errors due to cross reactivity - Highly selective antibodies toward target analyte
Long Column Lifetime	Analyze over 200 samples on a single column without column deterioration due to the high ligand stability of the Venture® IAC columns
Analysis of Difficult Matrices	Venture® IAC columns isolate, concentrate and purify targeted sample components from dilute and complex matrices in one step
Significant Cost Reductions	- Costs reduced by as much as 90% - Long column lifetime decreases material costs to less than \$5.00 per analysis - Rapid analysis and automation reduces technician time - Significant reduction in solvent use - Less solvent waste disposal costs
Automated Analysis	HPLC format allows automation for high sample throughput

Venture® Immunoaffinity Columns

Product Name	Target Analyte	i.d. and length	Part No.
<i>Mycotoxins Analysis</i>			
Venture® AF	Aflatoxin	2.1 x 50mm	5120313
Venture® OT	Ochratoxin A	2.1 x 50mm	5135954
<i>Food Nutrient Analysis</i>			
Venture® FA	Folic Acid	2.1 x 50mm	5135952
Venture® B12	Vitamin B ₁₂	2.1 x 50mm	5120201
Venture® BF	Folic Acid and Vitamin B ₁₂	2.1 x 50mm	5135951
<i>Acrylamide Analysis</i>			
Venture® AC	Acrylamide	2.1 x 50mm	5135953
<i>Lactoferrin Analysis</i>			
Venture® LTF	Lactoferrin	2.1 x 50mm	5120400
<i>Endocrine Disruptors Analysis</i>			
Venture® EE2	17α-Ethynyl Estradiol	2.1 x 50mm	5120404
Venture® E2	17β-Estradiol	2.1 x 50mm	5120403
Venture® E1	Estrone	2.1 x 50mm	5120405
Venture® BPA	Bisphenol A	2.1 x 50mm	5120406
<i>Pollutants Analysis</i>			
Venture® CPA	Chlorophenoxy Acetic Acid Herbicides	2.1 x 50mm	5120407
Venture® PVH	Phenylurea Herbicides	2.1 x 50mm	5120408
Venture® OPP	Organophosphorous Pesticides	2.1 x 50mm	5120410
Venture® VCZ	Vinclozolin Fungicide	2.1 x 50mm	5120411
<i>Steroid Hormones Analysis</i>			
Venture® TT	Testosterone	2.1 x 50mm	5120401
Venture® NT	Nortestosterone	2.1 x 50mm	5120402

Vydac® Denali® C18 Reversed Phase

Denali® columns contain a new-generation silica-based 120Å monomeric C18 adsorbent based on the same bonding technology employed in Vydac® Everest® 300Å columns. This new technology improves C18 surface coverage and deactivates residual silanols. Previously, the best monomeric C18 chemistries had carbon coverage in the 2.8 to 3.6µmol/m² range. Denali® C18 has coverage in excess of 4µmol/m² and approximates the theoretical limit based on surface area.

VYDAC



Vydac® Denali® C18 Reversed-Phase 238DE C18

Particle Size	Columns					Recommended Guards	
	i.d.	50mm	100mm	150mm	250mm	Guard Kit ¹	Guard Cartridge ²
3µm	2.1mm ³	238DE3205	238DE3210	—	—	—	—
	4.6mm ³	238DE3405	238DE3410	—	—	238GK34DE	238GD34DE
5µm	1.0mm ³	238DE5105	238DE5110	238DE5115	238DE51	238GK51DE	238GD51DE
	2.1mm ³	238DE5205	238DE5210	238DE5215	238DE52	238GK52DE	238GD52DE
	4.6mm ³	238DE5405	238DE5410	238DE5415	238DE54	238GK54DE	238GD54DE

NOTE: Additional column diameters and lengths are available on request. Please contact Grace Davison Discovery Sciences to discuss your requirements.

¹A guard kit includes a holder and one guard cartridge. ²Guard cartridge units include two guard cartridges. ³Titanium frits are standard in column diameters 4.6mm and smaller.

analytical hplc

Vydac® 201TP and 202TP C18

Specialty Reversed Phases for PAH and Vitamins

- 201TP: The standard for PAH analysis in all types of environmental samples. Vydac® 201TP columns separate the EPA 16 priority pollutants in less than 20 minutes.
- 202TP3405: Rapid analysis to separate the 16 priority pollutant PAHs in under 10 minutes
- 202TP54 and 202TP5415: For the analysis of derivatized PAHs

VYDAC



Vydac® 201TP and 202TP columns were developed specifically for the separation and quantification of PAHs required by environmental regulations, current and future. Beyond the 16 EPA priority pollutant PAHs, Vydac® PAH columns are used to separate many other PAHs, such as methylated naphthalenes.

Vydac® 201TP and 202TP C18 Specifications

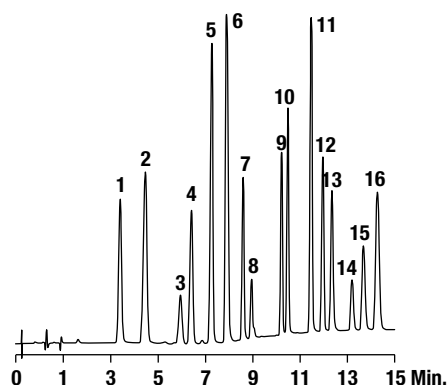
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
201TP C18	Silica	Spheroidal	5, 7, 10, 10–15, 15–20µm	300Å	70–90m²/g	8%	Polymeric	No	L1
202TP C18	Silica	Spheroidal	3, 5, 10µm	300Å	60–90m²/g	9%	Polymeric	No	L1

Vydac® 201TP

Vydac® 201TP HPLC columns have long been the standard for the analysis of PAHs in water, air, soil, automotive exhaust, and food. They were used to establish standard reference materials, measure air quality, measure PAHs in sediments, quantify PAHs in food, and study high molecular weight PAHs. They have also been used in the study of shape selectivity of reversed-phase materials.

Priority Pollutants PAHs In Accordance with EPA Methods 505, 550.1, 610, and 8310

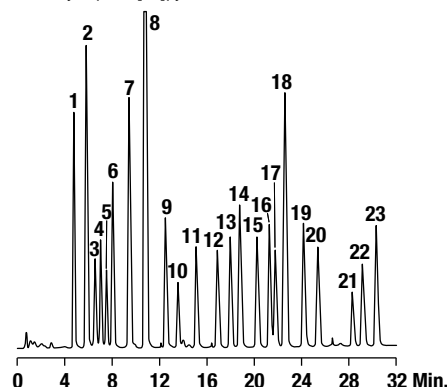
1. Naphthalene
2. Acenaphthylene
3. Acenaphthene
4. Fluorene
5. Phenanthrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. Benz[a]anthracene
10. Chrysene
11. Benzo[b]fluoranthene
12. Benzo[k]fluoranthene
13. Benzo[a]pyrene
14. Dibenzo[ah]anthracene
15. Benzo[ghi]perylene
16. Indeno[1,2,3-cd]pyrene



Column: Vydac® C18, 5µm, 4.6 x 150mm (Part No. 201TP5415)
Flow Rate: 1.5mL/min
Mobile Phase: A: Water B: ACN
Gradient: Hold 50% B for 3min, then 50 to 100% B in 7min
Detector: UV at 254nm

PAHs Beyond the EPA Priority Pollutants

1. Naphthalene
2. Acenaphthylene
3. 1-Methylnaphthalene
4. 2-Methylnaphthalene
5. Acenaphthene
6. Fluorene
7. Phenanthrene
8. Anthracene
9. Fluoranthene
10. Pyrene
11. Benzo[c]phenanthrene
12. Cyclopenta[cd]pyrene
13. Benz[a]anthracene
14. Chrysene
15. Benzo[b]naphtho[2,1-d]thiopen
16. 7,12-Dimethylbenz[a]anthracene
17. Benzo[e]pyrene
18. Benzo[b]fluoranthene
19. Benzo[k]fluoranthene
20. Benzo[a]pyrene
21. Dibenzo[ah]anthracene
22. Benzo[ghi]perylene
23. Indeno[1,2,3-cd]pyrene



Column: Vydac® C18, 5µm, 4.6 x 150mm (Part No. 201TP5415)
Flow Rate: 1.0mL/min
Mobile Phase: A: Water B: ACN
Gradient: 50 to 100% B over 30min
Column Temp: 30°C
Detector: UV at 254nm

more applications

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



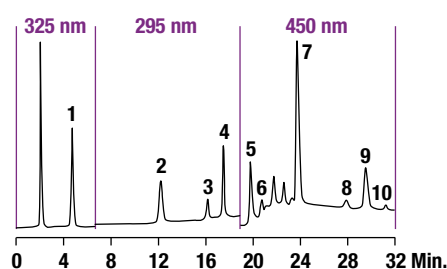
Vydac® 201TP (continued)

Vitamins

Vydac® 201TP columns also have application in the analysis of carotenoids, retinoids, and vitamins.

Retinol, α -Tocopherol, and β -Carotene in Serum

1. All-trans-retinol (vitamin A)
2. Tocol
3. γ -Tocopherol
4. α -Tocopherol (vitamin E)
5. Lutein
6. Zeaxanthin
7. Cryptoxanthin
8. α -Carotene
9. All-trans- β -carotene
10. Cis- β -carotene



Column: Vydac® 201TP C18, 5 μ m, 4.6 x 250mm (Part No. **201TP54**)
Flow Rate: 1.5mL/min
Mobile Phase: A: 15:75:10 Buffer/Methanol/n-Butanol
B: 2:88:10 Buffer/Methanol/n-Butanol
Buffer = Aqueous 0.02 M NH₄OAc, pH 3.5
Gradient: 100% A for 3min, then 0 to 100% B over 15min, then hold 100% B
Detector: UV, programmed wavelengths

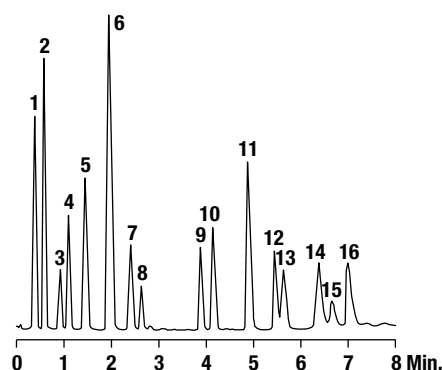
Chromatogram reproduced with author's permission. From W.A. MacCrehan and E. Schonberger, *Clin. Chem.*, 33(9), 1585-1592 (1987).

Vydac® 202TP

Built on top of the success of 201TP, 202TP columns are ideal for derivatized PAH samples or high throughput PAH analyses.

Rapid Analysis of Polyaromatic Hydrocarbons

1. Naphthalene
2. Acenaphthylene
3. Acenaphthene
4. Fluorene
5. Phenanthrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. Benz[a]anthracene
10. Chrysene
11. Benzo[b]fluoranthene
12. Benzo[k]fluoranthene
13. Benzo[a]pyrene
14. Benzo[ghi]perylene
15. Dibenzo[ah]anthracene
16. Indeno[1,2,3-cd]pyrene



Column: Vydac® 202TP C18, 5 μ m, 4.6 x 50mm (Part No. **202TP3405**)
Flow Rate: 3.0mL/min
Mobile Phase: A: Water B: ACN
Gradient: 40 to 95% B in 8min
Column Temp: 30°C
Detector: UV at 254nm

201TP C18 Analytical Columns

Particle Size	Columns				Recommended Guards	
	i.d.	50mm	100mm	150mm	250mm	
5 μ m	1.0mm	201TP5105	—	201TP5115	201TP51	201GK51T
	2.1mm	201TP5205	201TP5210	201TP5215	201TP52	201GK52T
	3.2mm	—	—	201TP5315	201TP53	201GK54T
	4.6mm	201TP5405	201TP5410	201TP5415	201TP54	201GK54T
10 μ m	4.6mm	—	—	201TP10415	201TP104	201GK104T

¹A guard kit includes a holder and one guard cartridge. ²Guard cartridge units include two guard cartridges.

202TP High-Carbon-Load C18 Analytical Columns

Particle Size	Columns				Recommended Guards	
	i.d.	50mm	100mm	150mm	250mm	
3 μ m	3.2mm	—	—	202TP3315	—	—
	4.6mm	202TP3405	202TP3410	—	—	—
5 μ m	4.6mm	—	—	202TP5415	202TP54	202GK54T
10 μ m	4.6mm	202TP10405	—	—	—	202GK104T

¹A guard kit includes a holder and one guard cartridge. ²Guard cartridge units include two guard cartridges.

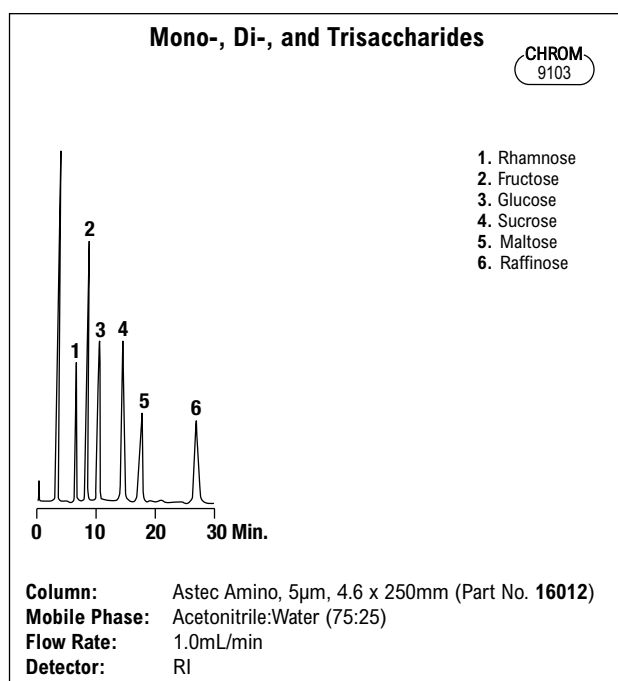
analytical hplc

Astec Amino and Reversed-Phase Columns

- Durable vinyl alcohol copolymer
- Stable from pH 2–13
- Stable and reproducible performance

Choose Astec amino columns for separating mono- and oligosaccharides. Astec's polymer base makes these columns much more stable than silica-based amino columns.

Choose Astec reversed-phase columns for amines and high recoveries of proteins and peptides. Because there are no silanols, elution order is always based on hydrophobicity of the analytes rather than polar interactions with the base material. High recovery of proteins and peptides is typical even at low sample loads.



Astec Amino and Reversed-Phase 300Å Columns

Packing	Format	i.d. x Length	Part No.
C18, 5 μ m	Analytical	4.6 x 150mm	16004
	Analytical	4.6 x 250mm	16005
C8, 5 μ m	Analytical	4.6 x 150mm	16006
	Analytical	4.6 x 250mm	16007
C4, 5 μ m	Analytical	4.6 x 150mm	16008
	Analytical	4.6 x 250mm	16009
Amino, 5 μ m	Analytical	4.6 x 250mm	16012

Astec Amino and Reversed-Phase Guard Columns

Packing	i.d. x Length	Qty.	Part No.
C18, 5 μ m	4.6 x 10mm	ea	28180
C8, 5 μ m	4.6 x 10mm	ea	28181
C4, 5 μ m	4.6 x 10mm	ea	28182
Amino, 5 μ m	4.6 x 10mm	ea	28187

Astec Cyclobond™ Columns

For Chiral Separations

- Versatile chiral selectors
- High-purity 5 μ m spherical silica

Cyclodextrin Phases

Designation	Substituent
I 2000	β -Cyclodextrin
I 2000 Ac	β -Cyclodextrin Acetate
I 2000 RSP	β -Cyclodextrin R,S-Hydroxypropyl Ether
I 2000 DMP	β -Cyclodextrin 3,5-Dimethylphenyl Carbamate
II	γ -Cyclodextrin

Cyclobond™ I 2000 has the broadest applicability, and is ideal for small analytes in pharmaceutical, chemical, and environmental applications.

Cyclobond™ 1 2000 Ac is ideal for aromatic alcohols or amines that are chiral on the alpha or beta carbon.

Cyclobond™ I 2000 RSP is a general-purpose chiral stationary phase. It can separate non-aromatic structures such as t-boc amino acids.

Cyclobond™ DMP shows good selectivity when the chiral centers are part of a ring structure or on the alpha carbon. This phase is ideal for derivatized amines such as amphetamine ACQ.

Cyclobond™ II is useful for isomeric compounds based on anthracene, chrysene, and pyrene ring structures. Some applications include steroids, porphyrins, and Fmoc amino acids.

Astec Cyclobond™ Columns

Packing	Format	i.d. x Length	Part No.
I 2000, 5 μ m	Analytical	4.6 x 100mm	400101
	Analytical	4.6 x 250mm	410101
I 2000 Ac, 5 μ m	Analytical	4.6 x 250mm	410121
I 2000 RSP, 5 μ m	Analytical	4.6 x 250mm	411121
I 2000 DMP, 5 μ m	Analytical	4.6 x 250mm	412111
II	Analytical	4.6 x 100mm	400201
	Analytical	4.6 x 250mm	410201

Astec Cyclobond™ Guard Cartridges*

Packing,	i.d. x Length	Qty.	Part No.
I 2000, 5 μ m	4.0 x 20mm	ea	430102
I 2000 Ac, 5 μ m	4.0 x 20mm	ea	430103
I 2000 RSP, 5 μ m	4.0 x 20mm	ea	430105
I 2000 DMP, 5 μ m	4.0 x 20mm	ea	430108
II	4.0 x 20mm	ea	430109
Astec Guard Cartridge Holder			ea 11014

*Guard holder required.

Astec Chirobiotic™ HPLC Columns

For Multi-Mode Chiral Separations

- Bonded macrocyclic glycopeptide phases
- Three complimentary selectivities
- High-purity 5µm spherical silica

Chirobiotic™ columns demonstrate a broad selectivity in reversed phase, normal phase, and polar organic modes. This gives Chirobiotic™ columns the ability to separate a greater variety of chiral analytes than columns that can only operate in one mode.

Chirobiotic™ V

Chirobiotic™ V Specifications

Ligand: Vancomycin

Ideal For: Neutral molecules, amides, acids, esters, cyclic amines

Chirobiotic™ V has a selectivity similar to glycoprotein phases while also being stable from 0–100% organic modifiers. New Chirobiotic™ V2 has enhanced selectivity and capacity in the polar organic mode, and increased capacity.

Chirobiotic™ T

Chirobiotic™ T Specifications

Ligand: Teicoplanin

Ideal For: Underivatized amino acids, n-derivatized amino acids, carboxylic acids, phenols, neutral aromatics, cyclic aromatics with aliphatic amines

Chirobiotic™ T is an excellent alternative to crown ether and ligand exchange for amino acids and hydroxy acids. New Chirobiotic™ T2 has enhanced selectivity and capacity in the polar organic mode.

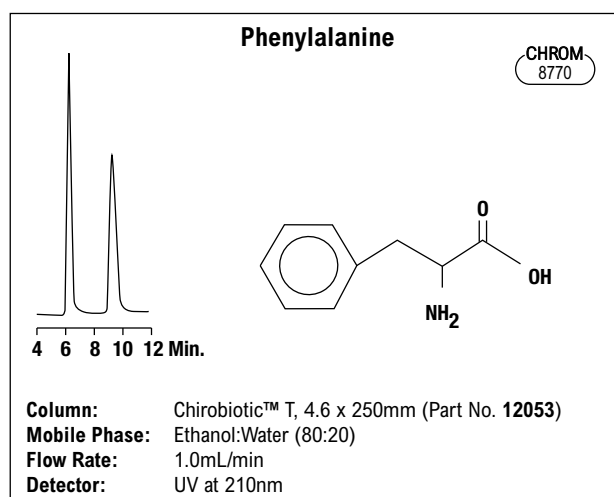
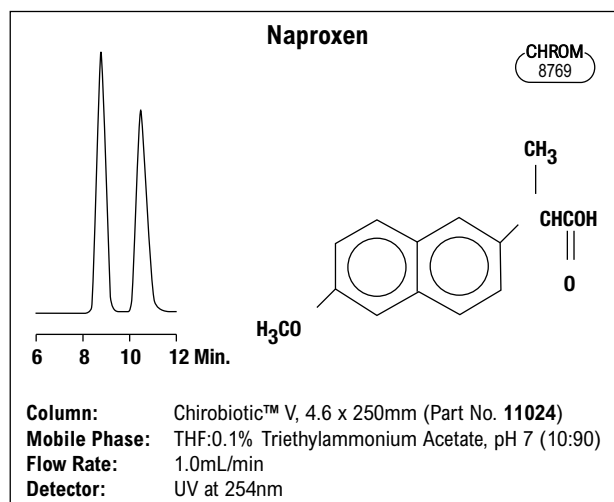
Chirobiotic™ R

Chirobiotic™ R Specifications

Ligand: Ristocetin A

Ideal For: Anionic molecules, di- and tri-peptides, α-hydroxy acids, substituted aliphatic acids, aromatic esters, chiral alcohols, secondary and tertiary amines

Chirobiotic™ R is the largest and most complex of the Chirobiotic™ ligands. Sugar moieties, a peptide chain, and additional ionizable groups give this structure the complexity and diversity to separate a wide variety of analytes.



Astec Chirobiotic™ Columns

Packing	Format	i.d. x Length	Part No.
Chirobiotic™ V	Analytical	4.6 x 50mm	11346
	Analytical	4.6 x 150mm	11023
	Analytical	4.6 x 250mm	11024
Chirobiotic™ V2	Analytical	4.6 x 100mm	A15022
	Analytical	4.6 x 150mm	A15023
	Analytical	4.6 x 250mm	A15024
	Prep	10 x 250mm	A15034
	Prep	21.2 x 250mm	A15044
Chirobiotic™ T	Analytical	4.6 x 50mm	11349
	Analytical	4.6 x 150mm	12051
	Analytical	4.6 x 250mm	12053
Chirobiotic™ T2	Analytical	4.6 x 100mm	A16022
	Analytical	4.6 x 150mm	A16023
	Analytical	4.6 x 250mm	A16024
	Prep	10 x 250mm	A16034
	Prep	21.2 x 250mm	A16044
Chirobiotic™ R	Analytical	4.6 x 50mm	12514
	Analytical	4.6 x 150mm	12516
	Analytical	4.6 x 250mm	12518

Astec Chirobiotic™ Guard Cartridges*

Packing	i.d. x Length	Qty.	Part No.
Chirobiotic™ V, 5µm	4.0 x 20mm	ea	11019
Chirobiotic™ T, 5µm	4.0 x 20mm	ea	12445
Chirobiotic™ R, 5µm	4.0 x 20mm	ea	12522
Astec Guard Cartridge Holder		ea	11014

*Guard holder required.

analytical hplc

Brownlee™ Columns

Economical MPLC™ Cartridge System with Reusable Hardware

- Finger-tight modular design
- Reusable end assemblies with interchangeable holders
- Guards fit conventional columns or MPLC™ hardware

The Brownlee™ MPLC™ Cartridge system is convenient and easy to use. Decide which column length you prefer, and purchase the hardware and the disposable packed cartridges separately.

Cartridge Hardware

Brownlee™ MPLC™ Cartridge Hardware

Photo	Description	Part No.
<i>MPLC™ Cartridge Holders</i>		
	30mm	140200
	100mm	140230
	220mm	140400
<i>MPLC™ Cartridge Accessories</i>		
	MPLC™ Cartridge Union	140300
	MPLC™ Cartridge End Assembly	1402501
<i>MPLC™ Cartridge Holder Bodies</i>		
	30mm	140203
	100mm	140003
	220mm	140403
<i>Universal MPLC™ Cartridge Holder Kit</i>		140530
Includes: 30-, 100-, and 220mm MPLC™ Cartridge Holder Bodies (E), 1 MPLC™ Cartridge Union (C), 2 End Assemblies (D), and 1 NewGuard™ End Assembly (H)		

Brownlee™ MPLC™ Cartridge Hardware Seals

Description	Part No.
Analytical Holder Seal Replacement Kit	140260
Includes Tool and 2 Seals	
Analytical Seals, 2/pk	140216
Seal Replacement Tool Required	

NewGuard™ System

Brownlee™ MPLC™ NewGuard™ Hardware

Photo	Description	Part No.
	NewGuard™ Cartridge Holders NewGuard™ Holder for use with Conventional Columns	140601
	220mm NewGuard™ System Holder for Direct Coupling of 220mm Analytical Cartridge with a NewGuard™ Cartridge	140410
	NewGuard™ End Assembly	140600

Brownlee™ NewGuard™ Cartridges*

Description	Qty.	Part No.
RP-18	3	141004
RP-8	3	141003
Cyano	3	141008
Amino	3	141007
Silica	3	141012
Anion (AX-300)	3	141009

*NewGuard™ cartridge holder required (Part No. **140601**).

Spheri-5™ and Spheri-10™ Cartridges

- Rugged and reproducible
- Use with MPLC™ cartridge hardware
- 80Å, spherical silica

RP-18 and RP-8 phases are monomeric for optimum mass transfer kinetics and high efficiency. The ODS phase is polymeric and more suitable for acidic mobile phases.

Brownlee™ Spheri-5™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
ODS (C18), 5µm	2.1 x 30mm	2	141061
	2.1 x 100mm	ea	141063
	2.1 x 220mm	ea	141065
	4.6 x 30mm	2	141060
	4.6 x 100mm	ea	141062
RP-18, 5µm	4.6 x 220mm	ea	141064
	2.1 x 30mm	2	141052
	2.1 x 100mm	ea	141054
	2.1 x 220mm	ea	141056
	4.6 x 100mm	ea	141053
RP-8, 5µm	4.6 x 220mm	ea	1410551
	2.1 x 30mm	2	141028
	2.1 x 100mm	ea	141030
	2.1 x 220mm	ea	141032
	4.6 x 30mm	2	141027
Cyano, 5µm	4.6 x 100mm	ea	141029
	4.6 x 220mm	ea	141031
	4.6 x 30mm	2	141083
	4.6 x 100mm	ea	141085
	4.6 x 220mm	ea	141087
Amino, 5µm	4.6 x 30mm	2	141177
	4.6 x 100mm	ea	141179
	4.6 x 220mm	ea	141181
Silica, 5µm	2.1 x 30mm	2	141194
	4.6 x 30mm	2	141193
	4.6 x 100mm	ea	141195
	4.6 x 220mm	ea	141197

*Brownlee™ MPLC™ cartridge holder required.

Brownlee™ Spheri-10™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
RP-18, 10µm	4.6 x 30mm	2	141043
	4.6 x 100mm	ea	1410451
RP-8, 10µm	4.6 x 30mm	2	141020
	4.6 x 100mm	ea	141022
Silica, 10µm	4.6 x 30mm	2	141186

*Brownlee™ MPLC™ cartridge holder required.

Aquapore™ DEAE WAX Cartridges

- Large pore for macromolecules

Choose AX-300 with its DEAE functional group for weak anion exchange applications with proteins and peptides.

Brownlee™ Aquapore™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
AX-300, 7µm	4.6 x 30mm	2	141212
	4.6 x 100mm	ea	141214

*Brownlee™ MPLC™ cartridge holder required.

Jordi Columns

Normal- and Reversed-Phase

- **Rugged**—use at high temperatures, from pH 0–14, with any solvent
- **Silanol Free**—analyze polar compounds without silanol effects

Jordi normal-phase and reversed-phase columns are made from highly pure 5µm DVB, for extremely durable and efficient phases.

Jordi Specifications			
Phase	Particle Size	Pore Size	Description
RP-DVB	5µm	500Å, 1000Å	Reversed-phase, not bonded
C18-DVB	5µm	500Å	Reversed-phase, C18 bonded
Polyamine-DVB	5µm	500Å	Normal-phase

RP-DVB

RP-DVB is a reversed-phase non-polar packing with a high degree of aromatic character. SM-500, with a 500Å pore, is recommended for most applications. LM-1000, with a 1000Å pore, is ideal for molecules 100,000 Daltons or larger.

C18-DVB

C18-DVB has C18 chains bonded to the DVB base. These columns are more hydrophobic than traditional C18 columns and have different selectivities due to the absence of silanols.

Polyamine-DVB

Polyamine-DVB is a normal-phase column for simple sugar and polysaccharide applications. The DVB-based packing provides a non-reactive amine surface that lasts longer and equilibrates faster than traditional silica-based amine columns. Polyamine-DVB columns can be used with aqueous mobile phases, even 1M NaOH. Ideal for carbohydrate analyses requiring sharp peaks and short run times.

Jordi HPLC Columns			
Packing	Format	i.d. x Length	Part No.
RP-DVB (SM-500Å), 5µm	Analytical	4.6 x 150mm	1005500
	Analytical	4.6 x 250mm	1005520
RP-DVB (LM-1000Å), 5µm	Analytical	4.6 x 150mm	1005580
	Analytical	4.6 x 250mm	1005585
C18-DVB (500Å), 5µm	Analytical	4.6 x 150mm	18500
	Analytical	4.6 x 250mm	18501
Polyamine-DVB (500Å), 5µm	Analytical	4.6 x 250mm	1005900

Jordi All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
RP-DVB (SM-500Å), 5µm	4.6 x 7.5mm	3	1005595
RP-DVB (LM-1000Å), 5µm	4.6 x 7.5mm	3	1005596
C18-DVB (500Å), 5µm	4.6 x 7.5mm	3	1005601
Polyamine-DVB (500Å), 5µm	4.6 x 7.5mm	3	1005615
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

*All-Guard™ holder required. Other particle sizes available.



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related product

Looking for column heaters?
See pages 16 and 17.

GPC Columns

Organic GPC

- **Rugged**—highly crosslinked DVB for broad temperature stability and solvent compatibility
- **Powerful**—high pore volume for greater resolution from a single column

Jordi Organic and Aqueous GPC Specifications		
Pore Size	Pressure Limit	MW Range (Daltons)
100Å	8000psig	100–5000
500Å	8000psig	100–10,000
103Å	8000psig	100–25,000
104Å	2000psig	100–2,000,000
105Å	2000psig	10,000–10,000,000
Mixed Bed	2000psig	100–>10,000,000

Jordi HPLC columns, offer unparalleled resistance to shrinking and swelling, as well as better temperature and solvent compatibility than traditional ps-DVB phases.

The high pore volume speeds up your analyses. A single 10 x 500mm Jordi column replaces three 7.8 x 300mm ps-DVB columns and separates the same sample in 40% less time.

Aqueous GPC

Glucose-DVB packings are rugged, hydrophilic packings for separating polar compounds. Glucose units are bonded to the DVB base to yield a hydrophilic surface. Glucose-DVB columns equilibrate faster than silica-based columns.

Jordi Organic GPC Columns*

Pore Size	Format	i.d. x Length	Part. No.
100Å, 5µm	Semi Prep	7.8 x 300mm	10510
	Prep	10 x 250mm	100561
500Å, 5µm	Semi Prep	7.8 x 300mm	10511
	Prep	10 x 250mm	100565
	Prep	10 x 500mm	100567
103Å, 5µm	Semi Prep	7.8 x 300mm	10512
	Prep	10 x 250mm	100569
104Å, 5µm	Semi Prep	7.8 x 300mm	10513
	Prep	10 x 250mm	100573
105Å, 5µm	Semi Prep	7.8 x 300mm	10514
	Prep	10 x 250mm	100577
Mixed-Bed Linear, 5µm	Semi Prep	7.8 x 300mm	10515
	Prep	10 x 250mm	100581
	Prep	10 x 500mm	100583

*Jordi GPC columns are constructed from Type 316 stainless steel. All tubing connections are 1/16" female. Columns are shipped in Chloroform unless otherwise requested when placing order.

Jordi Aqueous GPC Columns

Pore Size	Format	i.d. x Length	Part No.
100Å, 5µm	Semi Prep	7.8 x 300mm	10517
	Prep	10 x 250mm	100761
500Å, 5µm	Semi Prep	7.8 x 300mm	10518
	Prep	10 x 250mm	100765
103Å, 5µm	Semi Prep	7.8 x 300mm	10519
	Prep	10 x 250mm	100769
104Å, 5µm	Semi Prep	7.8 x 300mm	10520
	Prep	10 x 250mm	100773
105Å, 5µm	Semi Prep	7.8 x 300mm	10521
	Prep	10 x 250mm	100777
Mixed-Bed Linear, 5µm	Semi Prep	7.8 x 300mm	10522
	Prep	10 x 250mm	100781
	Prep	10 x 500mm	100783

analytical hplc

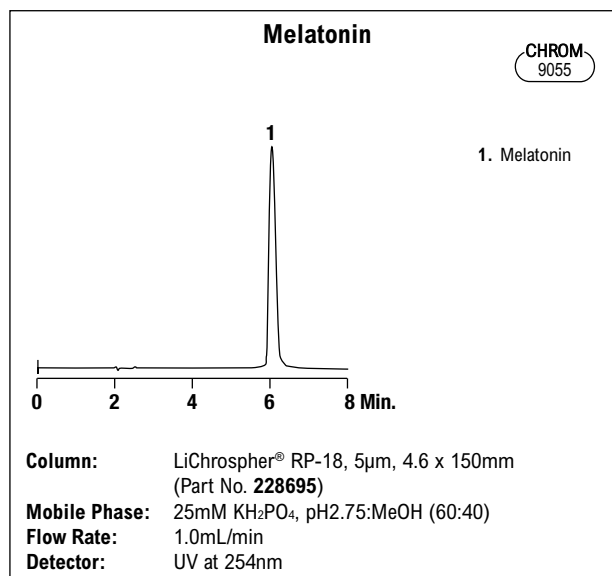
Merck LiChrosorb® and LiChrospher® Columns

- LiChrosorb®—irregular silica for larger surface areas
- LiChrospher®—spherical silica for higher stability and reproducibility

All Merck columns are packed by Grace to our highest QC standards. Custom columns are available.

LiChrosorb® HPLC Columns

Packing	Format	i.d. x Length	Part No.
RP-18, 5µm	Solvent Reducer	3.0 x 150mm	38513
	Solvent Reducer	3.0 x 250mm	38514
	Analytical	4.6 x 250mm	8684
RP Select B, 5µm	Analytical	4.6 x 150mm	228700
	Analytical	4.6 x 250mm	228685
RP-8, 5µm	Solvent Reducer	3.0 x 150mm	38515
	Solvent Reducer	3.0 x 250mm	38516
	Analytical	4.6 x 250mm	8692
Amino, 5µm	Analytical	4.6 x 250mm	228872
Si-60, 10µm	Analytical	4.6 x 250mm	8369
Si-100, 10µm	Analytical	4.6 x 250mm	8720



LiChrospher® HPLC Columns

Packing	Format	i.d. x Length	Part No.
RP-18, 3µm	Analytical	4.6 x 150mm	228688
RP-18, 5µm	Analytical	4.6 x 150mm	228695
	Analytical	4.6 x 250mm	228673
	Analytical	4.6 x 150mm	228686
RP-18 EC, 3µm	Analytical	4.6 x 150mm	228694
RP-18 EC, 5µm	Analytical	4.6 x 150mm	228672
	Analytical	4.6 x 250mm	228696
RP-8, 5µm	Analytical	4.6 x 150mm	228675
	Analytical	4.6 x 250mm	228697
RP-8 EC, 5µm	Analytical	4.6 x 150mm	228678
	Analytical	4.6 x 250mm	228611
RP-Select B, 5µm	Analytical	4.6 x 150mm	228613
	Analytical	4.6 x 250mm	228693
Amino, 5µm	Analytical	4.6 x 150mm	228670
	Analytical	4.6 x 250mm	228691
Diol-100, 5µm	Analytical	4.6 x 150mm	228666
	Analytical	4.6 x 250mm	228699
Si-60, 5µm	Analytical	4.6 x 150mm	228683



Alltech® All-Guard™ System—change cartridges in seconds without tools.

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LiChrosorb® All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
RP-18, 5µm	3.0 x 7.5mm	3	96374
	4.6 x 7.5mm	3	96171
RP-Select B, 5µm	4.6 x 7.5mm	3	96181
RP-8, 5µm	3.0 x 7.5mm	3	96373
	4.6 x 7.5mm	3	96173
Amino, 5µm	4.6 x 7.5mm	3	96175
Silica, 5µm	4.6 x 7.5mm	3	96201
All-Guard™ Cartridge Holder (Includes Direct-Connect™ Column Coupler)		ea	80101

*All-Guard™ holder required. Other particle sizes available.

LiChrospher® All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
RP-18, 5µm	4.6 x 7.5mm	3	96185
RP-18 Endcapped, 5µm	4.6 x 7.5mm	3	96183
RP-8, 5µm	4.6 x 7.5mm	3	96189
RP-8 Endcapped, 5µm	4.6 x 7.5mm	3	96187
RP Select B, 5µm	4.6 x 7.5mm	3	96425
Amino, 5µm	4.6 x 7.5mm	3	96191
Diol, 5µm	4.6 x 7.5mm	3	96195
Silica, 5µm	4.6 x 7.5mm	3	96201
All-Guard™ Cartridge Holder (Includes Direct-Connect™ Column Coupler)		ea	80101

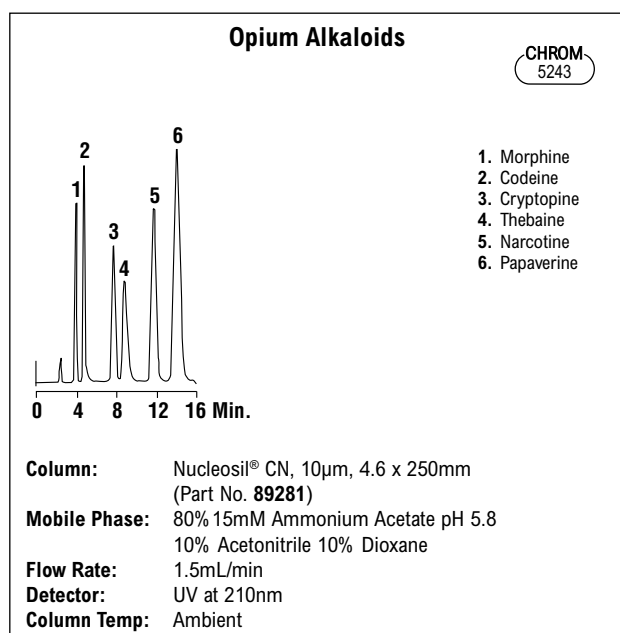
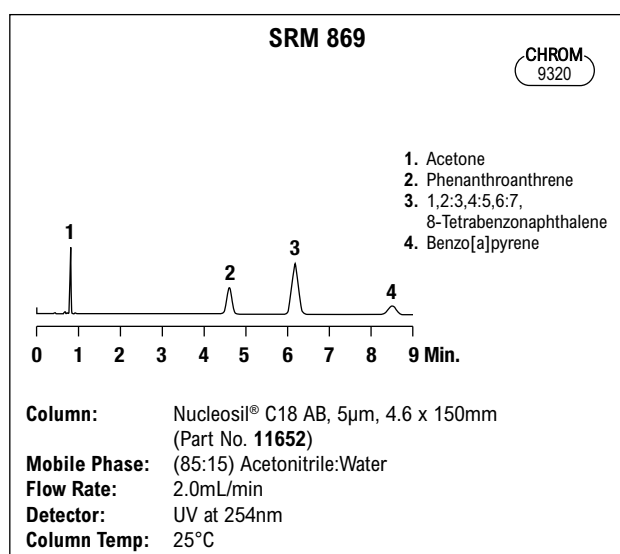
*All-Guard™ holder required. Other particle sizes available.

Macherey-Nagel Nucleosil® Columns

- 100Å, high-purity silica
- Narrow particle size distribution
- A choice of phases for any application

All Nucleosil® columns are packed by Grace to our highest QC standards.

C18 AB is polymerically bonded specifically for reversed-phase chromatography of acidic and basic compounds. It has a 25% carbon load for strong retention.



more applications

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



Nucleosil® HPLC Columns

Packing	Format	i.d. x Length	Part No.	Waters® Fittings Part No.
C18, 3µm	Analytical	4.6 x 100mm	89531	89532
	Analytical	4.6 x 150mm	89511	89512
C18, 5µm	Analytical	4.6 x 150mm	89161	89162
	Analytical	4.6 x 250mm	89141	89142
C18, 10µm	Analytical	4.6 x 250mm	89121	89122
C18 AB, 5µm	Analytical	4.6 x 150mm	11652	—
	Analytical	4.6 x 250mm	11657	—
C8, 5µm	Analytical	4.6 x 150mm	89221	89222
	Analytical	4.6 x 250mm	89201	89202
C8, 10µm	Analytical	4.6 x 250mm	89181	89182
Phenyl, 7µm	Analytical	4.6 x 150mm	89261	89262
	Analytical	4.6 x 250mm	89241	89242
Cyano, 5µm	Analytical	4.6 x 150mm	89321	89322
	Analytical	4.6 x 250mm	89301	89302
Cyano, 10µm	Analytical	4.6 x 250mm	89281	89282
	Analytical	4.6 x 150mm	89381	89382
Amino, 5µm	Analytical	4.6 x 250mm	89361	89362
	Analytical	4.6 x 250mm	89341	89342
Amino, 10µm	Analytical	4.6 x 150mm	89441	89442
	Analytical	4.6 x 250mm	89421	89422
Silica, 5µm	Analytical	4.6 x 150mm	89401	89402
	Analytical	4.6 x 250mm	228498	228504
SA, 5µm	Analytical	4.6 x 250mm	228497	228503
	Analytical	4.6 x 250mm	228496	228502
SB, 5µm	Analytical	4.6 x 150mm	228501	228507
	Analytical	4.6 x 250mm	228500	228506
SB, 10µm	Analytical	4.6 x 250mm	228499	228505



Alltech® All-Guard™ System—change cartridges in seconds without tools.

Nucleosil® All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
C18, 5µm	4.6 x 7.5mm	3	96210
C8, 5µm	4.6 x 7.5mm	3	96211
Phenyl, 5µm	4.6 x 7.5mm	3	96214
Cyano, 5µm	4.6 x 7.5mm	3	96213
Amino, 5µm	4.6 x 7.5mm	3	96212
Silica, 5µm	4.6 x 7.5mm	3	96215
SA, 5µm	4.6 x 7.5mm	3	89340
SB, 5µm	4.6 x 7.5mm	3	89345
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

*All-Guard™ holder required. Other particle sizes available.

more info

For more HPLC Applications, see pages 395–453.

analytical hplc

Whatman Partisil™ Columns

All Whatman Partisil™ columns are packed by Grace to our highest QC standards. Partisil® columns use 85Å, irregular silica with a surface area of 350m²/g.

Partisil™ PAC is a polar amino cyano phase with secondary amino groups for thermal and chemical stability. It separates primarily by reversed-phase or weak anion exchange.

Partisil™ HPLC Columns

Packing	Format	i.d. x Length	Part No.	Waters® Fittings Part No.
ODS, 10µm	Analytical	4.6 x 250mm	8246	8247
ODS-2, 5µm	Analytical	4.6 x 250mm	12571	12572
ODS-2, 10µm	Analytical	4.6 x 250mm	8251	8252
ODS-3, 5µm	Analytical	4.6 x 250mm	8660	8662
ODS-3, 10µm	Analytical	4.6 x 250mm	8256	8257
C8, 5µm	Analytical	4.6 x 250mm	8668	8670
C8, 10µm	Analytical	4.6 x 250mm	8380	8381
PAC, 5µm	Analytical	4.6 x 250mm	8676	8678
PAC, 10µm	Analytical	4.6 x 250mm	8261	8262
Silica, 5µm	Analytical	4.6 x 250mm	8266	8267
Silica, 10µm	Analytical	4.6 x 250mm	8271	8272
SAX, 5µm	Analytical	4.6 x 250mm	12576	12577
SAX, 10µm	Analytical	4.6 x 250mm	8165	8167
SCX, 10µm	Analytical	4.6 x 250mm	8173	8175

Partisil™ All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
ODS, 5µm	4.6 x 7.5mm	3	96252
ODS-2, 5µm	4.6 x 7.5mm	3	96253
ODS-3, 5µm	4.6 x 7.5mm	3	96254
C8, 5µm	4.6 x 7.5mm	3	96255
PAC, 5µm	4.6 x 7.5mm	3	96256
Silica, 5µm	4.6 x 7.5mm	3	96257
SAX, 5µm	4.6 x 7.5mm	3	96259
SCX, 5µm	4.6 x 7.5mm	3	96258
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

*All-Guard™ holder required. Other particle sizes available.

technical assistance

Contact Tech Support: Phone: 1.800.255.8324 (North America)

Email: contact.alltech@grace.com

Online: www.discoverysciences.com

Whatman Partisphere® WVS Columns

Whatman's Partisphere® WVS columns have built-in void compensators that help you extend the column lifetime. Use the piston-like plungers at each end of the column to compress the bed and seal any voids that develop over time. Choose your column from the table below, and purchase reusable WVS endfittings separately.

Partisphere® WVS HPLC Cartridges*

Packing	Format	i.d. x Length	Part No.
C18, 5µm	Analytical	4.6 x 125mm	46210502
C8, 5µm	Analytical	4.6 x 125mm	46210503
PAC, 5µm	Analytical	4.6 x 125mm	46210508
Silica, 5µm	Analytical	4.6 x 125mm	46210501
SAX, 5µm	Analytical	4.6 x 125mm	46210505
SCX, 5µm	Analytical	4.6 x 125mm	46210507
WVS Reusable Endfittings, 2/pk			46310001

*Reusable endfittings required.

Partisphere® WVS Guard Cartridges*

Packing	i.d. x Length	Qty.	Part No.
C18/C8, 5µm	5 x 17mm	5	46410002
PAC, 5µm	5 x 17mm	5	46410008
Silica, 5µm	5 x 17mm	5	46410001
SAX, 5µm	5 x 17mm	5	46410005
SCX, 5µm	5 x 17mm	5	46410007
Guard Cartridge Holder	19 x 40mm	ea	46311004

*Guard holder required.

more info

For HPLC Applications, see pages 395–453.

related products

Need HPLC tubing?

See pages 384–391.



5535

related products

Looking for high-pressure fittings?

See pages 112–118.



6673

Polymer Labs Columns

Outstanding Durability and Stability

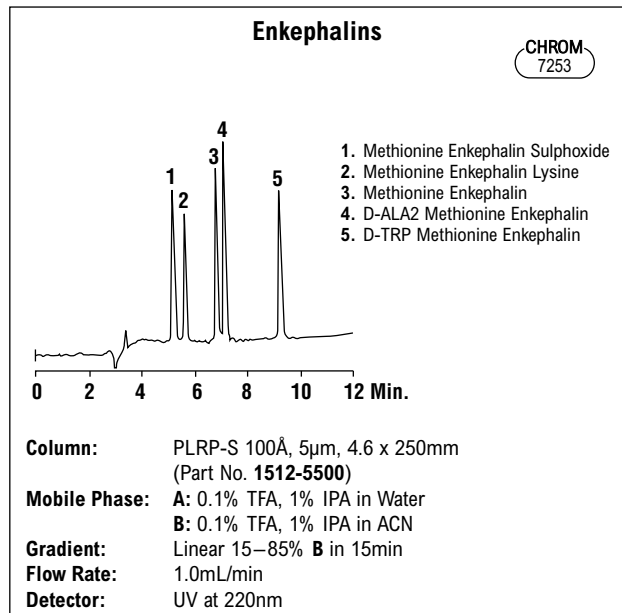
- Ideal for elevated temperature and pressure applications
- Stable from pH 1–13

PLRP-S is a polystyrene divinylbenzene copolymer designed specifically for reversed-phase HPLC. PLRP-S columns are extremely stable, performing over a wide pH range and at elevated temperatures and pressures.

PLRP-S Choice of Pore Sizes:

- 100Å for small molecules, peptides, and nucleotides
- 300Å for polypeptides and globular proteins
- 1000Å for fibrous proteins
- 4000Å for the analysis of very large biomolecules or high-speed/high-resolution separations

PLRP-S HPLC Specifications	
Base Material	Polystyrene Divinylbenzene
Organic Modifier	0 to 100%
Particle Size	3, 5, 8, 10µm
Pore Size	100, 300, 1000, 4000Å
pH Range	1–13
Max. Temp.	80°C
Max. Pressure	3000psig
Max. Flow Rate	4mL/min



PLRP-S HPLC Columns

Packing	Format	i.d. x Length	Part No.
100Å, 3µm	Microbore	2.1 x 50mm	1912-1300
	Microbore	2.1 x 150mm	1912-3300
	Analytical	4.6 x 50mm	1512-1300
	Analytical	4.6 x 150mm	1512-3300
100Å, 5µm	Microbore	2.1 x 50mm	1912-1500
	Microbore	2.1 x 150mm	1912-3500
	Microbore	2.1 x 250mm	1912-5500
	Analytical	4.6 x 50mm	1512-1500
	Analytical	4.6 x 150mm	1512-3500
	Analytical	4.6 x 250mm	1512-5500
100Å, 8µm	Analytical	4.6 x 150mm	1512-3800
	Analytical	4.6 x 250mm	1512-5800
300Å, 3µm	Microbore	2.1 x 50mm	1912-1301
	Microbore	2.1 x 150mm	1912-3301
	Analytical	4.6 x 50mm	1512-1301
300Å, 5µm	Analytical	4.6 x 150mm	1512-3301
	Microbore	2.1 x 50mm	1912-1501
	Microbore	2.1 x 150mm	1912-3501
	Microbore	2.1 x 250mm	1912-5501
	Analytical	4.6 x 50mm	1512-1501
	Analytical	4.6 x 150mm	1512-3501
	Analytical	4.6 x 250mm	1512-5501
300Å, 8µm	Analytical	4.6 x 150mm	1512-3801
	Analytical	4.6 x 250mm	1512-5801
1000Å, 5µm	Microbore	2.1 x 50mm	1912-1502
	Analytical	4.6 x 50mm	1512-1502
1000Å, 8µm	Microbore	2.1 x 50mm	1912-1802
	Microbore	2.1 x 150mm	1912-3802
	Analytical	4.6 x 50mm	1512-1802
	Analytical	4.6 x 150mm	1512-3802
	Analytical	4.6 x 250mm	1512-5802
4000Å, 5µm	Microbore	2.1 x 50mm	1912-1503
	Analytical	4.6 x 50mm	1512-1503
4000Å, 8µm	Microbore	2.1 x 50mm	1912-1803
	Microbore	2.1 x 150mm	1912-3803
	Analytical	4.6 x 50mm	1512-1803
	Analytical	4.6 x 150mm	1512-3803

PLRP-S Guard Columns

Packing	i.d. x Length	Qty.	Part No.
PLRP-S, 5µm	3 x 5mm	2	1512-1503
Guard Column Holder		ea	1310-0016

more info

For more large molecule columns, see pages 84–97.

related product

Looking for column heaters?
See page 16–17.



6219

analytical hplc

Shodex® Columns

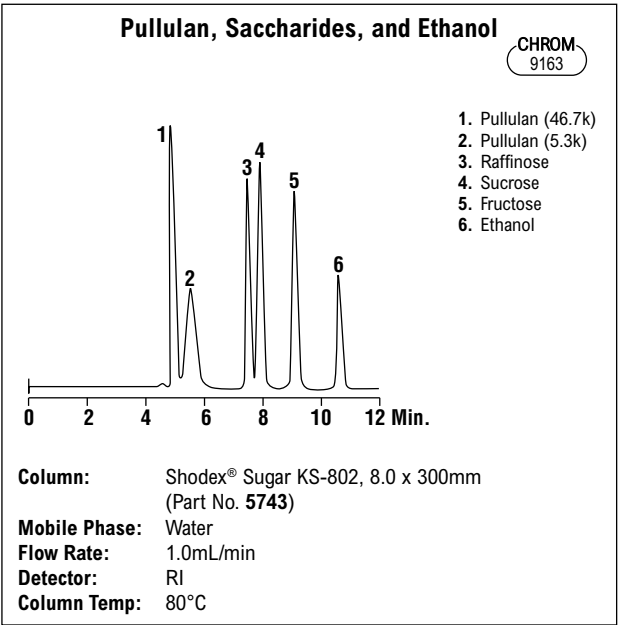
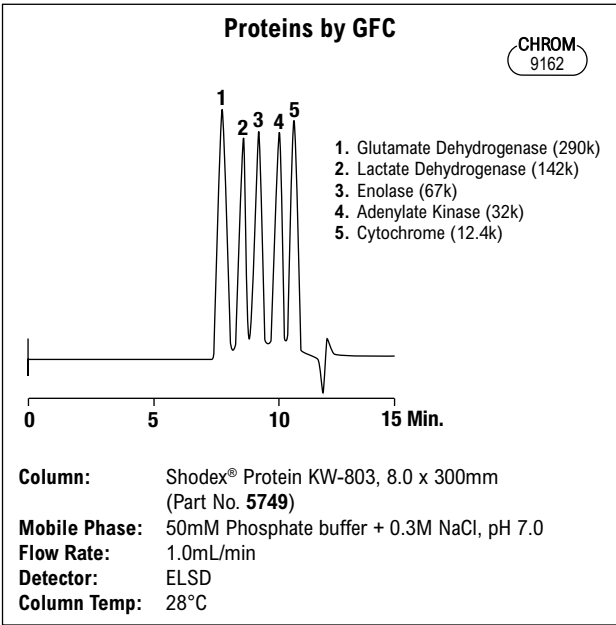
Aqueous Size Exclusion

- High efficiency and high mass recovery
- Separate biopolymers by their effective size in solution
- Stable sugar GFC columns

Shodex® Ohpak and Sugar columns are designed for high-resolution separations of water-soluble compounds such as organics, inorganics, oligomers, and polymers. Three different gel filtration size exclusion materials are available.

Shodex® Sugar columns use a sulfonated gel with a sodium counter ion for separation of mono, di, oligo, and polysaccharides, starches, and celluloses.

Aqueous Size Exclusion Columns		
Packing Series	Description	Applications
Ohpak SB-800	Polyhydroxymethacrylate	General purpose GFC of water-soluble polymers, proteins, and enzymes
Protein KW-800	Porous Silica Gel	GFC of proteins, glycoproteins, and peptides
Sugar KS-800	Sulfonated PS Gel (Na ⁺ counter ion)	Separation of mono, di, oligo, and polysaccharides, starches, and celluloses



Shodex® Size Exclusion HPLC Columns

	Particle Size	Format	Packing	MW Range	i.d. x Length	Part No.
Ohpak	8µm	Analytical	Q-801	50–1800	8.0 x 500mm	5737
	8µm	Analytical	SB-802 HQ	50–4000	8.0 x 300mm	5730
	6µm	Analytical	SB-802.5 HQ	50–10,000	8.0 x 300mm	5731
	6µm	Analytical	SB-803 HQ	50–100,000	8.0 x 300mm	5732
	10µm	Analytical	SB-804 HQ	100–1,000,000	8.0 x 300mm	5733
	13µm	Analytical	SB-805 HQ	500–4,000,000	8.0 x 300mm	5734
Protein	13µm	Analytical	SB-806M HQ	100–20,000,000	8.0 x 300mm	5736
	5µm	Analytical	KW-802.5	50–50,000	8.0 x 300mm	5748
	5µm	Analytical	KW-803	50–150,000	8.0 x 300mm	5749
Sugar	7µm	Analytical	KW-804	100–600,000	8.0 x 300mm	5750
	5µm	Analytical	KS-801	50–1000	8.0 x 300mm	5742
	5µm	Analytical	KS-802	50–10,000	8.0 x 300mm	5743
	5µm	Analytical	KS-803	50–50,000	8.0 x 300mm	5744
	7µm	Analytical	KS-804	100–400,000	8.0 x 300mm	5745
	17µm	Analytical	KS-805	100–5,000,000	8.0 x 300mm	5746
	17µm	Analytical	KS-806	500–50,000,000	8.0 x 300mm	5747

related product

Doing carbohydrate analysis?
 ELSD offers greater sensitivity than RI. See pages 5–11.



related product

Looking for column heaters?
 See pages 16 and 17.

Shodex® ODP2 HP Columns

High-Efficiency Polymer-Based Reversed-Phase Column

- Column efficiency is comparable with that of silica-based ODS columns
- Better retention of highly polar substances comparing to ODS columns
- Long column life even with high protein content samples: ODP2 HP prevent protein adsorption that causes ODS column degradation
- Excellent peak shape using low salt mobile phase, ideal for microbore
- High pH stability

ODP2 HP series is a polymer-based [poly(hydroxymethacrylate)] column for reversed-phase chromatography. The efficiency of ODP2 HP is improved over most resin-based columns, with typical theoretical plate number >65,000 per meter.

ODP2 HP Columns

Packing	Format	i.d. x Length	Part No.
ODP2 HP-4B, 5µm	Analytical	4.6 x 50mm	F7622001
ODP2 HP-4D, 5µm	Analytical	4.6 x 150mm	F7622002
ODP2 HP-4E, 5µm	Analytical	4.6 x 250mm	F7622003
ODP2 HPG-4A, 5µm	Analytical	4.6 x 10mm	F6714010
ODP2 HP-2B, 5µm	Analytical	4.6 x 50mm	F7622004
ODP2 HP-2D, 5µm	Analytical	4.6 x 150mm	F7622005
ODP2 HPG-2A, 5µm	Analytical	4.6 x 10mm	F6714011

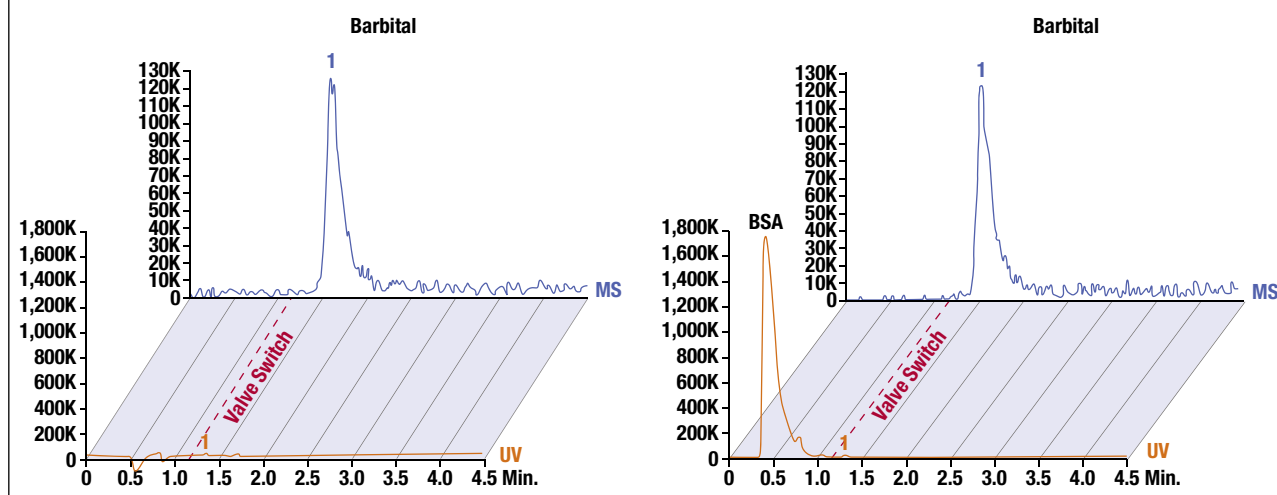
ODP2 HP Columns Specifications

Packing	Theoretical Plate Number (per column)	Theoretical Plate Number (per meter)	Particle Size	pH Range	i.d. x Length
ODP2 HP-4B	≥3500	70,000	5µm	3–12	4.6 x 50mm
ODP2 HP-4D	≥13,000	86,000	5µm	3–12	4.6 x 150mm
ODP2 HP-4E	≥17,000	68,000	5µm	3–12	4.6 x 250mm
ODP2 HPG-4A	guard column	guard column	5µm	3–12	4.6 x 10mm
ODP2 HP-2B	≥3000	60,000	5µm	3–12	2.0 x 50mm
ODP2 HP-2D	≥7000	46,600	5µm	3–12	2.0 x 150mm
ODP2 HPG-2A	guard column	guard column	5µm	3–12	2.0 x 10mm

Drug in Biological Fluid

Microbore is effective for the high sensitivity analysis of drugs; however, when protein is present and enters the MS (Mass detector), it contaminates the MS or suppresses ionization of the sample. Often pretreatment does not remove protein thoroughly. Drugs in biological fluid are hard to analyze because protein co-elutes with the component of interest. The target drug receives ion suppression from the protein and appears as a small peak.

ODP2 HP can separate the target drug from protein by eluting protein early. The result of barbital analysis with BSA using microbore is shown as below. Barbital was introduced into the MS by a switching valve after BSA was eluted, and barbital was detected without any influence of ion suppression.



more info

For other Shodex® columns, including KW400, KF-400, SB-800, KF-400, KF-600, KF-800, NH2P, Ion Exchange, affinity, and sugar columns, visit www.discoverysciences.com.

analytical hplc

Waters® Spherisorb® Columns

All Waters® columns are packed by Grace to our highest QC standards. Spherisorb® columns have 80Å pores and 220m²/g surface area. ODS-1 is unendcapped with a 6% carbon load, and ODS-2 is endcapped with a 12% carbon load.

Spherisorb® HPLC Columns

Packing	Format	i.d. x Length	Part No.	Waters® Fittings Part No.
ODS-1, 5µm	Analytical	4.6 x 150mm	8441	8443
	Analytical	4.6 x 250mm	8364	8357
ODS-2, 3µm	Analytical	4.6 x 100mm	8487	8489
	Analytical	4.6 x 150mm	8558	8560
ODS-2, 5µm	Analytical	4.6 x 150mm	8545	8547
	Analytical	4.6 x 250mm	8736	8738
C8, 3µm	Analytical	4.6 x 100mm	8561	8563
	Analytical	4.6 x 150mm	8609	8611
C8, 5µm	Analytical	4.6 x 150mm	8571	8573
	Analytical	4.6 x 250mm	8744	8746
C6, 5µm	Analytical	4.6 x 150mm	8211	8217
	Analytical	4.6 x 250mm	8223	8224
Phenyl, 5µm	Analytical	4.6 x 150mm	8689	8691
	Analytical	4.6 x 250mm	8752	8754
Cyano, 5µm	Analytical	4.6 x 150mm	8713	8715
	Analytical	4.6 x 250mm	8361	8362
Amino, 5µm	Analytical	4.6 x 150mm	8739	8741
	Analytical	4.6 x 250mm	8371	8372
Silica, 3µm	Analytical	4.6 x 100mm	8382	8383
	Analytical	4.6 x 150mm	8554	8556
Silica, 5µm	Analytical	4.6 x 150mm	8389	8391
	Analytical	4.6 x 250mm	8376	8377
SAX, 5µm	Analytical	4.6 x 250mm	8765	8767
SCX, 5µm	Analytical	4.6 x 250mm	8888	8889

Spherisorb® All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
ODS-1, 5µm	4.6 x 7.5mm	3	96218
ODS-2, 5µm	4.6 x 7.5mm	3	96219
C8, 5µm	4.6 x 7.5mm	3	96220
C6, 5µm	4.6 x 7.5mm	3	96221
Phenyl, 5µm	4.6 x 7.5mm	3	96226
Cyano, 5µm	4.6 x 7.5mm	3	96225
Amino, 5µm	4.6 x 7.5mm	3	96224
Silica, 5µm	4.6 x 7.5mm	3	96227
SAX, 5µm	4.6 x 7.5mm	3	96228
SCX, 5µm	4.6 x 7.5mm	3	96217
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

*All-Guard™ holder required. Other particle sizes available.

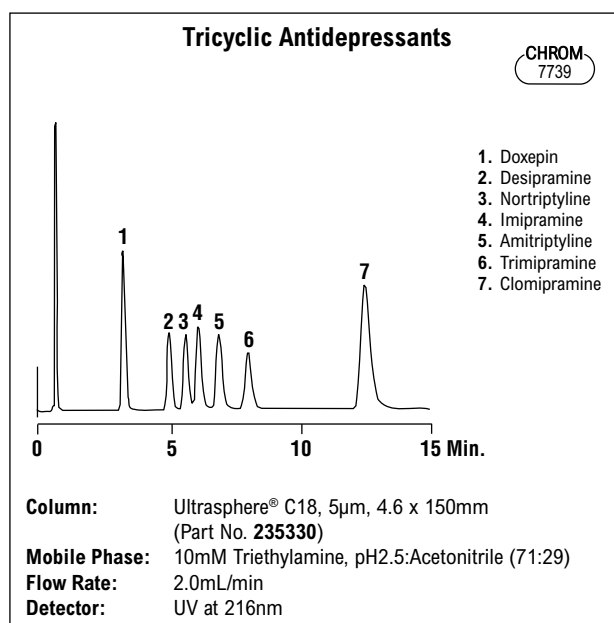
more info

If you like Spherisorb®, try Grace's lower cost Allsphere™ on page 59.

Beckman® Ultrasphere® Columns

- Low metal content for symmetrical peaks
- Narrow particle size range for high efficiency
- Maximum surface coverage for long column lifetimes

All Ultrasphere® columns are packed by Grace to our highest QC standards. Ultrasphere® columns are highly endcapped to reduce silanol interactions and have a narrow particle size range for excellent resolving power.



Ultrasphere® HPLC Columns

Packing	Format	i.d. x Length	Part No.
C18, 3µm	Analytical	4.6 x 75mm	244254
C18, 5µm	Microbore	2.0 x 150mm	237390
	Microbore	2.0 x 250mm	244434
	Analytical	4.6 x 150mm	235330
	Analytical	4.6 x 250mm	235329
C18-IP, 5µm	Prep	10 x 250mm	235328
	Analytical	4.6 x 150mm	235334
C8, 5µm	Analytical	4.6 x 250mm	235335
	Analytical	4.6 x 150mm	235333
Cyano, 5µm	Analytical	4.6 x 250mm	235332
	Analytical	4.6 x 150mm	244070
Silica, 5µm	Analytical	4.6 x 250mm	244071
	Analytical	4.6 x 150mm	235342
	Analytical	4.6 x 250mm	235341

Ultrasphere® Guard Columns

Description	i.d. x Length	Qty.	Part No.
C18, 5µm	4.6 x 45mm	ea	243536
C18-IP, 5µm	4.6 x 45mm	ea	243534
C8, 5µm	4.6 x 45mm	ea	243532
Cyano, 5µm	4.6 x 45mm	ea	243538
Silica, 5µm	4.6 x 45mm	ea	243530

Ultrasphere® guard columns connect directly to the analytical column with a zero dead volume connector, or a small piece of tubing with finger tight fittings. No holder required.

ZirChrom® Columns

- Better pH and thermal stability than silica-based columns
- More efficient than polymer-based columns
- Widest range of reversed-phase selectivities

ZirChrom Separations, Inc. produces HPLC columns based on 3µm zirconia (zirconium oxide) particles. These columns are more rugged and durable than silica-based columns and more efficient than polymer-based columns. ZirChrom® normal-phase and reversed-phase columns can be used across the entire pH range (1–14) and are thermally stable to 200°C. Additionally, zirconia's silanol-free surface produces sharp, symmetrical peaks for amines without mobile phase modifiers.

ZirChrom® Packings		
Packing	Functional Group	Mode
DiamondBond™-C18 PBD	Octadecylsilane	Reversed-Phase
	Polybutadiene	Reversed-Phase & Secondary Ionic
PS	Polystyrene	Reversed-Phase (Low Retention)
CARB	Graphitic Carbon	Reversed-Phase (High Retention)
PHASE	Zirconia	Normal-Phase
EZ	—	Reversed-Phase
MS	—	Reversed-Phase

- **DiamondBond®-C18** — ideal for microbore applications and acidic compounds. pH range 1–14
- **ZirChrom®-PBD** — for general purpose applications and basic compounds; similar to ODS for non-electrolytes. pH range 1–14
- **ZirChrom®-PS** — ideal for highly aqueous mobile phases; an alternative to ODS selectivity. pH range 1–14
- **ZirChrom®-CARB** — for diastereomers/geometric isomers; greatest difference in selectivity compared to ODS. pH range 1–14
- **ZirChrom®-Phase** — the bare zirconia particle. The columns are used as a normal-phase alternative to silica. pH range 1–14
- **ZirChrom®-EZ** — unique selectivity with mobile phase selectivity. pH range 1–10
- **ZirChrom®-MS** — low column bleed makes it ideal for microbore applications. pH range 1–10

ZirChrom® Specifications	
Pore Size	300Å
Particle Size	3µm, 5µm
Surface Area	30m²/g
pH Range	1–14 (EZ and MS 1–10)
Max. Temperature	200°C

EZ and MS HPLC Columns

- Unique selectivity on a zirconia platform
- Mobile phase flexibility, including microbore compatible buffers
- Stable from pH 1–10

The deactivation of Lewis acid sites on the zirconia surface allows for the chromatography of Lewis base analytes using volatile mobile phase additives, including conventional microbore compatible buffers such as acetate and formate.

ZirChrom® HPLC Columns

Packing	Format	i.d. x Length	Part No.
<i>DiamondBond®, 3µm</i>	Microbore	2.1 x 100mm	DB01-1021
	Microbore	2.1 x 150mm	DB01-1521
	Analytical	4.6 x 50mm	DB01-0546
	Analytical	4.6 x 100mm	DB01-1046
<i>PBD, 3µm</i>	Analytical	4.6 x 150mm	DB01-1546
	Microbore	2.1 x 100mm	ZR03-1021
	Microbore	2.1 x 150mm	ZR03-1521
	Analytical	4.6 x 50mm	ZR03-0546
<i>CARB, 3µm</i>	Analytical	4.6 x 100mm	ZR03-1046
	Analytical	4.6 x 150mm	ZR03-1546
	Microbore	2.1 x 100mm	ZR09-1021
	Microbore	2.1 x 150mm	ZR09-1521
<i>PS, 3µm</i>	Analytical	4.6 x 50mm	ZR09-0546
	Analytical	4.6 x 100mm	ZR09-1046
	Analytical	4.6 x 150mm	ZR09-1546
	Microbore	2.1 x 100mm	ZR01-1021
<i>PHASE, 3µm</i>	Microbore	2.1 x 150mm	ZR01-1521
	Analytical	4.6 x 100mm	ZR01-1046
	Analytical	4.6 x 150mm	ZR01-1546
	Analytical	4.6 x 250mm	ZR02-2546
<i>EZ, 3µm</i>	Microbore	2.1 x 50mm	EZ01-0521
	Microbore	2.1 x 100mm	EZ01-1021
	Microbore	2.1 x 150mm	EZ01-1521
	Microbore	2.1 x 250mm	EZ01-2521
<i>MS, 3µm</i>	Analytical	4.6 x 50mm	EZ01-0546
	Analytical	4.6 x 100mm	EZ01-1046
	Analytical	4.6 x 150mm	EZ01-1546
	Analytical	4.6 x 250mm	EZ01-2546
<i>EZ, 5µm</i>	Analytical	4.6 x 50mm	EZ01-05215
	Microbore	2.1 x 100mm	EZ01-10215
	Microbore	2.1 x 150mm	EZ01-15215
	Microbore	2.1 x 250mm	EZ01-25215
<i>MS, 5µm</i>	Analytical	4.6 x 50mm	EZ01-05465
	Analytical	4.6 x 100mm	EZ01-10465
	Analytical	4.6 x 150mm	EZ01-15465
	Analytical	4.6 x 250mm	EZ01-25465
<i>MS, 3µm</i>	Microbore	2.1 x 50mm	MS01-0521
	Microbore	2.1 x 100mm	MS01-1021
	Microbore	2.1 x 150mm	MS01-1521
	Microbore	2.1 x 250mm	MS01-2521
<i>MS, 5µm</i>	Analytical	4.6 x 50mm	MS01-0546
	Analytical	4.6 x 100mm	MS01-1046
	Analytical	4.6 x 150mm	MS01-1546
	Analytical	4.6 x 250mm	MS01-2546
<i>MS, 3µm</i>	Microbore	2.1 x 50mm	MS01-05215
	Microbore	2.1 x 100mm	MS01-10215
	Microbore	2.1 x 150mm	MS01-15215
	Microbore	2.1 x 250mm	MS01-25215
<i>MS, 5µm</i>	Analytical	4.6 x 50mm	MS01-05465
	Analytical	4.6 x 100mm	MS01-10465
	Analytical	4.6 x 150mm	MS01-15465
	Analytical	4.6 x 250mm	MS01-25465

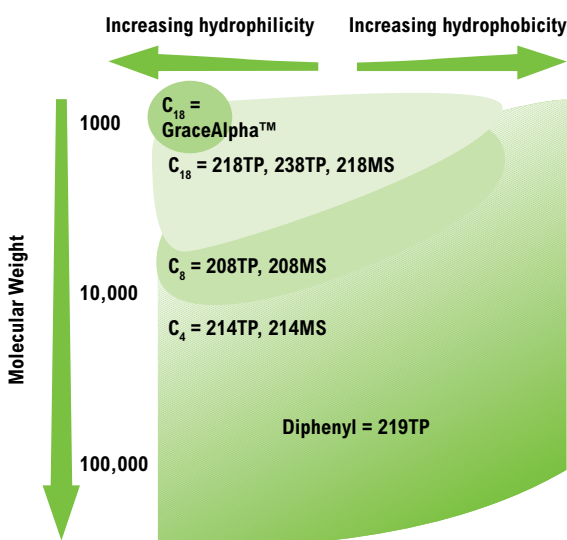
Vydac® Large Molecule Columns

Vydac® has always been a trusted name in bioseparations, now, with technology acquired by Grace over the past few years, we have expanded this expertise further. New Grace® large molecule columns range from nano, capillary to micro, analytical to preparative columns.

Separate biomolecules from small peptides to large intact proteins with the Vydac® family of products which includes reversed-phase, normal-phase, ion-exchange, and affinity phases. Our extensive applications library offers solid method development guidance, and our technical experts provide insight to even the most unusual separation challenges. Whether your primary analysis consideration is speed, MS compatibility, resolution, or recovery, we have a solution.

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.



Phase	Simple Enzymatic Digests (<12 proteins)	Complex Enzymatic Digests (>12 proteins)	Biomolecules 0-5K MW	Biomolecules 5-10K MW	Biomolecules >10K MW	Un-denatured Intact Proteins	Antibodies	Oligonucleotides	Oligosaccharides	Comments
218MS (C18) See page 85–87	●		●							Polymeric bonding highest hydrophobic interaction and unique geometric selectivity
238MS (C18) See page 85–87	◐		●							Monomeric bonding offers increased peptide interaction and generally yields higher peak counts. Different selectivity compared to 218MS.
208MS (C8) See page 85–87				●				◐		Lower hydrophobicity is better for larger molecules
214MS (C4) See page 85–87					●	●	●	●		Ideal for hydrophobic proteins, or when minimal organic is desired
219MS (Diphenyl) See page 85–87			◐	◐	◐		◐			Lowest capacity, highly selective for proteins with aromatic sidechains
Everest® C18 See page 88–89		●							●	Maximum surface coverage for highest resolution of complex samples
ProZap™ See page 93–94				◐	●	●	●	●	●	Sub 2µm, in Expedite™ format optimized for fast analysis
218TP (C18) See page 90–92	◐		◐							First generation media with extensive applications library
214TP (C4) See page 90–92					◐	◐	◐			First generation media with extensive applications library

related products

Looking for large molecule prep columns?
See pages 156–161.

www.discoverysciences.com

Vydac® MS Introduction

New Generation Columns with Unsurpassed Resolution, Sensitivity, and Recovery

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

Vydac® MS columns are the latest development in the ongoing effort to provide the best reversed-phase HPLC columns for biomolecule. A surface treatment and proprietary bonding process gives Vydac® MS columns a unique selective not found anywhere else. A variety of reversed phases makes this product line suitable for small peptides to large intact, undenatured proteins.

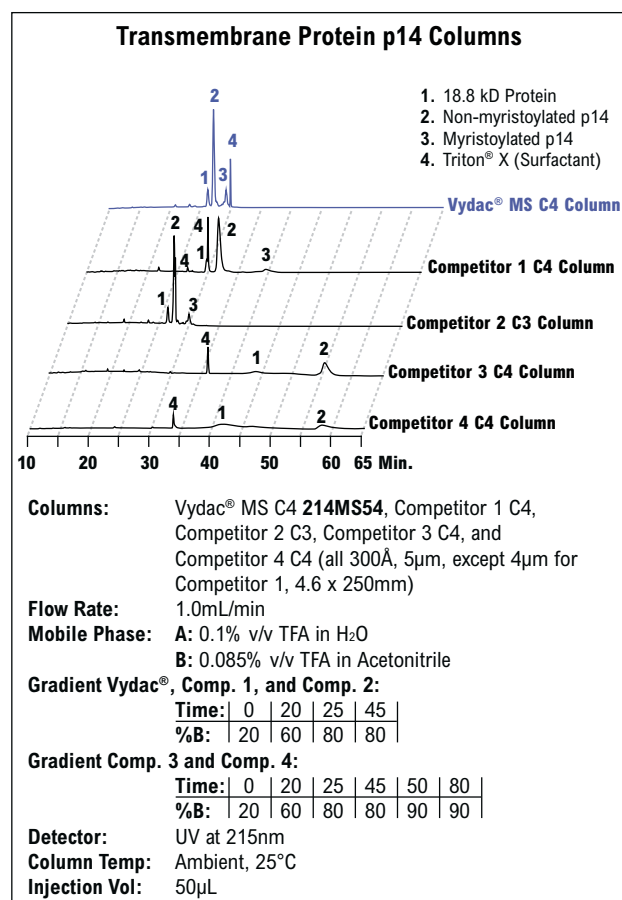
VYDAC


7300

MS Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
208MS C8	Silica	Spheroidal	5µm	300Å	70m ² /g	5%	Polymeric	Yes	L7
214MS C4	Silica	Spheroidal	5µm	300Å	70–110m ² /g	3%	Polymeric	Yes	L26
218MS C18	Silica	Spheroidal	3, 5, 10, 10–15µm	300Å	60–110m ² /g	8%	Polymeric	Yes	L1
238MS C18	Silica	Spheroidal	5µm	300Å	70m ² /g	4%	Monomeric	Yes	L1
219MS Di-Phe	Silica	Spheroidal	5µm	300Å	70m ² /g	4%	Polymeric	Yes	—

Unique Selectivity

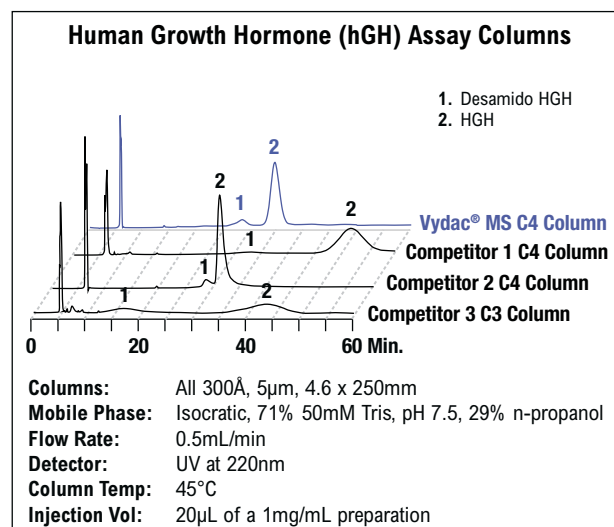
A sample of bovine fetuin, a 36kD glycoprotein, was digested with trypsin. Some of the sample components interfere with the peptide separation on the Competitor 1 and Competitor 2 columns and appear as a chromatographic “hump” with peaks riding on top. The unique selectivity of Vydac® MS columns solves these separation problems



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

Unsurpassed Resolution and Peak Symmetry

Vydac® MS C4 columns provide the overall best performance for hGH and desamido hGH analysis. Competitive columns show significant, undesirable interaction of hGH with the stationary phase.



more info

For additional protein and peptide applications, see application section pages 429–441.

more applications

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

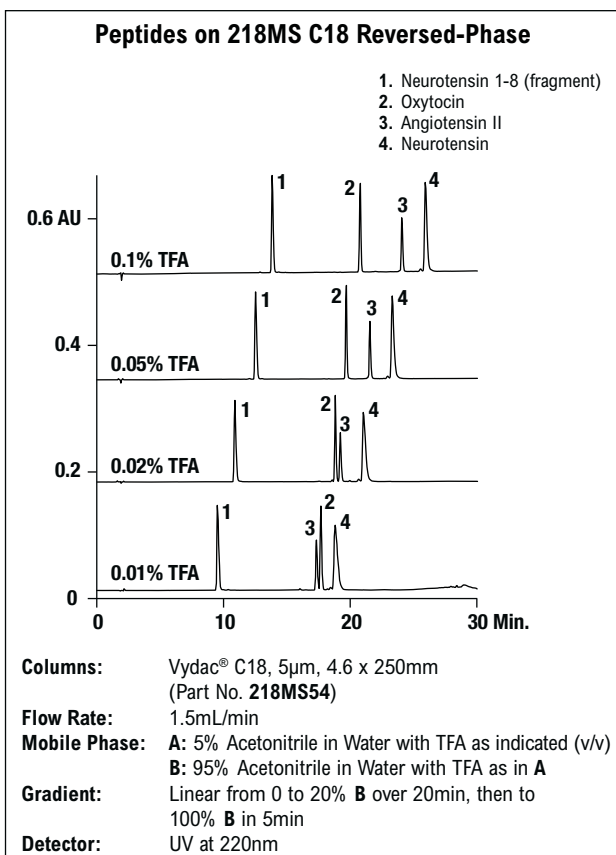


analytical hplc

Vydac® MS Columns

Excellent Peak Shape with Little or No TFA

It is common practice for protein and peptide separations to include an acidic modifier such as TFA in the mobile phase. TFA masks basic entities, reducing mixed-mode retention, and improving peak symmetry. TFA also changes retention and selectivity for different analytes, and its concentration can be adjusted to optimize a separation. Unfortunately TFA is UV absorbent and contributes background at low UV wavelengths. Also It is especially problematic with electrospray MS where it interferes with ion generation, called "quenching", and reduces MS sensitivity.



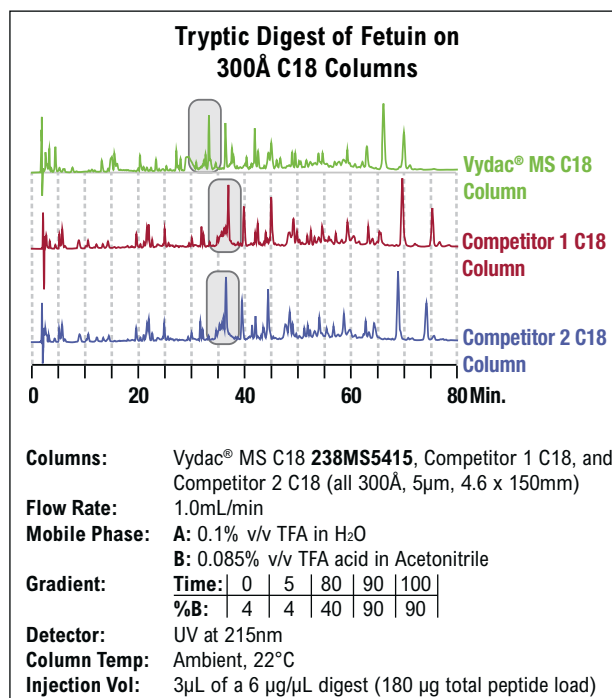
more applications

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



Hydrophobic Proteins

Transmembrane proteins are hydrophobic proteins which bind to cell membranes and are particularly difficult to separate. Vydac® MS columns provide excellent selectivity and peak shape for these molecules. In this case, a hydrophobic transmembrane protein was separated from a synthetic myristoylated derivative and other cellular components.

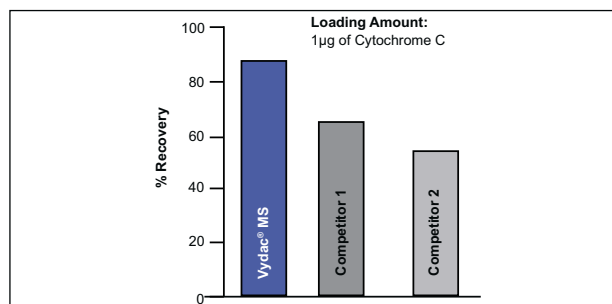


The Vydac® column provides better separation and recovery for a highly hydrophobic membrane protein (RRV p14) and its fatty acid modified (myristoylated) form, a component of a potentially new vaccine delivery system.

High Protein Recovery for Higher Sensitive, Ideal for Preparative Chromatography

Surface chemistry reduces adsorption of proteins for higher recoveries and also increases mass loading.

% Recovery at Low Protein Load: Vydac® MS C4 vs. 2 Competitors



Vydac® MS C4 column provides more than 20% more loading of Cytochrome C.



Vydac® MS Columns

Vydac® MS Analytical Columns

Particle Size	Columns					Recommended Guards	
	i.d.	50mm	100mm	150mm	250mm	Guard Kit ¹	Guard Cartridge ²
214 MS C4							
5µm	1.0mm	214MS5105	214MS5110	214MS5115	214MS51	214GK51MS	214GD51MS
	2.1mm	214MS5205	214MS5210	214MS5215	214MS52	214GK52MS	214GD52MS
	3.2mm	—	—	—	214MS53	214GK54MS	214GD54MS
	4.6mm	214MS5405	214MS5410	214MS5415	214MS54	214GK54MS	214GD54MS
208 MS C8							
5µm	1.0mm	208MS5105	208MS5110	208MS5115	208MS51	208GK51MS	208GD51MS
	2.1mm	208MS5205	208MS5210	208MS5215	208MS52	208GK52MS	208GD52MS
	3.2mm	—	—	—	208MS53	208GK54MS	208GD54MS
	4.6mm	208MS5405	208MS5410	208MS5415	208MS54	208GK54MS	208GD54MS
218 MS Polymeric C18							
5µm	1.0mm	218MS5105	218MS5110	218MS5115	218MS51	218GK51MS	218GD51MS
	2.1mm	218MS5205	218MS5210	218MS5215	218MS52	218GK52MS	218GD52MS
	3.2mm	—	—	—	218MS53	218GK54MS	218GD54MS
	4.6mm	218MS5405	218MS5410	218MS5415	218MS54	218GK54MS	218GD54MS
238 MS Monomeric C18							
5µm	1.0mm	238MS5105	238MS5110	238MS5115	238MS51	238GK51MS	238GD51MS
	2.1mm	238MS5205	238MS5210	238MS5215	238MS52	238GK52MS	238GD52MS
	3.2mm	—	—	—	238MS53	238GK54MS	238GD54MS
	4.6mm	238MS5405	238MS5410	238MS5415	238MS54	238GK54MS	238GD54MS
219 MS Diphenyl							
5µm	1.0mm	219MS5105	219MS5110	219MS5115	219MS51	219GK51MS	219GD51MS
	2.1mm	219MS5205	219MS5210	219MS5215	219MS52	219GK52MS	219GD52MS
	3.2mm	—	—	—	219MS53	219GK54MS	219GD54MS
	4.6mm	219MS5405	219MS5410	219MS5415	219MS54	219GK54MS	219GD54MS

¹A guard kit includes a holder and one guard cartridge; ²Guard cartridge units include two guard cartridges.

Vydac® MS Nano and Capillary Columns

	i.d.	50mm	100mm	150mm	250mm
214 MS C4					
5µm	75µm	214MS5.07505	214MS5.07510	214MS5.07515	214MS5.07525
	150µm	214MS5.1505	214MS5.1510	214MS5.1515	214MS5.1525
	300µm	214MS5.305	214MS5.310	214MS5.315	214MS5.325
	500µm	214MS5.505	214MS5.510	214MS5.515	214MS5.525
208 MS C8					
5µm	75µm	208MS5.07505	208MS5.07510	208MS5.07515	208MS5.07525
	150µm	208MS5.1505	208MS5.1510	208MS5.1515	208MS5.1525
	300µm	208MS5.305	208MS5.310	208MS5.315	208MS5.325
	500µm	208MS5.505	208MS5.510	208MS5.515	208MS5.525
218 MS Polymeric C18					
3µm	75µm	218MS3.07505	218MS3.07510	218MS3.07515	218MS3.07525
	150µm	218MS3.1505	218MS3.1510	218MS3.1515	218MS3.1525
	300µm	218MS3.305	218MS3.310	218MS3.315	218MS3.325
	500µm	218MS3.505	218MS3.510	218MS3.515	218MS3.525
5µm	75µm	218MS5.07505	218MS5.07510	218MS5.07515	218MS5.07525
	150µm	218MS5.1505	218MS5.1510	218MS5.1515	218MS5.1525
	300µm	218MS5.305	218MS5.310	218MS5.315	218MS5.325
	500µm	218MS5.505	218MS5.510	218MS5.515	218MS5.525
238 MS Monomeric C18					
5µm	75µm	238MS5.07505	238MS5.07510	238MS5.07515	238MS5.07525
	150µm	238MS5.1505	238MS5.1510	238MS5.1515	238MS5.1525
	300µm	238MS5.305	238MS5.310	238MS5.315	238MS5.325
	500µm	238MS5.505	238MS5.510	238MS5.515	238MS5.525
219 MS Diphenyl					
5µm	75µm	219MS5.07505	219MS5.07510	219MS5.07515	219MS5.07525
	150µm	219MS5.1505	219MS5.1510	219MS5.1515	219MS5.1525
	300µm	219MS5.305	219MS5.310	219MS5.315	219MS5.325
	500µm	219MS5.505	219MS5.510	219MS5.515	219MS5.525

Vydac® MS Guard Cartridges

Packing	i.d. x Length	Qty.	Part No.
C18 Polymeric, 5µm* Capillary Guard**	0.150 x 10mm	ea	218MS5C0115
	0.300 x 10mm	ea	218MS5C0130
	1.0 x 10mm	2	218GD51MS
C4, 5µm* Capillary Guard**	0.150 x 10mm	ea	214MS5C0115
	0.300 x 10mm	ea	214MS5C0130
	1.0 x 10mm	2	214GD51MS

Vydac® MS Guard Cartridges (continued)

Packing	Qty.	Part No.
Capillary Guard Cartridge Holder		
Guard Holder for 0.100mm and 0.150mm Guards	ea	GR-3710E
Guard Holder for 0.300mm and 0.500mm Guards	ea	GR-3710A
Guard Holder for 1mm Guards	ea	GCH1

*All-Guard™ holder required. Other particle sizes available.

**1.5µm and 5µm particles and other dimensions are available.

Vydac® Everest® Columns Introduction

High Resolution for Complex Peptide Samples

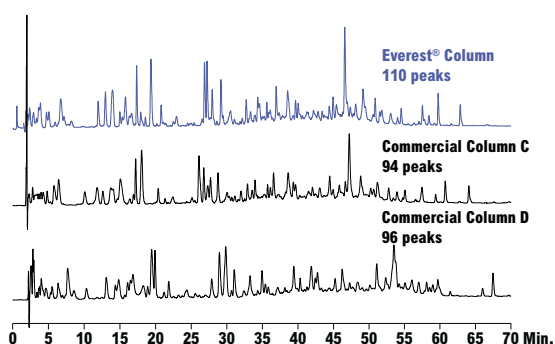
- High resolution of complex peptide digests
- Unique selectivity for both hydrophilic and hydrophobic peptides
- Exceptional microbore sensitivity with little or no TFA in the mobile phase

Everest® columns provide exceptionally high resolution for complex peptide digest separations. Unique selectivity and sensitivity are the result of new bonding technology that improves C18 surface coverage and deactivates residual silanols. Previously, the best 300Å C18 chemistries have had carbon coverage in the 2.8 to 3.6µmol/m² range. Everest® C18 coverage is in excess of 4µmol/m² and approximates the theoretical limit based on surface area. This increased shielding of the base silica increases column life and reduces the amount of TFA required to shield the silica.



Everest® Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
238EV C18	Silica	Spheroidal	5, 10, 10–15, 15–20µm	300Å	70–110m²/g	6%	Monomeric	Yes	L1

Tryptic Digest of Bovine Serum Albumin



Column: Vydac® Everest® C18, 300Å, 5µm, 4.6 x 150mm
Commercial 300Å C18 columns 4.6 x 150mm (Part No. 238EV5415)

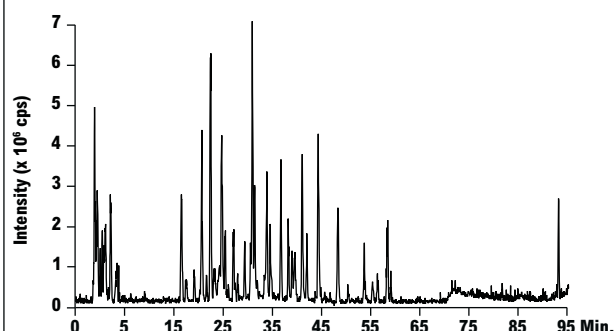
Mobile Phase: A: 0.1% TFA in Water
B: 0.085% TFA in Acetonitrile

Gradient: Time: 0 | 5 | 80 | 90 | 100
%B: 4 | 4 | 40 | 90 | 90

Flow Rate: 1.0mL/min

Detector: UV at 215nm

Base Peak Chromatogram of Tryptic Digest of BSA



Column: Vydac® Everest® C18, 300Å, 5µm, 300µm x 150mm; (Part No. 238EV5.315)

Mobile phase: A: 0.1% v/v Formic Acid in Water
B: 0.1% v/v Formic Acid in Acetonitrile

Gradient: Time: 0 | 5 | 75 | 85 | 95
%B: 4 | 4 | 40 | 90 | 90

Flow Rate: 5µL/min

Column Temp: 22°C

Detector: MS + ESI

Everest® columns outperform competitor columns at higher peptide loads, by providing higher-resolution separations (average of 17% higher peak counts than competitor columns tested).

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

Everest® 300Å C18

Particle Size		Columns				Recommended Guards	
	i.d.	50mm	100mm	150mm	250mm	Guard Kit ¹	Guard Cartridge ²
Everest® Analytical Columns 238EV C18							
5µm	1.0mm ³	238EV5105	238EV5110	238EV5115	238EV51	238GK51EV	238GD51EV
	2.1mm ³	238EV5205	238EV5210	238EV5215	238EV52	238GK52EV	238GD52EV
	4.6mm ³	238EV5405	238EV5410	238EV5415	238EV54	238GK54EV	238GD54EV
Everest® Capillary Columns 238ZU C18							
5µm	75µm	238EV5.07505	238EV5.07510	238EV5.07515	238EV5.07525	—	—
	150µm	238EV5.1505	238EV5.1510	238EV5.1515	238EV5.1525	—	—
	300µm	238EV5.305	238EV5.310	238EV5.315	238EV5.325	—	—
	500µm	238EV5.505	238EV5.510	238EV5.515	238EV5.525	—	—

¹A guard kit includes a holder and one guard cartridge. ²Guard cartridge units include two guard cartridges. ³Titanium frits are standard in column diameters 4.6mm and smaller.

Everest® Guard Cartridges

Packing	i.d. x Length	Qty.	Part No.
C18, 5µm* Capillary Guard**	0.150 x 10mm	ea	238EV5C0115
	0.300 x 10mm	ea	238EV5C0130
	1.0 x 10mm	2	238GD51EV

*All-Guard™ holder required. Other particle sizes available.

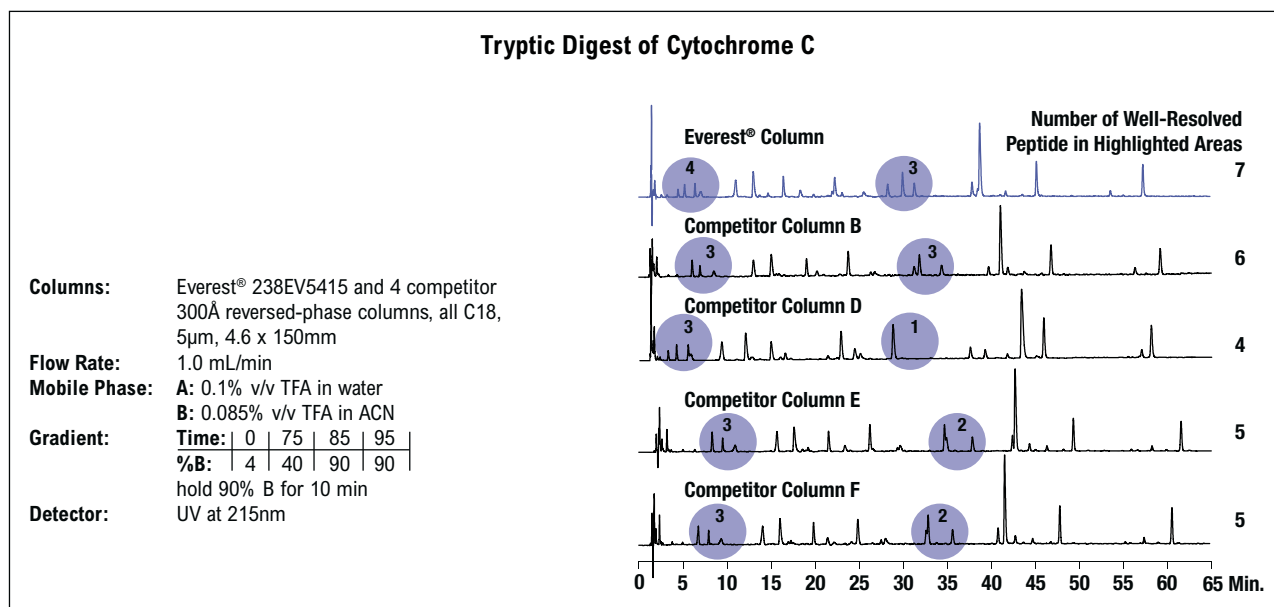
**1.5µm and 5µm particles and other dimensions are available.

Everest® Guard Cartridges (continued)

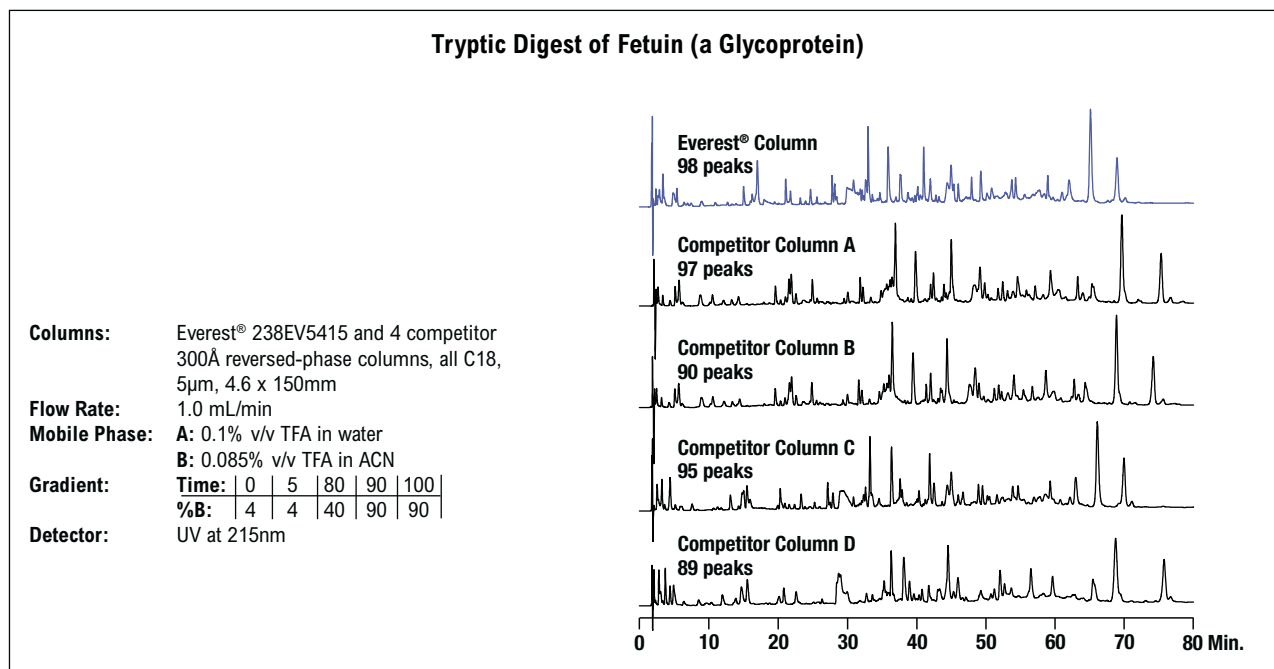
Packing	Qty.	Part No.
Capillary Guard Cartridge Holder		
Guard Holder for 0.100mm and 0.150mm Guards	ea	GR-3710E
Guard Holder for 0.300mm and 0.500mm Guards	ea	GR-3710A
Guard Holder for 1mm Guards	ea	GCH1



Vydac® Everest® Columns



For a tryptic digest of Cytochrome C, an Everest® column offers unique selectivity which allows the best separation of a group of hydrophilic and hydrophobic peptides. To assess resolution, chromatograms of tryptic digests of several proteins on an Everest® column and several other commercial 300Å C18 reversed-phase columns were compared. Peak counts were based on detection by automated chromatography software with parameters set identically for all columns. In the analyses of a tryptic digest of cytochrome c, specific regions of the chromatogram were examined for the number of peaks resolved. The Everest® column demonstrated unique selectivity for both hydrophilic and hydrophobic peptides.



A tryptic digest of fetuin injected at high load on an Everest® column provided higher peak counts compared to four commercial columns. Peak numbers shown are the average of three separations on each column.

more applications

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



analytical hplc

Vydac® TP Columns

Industry Standard for Polypeptide Separations

- Referred in over 9000 patents, Vydac® 300Å TP is the industry-standard, for peptide, protein, and large molecule separations
- Polymeric bonded phases have exceptionally long column lifetime and negligible phase leaching
- Extensive applications library based on over two decade's experience



Vydac® TP reversed-phase material consists of aliphatic groups bonded to the surface of 300Å pore diameter silica. The large pores of the 300Å TP silica give polypeptide molecules complete access to the interior of the silica pores. The unique process by which we manufacture Vydac® TP silica results in high-purity, synthetic silica with carefully controlled characteristics. Vydac® TP silica is the standard that has defined large pore HPLC silica for polypeptide separations for nearly two decades.

Vydac® TP Columns										
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code	
101TP Sil	Silica	Spheroidal	5, 10, 10–15, 15–20µm	300Å	70–110m ² /g	—	unbonded	—	L3	
201TP C18	Silica	Spheroidal	5, 7, 10, 10–15, 15–20µm	300Å	70–90m ² /g	8%	Polymeric	No	L1	
202TP C18	Silica	Spheroidal	3, 5, 10µm	300Å	60–90m ² /g	9%	Polymeric	No	L1	
208TP C8	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m ² /g	5%	Polymeric	Yes	L7	
214TP C4	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m ² /g	3%	Polymeric	Yes	L26	
218TP C18	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m ² /g	8%	Polymeric	Yes	L1	
219TP Di-Phe	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m ² /g	4%	Polymeric	Yes	—	
238TP C18	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m ² /g	4%	Monomeric	Yes	L1	

Vydac® 218TP C18 Columns

Vydac® 218TP is a polymerically bonded endcapped n-octadecyl reversed-phase based on 300Å TP silica.

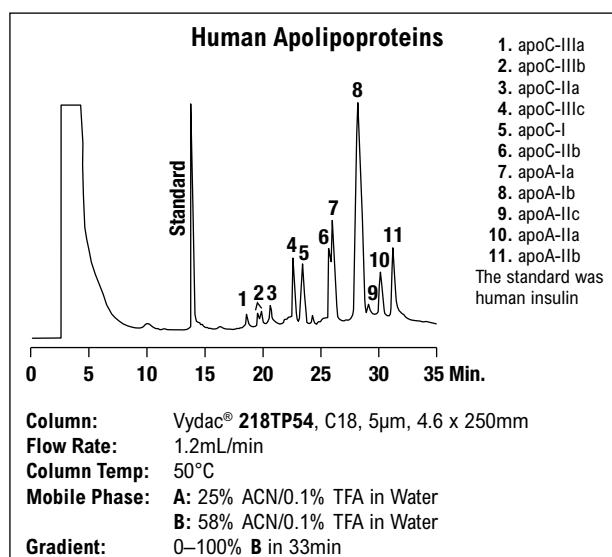
Applications

Vydac® 218TP reversed-phase columns are recommended for the separation of:

- Small polypeptides less than 4000–5000 MW
- Enzymatic digest fragments
- Natural and synthetic peptides
- Multi-ring compounds

Specific examples include:

- Tryptic digests
- *S. aureus* V8 digests
- Synthetic peptides
- Natural peptides
- Peptide studies



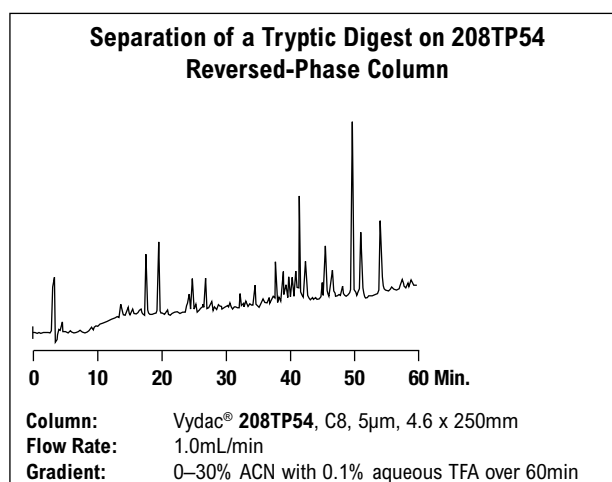
Vydac® 208TP C8 Reversed-Phase

Vydac® 208TP is a polymerically bonded endcapped n-octyl reversed-phase based on 300Å TP silica.

Applications

Vydac® 208TP reversed-phase columns are recommended for the separation of:

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

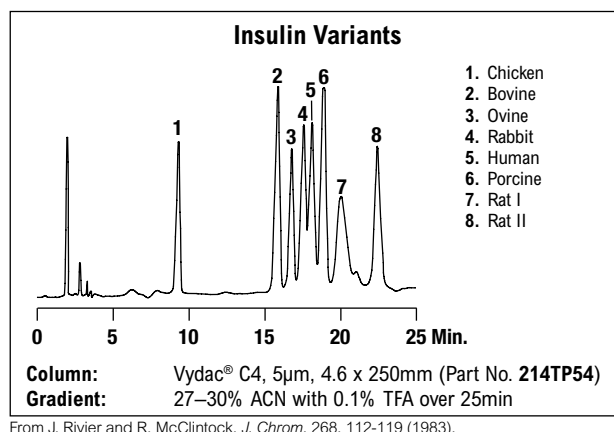


Vydac® 214TP C4

Vydac® 214TP is a polymerically bonded endcapped n-butyl reversed-phase based on 300Å TP silica. 214ATP is a less extensively endcapped C4 that has been found more suitable for resolution of degradation products in analysis of biosynthetic human growth hormone.

Applications

- Glycoproteins
- Hemoglobin variants
- Histones
- Human growth hormone
- Insulin variants
- Membrane proteins



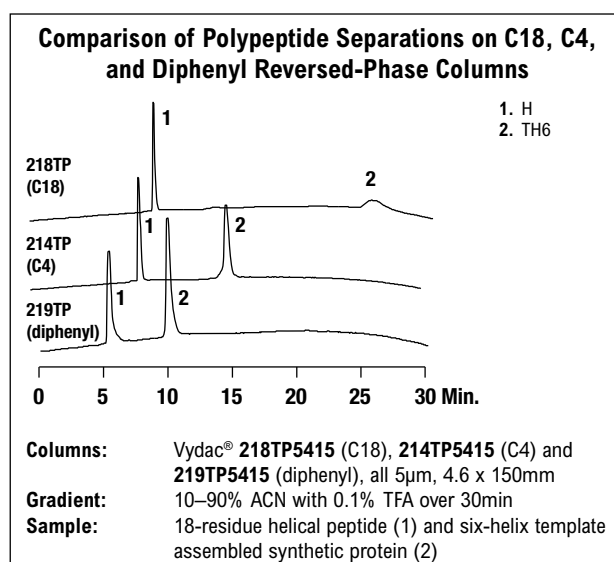
From J. Rivier and R. McClintock, *J. Chrom.* 268, 112-119 (1983).

Vydac® 219TP Diphenyl Reversed-Phase

Vydac® 219TP is a polymerically bonded endcapped diphenyl reversed-phase based on 300Å TP silica. It combines moderate retentivity with unique selectivity.

Applications

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



Vydac® 238TP C18 Reversed-Phase

Vydac® 238TP is a monomerically bonded endcapped n-octadecyl reversed-phase based on 300Å TP silica.

Applications

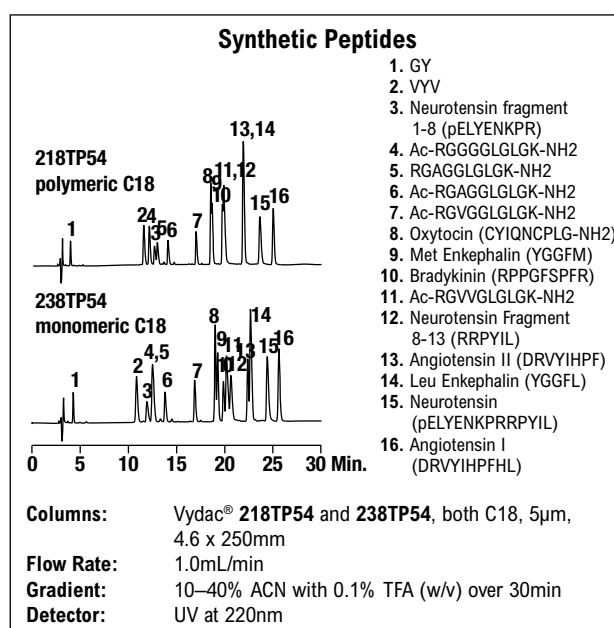
Monomerically bonded C18 provides an alternative to 218TP polymeric C18 with subtle differences in selectivity. The combination of these adsorbents can reveal analytes that may be hidden on a single C18 column.

more info

For more protein and peptide applications, see the application section pages 429-441.

more applications

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



Vydac® TP Columns

Vydac® TP Analytical Columns

Particle Size	Columns					Recommended Guards	
	i.d.	50mm	100mm	150mm	250mm	Guard Kit ¹	Guard Cartridge ²
218TP C18							
3µm	4.6mm	218TP3405	218TP3410	—	—	218GK34	218GD34
5µm	1.0mm	218TP5105	218TP5110	218TP5115	218TP51	218GK51	218GD51
	2.1mm	218TP5205	218TP5210	218TP5215	218TP52	218GK52	218GD52
	3.2mm	218TP5305	218TP5310	218TP5315	218TP53	218GK54	218GD54
	4.6mm	218TP5405	218TP5410	218TP5415	218TP54	218GK54	218GD54
208TP C8							
3µm	4.6mm	208TP3405	208TP3410	—	—	208GK34	208GD34
5µm	1.0mm	208TP5105	208TP5110	208TP5115	208TP51	208GK51	208GD51
	2.1mm	208TP5205	208TP5210	208TP5215	208TP52	208GK52	208GD52
	3.2mm	208TP5305	208TP5310	208TP5315	208TP53	208GK54	208GD54
	4.6mm	208TP5405	208TP5410	208TP5415	208TP54	208GK54	208GD54
214TP C4							
3µm	4.6mm	214TP3405	214TP3410	—	—	214GK34	214GD34
5µm	1.0mm	214TP5105	214TP5110	214TP5115	214TP51	214GK51	214GD51
	2.1mm	214TP5205	214TP5210	214TP5215	214TP52	214GK52	214GD52
	3.2mm	214TP5305	214TP5310	214TP5315	214TP53	214GK54	214GD54
	4.6mm	214TP5405	214TP5410	214TP5415	214TP54	214GK54	214GD54
214ATP C4 Columns							
5µm	2.1mm	—	—	—	214ATP52	—	—
	4.6mm	—	—	—	214ATP54	—	—
219TP Diphenyl							
3µm	4.6mm	219TP3405	219TP3410	—	—	219GK34	219GD34
5µm	1.0mm	219TP5105	219TP5110	219TP5115	219TP51	219GK51	219GD51
	2.1mm	219TP5205	219TP5210	219TP5215	219TP52	219GK52	219GD52
	3.2mm	219TP5305	219TP5310	219TP5315	219TP53	219GK54	219GD54
	4.6mm	219TP5405	219TP5410	219TP5415	219TP54	219GK54	219GD54
238TP C18							
3µm	4.6mm	238TP3405	238TP3410	—	—	238GK34	238GD34
5µm	1.0mm	238TP5105	238TP5110	238TP5115	238TP51	238GK51	238GD51
	2.1mm	238TP5205	238TP5210	238TP5215	238TP52	238GK52	238GD52
	3.2mm	238TP5305	238TP5310	238TP5315	238TP53	238GK54	238GD54
	4.6mm	238TP5405	238TP5410	238TP5415	238TP54	238GK54	238GD54

NOTE: Additional column diameters and lengths are available on request. Please contact Grace Davison Discovery Sciences to discuss your requirements.
¹A guard kit includes a holder and one guard cartridge; ²Guard cartridge units include two guard cartridges.

related products

For prep Vydac® TP Columns, see our prep section pages 158–160.

related products

Looking for HPLC column prefilters? See page 111.



6673

related products

Need high-pressure polymeric fittings? See pages 112–114 for our full selection of high-pressure fittings.

technical assistance

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

related products

Need HPLC tubing? See pages 384–391.



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Vydac® ProZap™ C18

Ultra Fast Protein and Peptide Separations

- 10 times faster bioseparations than traditional column formats
- Ultra-high efficiency 1.5µm packing
- Fast protein and peptide separations with conventional HPLC systems

ProZap™ 1.5µm, 500Å packings are ideal for fast bioseparations in life science applications. The combination of ProZap™ packings and short, 10mm Expedite™ column hardware delivers not only faster sample throughput, but also low back pressures suitable for conventional LC systems.

VYDAC

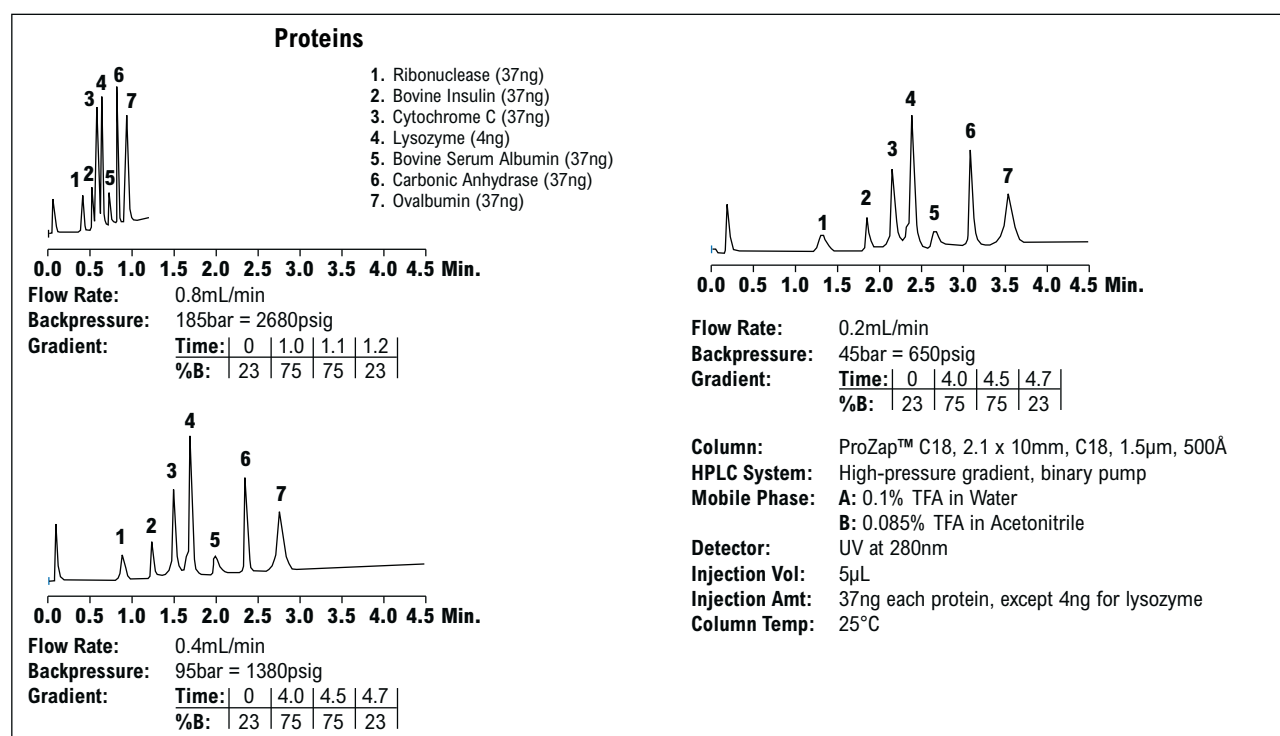


7279

Optimization of Gradient Parameters for Fast Protein Analysis

Short ProZap™ columns are the perfect tool for fast reversed-phase protein separations. Under gradient conditions, longer columns only increase run time and do not increase resolution to improve the separation. Proteins adsorb at the head of the column and then desorb once the critical mobile phase concentration is reached. Since the proteins do not interact with the full length of the packed bed, short columns are sufficient for full resolution. Therefore, proteins of broad molecular weight ranges can be separated in less than one minute by combining short columns, higher flow rates, and fast, modified gradients. For best results high-pressure mixing should be used with fast gradients.

ProZap™ C18 Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18 ProZap	Silica	Spherical	1.5µm	500Å	59m²/g	3%	Monomeric	Yes	L1



Seven proteins were tested on a 10mm ProZap™ column. By increasing flow rate and reducing gradient time, total run time is reduced from 4.5 minutes to 1.2 minutes.

more info

For more information about the Expedite™ hardware format, see page 31.



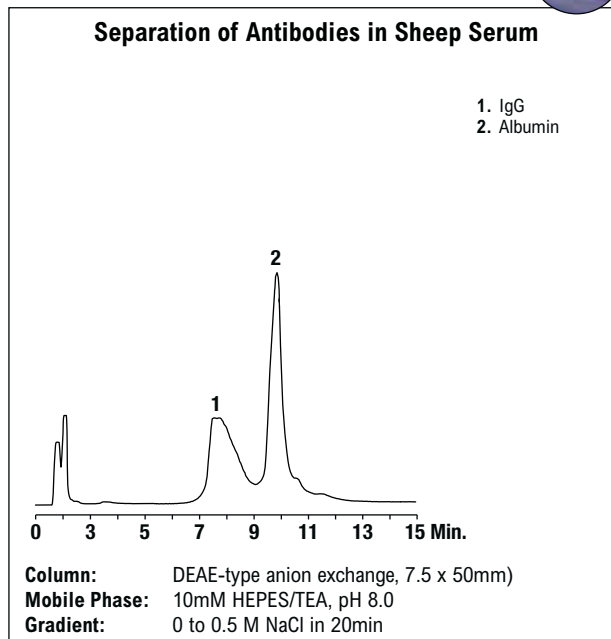
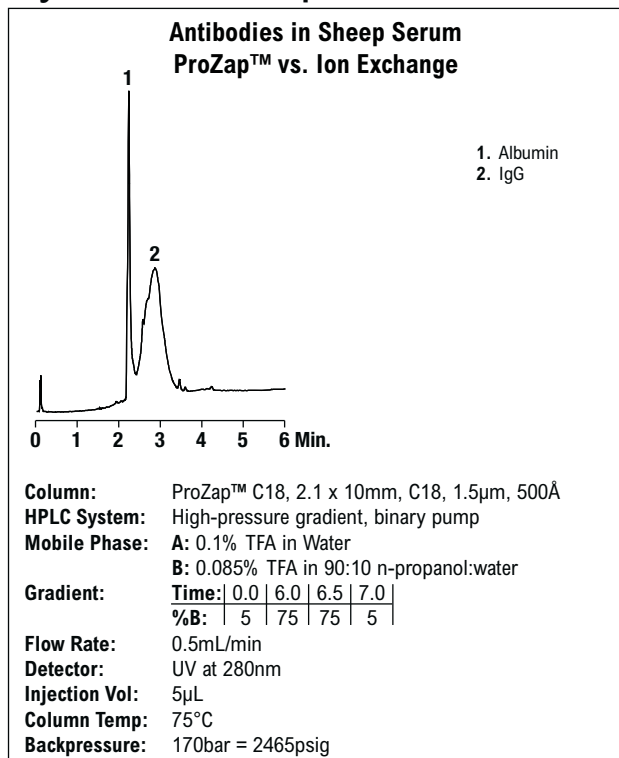
6113

more applications

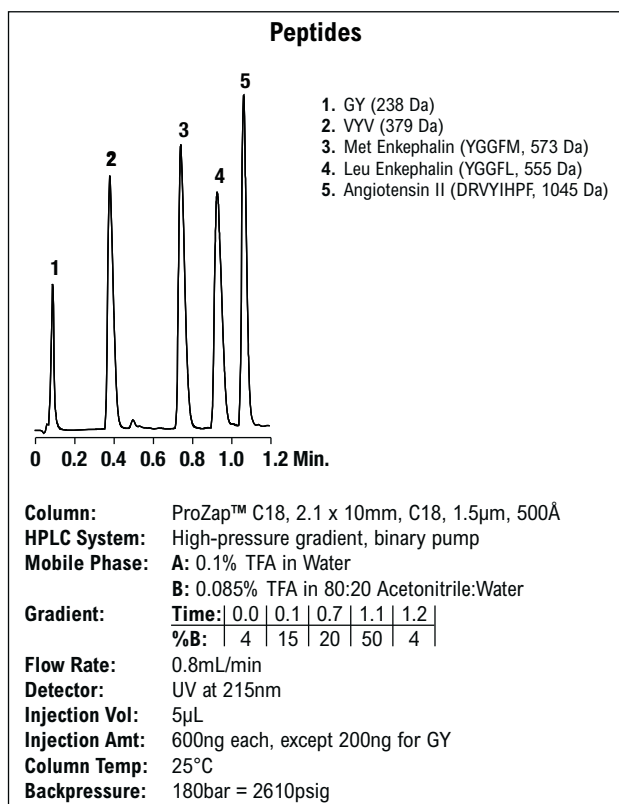
To view our complete searchable chromatogram database visit www.discoverysciences.com/chromdb/



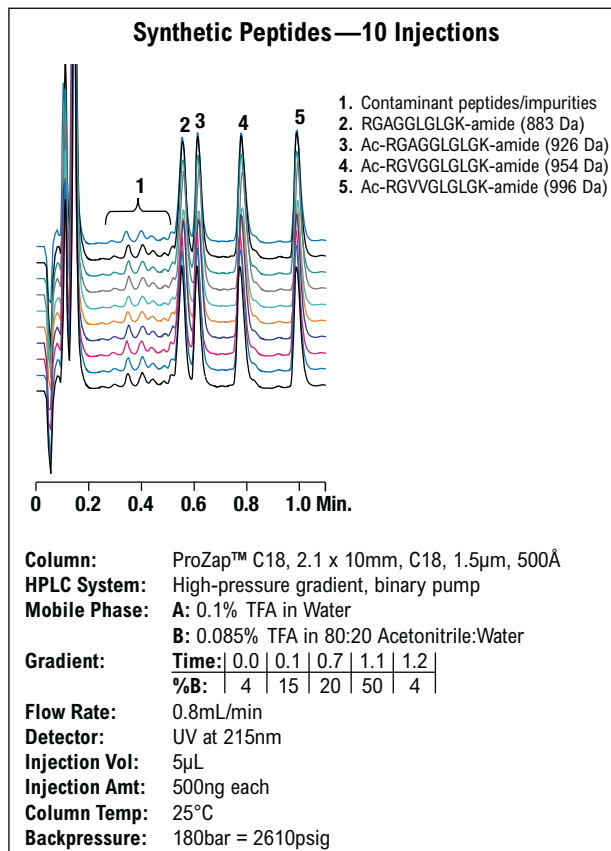
Vydac® ProZap™ Columns



Vydac® ProZAP™ columns separate intact IgG antibodies (150 kDa) rapidly. Other traditional HPLC methods, such as ion exchange take longer and typically involve the use of non-volatile buffers.



Peptides under one minute.



Reproducibly separate synthetic peptides can be in one minute.

ProZap™ (1.5µm)

Dimension	2.1 x 10mm	2.1 x 20mm	4.6 x 10mm	4.6 x 20mm	7 x 33mm
Part No.	35585	35587	35586	35588	35589

Vydac® Venture® A

Protein A Affinity Columns for Antibody Purification

- High binding capacity for polyclonal and monoclonal antibodies
- No non-specific binding—patented ICEtech™ (*Inert Coating Enhancement Technology*, U.S. Patent No. 6,802,966) completely passivates the silica surface to ensure highly purified antibodies
- Long lifetime—proven over 300 runs
- Standard HPLC column format uses biocompatible PEEK hardware for use with HPLC or FPLC instruments

The Venture® A column is the first affinity column to take advantage of silica's rigid porous structure, providing increased productivity over other supports. Grace's patented technology, ICEtech™ (inert coating enhancement technology), eliminates non-specific binding on the silica surface enabling the breakthrough use of silica for affinity separations.

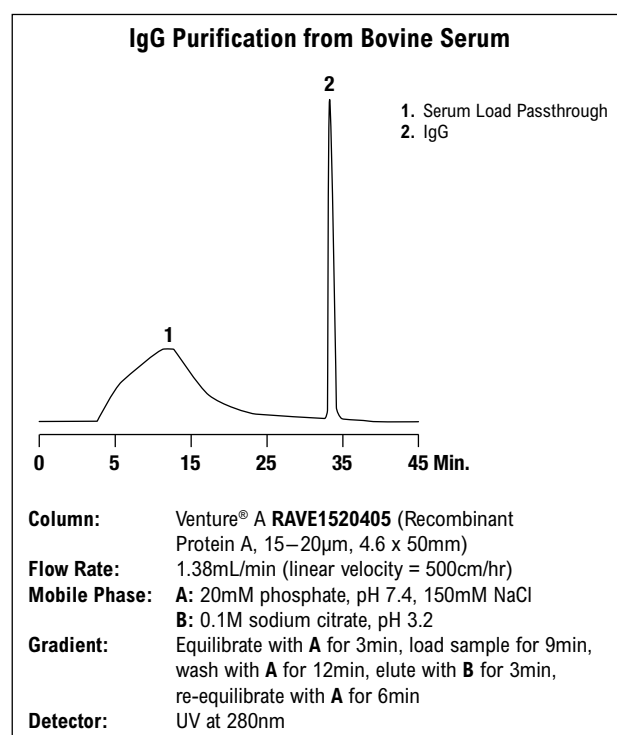
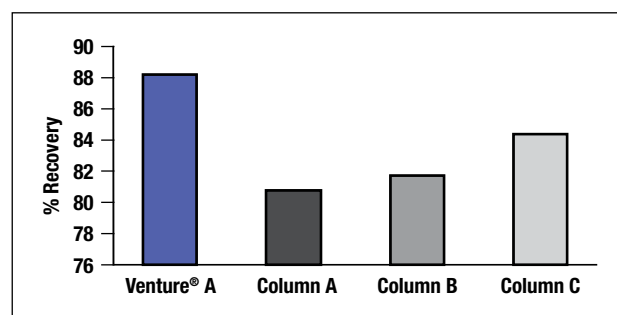
Venture® A columns use a recombinant protein A ligand for binding antibodies. They are designed to perform both as an analytical tool for fast, accurate measurement of antibody titers and as a quick and easy way to purify antibodies from cell culture supernate, serum, or other feedstocks.

Venture® A Characteristics	
Composition:	Wide-porous spherical silica treated with ICEtech™ surface passivation technology
Particle Size:	15–20µm
Ligand:	Recombinant protein A
pH Range:	pH 1 to 8 (long term), pH 1 to 9 (short term)
Pressure:	Maximum operating pressure = 3000psig (200bar)
Recommended Mobile-Phase Velocity:	500cm/h
Mobile-Phase Velocity Range:	150–5000cm/h
Delivery Conditions:	20% ethanol
Storage:	At +4 to +8°C in 20% ethanol
Chemical Stability:	Stable in all aqueous buffers with pH 1 to 8 commonly used in protein A chromatography

Static Capacity of Venture® A Affinity Columns	
Polyclonal	
Species	Capacity (mg/mL)
human	40
bovine	23
mouse	38
rabbit	37
sheep	13
Monoclonal	
Subclass	Capacity (mg/mL)
IgG1 Kappa	15
IgG2a	29
IgG2b	23

High Recovery: Experience Up to a 10% Improvement in Recovery Compared to Other Commercially Available Columns, Increasing Your Yield and Measurement Accuracy

20mM Phosphate and 0.15M NaCl Buffer pH 7.4 was loaded on each column up to 90% of the total capacity. After loading the columns were washed with phosphate buffer and the IgG eluted with citrate buffer pH 3.2.



Venture® A Affinity Columns

Particle Size	i.d.	50mm	100mm
15–20µm	2mm	RAVE1520205	—
	4.6mm	RAVE1520405	RAVE1520410
	7.5mm	—	RAVE1520710

NOTE: Additional column diameters and lengths are available on request. Please contact Grace Davison Discovery Sciences to discuss your requirements.

related products

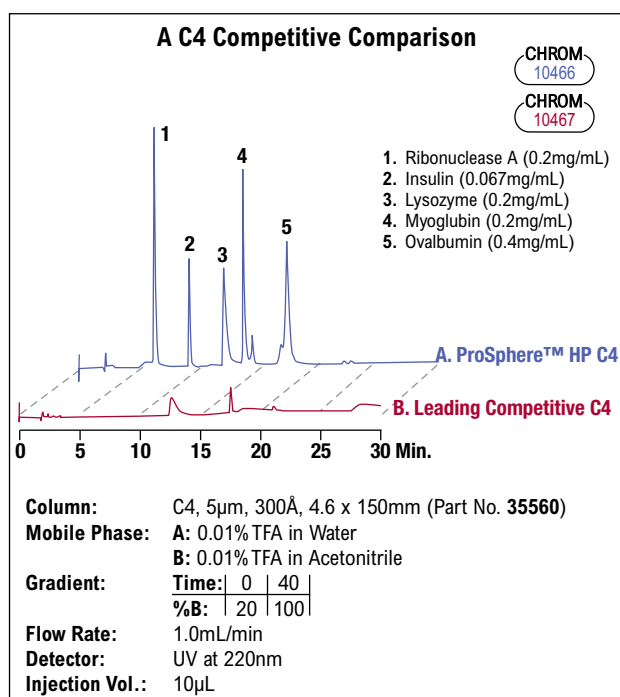
Venture® Immunoaffinity columns are also developed for small molecules, which have been fully validated. Applications areas include: **Food** (Aflatoxin, Lactoferrin, Vitamin B12, Testosterone, Nortestosterone), **Endocrine Disruptors** (17α-Ethynyl Estradiol, 17β-Estradiol, Estrone, Bisphenol A) and **Pollutants** (Chlorophenoxy Acetic Acid Herbicides, Phenylurea Herbicides, Organophosphorus Pesticides, Vinclozolin Fungicide). For details, visit www.discoverysciences.com.

analytical hplc

Alltech® ProSphere™ HP 300Å Columns

- High recoveries at low sample concentrations and low TFA concentrations
- Use for protein, peptides, sequencing, nucleic acid fragments
- pH range 2–7.5

These columns produce sharp symmetrical peaks even for basic biomolecules. The 300Å pores allow access of large proteins while still maintaining high resolution of small peptides.



Even at very low concentrations of TFA, ProSphere™ HP C4 exhibits excellent recoveries; significantly better than a leading competitive C4 column.

ProSphere™ HP 300Å HPLC Columns

Packing	Format	i.d. x Length	Part No.
C18, 3µm*	Capillary	0.150 x 50mm	35510
	Capillary	0.150 x 150mm	35423
	Capillary	0.150 x 150mm	35516
	Capillary	0.300 x 50mm	35511
	Capillary	0.300 x 100mm	35424
	Capillary	0.300 x 150mm	35517
	Solvent Reducer	3.0 x 50mm	35512
	Solvent Reducer	3.0 x 150mm	35518
	Analytical	4.6 x 50mm	35513
	Analytical	4.6 x 150mm	35520
C18, 5µm	Solvent Reducer	3.0 x 150mm	35519
	Solvent Reducer	3.0 x 250mm	35522
	Analytical	4.6 x 150mm	35521
C4, 3µm*	Analytical	4.6 x 250mm	35523
	Capillary	0.150 x 50mm	35533
	Capillary	0.150 x 150mm	35464
	Capillary	0.150 x 150mm	35539
	Capillary	0.300 x 50mm	35534
	Capillary	0.300 x 100mm	35465
	Capillary	0.300 x 150mm	35545
	Solvent Reducer	3.0 x 50mm	35535
	Solvent Reducer	3.0 x 150mm	35547
	Analytical	4.6 x 50mm	35536
C4, 5µm	Analytical	4.6 x 150mm	35549
	Solvent Reducer	3.0 x 150mm	35548
	Solvent Reducer	3.0 x 250mm	35561
	Analytical	4.6 x 150mm	35560
	Analytical	4.6 x 250mm	35562

*5µm, 10µm particles and other dimensions are also available.

ProSphere™ HP 300Å All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
300Å C18, 5µm	3.0 x 7.5mm	3	35526
	4.6 x 7.5mm	3	35527
HP C18, 3µm	0.150 x 10mm	—	22668
Capillary Guard**	0.300 x 10mm	—	22669
300Å C4, 5µm*	3.0 x 7.5mm	3	35565
	4.6 x 7.5mm	3	35566
HP C4 Capillary Guard**	0.150 x 10mm	—	22678
	0.300 x 10mm	—	22679

All-Guard™ Cartridge Holder
(Includes Direct-Connect Column Coupler)

Capillary Guard Cartridge Holder

Guard Holder for 0.100mm and 0.150mm Guards ea GR-3710E

Guard Holder for 0.300mm and 0.500mm Guards ea GR-3710A

*All-Guard™ holder required. Other particle sizes available.

**5µm, 10µm particles and other dimensions are also available.

Table 1—Percent Protein Recovery at Low Sample Concentration

Phase	Insulin		Ribonuclease A		Lysozyme		Bovine Serum Albumin		Human Serum Albumin	
	0.02mg/mL	0.4mg/mL	0.02mg/mL	0.4mg/mL	0.02mg/mL	0.4mg/mL	0.02mg/mL	0.4mg/mL	0.02mg/mL	0.4mg/mL
ProSphere™ HP C18	68	94	74	94	45	87	65	90	66	87
A Leading Competitive C18	13	90	0	84	0	74	0	63	0	63
ProSphere™ HP C4	79	95	79	94	64	92	74	93	72	89
A Leading Competitive C4	31	93	53	91	20	75	0	53	0	68

Every column has good recoveries with high sample concentrations. How does your column compare at low sample concentrations? ProSphere™ HP 300Å phases outperform a leading competitor at 0.02mg/mL.

related products

Looking for ProSphere™ prep columns?

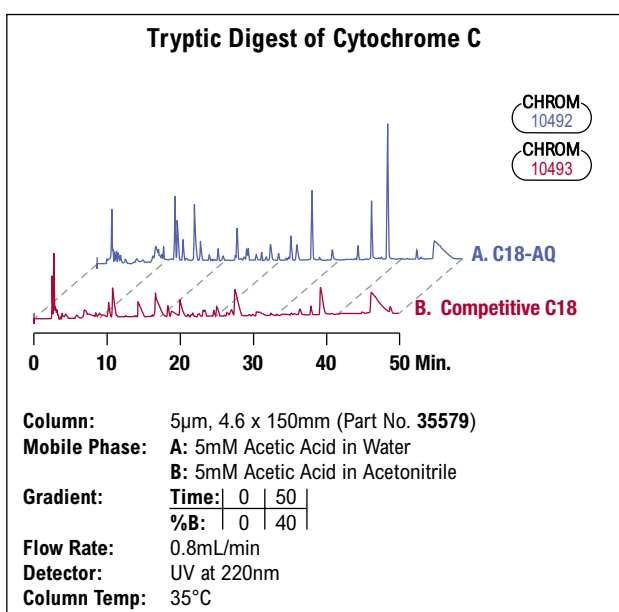
See page 161.

Alltech® ProSphere™ HP C18-AQ Columns

Ideal for Peptide Mapping

- Stable from 100% aqueous to 100% organic mobile phases
- Compatible with a broad range of LC/MS compatible mobile phases

ProSphere™ HP C18-AQ Specifications	
Base Material	Silica
Particle Size	3µm, 5µm
Pore Size	100Å
pH Range	2–8



This water-wettable phase is ideally suited for LC/MS and delivers more peaks than traditional C18 phases.

ProSphere™ HP C18-AQ HPLC Columns

Packing	Format	i.d. x Length	Part No.
C18-AQ, 3µm	Capillary	150µm x 50mm	35568
	Capillary	150µm x 150mm	35574
	Capillary	300µm x 50mm	35569
	Capillary	300µm x 150mm	35575
	Solvent Reducer	3.0 x 50mm	35570
	Solvent Reducer	3.0 x 150mm	35576
	Analytical	4.6 x 50mm	35571
C18-AQ, 5µm	Analytical	4.6 x 150mm	35578
	Solvent Reducer	3.0 x 150mm	35577
	Solvent Reducer	3.0 x 250mm	35580
	Analytical	4.6 x 150mm	35579
	Analytical	4.6 x 250mm	35581

ProSphere™ HP C18-AQ All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
C18-AQ, 5µm	3.0 x 7.5mm	3	35582
	4.6 x 7.5mm	3	35583
All-Guard™ Cartridge Holder (Includes Direct-Connect™ Column Coupler)		ea	80101

*All-Guard™ holder required. Other particle sizes available.

Alltech® Macrosphere™ GPC Columns

- 7µm GPC phases separate proteins, peptides, and polar synthetic compounds by size-exclusion

Macrosphere™ GPC Exclusion Limits in Daltons		
Pore Size	Included	Excluded
60Å	250	28,000
100Å	2500	350,000
150Å	4000	500,000
300Å	7500	1,200,000

Macrosphere™ GPC Columns

Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
GPC 60Å	Analytical	4.6 x 250mm	88129	88130
	Semi-Prep	7.5 x 300mm	88175	—
GPC 100Å	Analytical	4.6 x 250mm	88133	88134
	Semi-Prep	7.5 x 300mm	88177	—
GPC 150Å	Analytical	4.6 x 250mm	88137	88138
	Semi-Prep	7.5 x 300mm	88179	—
GPC 300Å	Analytical	4.6 x 250mm	88141	88142
	Semi-Prep	7.5 x 300mm	88181	—

Macrosphere™ GPC All-Guard™ Cartridges*

Packing, 5µm	i.d. x Length	Qty.	Part No.
GPC	4.6 x 7.5mm	3	96133
All-Guard™ Cartridge Holder (Includes Direct-Connect™ Column Coupler)		ea	80101

*All-Guard™ holder required. Other particle sizes available.

Alltech® Macrosphere™ Ion-Exchange Columns

- 300Å weak and strong ion-exchange phases separate proteins, enzymes, and other biologicals

Macrosphere™ Ion-Exchange Specifications		
	Exchange Group	Exchange Capacity
WAX	Diethylaminoethane	0.13 meq/gram
WCX	Carboxylic Acid	0.49 meq/gram
SAX	Quaternary Ammonium	0.14 meq/gram
SCX	Sulfonic Acid	0.50 meq/gram

Macrosphere™ Ion-Exchange Columns

Packing	Format	i.d. x Length	Part No.
WAX, 7µm	Analytical	4.6 x 150mm	71151
	Analytical	4.6 x 250mm	71154
WCX, 7µm	Analytical	4.6 x 150mm	71157
	Analytical	4.6 x 250mm	71160
SAX, 7µm	Analytical	4.6 x 150mm	72303
	Analytical	4.6 x 250mm	72603
SCX, 7µm	Analytical	4.6 x 150mm	72308
	Analytical	4.6 x 250mm	72608

Macrosphere™ Ion-Exchange All-Guard™ Cartridges*

Packing	i.d. x Length	Qty.	Part No.
WAX, 5µm	4.6 x 7.5mm	3	96135
WCX, 5µm	4.6 x 7.5mm	3	96137
SAX, 5µm	4.6 x 7.5mm	3	96139
SCX, 5µm	4.6 x 7.5mm	3	96141
All-Guard™ Cartridge Holder (Includes Direct-Connect™ Column Coupler)		ea	80101

*All-Guard™ holder required. Other particle sizes available.

IC Columns Introduction

Alltech® IC Column Specifications						
Column	Composition	pH Range	Applications	EPA Methods	Optimized for Suppressed or Non-Suppressed Conductivity	Page
Anion Exchange Columns						
Allsep™	polymer-based anion exchanger, 7µm	pH 2–10	inorganic anions, weak and strong acid ions, metal complexes, organic acids	300.0, Part A	both	99
Allsep™ A-2	polymer-based anion exchanger, 7µm	pH 2–11	inorganic anions, organic acids, suitable for both weak and strong anions in a single run	300.0, Part A	both	99
Novosep™ A-2	polymer-based anion exchanger, 5µm	pH 3–12	inorganic anions and oxyhalides; ideal for separation of seven common anions plus three oxyhalide anions in one run	300.0, 300.1, 317.0, 326.0	suppressed	100
AN1™	polymer-based anion exchanger, 9µm	pH 2–13	inorganic anions, weak and strong acid ions, organic acids	—	both	100
Anion/S	silica-based anion exchanger, 10µm	pH 2–5.5	inorganic anions	—	non-suppressed	101
Anion/R	polymer-based anion exchanger, 10µm	pH 2–12	inorganic anions, weak and strong acid ions	—	non-suppressed	101
PRP™-X100	polymer-based anion exchanger, 10µm	pH 1–13	inorganic anions, weak and strong acid ions	—	non-suppressed	103
Cation Exchange Columns						
Universal Cation	silica-based cation exchanger, 7µm	pH 2–7	groups I and II cations, amines, divalent transition metals	300.7	both	102
Universal Cation HR	silica-based cation exchanger, 3µm	pH 2–7	groups I and II cations, amines, divalent transition metals; smaller particle size for improved peak resolution	300.7	both	102
PRP™-X200	polymer-based cation exchanger, 10µm	pH 1–13	groups I and II cations (separate runs), amines, lanthanides	—	non-suppressed	103
Organic Acid Columns						
PRP™-X300	polymer-based sulfonated cation exchanger	pH 1–13	simple aliphatic carboxylic acids and alcohols	—	non-suppressed	103
Anion Exclusion	polymer-based cation exchanger, 10µm	pH 1–13	organic acids, weak acid anions	—	non-suppressed	104
Specialty Columns						
Transition Metal	silica-based reversed-phase, 3µm and 7µm	pH 2–7	high capacity, separates divalent transition metals and metal-cyano complexes more selectively than a cation exchange column	—	non-suppressed	104
Surfactant/R	polymer-based reversed-phase, 7µm	pH 1–14	anionic and cationic surfactants; separate short and long chain surfactants in one gradient run	—	both	105
Surfactant C8	silica-based reversed-phase, 5µm	pH 2–7	short chain anionic surfactants	—	non-suppressed	105
Surfactant C18	silica-based reversed-phase, 5µm	pH 2–7	long chain or aromatic anionic surfactants	—	non-suppressed	105

IC Guard Kits Cross Reference

Kit includes holder and three guard cartridges.

Guard Reference Table

Brand	Column Type	Guard Cartridge Type	All-Guard™ Kit Part No.
Alltech	Allsep™, Allsep™ A-2	GA-1	38109
	Novosep™ A-2	GA-1	38109
	Anion/R, Anion/S	GA-1	38109
	Universal Cation	GC-2	27109
	Universal Cation HR	GC-3	23115
	Anion Exclusion	GIE-1	38117
	Transition Metal C18	GRP-2	38123
	Surfactant/R	GRP-1	38122
	Surfactant C8, C18	GRP-2	38123
	IonPac® AS4A-SC, AS7, AS11, AS22, AS24, AS26, AS27	GA-1	38109
Dionex	IonPac® CS3, CS10, CS11	GC-1	38113
	IonPac® CS12, CS14, CS15	GC-2	27109
	IonPac® NS1	GRP-1	38122
	IonPac® AS1, AS5	GIE-1	38117

Guard Reference Table (continued)

Brand	Column Type	Guard Cartridge Type	All-Guard™ Kit Part No.
Waters	IC-Pak™-A	GA-1	38109
	IC-Pak™-M/D	GC-2	27109
	Ion Exclusion	GIE-1	38117
Hamilton	PRP™-X100	GA-1	38109
	PRP™-X200	GC-1	38113
	PRP™-X300	GIE-1	38117
Misc.	Sarasep ANIONSEP AN1™	GA-1	38109
	Bio-Rad®, Aminex®, HPX-87	GIE-1	38117
	Interaction™ ION-120	GA-1	38109
	Interaction™ ION-210	GC-1	38113
	Interaction™ ORH-801	GIE-1	38117
	Metrohm® Metrosep	GA-1	38109

more info

Cartridges and holders can also be purchased separately. See specific phase pages for replacement cartridge ordering information.

Alltech® Anion Columns

Allsep™ Anion IC Columns

- Resolves fluoride away from the water dip
- Meets requirements for U.S. EPA Method 300.0 part A

The Allsep™ Anion Column is compatible with common IC mobile phases: carbonate, bicarbonate, p-hydroxybenzoic acid, phthalic acid, succinic acid, and sodium octane sulfonate.

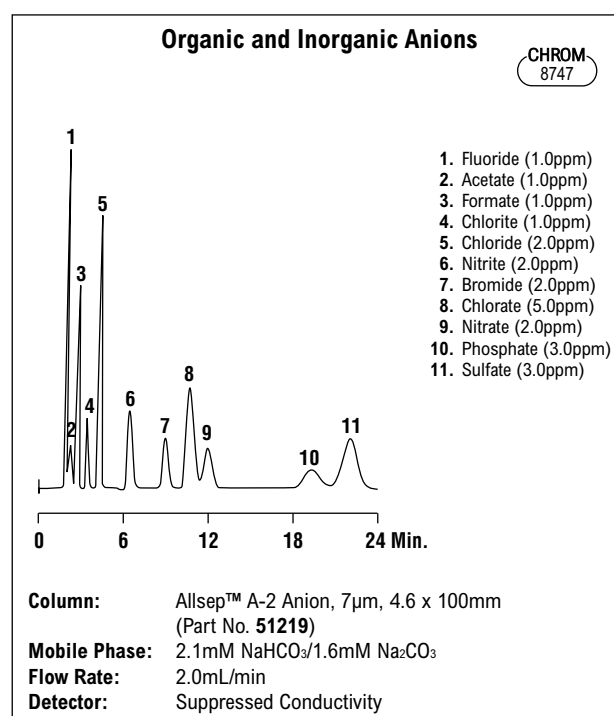
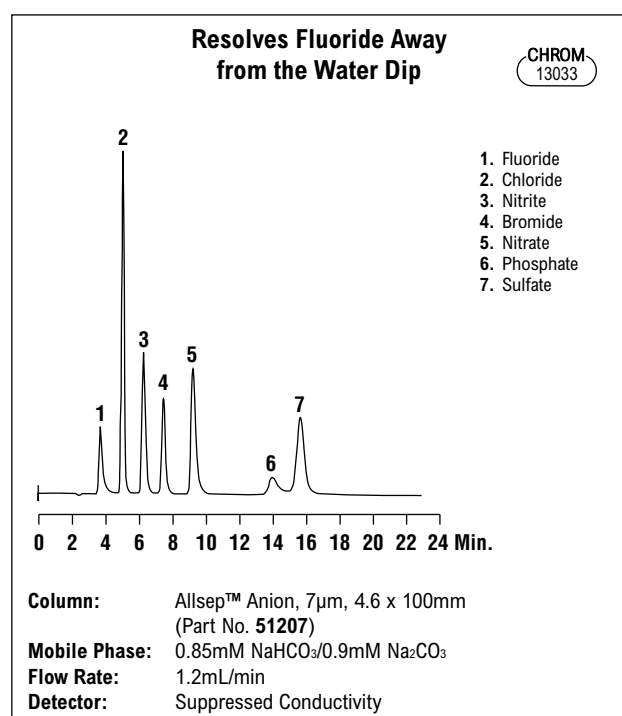
Use this column for performing EPA Method 300.0 Part A "Determination of Inorganic Anions in Water" per U.S. EPA guidelines.



Allsep™ A-2 Anion IC Columns

- Separates both weak and strong acid anions in one run
- Resolves formate away from fluoride and chloride

The Allsep™ A-2 Anion Column separates both weakly retained organic and strongly retained inorganic anions in one run. The high capacity Allsep™ A-2 Anion Column is also suitable for the separation of chlorite and chlorate.



Allsep™ Anion Specifications	
Composition:	Methacrylate based w/quaternary ammonium functional groups
Particle Size:	7µm
Mobile Phase Limits:	pH 2–10, 0–100% organic modifier

Allsep™ A-2 Anion Specifications	
Composition:	Methacrylate based w/quaternary alkanol amine functional groups
Particle Size:	7µm
Mobile Phase Limits:	pH 2–11, 0–100% organic modifier

Allsep™ Anion Columns			
Packing	i.d. x Length	PEEK Part No.	SS Part No.
Allsep™ Anion	4.6 x 30mm	51217	51216
	4.6 x 50mm	51213	51214
	4.6 x 100mm	51207	51200
	4.6 x 150mm	51209	51208

Allsep™ A-2 Anion Columns			
Packing	i.d. x Length	PEEK Part No.	SS Part No.
Allsep™ A-2	4.6 x 50mm	51221	51220
	4.6 x 100mm	51219	51218

related product

Save money with IC All-Guard™ Kits on page 98. Kit includes one holder and three cartridges.

Guards for Allsep™ and Allsep™ A-2 Columns

Description	Qty.	Part No.
GA-1 Anion Cartridges	3	38108
All-Guard™ Cartridge Holder*	ea	80101

*Direct-Connect™ column coupler included.

analytical hplc

Alltech® Anion Columns

Novosep™ A-2 Anion IC Columns

- Separates seven inorganic anions and three oxyhalide anions in a single run
- Meets the requirements of U.S. EPA Methods 300.0, 300.1, 317.0, and 326.0

The Novosep™ A-2 Anion Column is ideal for the separation of 10 inorganic anions by suppressor-based ion chromatography using U.S. EPA Method 300.1. The column can also be used to determine inorganic anions in drinking water per U.S. EPA Method 300.0 and trace bromate in drinking water using U.S. EPA Methods 317.0 and 326.0.

Alltech



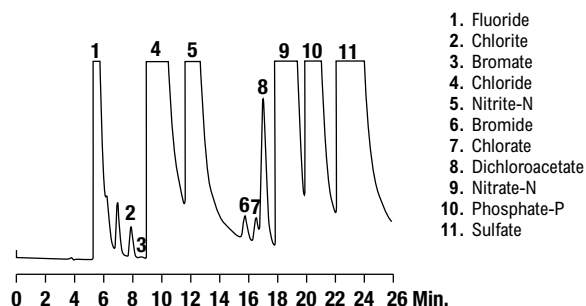
IC Sep AN1™ IC Column

- Separates anions with carbonate/bicarbonate and hydroxide mobile phases

The IC Sep AN1™ Column is compatible with both suppressor-based and non-suppressed detection. A variety of mobile phases including sodium carbonate/bicarbonate, sodium hydroxide, and borate/gluconate may be used.

Anions in High Ionic Strength Water by EPA Method 300.0

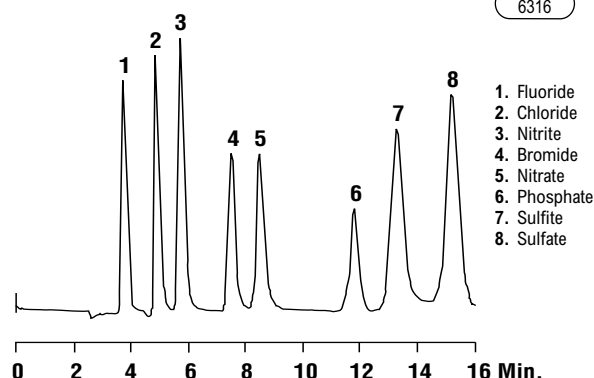
CHROM
10121



Column: Novosep™ A-2 Anion, 5µm, 4.0 x 250mm
(Part No. 51410)
Mobile Phase: 3.6mM NaHCO₃
Flow Rate: 0.8mL/min
Detector: Suppressed Conductivity

Separation of Sulfite and Sulfate

CHROM
6316



Column: IC Sep AN1™, 9µm, 4.6 x 250mm
(Part No. 38140)
Mobile Phase: 1.8mM NaHCO₃, 1.8mM Na₂CO₃
Flow Rate: 1.0mL/min
Detector: Suppressed Conductivity

Novosep™ A-2 Anion Specifications

Composition: Polyvinyl alcohol-based w/quaternary ammonium functional groups
Particle Size: 5µm
Mobile Phase Limits: pH 3–12, 0–100% organic modifier, 10% modifier is practical upper limit

IC Sep AN1™ Specifications

Composition: Poly(styrene-divinylbenzene) alkyl dimethyl ethanol ammonium functional group
Particle Size: 9µm
Exchange Capacity: 0.05meq/g
Mobile Phase Limits: pH 2–13, No organic solvents

Novosep™ A-2 Anion Column

Packing	i.d. x Length	PEEK Part No.
Novosep™ A-2	4.0 x 250mm	51410

Guards for Novosep™ A-2 Anion Columns

Description	Qty.	Part No.
GA-1 Anion Cartridges	3	38108
All-Guard™ Cartridge Holder*	ea	80101

*Direct-Connect™ column coupler included.

IC Sep AN1™ Columns

Packing	i.d. x Length	Part No.
AN1™	4.6 x 250mm	38140

Choose a guard column or integral guard discs to protect your IC Sep Column.

IC Sep Guards

Description	Qty.	Part No.
Guard Column, 50 x 4.6mm	ea	38145
Guard Column Guard-Disc™	5	38146

more applications

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



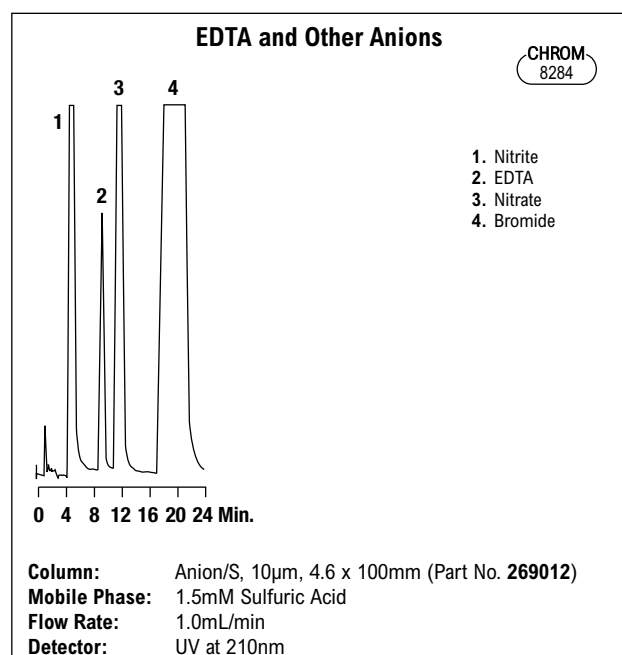
www.discoverysciences.com

Alltech® Anion Columns

Anion/S IC Columns

- Silica-based for symmetrical peak shapes
- Separates inorganic and organic anions

The Anion/S Columns are best suited for routine separations of chloride, bromide, nitrate, and sulfate. Not suitable for fluoride analysis.



Anion/S Specifications

Composition:	Silica w/quaternary ammonium ion exchanger
Particle Size:	10µm
Exchange Capacity:	0.25meq/g
Mobile Phase Limits:	pH 2–5.5, 0–100% organic modifier

Anion/S Columns

Packing	i.d. x Length	PEEK Part No.	SS Part No.
Anion/S	4.6 x 100mm	269012	269013
	4.6 x 250mm	269011	269001

related product

Save money with IC All-Guard™ Kits on page 98. Kit includes one holder and three cartridges.

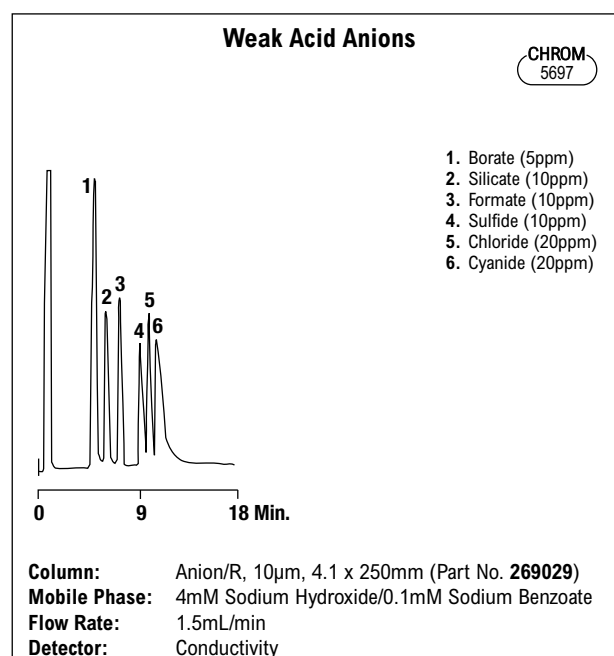
Alltech



Anion/R IC Columns

- Polymer-based for broad pH stability
- Separates seven common inorganic anions

Because of their high pH stability, these columns are ideal for the separation of anions using high pH mobile phases such as p-hydroxybenzoate, sodium hydroxide, and sodium carbonate/bicarbonate. The larger dimension columns (150mm and 250mm) are suitable for a high-resolution separation of the seven common inorganic anions.



Anion/R Specifications

Composition:	Poly(styrene-divinylbenzene) Trimethylammonium
Particle Size:	10µm
Exchange Capacity:	0.19 ± 0.02meq/g
Mobile Phase Limits:	pH 2–12, 0–100% organic modifier

Anion/R Columns

Packing	i.d. x Length	PEEK Part No.	SS Part No.
Anion/R	4.1 x 100mm	—	269031
	4.1 x 250mm	—	269029
	4.6 x 100mm	269036	—
	4.6 x 150mm	269034	—

Guards for Anion/S and Anion/R Columns

Description	Qty.	Part No.
GA-1 Anion Cartridges	3	38108
All-Guard™ Cartridge Holder*	ea	80101

*Direct-Connect™ column coupler included.

analytical hplc

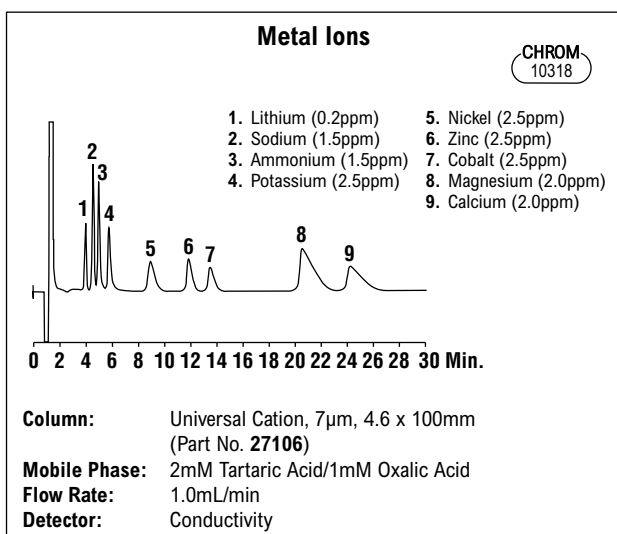
Alltech® Cation Columns

Universal Cation and Universal Cation HR IC Columns

- Separate Groups I and II cations in one isocratic run
- Separate transition metals without post-column reaction
- New Universal Cation HR 3µm particle size for improved efficiency

Compatible with a variety of mobile phases including complexing acids (citric acid, tartaric acid, oxalic acid), mineral acids (nitric acid, hydrochloric acid, sulfuric acid) and non-complexing organic acids (methanesulfonic acid).

Alltech



Universal Cation Specifications

Composition:	Silica coated with polybutadiene/maleic acid copolymer
Particle Size:	3µm and 7µm, spherical
Mobile Phase Limits:	pH 2–7, 0–100% organic modifier

Universal Cation Columns

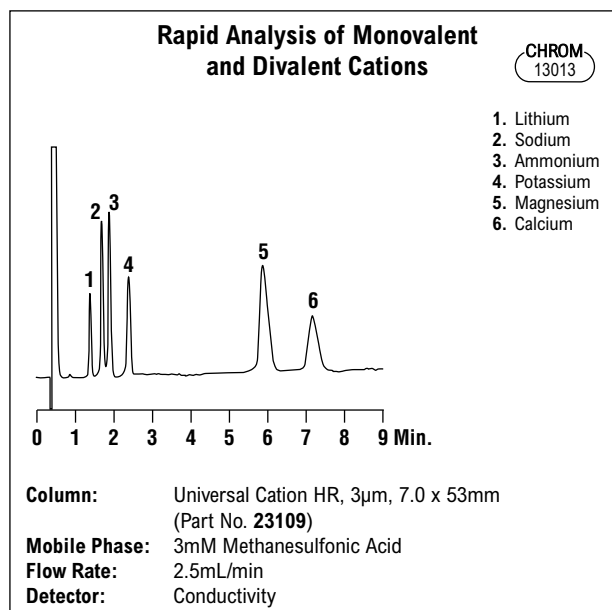
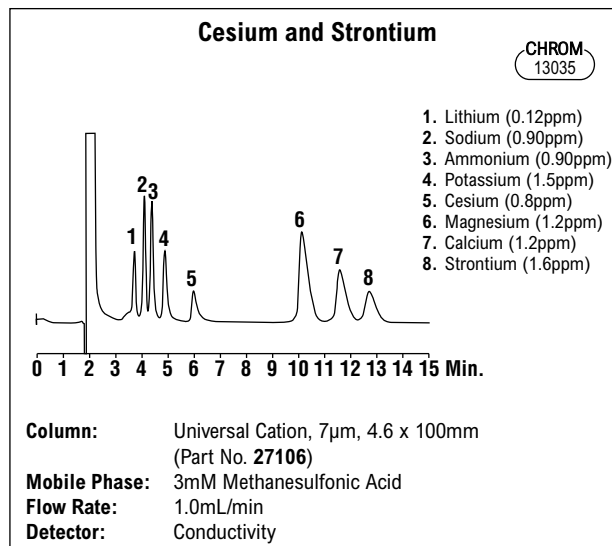
Packing	i.d. x Length	PEEK Part No.	SS Part No.
7µm	4.6 x 100mm	27106	27100
3µm HR	4.6 x 100mm	—	23100
	7.0 x 53mm	—	23109

technical assistance

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

more applications

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



Guards for Universal Cation Columns

Description	Qty.	Part No.
GC-2 Universal Cation	3	271010
GC-3 Universal Cation HR	3	23110
All-Guard™ Cartridge Holder*	ea	80101

*Direct-Connect™ column coupler included.

related product

Save money with IC All-Guard™ Kits on page 98. Kit includes one holder and three cartridges.

Hamilton® Anion, Cation, and Organic Acid Columns

PRP™-X100 Anion Columns

High pH stability makes this column ideal for the separation of weak anions. PRP™-X100 provides excellent resolution for the seven most frequently analyzed inorganic anions. For non-suppressed analyses only.

PRP™-X200 Cation Analysis Columns

For separation of the alkali metal and alkaline earth cations in separate runs.

PRP™-X300 Organic Acid Columns

For separation of simple aliphatic carboxylic acids and alcohols. Inorganic anions are not retained.

Hamilton® PRP™-X100 Specifications

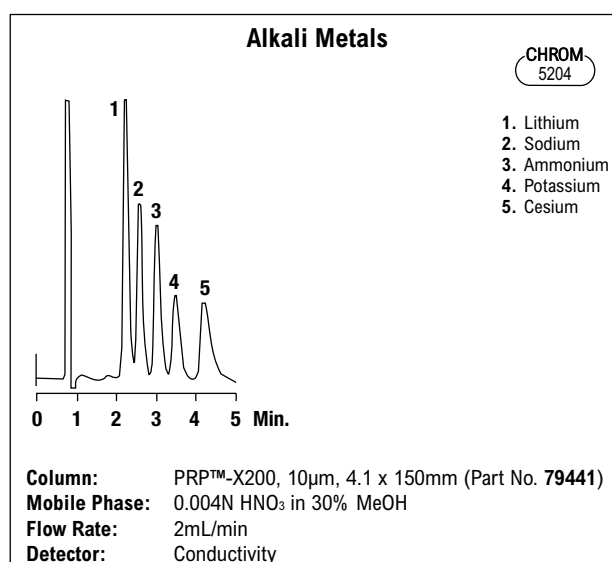
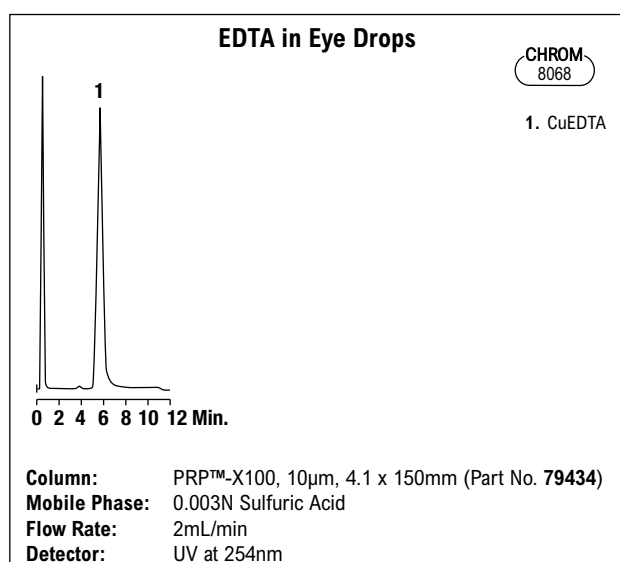
Composition:	Trimethylammonium psDVB copolymer
Particle Size:	10µm, spherical
Exchange Capacity:	0.19meq/g
Mobile Phase Limits:	pH 1–13, 0–100% organic modifier

Hamilton® PRP™-X200 Specifications

Composition:	Sulfonated psDVB copolymer
Particle Size:	10µm, spherical
Exchange Capacity:	0.35meq/g
Mobile Phase Limits:	pH 1–13, 0–100% organic modifier

Hamilton® PRP™-X300 Specifications

Composition:	Sulfonated psDVB in H ⁺ form
Particle Size:	3µm and 7µm
Mobile Phase Limits:	pH 1–13, 0–100% organic modifier



Hamilton® PRP™-X100 Columns

Packing	i.d. x Length	Part No.
PRP™-X100	2.1 x 150mm	79348
	2.1 x 250mm	79346
	4.1 x 100mm	79439
	4.1 x 150mm	79434
	4.1 x 250mm	79433

Hamilton® PRP™-X200 Columns

Particle Size	i.d. x Length	Part No.
PRP™-X200	2.1 x 150mm	79394
	2.1 x 250mm	79347
	4.1 x 150mm	79441
	4.1 x 250mm	79442

Hamilton® PRP™-X300 Columns

Particle Size	i.d. x Length	Part No.
PRP™-X300, 3µm	4.1 x 150mm	79819
PRP™-X300, 7µm	4.1 x 150mm	79464
	4.1 x 250mm	79465
	4.6 x 150mm	79485

Hamilton® PRP™-X100 Guard Kits and Cartridges

Description	Qty.	Part No.
Guard Column Starter Kit	ea	79448
PRP™-X100, 1 Holder, 2 Cartridges		
Replacement Guard Cartridges (Requires Hamilton® Guard Holder)	5	79446
PRP™-X100, 25 x 2.3mm		

Hamilton® PRP™-X200 Guard Kits and Cartridges

Description	Qty.	Part No.
Guard Column Starter Kit	ea	79456
PRP™-X200, 1 Holder, 2 Cartridges		
Replacement Guard Cartridges (Requires Hamilton® Guard Holder)	5	79449
PRP™-X200, 25 x 2.3mm		

Hamilton® PRP™-X300 Guard Kits and Cartridges

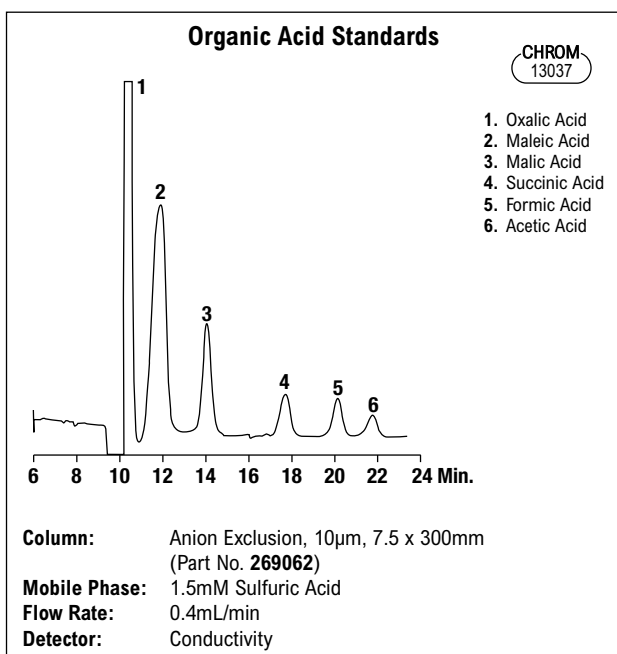
Description	Qty.	Part No.
Guard Column Starter Kit	ea	79460
PRP™-X300, 1 Holder, 2 Cartridges		
Replacement Guard Cartridges (Requires Hamilton® Guard Holder)	5	79453
PRP™-X300, 25 x 2.3mm		

analytical hplc

Alltech® Anion
Exclusion Columns

- Separate organic acids and weak acid anions
- Polymer-based for broad pH stability
- Economical choice for small inorganics

Anion Exclusion Columns separate organic acids and weakly ionized anions by an anion exclusion mechanism. Dilute mineral acids are the typical mobile phases for the separation. Acetonitrile may be used as an organic modifier to decrease the retention of hydrophobic compounds.

**Anion Exclusion Specifications**

Composition:	Highly sulfonated poly (styrene-divinylbenzene) cation exchanger
Particle Size:	10 μ m
Mobile Phase Limits:	<10% acetonitrile, no methanol <5% isopropyl or ethyl alcohols

Anion Exclusion Columns

Packing	i.d. x Length	PEEK Part No.	SS Part No.
Anion Exclusion, 10 μ m	7.5 x 100mm	269069	—
	7.5 x 300mm	269062	—
	7.8 x 100mm	—	269068
	7.8 x 300mm	—	269006

Anion Exclusion All-Guard™ Cartridges

Description	Qty.	Part No.
Anion Exclusion GIE-1	3	38118
All-Guard™ Cartridge Holder*	ea	80101

*Direct-Connect™ column coupler included.

related product

Save money with IC All-Guard™ Kits on page 98. Kit includes one holder and three cartridges.

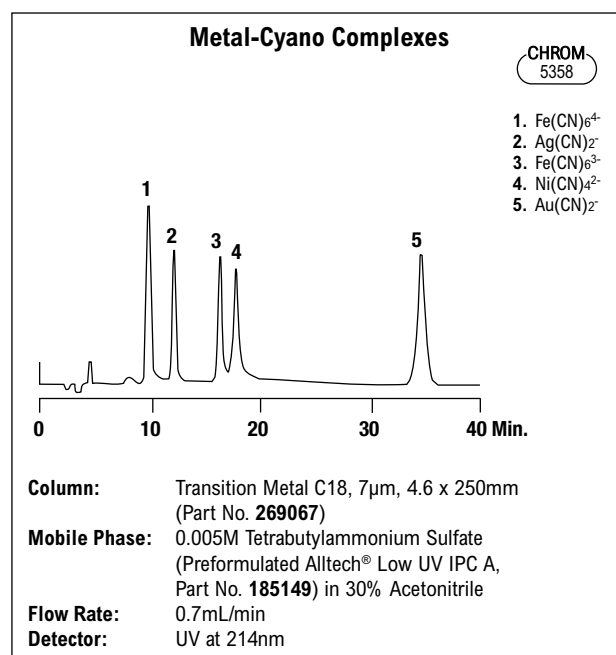
Alltech

Alltech® Transition
Metal Columns

- Separate divalent transition metals and metal-cyano complexes more selectively than a cation exchange column

To separate divalent transition metals, use conductivity detection for concentrations as low as 1ppm, or UV detection with post-column reaction for ppb-level concentrations

To separate metal-cyano complexes, use the Alltech® low UV IPC A (Part No. **185149**) as the ion-pair reagent, and methanol or acetonitrile as the organic modifier.

**Transition Metal Specifications**

Composition:	Silica-based with C18 bonded phase (20% Carbon)
Particle Size:	3 μ m and 7 μ m, spherical
Mobile Phase Limits:	pH 2–7

Transition Metal Columns

Packing	i.d. x Length	PEEK Part No.
C18, 3 μ m	4.6 x 100mm	269064
C18, 7 μ m	4.6 x 250mm	269067

Transition Metal All-Guard™ Cartridges

Description	Qty.	Part No.
GRP-2 Revised Phase	3	38129
All-Guard™ Cartridge Holder*	ea	80101

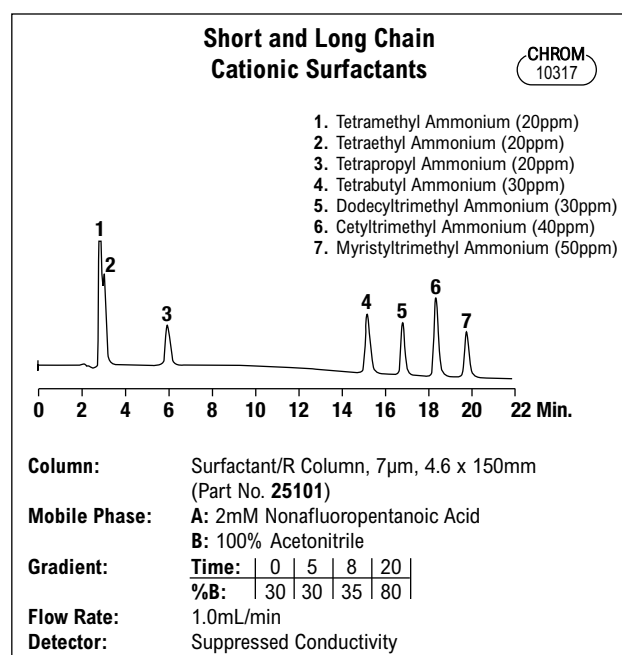
*Direct-Connect™ column coupler included.

Alltech® Surfactant Columns

Surfactant/R IC Columns

- Separate anionic and cationic surfactants
- Separate short and long chain surfactants in one gradient run

The Surfactant/R Column separates anionic and cationic surfactants by ion-pair chromatography along with suppressed conductivity detection. This column can also be used for other reversed-phase applications.



Surfactant/R Specifications	
Composition:	Polydivinylbenzene (DVB) based resin
Particle Size:	7µm
Mobile Phase Limits:	pH 1–14, 0–100% organic modifier

Surfactant/R Columns

Packing	i.d. x Length	PEEK Part No.	SS Part No.
Surfactant/R, 7µm	4.6 x 150mm	25101	25100

Guards for Surfactant/R Columns

Description	Qty.	Part No.
GRP-1 Revised Phase	3	38124
All-Guard™ Cartridge Holder*	ea	80101

*Direct-Connect™ column coupler included.

related product

Save money with IC All-Guard™ Kits on page 98. Kit includes one holder and three cartridges.

more applications

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



Alltech

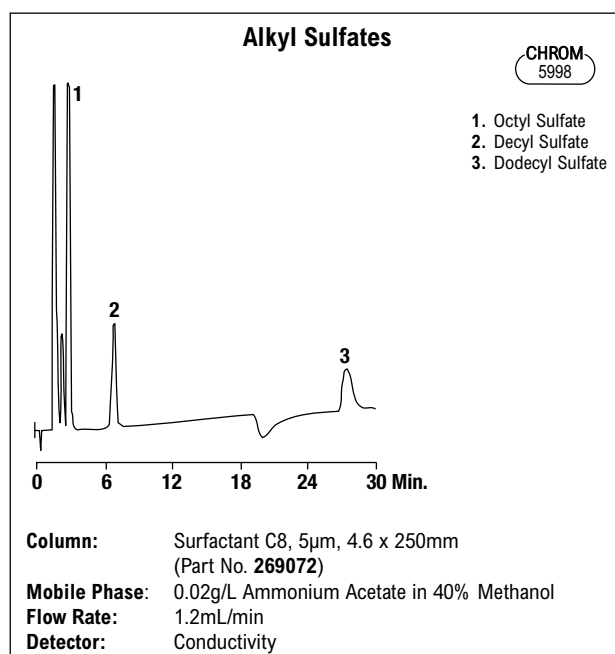


Surfactant/C IC Columns

- For non-suppressed analyses
- Silica-based for symmetrical peak shapes

Choose Surfactant C8 for short chain anionic surfactants such as alkyl sulfates and alkyl sulfonates.

Choose Surfactant C18 for long chain or aromatic surfactants such as xylene sulfonate and dodecyl benzene sulfonate.



Surfactant/C Specifications

Composition:	Silica-based C8 or C18
Particle Size:	5µm
Mobile Phase Limits:	pH 2–7, 0–100% organic modifier

Surfactant/C Columns

Packing	i.d. x Length	PEEK Part No.	SS Part No.
C8, 5µm	4.6 x 250mm	269072	269092
C18, 5µm	4.6 x 250mm	269071	269091

Guards for Surfactant/C Columns

Description	Qty.	Part No.
GRP-2 Revised Phase	3	38129
All-Guard™ Cartridge Holder*	ea	80101

*Direct-Connect™ column coupler included.

Custom HPLC Columns

Ordering Instructions

Alltech offers a large selection of packing materials and formats to create your own custom HPLC column.

Step 1: Select your packing material and particle size from **Table 1**.

Step 2: Select your column format from **Table 2**.

Step 3: Call your local Customer Service office for a quote. Indicate phase, particle size, format, and dimensions.



7102a

Family	Phase	Particle Sizes
Adsorbosphere™ Alltech	C18, C8, CN, NH ₂ , Silica, HS C18, HS Silica, UHS C18, Phenyl, CN-AQ, SAX, SCX, OPA HR, OPA HS, CN-AQ, SAX, SCX, OPA HR, OPA HS	3, 5, 10µm
Adsorbosphere™ XL Alltech	C18 300, C8 300, C18, C8, Silica, SAX, SCX, TMS	3, 5, 10µm
Allsphere™ Alltech	C8, CN, NH ₂ , ODS-2, Silica, C1, ODS-1, Phenyl, C6, SAX, SCX	3, 5µm
Alltima™ Alltech	C18, C8, Silica, CN, NH ₂ , Phenyl, C18-LL, C18-WP, C4-WP	3, 5, 10µm
Alltima™ HP Alltech	C18, C18 Amide, C18 EPS, C18 HiLoad, C8, CN, Silica	1.5, 3, 5µm
Apollo™ Alltech	C18, C8, Phenyl, Silica	5µm
Brava™ Alltech	C18 BDS, C18 ODS, C8, Phenyl, Cyano BDS, Cyano, Amino, Silica	3, 5µm
Carbohydrate Alltech	Anomer, NH ₂	10µm
Econosphere™ Alltech	C18, C8, Silica, CN, NH ₂	3, 5, 10µm
Everest® VYDAC	C18	5, 10, 15–20µm
GraceAlpha™ GRACE	C18, C8, Silica	5, 10, 15, 20µm
Grom™-Sil CROM	ODS-0, ODS-1, ODS-3, ODS-4, ODS-5, ODS-6, ODS-7, C8, C6, C4, C1, CN, NH ₂ , DIOL, IEX, Silica	1.5, 3, 5, 7, 10µm
Grom™-Sapphire CROM	C18, C8, C4, Silica	3, 5, 10µm
Ion Chromatography Alltech	Transition Metal, Universal Cation, Surfactant C8, Surfactant C18, Surfactant/R, Allsep™, Allsep™ A-2, Novosep™ A-1	5, 7, 10µm
Kromasil®, Akzo-Nobel	C18, C4, C8, NH ₂ , Silica	5, 10µm
LiChrosorb®, Merck	NH ₂ , RP-18, RP-8, RP-Select B, Silica-60, Silica-100	5, 10µm
LiChrospher®, Merck	RP-18, RP-18 Endcapped, RP-8, RP-8 Endcapped, Silica-60, CN, Diol, NH ₂ , Silica-100, RP-Select B	3, 5µm
Macrosphere™ Alltech	GPC 60, 100, 150, 300, SAX 300, SCX 300, WAX 300, WCX 300	5, 7µm
Mixed-Mode Alltech	C18/Cation, C8/Anion, C8/Cation	5, 7µm
Nucleosil®, Macherey-Nagel	C18, C8, CN, NH ₂ , SA, SB, Silica, Phenyl	3, 5, 10µm
Partisil™ , Whatman	C8, ODS-2, ODS-3, PAC, SAX, Silica, ODS, SCX	5, 10µm
Platinum™ Alltech	C18-300, EPS C18-300, Silica-300, C18, EPS C18, C8, C18, EPS C18, C8, EPS C8, CN, NH ₂ , Phenyl, Silica, SAX	1.5, 3, 5µm
Prevail™ Alltech	Amide, Amino, C18, C18 Select, C8, CN, Phenyl, Silica	3, 5µm
ProSphere™ HP Alltech	C18 300, C18 100, C4 300	1.5, 3, 5, 10µm
Spherisorb®, Waters	C8, CN, NH ₂ , ODS-2, Silica, ODS-1, Phenyl, C6, SAX, SCX	3, 5µm
Vydac® MS VYDAC	C18, C8, C4, Diphenyl	3, 5, 10–15µm
Vydac® TP VYDAC	C18, C8, C4, Diphenyl	3, 5, 10–15µm

Format	Custom Part No.	Description	Available Lengths	Available i.d.s
Capillary	Call	Quartz glass Grace capillary columns connect directly to microinjector and via fused silical capillary detectors	5, 10, 20, 50, 75, 100, 150, 250mm	0.075, 0.1, 0.2, 0.3, 0.5, 0.8mm
Analytical, Solvent-Reducer, and LC/MS	C-6000	Stainless steel analytical column with industry standard female fittings.	30, 50, 100, 150, 250, 300mm	2.1, 3.0, 3.9, 4.1, 4.6mm
Analytical, Waters® Style Endfittings	C-6000	Stainless steel analytical column with Waters®-style endfittings.	30, 50, 100, 150, 250, 300mm	2.1, 3.0, 3.9, 4.1, 4.6mm
Metal-Free*	C-6000	Metal-Free columns with industry standard female fittings.*	30, 50, 100, 150, 250, 300mm	2.1 (30 or 100mm lengths only), 4.6, 7.5mm
Rocket™	C-6000	Fast-analysis columns with Rocket™ endfittings; requires 3µm or smaller particle size.	33, 53mm	7mm
All-Guard™ Cartridges Stainless Steel	C-9800	4/pk All-Guard™ Cartridges, Stainless Steel. Purchase holder 80101 separately.	7.5mm	2.1, 3.0, 4.6mm
All-Guard™ Cartridges Metal-Free*	C-9400	4/pk All-Guard™ Cartridges, PEEK. Purchase holder 80101 separately.	7.5mm	4.6mm
Preparative**	C-6000F	Stainless steel preparative column with threaded endfittings.	70, 100, 250, 500mm	7, 10, 22mm
Capillary Guards	Call	Create a zero dead volume finger-tight connection to capillary columns.	5, 10, 20mm	0.1, 0.15, 0.3, 0.5mm

*Metal-Free columns are available with ProSphere™ and Ion Chromatography packings only.

**Additional custom prep columns available, see pages 162–170.

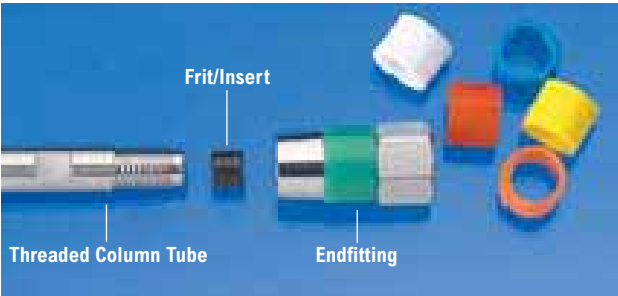
more info

For more information on our column formats, see page 31.

Empty HPLC Hardware

Stainless Steel Analytical Column Hardware

- Threaded tube for easy assembly
- Type 316 stainless steel construction
- Column i.d. of 2.1, 3.2, 3.9, 4.1, and 4.6mm



Stainless steel analytical columns come complete with the threaded tube, two 2µm industry standard frit/inserts, and two stainless steel endfitting nuts. Removable color-coded bands available separately, (Part No. 93237). Industry standard frit/inserts contain a stop depth equal to 0.100" (see **Figure 1**). Optional 0.5µm porosity frit/inserts are also available.

Adapters and sealing rings are available for slurry packing your own columns (see **Figure 2**). The packing adapter comes with a 1/4" precolumn tube to connect to 1/4" slurry reservoirs.

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

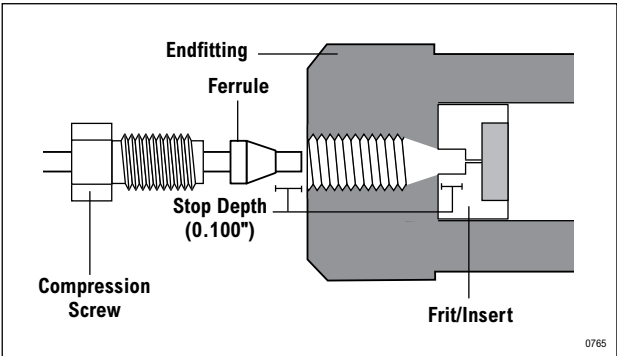


Figure 1—Stainless steel analytical columns have ports with industry standard stop depth.

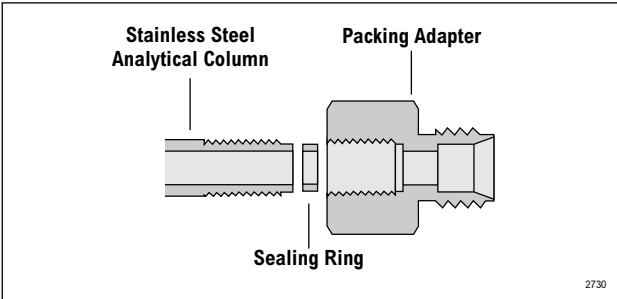


Figure 2—Packing adapter threads directly onto stainless steel analytical column tube.

Stainless Steel Analytical Hardware and Accessories

Description	2.1mm i.d. Part No.	3.2mm i.d. Part No.	3.9mm i.d. Part No.	4.1mm i.d. Part No.	4.6mm i.d. Part No.
<i>Complete Columns</i>					
50mm	65175	65170	65165	65160	65150
100mm	65176	65171	65166	65161	65152
150mm	65177	65172	65167	65162	65154
250mm	65178	65173	65168	65163	65156
300mm	65179	65174	65169	65164	65158
<i>Replacement Parts</i>					
Endfitting (ea)	75001	75001	75001	75001	75001
Frit/Insert, 2µm (5/pk)	75028	75026	75024	75022	75020
Frit/Insert, 0.5µm (5/pk)	75029	75027	75025	75023	75021
<i>Packing Accessories</i>					
Packing Adapter (ea)	65189	65188	65187	65186	65185
Sealing Rings (10/pk)	65199	65198	65197	65196	65195

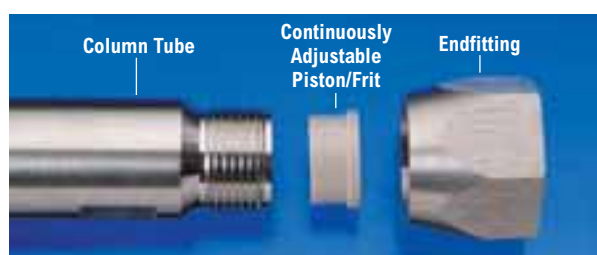
analytical hplc

Empty HPLC Hardware

Stainless Steel Preparative Column Hardware

- Threaded format for easy assembly
- Extended column life with the patented continuously adjustable piston (CAP™)
- Column i.d. of 7, 10, and 22mm

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



5544

Stainless Steel Preparative Column Hardware Specifications

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

Stainless Steel Preparative Hardware and Accessories

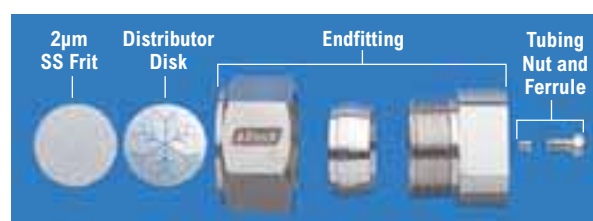
i.d.	Length	Qty.	Part No.
<i>Complete Columns</i>			
7mm	100mm	ea	96500
7mm	250mm	ea	96501
7mm	500mm	ea	96502
10mm	100mm	ea	96510
10mm	250mm	ea	96511
10mm	500mm	ea	96512
22mm	70mm	ea	96524
22mm	100mm	ea	96520
22mm	250mm	ea	96521
22mm	500mm	ea	96522
<i>Replacement Endfittings</i>			
7mm	—	ea	96505
10mm	—	ea	96515
22mm	—	ea	96525
<i>Replacement Piston/Frit, 2µm</i>			
7mm	—	ea	96507
10mm	—	ea	96517
22mm	—	ea	96527
<i>Packing Adapters*</i>			
7mm	—	ea	96508
10mm	—	ea	96518
<i>Packing Seals*</i>			
7mm	—	10	96509
10mm	—	10	96519

*22mm packing adapters and seals are not available.

Stainless Steel Swaged Column Hardware

- Passivated stainless steel for a more inert surface
- Uses precision bore tubing and OptiFlow™ endfittings
- Column i.d. of 2.1, 3.2, 4.6, 10, and 22.5mm

Stainless steel swaged hardware uses precision bore seamless tubing and OptiFlow™ endfittings. It is the ideal choice when standard column lengths are not desirable—just cut to your specification. OptiFlow™ endfittings have a flow distributor which spreads the sample and eluant across the entire frit surface to improve peak symmetry and prevent frit blockage.



5568

Precision Bore HPLC Column Tubing Specifications

Material:	316 Stainless Steel
Max. Temperature:	500°C
Max. Pressure:	8000psig
Typical Use:	HPLC Column Assembly w/Swageable Endfittings

Precision Bore Tubing

o.d. x i.d.	Per Foot Part No.	Per Meter Part No.
<i>Precision Bore Tubing</i>		
1/8" x 2.1mm	3012	30120
1/4" x 2.1mm	3013	30130
1/4" x 3.2mm	3011	30110
1/4" x 4.6mm	3015	30150

OptiFlow™ Endfittings*

Description	For use with Tubing i.d.	Qty.	Part No.
<i>OptiFlow™ Endfittings</i>			
1/4"	2.1, 3.2, 4.6mm	ea	400612
3/8"	7.0mm	ea	10123
1/2"	10.0mm	ea	9205
1"	2.25mm	ea	9204

*Each fitting is supplied with a nut and ferrule for 1/16" tubing, a 2-micron stainless steel frit and distributor disk.

related products

Additional prep hardware also available. See page 150.

Stainless Steel Frits

- Type 316 stainless steel
- Heat-passivated for a more inert surface

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

Stainless Steel Frits

Frit Diameter	Thickness	Porosity	5/pk Part No.	25/pk Part No.
1/4" (6.350mm)	0.031" (0.79mm)	0.5µm	720805	720825
	0.031" (0.79mm)	2.0µm	721005	721025
	0.063" (1.59mm)	2.0µm	716505	716525
3/8" (9.525mm)	0.031" (0.79mm)	0.5µm	721205	721225
	0.031" (0.79mm)	2.0µm	721405	721425
	0.063" (1.59mm)	0.5µm	718005	718025
	0.063" (1.59mm)	2.0µm	718205	718225
1/2" (12.7mm)	0.031" (0.79mm)	0.5µm	721605	721625
	0.031" (0.79mm)	2.0µm	721805	721825
1" (25.4mm)	0.031" (0.79mm)	2.0µm	722205	722225
	0.063" (1.59mm)	2.0µm	718605	718625



Encased Stainless Steel Frits

- Improved sealing over conventional frits
- Better mechanical stability

Encased Stainless Steel Frit Specifications	
Material:	316 Stainless Steel, PEEK, or Graph-Tite™
Max. Temperature:	100°C
Max. Pressure:	10,000psig
Typical Use:	Column Inlet/Outlet

Encased Stainless Steel Frits

Frit Diameter	Ring Diameter	Thickness	0.5 Micron (5/pk) Part No.	2 Micron (5/pk) Part No.	2 Micron (10/pk) Part No.	2 Micron (20/pk) Part No.
<i>Stainless Steel Frits with PEEK Ring</i>						
0.083" (2.1mm)	0.250" (6.4mm)	0.063" (1.59mm)	—	—	9900	99001
0.125" (3.2mm)	0.250" (6.4mm)	0.063" (1.59mm)	—	—	9902	99021
0.156" (4.0mm)	0.250" (6.4mm)	0.063" (1.59mm)	—	—	9906	99061
0.273" (7.0mm)	0.375" (9.5mm)	0.063" (1.59mm)	—	—	9910	99101
0.352" (10mm)	0.500" (12.7mm)	0.063" (1.59mm)	—	—	9912	99121
<i>Stainless Steel Frits with Carbon-Reinforced PEEK Ring</i>						
0.083" (2.1mm)	0.250" (6.4mm)	0.031" (0.79mm)	75015	75014	—	—
0.125" (3.2mm)	0.250" (6.4mm)	0.031" (0.79mm)	75013	75012	—	—
0.181" (4.6mm)	0.250" (6.4mm)	0.031" (0.79mm)	75006	75005	—	—

Encased Metal-Free PEEK Frits

- Metal-free inert construction
- Ideal for chromatography biocompatibility applications

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

Encased Metal-Free PEEK Frits

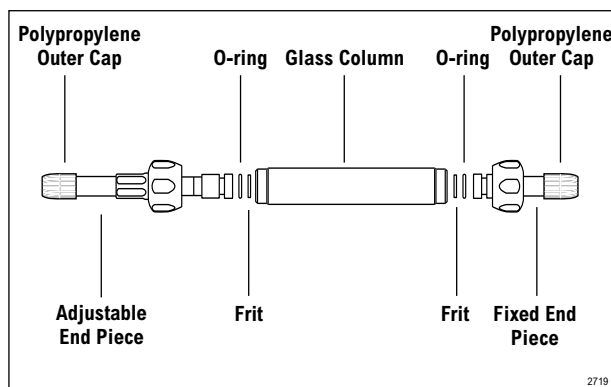
Frit Diameter	Ring Diameter	Thickness	5 Micron (5/pk) Part No.	10 Micron (5/pk) Part No.
<i>PEEK Frits with PEEK Ring</i>				
0.125" (3.2mm)	0.250" (6.4mm)	0.063" (1.59mm)	69025	69026
0.181" (4.6mm)	0.250" (6.4mm)	0.063" (1.59mm)	68152	69027
0.312" (7.9mm)	0.375" (9.5mm)	0.063" (1.59mm)	67152	69028

Empty Low-Pressure Hardware

Omnifit® Low-Pressure Column Hardware

- Borosilicate heavy wall glass with precision threaded ends and patented “strain free” endfittings
- Bore diameter constant to $\pm 0.1\text{mm}$
- Higher pressure limits than other low-pressure column hardware

Each Omnifit® glass column includes two PTFE end pieces (one fixed, one adjustable), two 1/4-28 polypropylene outer caps, one frit kit (two each: 10 μm polyethylene, 10 μm PTFE and 25 μm PTFE), two flangeless tube endings, two gripper fittings, and two meters of 1/16" PTFE tubing.



2719



5551

Omnifit® Column Hardware Specifications

Material:	Borosilicate Glass, PTFE, Fluoroelastomer Polymer, Polypropylene, and Polyethylene
Max. Temperature:	100°C
Max. Pressure:	Varies, See Price Block
Thread Type:	1/4-28 UNF
Typical Use:	Low-pressure, Metal-free Columns

Omnifit® Glass Columns

Length	Part No.
<i>6.6mm i.d. Column, rated to 60Atm (900psig)</i>	
100mm	62271
150mm	62272
250mm	62273
400mm	62276
<i>10mm i.d. Column, rated to 40Atm (600psig)</i>	
100mm	61110
150mm	61120
250mm	61140
500mm	61160
1000mm	61180
<i>15mm i.d. Column, rated to 20Atm (300psig)</i>	
100mm	64110
150mm	64120
250mm	64140
500mm	64160
1000mm	64180
<i>25mm i.d. Column, rated to 10Atm (150psig)</i>	
150mm	62121
250mm	62141
500mm	62161
1000mm	62181

related products

Looking for low-pressure accessories?

Low-pressure fittings, pages 117–120;

Low-pressure tubing, page 387.

Omnifit® Glass Column Accessories

Description	Qty.	Part No.
<i>6.6mm i.d. Column Accessories</i>		
Adjustable Plunger	ea	62287
25 μm Polyethylene Frits	20	62281
25 μm PTFE Frits	20	62282
10 μm PTFE Frits	20	62283
5 μm PTFE Frits	20	62284
Fluoroelastomer Polymer O-rings	10	62285
Silicone O-rings	10	62286
<i>10mm i.d. Column Accessories</i>		
Adjustable Plunger	ea	61651
25 μm Polyethylene Frits	20	61411
25 μm PTFE Frits	20	61421
10 μm PTFE Frits	20	61461
5 μm PTFE Frits	20	61471
Fluoroelastomer Polymer O-rings	10	61661
Silicone O-rings	10	61671
<i>15mm i.d. Column Accessories</i>		
Adjustable Plunger	ea	64651
25 μm Polyethylene Frits	20	64411
25 μm PTFE Frits	20	64421
10 μm PTFE Frits	20	64461
5 μm PTFE Frits	20	64471
Fluoroelastomer Polymer O-rings	10	64661
Silicone O-rings	10	64671
<i>25mm i.d. Column Accessories</i>		
Adjustable Plunger	ea	62651
25 μm Polyethylene Frits	20	62411
25 μm PTFE Frits	20	62421
10 μm PTFE Frits	20	62461
5 μm PTFE Frits	20	62471
Fluoroelastomer Polymer O-rings	10	62661
Silicone O-rings	10	62671

Prefilters

Direct-Connect™ Filter Kit

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



In-Line Filter Kit

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



Universal Mini Filters

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



High-Pressure In-Line Column Prefilter

- Install between injector and column
- Filter has surface area of 7.1mm²



Rheodyne® Column In-Line Filter Kit

- Install between injector and column
- Use 3mm filter kit for 4.6mm columns
- Use 1.5mm filter kit for 1 and 2mm columns



High-Capacity In-Line Filters

- Place between the pump and the injector
- Filter has a surface area of 2.5cm²



Prefilters

Description	Material	Max. Temp.	Max. Pressure	Thread Type	Porosity	Qty.	Part No.
<i>Direct-Connect™ Filter Kit and Replacement Parts</i>							
Direct Connect Filter Kit	316 SS, PTFE, and Kel-F®	100°C	5000psig	10-32 UNF	2.0µm	ea	28689
Housing	316 Stainless Steel	100°C	5000psig	10-32 UNF	—	ea	27005
Filter	Stainless Steel	100°C	5000psig	10-32 UNF	2.0µm	5/pk	28640
Female Tip	Kel-F®	100°C	5000psig	10-32 UNF	—	ea	28002
Waters® Tip	Kel-F®	100°C	5000psig	10-32 UNF	—	ea	28004
Valco® Tip	Kel-F®	100°C	5000psig	10-32 UNF	—	ea	28006
Distributor Disks	PTFE	100°C	5000psig	10-32 UNF	—	ea	28008
<i>In-Line Filter Kit and Replacement Parts</i>							
Metal-Free Filter Kit*	PEEK, PAT®, and Graph-Tite™	100°C	5000psig	10-32 UNF	2.0µm	ea	68250
Stainless Steel Filter Kit**	316 SS and Graph-Tite™	100°C	5000psig	10-32 UNF	2.0µm	ea	27000
Filter	PAT®	100°C	5000psig	10-32 UNF	2.0µm	5/pk	68152
Filter	Stainless Steel	100°C	5000psig	10-32 UNF	2.0µm	5/pk	28640
Housing	316 Stainless Steel	100°C	5000psig	10-32 UNF	—	ea	27010
<i>Universal Mini Filters†</i>							
Mini Filter 1.2µL internal volume	316 Stainless Steel	100°C	7000psig	10-32 UNF	0.5µm	5/pk	77166
Mini Filter 1.2µL internal volume	316 Stainless Steel	100°C	7000psig	10-32 UNF	2.0µm	5/pk	77167
Mini Filter 0.3µL internal volume	316 Stainless Steel	100°C	7000psig	10-32 UNF	1.0µm	5/pk	77168
<i>High-Pressure In-Line Column Prefilter and Replacement Parts</i>							
1/16" o.d. SSI Prefilter	316 Stainless Steel	500°C	15,000psig	1/4-28 UNF	2.0µm	ea	05-0148
1/16" o.d. SSI Prefilter	316 Stainless Steel	500°C	15,000psig	1/4-28 UNF	0.5µm	ea	05-0149
1/16" o.d. Industry Std. CPI Prefilter	316 Stainless Steel	500°C	15,000psig	10-32 UNF	0.5µm	ea	25-0149
1/16" o.d. Waters® Prefilter	316 Stainless Steel	500°C	15,000psig	10-32 UNF	2.0µm	ea	35-0148
1/16" o.d. Waters® Prefilter	316 Stainless Steel	500°C	15,000psig	10-32 UNF	0.5µm	ea	35-0149
Filter Elements	316 Stainless Steel	500°C	15,000psig	—	2.0µm	10/pk	05-0154
Filter Elements	316 Stainless Steel	500°C	15,000psig	—	0.5µm	10/pk	05-0155
<i>Rheodyne® Column In-Line Filter Kits†† and Replacement Parts</i>							
1.5mm Filter Diameter Kit	316 Stainless Steel	500°C	7000psig	10-32 UNF	0.5µm	ea	7315RV
3mm Filter Diameter Kit	316 Stainless Steel	500°C	7000psig	10-32 UNF	0.5µm	ea	7335RV
1.5mm Filter Element	316 Stainless Steel	500°C	7000psig	10-32 UNF	0.5µm	ea	7315-010
3mm Filter Element	316 Stainless Steel	500°C	7000psig	10-32 UNF	0.5µm	ea	7335-010
<i>High-Capacity In-Line Filters and Replacement Parts</i>							
SSI Filter	316 Stainless Steel	500°C	15,000psig	1/4-28 UNF	0.5µm	ea	050105
SSI Filter	316 Stainless Steel	500°C	15,000psig	1/4-28 UNF	2.0µm	ea	050108
Industry Standard CPI	316 Stainless Steel	500°C	15,000psig	10-32 UNF	0.5µm	ea	250105
Industry Standard CPI	316 Stainless Steel	500°C	15,000psig	10-32 UNF	2.0µm	ea	250108
Filter Elements	316 Stainless Steel	500°C	15,000psig	—	0.5µm	2/pk	050106
Filter Elements	316 Stainless Steel	500°C	15,000psig	—	2.0µm	2/pk	050107

*Includes PEEK holder, PAT® filter, and two SofGrip™ fittings. **Includes 316 Stainless Steel holder, Stainless Steel filter, and two SofGrip™ fittings.

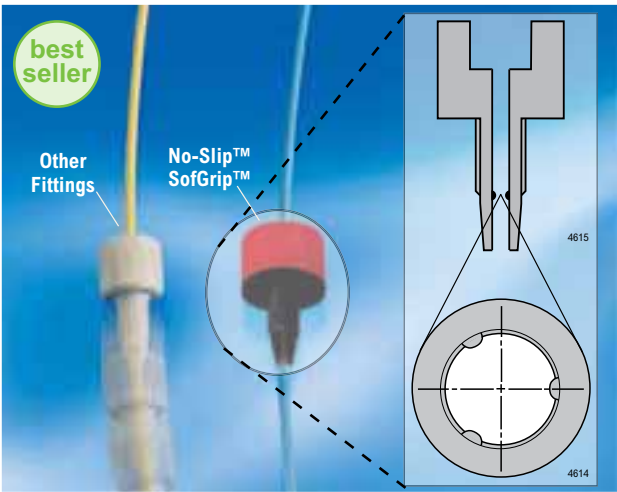
†Patent #5, 525, 503; #5,730,943; #5,911,954. ††Includes one holder, one filter, three fittings, and two connecting tubes 6cm x 0.007" i.d.

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SofGrip™ One-Piece High-Pressure Fittings

- Soft elastomer cushion makes hand-tightening comfortable
- Graph-Tite™ construction is three times stronger than PEEK
- One-piece integrated ferrule eliminates handling small pieces
- No-Slip™ version stays on tubing between connections

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



Integral barrel tines in No-Slip™ SofGrip™ fittings lightly grip tubing. This holds the fitting in place between connections.

One-Piece High-Pressure Fittings

- PEEK or Graph-Tite™ construction is inert and biocompatible
- One-piece integrated ferrule eliminates handling small pieces
- No-Slip™ version stays on tubing between connections

One-Piece Fitting Specifications	
Material:	PEEK or Graph-Tite™ (Carbon-Reinforced PEEK)
Max. Temperature:	100°C
Max. Pressure:	Finger-Tight™: 5000psig / Wrench-Tight™: 8000psig
Thread Type:	10-32 UNF
Typical Use:	1/16" o.d. Tubing Connections



One-Piece High-Pressure Fittings

Graphic	Length	Color	Material	Qty.	Standard Part No.	No-Slip Part No.
<i>SofGrip™ One-Piece Fittings</i>						
A	Short	Black	Graph-Tite™	10	40501	40511
A	Short	Red	Graph-Tite™	10	40502	40512
A	Short	Blue	Graph-Tite™	10	40503	40513
A	Short	Green	Graph-Tite™	10	40504	40514
A	Short	Yellow	Graph-Tite™	10	40505	40515
B	Long	Black	Graph-Tite™	10	40506	40516
A	Short	Assort.	Graph-Tite™	10	40507	40517
<i>One-Piece Fittings, Finger-Tight™</i>						
C	Short	Natural	PEEK	10	32233	32293
C	Short	Red	PEEK	10	32072	32936
C	Short	Yellow	PEEK	10	32074	32935
C	Short	Blue	PEEK	10	32076	32933
C	Short	Green	PEEK	10	32078	32931
C	Short	Black	Graph-Tite™	10	32343	31001
C	Short	Assort.	PEEK	12	32070	32937
D	Long	Natural	PEEK	10	32235	—
D	Long	Black	Graph-Tite™	10	—	31002
<i>One-Piece Fittings, Hex-Head</i>						
E	Short	Natural	PEEK	10	32236	32297
E	Short	Black	Graph-Tite™	10	32347	31003
F	Long	Natural	PEEK	10	32238	32299
F	Long	Black	Graph-Tite™	10	32349	31004

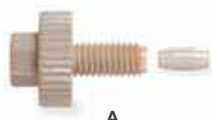
Two-Piece High-Pressure Fittings

best value

Double-Sided Ferrule (DSF) Fittings

- Double-sided ferrule (DSF) provides twice the gripping power
- PEEK construction is inert and biocompatible
- Economical two-piece design

DSF fittings have a double-sided ferrule which grips tubing in two places. This increases the holding power and decreases the force on one area of the tubing. A unique Wrench-Tight™ and Finger-Tight™ design is available and combines the convenience of a Finger-Tight™ fitting with the option to wrench-tighten when higher pressures are used.



A



B



C

Two-Piece DSF Fittings

Color	Material	Qty.	Wrench-Tight™/Finger-Tight™ Part No. (A)	Short Hex-Head Part No. (B)	Long Hex-Head Part No. (C)
<i>Two-Piece DSF Fittings</i>					
Natural	PEEK	10	35753	35744	35735
Black	PEEK	10	35077	37087	37097
<i>Replacement Ferrules (DSF)</i>					
Natural	PEEK	10	35740	35740	35740
Natural	Kel-F®	5	32025	32025	32025

Wing-Nut Fittings

- “Wing-Nut” provides Finger-Tight™ operation to 6000psig
- Easier to make and break connections by hand
- Economical two-piece design
- PEEK or Graph-Tite™ construction is inert and biocompatible



A



B



C

Two-Piece Wing-Nut Fittings

Graphic	Color	Material	Qty.	Part No.
<i>Two-Piece Wing-Nut Fittings with Ferrules</i>				
A	Black	Graph-Tite™†	10	32327
B	Natural	PEEK	10	32326
<i>Replacement Ferrules</i>				
C	PEEK Ferrules	PEEK	10	32335

†Carbon-reinforced PEEK.

Stainless Steel Hex-Head and Finger-Tight™ Fittings



A



B



C



D



E



F



G



H

Stainless Steel Two-Piece Hex-Head Fitting Specifications

Material: 300 Stainless Steel
Max. Temperature: 500°C
Max. Pressure: 10,000psig
Thread Type: 10-32 UNF for 1/16", 6-32 UNF for 1/32"
Typical Use: 1/16" and 1/32" o.d. Tubing Connections

Stainless Steel Two-Piece Finger-Tight™ Fitting Specifications

Material: 300 Stainless Steel and PEEK
Max. Temperature: 100°C
Max. Pressure: 7000psig
Thread Type: 10-32 UNF
Typical Use: 1/16" o.d. Tubing Connections

Stainless Steel Two-Piece Fittings

Graphic	Description	Length	Qty.	Part No.
<i>Stainless Steel Two-Piece Hex-Head Fittings</i>				
A	1/16" Nut	Short	5	206085
B	1/16" Nut	Long	5	286335
C	1/16" Nut	Extra-Long	5	306141
—	1/32" Nut	Short	10	306101
D	1/16" Female Nut	—	5	321355
<i>Ferrules</i>				
E	1/16"	—	5	286075
—	1/32"	—	10	30640
<i>Stainless Steel Two-Piece Finger-Tight™ Fittings</i>				
F	1/16" Nut	Short	5	321185
G	1/16" Nut	Long	5	321025
<i>Ferrule</i>				
H	PEEK, 1/16"	—	5	321805

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Valco® High-Pressure Fittings

Valco® Fitting Specifications

Material:	316 Stainless Steel, PEEK, or PTFE
Max. Temperature:	500°C (SS) 100°C (PEEK and PTFE)
Max. Pressure:	10,000psig (SS), 8000psig (PEEK and PTFE)
Typical Use:	High-Pressure Tubing Connections

Valco® Nuts and Ferrules



Valco® Nuts and Ferrules

Graphic	Description	Qty.	Part No.
<i>Stainless Steel Nuts</i>			
A	1/32" Nut	10	306101
A	1/16" Nut	10	306121
A	1/8" Nut	10	306151
<i>Stainless Steel Ferrules</i>			
B	1/32" (Type 303)	10	30640
B	1/16" (Type 316)	10	30646
B	1/8" (Type 316)	10	30647
<i>PEEK Ferrules</i>			
C	1/16"	10	30661
C	1/8"	10	30662
<i>PTFE Ferrules</i>			
D	1/16"	10	30671
D	1/8"	10	30672

Valco® Tees and Crosses



Valco® Tees and Crosses

Graphic	Size	Bore	Part No.
<i>Tees</i>			
E	1/32"	0.25mm	30770
E	1/16"	0.25mm	30771
E	1/8"	0.75mm	30773
E	1/8"	2.0mm	30774
<i>Crosses</i>			
F	1/32"	0.25mm	30780
F	1/16"	0.75mm	30782

Valco® Unions



Valco® Unions

Graphic	Size	Bore	Part No.
<i>Internal Unions</i>			
G	1/16"	0.25mm	30713
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
<i>External Unions</i>			
H	1/8"	2.0mm	30731
<i>Internal Reducing Unions</i>			
I	1/16" to 1/32"	0.25mm	30740
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
<i>External/Internal Reducing Unions</i>			
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
<i>Column Endfittings</i>			
K	1/4" to 1/16"	2.1mm	45905
K	1/4" to 1/16"	3.0mm	45907

related products

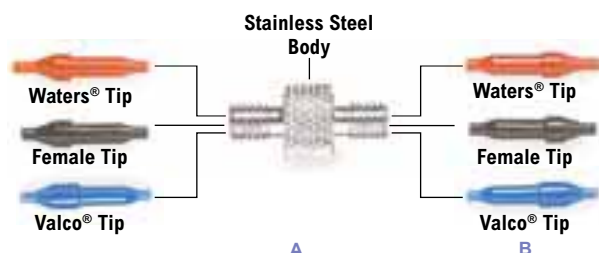
Looking for stainless steel tubing?
See pages 386 and 388.



High-Pressure Adapters

Universal Direct-Connect™ Column Coupler

The Universal Direct-Connect™ Column Coupler will join any two columns, regardless of fitting type. A 10-32 threaded body accepts any of the three Kel-F® tips on either side. Select the correct tip to join columns of any fitting type.



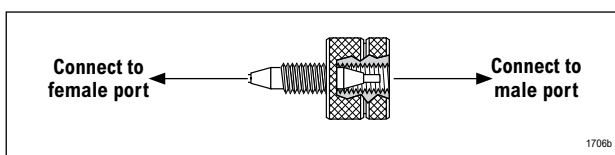
Universal Direct-Connect™ Column Couplers

Graphic	Description	Color	Part No.
<i>Universal Direct-Connect™ Column Coupler</i>			
A	Universal Type*	—	28638
<i>Replacement Kel-F® Tips</i>			
B	Waters® ("C")	Red	28004
B	Female ("B")	Black	28002
B	Valco®	Blue	28006

*Includes one stainless steel body, two Waters® tips, and two ferrule tips.

Universal Direct-Connect™ Column Adapter

- Double-sided adapter works with male or female 10-32 fittings
- Polymeric ferrule insert adjusts to any stop depth
- Seals Finger-Tight™ to 5000psig
- Inert PEEK or Graph-Tite™ ferrule insert



Flip adapter around to accommodate any 10-32 fitting.

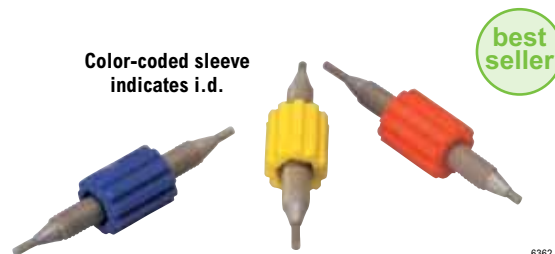
Universal Direct-Connect™ Column Adapter

Description	PEEK Part No.	Graph-Tite™ Part No.
Universal Direct-Connect™ Column Adapter	29242	29246
Replacement Inserts	292405	29247
Universal Adapter Kit*	29244	29248

*Includes two adapters and four inserts.

Universal One-Piece Coupler

Universal one-piece column couplers adapt to the stop depth of any 10-32 port. Each side of these PEEK couplers adjusts and bottoms out in the port to ensure that minimal dead volume is created.



Universal One-Piece Coupler

Description	Color	Part No.
0.005" i.d.	Red	336501
0.007" i.d.	Yellow	336502
0.009" i.d.	Blue	336503
0.020" i.d.	Orange	336504

One-Piece Couplers

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



One-Piece Column Couplers

Port Configuration	Color	Part No.
Female	Black	28191
Waters®	Red	28192
Male	Red	28193
Valco®	Blue	28194
Female to Waters®	—	28196

Column Coupler Kits



Column Coupler Kits*

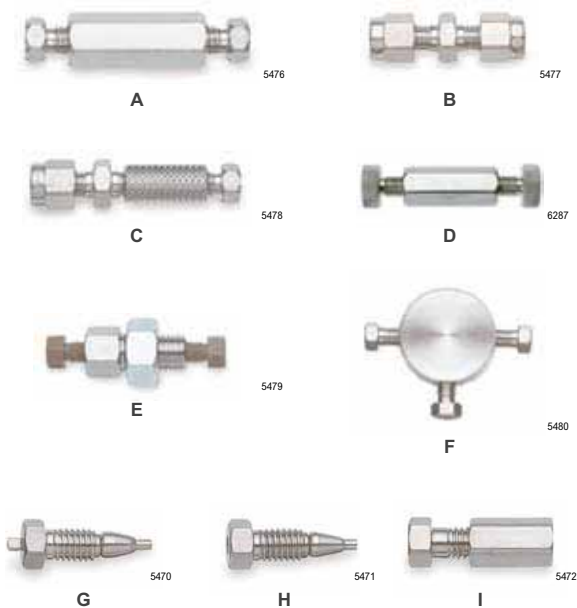
Description	Part No.
Stainless Steel	9549
PEEK	9614

*Includes two 10-32 UNF fittings, two ferrules, and a 5cm 1/16" o.d. x 0.010" i.d. tube.

High-Pressure Adapters, Plugs, and Caps

Stainless Steel Adapters, Plugs, and Caps

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

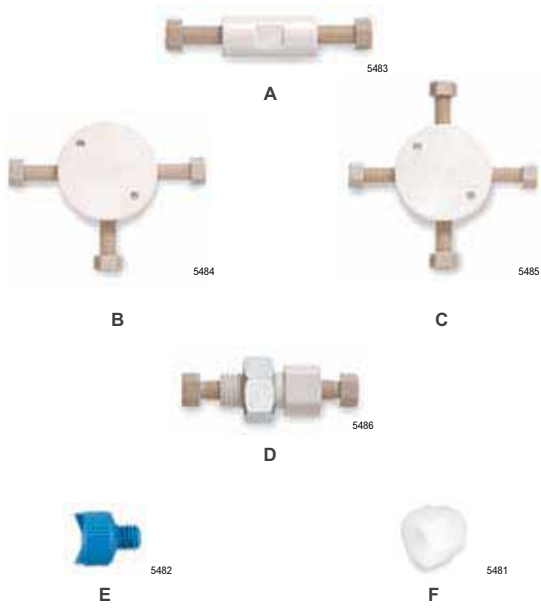


Stainless Steel Adapters, Plugs, and Caps				
Graphic	Description	Bore	Qty.	Part No.
<i>Stainless Steel Adapters</i>				
—	Union, Female	0.003"	ea	77450
A	Union, Female	0.012"	ea	28627
A	Union, Waters	0.012"	ea	97332
B	Union, Male	0.067"	ea	10061
C	Union, Male to Female	0.067"	ea	28609
D	Union, Female, Finger-Tight™*	0.013"	ea	32110
E	Bulkhead Union	—	ea	31505
F	Tee	—	ea	28629
<i>Stainless Steel Plugs</i>				
G	Standard (7000psig)	—	ea	30631
H	High-Pressure (10,000psig)	—	ea	30636
<i>Stainless Steel Cap</i>				
I	Standard	—	ea	30606

*Finger-Tight™ union has PEEK ferrule, maximum pressure 8000psig, maximum temperature 100°C.

Polymeric Adapters, Plugs, and Caps

Polymeric Adapters, Plugs, and Caps Specifications	
Material:	PEEK, Delrin®, Nylon
Maximum Temperature:	100°C
Maximum Pressure:	8000psig
Thread Type:	10-32 UNF
Typical Use:	1/16" o.d. Tubing



Polymeric Adapters, Plugs, and Caps				
Graphic	Description	Bore	Qty.	Part No.
<i>PEEK Adapters</i>				
A	Union	0.010"	ea	32141
B	Tee	0.010"	ea	32143
C	Cross	0.010"	ea	32145
D	Bulkhead Union	—	ea	31504
<i>Delrin® Plugs</i>				
E	Blue	—	10	8872
E	Black	—	10	18873
E	White	—	10	18874
E	Red	—	10	18875
E	Yellow	—	10	18876
E	Green	—	10	18877
<i>Nylon Caps</i>				
F	White	—	10	8870

technical assistance

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

High- and Low-Pressure Fittings

Flange-Free™ Low-Pressure Fittings†

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

The Flange-Free™ system makes connections to 1/4-28, flat-bottomed ports without flanging tools. Hand-tightened connections produce a leak-free seal to 500psig on 1/8" o.d. PTFE tubing and to 1000psig on 1/16" o.d. PTFE tubing. Hex-head fittings are available for use with harder tubing, such as PEEK, Tefzel®, or metal.

†U.S. Patent #4,690,437.

Flange-Free™ Fitting Specifications	
Material:	Varies, See Price Block
Maximum Temperature:	100°C
Maximum Pressure:	1/8" 500psig 1/16" 1000psig
Thread Type:	1/4-28 UNF
Typical Use:	1/16" or 1/8" o.d. Tubing Connection



Flange-Free™ Fittings, 10/pk

Graphic	Description	Material	1/16" o.d. Tubing Part No.	1/8" o.d. Tubing Part No.
<i>Finger-Tight™ Nuts</i>				
A	White	Delrin®	201101	201201
A	Black	Delrin®	201122	201211
A	White, Long	Delrin®	201131	201221
A	Black, Long	Delrin®	201141	201231
A	Natural	PEEK	37065	37075
<i>Hex-Head Nuts</i>				
B	Aluminum	Metal	200911	200901
B	Stainless Steel	Metal	200936	200926
<i>Flange-Free™ Ferrules</i>				
C	Ferrules	PEEK	201171	201271
C	0.3mm Bore	Kel-F®	200771	—
C	0.8mm Bore	Kel-F®	200781	—
C	Ferrules	Kel-F®	201152	201251
C	Ferrules	Tefzel®	20240	20242

Flange-Free™ Plus High-Pressure Fittings

- Seals Finger-Tight™ to 5000psig
- Connects to any standard 1/4-28 port
- Available only for 1/16" tubing



Flange-Free™ Plus Fitting Specifications	
Material:	PEEK and Stainless Steel
Maximum Temperature:	100°C
Maximum Pressure:	5000psig
Thread Type:	1/4-28 UNF
Typical Use:	1/16" o.d. Tubing Connection

Flange-Free™ Plus Fittings

Description	Qty.	Part No.
Fitting System*	10	25020
<i>Replacement Parts</i>		
Stainless Steel Bushings	10	25022
PEEK Ferrules	10	25021

*Includes 10 each of fittings, bushings, and ferrules.

Flanged Tubing Low-Pressure Fittings

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

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



Flanged Tubing Fittings, 10/pk

Graphic	Description	Material	1/16" Part No.	1/8" Part No.
<i>Flanged Tubing Fittings (washer included)</i>				
A	Natural	PEEK	37165	37175
<i>Replacement Washers</i>				
B	316 SS	SS	20067	20068

Pre-Flanged PTFE Tubing

- Chemically inert
- Supplied with 1/4-28 nylon fittings flanged in place



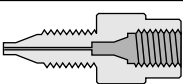
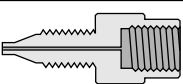
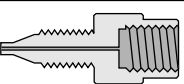
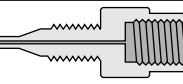
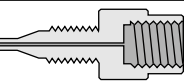
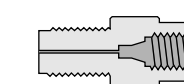
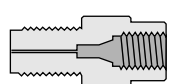
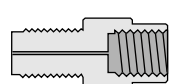
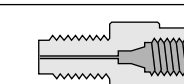
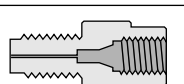
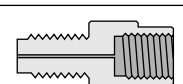
Pre-Flanged PTFE Tubing Specifications	
Material:	PTFE
Maximum Temperature:	100°C
Maximum Pressure:	0.020" i.d., 1200psig 0.030" i.d., 900psig 0.063" i.d., 400psig 0.100" i.d., 300psig
Typical Use:	Low-Pressure Plumbing

Pre-Flanged PTFE Tubing, ea

Length	o.d.	i.d.	Part No.
5cm	1/16"	0.030"	20013
	1/8"	0.063"	20012
10cm	1/16"	0.030"	20015
	1/8"	0.063"	20014
25cm	1/16"	0.030"	20017
	1/8"	0.063"	20016
50cm	1/16"	0.030"	20027
	1/8"	0.063"	20018
100cm	1/16"	0.030"	20043
	1/8"	0.063"	20020

High- and Low-Pressure Adapters

PEEK Port Adapters

		INTERNAL PORT TYPE			
		CPI Standard ("B") 1	Waters® ("C") 2	1/4-28 UNF 3	M6 4
EXTERNAL THREAD TYPE	A CPI Standard ("B")	 Part No. 32015		 Part No. 32022	 Part No. 32065
	B Waters® ("C")			 Part No. 32023	 Part No. 32066
	C 1/4-28 UNF	 Part No. 32013	 Part No. 32016		 Part No. 32067
	D M6	 Part No. 32014	 Part No. 32017	 Part No. 32024	

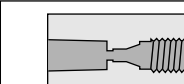
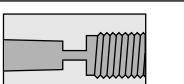
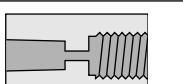
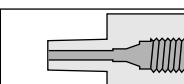
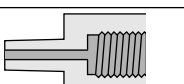
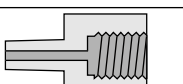
PEEK Port Adapters

Graphic Coordinate	External Thread Type	Internal Port Type	Part No.
A2	CPI Standard	Waters® Style	32015
A3	CPI Standard	1/4-28 UNF	32022
A4	CPI Standard	M6	32065
B3	Waters® Style	1/4-28 UNF	32023
B4	Waters® Style	M6	32066

PEEK Port Adapters (continued)

Graphic Coordinate	External Thread Type	Internal Port Type	Part No.
C1	1/4-28 UNF	CPI Standard	32013
C2	1/4-28 UNF	Waters® Style	32016
C4	1/4-28 UNF	M6	32067
D1	M6	CPI Standard	32014
D2	M6	Waters® Style	32017
D3	M6	1/4-28 UNF	32024

PEEK Luer Adapters

		INTERNAL PORT TYPE		
		CPI Standard ("B") 1	1/4-28 UNF 2	M6 3
LUER TYPE	E Female	 Part No. 20132	 Part No. 20136	 Part No. 20138
	F Male	 Part No. 20133	 Part No. 20137	 Part No. 20139

PEEK Luer Adapters

Graphic Coordinate	Luer Type	Internal Port Type	Part No.
E1	Female Luer	10-32 Female	20132
E2	Female Luer	1/4-28 Female	20136
E3	Female Luer	M6 Female	20138

PEEK Luer Adapters (continued)

Graphic Coordinate	Luer Type	Internal Port Type	Part No.
F1	Male Luer	10-32 Female	20133
F2	Male Luer	1/4-28 Female	20137
F3	Male Luer	M6 Female	20139

Low-Pressure Adapters and Plugs

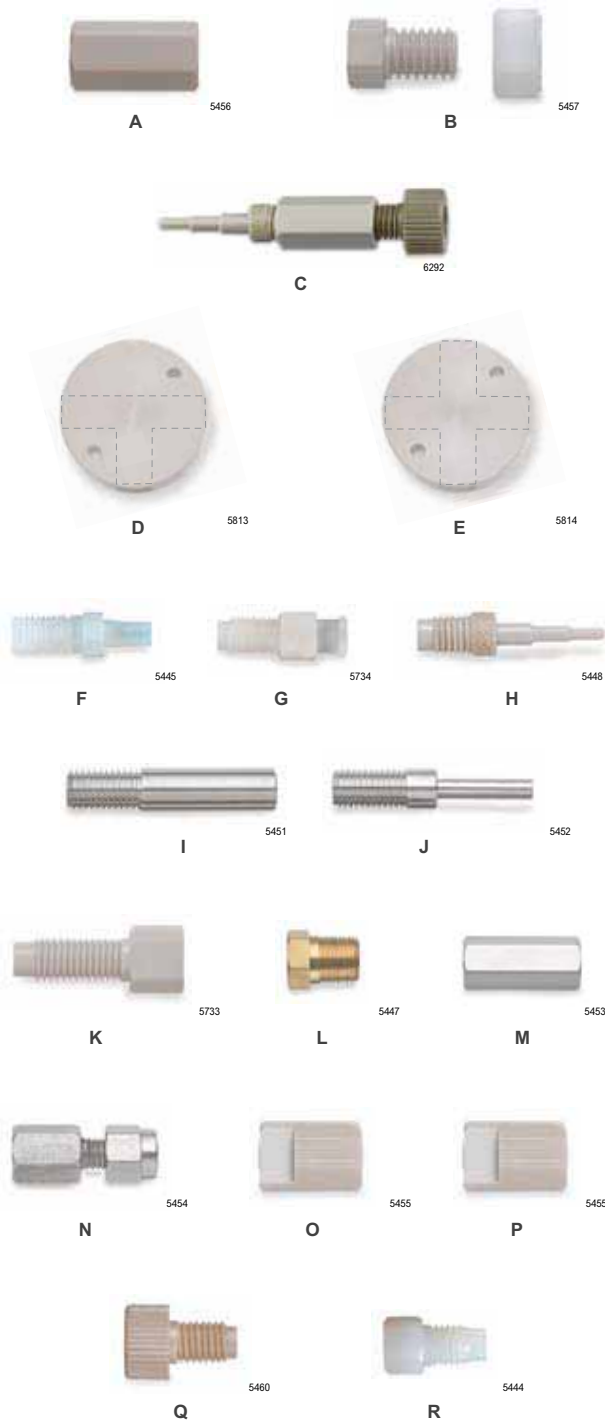
- Chemically inert
- 1/4-28 threaded ports
- For use with Flange-Free™ or flanged fittings

Low-Pressure Adapters and Plugs Specifications	
Material:	Varies, See Price Block
Maximum Temperature:	100°C
Maximum Pressure:	Limited by Fittings
Thread Type:	1/4-28 UNF

1/4-28 Low-Pressure Adapters and Plugs

Graphic	Description	Material	Qty.	Part No.
Unions				
A	Union	PEEK	ea	20088
B	Bulkhead Union	PEEK	ea	31506
C	Waters® Pump Tubing Union†	PEEK	ea	590110
Tees				
D	0.8mm Bore Tee	PEEK	ea	20058
D	1.5mm Bore Tee	PEEK	ea	20023
Crosses				
E	0.8mm Bore Cross	PEEK	ea	20059
E	1.5mm Bore Cross	PEEK	ea	20025
Male 1/4-28 Adapters				
F	Male 1/4-28 to Male Luer	Tefzel®	ea	20019
G	Male 1/4-28 to Female Luer	Tefzel®	ea	20055
H	Male 1/4-28 to Slip-Fit*	PEEK	ea	28848
I	Male 1/4-28 to 1/4" o.d. Tube	SS	ea	20021
J	Male 1/4-28 to 1/8" o.d. Tube	SS	ea	20056
K	Male 1/4-28 to Female 10-32	PEEK	2	32261
Female 1/4-28 Adapters				
L	Female 1/4-28 to 1/8" MPT	Brass	ea	20053
M	Female 1/4-28 to Female 10-32	SS	ea	20041
N	Female 1/4-28 to Male 10-32	SS	ea	20057
O	Female 1/4-28 to Female 10-32	PEEK	2	32262
P	Female M6 to Female 10-32	PEEK	ea	32264
Plugs				
Q	Natural	PEEK	10	37185
Q	Black	PEEK	10	37187
R	White	Nylon	5	20050
R	White	Kel-F®	5	20089

*Slip-Fit fits 1/16" to 5/32" i.d. tubing.
†Slip-Fit Waters® pump tubing to left side of union, and connect standard 1/8" or 1/16" o.d. tubing to right side of union.



Low-Pressure Accessories

Easy-Flange™ Tool

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

Using mechanical force (no electricity or heat required), Easy-Flange™ forms perfect flanges on any PTFE tubing with an o.d. between 1/16" and 1/8" or thin walled (0.015" maximum wall thickness) PEEK tubing. Simply cut the tubing to the desired length, place a fitting on the tubing, slide the tubing into the Easy-Flange™ body, and form the flange using the flange-rolling tool. The entire operation takes just seconds and produces flanges with superior sealing characteristics compared to flanges formed by conventional heat methods.



5526

Easy-Flange™ Tool

Description	Part No.
Easy-Flange™ Flanging Tool*	35900
Replacement Parts	
1.5mm Pin (Polymer)	35905
1.3mm Pin (Polymer)	35906
1.3mm Pin (Titanium)	35910
1.0mm Pin (Polymer)	35909
0.8mm Pin (Polymer)	35907
0.5mm Pin (Titanium)	35908
0.8mm Pin (Titanium)	35920
Clean-Cut™ Tubing Cutter	35902
Replacement Blade (for Part No. 35902)	35903

*Includes: Clean-Cut™ tubing cutter and insert disks 35908, 35907, 35906, 35910, 35920.



5531

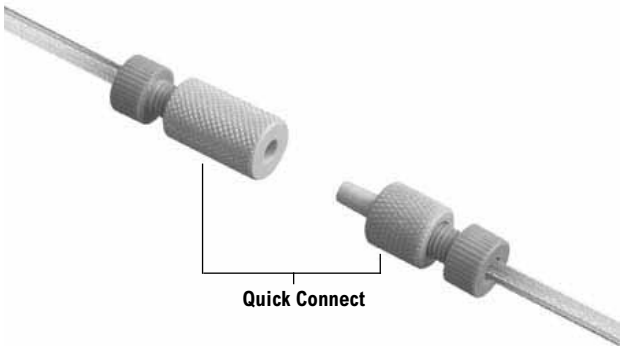
related product

Looking for low-pressure tubing?
See page 387.

Low-Pressure In-Line Quick Connect

- Make and break 1/16" or 1/8" tubing connections quickly and easily
- Eliminate wear and tear on fittings and ferrules
- Highly inert PEEK construction

The Alltech® Low-Pressure In-Line Quick Connect allows fast, effortless connection of 1/16" or 1/8" tubing where 1/4-28 fittings are used. Made from high quality PEEK, the quick connect withstands repetitive connections and is compatible with a wide range of solvents. The 1/16" quick connect withstands pressures up to 1000psig, and 1/8" quick connect withstands pressures up to 500psig.



6156

Suggested Quick Connect Usage:

- Perfect for plumbing low- and medium-pressure LC systems
- Use with any low-pressure switching valve
- Quickly swap mobile phase bottles from LC system or filtration equipment
- Make and break connections to an online degasser

Low-Pressure In-Line Quick Connect

Description	Part No.
1/16" Quick Connect	77301
1/8" Quick Connect	77302

related product

Looking for low-pressure 1/4-28 fittings?
See page 117 for Flange-Free™ fittings. See page 117 for flanged fittings.

Fitting and Accessory Kits

Basic Start-Up Package

Provides the essential products for HPLC system start-up. No frills and no unnecessary cost.



6283

Basic Start-Up Package			
Description	Material	Qty.	Part No.
Basic Start-Up Package	—	1	97817
Replacement Individual Components			
Short Hex-Head Nuts/Ferrules	PEEK	10	35744
Long Hex-Head Nuts/Ferrules	PEEK	10	35735
Short Finger-Tight™ One-Piece*	PEEK	12	32070
1/8" Flange-Free™ Nuts	PEEK	10	37075
1/8" Flange-Free™ Ferrules	Tefzel®	10	20242
1/16" x 0.020" i.d. Tubing	PEEK	10ft	35708
1/16" x 0.007" i.d. Tubing	PEEK	10ft	35712
1/8" x 0.063" i.d. Tubing	TFE	10ft	20063
Plastic Tubing Cutter	—	1	3206
Replacement Blade	—	1	3214
10µm Solvent Inlet Filter	SS	2	28870
20µL Sample Loop	PEEK	1	32195
Open-End Wrench, 1/4" x 5/16"	—	1	1998
Union	PEEK	1	32141

Advanced Start-Up Package

Keeps your HPLC consumables stocked for some time with products that maximize system and lab efficiency.



6282

Advanced Start-Up Package			
Description	Material	Qty.	Part No.
Advanced Start-Up Package	—	1	97818
Replacement Individual Components			
Short Hex-Head Nuts/Ferrules	PEEK	10	35744
Long Hex-Head Nuts/Ferrules	PEEK	10	35735
Short Finger-Tight™ No-Slip™ Fitting*	PEEK	24	32937
Long Finger-Tight™ No-Slip™ Fitting	PEEK	10	32295
1/8" Flange-Free™ Nuts	PEEK	10	37075
1/8" Flange-Free™ Ferrules	Kel-F®	10	201251
1/16" x 0.020" i.d. Tubing	PEEK	20ft	35708
1/16" x 0.005" i.d. Tubing	PEEK	20ft	35714
1/8" x 0.063" i.d. Tubing	TFE	10ft	20063
Clean-Cut™ Tubing Cutter	—	1	35902
Replacement Blade	—	2	35903
10µm Last-Drop™ Inlet Filter	PAT®	2	28839
In-Line Filter, 2µm	PAT®	1	68250
Replacement Filter Elements	PAT®	5	68152
20µL Flex-Connect™ Sample Loop	PEEK	1	32195
100µL Flex-Connect™ Sample Loop	PEEK	1	32204
Handy-Lok Fitting Wrench	—	1	35751
Open-End Wrench, 1/4" x 5/16"	—	1	1998
Union	PEEK	2	32141

*Assorted Colors

related products

Accessories for your system. Grace has an assortment of Accessories Quick Reference guides available for many popular instruments.

- Waters® Alliance® System Accessories – Request M202
- Agilent 1100 and 1200 System Accessories – Request M203
- Waters® Acquity UPLC® System Accessories – Request M204



Alltech® Fitting Kits

- Find all common accessories in one convenient kit
- Fittings to match your HPLC system
- Includes both high- and low-pressure fittings

Alltech® Fitting Kits provide all the necessary HPLC accessories conveniently stored in one place. You will always find what you need to keep your system running. The chart lets you determine how many of each product are included in each systems fitting kits.



6261

Fittings Kits

System Components	Part No.	Material	Beckman 97137	PerkinElmer® 97148	Rheodyne®* 97130	Shimadzu®* 97151	Universal 97145	Waters® 97155
<i>Nuts</i>								
Universal SS Male Nut	206085	316 SS	15	5	4	10	5	—
Two-Piece Finger-Tight™	32310	PEEK	2	2	2	2	—	2
Universal Wrench-Tight™/Finger-Tight™	35754	PEEK	5	5	4	5	15	5
1/16" Flange-Free™ (1/4-28)	201101	Delrin®	6	6	6	—	—	6
Long Universal SS Male Nut	28633	316 SS	—	—	10	—	—	10
One-Piece Fitting	32232	PEEK	—	—	—	—	2	—
Long Finger-Tight™ One-Piece	32234	PEEK	—	—	—	2	—	—
Standard Wrench-Tight™/Finger-Tight™	35752	PEEK	—	—	—	4	—	—
<i>Ferrules</i>								
Universal SS Ferrule	286075	316 SS	20	10	4	10	10	20
Ferrule for Two-Piece Finger-Tight™	32322	PEEK	4	4	2	4	—	4
Double-Sided Ferrule	35730	PEEK	10	10	10	10	30	10
1/16" Flange-Free™ Ferrule	201152	Kel-F®	6	6	—	—	—	6
<i>Plugs</i>								
10-32 Plug	8872	Delrin®	2	2	—	2	—	2
<i>SSI Products</i>								
Nut	01-0140	316 SS	—	4	5	—	—	—
Ferrule	01-0142	316 SS	—	4	5	—	—	—
<i>Rheodyne® Products</i>								
Bushing	77510	316 SS	—	4	4	4	—	—
Long Bushing	77512	316 SS	—	2	2	4	—	—
Extra-long Bushing	77519	316 SS	—	2	2	10	—	—
Ferrule	77511	316 SS	—	10	10	10	—	—
<i>Unions</i>								
PEEK Female Union	32141	PEEK	1	1	3	1	3	—
SS Male Union	10061	316 SS	—	—	1	—	1	—
Waters® Female Union	97332	316 SS	—	—	—	—	—	1
<i>Adapters</i>								
Universal Column Adapter	29242	PEEK/SS	—	—	—	—	1	—
<i>Tubing, EDM-Cut</i>								
0.010" i.d. x 5cm	97045	316 SS	5	5	5	5	5	5
0.010" i.d. x 10cm	97055	316 SS	5	5	5	5	5	5
0.010" i.d. x 20cm	97060	316 SS	5	5	5	5	5	5
0.020" i.d. x 5cm	97075	316 SS	5	5	5	5	5	5
0.020" i.d. x 10cm	97080	316 SS	5	5	5	5	5	5
0.020" i.d. x 20cm	97085	316 SS	5	5	5	5	5	5

*Can also be used for Spectra-Physics®.

Mobile Phase Inlet Filters

Cup-Style Inlet Filters

- Disposable filters and reusable PTFE sleeve for long-term savings
- Uses all the mobile phase in the reservoir

Cup Filters use all the mobile phase in the reservoir without drawing air into the system. A replaceable stainless steel filter cup provides the same high surface area of conventional mobile phase filters. But unlike conventional filters, a PTFE sleeve fits over the cup filter so mobile phase is drawn from the bottom of the bottle.

Cup-Style Inlet Filter Specifications	
Material:	PEEK, PTFE, 316 Stainless Steel
Porosity:	2µm or 10µm
Max. Temperature:	100°C
Plumbing:	Slip Fit to 1.5, 2.2, or 3.0mm i.d. Tubing



Cup-Style Inlet Filters			
Description	Porosity	Qty.	Part No.
Stainless Steel Cup Filter	2µm	1	28981
Stainless Steel Cup Filter	10µm	1	28982
Replacement Cup Filter	2µm	1	28983
Replacement Cup Filter	10µm	1	28984

Hastelloy® C Inlet Filter

- Ideal for use with halogenated solvents
- More inert than other types of stainless steel



Hastelloy® C Inlet Filter Specifications	
Material:	Hastelloy® C
Porosity:	2µm
Max. Temperature:	500°C
Plumbing:	Slip Fit to 1.5 or 3.0mm i.d. Tubing

Hastelloy® C Inlet Filters			
Description	Porosity	Qty.	Part No.
For 0.062" (1.5mm) i.d.	2µm	ea	9400
For 0.125" (3.0mm) i.d.	2µm	ea	9402

Economy Inlet Filters

- Flat bottom design draws all solvent from the reservoir
- Economical style means economical price

Economy Filters have 22mm stainless steel filter that sits on the bottom of the mobile phase reservoir drawing in all but a few milliliters of mobile phase. The heavy PTFE housing acts as a "sinker" and has a 1/8" port to push tubing securely in place.

Economy Inlet Filter Specifications	
Material:	PTFE, Stainless Steel
Porosity:	2µm or 10µm
Max. Temperature:	100°C
Plumbing:	Push Fit for 1/8" o.d. Tubing



Economy Inlet Filters			
Description	Porosity	Qty.	Part No.
Stainless Steel Filter	2µm	1	79964
Stainless Steel Filter	10µm	1	79966

CPI Stainless Steel Inlet Filter

- Unique knurled fitting connects securely to 1/8" o.d. tubing
- Comes with replaceable Tefzel® ferrule



CPI Stainless Steel Inlet Filter Specifications	
Material:	316 Stainless Steel, Tefzel®
Porosity:	10µm
Max. Temperature:	100°C
Plumbing:	CPI Port for 1/8" o.d. Tubing

CPI Stainless Steel Inlet Filters			
Description	Porosity	Qty.	Part No.
Stainless Steel Filter	10µm	ea	250145
Replacement Filter	10µm	2	250147
Replacement Tefzel® Ferrules	—	5	210144

analytical hplc

Mobile Phase Inlet Filters

Metal-Free Inlet Filter

- Ideal for IC or biochromatography applications
- Replaceable polyethylene filter elements
- Threaded body allows easy connection to 1/4-28 fittings



5217

Metal-Free Inlet Filter Specifications

Material:	PEEK Body, Polyethylene Filter
Porosity:	20µm
Max. Temperature:	100°C
Plumbing:	1/4-28 Port for 1/16" or 1/8" o.d. Tubing

Metal-Free Inlet Filters

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

Stainless Steel Slip-On Inlet Filter

- Economical mobile phase inlet filtration
- 316 stainless steel filters



5564

Stainless Steel Slip-On Inlet Filter Specifications

Material:	316 Stainless Steel
Porosity:	2µm or 10µm
Max. Temperature:	500°C
Plumbing:	Slip Fit to 1.5, 2.2, or 3.0mm i.d. Tubing

Stainless Steel Slip-On Inlet Filters

Description	Porosity	Qty.	Part No.
For 0.062" (1.5mm) i.d.	2µm	5	28861
For 0.062" (1.5mm) i.d.	10µm	5	28863
For 0.085" (2.2mm) i.d.	2µm	5	28865
For 0.085" (2.2mm) i.d.	10µm	5	28867
For 0.125" (3.0mm) i.d.	2µm	5	28869
For 0.125" (3.0mm) i.d.	10µm	5	28871

tech tip

How do I choose a mobile phase inlet filter?

Choose the filter material based on the analysis

Stainless Steel:	Suitable for most applications except very strong acid or halogenated solvents
Hastelloy® C:	More inert grade of stainless steel, suitable for halogenated solvents where halide salts tend to corrode other types of stainless steel
Polyethylene:	Good general inertness. Ideal for any metal-free or IC application.

Choose the filter porosity based on the HPLC flow rate

Flow Rate (mL/min)	Inlet Filter Porosity
0.1–5	2µm
1–10	10µm
10–50	20µm



5531

related product

Looking for low-pressure tubing?
Grace carries a full line of low-pressure tubing. See page 387.

related products

Looking for mobile phase degassers?
See pages 128 and 129.



6508a

technical assistance

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

Mobile Phase Delivery/Storage-Bottle Kits

Kontes Three-Valve Bottle Kit

These bottle kits have three color-coded, helium-tight valves to maintain a sealed environment between runs. Each kit comes complete with a three-valve cap, a safety-coated conical bottom Kontes Ultra-Ware® reservoir, and the required 1/4-28 fittings and tubing.



1842

Kontes Three-Valve Bottle Kit

Description	Thread Size	Part No.
<i>Three-Valve Bottle Kit</i>		
1 Liter	GL-45	31870
2 Liter	GL-45	31871
5 Liter	GL-45	31872
<i>THF-Resistant Three-Valve Bottle Kit</i>		
1 Liter	GL-45	31875
2 Liter	GL-45	31876
5 Liter	GL-45	31877

Kontes Three-Hole Bottle Kit

The standard Three-Hole bottle kit includes a safety-coated conical-bottom Kontes Ultra-Ware® reservoir and a Three-Hole cap with 1/4-28 threads on both the top and bottom portions of the cap to separate tubing lines inside and outside the reservoir.



2226

Kontes Three-Hole Bottle Kit

Description	Thread Size	Part No.
<i>Three-Hole Bottle Kit</i>		
1 Liter	GL-45	31880
2 Liter	GL-45	31881
5 Liter	GL-45	31882

Kontes Economy Three-Hole Bottle Kit

The Economy Three-Hole Bottle Kit includes a safety-coated flat-bottom Kontes Ultra-Ware™ reservoir and an Economy Three-Hole cap with 1/4-28 threads on the top portion of the cap (2 x 1/8" and 1 x 1/16" through hole). Pass a single length of tubing through the cap into the reservoir.



1841

Kontes Economy Three-Hole Bottle Kit

Description	Thread Size	Part No.
<i>Economy Three-Hole Bottle Kit</i>		
1 Liter	GL-45	95393012
2 Liter	GL-45	95393022
5 Liter	GL-45	95393052
10 Liter	GL-45	95393013
20 Liter	GL-45	95393023

Kontes Safety-Coated Glass Bottles

- Plastic coating blocks UV light and retains glass fragments if breakage occurs
- Safety pressure rating of 6psig
- Conical bottom reservoir delivers all mobile phase

Kontes Ultra-Ware® reservoirs are made from the most chemically inert glass available to prevent leaching extractables into the mobile phase solvent. In case of an accident, the external safety coating retains glass fragments and serves as a UV blocking agent up to 385nm.



Conical Bottom



Flat Bottom

Kontes Safety-Coated Bottles

Description	Thread Size	Part No.
<i>Kontes Ultra-Ware® Conical Bottom Reservoir</i>		
1 Liter	GL-45	10133
2 Liter	GL-45	10135
5 Liter	GL-45	10137
<i>Kontes Ultra-Ware® Flat-Bottom Reservoir</i>		
1 Liter	GL-45	10967
2 Liter	GL-45	10968
5 Liter	GL-45	10969

tech tip

Tips for safe helium sparging

As with any glass container, a nick or score caused by normal lab usage will lessen the integrity of the glass, so beware in any pressure or vacuum application. Ideally, use safety-coated glass bottles, and perform vacuum filtration and/or helium sparging under a protective hood.

Mobile Phase Delivery/Storage Bottles

Glass Mobile Phase Bottles

- Economical
- Graduated markings
- Borosilicate glass

Economical glass mobile phase bottles with un-lined storage caps are available in 500mL, 1000mL, and 2000mL sizes. These graduated borosilicate glass bottles can be ordered individually or by the case.



5595

Glass Mobile Phase Bottles

Volume	Thread Size	Qty.	Part No.
500mL	33-430	1	2198191
500mL	33-430	6	219816
1000mL	38-430	1	2198201
1000mL	38-430	6	219826
1000mL	GL-45	1	2199301
1000mL	GL-45	6	2193011
2000mL	GL-45	1	2199311
2000mL	GL-45	6	219311

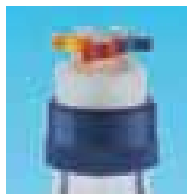
Kontes Mobile Phase Caps

- Spurge and deliver solvent with one cap
- Available with or without valves

Kontes Three-Valve Cap has three 1/4-28 threaded ports and color-coded, helium-tight valves to maintain a sealed environment. The Standard Three-Hole Cap has 1/4-28 threads on the top and bottom portions of the cap for separate tubing lines inside and outside the reservoir. The Economy Three-Hole Cap has 1/4-28 threads on the top portion of the cap (2 x 1/8" and 1 x 1/16" through holes). Pass a single length of tubing through the cap into the reservoir.



Three-Hole Cap 5588



Three-Valve Cap 5573

Kontes Mobile Phase Caps

Description	Thread Size	Part No.
Three Valve Cap	GL-45	10140
Standard Three-Hole Cap	GL-45	10974
Economy Three-Hole Cap	GL-45	10973
TFE-Storage Cap, No Holes	GL-45	10153

Alltech® Economy Mobile Phase Caps

- Most economical way to helium sparge and deliver HPLC mobile phases
- Three-hole cap with or without threaded ports

The MP1-Cap has a PTFE insert and a polypropylene screw collar. The insert contains three 1/4-28 threaded ports with through-holes* that allow the tubing to either be pushed through or connected with flanged fittings. The MP2-Cap is made from Tefzel® and polypropylene and has three unthreaded holes* for tubing insertion. Just push the tubing through! Alltech also offers PTFE lined screw caps with one or two pre-drilled holes (not shown).

*(2x1/8" and 1x1/16")



MP1-Cap 6338



MP2-Cap 6339

Alltech® Economy Mobile Phase Caps*

Description	Qty.	Thread Size	Part No.
MP1-Cap	ea	GL-45	955664
MP2-Cap	ea	GL-45	955665
1-Hole Screw Cap	4/pk	38-430	9547
2-Hole Screw Cap	4/pk	38-430	9541

*Not intended for build-up of helium environment.

Omnifit® Mobile Phase Caps

- Anti-twist design prevents tubing from getting tangled
- Highly inert PTFE wetted surface
- Stainless steel inserts prevent cross-threading



6334

Omnifit® bottle caps are made from a single PTFE block built into a Polypropylene threaded cap. The anti-twist design enables the central block to turn independently when the cap is being connected onto the bottle. This prevents tubing from being twisted. The 1/4-28 ports have reinforced non-wetted stainless steel threaded inserts. Optional Kel-F® turn-key valves provide a completely closed system.

Omnifit® Mobile Phase Caps

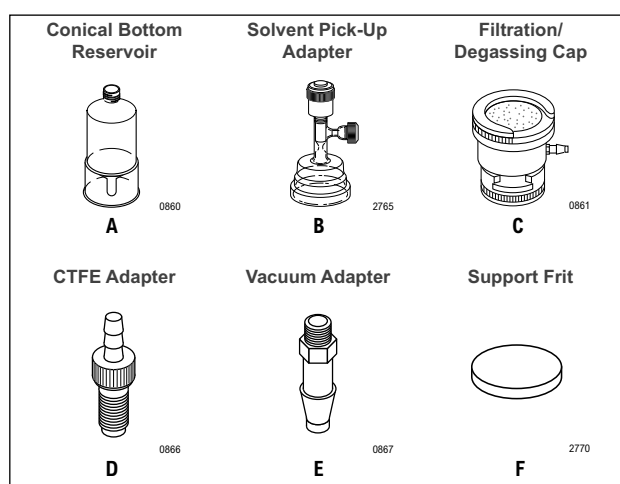
Description	Thread Size	Part No.
Two-Hole Cap	GL-45	53280
Three-Hole Cap	GL-45	53281
Two-Hole Cap with Valve	GL-45	53282
Three-Hole Cap with Valve	GL-45	53283

Kontes Ultra-Ware® Filtration Cap System

Now you can filter, degas, and deliver mobile phase from the same reservoir with this modular system. The Filtration/Degassing Cap uses a 47mm diameter membrane to filter directly into the reservoir. Vacuum degassing is accomplished by closing the Hi-Vac valve on the Solvent Pickup Adapter. This system comes complete with the Filtration/Degassing Cap, a standard Solvent Pickup Adapter, a Conical Bottom Kontes Ultra-Ware® Reservoir, and the required fittings and tubing.



5575



Kontes Ultra-Ware® Filtration Systems

Graphic	Description	Part No.
<i>Filtration Cap System</i>		
—	With 1 Liter Reservoir	31860
—	With 2 Liter Reservoir	31861
—	With 5 Liter Reservoir	31862
<i>Replacement Parts and Accessories</i>		
A	1 Liter Reservoir*	10133
A	2 Liter Reservoir*	10135
A	5 Liter Reservoir*	10137
B	Solvent Pickup Adapter (THF Resistant)	31869
C	Filtration/Degassing Cap	10141
D	CTFE, 1/4-28 to 1/8" Barb Adapter	10128
D	CTFE, 1/4-28 to 5/32" Barb Adapter	10139
E	Vacuum Adapter 1/4-28 to 1/4" i.d. Tubing	10127
F	Replacement Support Frit	31801

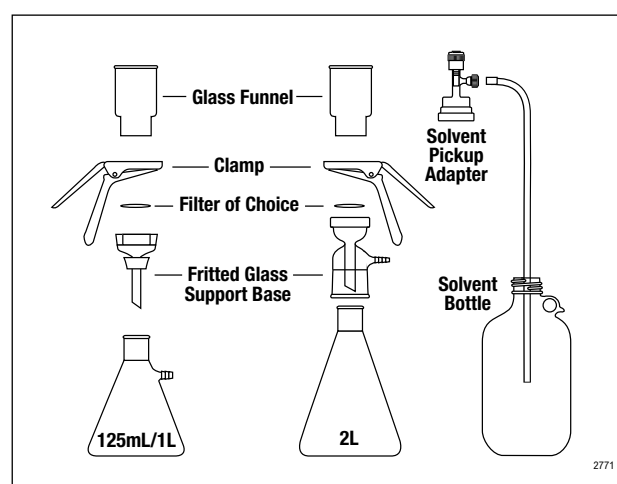
*Bottles have GL-45 threads.

Alltech® Solvent Filtration Apparatus

The Alltech® Solvent Filtration Apparatus rapidly filters and degasses HPLC and IC mobile phases. Depending on your analytical requirements, several interchangeable funnel and flask options are available. You can easily replace the funnel with the solvent pickup adapter. The Solvent Pickup Adapter draws solvent directly from a reagent bottle through a 47mm filter and into the collecting flask.



6266



2771

Alltech® Solvent Filtration Apparatus

Description	Part No.
<i>Solvent Filtration Apparatus</i>	
125mL Flask, 15mL Funnel, 25mm Filter Support, 25mm Clamp, 0.2µm Nylon Filters 100/pk	2331
1L Flask, 300mL Funnel, 47mm Filter Support, 47mm Clamp, 0.2µm Nylon Filters 100/pk	2001
2L Flask, 500mL Funnel, 47mm Filter Support, 47mm Clamp, 0.2µm Nylon Filters 100/pk	2003
<i>Replacement Parts and Accessories</i>	
125mL Flask (For 2331)	2337
1L Flask (For 2001)	350062
2L Flask (For 2003)	350066
15mL Glass Funnel (For 2331)	2333
300mL Glass Funnel (For 2001)	350064
500mL Glass Funnel (For 2003)	350067
1L Glass Funnel (for 2003)	350070
25mm Fritted Base Support (For 2331)	2335
47mm Fritted Base Support (For 2001)	350065
47mm Fritted Base Support (For 2003)	350068
25mm Aluminum Clamp (For 2331)	2339
47mm Aluminum Clamp (For 2001, 2003)	350061
47mm Solvent Pick Up Adapter	2343
47mm Nylon Filter Membranes, 0.2µm, 100/pk	2034
25mm Nylon Filter Membranes, 0.2µm, 100/pk	2050

analytical hplc

Alltech® On-Line Degassing Systems

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

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



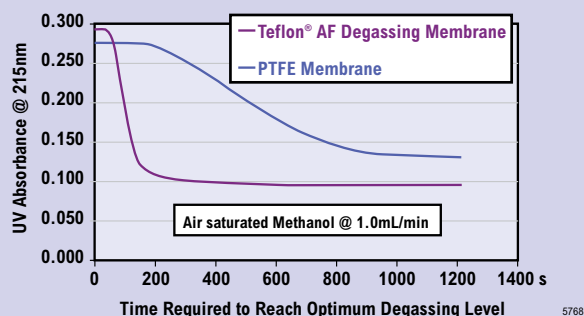
6508a

Every Alltech® On-Line Degassing System is equipped with our best degassing technology, and is available in two families, three flow ranges, and four channels to meet every need and budget. First decide which family features meet your need, then choose the degassing system with the flow range and number of channels you need today. If your needs change in the future you can upgrade at any time by either replacing or adding up to four degassing channels per unit.

Advanced Degassing Technology from Three Key Components

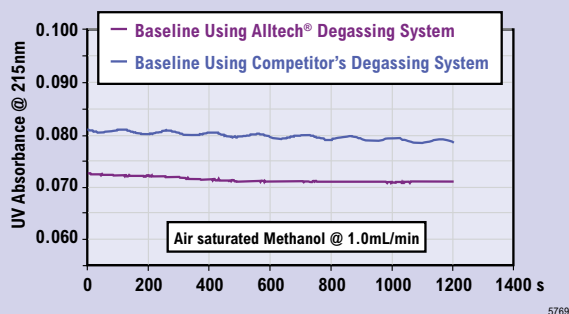
Teflon® AF Degassing Membrane

50x more efficient than competitive PTFE membranes. This means channel volumes are 10x smaller and equilibration is 4x faster.



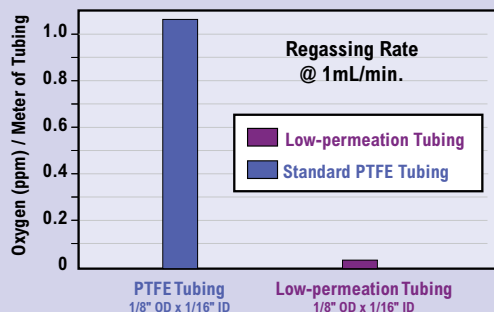
Continuous-Run Vacuum Pump

Delivers a steady baseline. Competitive degassers have fluctuating baselines due to the on/off cycle of the vacuum pump.

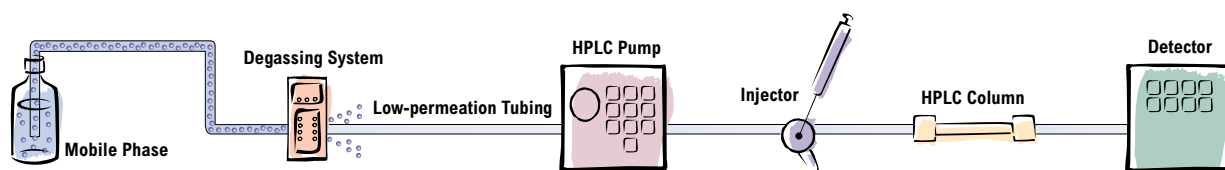


Low-permeation Tubing

Double-layered with an inert PTFE inner layer and a gas impermeable outer layer so solvent remains degassed as it travels to the pump.



Alltech® Online Degassing Systems



Eliminate extra mobile phase preparation steps by degassing online.

6524

Choice of Two Degasser Families:

Elite™ Degasser Family

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

Select™ Degasser Family

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

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

On-Line Degassing Systems

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

Channel Upgrade Kits*

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

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

Face Plates*

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

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

Upgrade Labor Charge*

Description	Part No.
Labor	590525

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

technical assistance

Contact Tech Support: Phone: 1.800.255.8324 (North America)

Email: contact.alltech@grace.com

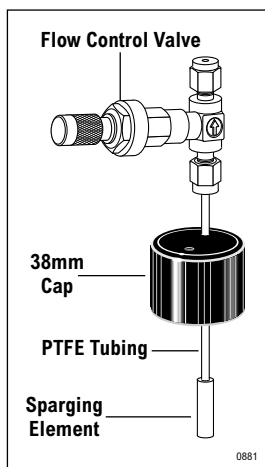
Online: www.discoverysciences.com

analytical hplc

Helium Sparger Kit

- 38-430 threaded cap
- Available in single, binary, or ternary versions

The Alltech® Helium Sparger kit has a 316 stainless steel sparging element which may be immersed in the mobile phase reservoir. A length of 1/8" PTFE tubing connects the sparger to a flow-control valve (optional) which connects to a source of helium, and allows the bubble rate to be adjusted. A 38mm, two-hole cap attaches to the top of standard 1-liter mobile phase reservoirs or to any 4-liter solvent bottle. All kits include tubing, reservoir cap(s), and sparging element(s). For kits with a flow control valve, one valve controls the bubble rate on all sparging outlets.



Helium Sparger Kits

Description	Part No.
Single Sparger Kit with Flow Control Valve	28915
Binary Sparger Kit with Flow Control Valve	28919
Ternary Sparger Kit with Flow Control Valve	28923
Replacement Sparging Element	28862

Ultrasonic Bath

- For laboratory cleaning, solvent degassing, and dispersing slurries
- 2.8-liter tank
- Mechanical timer
- Overall size: 12" H x 13.3" W x 11.6" L
- Tank Size: 4.0" H x 5.5" W x 9.5" L



Ultrasonic Bath

Description	Part No.
120V	9490
220V	9490-220V

tech tip

Use caution when filtering

As with any vacuum or pressure application, glassware cannot be guaranteed against breakage due to varying conditions of field usage. Be sure to filter in a glass hood. Safety-coated glass bottles are always recommended.

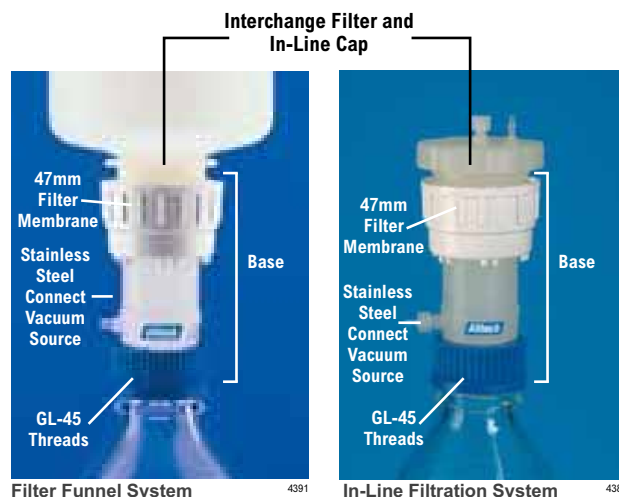
Vacuum Filtration System



- Eliminate solvent transfer steps with direct filtration into any GL-45 reservoir
- Interchange funnels and in-line filter cap handle any filtration volume
- Durable polypropylene construction

New Features:

- Stainless steel connection at vacuum source
- Retainer ring prevents filter from twisting during assembly
- A sealing o-ring in the neck of the GL-45 for a tighter seal



Alltech® Vacuum Filtration Systems

Description	Qty.	Part No.
1L Filter Funnel System Includes: Base, Adapter Kit, Mesh Filter Support, 1L Funnel	1	6409
2L Filter Funnel System Includes: Base, Adapter Kit, Mesh Filter Support, 2L Funnel	1	6429
In-Line Filtration System Includes: Base, Adapter Kit, Mesh Filter Support, In-Line Filter Cap	1	6407
<i>Replacement Parts and Accessories</i>		
1L Funnel	1	6473
In-Line Filter Cap	1	6463
Hose Barb Adapter Kit (includes eight adapters)	1	6438
Stainless Steel Mesh Filter Support Ring	1	6421
Silicone Rubber O-Ring	1	8619230
Retainer Ring	1	8619231

Alltech® Adjustable Backpressure Regulators

- Constant backpressure, even with changing flow
- Ultra-low dead volume—under 0.6µL
- Easily adjusts by hand—no cartridges



4704

The Alltech® Backpressure Regulator prevents bubbles from forming in detector flow cells by exerting a constant pressure. The pressure will not vary with mobile phase composition or flow rate. Optimized port configuration delivers an internal volume of less than 0.6µL. A convenient, knurled knob adjusts the pressure, and eliminates cartridge changes. It also allows adjustments to be made without interrupting flow.

Alltech® Adjustable Backpressure Regulators

Description	Part No.
0–100psig	39021
0–300psig	39022
100–600psig	39023
100–1500psig	39024

Optimize Fixed Backpressure Regulators

- Flow-through design—use in-line or as a terminator
- May be immersed in the waste solvent bottle
- 1/4-28 ports for tubing connections



5625

These flow-through, backpressure regulators prevent solvent outgassing in your LC detector. More than a flow restrictor, Optimize fixed regulators maintain a consistent backpressure, regardless of viscosity or flow rate. Pressure ratings are preset to their listed value. Internal volume is 100 microliters. They are supplied with fittings, and complete instructions.

Optimize Fixed Backpressure Regulators

Description	Part No.
10psig	29059
30psig	29060
60psig	29062
100psig	29064
150psig	29069

Alltech® Liquid Pressure Gauges

- Inert 316 stainless steel construction
- Built-in 1/16" connecting tee for in-line use
- Non-wetted glycerine-filled face plate



2349

These liquid gauges come equipped with a 10-32 threaded, 1/16" connecting tee for attaching it in-line to the solvent stream. Each gauge is constructed of 316 stainless steel and features an easy-to-read 2-1/2" face plate.

Alltech® Pressure Gauges

Description	Part No.
0–100psig	19255
0–300psig	19256
0–1000psig	19257
0–3000psig	19258
0–5000psig	19259

related products

For high-pressure fittings, see pages 112–118.



6280

related products

For PEEK tubing, see pages 384–385.



5535

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Optimize Pump Replacement Parts

OPTI-MAX® Cartridge Check Valves

- Economical, disposable cartridge with reusable holder
- Available with PEEK or stainless steel cartridges
- Same cartridge fits inlet and outlet housings
- Cartridge fits multiple housing brands for reduced inventory



2376

OPTI-MAX® Check Valve Assembly (Holder and Cartridge)

Description	Inlet Part No.	Outlet Part No.
<i>Standard Assembly (1/8" Ball) For:</i>		
Agilent/HP 1050, 1100	155231*	155232
Bio-Rad® 1330	32350	32351
Dionex® GPM-2,DXP, AGP Analytical, 2000, 4000	32354	32356
Gilson®/Rainin® 5, 10, 25mL S, SC Heads	155511	155521
PerkinElmer® Inlet Model 250, Series 4, 200, 400, 410, 620, Integral 4000	32358	32359
Spectra-Physics® 8100, 8700, 8800 Series, P-Series	155441	155452
Waters® M45, M45G, M501, 6K, 6KA, 510, 590, 600E, 610	155001	155111
<i>Low Flow Rate Assembly (1/16" Ball) For:</i>		
Hitachi® 655, L6000, L6200, L6200A	155341	155352
Hitachi® L-7100 (LaChrom)	155233	155234
Shimadzu® LC-10 AT, LC-10ATVP	155235	155236
Shimadzu® LC-10AD, LC-600, LC-9A	155237	152238
Waters® 2690 Alliance, 616	155250	155251
Waters® 625, 626	155252	155253

*Replace cartridge for active inlet valve.

OPTI-MAX® Replacement Cartridges

Description	Qty.	Part No.
<i>Standard Series (1/8" Ball)</i>		
PEEK	2	151002
316 Stainless Steel	2	10481
<i>Low Flow Rate Series (1/16" Ball)</i>		
PEEK	2	10482
316 Stainless Steel	2	10483

Optimize Pump Pistons

- Pump pistons meet or exceed manufacturer's standards.

Optimize Pistons

Description	Manufacturer Part No.	Grace Part No.
<i>Pump Pistons For:</i>		
Agilent/HP 1050, 1100	5062-2441	11907
Agilent/HP 1090	3980-0672	11908
Beckman® 110A, 110B, 112, 112M	243053	11901
Dionex® Analytical	36904	11904
Hitachi® 655, L6000, L6200/A, 7100 (LaChrom)	635-1021	11909
LDC, Milton Roy®	801306	980014
Shimadzu® LC-6A LC-1A, LC-10AS, LC-10AT, LC-10ATVP	228-12904-93	11912
Shimadzu® LC-600/LC-9A, LC-10AD	228-18523-91	11913
Spectra-Physics® 8800, 8810, P-1000, P-2000, P-4000	A3102-010	11914
Waters® M510, M590, M600E, M610, M6000, M6000A	25656	11915
Waters® 2690 Alliance	270959	119165

OPTI-SEAL® Pump Seals

- Ideal for aqueous solutions
- Proprietary UHMW-PE blend, OS-10.1



2378

ITB™ Improved PTFE-Blend Seals

- Ideal for high organic solutions or when broad solvent compatibility is required
- Proprietary PTFE blend



2379

OPTI-SEAL® Pump Seals

Manufacturer	Description	Manufacturer Part No.	Qty.	OPTI-SEAL® Part No.	ITB™ Seal Part No.
Agilent/HP	1050, 1100	5062-8516	ea	32056	11883
Bio-Rad	1350, 2700	1250302	ea	32050	11875
Hitachi	655, L6000, L6200, L6200A, L-7100, LaChrom®	655-1080	10	25649	11886
			ea	25648	11887
LDC	Milton Roy	206129001	10	25643	11889
Shimadzu	LC-6A, LC-7A, LC-10AS, LC-10AT, LC-10ATVP	228-11999-00	10	25645	11893
			ea	25644	11894
	LC-600/LC-9A, LC-10AD	228-18745-00	10	32063	—
			ea	32062	11896
Spectra-Physics	8800, 8810, P-1000, P-2000, P-4000	A2963-010	10	11864	—
			ea	11865	11898
Waters	M45, M45G, M501, M510, M590, M600E,	22934	10	25639	11899
	M610, M6000, M6000A		ea	25638	11866
Waters	2690 Alliance®	26938	10	119166	—
			ea	119167	—

ASI Pump Replacement Parts

ASI Cartridge Check Valves

- Self-priming
- Rugged construction
- Convenient and economical
- Superior flow stability



The ASI cartridge has a 15,000psig pressure limit.

During routine maintenance, replace only the cartridge, not the entire assembly. Cartridges cost less than most conventional valve rebuild kits.

Every valve is tested prior to shipping to ensure it passes a stringent set of performance specifications. A replaceable 2µm outlet filter insures clog-free operation and protects the column from pump wear particles.

ASI Check Valve Assembly (Holder and Cartridge)

Pump Model	Inlet Part No.	Outlet Part No.
<i>Assembly For:</i>		
Beckman® 110, 112, 114, 116, 118, 125, 126, 127, 128	15811	15831
Gilson® 5 and 10s, SC	15815	15835
Hitachi® 655, L6000, L6200, L6200A	15817	15837
LKB 2150	15820	—
Shimadzu® LC600, LC6A, LC7A, LC9A, LC10A, LC10AS, LC10AT	15823	15843
Spectra-Physics® 8100, 8700, 8700, 8800, 8810	15824	15844
Waters® M45, 510, 590, 6000	15828	15848
Waters® M501 and 600E	15828	15850
Waters® 6KEF, 6KAEF, 510EF, 600EF	15829	15849

ASI Replacement Cartridges

Pump Model	Inlet Part No.	Outlet Part No.
<i>ASI Replacement Cartridges For:</i>		
Beckman® 110, 112, 114, 116, 118 125, 126, 127, 128	15854	16123
Bio Rad® 1330 and 1350	—	16124
Gilson® 5 and 10s, SC	15858	16127
Hewlett-Packard® 1090	15859	16128
PerkinElmer® Series 4, 200, 400, 410, 620, 4000	15864	16133
Shimadzu® LC600, LC6A, LC7A, LC9A, LC10A, LC10AS, LC10AT	15866	16135
Spectra-Physics® 8100, 8700, 8800, 8810	15867	16136
Waters® M45, 501, 510, 590, 600E, 6000	16120	16139

ASI Pump Pistons

ASI offers precision-manufactured replacement pump pistons. Superior surface finish of the piston rods improves piston seal lifetime.



ASI Pistons

Description	Manufacturer Part No.	Grace Part No.
<i>Pump Pistons For:</i>		
Gilson® 10, SC	3650009	11746
Gilson® 5SC	3650008	11747
Hitachi® 655, L6000, L6200, L6200A, L7100	810-1033	11760
Shimadzu® LC-600, LC-9A, LC-10AD	228-18523-91	11766
Spectra-Physics® 8800, 8100	A3102-010	11767
Waters® M-45, 501	26524	11364
Waters® M-510, 590, 600, 6000	25656	11365
Waters® Ext. Flow 510EF, 590EF, 600EF, 610EF, 650EF, 6000EF, 6000AEF	60304	11366

ASI Pump Seals

- Replacement seals for a variety of pumps
- All seals below are UHMW-PE, unless otherwise specified



ASI Pump Seals

Description	Qty.	Manufacturer Part No.	Grace Part No.
<i>Pump Seals For:</i>			
Agilent 1090—PTFE	ea	5062-2494	11679
Agilent 1090—PTFE	10		11680
Gilson®/Rainin® 5SC	ea	5463088863	11675
Gilson®/Rainin® 5SC	10		11676
Hitachi® 655, L6000, L6200, L6200A, L7100	ea	655-1080	11681
Hitachi® 655, L6000, L6200, L6200A, L7100	10		11682
Spectra-Physics® 8800, 8100	ea	A2962-010	11687
Spectra-Physics® 8800, 8100	10		11688
Waters® M45, 501, 510, 590, 600, 6000	ea	22934	11695
Waters® M45, 501, 510, 590, 600, 6000	10		11696
Waters® M45, 501, 510, 590, 600, 6000—PTFE	ea	26613	11697
Waters® Ext. Flow UHMW	ea	26644	11699

related products

Accessories for your system. Grace has an assortment of Accessories Quick Reference guides available for many popular instruments.

- Waters® Alliance® System Accessories – Request M202

- Agilent 1100 and 1200 System Accessories – Request M203

- Waters® Acquity® System Accessories – Request M204



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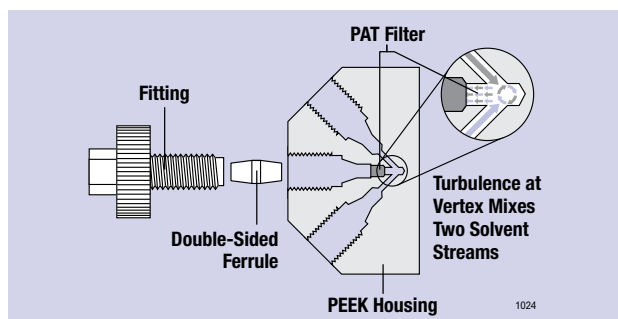
PEEK Mixing Tee

- Better mixing than a conventional tee
- Inert, metal-free construction
- Ideal for high-pressure gradient mixing

Better mixing is the result of the turbulence generated by the angled ports and the flow through a PAT (PEEK alloyed with TFE) filter element. Solvent streams mix more thoroughly than with a conventional tee. This reduces baseline noise and improves high pressure gradient mixing or post-column reactions. Solvents contact PEEK and the PAT filter, providing a biocompatible, inert, and metal-free flow path. This tee has a 2.5µL internal volume, a pressure limit of 6000psig, and comes with fittings and ferrules.



5616



1024

PEEK Mixing Tee

Description	Qty.	Part No.
Mixing Tee with Fittings	ea	32157
Replacement PEEK Fittings	5	35752
Replacement PEEK Ferrules	5	35730

Toroid Mixer

- High efficiency mixer for preparative chromatography
- Precise and reliable

The unique design of the Toroid Mixer extends the mixing characteristics of a pulse dampener in higher flow rate applications. High efficiency mixing yields reproducible quantitation, better reproducibility of retention times, and reduced baseline noise due to uniform solvent composition. Featuring a clean-swept mixing chamber, the Toroid Mixer has no motors or moving parts.



4708

Toroid Mixer Specifications

Internal Volume:	5mL
Flow Range:	10 to 200mL/min
Maximum Pressure:	6000psig
Flow Path:	PEEK

Toroid Mixer

Description	Part No.
Toroid Mixer, Biocompatible	060143

ASI Static Mixer

- Interchangeable mixer cartridges
- Selectable volume*
- Suitable for analytical and micro LC flow rates

ASI HyperShear Static Mixers use a highly efficient liquid-liquid shearing interface which induces vortex mixing over a wide flow rate range. The versatile cartridge design is available as an in-line, binary, or ternary inlet housing. Analytical volume housings accept 350 or 500µL mixer cartridges. Low volume housings accept 50, 150, or 250µL mixer cartridges. And Micro volume housings accept 2, 5, 10, or 25µL mixer cartridges. All are rated to 5000psig.



4707

ASI HyperShear Static Mixers

Description	SS Part No.	PEEK Part No.
<i>Analytical Volume Housing</i>		
In-Line	40167	—
Binary Inlet	40168	—
Ternary Inlet	40169	—
<i>Analytical Volume Mixer Cartridges</i>		
350µL	40146	—
500µL	40147	—
<i>Low Volume Housings</i>		
In-line	20141	201411
Binary Inlet	20143	201431
Ternary Inlet	20145	201451
<i>Low Volume Mixer Cartridges</i>		
50µL	20147	201471
150µL	20148	201481
250µL	20149	201491
<i>Micro Volume Housing</i>		
In-Line	30167	—
Binary Inlet	30168	—
Ternary Inlet	30169	—
<i>Micro Volume Mixer Cartridges</i>		
2µL	30146	—
5µL	30147	—
10µL	30148	—
25µL	30166	—

*Other cartridge volumes available, call for assistance.

tech tip

What should I consider when choosing a mixer volume?

- For any given flow rate, the more mixing volume, the better the mixing and lower the baseline noise.
- The smaller the mixing volume, the better the definition and sharpness of step gradients.
- High-pressure multi-pump gradient systems typically require far less mixing volume than low-pressure single-pump gradient systems.

Hamilton® Priming Syringe

- Ideal for use with Waters® pumps



5506

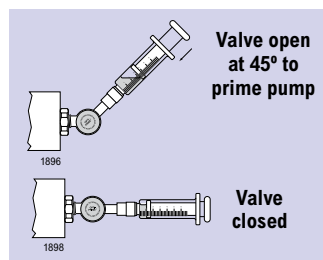
Hamilton® Priming Syringe

Description	Part No.
10mL GasTight™ Priming Syringe	81662
Draw Needles for Waters® Pump	25559

OPTI-PRIME™ Valve

- Convenient—one-handed operation
- Efficient—no need to remove syringe
- Inert—PPS, TFE, and 316SS wetted surfaces

The syringe of the OPTI-PRIME™ serves as a handle to open the OPTI-PRIME™ valve, allowing one-handed operation. At a 45° angle, air bubbles rise to the top of the syringe, allowing purging and priming without removing the syringe.

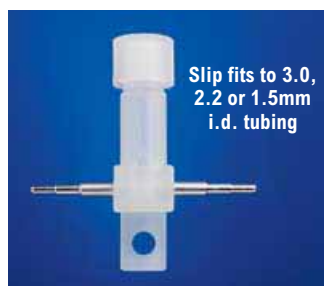


OPTI-PRIME™ Valve

Description	Part No.
OPTI-PRIME™ Priming Valve	11647
OPTI-PRIME™ Priming Valve w/Safety Syringe	11648
Optimize Safety Syringe	11649

In-Line Bubble Trap

This handy accessory installs on pump inlet lines by slip fitting onto the connecting tubing. Bubbles in the solvent line are trapped before reaching the pump. Includes mounting bracket.



4042

In-Line Bubble Trap

Description	Part No.
In-Line Bubble Trap	01-0221

Pump Inlet Kit

Install the Pump Inlet Kit between the mobile phase reservoir and the pump to allow rapid priming and solvent changeover. A luer-lock adapter in the side port easily attaches to a priming syringe. Includes: one 3-way valve, one luer adapter, 2µm inlet filter, 100cm x 1/8" o.d. x 1/16" TFE tubing, two 1/8" flange-free fittings and ferrules.



5617

Pump Inlet Kit

Description	Part No.
Pump Inlet Kit	39652
Replacement Inlet Filter	9400

LO-Pulse™ Dampener

- 95% pulse reduction
- Only 900µL internal volume

As a pressure pulse enters the dampener, the flexible diaphragm transfers the pulse to the compressible fluid resulting in a 95+% reduction in pressure fluctuation. The low internal-volume (only 900µL at 6000psig) and flow-through design minimize gradient delays.



2390

LO-Pulse™ Dampener Specifications

Flow Path Material:	PEEK or 316 Stainless Steel
Internal Volume:	0.9mL
Workable Pressure Range:	500–6000psig
Maximum Temperature:	100°C
Dampener Mechanism:	Compressible Fluid

LO-Pulse™ Dampener

Description	Part No.
Stainless Steel	20-0218
PEEK	120312
Diaphragm Replacement Kit	120139



2349

related products

Need a liquid pressure gauge?
See page 131 for a complete selection.

analytical hplc

Rheodyne® Model 7725 and 9725 Analytical Injectors

- “Make-Before-Break” (MBB) switching for uninterrupted flow
- Wider port angles provide improved fitting access
- Position sensing switch option
- Capable of injecting volumes from 1 µL to 5 mL with high precision
- Suction Needle Adapter eliminates exposure of sample to metal of a syringe needle

The 7725i features a built-in position-sensing switch, providing the chromatograph with a reproducible start signal. The 9725, 9725i are biocompatible versions. Wetted materials are PEEK and Tefzel®, making them ideal for applications requiring a metal-free flow path.



5503

Analytical Sample Injectors

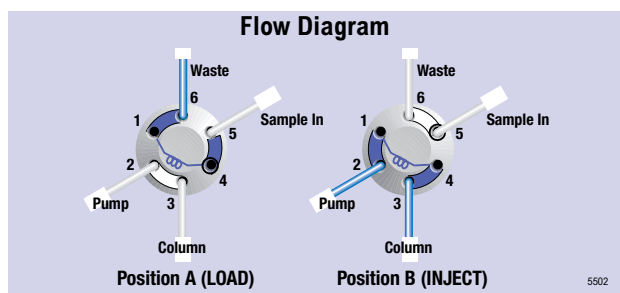
Description	Version	Part No.
7725, Includes a 20 µL PEEK Sample Loop	SS	77250
7725i, Includes a 20 µL PEEK Sample Loop	SS	77251
9725, Includes a 20 µL PEEK Sample Loop	PEEK	40010
9725i, Includes a 20 µL PEEK Sample Loop	PEEK	40011

Accessories

Suction Needle Adapter	—	40016
------------------------	---	--------------

Rheodyne® Model 7125 Analytical Injectors

- Versatile and reliable reputation
- 5 µL to 5 mL sample loops available
- Position-sensing switch option
- The wetted materials are: Titanium, Tefzel®, and ceramic



5502



5502

Analytical Sample Injectors

Description	Version	Part No.
7125	SS	7125RV

Accessories

Suction Needle Adapter	—	40016
------------------------	---	--------------

Rheodyne® Model 7010 and 9010 Analytical Injectors

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

The 7010 injects sample volumes of 5 µL or larger by means of a removable sample loop. Functionally similar to the 7010, the 9010 is more inert, made from PEEK, Tefzel® and ceramic. The 9010 comes with a built-in position-sensing switch.



5501

Analytical Sample Injectors

Description	Version	Part No.
7010, Includes a 20 µL Sample Loop	SS	7010RV
9010, Includes a 20 µL Sample Loop	PEEK	9000RV

Accessories

Loop-Filler Port	SS	7044
Loop-Filler Port	PEEK	40012
Needle Port Fitting	—	7012-009

Rheodyne® Model 8125 Micro-Scale Injector

- Versatile! —Works with microbore (1–2mm i.d.) and analytical (2–6mm i.d.) columns
- Low dispersion 0.25mm flow passages
- Built-in position-sensing switch



5498

The 8125 valve has unique “dual size” ports for tubing connections. This allows either 1/16" o.d. or 0.02" o.d. tubing to be used. Connections to 1/16" column endfittings are facilitated with a connecting tube supplied with the valve. The smaller flow passages also result in more resistance to flow. This makes it harder to load large sample volumes. The maximum recommended sample volume for the 8125 valve is 500µL. All sample loops are externally plumbed.

Micro-Scale Sample Injector

Description	Version	Part No.
8125	SS	8125RV

related products

Need sample loops and fittings for your Rheodyne® injector?

For sample loops, see page 140.
For fittings, see page 141.



5640

technical assistance

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

Rheodyne® Model 7410 Micro-Scale Injector

- High volumetric precision
- 0.5µL to 2µL removable internal sample loops
- Designed for 1–2mm i.d. columns



5499

Rheodyne® Model 7410 Sample Injection Valve is a single mode injector whereby sample is loaded with the complete filling method using a loop-filler port. This injector can be used with Rheodyne® loop-filler port accessories, position sensing switches, and mounting panels.

The valve has four ports which are threaded to accept Rheodyne® male nuts and ferrules (compression-type tube fittings) for 1/16" o.d. stainless steel tubing.

Micro-Scale Sample Injector

Description	Version	Part No.
7410	SS	7410RV
<i>Accessories</i>		
0.5µL Loop Disc	—	7410-070
1µL Loop Disc	—	7410-071
2µL Loop Disc	—	7410-072

related products

Did you know that Grace has a complete offering of nano, capillary, and microbore columns for both small and large molecule applications? See page 31 for explanation of hardware formats and see pages 24 and 25 for phase descriptions.



6950



6951

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 6-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.

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

Rheodyne® Manual Switching Valves

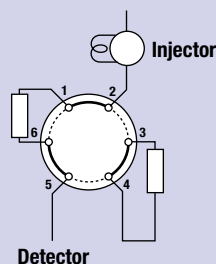
Description	Version	Bore	Part No.
<i>2-Position Valves</i>			
6-Port	SS	Standard	7000RV
6-Port	SS	Large Bore	7000L
3-Way	SS	Standard	7030RV
3-Way	SS	Large Bore	7030L
4-Way	SS	Standard	7040RV
<i>Multi-Position Valves</i>			
6-Position 6-Port	SS	Standard	7060RV

related products

Need fittings for valves? See page 141.

Manual Switching Valve Applications

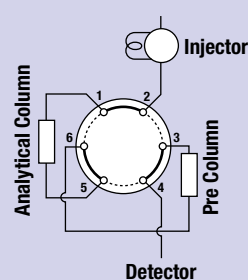
2-Position 6-Port: Two Column Selection



0798

Off line column is sealed. Flow continues on line.

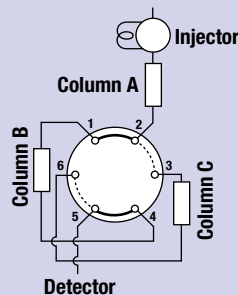
2-Position 6-Port: Pre-Column Backflushing



0801

Flow continues through column. Only pre-column is backflushed.

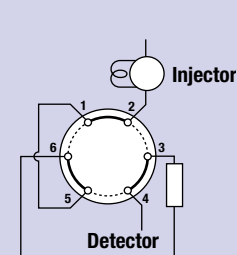
3-Way Valve: Column Programming



0802

Part of sample is analyzed on columns A-B, the other part on columns A-C.

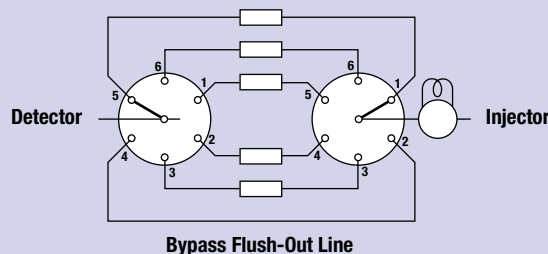
4-Way Valve: Column Backflushing



0800

Flow is backflushed to direct peak of interest to detector.

6-Position 6-Port Valve: Tandem Five Column Selection



0799

Selects between five columns. Use the sixth port for a bypass/flush out line. Two 7060s are required.

Rheodyne® RheBuild® Kits for Injection Valves

- Contains everything necessary for valve maintenance
- Conveniently packaged according to valve model
- Economical—Save over buying individual replacement parts



RheBuild® Kits contain a complete assortment of all the parts you need for general valve maintenance. In addition to the genuine Rheodyne® parts selected for your specific valve, detailed instructions guide you through the repair process.

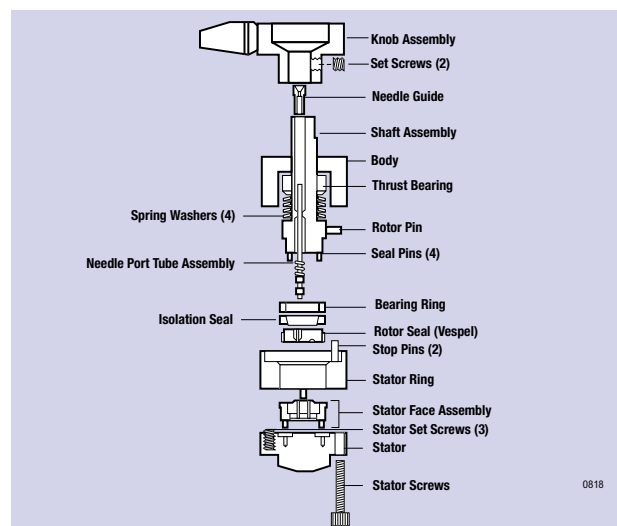
Rheodyne® RheBuild® Kit Specifications

Model	Includes:
3725, 3725i, 3725-038, 3725i-038, 7125, 7126, 7125-081, 7725, 7725i, 7726, 8125, 8126, 9125, 9126, 9725, 9725i, 9726	Standard Rotor Seal, Stator Face Assembly, Isolation Seal, Needle Guide, Needle Port Cleaner, 2 Hex Keys, and Instructions
7520, 7526	Inlet Stator, Rotor, Needle Guide, Needle Port Cleaner, Hex Key, Rotor Removal Tool, and Instructions
7010, 7000, 7410, 9010, 9040	Standard Rotor Seal, Isolation Seal, 2 Hex Keys, and Instructions

Rheodyne® RheBuild® Kits

Description	Part No.
3725, 3725i, 3725-038, 3725i-038	10455
7125, 7126	10457
7125-081	10459
7725, 7725i, 7726	10461
8125, 8126	10463
9125, 9126	10465
9725, 9725i, 9726	10467
7520, 7526	10469
7010, 7000	10471
7410	10473
9010, 9040	10474

Rheodyne® Replacement Parts



Replacement Parts for Rheodyne® Injectors

Description	Qty.	Part No.
Isolation Seal for All Valves	ea	7010-015
Stator Screw for 7010	10	77514
Rotor Seal for 7010	ea	7010-039
Stator for 7010/7125	ea	7010-040
Stator for 7060	ea	7060-039
Needle Guide for 7125/7725/7725i/8125/9125	ea	7125-008
Knob Assembly for 7125	ea	7125-043
Rotor Seal for 7125/7126/7725/7725i	ea	7125-047
PEEK Rotor Seal for 9010	ea	9010065
Tefzel® Rotor Seal for 9010	ea	90100510
Stator Face Assembly for 7125	ea	7125-067
Rotor Seal for 7410	ea	7410-038
Rotor Seal for 7413	ea	7413-013
Stator for 7725/7725i	ea	7725010
Stator Face Assembly for 7725/7725i	ea	77250260
Rotor Seal (Vespel) for 8125	ea	8125038
Stator Face Assembly for 8125	ea	8125-074
Stator Face Assembly for 9125	ea	8125-094
Stator for 9125	ea	9125-036*
Tefzel® Rotor Seal for 9125	ea	9125-082
PEEK Rotor Seal for 9125	ea	9125-095
Tefzel® Rotor Seal for 9010	ea	9010065

*Includes ring.

analytical hplc

Rheodyne® Sample Loops

Metal Sample Loops

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



2745

Rheodyne® metal sample loops are available in 316 stainless steel or titanium. Actual volumes can differ due to the tolerances of the tubing. Precise volumes may be injected by the “partial-filling” method if you are using a dual-mode injector.

Metal-Free Sample Loops

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



5640

PEEK sample loops are a convenient alternative to stainless steel. Actual sample loop volume can differ from theoretical designations due to the $\pm 0.05\text{mm}$ tolerances on the tubing bore.

Sample Loops—Analytical Injectors

Description	Metal 7725/7725i Part No.	Metal 7125/7010 Part No.	Metal 8125/8126 Part No.	PEEK 9000/9725 Part No.
2 μL (Internal)	7725015	—	—	—
5 μL	7725020	70-20SL	802001	9055020
10 μL	7725021	70-21SL	—	9055021
20 μL	7725022	70-22SL	—	9055022
50 μL	7725023	70-23SL	—	9055023
100 μL	7725024	70-24SL	7725024	9055024
200 μL	7725025	70-25SL	7725025	9055025
500 μL	7725026	70-26SL	7725026	9055026
1mL	7725027	70-27SL	7725027	9055027
2mL	7725028	70-28SL	7725028	9055028
5mL	7725029	70-29SL	7725029	9055029



5641

related products

The Handy-Lok Fitting Wrench has a slotted design which fits conveniently around the connecting tubing, and grips the entire hex securely. This gives you better access to fittings in awkward or obstructed locations, such as the back of an injection valve. See page 393 to order the Handy-Lok Fitting Wrench.

Alltech® Sample Loops

Flex-Connect™ Sample Loops

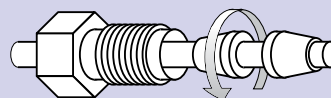
- Flexible coil bends into place quickly and easily
- Includes universal fittings that prevent dead volume
- 100% PEEK construction—prevents corrosion and sample loss



Flexible Coil

0813

Two-piece Ferrule Does Not Twist Tubing



1086

PEEK Flex-Connect™ Sample Loops

Description	Qty.	Part No.
<i>Flex-Connect™ Sample Loop with Hex-Head Nuts and a Two-piece Ferrule</i>		
5 μL	ea	32194
10 μL	ea	32196
20 μL	ea	32195
50 μL	ea	32202
100 μL	ea	32204
200 μL	ea	32206
500 μL	ea	32210
1mL	ea	32222
<i>Fittings (PEEK)</i>		
Short Hex-Head Nut and Ferrule	5	32215
Long Hex-Head Nut and Ferrule	5	32217
Two-Piece Ferrule	5	32218

Stainless Steel Sample Loops

- Includes finger-tight fittings that require no wrenches
- PEEK ferrule automatically adjusts to port dimensions
- Leak-proof to 5000psig
- Stainless steel loop, PEEK ferrule



5642

Stainless Steel Sample Loops

Description	Qty.	Part No.
5 μL Sample Loops	ea	32101
10 μL Sample Loops	ea	32105
20 μL Sample Loops	ea	32109
50 μL Sample Loops	ea	32113
100 μL Sample Loops	ea	32119
200 μL Sample Loops	ea	32122
<i>Sample Loop Kit</i>		
Includes: 1 each of above Loops, 12 PEEK Ferrules	ea	32125
<i>Fittings</i>		
Long Stainless Steel Nut	5	321025
Short Stainless Steel Nut	5	321185
PEEK Ferrules	5	321805

Rheodyne® ChromTRAC™ Fitting System

- Allows hex-head fittings to be finger-tightened
- Color code fluid lines
- Fits tightly atop any Alltech® or Rheodyne® hex-head 10-32 fitting



5379

ChromTRAC™ ID Kit

Description	Qty.	Part No.
ID Kit*	20/pk	6002830

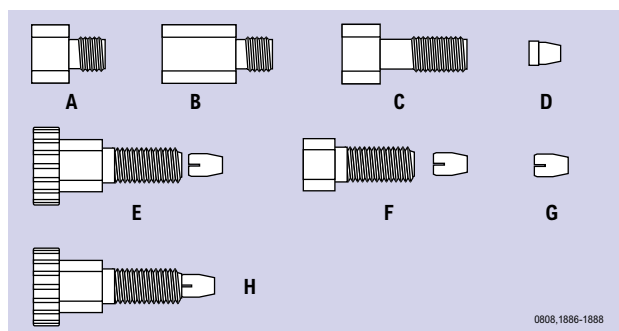
*Four each of blue, red, yellow; two each of grey, green, white, black.

Rheodyne® RheFlex® PEEK Fittings with ChromTRAC™

Color	Qty.	One-Piece Part No.	Qty.	Two-Piece Part No.	Qty.	Two-Piece Extra-Long Part No.
<i>RheFlex® Fittings with ChromTRAC™</i>						
Blue	10	6002821	5	6005401	—	—
Grey	10	6002822	5	6005402	1	6006602
White	10	6002823	5	6005403	1	6006603
Green	10	6002824	5	6005404	1	6006604
Red	10	6002825	5	6005405	1	6006605
Yellow	10	6002826	5	6005406	1	6006606
Black	—	—	5	6000054	1	6006608
Multicolor*	10	6002827	—	—	—	—

*Includes two each of blue, grey, green, red, yellow.

Rheodyne® RheFlex® Fittings



0808, 1886-1888

Rheodyne® RheFlex® Fittings

Graphic	Description	Qty.	Part No.
<i>RheFlex® Stainless Steel Fittings with Ferrules</i>			
A	Nut	10	77510
B	Long Nut	10	77512
C	Extra Long Nut	10	77519
D	Replacement Ferrules	10	77511
<i>RheFlex® PEEK Fittings with Ferrules</i>			
E	RheFlex® Fitting	5	6000054
F	Short RheFlex® Fitting	5	6000055
G	Replacement Ferrules	5	6000051
<i>RheFlex® PEEK One-Piece Fingertights</i>			
H	RheFlex® Fitting	10	600282

Valve Mounting Brackets

Rheodyne® Mounting Panels

Aluminum mounting plates are drilled with the appropriate holes for attaching all Rheodyne® high-pressure valves. A hole is included for the Model 7012 Loop-Filler Port. The flat panel (1.57 x 5.12", 4 x 13cm) has valve mounting holes at one end and panel mounting holes at the other. The angled panel (2.5 x 2.5 x 2.3", 6.4 x 6.4 x 5.9cm) is shown above.



5623

Rheodyne® Valve Mounting Panels

Description	Part No.
Mounting Panel	7160RV
Angle Mounting Bracket	7160-010

Alltech® Ring Stand Brackets

These sturdy brackets allow Rheodyne® or Valco® HPLC valves to be securely mounted to standard laboratory ring stands. The dimensions for the mounting bracket are 1.5 x 2.5 x 4.5" (3.8 x 6.4 x 11.4cm).



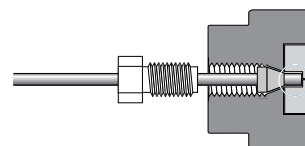
5624

Alltech® Ring Stand Brackets for HPLC Valves

Description	Part No.
Mounting Bracket	9540

tech tip

What Is the correct way to plumb a valve?



0629

Figure 1

1. Make a burr-free square cut on any tubing that will be plumbed into the valve. This ensures the tubing will "bottom out" in the valve port. If tubing does not "bottom out", a cavity will form which leads to peak distortion such as fronting, tailing or broadening.
2. Place a nut and ferrule on the tubing
3. Insert tubing into the valve port. Confirm that the tubing is bottomed in the valve port as shown in **Figure 1**.
4. While firmly pressing the tubing, finger-tighten the nut as much as possible. For hex-head fittings, use a wrench to turn the fitting another 1/4 to 1/2 turn past finger-tight.

Alltech® SelectPRO™ Automated Switching Valves

- Increase productivity
- Save time with unattended operation
- Available in stainless steel or PEEK

SelectPRO™ valve systems are electronically-controlled instruments. They increase productivity and save time and money by eliminating repetitive, manual switching. Now you can automate a wide variety of fluid-processing applications such as methods development, solvent switching, sample preconcentration, and fraction collection.

SelectPRO™ valve position is always indicated by a digital display on the front panel. Operation is easy with manual switching on the front panel or automated switching with a built-in electronic communication interface. Automated control through the communication interface is accomplished by either level logic (2-position) or four-line BCD (multi-position) control. All line controls require contact closure or TTL outputs.

SelectPRO™ Automated Switching Valves Specifications	
Dimensions:	5.5" H x 3.0" W x 7.5" D (14cm H x 76cm W x 19.1cm D)
Maximum Pressure:	5000psig (345 bar)*
Warranty:	1 Year
2-Position Valve Control:	Level Logic
Multi-Position Valve Control:	4-Line BCD
Supplied With:	Interface Cable and Universal Power Supply

*Maximum pressure for 6-position solvent selector is limited by 1/4-28 fittings.

Alltech® SelectPRO™ Automated Switching Valves

Description	Version	Part No.
<i>2-Position Valves</i>		
6-Port	SS	85521
10-Port	SS	85531
6-Port	PEEK	85525
10-Port	PEEK	85535
<i>Multi-Position Valves</i>		
2-Channel Selector By-Pass	SS	85563
2-Channel Selector By-Pass	PEEK	85567
10-Position Selector	SS	85583
10-Position Selector	PEEK	85587
6-Position Solvent Selector, 1/16"†	SS	85593
6-Position Solvent Selector, 1/8"†	SS	85597
<i>SelectPRO™ Valve RheBuild® Kits</i>		
For 2-Position, 6-Port**		85529
For 2-Position, 10-Port**		85539
For 2-Channel Selector with By-Pass**		85569
For 10-Position Selectors**		85589
For 1/16" Tubing, 6-Position Solvent Selectors		85594
For 1/8" Tubing, 6-Position Solvent Selectors		85599

**Suitable for Stainless Steel or PEEK version.

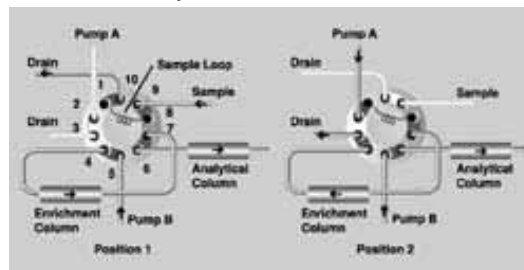
†Low pressure valve uses 1/4-28 fittings.

related products

Refer to page 141 for Rheodyne® fittings.

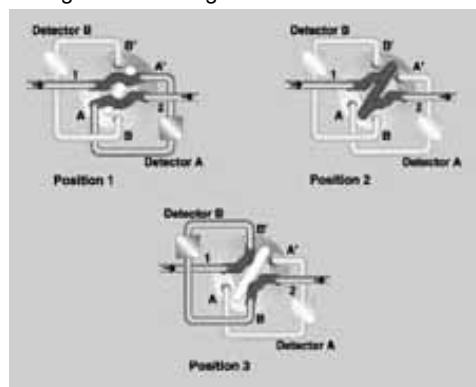
SelectPRO™ Switching Valve Applications

2-Position, 10-Port: On-line sample enrichment to decrease total analysis time



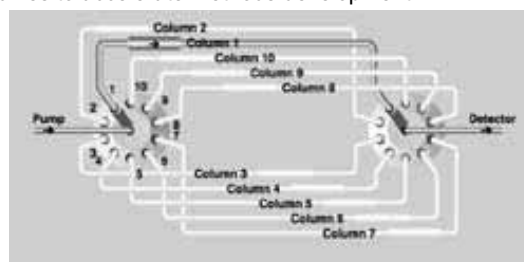
4108

2-Channel Selector with By-Pass: Reduce equilibration time during solvent changeover between two columns



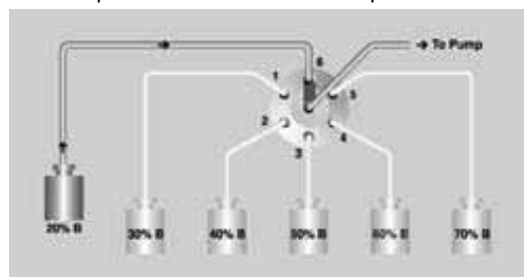
4107

10-Position Selector: Select ten columns using two valves to accelerate methods development



4109

6-Position Solvent Selector: Select various mobile phase compositions for method development.



4110

Alltech® SelectPRO™ Column Selector

- Streamline method development and validation
- Screen multiple HPLC columns quickly and automatically
- Eliminate sample carry-over and minimize dispersion with low dead-volume valve architecture

The Alltech® SelectPRO™ Column Selector is a self-contained, electrically operated instrument for automated column selection. A SelectPRO™ Column Selector is a powerful tool for quickly screening multiple columns for the best separation. After column selection and method optimization is achieved, use the column selector to quickly validate methods using different lots of the same packing material or, alternatively, different columns from the same lot.

Many laboratories have a number of users sharing the same system. The column selector lets multiple users select methods using the correct column for their assay and offers convenient washout and column storage. Different samples can be run at night and over weekends using different methods, better utilizing existing equipment and increasing productivity.

The selected column is indicated by a bright digital display on the front panel. Select columns remotely using 4-line BCD electronic interface, or locally by push button.

Design Features:

- Pinch clips simplify column mounting and removal
- Built-in drip tray provides safe and convenient solvent containment for leaks and spills
- Magnetically secured cover maintains environmental isolation and stabilizes ambient temperature
- Side tubing fasteners organize tubing connections
- Accommodates columns in lengths of 3–35cm (2–14") and diameters of 0.6–3.2cm (0.25–1.25")

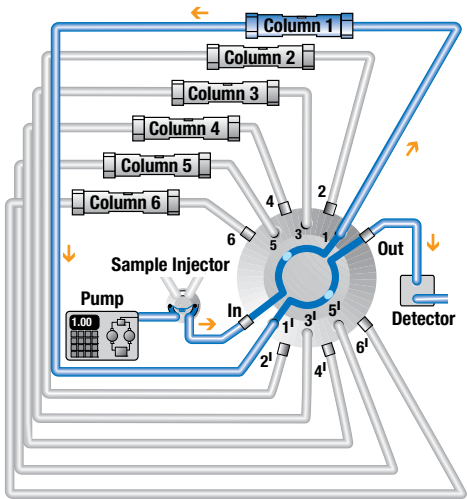
SelectPRO™ Column Selector Specifications	
Dimensions:	22" H x 9.8" W x 12.8" D (55.9cm H x 24.9cm W x 32.5cm D)
Maximum Pressure:	5000psig (345 bar)
Flow Passage:	0.6mm (0.024") and 0.4mm (0.015")
Environment:	4–40°C, <95% humidity (non-condensing)
Supplied with:	10-32 nuts and ferrules, 3.5m x 1/16" o.d. PEEK tubing, universal power supply, power line cord, and interface cable
Warranty:	1 Year
Control:	4-Line BCD



Column Selector



Column Selector with Cover



Column Selection

SelectPRO™ Column Selectors

Control Logic	Part No.
<i>Six-column Selectors</i>	
Stainless Steel	85503
PEEK	85507
<i>Three-column Selectors</i>	
Stainless Steel	85513
PEEK	85517

SelectPRO™ Valve RheBuild® Kits

Description	Part No.
<i>Valve RheBuild® Kits</i>	
For Six-column Selectors	85509
For Three-column Selectors	85519

ASI QuickSplit Flow Splitters

Post-Column Fixed Splitters

- Easy-to-use “plug and play” device
- Predefined split ratio eliminates tedious adjustments to capillary tubing
- Ultra-low dead volume as small as 100nL
- Interchangeable fluid resistors create split ratios from 1:1 to 2000:1



ASI Post-Column Fixed Flow Splitters provide a fixed split ratio with extremely low dead volume—as low as 100 nanoliters, depending upon the resistor cartridge. Split ratios are unaffected by solvent viscosity or pressure changes, and are extremely stable and reproducible. Ultra low internal volume means that solvent composition in both resistors at the same time is identical, and therefore viscosity changes associated with gradient runs do not impact the split ratio. These splitters have an input flow range from 0.1 to 5mL/min.

Post-Column Fixed Flow Splitters and Replacement Resistor Sets

Ratio	Splitter Part No.	Replacement Resistor Set Part No.
2000:1	620103	6200103
1000:1	620104	6200104
500:1	620105	6200105
200:1	620106	6200106
100:1	620107	6200107
50:1	620108	6200108
20:1	620109	6200109
10:1	620010	6200110
5:1	620011	6200111
3:1	620012	6200112
1:1	620013	6200113

Post-Column Adjustable Splitters

- Adjustable flow splitter enables direct real time control over split ratio optimization
- Create split ratios from 1:1 to 1000:1
- Ultra low 0.5µL delay volume on capillary side
- Easy to use interchangeable fluid resistors create a wide range of split ratios



The flow path of the ASI post-column Adjustable Flow Splitter contains two fluid resistors that form a parallel flow path. The low flow rate stream passes through a fixed resistor cartridge, while the high flow rate stream passes through an adjustable fluid resistor (metering valve). The ratio of these two resistors creates the split flow ratio. Due to the rugged design, the split ratio repeatability is $\pm 1\%$ of setting, and unlike alternative splitter valves or tees, will not be affected by actions that effect input flow such as turning the pump off and on, or pressure spikes.

Because the Adjustable Flow Splitter incorporates a metering valve, split ratios can be changed frequently with flow changes that are stable and reproducible. This provides direct real time control over split ratio optimization. Split ratios are not affected by changes in solvent viscosity or pressure. These splitters have an input flow range from 0.1 to 5mL/min.

ASI Post-Column Adjustable Flow Splitters

Description	Part No.
<i>ASI Post-Column Adjustable Flow Splitters</i>	
Adjustable from 50:1 to 1000:1	60201
Adjustable from 15:1 to 250:1	60203
Adjustable from 5:1 to 100:1	60204
Adjustable from 1:1 to 20:1	60206
<i>Replacement Resistor Cartridges</i>	
For 50:1 to 1000:1	601101
For 15:1 to 250:1	601103
For 5:1 to 100:1	601104
For 1:1 to 20:1	601106

ASI QuickSplit Makeup-Flow Splitter Manifold

- Add makeup-flow to predetermined post column splits
- Built-in delay time ensures proper sequencing between detector and fraction collector
- Extremely low peak dispersion

This splitter manifold is designed for post-column applications where a small amount of flow from an HPLC column is combined with a makeup-flow before it reaches the detector. A common application that uses this device involves splitting a small portion of the outlet flow from a preparative HPLC column which is then combined and diluted with a makeup-flow. This flow is sent to a mass spec or UV to trigger a fraction collector from the remaining flow.

Makeup-Flow Splitter Manifold

Flow Range	Split Ratio	Part No.
1–20mL/min	1000:1	620014
20–50mL/min	10,000:1	620015
50–150mL/min	5000:1	620016
<i>Replacement Resistor Cartridges</i>		
1–20mL/min	1000:1	620017
20–50mL/min	10,000:1	620018
50–150mL/min	5000:1	620019

Hamilton® Miniature Inert Low-Pressure Valves

- Inexpensive low-pressure injection valves
- Convenient solvent selection
- Variety of flow configurations
- Available in standard or panel mount

Hamilton® low-pressure valves provide an economical and flexible method of custom-building a fluid flow control system from a simple on/off valve to more complex multi-valve arrangement. The small valve body and inert flow path is suited for any low-pressure system. Three body styles are available. The HV is a stand alone manual valve. The HVP is the same as the HV valve except that it is panel mountable. The HVX is panel mountable and has a larger internal diameter of high flow or viscous fluids.



HV Valve



HVP Valve



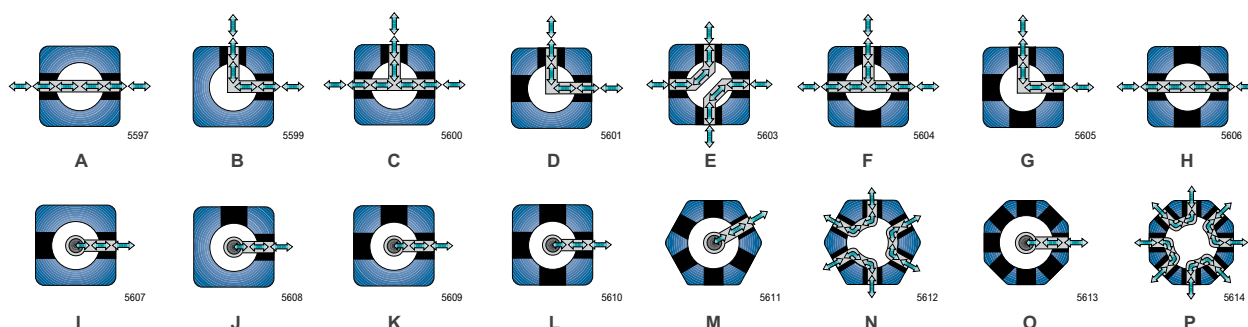
HVX Valve

Hamilton® Miniature Inert Valves Specifications

Material:	PTFE, Kel-F® flow path
Temperature Range:	10–100°C
Maximum Pressure:	100psig
Thread Type:	1/4-28
Port Orifice:	0.059" for HV and HVP. 0.118" for HVX

Hamilton® Plug Types

90, 180, T, 4-Port:	Flow path connects two or more side ports
Distribution:	Flow path connects bottom port to any one side port
Injection:	Flow path connects pairs of adjacent ports



Hamilton® Miniature Inert Valves

Graphic	Housing Type	Plug Type	HV Part No.	HVP Part No.	HVX Part No.
A	180°	180°	86725	86775*	—
B	90°	90°	86726	86776*	—
C	"T"	"T"	86727	86777*	—
D	"T"	90°	86728	86778*	—
E	4-Port	4-Port	86729	86779*	—
F	4-Port	"T"	86730	86780*	—
G	4-Port	90°	86731	86781*	—
H	4-Port	180°	86732	86782*	—
I	180°	Distribution	86735	86785*	—
J	90°	Distribution	86736	86786*	—
K	"T"	Distribution	86737	86787*	—
L	4-Port	Distribution	86738	86788*	—
M	6-Port	Distribution	—	—	86915†
N	6-Port	Injection	—	—	86916†
O	8-Port	Distribution	—	—	86918†
P	8-Port	Injection	—	—	86919†

*HVP Valves require locking nut (Part No. **16450**) for panel mounting.

†HVX Valves require locking nut (Part No. **35121**) for panel mounting.

Valve Accessories

Description	Part No.
Panel Mount Nut for HVP Valves	16450
Panel Mount Nut for HVX Valves	35121

Valve Adapters

Description	Material	Part No.
1/4-28 Male Thread to Hose Barb	CTFE	350320
1/4-28 Male Thread to Male Luer	CTFE	35030
1/4-28 Male Thread to Female Luer Lock	CTFE	350310
1/4-28 Male Thread to Male Luer Lock	CTFE	350330
1/4-28 Male Thread to RN Needle Adapter	CTFE	350350

analytical hplc

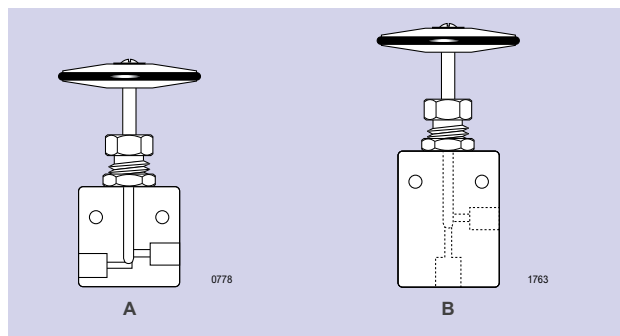
SSI High-Pressure Needle Valves

- Useful to aid in HPLC pump functions
- Available in two-way and three-way configurations
- Higher pressure limitations than other valves

Fittings/Ferrules

Description	Qty.	Part No.
1/16" Gland Nut	10	01-0140
1/16" Ferrule	10	01-0142

Two-Way Valves



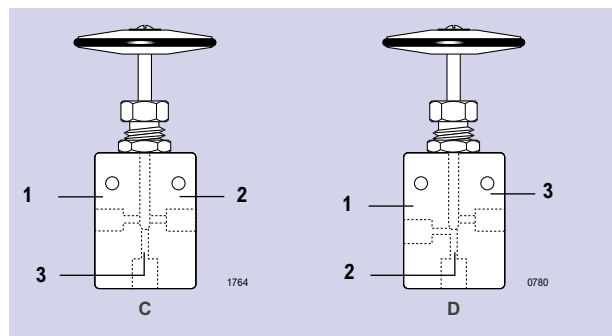
Two-Way Valve Specifications

Material:	PTFE, Tefzel®, and 316 Stainless Steel
Max Temperature:	100°C
Max Pressure:	15,000psig
Thread Type:	1/16" SSI Fittings
Typical Use:	Basic shut-off valve with straight or angled ports

Two-Way Valves

Graphic	Description	Part No.
A	Two-Way, Through Valve	02-0120
B	Two-Way, Angle Valve	02-0121

Three-Way Valve



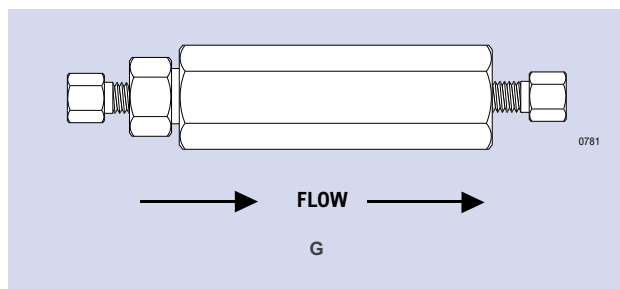
Three-Way Valve Specifications

Material:	PTFE, Tefzel®, and 316 Stainless Steel
Max Temperature:	100°C
Max Pressure:	15,000psig
Thread Type:	1/16" SSI Fittings
Typical Use:	Pressure venting to aid in pump priming, purging, or solvent changeover

Three-Way Valves

Graphic	Description	Part No.
C	Three-Way, Bottom Vent	02-0124
D	Three-Way, Side Vent	02-0125

Check Valves



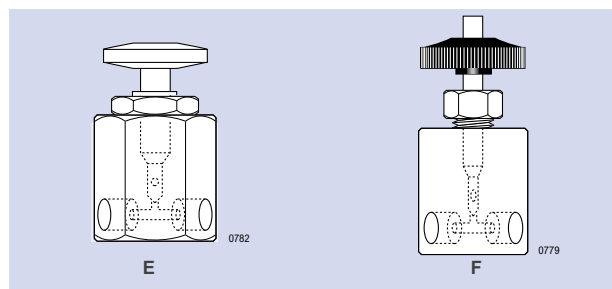
Check Valve Specifications

Material:	PTFE, Chemraz®, and 316 Stainless Steel
Max Temperature:	100°C
Max Pressure:	6000psig
Thread Type:	1/16" SSI Fittings
Internal Volume	121µL
Typical Use:	Install as a back-up to inlet and outlet pump check valves to reduce pulsations in less sophisticated reciprocating pumps

Check Valves

Graphic	Description	Part No.
G	Check Valve	02-0129
—	Replacement Check Valve Seal	90-1001

Prime/Purge Valves



Prime/Purge Valve Specifications

Material:	PEEK or 316 Stainless Steel
Max Temperature:	100°C
Max Pressure:	6000psig
Thread Type:	Standard: 1/16" SSI fittings and 1/4-28 for low pressure side port Luer: 1/16" SSI fittings, and luer stem for low-pressure side port
Typical Use:	Low-pressure side port opens to prime and closes for normal use

Prime/Purge Valves

Graphic	Description	Material	Part No.
F	Prime/Purge Valve, Luer Stem	PEEK	060115
F	Prime/Purge Valve, Luer Stem	SS	02-0292
E	Prime/Purge Valve, Standard	SS	02-0191
—	Seal Kit for 02-0191	—	02-0194