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Waters Quality Parts® Chromatography Columns, and Supplies Catalog

Waters
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2017/18

2017/18

Waters Quality Parts, Chromatography Columns, and Supplies Catalog

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Sample Preparation



"We are focused on quality and reproducibility."

– Pat Curtis, Principal Process Chemist, Wexford, Ireland

Sample Preparation

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Sample Preparation

Goals of Sample Preparation

Successful sample preparation for most analytical techniques (HPLC, UPLC,® LC-MS, UV, GC, etc.) has a threefold objective. It needs to provide the sample component of interest:

- In solution
- Free from interfering matrix elements
- At a concentration appropriate for detection or measurement

Waters® sample preparation solutions for quantitative analysis make it easy to deliver a sample that is reproducible with high recovery and free of interferences. Based on simple, logical workflows that produce clean samples through selective separations, Waters sample preparation products maximize sensitivity, increase throughput, and enable the development of robust methods.

SELECTING THE CORRECT SPE FORMAT

Formats		
µElution Plates	▪ Patented µElution™ plate design. ▪ Ideal for SPE cleanup and analyte enrichment of sample volumes ranging from 10 µL to 375 µL. ▪ No evaporation and reconstitution necessary due to elution volumes as low as 25 µL. ▪ Up to a 15× increase in concentration. ▪ Compatible with most liquid-handling robotic systems for automated, reliable, high-throughput SPE (HT-SPE).	
96-well Extraction Plates	▪ Innovative, award-winning, two-stage well design. ▪ High throughput and high recovery. ▪ Available with 5 mg, 10 mg, 30 mg, and 60 mg of sorbent per well. ▪ Compatible with most liquid-handling robotic systems for automated, reliable high throughput SPE (HT-SPE).	
Syringe-barrel Cartridges	▪ Ultra-clean syringe barrel and frits. ▪ Available with cartridge sizes ranging from 1 cc/10 mg up to 35 cc/6 g. ▪ Flangeless syringe-barrel cartridges available in 1 cc, 3 cc, and 6 cc configurations. ▪ Plus-style cartridges with Luer inlet hub and outlet tip with 225 mg of sorbent.	
Glass Cartridges	▪ Ultra-clean glass syringe with Teflon frit. ▪ For trace level detection and analysis at part-per-trillion levels. ▪ Available in 5 cc with 200 mg of sorbent configuration.	
On-line Columns and Cartridges	▪ For rugged, reproducible, and ultra-fast on-line analysis. ▪ Wide choice of configurations, particle sizes, and sorbent chemistries. ▪ Available with six patented Oasis® Sorbents—HLB, PRiME HLB, MCX, MAX, WCX, and WAX. ▪ High recovery and reproducible results for a wide range of compounds. ▪ Cartridge format for use with Spark Holland Prospekt-2/Symbiosis systems also available.	

Oasis Solid-Phase Extraction (SPE) Products

A BREAKTHROUGH IN SPE

Through the combination of innovative sorbent technology and hardware design, Oasis Products have become the first choice in solid-phase extraction (SPE). Oasis Products are trusted by separation scientists across the globe to meet a wide variety of sample preparation needs, ranging from a simple and fast matrix cleanup to the need to solve the most difficult and highly selective sample preparation challenges. Researchers rely on the superior technical performance of Oasis products to achieve unmatched purity, consistency, and quality in their sample preparation methods.

What is the Ideal SPE Method?

✓ Easy to implement ✓ Reproducible and robust ✓ Fast ✓ Achieves your goals

[Start Here]

Oasis HLB

Choose If:
Require ultra high capacity of very polar compounds

All matrices

- Reversed-Phase Solid-Phase Extraction
- No condition and equilibration steps required
- High capacity for extremely polar compounds
- Compatible with solvents pH 0–14

Oasis PRiME HLB

First Choice:
Reversed-phase SPE cleanup of samples in routine analysis

All matrices

- Reversed-Phase Solid-Phase Extraction
- Simple and fast protocol with no condition and equilibration steps required
- Reduces matrix effects with more than 95% of common matrix interferences removed
- One method provides high recoveries for a diverse, wide range of analytes
- High throughput with faster flows and less plugging

Oasis Mixed-Mode

Choose If:
Higher analyte specificity, sensitivity, and/or cleanliness required

All matrices

- Mixed Mode Solid-Phase Extraction
- Enriches/concentrates
- Cleanest extracts
- Best reduction of matrix effects
- Highest sensitivity
- Dual retention mechanism
- Provides orthogonality and selectivity
- 2 screening protocols, 4 sorbents

Oasis HLB	Oasis PRiME HLB	Oasis Mixed-Mode Sorbents
Load sample	Load sample	Oasis 2 x 4 Strategy: Only 2 protocols and 4 sorbents to analyze all types of compounds: acids, bases, and neutrals
Wash with 5% CH_3OH in H_2O	Wash with 5% CH_3OH in H_2O	For Weak Bases pK_a 2–10: Use Oasis MCX; For Strong Acids pK_a <1: Use Oasis WAX; For Weak Acids pK_a 2–8: Use Oasis MAX; For Strong Bases pK_a >10: Use Oasis WCX
Elute 100% CH_3OH	Elute with 90/10 ACN/CH_3OH	Apply Protocol 1: Load pre-treated sample; Wash: 2% HCOOH; Elute 1: 100% CH_3OH; Elute 2: 5% NH_4OH in CH_3OH
		Apply Protocol 2: Load pre-treated sample; Wash: 5% NH_4OH; Elute 1: 100% CH_3OH; Elute 2: 2% HCOOH in CH_3OH

SIMPLEST — Combined Advantage with Oasis PRiME HLB — CLEANEST

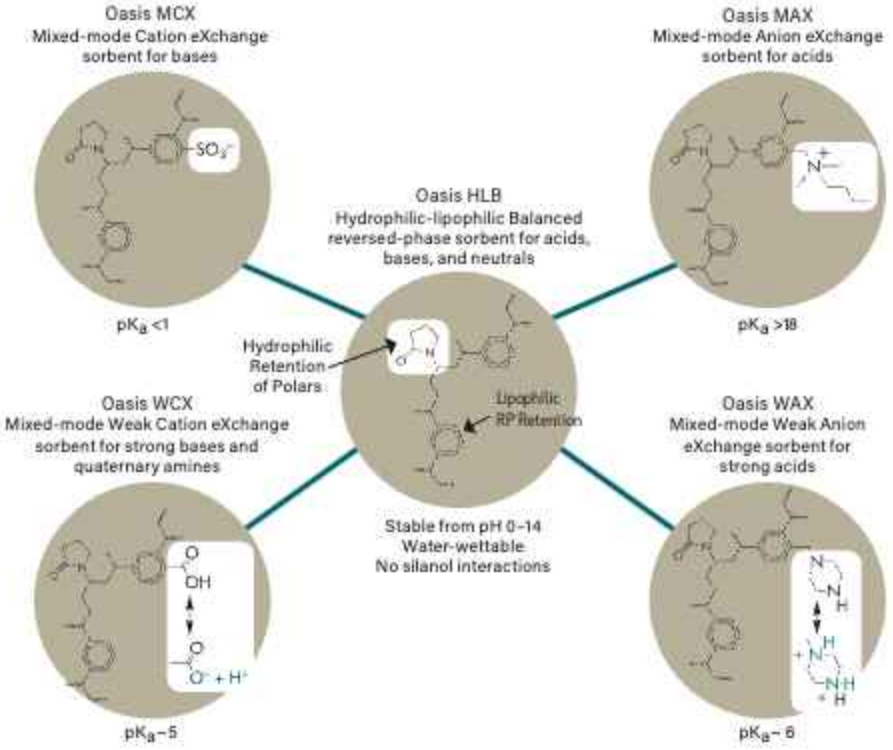
Solid-Phase Extraction enables scientists to:

- Reduce chromatographic complexity
- Increase signal to noise/improve detection limits
- Minimize risks associated with matrix effects
- Concentrate analytes of interest
- Reduce variability in analytical results/increase robustness of analysis
- Increase column lifetime
- Reduce system downtime

Waters introduced Oasis HLB in 1996, effectively changing the way scientists performed solid-phase extraction (SPE). Constructed with a water-wettable copolymer that is stable from pH 0–14, Oasis HLB created a whole new range of solid-phase extraction method development possibilities. It is the gold standard in SPE, trusted by scientists around the world.

The Oasis SPE Family of Sorbents

As a unique, water-wettable polymeric sorbent, Oasis Products can be used without the conditioning and equilibration steps required by other polymeric and silica based sorbents. Historically, those steps were required to obtain retention of analytes by reversed-phase SPE. The water-wettable nature of Oasis allows direct loading of aqueous samples without sacrificing recovery.



Oasis PRiME HLB* was designed to make solid-phase extraction easy to implement into routine laboratory use by providing generic, simple methods that remove 95% of common matrix interferences such as phospholipids, fats, salts, and proteins. It produces the cleanest sample eluates with a simple, two or three step protocol.

Oasis HLB is the backbone of all Oasis Sorbents. It is a multi-purpose reversed-phase sorbent that provides high capacity for a wide range of compounds.

Analyte specificity and sensitivity can be increased by using a **Mixed-Mode Oasis** Sorbent, which includes both reversed-phase and ion-exchange functionality for orthogonal sample preparation.

*Oasis PRiME HLB is a proprietary, patent pending sorbent.

Ordering Information

Oasis Product Selection Guide



	1 cc/10 mg	1 cc/10 mg Flangeless	1 cc/30 mg	1 cc/30 mg Flangeless	1 cc/30 mg Gilson Adapter	3 cc/60 mg	3 cc/60 mg Flangeless	3 cc/60 mg Gilson Adapter	3 cc/150 mg	3 cc/540 mg	3 cc/540 mg Flangeless	6 cc/150 mg
Sorbent	**100/box**	**100/box**	**100/box**	**100/box**	**500/box**	**100/box**	**100/box**	**500/box**	**100/box**	**100/box**	**100/box**	**30/box**
Oasis HLB 30 µm	186000383	186006339	WAT094225	186001879	WAT058882	WAT094226	186001880	WAT058883	–	–	–	186003365
Oasis HLB 60 µm	–	–	–	–	–	–	–	–	–	186004134	186003852	186003379
Oasis MCX 30 µm	186004648	186006340	186000252	186001881	186001888	186000254	186001882	–	–	–	–	186000256
Oasis MCX 60 µm	–	–	186000782	–	–	186000253	–	–	–	–	–	186000255
Oasis MAX 30 µm	186004649	186006341	186000366	186001883	–	186000367	186001884	–	–	–	–	186000369
Oasis MAX 60 µm	–	–	–	–	–	186000368	–	–	–	–	–	186000370
Oasis WCX 30 µm	186004650	186006342	186002494	186006499	–	186002495	186006501	–	–	–	–	186002498
Oasis WCX 60 µm	–	–	186002496	–	–	186002497	–	–	–	–	–	–
Oasis WAX 30 µm	186004651	186006343	186002489	186006500	–	186002490	186006502	–	–	–	–	186002493
Oasis WAX 60 µm	–	–	186002491	–	–	186002492	–	–	–	–	–	–
Oasis PRiME HLB	–	–	186008055	–	–	186008056	–	–	186008717	–	–	–

Simplifying Solid-Phase Extraction

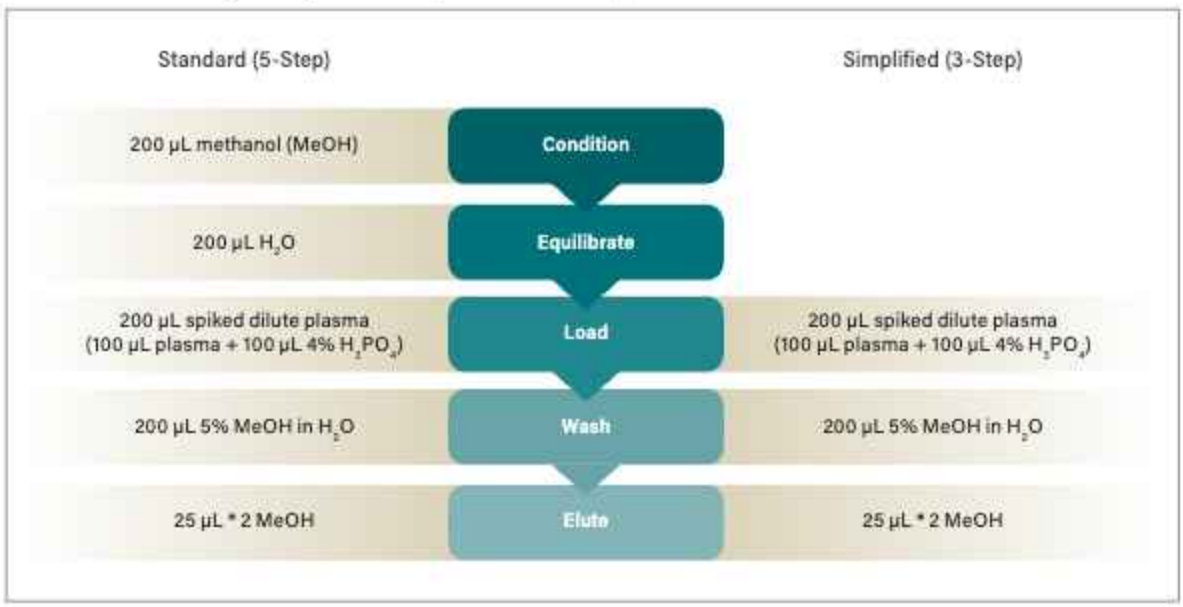
Traditionally, solid-phase extraction methods have required condition and equilibration steps to prepare the sorbent for sample introduction. The condition step was required to wet the sorbent and allow liquid to enter the pores, enabling retention within the sorbent. Once wetted, the sorbent needed to be equilibrated with aqueous solution to prepare it for aqueous sample loading. Since Oasis HLB is a water-wettable sorbent, the analytes can interact with the sorbent and are retained when loaded directly onto the sorbent in an aqueous sample solution. This eliminates the condition and equilibration steps from the traditional solid-phase extraction protocol and reduces the number of processing steps from 5 to 3. The result is an average reduction in solvent consumption of up to 70% and a 40% savings in sample preparation time.

The ability to simplify and shorten SPE protocols is due to the unique water-wettable, balanced nature of the hydrophilic/lipophilic Oasis Sorbent.



	6 cc/200 mg	6 cc/400 mg Flangeless	6 cc/500 mg	12 cc/500 mg	20 cc/1 g	35 cc/6 g	225 mg Plus Short	30 mg Plus Light	30 mg Vac RC	60 mg Vac RC	5 cc/200 mg Glass Cartridge
Sorbent	**30/box**	**100/box**	**30/box**	**20/box**	**20/box**	**10/box**	**50/box**	**50/box**	**50/box**	**50/box**	**30/box**
Oasis HLB 30 µm	WAT106202	–	–	–	–	–	–	186005125	186000382	186000381	–
Oasis HLB 60 µm	–	–	186000115	186000116	186000117	186000118	186000132	–	–	–	186000683
Oasis MCX 30 µm	–	186001216	–	–	–	–	–	–	–	186000261	–
Oasis MCX 60 µm	–	–	186000776	–	186000777	186000778	186003516	–	–	186000380	–
Oasis MAX 30 µm	–	186001855	–	–	–	–	–	–	186000372	186000371	–
Oasis MAX 60 µm	–	–	186000865	–	–	–	186003517	–	–	186000378	–
Oasis WCX 30 µm	–	–	–	–	–	–	–	–	–	–	–
Oasis WCX 60 µm	–	–	186004646	–	–	–	186003518	–	–	–	–
Oasis WAX 30 µm	–	–	–	–	–	–	–	–	–	–	–
Oasis WAX 60 µm	–	–	186004647	–	–	–	186003519	–	–	–	–
Oasis PRiME HLB	186008057	–	186008718	–	–	–	–	–	–	–	–

Save Time and Solvent by Moving from a 5-Step Protocol to a 3-Step Protocol



Traditional 5-step SPE protocol vs. the new 3-step SPE protocol using an Oasis HLB µElution Plate. (Typical loading range between 10–375 µL undiluted plasma).

Sorbent Amount and Solvent Selection for the Generic SPE Method

The suggested amount of sorbent in a cartridge or a plate required for your application is given in the table below. Due to the increased capacity of the Oasis Sorbents, you can use less sorbent than you would normally need if you used a silica-based packing. When converting from C_{18} silica-based sorbents to Oasis SPE Sorbents, use approximately 2/3 less Oasis Sorbent (100 mg C_{18} Sorbent = 30 mg Oasis Sorbent).

Capacity and Elution Volume of Oasis 96-well Plates and Cartridges

Sorbent Per Device	Maximum Mass Capacity	Typical Sample Volumes	Elution Volume
2 mg (µElution Plate)*	60–400 µg	10–375 µL	25 µL**
5 mg*	0.15–1 mg	10–100 µL	≤150 µL
10 mg	0.35–2 mg	50–200 µL	≤250 µL
30 mg	1–5 mg	100 µL–1 mL	≥400 µL
60 mg	2–10 mg	200 µL–2 mL	≥800 µL

* Available only in 96-well plate formats.
** µElution Plate requires no evaporation step.

Tips for Selecting Elution Solvents for the Generic SPE Method (I-D)*
The elution solvent is selected based on polarity of analyte.

Solvent	Solvent Type	Relative Elution Strength**	Comments
Methanol	Proton donor	1.0	Disrupts H-bonding
Acetonitrile	Dipole-dipole	3.1	Medium polarity drugs
Tetrahydrofuran	Dipole-dipole	3.7	Medium polarity drugs
Acetone	Dipole-dipole	8.8	Medium polarity drugs
Ethyl acetate	Dipole-dipole	High	Nonpolar drugs and GC compatible
Methylene chloride	Dipole-dipole	High	Nonpolar drugs and GC compatible

* When using solvents other than methanol, add 10–30% of proton donor solvent such as methanol to disrupt H-bonding on the Oasis HLB sorbent.

** High-Purity Solvent Guide. Burdick and Jackson Laboratories, Inc. Solvent Properties of Common Liquids, L.R. Snyder, J. Chromatogr., 92, 223 (1974); J. Chromatogr. Sci. 16, 223 (1978).

DID YOU KNOW...

Sample Pretreatment Suggestion

Applying one or more of the following steps before loading your sample may improve your results:

1. Dilute sample 1:1 with buffer to improve flow during loading
2. Dilute 1:1 or greater with 4% phosphoric acid or other acids
3. Filter through 0.45 µm membrane
4. Centrifuge @ ≥3000 rpm

APPLICATION AREA: Sample Cleanup

"We tested the Waters Oasis HLB µElution PRiME plate by direct comparison with a standard HLB µElution plate using a validated method for 2 analytes. The end results were the same, in terms of sample cleanliness and recovery. The flow characteristics were also the same (some positive pressure required, not unexpected with µElution SPE). Time was saved as no conditioning or equilibration was required. As the price is the same as the standard HLB plates, we would not hesitate to use it routinely in our lab in order to save time and money (no solvent required for conditioning). I look forward to using the standard HLB PRiME plate for flow rate comparison."

REVIEWER: Hayley Hawthorne
ORGANIZATION: York Bioanalytical Solutions

TRUSTED REVIEWS

★★★★★

OASIS PRIME HLB

Oasis PRiME HLB is the first-of-its-kind SPE sorbent that sets the new performance standard for routine analyses. The unique, patent pending Oasis PRiME HLB Sorbent provides cleaner samples in less time and with less effort.

- Removes 95% of common matrix interferences such as salts, proteins, and phospholipids
- Ability to concentrate analytes
- Faster, more predictable analysis times
- Directly load pre-treated samples without conditioning and equilibration

Simpler: Easy, efficient protocols

The Oasis PRiME HLB copolymer is extremely water-wettable, making it possible to eliminate the condition and equilibration steps that are absolutely essential when using silica based or other polymeric sorbents. This saves valuable sample processing time and costly solvent purchase and disposal.

Faster: More even flows across cartridges and plates with less plugging

Oasis PRiME HLB has been designed to increase speed within the device and in your workflow. Flow times through the device are 30–50% faster for urine and plasma. Desired flow rates are achieved using less vacuum or positive pressure than required with other SPE devices.

Even Cleaner: The optimally designed sorbent removes more than 95% of common matrix interferences like proteins, salts, fats and phospholipids

Choose the sample preparation method that meets your analytical needs.

3-step Cleanup
(Catch and Release)

Load pre-treated sample

Wash: 5% MeOH

Elute: 90/10 acetonitrile/ MeOH

Use 3-step solid-phase extraction to remove the most matrix interferences, including salts, phospholipids and proteins. This technique also allows for sample concentration/enrichment. Perfectly suited for routine bioanalytical sample cleanup.

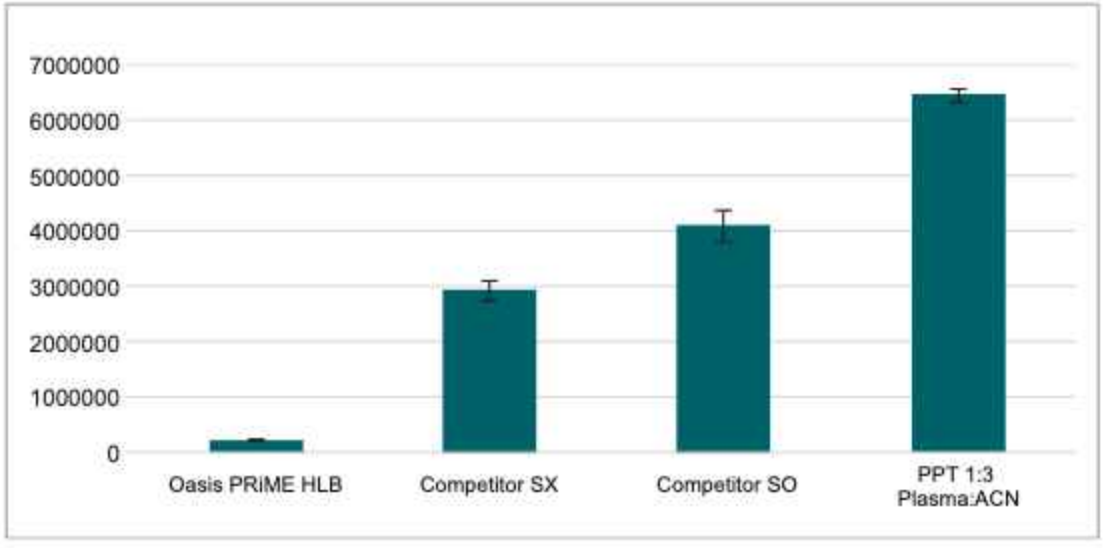
2-step Cleanup
(Pass-through)

Load pre-treated sample Analytes pass-through unretained

Rinse to collect hold up volume

Use 2-step sample cleanup to remove matrix interferences quickly if your beginning sample solution is high organic and concentration and/or salt removal is not required. Perfectly suited for multiple residue veterinary drug screening in meats.

Phospholipids Remaining in Final Eluate



Fewer phospholipids remain in the final sample eluate with the Oasis PRiME HLB Sorbent and 3-step protocol, compared to the final eluates using traditional 5-step protocol on the competitors' sorbents or protein precipitation (PPT). This removal is also more reproducible with Oasis PRiME HLB as indicated by the error bars (n=5).

Ordering Information

Oasis HLB Sample Extraction Products

Description	Format	Particle Size	Qty.	P/N
Oasis HLB Cartridge	1 cc/10 mg	30 µm	100/box	186000383
Oasis HLB Cartridge	1 cc/30 mg	30 µm	100/box	WAT094225
Oasis HLB Cartridge	1 cc/30 mg	30 µm	1000/box	186003908
Oasis HLB Flangeless Cartridge	1 cc/30 mg	30 µm	100/box	186001879
Oasis HLB Cartridge with Gilson ASPEC Adapter	1 cc/10 mg	30 µm	500/box	186000988
Oasis HLB Cartridge with Gilson ASPEC Adapter	1 cc/30 mg	30 µm	500/box	WAT058882
Oasis HLB Cartridge	3 cc/60 mg	30 µm	100/box	WAT094226
Oasis HLB Cartridge	3 cc/60 mg	30 µm	1000/box	186007646
Oasis HLB Flangeless Cartridge	3 cc/60 mg	30 µm	100/box	186001880
Oasis HLB Cartridge with Gilson ASPEC Adapter	3 cc/60 mg	30 µm	500/box	WAT058883
Oasis HLB Cartridge	6 cc/200 mg	30 µm	30/box	WAT106202
Oasis HLB Cartridge	3 cc/400 mg	60 µm	100/box	186003849
Oasis HLB Cartridge	3 cc/540 mg	60 µm	100/box	186004134
Oasis PRiME HLB Cartridge	3 cc/150 mg	–	100/box	186008717
Oasis PRiME HLB Cartridge	3 cc/150 mg	–	30/box	186008718
Oasis HLB Flangeless Cartridge	3 cc/540 mg	60 µm	100/box	186003852
Oasis HLB Cartridge	6 cc/150 mg	30 µm	30/box	186003365
Oasis HLB Cartridge	6 cc/150 mg	60 µm	30/box	186003379
Oasis HLB Cartridge	6 cc/500 mg	60 µm	30/box	186000115
Oasis HLB Cartridge	12 cc/500 mg	60 µm	20/box	186000116
Oasis HLB Cartridge	20 cc/1 g	60 µm	20/box	186000117
Oasis HLB Cartridge	35 cc/6 g	60 µm	10/box	186000118
Oasis HLB Plus Short Cartridge	225 mg	60 µm	50/box	186000132
Oasis HLB Plus Light Cartridge	30 mg	30 µm	50/box	186005125
Oasis HLB Vac RC Cartridge	20 cc/30 mg	30 µm	50/box	186000382
Oasis HLB Vac RC Cartridge	20 cc/60 mg	30 µm	50/box	186000381
Oasis HLB Glass Cartridge	5 cc/200 mg	60 µm	30/box	186000683
Oasis HLB µElution Plate	2 mg/96-well	30 µm	1/pk	186001828BA
Oasis HLB Plate	5 mg/96-well	30 µm	1/pk	186000309
Oasis HLB Plate	10 mg/96-well	30 µm	1/pk	186000128
Oasis HLB Plate	30 mg/96-well	30 µm	1/pk	WAT058951
Oasis HLB Plate	60 mg/96-well	60 µm	1/pk	186000679

OASIS MCX FOR BASIC COMPOUNDS

Obtain selective retention of basic drugs with cation-exchange groups on the sorbent surface. The Oasis MCX (Mixed-mode Cation eXchange) Sorbent has a tightly controlled ion-exchange capacity (1 meq/g). There are no silanol groups to complicate the retention mode or method development. This novel, water-wettable, polymeric sorbent is stable from pH 0–14, making method development simple and fast.

Ordering Information

Oasis MCX Sample Extraction Products (Cation Exchange)

Description	Format	Particle Size	Qty.	P/N
Oasis MCX Cartridge	1 cc/10 mg	30 µm	100/box	186004648
Oasis MCX Cartridge	1 cc/30 mg	30 µm	100/box	186000252
Oasis MCX Flangeless Cartridge	1 cc/30 mg	30 µm	100/box	186001881
Oasis MCX Cartridge	1 cc/30 mg	60 µm	100/box	186000782
Oasis MCX Cartridge	3 cc/60 mg	30 µm	100/box	186000254
Oasis MCX Flangeless Cartridge	3 cc/60 mg	30 µm	100/box	186001882
Oasis MCX Cartridge	3 cc/60 mg	60 µm	100/box	186000253
Oasis MCX Cartridge	6 cc/150 mg	30 µm	30/box	186000256
Oasis MCX Cartridge	6 cc/150 mg	60 µm	30/box	186000255
Oasis MCX Cartridge	6 cc/500 mg	60 µm	30/box	186000776
Oasis MCX Cartridge	20 cc/1 g	60 µm	20/box	186000777
Oasis MCX Cartridge	35 cc/6 g	60 µm	10/box	186000778
Oasis MCX Plus Short Cartridge	225 mg	60 µm	50/box	186003516
Oasis MCX Vac RC Cartridge	20 cc/60 mg	30 µm	50/box	186000261
Oasis MCX Vac RC Cartridge	20 cc/60 mg	60 µm	50/box	186000380
Oasis MCX µElution Plate	2 mg/96-well	30 µm	1/pk	186001830BA
Oasis MCX Plate	10 mg/96-well	30 µm	1/pk	186000259
Oasis MCX Plate	30 mg/96-well	30 µm	1/pk	186000248
Oasis MCX Plate	30 mg/96-well	60 µm	1/pk	186000250
Oasis MCX Plate	60 mg/96-well	60 µm	1/pk	186000678

DID YOU KNOW...

Oasis Cartridges and Plates are available in two particle sizes (30 µm or 60 µm).

This allows you to select the appropriate product based on the viscosity and turbidity of your sample. For extraction of most plasma, serum, and human urine, choose the 30 µm sorbent. For more viscous samples such as animal urine, excellent flow can be achieved using the 60 µm sorbent in either cartridges or plates.

OASIS MAX FOR ACIDIC COMPOUNDS

The Oasis MAX (Mixed-mode Anion eXchange) Sorbent has a tightly controlled ion-exchange capacity of 0.25 meq/g, ensuring reproducible SPE protocols for extraction of acidic compounds and metabolites from biological fluids. There are no silanol groups to complicate the retention mode or method development. This novel, water-wettable, polymeric sorbent is stable from pH 0–14, making method development simple and fast.

DID YOU KNOW...

When compared to other sample preparation techniques, SPE offers:

- Faster sample prep
- Lower cost
- Greater recoveries
- Greater accuracy
- Powerful enrichment of analytes
- Additional selectivity and specificity

Ordering Information

Oasis MAX Sample Extraction Products (Anion Exchange)

Description	Format	Particle Size	Qty.	P/N
Oasis MAX Cartridge	1 cc/10 mg	30 µm	100/box	186004649
Oasis MAX Cartridge	1 cc/30 mg	30 µm	100/box	186000366
Oasis MAX Flangeless Cartridge	1 cc/30 mg	30 µm	100/box	186001883
Oasis MAX Cartridge	3 cc/60 mg	30 µm	100/box	186000367
Oasis MAX Cartridge	3 cc/60 mg	60 µm	100/box	186000368
Oasis MAX Flangeless Cartridge	3 cc/60 mg	30 µm	100/box	186001884
Oasis MAX Cartridge	6 cc/150 mg	30 µm	30/box	186000369
Oasis MAX Cartridge	6 cc/150 mg	60 µm	30/box	186000370
Oasis MAX Cartridge	6 cc/500 mg	60 µm	30/box	186000865
Oasis MAX Plus Short Cartridge	225 mg	60 µm	50/box	186003517
Oasis MAX Vac RC Cartridge	20 cc/30 mg	30 µm	50/box	186000372
Oasis MAX Vac RC Cartridge	20 cc/60 mg	30 µm	50/box	186000371
Oasis MAX Vac RC Cartridge	20 cc/60 mg	60 µm	50/box	186000378
Oasis MAX µElution Plate	2 mg/96-well	30 µm	1/pk	186001829
Oasis MAX Plate	10 mg/96-well	30 µm	1/pk	186000375
Oasis MAX Plate	30 mg/96-well	30 µm	1/pk	186000373
Oasis MAX Plate	60 mg/96-well	30 µm	1/pk	186001256
Oasis MAX Plate	60 mg/96-well	60 µm	1/pk	186001205

OASIS WCX FOR STRONG BASIC COMPOUNDS

The Oasis WCX (Weak Cation eXchange) SPE material was developed to provide better sample preparation for strong bases and quaternary amines. The retention mechanism is mixed mode (both ion-exchange and reversed-phase), which improves retention for all types of basic analytes, especially strong bases.

Ordering Information

Oasis WCX Sample Extraction Products (Weak Cation Exchange)

Description	Format	Particle Size	Qty.	P/N
Oasis WCX Cartridge	1 cc/10 mg	30 µm	100/box	186004650
Oasis WCX Cartridge	1 cc/30 mg	30 µm	100/box	186002494
Oasis WCX Cartridge	3 cc/60 mg	30 µm	100/box	186002495
Oasis WCX Cartridge	6 cc/150 mg	30 µm	30/box	186002498
Oasis WCX Cartridge	1 cc/30 mg	60 µm	100/box	186002496
Oasis WCX Cartridge	3 cc/60 mg	60 µm	100/box	186002497
Oasis WCX Cartridge	6 cc/500 mg	60 µm	30/box	186004646
Oasis WCX Plus Short Cartridge	225 mg	60 µm	50/box	186003518
Oasis WCX µElution Plate	2 mg/96-well	30 µm	1/pk	186002499
Oasis WCX 96-well Plate	10 mg/96-well	30 µm	1/pk	186002501
Oasis WCX 96-well Plate	30 mg/96-well	30 µm	1/pk	186002503

OASIS WAX FOR STRONG ACIDIC COMPOUNDS

The Oasis WAX (Weak Anion eXchange) SPE material was developed to provide sample preparation for strong acidic compounds. The retention mechanism is mixed mode (both ion-exchange and reversed-phase), which improves retention for strong acidic compounds.

DID YOU KNOW...

You can reduce non specific binding as well as sample loss, when working with therapeutic peptides on µElution plates.

Ordering Information

Oasis WAX Sample Extraction Products (Weak Anion Exchange)

Description	Format	Particle Size	Qty.	P/N
Oasis WAX Cartridge	1 cc/10 mg	30 µm	100/box	186004651
Oasis WAX Cartridge	1 cc/30 mg	30 µm	100/box	186002489
Oasis WAX Cartridge	3 cc/60 mg	30 µm	100/box	186002490
Oasis WAX Cartridge	6 cc/150 mg	30 µm	30/box	186002493
Oasis WAX Cartridge	1 cc/30 mg	60 µm	100/box	186002491
Oasis WAX Cartridge	3 cc/60 mg	60 µm	100/box	186002492
Oasis WAX Cartridge	6 cc/500 mg	60 µm	30/box	186004647
Oasis WAX Plus Cartridge	225 mg	60 µm	50/box	186003519
Oasis WAX µElution Plate	2 mg/96-well	30 µm	1/pk	186002500
Oasis WAX 96-well Plate	10 mg/96-well	30 µm	1/pk	186002502
Oasis WAX 96-well Plate	30 mg/96-well	30 µm	1/pk	186002504
Oasis WAX 96-well Plate	60 mg	30 µm	1/pk	186003915

Oasis 2 × 4 Method Development Protocol



OASIS SORBENT SELECTION TOOLS FOR CONVENIENT METHOD DEVELOPMENT

The Oasis Sorbent Selection Plate and Cartridge Kits enable rapid development of SPE methods for LC-MS analysis. Having all four Oasis Ion-exchange Sorbents (MCX, MAX, WAX, and WCX) in a single plate or a cartridge kit is convenient for scouting the best methods to accomplish efficient isolation of unknown analytes, zwitterionic compounds, or mixtures of analytes with different retention/elution properties.

Ordering Information

Oasis Method Development Kits

Description	Format	Particle Size	P/N
Oasis Sorbent Selection Plate, 3 rows each: MCX, MAX, WCX, and WAX	30 mg/96-well	30 µm	186003249
Oasis µElution Sorbent Selection Plate, 3 rows each: MCX, MAX, WCX, and WAX	2 mg/96-well	30 µm	186004475
Oasis Sorbent Selection Cartridge Kit, 10 each: MCX, MAX, WCX, and WAX	1 cc/30 mg	30 µm	186003463
Oasis Sorbent Selection Flangeless Cartridge Kit, 10 each: MCX, MAX, WCX, and WAX	1 cc/10 mg	30 µm	186006344
Oasis Sorbent Selection Flangeless Cartridge Kit, 10 each: MCX, MAX, WCX, and WAX	1 cc/30 mg	30 µm	186006345

Oasis µElution 96-well Plates

Description	Particle Size	Qty.	P/N
Oasis HLB	30 µm	1/pk	186001828BA
Oasis MCX	30 µm	1/pk	186001830BA
Oasis MAX	30 µm	1/pk	186001829
Oasis WCX	30 µm	1/pk	186002499
Oasis WAX	30 µm	1/pk	186002500

Oasis 96-well Plates

Description	Particle Size	5 mg/ 96-well	10 mg/ 96-well	30 mg/ 96-well	60 mg/ 96-well
		1/pk	1/pk	1/pk	1/pk
Oasis HLB	30 µm	186000309	186000128	WAT058951	—
Oasis HLB	60 µm	—	—	—	186000679
Oasis MCX	30 µm	—	186000259	186000248	—
Oasis MCX	60 µm	—	—	186000250	186000678
Oasis MAX	30 µm	—	186000375	186000373	186001256
Oasis MAX	60 µm	—	—	—	186001205
Oasis WCX	30 µm	—	186002501	186002503	—
Oasis WAX	30 µm	—	186002502	186002504	186003915

Oasis Symbiosis/Prospekt-2 Cartridges

Description	Format	Particle Size	Qty.	P/N
Oasis HLB Symbiosis/ Prospekt-2 Cartridge	1 × 10 mm	30 µm	96/box	186005781
Oasis HLB Symbiosis/ Prospekt-2 Cartridge	1 × 20 mm	30 µm	96/box	186005786
Oasis MCX Symbiosis/ Prospekt-2 Cartridge	1 × 10 mm	30 µm	96/box	186005782
Oasis MCX Symbiosis/ Prospekt-2 Cartridge	1 × 20 mm	30 µm	96/box	186004653
Oasis MAX Symbiosis/ Prospekt-2 Cartridge	1 × 10 mm	30 µm	96/box	186005783
Oasis MAX Symbiosis/ Prospekt-2 Cartridge	1 × 20 mm	30 µm	96/box	186004654
Oasis WCX Symbiosis/ Prospekt-2 Cartridge	1 × 10 mm	30 µm	96/box	186005784
Oasis WCX Symbiosis/ Prospekt-2 Cartridge	1 × 20 mm	30 µm	96/box	186004655
Oasis WAX Symbiosis/ Prospekt-2 Cartridge	1 × 10 mm	30 µm	96/box	186005785
Oasis WAX Symbiosis/ Prospekt-2 Cartridge	1 × 20 mm	30 µm	96/box	186004656

APPLICATION AREA: Analyze Metabolites in Human Urine Samples

"The cartridges from Waters are the only ones that helped cleanup the samples for our method. Waters' cartridges produce high quality data and it is a great value for the price."

REVIEWER: Mike Trinidad
ORGANIZATION: CDC

★★★★★

On-Line SPE Columns and Cartridge Columns

Description	Format	Particle Size	Qty.	P/N
Oasis HLB Column	2.1 × 20 mm	5 µm	1/pk	186002034
Oasis HLB Column	3.0 × 20 mm	5 µm	1/pk	186002037
Oasis HLB Column	3.9 × 20 mm	5 µm	1/pk	186002040
Oasis HLB Cartridge Column	3.9 × 20 mm	5 µm	1/pk	186001413
Oasis HLB Column	4.6 × 20 mm	5 µm	1/pk	186002043
Oasis HLB Column	2.1 × 20 mm	15 µm	1/pk	186002035
Oasis HLB Column	3.0 × 20 mm	15 µm	1/pk	186002038
Oasis HLB Column	3.9 × 20 mm	15 µm	1/pk	186002041
Oasis HLB Cartridge Column	3.9 × 20 mm	15 µm	1/pk	186001414
Oasis HLB Column	4.6 × 20 mm	15 µm	1/pk	186002044
Oasis HLB Column	2.1 × 20 mm	25 µm	1/pk	186002036
Oasis HLB Cartridge Column	2.1 × 20 mm	25 µm	1/pk	186000706
Oasis HLB Column	3.0 × 20 mm	25 µm	1/pk	186002039
Oasis HLB Column	3.9 × 20 mm	25 µm	1/pk	186002042
Oasis HLB Column	4.6 × 20 mm	25 µm	1/pk	186002045
Oasis HLB Direct Connect Column	2.0 × 15 mm	25 µm	1/pk	186001792
Oasis MCX Column	2.1 × 20 mm	30 µm	1/pk	186002046
Oasis MCX Cartridge Column	2.1 × 20 mm	30 µm	1/pk	186002051
Oasis MCX Column	3.0 × 20 mm	30 µm	1/pk	186002047
Oasis MCX Column	3.9 × 20 mm	30 µm	1/pk	186002048
Oasis MCX Column	4.6 × 20 mm	30 µm	1/pk	186002049
Oasis MAX Column	2.1 × 20 mm	30 µm	1/pk	186002052
Oasis MAX Cartridge Column	2.1 × 20 mm	30 µm	1/pk	186002057
Oasis MAX Column	3.0 × 20 mm	30 µm	1/pk	186002053
Oasis MAX Column	3.9 × 20 mm	30 µm	1/pk	186002054
Oasis MAX Column	4.6 × 20 mm	30 µm	1/pk	186002055
Oasis WCX Column	2.1 × 20 mm	30 µm	1/pk	186002505
Oasis WCX Column	3.9 × 20 mm	30 µm	1/pk	186002507
Oasis WAX Column	2.1 × 20 mm	30 µm	1/pk	186002508
Oasis WAX Column	3.9 × 20 mm	30 µm	1/pk	186002509

Custom sorbents and configurations available upon request.

On-line Solid-phase Extraction (SPE) Cartridge

Description	Format	Particle Size	Qty.	P/N
Oasis WCX OSM Cartridge	1 × 10 mm	30 µm	96/pk	186005671

The XBridge® C_{18} and C_8 Sorbents use Waters proprietary Ethylene Bridged Hybrid (BEH) Technology to produce a sorbent with high mechanical strength, and excellent stability for reversed-phase separations. These sorbents can provide separations with superior peak shape and high efficiency.

Ordering Information

XBridge OSM Cartridges

Description	Format	Particle Size	Qty.	P/N
XBridge C_{18} OSM Cartridge	1 × 10 mm	10 µm	96/pk	186005672
XBridge C_8 OSM Cartridge	1 × 10 mm	10 µm	96/pk	186005673

SPE COLUMNS FOR WATERS UPLC WITH ON-LINE SPE TECHNOLOGY



UPLC with On-line SPE Technology combines automated sample handling, chromatographic media, and ultra-sensitive optical and mass spectrometry detection into an on-line SPE-LC-MS/MS solution. When paired with one of the three UPLC pressure-enabled on-line SPE column chemistries, you have the ability to extract a wide range of analytes.

This proven system and column chemistries dramatically streamlines the analysis of drinking water samples by providing analyte extraction, concentration, separation, and detection in one turnkey solution.

Ordering Information

Oasis Bulk Sorbents

Description	Dimension	Particle Size	Qty.	P/N
Oasis HLB	–	30 µm/100 gm	–	186007549
Oasis HLB	–	30 µm/250 gm	–	186007550
Oasis MAX	–	30 µm/100 gm	–	186007551
Oasis MAX	–	30 µm/250 gm	–	186007552
Oasis MCX	–	30 µm/100 gm	–	186007553
Oasis MCX	–	30 µm/250 gm	–	186007554
Oasis HLB Glass Cartridge	–	60 µm	30/box	186000683
Oasis HLB Direct Connect HP Column	2.1 × 30 mm	20 µm	1/pk	186005231
XBridge C_{18} Direct Connect HP Column	2.1 × 30 mm	10 µm	1/pk	186005232
XBridge C_8 Direct Connect HP Column	2.1 × 30 mm	10 µm	1/pk	186005233

Columns for Online Sample Manager (OSM)

Description	Dimension	Particle Size	Qty.	P/N
Oasis HLB Direct Connect HP Column	2.1 × 30 mm	20 µm	1/pk	186005231
XBridge C_{18} Direct Connect HP Column	2.1 × 30 mm	10 µm	1/pk	186005232
XBridge C_8 Direct Connect HP Column	2.1 × 30 mm	10 µm	1/pk	186005233

OASIS GLASS CARTRIDGES FOR PPT DETECTION LEVELS

Waters Oasis Glass Cartridges are available in a 5 cc (200 mg) configuration with Teflon Frits for trace analysis at parts per trillion (PPT) levels. Each lot is tested for the presence of bisphenol A and other phenols and phthalates, assuring that endocrine disruptors in water samples can be analyzed to PPT levels.



Ordering Information

Oasis HLB Glass Cartridge

Description	Dimension	Particle Size	Qty.	P/N
Oasis HLB Glass Cartridge	–	60 µm	30/box	186000683

To learn more, visit www.waters.com/onlineSPE

ACQUITY UPLC PFC COLUMN KIT

Optimized for trace level detection of Perfluorinated Compounds (PFCs) with the ACQUITY UPLC® System, this kit contains the ACQUITY UPLC BEH C_{18}, 1.7 µm, 2.1 × 50 mm Column, the ACQUITY UPLC PFC Isolator Column, and PFC reference standards.



Description	P/N
ACQUITY PFC Column Kit	176001692

ACQUITY UPLC PFC ANALYSIS KIT

The ACQUITY UPLC PFC Analysis Kit includes Oasis SPE Cartridges, PFC calibration and reference standards, certified vials, ACQUITY UPLC Columns, and the necessary instrument components to optimize your instrument for trace level detection of PFCs.



Description	P/N
ACQUITY PFC Analysis Kit	176001744

ACQUITY UPLC BISPHENOL A COLUMN AND METHOD KITS

The ACQUITY UPLC Bisphenol A Column and Method Kits are fully compliant with ASTM Method D7574-09. Waters ACQUITY UPLC Solution provides optimum resolution and sensitivity for the analysis of Bisphenol A in water. The column kit includes the ACQUITY UPLC BEH C_{18} Column and ACQUITY UPLC Isolator Column. The Method Kit also includes Oasis HLB SPE Cartridges and LCMS Certified Vials.



Description	P/N
ACQUITY Bisphenol A Column Kit	176001955
ACQUITY Bisphenol A Method Kit	186004932

EPA METHOD 1694 ANALYSIS KIT

Waters EPA Method 1694 Analysis Kit includes the XTerra® MS C_{18} Column, Atlantis® HILIC Column, and Oasis HLB Cartridges; all of which are specified in the EPA Method.



Description	P/N
EPA Method 1694 Analysis Kit	176001634
Sep-Pak Vac, 500 mg, PS2 (30/box)	WAT200601
Sep-Pak QMA Plus Carbonate, 46 mg (50/box)	186004540

THERAPEUTIC PEPTIDE METHOD DEVELOPMENT KITS

The Therapeutic Peptide Method Development Kits have been developed to simplify the process of sample preparation and LC method development for the analysis of therapeutic peptides in plasma. The kits contain an Oasis Peptide µElution Method Development Plate, a 1.7 µm or 3.5 µm BEH C_{18}, 300Å, 2.1 × 50 mm reversed-phase column, collection plates, cap mats, and the detailed screening protocol.

Mixed Mode Solid-Phase Extraction for Peptides:

- Generic screening method for wide range of peptides
- Achieves maximum sensitivity and selectivity for peptides
- Concentrates without evaporation
- Minimizes adsorption/sample loss
- Reduces matrix effects
- Streamlines method development for peptide analytes

Peptide Separation Technology

Oasis WCX µElution	Oasis MAX µElution
Dilute plasma with 4% H_3PO_4	
Load diluted plasma	
Wash 1: 5% NH_4OH	
Wash 2: 20% ACN	
Elute: 1% TFA in 75/25 ACN/H_2O	
Dilute H_2O	



Ordering Information

Therapeutic Peptide Method Development Kits

Description	P/N
UPLC Therapeutic Peptide Method Development Kit includes: • (1) Oasis Peptide Method Development 96-well µElution Plate, p/n: 186004713 • (1) ACQUITY UPLC Peptide BEH C_{18}, 300Å, 1.7 µm, 2.1 × 50 mm Column, p/n: 186003685 • (3) 96-well 1 mL Collection Plate and Cap Mat, p/n: 600001043	176001835
HPLC Therapeutic Peptide Method Development Kit includes: • (1) Oasis Peptide Method Development 96-well µElution Plate, p/n: 186004713 • (1) XBridge Peptide BEH C_{18}, 300Å, 3.5 µm, 2.1 × 50 mm Column, p/n: 186003607 • (3) 96-well 1 mL Collection Plate and Cap Mat, p/n: 600001043	176001836

Sep-Pak Solid-Phase Extraction (SPE) Products



The Most Referenced and Widely Used Sample Preparation Technology

Sep-Pak® bonded silica devices are recognized throughout the world and remain the most referenced SPE product for sample preparation. A diverse selection of formats and sorbents make Sep-Pak SPE Products ideally suited for all types of samples for GC, HPLC, and UPLC analysis methods.

Formats







Oasis µElution Plates	Oasis 96-well Extraction Plates	Oasis Syringe Barrel Cartridges
▪ Patented µElution plate design* ▪ Enabling technology facilitates elution volumes as low as 25 µL ▪ No evaporation and reconstitution necessary, just elute and shoot ▪ Ideal for small sample volumes ▪ Concentrates samples up to 15× ▪ Easily automated for reliable high-throughput SPE	▪ Innovative two-stage well design ▪ High throughput and high recovery ▪ Available in 5 mg, 10 mg, 30 mg, and 60 mg per well formats ▪ Easily automated for reliable high-throughput SPE	▪ Ultra-clean syringe barrel and frits ▪ Available in cartridges ranging from 1 cc to 60 cc ▪ Flangeless syringe-barrel cartridges available in 1 cc, 3 cc, and 6 cc ▪ "Plus" style cartridges designed for manual and automated instrument use ▪ Additional formats available for specific robotic instruments ▪ Custom cartridge format and chemistry available on request

*U.S. patent 6,723,236.

Ordering Information

Sep-Pak 96-well Plates

Description	P/N
Sep-Pak tC$_{18}$, 25 mg Plate	186002319
Sep-Pak tC$_{18}$, 40 mg Plate	186002320
Sep-Pak tC$_{18}$, 100 mg Plate	186002321
Sep-Pak AccellPlus QMA, 100 mg Plate	186001917
Sep-Pak C$_{18}$, 40 mg Plate	186003966

Sep-Pak 96-well µElution Plate

Description	P/N
Sep-Pak tC$_{18}$ µElution Plate	186002318

Reversed Phase

	Description	Applications	Properties
Sep-Pak C_{18} $Si(CH_3)_2C_{18}H_{37}$	Hydrophobic, silica-based bonded phase used to adsorb analytes from aqueous solutions. Monofunctional bonding provides alternate selectivity versus tC_{18}.	▪ Lipid fractionation; ganglioside isolation ▪ Organic acids in fruit juice, wine ▪ JPMHLW and CDFA official methods for pesticides in food ▪ Natural products ▪ AOAC methods for food colors, sugars	▪ Particle size: 55–105 µm ▪ Pore size: 125Å ▪ Surface area: 325 m^2/g ▪ Carbon load: 12% ▪ pH range: 2–8
Sep-Pak tC_{18} $SiC_{18}H_{37}$	Strongly hydrophobic, silica-based bonded phase used to adsorb analytes from aqueous solutions. Trifunctional bonding chemistry for increased hydrolytic stability.	▪ JPMHLW official methods for pesticides in water ▪ JPMHLW official methods for odorants in water	▪ Particle size: 37–55 µm ▪ Pore size: 125Å ▪ Surface area: 325 m^2/g ▪ Carbon load: 17% ▪ pH range: 2–8
Sep-Pak C_8 $Si(CH_3)_2C_8H_{17}$	Moderately hydrophobic, silica-based bonded phase used in methods when less retention than that of HLB or C_{18} is required.	▪ Drugs and their metabolites in biofluids ▪ Peptides in serum and plasma	▪ Particle size: 37–55 µm ▪ Pore size: 125Å ▪ Surface area: 325 m^2/g ▪ Carbon load: 9% ▪ pH range: 2–8
Sep-Pak tC2 SiC_2H_6	Weakly hydrophobic, silica-based bonded phase used in methods when less retention than that of C_8 is required. Trifunctional bonding chemistry for increased hydrolytic stability.	▪ Applications are similar to those of C_{18} and C_8	▪ Particle size: 37–55 µm ▪ Pore size: 125Å ▪ Surface area: 325 m^2/g ▪ Carbon load: 2.7% ▪ pH range: 2–8

Reversed or Normal Phase

	Description	Applications	Properties
Sep-Pak Aminopropyl $Si(CH_2)_3NH_2$	Moderately polar, silica-based bonded phase with weakly basic surface. Can be used as a polar sorbent with different selectivity for acidic/basic analytes or as weak anion exchanges in aqueous medium below pH 8.	▪ Phenols, phenolic pigments, natural products ▪ Petroleum fractionation ▪ Saccharides ▪ Drugs and drug metabolites ▪ JPMHLW official methods for pesticides in food	▪ Particle size: 55–105 µm ▪ Pore size: 125Å ▪ Surface area: 325 m^2/g ▪ Carbon load: 3.5% ▪ pH range: 2–8
Sep-Pak Cyanopropyl $Si(CH_3)(CH_2)_2(CN)$	Silica-based bonded phase with low hydrophobicity. Can be used as a less polar alternative to silica or as a less hydrophobic alternative to C_{18} or C_8.	▪ Drugs and their metabolites ▪ Pesticides	▪ Particle size: 55–105 µm ▪ Pore size: 125Å ▪ Surface area: 325 m^2/g ▪ Carbon load: 6.5% ▪ pH range: 2–8
Sep-Pak Diol $Si(CH_2)_3OCH_2CH(OH)CH_2OH$	Moderately polar, neutral, silica-based bonded phase. Used in normal-phase applications where acidic character of silica is undesirable or as a weakly hydrophobic phase in aqueous media.	▪ Antibiotics in cosmetics ▪ Protein and peptide isolation by HIC (hydrophobic-interaction chromatography)	▪ Particle size: 37–55 µm ▪ Pore size: 300Å ▪ Surface area: 100 m^2/g ▪ Carbon load: 2% ▪ pH range: 2–8

AOAC = Association of Official Analytical Chemists; ASTM = American Society for Testing and Materials [International]; CDFA = California Department of Agriculture; EPA = U.S. Environmental Protection Agency; JPMHLW = Japanese Ministry of Health, Labour and Welfare; JPMOE = Japanese Ministry of the Environment; NIOSH = National Institute for Occupational Safety and Health.

Normal Phase

	Description	Applications	Properties
Sep-Pak Silica SiO_2	Polar sorbent binds analytes in non-aqueous solvents. Also used as an intermediate-strength cation exchanges in aqueous media and as a support for liquid-liquid partition separations.	▪ Vitamins and food additives ▪ Lipid classification ▪ Synthetic organic compounds ▪ Natural products, plant pigments ▪ JPMHLW official methods for pesticides in food	▪ Particle size: 55–105 µm ▪ Pore size: 125Å ▪ Surface area: 325 m^2/g ▪ Activity: High (≤3.2% water)
Sep-Pak Alumina (A, B & N) Al_2O_3	Highly surface-active polar, acidic (A), neutral (N), and basic (B) sorbents. Exhibits specific pi-electron interactions with aromatic hydrocarbons. Acidic and basic alumina are also low-capacity ion exchangers in aqueous media, unaffected by high-energy radioactivity.	▪ Petroleum, synthetic crude oil fractionation (N) ▪ Radioactive compound isolation, isotope generators (A, B) ▪ Phospholipids, steroids, catecholamines (B) ▪ Food, feed additives (A, N), synthetic organic compounds (N) ▪ Pesticide, herbicide, priority pollutant isolation (N, B) ▪ Alternative to official AOAC and EPA methods (A, N, B)	▪ Particle size: 50–300 µm ▪ Pore size: 120Å ▪ Activity: High, ≤1 on Brockmann scale (≤1.5% water) ▪ pH of 10% aqueous slurry: A: 4, N: 7.5, B: 10
Sep-Pak Florisil $MgO{\cdot}SiO_2$	Polar, highly active, weakly basic sorbent for the adsorption of low to moderately polar species from non-aqueous solutions.	▪ AOAC and EPA official methods for pesticides ▪ JPMHLW official methods for pesticides in food ▪ Polychlorinated biphenyls (PCBs) in transformer oil	▪ Particle size: 50–200 µm ▪ Pore size: 60Å ▪ Activity: High (≤2.5% water) ▪ pH of 10% aqueous slurry: 8.5

Ion Exchange

	Description	Applications	Properties
Sep-Pak AccellPlus QMA Strong Anion Exchanger $C(O)NH(CH_2)_3N(CH_3)_3^+Cl^-$	Silica-based, hydrophilic, strong anion exchanger with large pore size used to extract anionic analytes in aqueous and non-aqueous solutions.	▪ Isolation of anionic proteins ▪ Acidic pigments in wine, fruit juices, food extracts ▪ Phenolic compounds ▪ Peptide pool fractionation ▪ Inorganic anions in environmental samples	▪ Particle size: 37–55 µm ▪ Pore size: 300Å ▪ pH range: 2–9 ▪ Carbon load: 6% ▪ Ligand density: 220 µmoles/g
Sep-Pak AccellPlus CM Weak Cation Exchanger COO^-Na^+	Silica-based, hydrophilic, weak cation exchanger with large pore size used to extract cationic analytes in aqueous and non-aqueous solutions.	▪ Isolation of cationic proteins ▪ Pesticides, herbicides ▪ Steroids ▪ Inorganic cations in environmental samples	▪ Particle size: 37–55 µm ▪ Pore size: 300Å ▪ pH range: 2–9 ▪ Carbon load: 5.5% ▪ Ligand density: 350 µmoles/g

AOAC = Association of Official Analytical Chemists; ASTM = American Society for Testing and Materials [International]; CDFA = California Department of Agriculture; EPA = U.S. Environmental Protection Agency; JPMHLW = Japanese Ministry of Health, Labour and Welfare; JPMOE = Japanese Ministry of the Environment; NIOSH = National Institute for Occupational Safety and Health.

Application Specific			
	Description	**Applications**	**Properties**
PoraPak RDX Divinylbenzene/ vinylpyrrolidone	For the analysis of explosives in surface and ground water. Meets or exceeds requirements of EPA Method 8330. Reduces use of organic solvent by 10-fold. PoraPak RDX is a divinylbenzene/ vinylpyrrolidone copolymer.	▪ EPA Method 8330 Nitroaromatics, Nitrosamines ▪ EPA Method 529 Explosives and related compounds	▪ Particle size: 125–150 µm ▪ Pore size: 200Å
Sep-Pak DNPH Diphenylhydrazine coated on silica	Acidified dinitrophenylhydrazine reagent coated on silica used for collection of air samples. Aldehydes and ketones react *in situ* to form hydrazone derivatives; these are then eluted and quantitated by HPLC analysis.	▪ EPA Method TO-11A; ASTM D5197 for carbonyl compounds in air ▪ JPMOE Official Methods for aldehydes: odor in outdoor air and in exhaust gas	▪ Particle size: 55–105 µm ▪ Pore size: 125Å ▪ Recommended maximum capacity: 75 µg (2.5 µmoles) formaldehyde/cartridge
Sep-Pak XPoSure Aldehyde sampler Diphenylhydrazine coated on silica	Acidified dinitrophenylhydrazine reagent coated on silica used for collection of air samples. Aldehydes and ketones react *in situ* to form hydrazone derivatives; these are then eluted and quantitated by HPLC analysis. Larger particle size optimized for low-pressure personal air monitors.	▪ JPMHLW official methods for aldehydes in indoor air ▪ EPA Methods TO-11A and IP-6A, ASTM D5197 for carbonyl compounds in air ▪ NIOSH Method 2532 for glutaraldehyde in air	▪ Particle size: 500–1000 µm ▪ Pore size: 125Å ▪ Recommended maximum capacity: 70 µg (2.3 µmoles) formaldehyde/cartridge
Sep-Pak Ozone Scrubber Potassium iodide	Potassium iodide cartridge is used in series with Sep-Pak DNPH and XPoSure Aldehyde Sampler cartridges to remove ozone interferences.	▪ EPA Method IP-6A and ASTM D5197 for carbonyl compounds in air	▪ Quantity: 1.4 g KI ▪ Capacity: 4.2 mmoles ozone/ cartridge (theoretical)
Sep-Pak Dry Anhydrous sodium sulfate	High-capacity desiccant used to remove residual water from normal-phase SPE extracts (in water-immiscible organic solvents).	▪ General purpose	▪ Quantity: 2.85 g anhydrous Na_2SO_4 ▪ Theoretical capacity: 3.6 g H_2O
Sep-Pak PS2 Styrene-DVB copolymer	Very hydrophobic copolymer designed for multi-residue pesticide analysis in water samples.	▪ JPMHLW official methods for pesticides in water ▪ JPMHLW official methods for pesticides in food	▪ Particle size: 80 µm ▪ Quantity: 265 mg/cartridge
Sep-Pak AC2 Activated carbon	Highly hydrophobic, low ash content, activated carbon used to remove or enrich very polar organic molecules from water.	▪ JPMHLW official method for 1,4-dioxane analysis in water ▪ Pesticides, herbicides, especially highly polar small molecules	▪ Particle size: 85 µm ▪ Quantity: 400 mg/cartridge
Sep-Pak Carbon Black/Aminopropyl Carbon black aminopropyl silica	Two-layer sorbent bed used for pesticide cleanup in food matrices prior to GC analysis.	▪ JPMHLW official methods for pesticides in food ▪ JPMHLW official method for propham	▪ Particle size: 37–105 µm (carbon black, top layer); 55–105 µm (aminopropyl silica, bottom layer) ▪ Quantity: 500 mg of each sorbent, separated by frit
Sep-Pak Carbon Black/PSA Primary-secondary amine silica	Two-layer sorbent bed used for pesticide cleanup in food matrices prior to GC analysis. PSA provides alternative selectivity compared to aminopropyl.	▪ JPMHLW official methods for pesticides in food	▪ Particle size: 37–105 µm (carbon black, top layer); 37–55 µm (PSA, bottom layer) ▪ Quantity: 500 mg of each sorbent, separated by frit

AOAC = Association of Official Analytical Chemists; ASTM = American Society for Testing and Materials [International]; CDFA = California Department of Agriculture; EPA = U.S. Environmental Protection Agency; JPMHLW = Japanese Ministry of Health, Labour and Welfare; JPMOE = Japanese Ministry of the Environment; NIOSH = National Institute for Occupational Safety and Health.

GlycoWorks *Rapi*Fluor-MS N-Glycan Kits

Reduce complicated, time consuming sample preparation

- Increased fluorescence quantification and supreme mass spectral response
- One label that provides valuable information from characterization to routine monitoring
- Simple to follow protocols with detailed tips and tricks provided for adaptation
- The ability to easily train non-glycan experts
- An experimentally derived library to help with data analysis



waters.com/glycans

See page 253 for more information.

Ordering Information

Sep-Pak Cartridge Selection Guide



	Plus Short	Plus Long	Plus Light	Classic Short	Classic Long	Vac 1 cc/50 mg	Vac 1 cc/100 mg	Vac RC/100 mg
	50/box	50/box	50/box	50/box	50/box	100/box	100/box	50/box
Sorbent	**P/N Mass/Volume***	**P/N Mass/Volume***	**P/N Mass/Volume***	**P/N Mass/Volume***	**P/N Mass/Volume***	**P/N Volume***	**P/N Volume***	**P/N Volume***
C_{18}	WAT020515 360 mg/0.7 mL	WAT023635 820 mg/1.6 mL	WAT023501 130 mg/0.3 mL	WAT051910 360 mg/0.85 mL	–	WAT054955 0.13 mL	WAT023590 0.2 mL	WAT036935 0.2 mL
tC_{18}	WAT036810 400 mg/0.8 mL	WAT036800 900 mg/1.4 mL	WAT036805 145 mg/0.4 mL	–	–	WAT054960 0.11 mL	WAT036820 0.25 mL	WAT043410 0.25 mL
C_8	WAT036775 400 mg/0.8 mL	–	WAT036770 145 mg/0.4 mL	–	–	WAT054965 0.11 mL	WAT036785 0.25 mL	WAT043415 0.25 mL
tC_2	WAT052720 400 mg/0.8 mL	–	WAT052725 145 mg/0.4 mL	–	–	–	WAT052710 0.25 mL	–
Silica	–	WAT020520 690 mg/1.6 mL	WAT023537 120 mg/0.4 mL	–	WAT051900 690 mg/2.0 mL	WAT054980 0.15 mL	WAT023595 0.25 mL	WAT036940 0.25 mL
Florisil	–	WAT020525 910 mg/1.4 mL	WAT023543 145 mg/0.3 mL	–	WAT051960 900 mg/1.7 mL	WAT054985 0.12 mL	WAT023600 0.2 mL	–
AccellPlus CM	WAT020550 360 mg/0.8 mL	–	WAT023531 130 mg/0.4 mL	WAT010910 360 mg/1.1 mL	–	–	WAT023625 0.25 mL	–
AccellPlus QMA	WAT020545 360 mg/0.8 mL	–	WAT023525 130 mg/0.4 mL	WAT010835 360 mg/1.1 mL	–	–	WAT023620 0.25 mL	WAT043460 0.25 mL
Alumina A	–	WAT020500 1710 mg/1.2 mL	WAT023549 280 mg/0.35 mL	–	WAT051800 1850 mg/1.8 mL	–	WAT023575 0.1 mL	–
Alumina B	–	WAT020505 1710 mg/1.2 mL	WAT023555 280 mg/0.35 mL	–	WAT051820 1850 mg/1.8 mL	–	WAT023580 0.1 mL	–
Alumina N	–	WAT020510 1710 mg/1.2 mL	WAT023561 280 mg/0.35 mL	–	WAT051810 1850 mg/1.8 mL	–	WAT023585 0.1 mL	–
Aminopropyl (NH_2)	WAT020535 360 mg/0.7 mL	–	WAT023513 130 mg/0.3 mL	WAT010830 360 mg/0.85 mL	–	–	WAT023610 0.2 mL	WAT043475 0.2 mL
Cyanopropyl (CN)	WAT020540 360 mg/0.7 mL	–	WAT023507 130 mg/0.3 mL	WAT010823 360 mg/0.85 mL	–	WAT054975 0.13 mL	WAT023615 0.2 mL	–
PSA	186004538 360 mg/0.7 mL	–	186004578 130 mg/0.3 mL	186004560 360 mg/0.85 mL	–	186004562 0.1 mL	186004561 0.2 mL	186004567 0.2 mL
Diol	WAT020530 360 mg/0.8 mL	–	WAT023519 130 mg/0.4 mL	–	–	–	WAT023605 0.25 mL	WAT043480 0.25 mL

*Hold-up volume.

Sep-Pak Specialty Chemistries

Description	Mass/Volume/Type	Qty.	P/N
Air Testing			
Sep-Pak DNPH-Silica Cartridge	350 mg/0.7 mL/Plus Short	20/box	WAT037500
Sep-Pak DNPH-Silica Cartridge	800 mg/1.6 mL/Plus Long	20/box	WAT039550
Sep-Pak XPoSure Aldehyde Sampler Cartridge	350 mg/0.7 mL/Plus Short	20/box	WAT047205
Sep-Pak Ozone Scrubber Cartridge	1.4 g/1.6 mL/Plus Short	20/box	WAT054420



	Vac 3 cc/200 mg	Vac 3 cc/500 mg	Vac RC/500 mg	Vac 6 cc/500 mg	Vac 6 cc/1 g	Vac 12 cc/2 g	Vac 20 cc/5 g	Vac 35 cc/10 g
	50/box	50/box	50/box	30/box	30/box	20/box	20/box	10/box
Sorbent	**P/N Volume***	**P/N Volume***	**P/N Volume***	**P/N Volume***	**P/N Volume***	**P/N Volume***	**P/N Volume***	**P/N Volume***
C_{18}	WAT054945 0.42 mL	WAT020805 0.8 mL	WAT036945 0.8 mL	WAT043395 1.2 mL	WAT036905 2.0 mL	WAT036915 3.6 mL	WAT036925 8.0 mL	WAT043345 16.8 mL
tC_{18}	WAT054925 0.34 mL	WAT036815 1.0 mL	WAT043425 1.0 mL	WAT036790 1.1 mL	WAT036795 1.9 mL	WAT043380 3.5 mL	WAT043365 7.8 mL	WAT043350 16.3 mL
C_8	WAT054940 0.34 mL	WAT036780 1.0 mL	WAT043430 1.0 mL	WAT054525 1.1 mL	WAT054570 1.9 mL	WAT054615 3.5 mL	WAT054660 7.8 mL	WAT054700 16.3 mL
tC_2	–	WAT052715 1.0 mL	–	–	WAT052705 1.9 mL	–	–	–
Silica	WAT054930 0.53 mL	WAT020810 1.2 mL	WAT036950 1.2 mL	WAT043400 1.2 mL	WAT036910 1.9 mL	WAT036920 3.9 mL	WAT036930 11.0 mL	WAT043355 23.4 mL
Florisil	–	WAT020815 0.8 mL	WAT043435 0.8 mL	WAT043405 1.2 mL	WAT043390 2.0 mL	WAT043385 3.6 mL	WAT043370 8.0 mL	WAT043360 16.8 mL
AccellPlus CM	–	WAT020855 1.1 mL	WAT054505 1.1 mL	WAT054545 1.2 mL	WAT054590 1.9 mL	WAT054635 3.5 mL	WAT054675 7.8 mL	WAT054720 16.3 mL
AccellPlus QMA	–	WAT020850 1.1 mL	WAT054500 1.1 mL	WAT054550 1.2 mL	WAT054595 1.9 mL	WAT054640 3.5 mL	WAT054680 7.8 mL	WAT054725 16.3 mL
Alumina A	–	WAT020820 0.4 mL	–	WAT054535 0.5 mL	WAT054580 0.8 mL	WAT054620 1.8 mL	WAT054670 3.9 mL	WAT054710 8.2 mL
Alumina B	–	WAT020825 0.4 mL	–	WAT054540 0.5 mL	WAT054585 0.8 mL	WAT054625 1.8 mL	WAT054665 3.9 mL	WAT054715 8.2 mL
Alumina N	–	WAT020830 0.4 mL	WAT043485 0.4 mL	WAT054530 0.5 mL	WAT054575 0.8 mL	WAT054630 1.8 mL	WAT043375 3.9 mL	WAT054705 8.2 mL
Aminopropyl (NH_2)	–	WAT020840 0.8 mL	WAT054515 0.8 mL	WAT054560 1.2 mL	WAT054605 2.0 mL	WAT054650 3.6 mL	WAT054695 8.0 mL	WAT054740 16.8 mL
Cyanopropyl (CN)	WAT054935 0.42 mL	WAT020835 0.8 mL	–	WAT054555 1.2 mL	WAT054600 2.0 mL	WAT054645 3.6 mL	WAT054685 8.0 mL	WAT054730 16.8 mL
PSA	186004598	186004536 0.8 mL	186004568 0.8 mL	186004563 1.2 mL	186004537 2.0 mL	186004564 3.6 mL	186004565 8.0 mL	186004566 16.8 mL
Diol	–	WAT020845 1.0 mL	WAT054520 1.0 mL	WAT054565 1.1 mL	WAT054610 1.9 mL	WAT054655 3.5 mL	WAT054690 7.8 mL	WAT054735 16.3 mL

*Hold-up volume.

Sep-Pak Specialty Chemistries

Description	Mass/Volume/Type	Qty.	P/N
Food, Environmental, and Biological Testing			
PoraPak RDX Cartridge	500 mg/1 mL/6 cc Vac	30/box	WAT047220
Sep-Pak Dry Cartridge	2.85 g/1.6 mL/Plus Long	50/box	WAT054265
Sep-Pak Carbon Black/Aminopropyl Cartridge	500 mg carbon black, 500 mg aminopropyl/1.4 mL/6 cc Vac	30/box	186003369
Sep-Pak Carbon Black/PSA Silica Cartridge	500 mg carbon black, 500 mg PSA/1.4 mL/6 cc Vac	30/box	186004590
Sep-Pak AccellPlus QMA Carbonate Cartridge	150 mg/0.4 mL/Plus Light	50/box	186004051
Sep-Pak AccellPlus QMA Carbonate Plus Light Cartridge	46 mg/0.15 mL/Plus Light	50/box	186004540

Advantages of Sep-Pak DNPH-Silica Cartridges

These cartridges provide you with significant advantages when compared to other techniques, such as liquid impingers, for the analysis of aldehydes and ketones. In addition, a new high speed, high resolution HPLC application has been developed to provide excellent quantitation capability in the low parts-per-billion range.

- Sep-Pak DNPH-silica Cartridges meet the requirements of EPA Method TO-11A and ASTM-D-5791-1
- Results from impingers and these cartridges are in excellent agreement
- Solvent consumption, solvent exposure, and hazardous waste disposal costs are reduced
- Sep-Pak DNPH-silica Cartridges provide superior convenience and reproducibility, making them ideal for field sampling and process monitoring applications
- Sep-Pak DNPH-silica Cartridges can save time and increase productivity
- Increased safety

Ordering Information

Sep-Pak DNPH-Silica Cartridge

Description	Qty.	P/N
Sep-Pak DNPH-Silica Short Body Cartridge	20/box	WAT037500
Sep-Pak DNPH-Silica Long Body Cartridge	20/box	WAT039550



Ozone Scrubber Cartridges

Ozone has been shown to interfere with the analysis of carbonyl compounds in air samples that have been drawn through cartridges containing silica-coated with 2,4-dinitrophenylhydrazine (DNPH). Ozone Scrubber Cartridges are designed to remove this ozone interference.

These disposable devices are intended for use in series combination with the Waters Sep-Pak DNPH-Silica Cartridges or XPoSure™ Aldehyde Sampler Cartridges.

Ordering Information

Sep-Pak Ozone Scrubber

Description	Qty.	P/N
Sep-Pak Ozone Scrubber	20/box	WAT054420



Sep-Pak XPoSure Aldehyde Sampler Cartridges for Monitoring Aldehydes in Indoor Air

Based on an extension of our DNPH coating technology, Sep-Pak XPoSure Aldehyde Sampler Cartridges are the most sensitive active samplers available today.



Ordering Information

Sep-Pak XPoSure Aldehyde Sampler Cartridge

Description	Qty.	P/N
Sep-Pak XPoSure Aldehyde Sampler Cartridge	20/box	WAT047205

PoraPak RDX Sep-Pak Extraction Cartridge for the Analysis of Explosives in Surface and Ground Waters

Designed to meet or exceed the QA/QC requirements of EPA Method 8330, the PoraPak™ RDX Sep-Pak Extraction Cartridge is ideal for environmental testing laboratories supporting Department of Defense remediation programs.

Ordering Information

PoraPak RDX Cartridges and Accessories

Description	Qty.	P/N
PoraPak RDX Cartridges	30/box	WAT047220
Tubing, Tefzel, 1/8 in. O.D. × 0.040 in. I.D.	10 ft.	WAT023344
Sep-Pak Vac Adapter	12/box	WAT054260
60 cc Sep-Pak Reservoir	12/box	186005587
Male-male Adapter	100/box	WAT024310

Sep-Pak Dry SPE Cartridge

Sep-Pak Dry Cartridges are packed with 2.85 g of anhydrous sodium sulfate. These cartridges are designed to remove residual water from the SPE extract.

Ordering Information

Sep-Pak Dry Cartridge

Description	Qty.	P/N
Sep-Pak Dry Cartridge	50/box	WAT054265

CERTIFIED SEP-PAK SOLID-PHASE EXTRACTION (SPE) CARTRIDGES

As a pioneer in SPE, Waters has advanced SPE performance and quality by offering Certified Sep-Pak Sample Preparation Products. By manufacturing these devices to strict performance and cleanliness specifications, we ensure that the detection limits and performance of your analytical methods will not be compromised by interfering substances commonly found in SPE hardware.

Improve Workflow and Reduce Solvent Waste

Certified Sep-Pak Sample Preparation Devices are available in the most commonly used formats and sorbents to allow easy integration into your sample preparation protocol. Reduced background interferences reduce solvent waste by eliminating unnecessary solvent pre-washing steps that are often required for trace residue methods.

Manufacturing

Our world-class manufacturing facilities strive to improve quality expectations for SPE product performance. We manufacture under the highest quality standard in the industry including ISO 9001, ISO 13485, and current Good Manufacturing Practices (CGMP). Each Certified Sep-Pak Product is thoroughly QC tested.

Sorbent specifications based on:

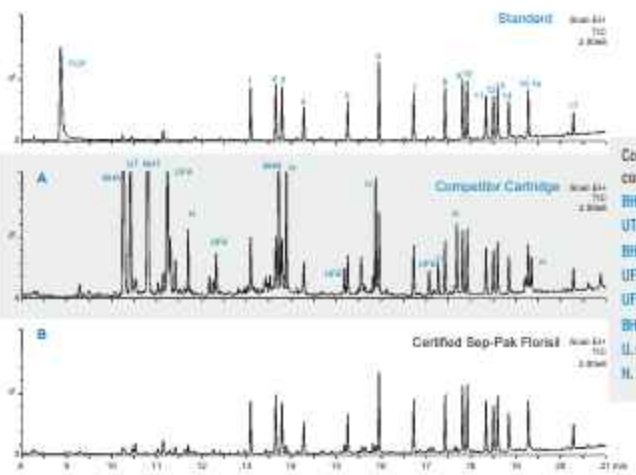
- Contaminants including hydrocarbons and other environmental contaminants
- Sorbent functionality including:
  - ligand density
  - particle size distribution
  - surface activity
- Chromatographic performance

Assembly specifications based on:

- Frit and barrel dimensional tolerance
- Chromatographic testing of total residual extractables including:
  - hydrocarbons
  - plasticizers
  - anti-oxidants
- Sorbent bed voiding
- Consistent sample flow characteristics



Comparison of Extracted Interference Levels in Organochlorine Pesticide Analysis at 1 ppm



Contaminants found in competitor's SPE devices:
- BHA, butylated hydroxyanisole
- UT, unknown terpene
- BHT, butylated hydroxytoluene
- UFA, unknown fatty alcohol
- UFE, unknown fatty ester
- BHB, butylated hydroxy benzaldehyde
- U, unknown
- H, hydrocarbon (alkane)

SPE Procedure

Certified Sep-Pak Florisil, 3 cc/500 mg
p/n: 186004611

Load:
1 mL hexane extract sample using gravity flow

Elute:
5 mL 90:10 hexane/acetone (v/v)

Evaporate:
To just under 1 mL and adjust to 1.0 mL final volume

Compounds:

α-HCH (hexachlorocyclohexane)	Endosulfan I	DDD
β-HCH	DDE	Endrin aldehyde
γ-HCH (lindane)	Dieldrin	Endosulfan sulfate
-HCH	Endrin	DDT
Heptachlor	Endosulfan II	Methoxychlor
Aldrin		
Heptachlor epoxide		

GC Analysis:

Instruments:	Waters Quattro micro GC™ with Agilent 6890 Full Scan 50–400 m/z
Column:	RTX 5 MS Column 30 M × 0.25 mm (0.25 µm df)
Injection:	2.0 µL (splitless) 250 °C injection, 300 °C transfer to MS
Temp. program:	Initial temp.: 50 °C for 1 min
Ramp:	10 °C/min
Final temp.:	320 °C

TCP (trichlorophenol) is added to the target compound mix as a polar probe to test sorbent specificity. Quantitative removal of TCP is expected using Florisil sorbent under these SPE conditions.

CERTIFIED SEP-PAK SORBENT SELECTION GUIDE

C_{18}



- Silica-based, trifunctionally-bonded octadecyl sorbent
- High carbon load provides excellent hydrolytic stability for a wide range of samples
- Strong hydrophobic sorbent used to adsorb analytes of even weak hydrophobicity from aqueous solutions
- Typical applications include drugs and their metabolites in serum, plasma or urine, desalting of peptides, trace organics in environmental water samples, organic acids in beverages

Silica



- Unbonded, highly-activated silica stationary phase
- A polar sorbent for analyte isolation from non-polar solvents like hydrocarbons and less polar esters and ethers
- Analyte retention can occur through hydrogen bonding or dipole-dipole interactions in non-aqueous samples
- Silica provides a slightly acidic surface for moderate cation-exchange interactions in aqueous samples
- Elution with more polar solvents like polar esters, ethers, alcohols, acetonitrile, or water

Ordering Information

C_{18} Sorbent

	3 cc/200 mg	3 cc/500 mg	6 cc/500 mg	6 cc/1 g
Sorbent	50/box	50/box	30/box	30/box
C_{18}	186004618	186004619	186004620	186004621

Ordering Information

Silica Sorbent

	3 cc/200 mg	3 cc/500 mg	6 cc/500 mg	6 cc/1 g
Sorbent	50/box	50/box	30/box	30/box
Silica	186004614	186004615	186004616	186004617

Alumina (A, B, N)



- Alumina is very similar to silica; however, the alumina surface tends to be slightly more stable under high pH conditions than unfunctionalized silica
- The aluminum oxide surface provides an extremely polar surface for analyte retention and has properties of a Lewis acid
- Depending on the sorbent's surface treatment, alumina is available in three forms: Alumina A, Alumina B, and Alumina N
- Alumina exhibits specific interactions with the π-electrons of aromatic hydrocarbons, making it useful for applications like crude oil fractionation
- Acidic and basic grades can be used as low-capacity ion exchangers

Ordering Information

Alumina (A, B, N) Sorbents

	3 cc/500 mg	6 cc/500 mg	6 cc/1 g
Sorbent	**50/box**	**30/box**	**30/box**
Alumina A	186004602	186004603	186004604
Alumina B	186004605	186004606	186004607
Alumina N	186004608	186004609	186004610

Florisil



- Very-polar, highly-active, weakly-basic sorbent for adsorption of low to moderate polarity species from non-aqueous solutions
- Specifically designed for the adsorption of pesticides using official AOAC, EPA, and JPMHLW regulated methods
- Applications include polychlorinated biphenyls (PCBs) in transformer oil

Ordering Information

Florisil Sorbent

	3 cc/500 mg	6 cc/500 mg	6 cc/1 g
Sorbent	**50/box**	**30/box**	**30/box**
Florisil	186004611	186004612	186004613

DID YOU KNOW...

Strategies for Isolating and Cleaning Up Analytes of Interest

Two general SPE strategies are implemented for isolating and cleaning up sample components of interest. A retention-cleanup-elution strategy is frequently used when the compounds of interest are present in levels too low for accurate and precise quantitation. Concentration of dilute samples and trace enrichment of compounds are achieved by this strategy. A pass-through cleanup strategy may be chosen when the desired sample component is present at a high concentration. However, no sample enrichment occurs when a pass-through cleanup strategy is used.

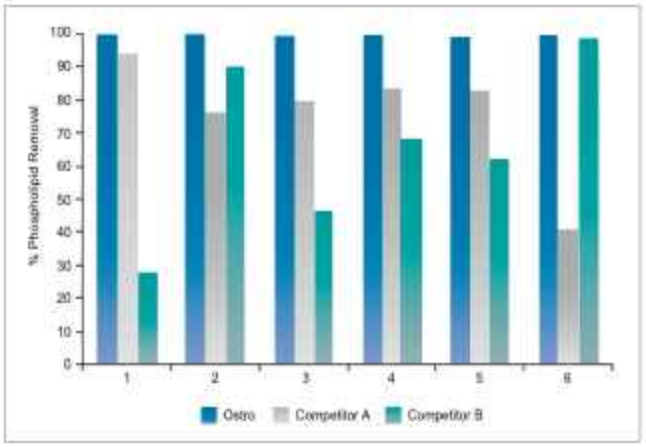
Ostro Pass-Through Sample Preparation Product

The Simplest Way to Cleaner Samples: Ostro™ Pass-through 96-well Plate provides a novel solution for cleanup, requiring minimal to no method development, using a combination of filtration and sorbent interactions to produce cleaner samples in less time.

- Pass-through sample preparation technique
- Removes 95% of phospholipids and proteins
- For reproducible, consistent, and robust methods
- Increases throughput with easy-to-implement protocol

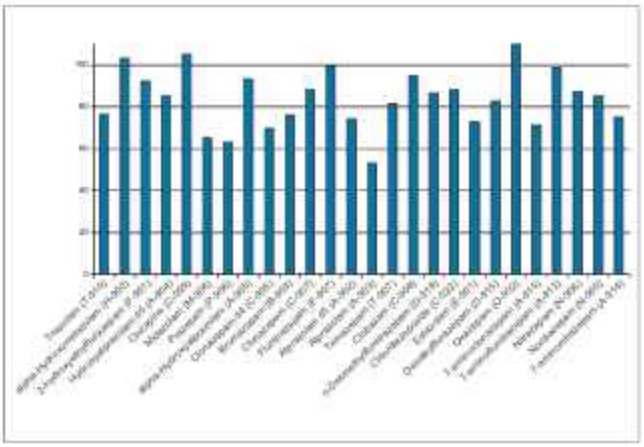


Reproducibility



Comparative % removal of total phospholipids from 6 different lots of plasma using the Ostro (0.19% RSD), phospholipid removal plate from competitor A (24.5% RSD) and phospholipid removal plate from competitor B (40.9% RSD).

Recovery



The Ostro Plate can be used with its standard protocol in a drug discovery setting for rapid sample cleanup. In this example, proteins and the vast majority of phospholipids were removed from a sample containing 26 structural analogs and metabolites while maintaining high analyte recovery.

Increased Instrument Uptime

Phospholipids can build up on your LC column and MS system. This leads to unpredictable, inaccurate results and necessitates extensive system cleaning and instrument downtime. Removing these contaminants before they enter your system provides increased instrument robustness, improved results, and maximum laboratory efficiency.

Protocol

Minimizing method development time, the standard Ostro protocol will provide excellent results for a wide variety of acidic, basic, and neutral compounds.

Place Ostro Plate onto collection plate

↓

Pipette 50–200 µL of plasma into wells*

↓

Forcefully add 1% formic acid in acetonitrile, 3:1 solvent:plasma (methanol not recommended)

↓

Mix thoroughly by aspirating 3× with pipette

↓

Pass-through samples using 15" vacuum manifold for 5–10 min. or 60 psi positive processor manifold for 5 min.

↓

Analyze samples by direct injection, dilution and injection, or by evaporation, reconstitution and injection

*For sample volumes 50 µL or less, a higher solvent to plasma ratio may be necessary.

Ordering Information

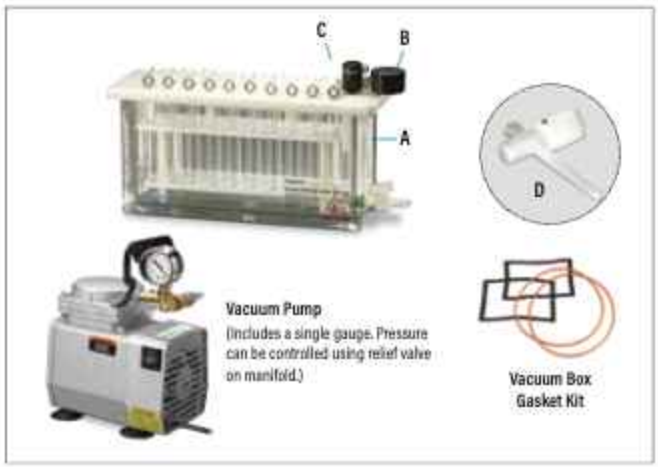
Ostro Pass-through Sample Preparation Plate

Description	Qty.	P/N
Ostro Pass-through Sample Preparation 96-well Plate (25 mg)	1	186005518

ACCESSORIES

Waters Vacuum Manifold for Use with SPE Cartridges

The vacuum manifold has the capacity to process up to twenty samples simultaneously. The extraction manifold has enhanced features designed for use with conventional silica-based, SPE cartridges as well as modifications that allow you to take full advantage of the unique performance characteristics of our Oasis Extraction Cartridges.



This manifold offers:

A. Precision-machined Delrin cover with alignment posts for quick and easy alignment with test tube rack.

B. Vacuum gauge placement on cover, not in fluid path, allows for quick and easy waste removal at bottom by vacuum.

C. Enhanced vacuum control valve designed for use with Waters Oasis Extraction Cartridges, allows for a quick and momentary rise in vacuum above the frit bubble point at the touch of a finger.

D. High purity polypropylene needle valves and needle tips with minimum dead volume (opening and closing the valves is required to prevent silica-based SPE cartridges from drying out).

Ordering Information

Spare Parts for the Waters Extraction Manifolds

Description	Qty.	P/N
Needle Valves (required when using silica-based SPE cartridges) (not required for use with extraction cartridges)	20/pk	WAT200685
Needle Tips	20/pk	WAT200691
Cover, 20 Position without Gauge Assembly	—	WAT200686
Gauge Assembly, Vacuum	—	WAT200687
Reservoir, Glass with Outlet Valve	—	WAT200688
Outlet Valve Kit	—	WAT200689
Gasket for Cover	—	WAT200690
Ejector Tool	—	WAT058839
Luer Plugs	25/pk	WAT058851
Rubber Ball Ring (for vacuum gauge assembly)	—	WAT058840
Reversible Vial Rack for 1 mL or 4 mL Autosampler Vials	—	WAT058871
2 mL Vial Rack for Manifold	—	186005234
13 × 75 mm Test Tube Rack	—	WAT200678
13 × 100 mm Test Tube Rack	—	WAT200679
16 × 75 mm Test Tube Rack	—	WAT200680
16 × 100 mm Test Tube Rack	—	WAT200681
Reservoir, 30 cc (for Plus, Light, Vac, and Classic Cartridges)	48/pk	WAT011390
Reservoir, 60 cc (for Plus, Light, and Vac Cartridges)	12/pk	186005587
Adapter, Male-male Luer (for Classic Cartridges)	100/pk	WAT024310
Adapter (to attach reservoir to 1, 3, and 6 cc Vac Cartridges)	12/pk	WAT054260
Adapter (to attach reservoir to 12, 20, and 35 cc Vac Cartridges)	10/pk	WAT048160
Vacuum Pump (110 V, 60 Hz)	—	725000417
Vacuum Pump (220 V, 50 Hz)	—	725000604

Manifold and Accessories for Extraction Plate



Description	Qty.	P/N
Extraction Plate Manifold for Oasis 96-well Plates	1/box	186001831
Extraction Plate Manifold Kit A (includes extraction plate manifold, reservoir tray, sealing cap and 350 µL sample collection plate)	—	WAT097944
Extraction Plate Manifold Kit B (as Kit A, with 1 mL sample collection plate)	—	WAT097945
Extraction Plate Manifold Kit C (as Kit A, with 2 mL sample collection plate)	—	WAT097946
Disposable Reservoir Tray	25/box	WAT058942
Sample Collection Plate, 350 µL	50/box	WAT058943
Sample Collection Plate, 2 mL	50/box	WAT058958
Sealing Cap for 96-well Collection Plate	50/pk	WAT058959
Vacuum Pump (115 V, 60 Hz)	—	725000417
Vacuum Pump (240 V, 50 Hz)	—	725000604
Vacuum Box Gasket Kit (Kit includes: 2 foam top gaskets, 2 orange O-rings)	—	186003522

Manifold and Accessories for Extraction Cartridges

Description	Qty.	P/N	Description	Qty.	P/N
Waters Extraction Manifold, 20-position without rack (includes 20 needle tips, 25 plugs, and ejector tool)	—	WAT200677	30 cc Reservoir	48/pk	WAT011390
Waters Extraction Manifold, 20-position (complete with rack for 13 × 75 mm tubes)	—	WAT200606	60 cc Reservoir	12/pk	186005587
Waters Extraction Manifold, 20-position (complete with rack for 13 × 100 mm tubes)	—	WAT200607	Reservoir Adapters for 1, 3, and 6 cc Cartridges	12/pk	WAT054260
Waters Extraction Manifold, 20-position (complete with rack for 16 × 75 mm tubes)	—	WAT200608	Reservoir Adapters for 12, 20, and 35 cc Cartridges	10/pk	WAT048160
Waters Extraction Manifold, 20-position (complete with rack for 16 × 100 mm tubes)	—	WAT200609	Male-Male Adapter	100/pk	WAT024310
Female Luer Plugs	100/pk	WAT044385	Male Luer Plugs	100/pk	WAT044395

SEP-PAK CARTRIDGE CONNECTIONS KIT

This kit contains a selection of the most commonly needed fittings, adapters, valves, and tubing for use with Sep-Pak Cartridges.

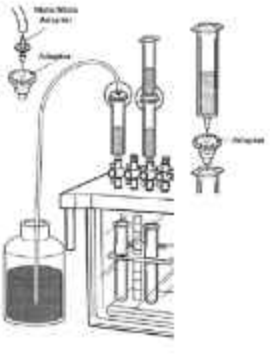


Ordering Information

Sep-Pak Cartridge Connections Kit

Description	P/N
Sep-Pak Connections Kit	WAT011400

SEP-PAK CARTRIDGE ACCESSORIES





Ordering Information

Accessories for Extraction Columns and Cartridges

Description	Qty.	P/N
Holder Kit for 2.1 × 20 mm Cartridge Column	1/pk	186000262
Holder Kit for 3.9 × 20 mm Cartridge Column	1/pk	WAT046910
Extraction Column Connector	1/pk	WAT082745
Inline Pre-column Filter Kit	1/pk	WAT084560
Replacement Filters	5/pk	WAT005139
Vacuum Pump (115 V, 60 Hz)	—	725000417
Vacuum Pump (240 V, 50 Hz)	—	725000604
Reservoir, 30 cc (for Plus, Light, and Vac Cartridges)	48/pk	WAT011390
Reservoir, 60 cc (for Plus, Light, and Vac Cartridges)	12/pk	186005587
Adapter, Male-male Luer (for Classic Cartridges)	100/pk	WAT024310
Adapter (to attach reservoir to 1, 3, and 6 cc Vac Cartridges)	12/pk	WAT054260
Adapter (to attach reservoir to 12, 20, and 35 cc Vac Cartridges)	10/pk	WAT048160
2 mL Vial Rack for Manifold	—	186005234

DisQuE Sample Preparation Solutions for QuEChERS

QuEChERS (an acronym for Quick, Easy, Cheap, Effective, Rugged, and Safe) methods offer a simple and straightforward sample preparation technique ideal for multi-residue analysis for pesticides, veterinary drugs, and mycotoxins in a wide variety of food and agricultural products. DisQuE™ Dispersive Sample Preparation Products are conveniently packaged with pre-weighed sorbents and buffers in pouches and tubes as described in regulatory methods and protocols.



These products offer several advantages over traditional sample preparation techniques:

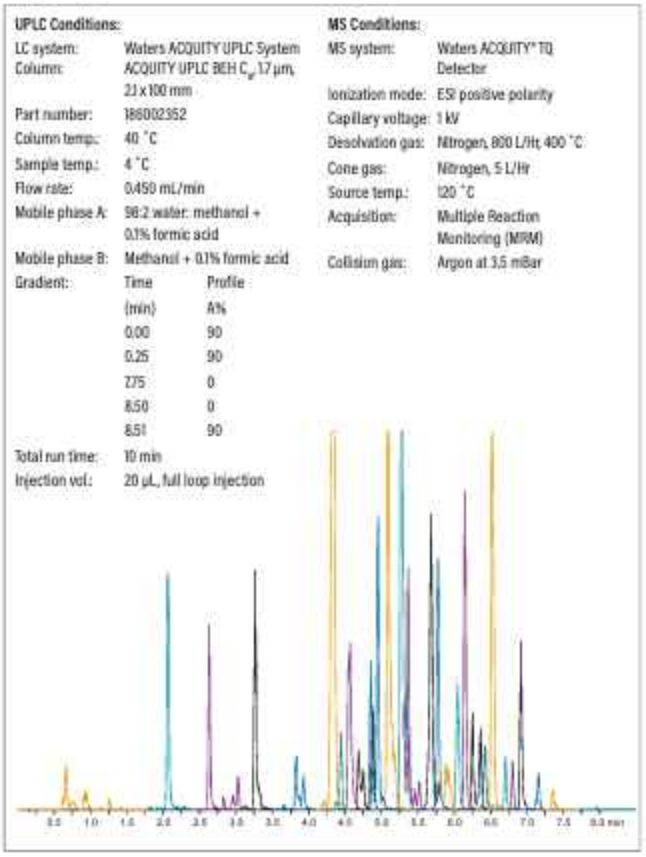
- Simplified QuEChERS protocols
- Decreased sample preparation time
- Efficient and cost effective sample preparation
- Consistent, high quality sorbents, and packaging

DisQuE KITTED SOLUTIONS

Complete solutions and kitted methods add value to your laboratory function by addressing the need for simple, easy-to-follow protocols that require very little training.

Waters offers several different versions of pre-packaged QuEChERS kits which conform to both AOAC and CEN protocols.

Chromatogram Showing 402 Pesticide Residues at 10 ppb ng/g In One 10 Minute Run



Ordering Information

DisQuE Dispersive Sample Preparation Kits

Description		P/N
DisQuE Kits		
DisQuE AOAC Dispersive SPE Kit-Pouch Format 	▪ **Pouch:** 1.5 g sodium acetate and 6 g $MgSO_4$ ▪ **50 mL Tube:** Empty ▪ **2 mL Tube:** 150 mg $MgSO_4$ and 50 mg PSA	176002922
DisQuE CEN Dispersive SPE Kit-Pouch Format 	▪ **Pouch:** 1 g trisodium citrate dihydrate, 0.5 g disodium hydrogencitrate sesquihydrate, 1 NaCl and 4 g $MgSO_4$ ▪ **50 mL Tube:** Empty ▪ **2 mL Tube:** 150 mg $MgSO_4$, 25 mg PSA, and 25 mg C_{18}	176002923
DisQuE AOAC Dispersive SPE Kit 	▪ **Tube 1:** 50 mL tube containing: 1.5 g sodium acetate and 6 g $MgSO_4$ ▪ **Tube 2:** 2 mL tube containing: 150 mg $MgSO_4$ and 50 mg PSA	176001676
DisQuE CEN Dispersive SPE Kit 	▪ **Tube 1:** 50 mL tube containing: 1 g trisodium citrate dihydrate, 0.5 g disodium hydrogencitrate sesquihydrate, 1 g NaCl and 4 g $MgSO_4$ ▪ **Tube 2:** 2 mL Tube containing: 150 mg $MgSO_4$, 25 mg PSA, and 25 mg C_{18}	176001903

DisQuE EXTRACTION AND CLEANUP TUBES AND POUCHES

DisQuE Extraction and Cleanup Tubes and Pouches are available separately for customized applications and method development. The salts contained in the 50 mL tubes are also available in a pouch format for greater flexibility. The cleanup tubes are available in a standard 2 mL size as well as a 15 mL size for sample enrichment.

Ordering Information

DisQuE Dispersive Sample Preparation Products

Description		P/N
Individual Extraction Tubes (Tube 1)		
50 mL Empty Tube for QuEChERS Extraction	▪ 50/pk	186006814
DisQuE 50 mL Tube/ AOAC–Acetate 	▪ **DisQuE 50 mL tube containing:** 1.5 g Sodium Acetate and 6 g $MgSO_4$, 100/pk	186004571
DisQuE 50 mL Tube/ CEN–Citrate 	▪ **DisQuE 50 mL tube containing:** 1 g trisodium citrate dihydrate, 0.5 g disodium hydrogencitrate sesquihydrate, 1 g NaCl and 4 g $MgSO_4$, 100/pk	186004837

Description		P/N
Individual Extraction Pouch		
DisQuE Pouch 	▪ 1.5 g sodium acetate, 6 g $MgSO_4$, 50/pk	186006812
	▪ 4 g $MgSO_4$, 1 g NaCl, 1 g trisodium citrate dehydrate, 0.5 g disodium hydrogencitrate sesquihydrate, 50/pk	186006813

DisQuE Cleanup Tubes (Tube 2)

AOAC Method

Description	Tube Size	P/N
▪ **DisQuE Tube containing:** 150 mg $MgSO_4$ and 50 mg PSA, 100/pk	2 mL	186004572
▪ **DisQuE Tube containing:** 150 mg $MgSO_4$, 50 mg PSA and 50 mg C_{18}, 100/pk	2 mL	186004830
▪ **DisQuE Tube containing:** 900 mg $MgSO_4$ and 300 mg PSA, 50/pk	15 mL	186008077
▪ **DisQuE Tube containing:** 900 mg $MgSO_4$, 300 mg PSA and 300 mg C_{18}, 50/pk	15 mL	186008078
▪ **DisQuE Tube containing:** 1200 mg $MgSO_4$ and 400 mg PSA, 50/pk	15 mL	186008072
▪ **DisQuE Tube containing:** 1200 mg $MgSO_4$, 400 mg PSA and 400 mg C_{18}, 50/pk	15 mL	186008073
▪ **DisQuE Tube containing:** 1200 mg $MgSO_4$, 400 mg PSA, 400 mg C_{18}, and 400 mg GCB, 50/pk	15 mL	186008074

DisQuE Cleanup Tubes (Tube 2)

CEN Method

Description	Tube Size	P/N
▪ **DisQuE Tube containing:** 150 mg $MgSO_4$ and 25 mg PSA, 100/pk	2 mL	186004831
▪ **DisQuE Tube containing:** 150 mg $MgSO_4$, 25 mg PSA, and 25 mg C_{18}, 100/pk	2 mL	186004832
▪ **DisQuE Tube containing:** 150 mg MgSO4, 25 mg PSA, and 2.5 mg GCB, 100/pk	2 mL	186008076
▪ **DisQuE Tube containing:** 900 mg $MgSO_4$, 150 mg PSA, 50/pk	15 mL	186004833
▪ **DisQuE Tube containing:** 900 mg $MgSO_4$, 150 mg PSA, and 150 mg C_{18}, 50/pk	15 mL	186004834

DisQuE Cleanup Tubes (Tube 2)

Specialty Cleanup Tubes

Description	Tube Size	P/N
▪ **DisQuE Tube containing:** 150 mg $MgSO_4$ and 50 mg C_{18}, 100/pk	2 mL	186008075
▪ **DisQuE Tube containing:** 150 mg $MgSO_4$, 25 mg PSA, 25 mg C_{18}, and 7 mg GCB, 100/pk	2 mL	186008071
▪ **DisQuE Tube containing:** 900 mg $MgSO_4$, 450 mg PSA, 300 mg C_{18}, and 50 mg GCB, 50/pk	15 mL	186008079
▪ **DisQuE Tube containing:** 150 mg $MgSO_4$, 50 mg PSA, 30 mg C_{18}, and 30 mg Alumina-N, 100/pk	2 mL	186008081
▪ **DisQuE Tube containing:** 750 mg $MgSO_4$, 250 mg PSA, 150 mg C_{18}, and 150 mg Alumina-N, 50/pk	15 mL	186008080



Bulk Sorbents

Description	P/N
Graphitized Carbon Black, 25 g Bottle	186004835
C_{18}, 100 g Bottle	WAT035672

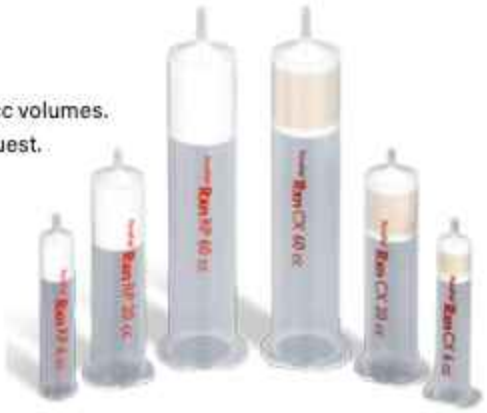
PoraPak Rxn Cartridges for Post-Synthesis Cleanup

PoraPak Rxn
Post Synthesis Cleanup

PoraPak Rxn, a family of polymer-based chromatography products for superior cleanup of synthetic reactions. PoraPak Rxn Products are available in two chemistries:

- PoraPak Rxn CX, a strong cation-exchange sorbent
- PoraPak Rxn RP, a reversed-phase sorbent

PoraPak Rxn Sorbents are available in fritted syringe-barrel devices in 6, 20, and 60 cc volumes. The resins are also sold in bulk units, and custom configurations are available on request.



New Solutions for Faster Results

PoraPak Rxn Sorbents are based on copolymers that exhibit the following properties:

- Hard material that does not develop increasing back pressure with flow
- Little swelling or shrinking across a range of solvents and pH extremes
- Low hydraulic resistance enables flow by gravity
- pH extreme tolerance without dissolution or hydrolysis, both limitations of silica-based sorbents

This combination of physical and chemical properties makes PoraPak Rxn Cartridges ideal for synthesis cleanup. The polymers characteristics and particle size maintain gravity-, pressure-, or vacuum-assisted flow; even when reaction mixtures contain precipitate that may contribute additional resistance to flow. The sample will still pass through the cartridge.

The polymer used in PoraPak Rxn Products is resistant to shrinking or swelling in the organic solvents typically used in synthetic reactions. Tests with the following solvents demonstrate that the packed bed maintains good flow properties:

- DCE
- DMF
- DCM
- THF
- DMSO
- Acetone

Some medicinal chemists are familiar with silica-based chromatographic products for reaction cleanup. One of the limitations of these silica-based ion-exchange materials is pH. Silica will dissolve at high pH, while bonded phases are hydrolyzed at low pH; both conditions result in loss of sample and/or impurities (silica and bonded phase) collected in product fractions. PoraPak Rxn polymer-based chromatographic phases are stable at extreme pH. This feature permits using pH as a very powerful tool to create a separation, particularly in ion-exchange mode.

Providing Separations Solutions

Waters is highly respected worldwide for its expertise in chromatography. Coupled with our ability to seamlessly link critical instrumentation, chemistries, separation technologies, and software, this expertise puts us in a unique position to deliver value-added solutions to our customers.

Manufacturing

Our world-class manufacturing facilities are continuously expanded and upgraded to keep pace with market demand for our new and existing products. We manufacture under the highest quality standards in the industry, including ISO 9001, ISO 13485, and Current Good Manufacturing Practices (cGMP).

Ordering Information

PoraPak Rxn Cartridges and Bulk Material

Description	PoraPak Rxn CX	PoraPak Rxn RP
6 cc Flanged Cartridges, 400 mg, 30/pk	186004541	186004545
6 cc Flangeless Cartridges, 400 mg, 30/pk	186004542	186004546
20 cc Cartridges, 2 g, 20/pk	186004543	186004547
60 cc Cartridges, 5 g, 10/pk	186004544	186004548
Bulk, 200 mL/Container	186004569	186004570

Waters Positive Pressure-96 Processor



The Waters Positive Pressure-96 Processor offers state-of-the-art operation for 96-well plates and 1 cc flangeless cartridge formats. Each of the 96 holes in the processor is restricted in order to maintain constant pressure, even if all the plate well positions are not filled. Positive pressure processing offers many advantages over traditional methods, including:

- Highly uniform flow from well to well
- Superior flow for viscous samples
- Highly reproducible assays
- Easy-to-use design

Ordering Information

Waters Positive Pressure-96 Processor

Description	Qty.	P/N
Waters Positive Pressure-96 Processor	1	186006961
96-flangeless Cartridge Holder	1	186005523
96-place Sealing Gasket	1	186005522
µElution Positive Pressure Spacer	1	405006528
Gas Supply Adapter, includes 1/8 in. to 1/4 in. NPT fitting, 6 ft. of 1/4 in. tubing	1	186005524
10 mL × 24 Waste Collection Plate	1	186005586

Waters/Pall Life Sciences Sample and Solvent Filtration Products

Filtration of samples and solvents is a preventative maintenance procedure that saves lab time and money. Filtration provides immediate protection for the components of column and instrumentation by minimizing down time.

Waters/Pall Life Sciences Filters have been Certified for Compliance; which means they have been designed and developed to assist customers in complying with their regulatory and quality objectives.

Waters carries a broad range of Pall Life Sciences Filter Products, a range of different membranes for solvent and sample compatibility, and a variety of devices for various filtration applications.

Choosing the Right Filter for your Application

To choose the right filter you need to consider sample characteristics, volume, pore size, and decide if the sample may require prefiltration because it is laden with particulate matter.

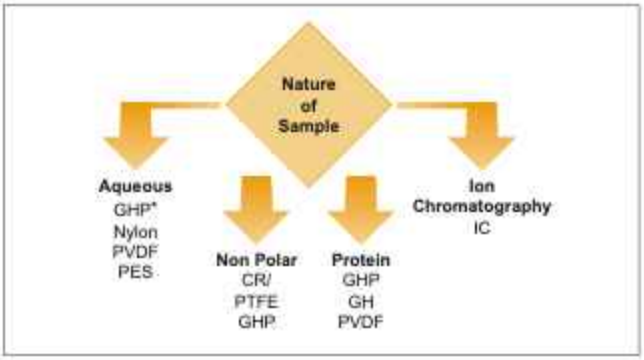
Membrane Choices

- **GHP Acrodiscs:** Hydrophilic propylene membrane suitable for aqueous, organic and has low protein binding
- **Nylon Acrodiscs:** Hydrophilic nylon membrane
- **GHP Acrodisc GF and Nylon Acrodisc GF:** Designed with a glass fiber pre filter over the membrane for hard to filter samples laden with particulate matter
- **Glass Fiber Acrodiscs:** Can be used alone or as a prefilter with another Acrodisc in series
- **Acrodisc LC (PVDF):** Hydrophilic polyvinylidene fluoride good for aqueous and organic solvents
- **Acrodisc CR (PTFE):** Used for aggressive organic solvents
- **Ion Chromatography (IC) Acrodisc:** Certified to contain low ionic backgrounds



Concerned about particulate matter in your sample?

Step 1: What is the nature of your sample?



*For samples with laden particulate that are difficult to filter, it is best to use a syringe filter with a glass fiber pre-filter over the membrane. These are available in GHP and Nylon.

Step 2: What micron size are the particles in the column you are using?

Column	Pore Size of Filter
>3 µm	0.45 µm
<3 µm	0.20 µm

Step 3: What is the volume of your sample?

Volume	Acrodisc Size	Hold Up Volume
<2 mL	4 mm	<10 µL
<10 mL	13 mm minispike	<14 µL
<10 mL	13 mm male Luer	<30 µL
<100 mL	25 mm	<100 µL

Example 1: 1.5 mL of aqueous sample to be filtered for injection on a 5 µm column:

Step	Question	Answer	Choice
1	Sample	Aqueous	GHP and others
2	Particle size in column	5 µm	0.45 µm
3	Volume	1.5 mL	4 mm or larger

Choice: Membrane 0.45 µm GHP Acrodisc in 4 mm or larger. You can also use the Nylon, PVDF or PES (other choices of hydrophilic membranes under the aqueous sample path). In terms of device size, if you are injecting only a few µL of sample on the column, you can use any device size. The 13 and 25 mm Acrodiscs have hold up volumes of at most 100 µL, leaving plenty of filtered sample for the application.

FILTER DESIGN AND MEMBRANE CHOICES

	Acetone	Acetonitrile	Acetic acid, glacial	n-Butanol	Chloroform	Dioxane	Dimethyl formamide	Dimethyl sulfoxide	Ethanol	Ethyl acetate	Ethyl ether	Freon TF	Hydrochloric acid (1N)	Hexane, dry	Methanol	Methylene chloride	Methyl ethyl ketone	N-Methylpyrrolidone	Isopropanol	Sodium hydroxide (5N)	Tetrahydrofuran	Tetrahydrofuran/water (50/50)	Toluene	Water
GH Polypro Syringe Filters																								
GHP Acrodisc 13 (13 mm)	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
GHP Acrodisc (25 mm)	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
GHP Acrodisc GF (25 mm)	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
PTFE Syringe Filters																								
Acrodisc 4CR PTFE (4 mm)	R*	R	R	R	LR	R	R*	R*	R	R*	R	R	R	R	R	LR	R*	R*	R	LR	LR	•	LR*	R
Acrodisc 13CR PTFE (13 mm)	R*	R	R	R	R	R	R*	R*	R	R*	R	R	R	R	R	R	R*	R*	R	R	R	R	R*	R
Acrodisc CR PTFE (25 mm)	R*	R	R	R	R	R	R*	R*	R	R*	R	R	R	R	R	R	R*	R*	R	R	R	R	R*	R
PVDF Syringe Filters																								
Acrodisc LC13 PVDF (13 mm)	NR*	R	R	R	R	R	NR*	NR*	R	R*	R	R	R	R	R	R	NR*	NR*	R	NR	R	R	R*	R
Acrodisc LC PVDF (25 mm)	NR*	R	R	R	R	R	NR*	NR*	R	R*	R	R	R	R	R	R	NR*	NR*	R	NR	R	R	R*	R
Nylon Syringe Filters																								
Nylon Acrodisc 4 (4 mm)	R*	R	R	R	NR	•	R*	R*	R	R*	NR	R	NR	R	R	NR	R*	R*	R	R	NR	LR	R*	R
Nylon Acrodisc 13 (13 mm)	R*	R	R	R	NR	•	R*	R*	R	R*	NR	R	NR	R	R	NR	R*	R*	R	R	NR	LR	R*	R
Nylon Acrodisc (25 mm)	R*	R	R	R	NR	•	R*	R*	R	R*	NR	R	NR	R	R	NR	R*	R*	R	R	NR	LR	R*	R
Nylon Acrodisc GF (25 mm)	R*	R	R	R	NR	•	R*	R*	R	R*	NR	R	NR	R	R	NR	R*	R*	R	R	NR	LR	R*	R
Ion Chromatography Syringe Filters																								
IC Acrodisc (13 mm & 25 mm)	NR	LR	NR	R	NR	•	NR	NR	•	LR	R	LR	•	LR	R	NR	•	NR	•	•	NR	•	R	R
Glass Fibre Syringe Filters																								
GF Acrodisc	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	NR	R	R	R	R
Acrylic Copolymer Syringe Filters																								
Non-sterile Acrodisc (25 mm)	NR	NR	NR	R	NR	NR	NR	NR	R	NR	NR	R	LR	NR	R	NR	NR	NR	R	R	NR	NR	NR	R
Disc Filters																								
GH Polypro	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
FP Verciel (PVDF)	NR	R	R	R	R	LR	NR	NR	R	R	R	R	R	R	R	R	LR	NR	R	NR	LR	•	R	R
Nylaflo (Nylon)	R	R	NR	R	NR	R	R	R	R	R	R	R	NR	•	LR	NR	NR	R	R	R	R	R	NR	R
TF (PTFE)	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R

Note:

R = Resistant
No significant change was observed in flow rate or bubble point of the membrane.
*UV absorbance was set at 254 nm.

LR = Limited Resistance
Moderate changes in physical properties or dimension of the membrane were observed.
The filter may be suitable for short term, non-critical use at room temperature.

NR = Not Resistant
The membrane is basically unstable. In most cases, extensive shrinkage or swelling occurs.
The filter may gradually weaken or partially dissolve after extended exposure.

• = Insufficient Data.



Ordering Information

Syringe Filters

Acrodisc 13 mm

	Pack Size	100	1000	100	1000
		Particle Size: 0.2 µm		Particle Size: 0.45 µm	
Aqueous	NYLON	WAT200524	WAT200834	WAT200520	WAT200832
	PVDF	WAT200806	–	WAT200512	WAT200827
Non Polar	CR	WAT200506	WAT200823	WAT200502	WAT200821
Protein	PVDF	WAT200806	–	WAT200512	WAT200827
Ion Chromatography	IC	WAT200810	WAT200844	WAT200812	WAT200842

Acrodisc 13 mm Minispike

	Pack Size	100	1000	100	1000
		Particle Size: 0.2 µm		Particle Size: 0.45 µm	
Aqueous	GHP	WAT097962	186005595	WAT200516	WAT200830
	NYLON	WAT200562	WAT200835	WAT200564	WAT200836
	PVDF	WAT200804	WAT200838	WAT200560	WAT200828
Non Polar	CR	WAT200556	WAT200824	WAT200558	WAT200825
	GHP	WAT097962	186005595	WAT200516	WAT200830
Protein	PVDF	WAT200804	WAT200838	WAT200560	WAT200828

Acrodisc 25 mm

	Pack Size	50	1000	50	1000
		Particle Size: 0.2 µm		Particle Size: 0.45 µm	
Aqueous	GHP	WAT097964	186005596	WAT200514	WAT200829
	NYLON	WAT200522	WAT200833	WAT200518	WAT200831
	PVDF	WAT200808	WAT200839	WAT200510	WAT200826
	GHP GF*	–	–	WAT200802	WAT058853
	NYLON GF*	–	–	WAT200800	WAT200846
	GF**	–	–	WAT200818	WAT200840
Non Polar	CR	WAT200504	WAT200822	WAT200500	WAT200820
	GHP	WAT097964	186005596	WAT200514	WAT200829
Protein	PVDF	WAT200808	WAT200839	WAT200510	WAT200826
Ion Chromatography	IC	–	–	–	WAT200843

* GHP GF and Nylon GF are glass fiber pre-filters in combination with GHP and Nylon filters for precipitate laden samples.
** Glass fiber filters are 1 µm in pore size.

Waters Filter Selector

The Waters Filter Selector helps you select the most appropriate filter for your analysis. Simply answer 3 easy questions about particle size, sample volume, and sample type and we will identify the most suitable filter.

For more information about Waters Filter Selector, please visit: www.waters.com/filterselector

Solvent Filtration Apparatus

The 300 mL capacity 47 mm Glass Filter Funnel and 1 L capacity 47 mm Glass Funnel/Support Assembly are ideal for vacuum filtration of liquids and degassing of HPLC solvent and mobile phases. The 100% borosilicate glass construction assures resistance to even the most aggressive solvents.

Ordering Information

Solvent Filtration Apparatus

Description	P/N
Solvent Filtration Apparatus 110 V, 60 Hz	176002986
Solvent Filtration Apparatus 220 V, 50 Hz	176002987
All Glass Filter Holder 47 mm, complete	WAT200543
Funnel, 300 mL	WAT200545
Glass Base, tabulated cap	WAT200546
Ground Joint Flask	WAT200547
Swinney Holder	WAT200566
Vacuum Pump 110 V, 60 Hz	725000417
Vacuum Pump 220 V, 50 Hz	725000604



Solvent Filtration Membranes

Description	Diameter	Pore Size	Qty.	P/N
PVDF Filter	47 mm	0.45 µm	100/pk	WAT200530
Nylon Filter	47 mm	0.45 µm	100/pk	WAT200532
PTFE Filter	47 mm	0.45 µm	100/pk	WAT200534
	13 mm	0.45 µm	100/pk	WAT200536
GH Polypro Filter	47 mm	0.45 µm	100/pk	WAT200537
Supor (PES) Filter	47 mm	0.45 µm	100/pk	WAT200538
	13 mm	0.45 µm	100/pk	WAT200540
PVDF Filter	47 mm	0.2 µm	100/pk	WAT200531
Nylon Filter	47 mm	0.2 µm	100/pk	WAT200533
PTFE Filter	47 mm	0.2 µm	100/pk	WAT200535
GHP	47 mm	0.2 mm	100/pk	186003524
Supor (PES) Filter	47 mm	0.2 µm	100/pk	WAT200539

Waters Sample Vials and Accessories

Waters Sample Vials and Accessories



"Quality has to do with the company as a whole, not just the end result."

– Emma French, Project Manager, Wexford, Ireland

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Waters Sample Vials and Accessories

Your choices of vials or plates should be well informed and consistent with your application and instrumentation. To facilitate your decisions, we organized information about vials and accessories into three sections. The first section covers technical information to consider when selecting the materials of construction for vials, septa, plates, and seals. It is important to take into consideration the nature of analytes and sample diluent used when selecting the vials and septa, or plates and seals. The second section includes quick selection guides that list the most frequently purchased products, organized by instrument model. The third section includes a complete listing of vials and accessories, according to size; combination packs; vials only; caps/septa only; and low-volume inserts.

Certified Vials

Waters offers three lines of certified vials:

- LC/GC Certified
- LCMS Certified
- TruView™ LCMS Certified

DIMENSIONAL TEST

All lines of Waters vials are certified to be within the dimensional tolerances for height, width, neck opening, neck center, threads, and bottom thickness specified for autosamplers. Conformance of vials to these permissible limits is essential. Out-of-dimension vials can cause needle damage and consequent system downtime.

CHEMISTRY TESTS

LC/GC Certified Vials are UV-tested by HPLC. The HPLC test detects trace levels of chemicals used in the manufacturing and packaging process. These chemicals include lubricants, surfactants, antistatic agents, and antioxidants from packaging. To ensure cleanliness, we test each batch of vials after it has been packaged for several days. An additional test, headspace GC test, determines whether the silicone septa cured properly.

LCMS Certified Vials are MS-tested using an unbiased test to look for any ionized masses, regardless of their source. The test, performed in the mass spectrometer's scan mode, determines total ion count and the presence of clusters in the high-mass range.

TruView LCMS Certified Vials are tested to ensure their conformance to stringent dimensional tolerances, UV and MS cleanliness, and polar-analyte adsorption. The vials are manufactured by a process that limits the concentration of free ions on the glass surface. Ionic sites can cause non-specific binding of polar analytes. Waters TruView LCMS Certified Vials are tested for high recovery of analyte at a concentration of 1 ng/mL using UPLC-MS/MS (MRM) and yield little adsorption. These vials exhibit the lowest adsorption of autosampler vials in the market.

Types of Certified Vials

Certification Tests	CERTIFIED	LCMS CERTIFIED	TruView® LCMS CERTIFIED
Dimensional Test	✓	✓	✓
Septum GC Test	✓	✓	✓
HPLC UV Test	✓	✓	✓
MS Scan		✓	✓
Low Adsorption Test			✓
To download these whitepapers, visit **www.waters.com** and search by these literature codes:	Waters Certified Sample Vials Whitepaper 720001303EN	Waters LCMS Certified Sample Vials Whitepaper 720001517EN	TruView LCMS Certified Sample Vials Whitepaper 720004097EN

Vial Selection



CHOOSING THE RIGHT VIAL

Choosing the correct vial for your application is important. Equally important, however, is your choice of septum and closure.

The selection options below help you choose the appropriate combination of vial and accessories. For convenience in ordering, we offer many of these items in combination packs of 100.

Step 1

Septa Selection Guide

PTFE	PTFE/Silicone	Pre-slit PTFE/Silicone	PE Septumless
Recommended for single injection applications.	Recommended for multiple injections and sample storage.	Provides adequate venting to prevent vacuum formation in sample vial, delivering excellent sample-draw reproducibility.	Same advantages as PTFE.
Excellent solvent resistance and chemical compatibility.	Demonstrates excellent resealing characteristics.	Eliminates coring from bottom draw needles.	—
Does not reseal upon puncturing.	PTFE chemical resistance until punctured, then the septum will have the chemical compatibility of silicone.	Good resealing capabilities.	—
Not recommended for long-term sample storage.	Working temperature range from -40 °C to 200 °C.	Recommended for multiple injections.	—
—	—	Working temperature range from -40 °C to 200 °C.	—

Waters recommends pre-slit PTFE/silicone septa, for venting and accurate sample draw. They also reduce the possibility of septum coring in bottom-draw needles.

For applications with a volatile solvent that require non-slit septa, there are simple steps you can take to reduce creating a vacuum. Do not fill the vial; leave headspace. You may have to reduce the syringe draw rate to improve sample volume accuracy.

Step 2

Vial Closures Guide

Vials are available in three closure types: crimp, snap, and screw cap. Each closure has its advantages.

Cap	Seal	Comment
Crimp	Excellent seal	Requires tools
Snap	Moderate seal	Fast, no tools, some cap cracking
Screw	Excellent seal	Universal

Crimp caps squeeze the septum between the vial's rim and the crimped aluminum cap forming an excellent seal. The crimp cap vial requires the use of a crimping tool to form the cap around the glass vial lip. When you plan to sample only a few vials, a manual crimper suffices. For large numbers of samples, however, the use of automated crimpers is more efficient.

Snap caps function similarly to crimp caps. The use of plastic snap caps requires no tools.

Snap caps are not as effective a seal as other closures:

- If the cap fits too tightly, it proves difficult to apply and may crack
- If the cap fits too loosely, the resultant seal is inadequate, and the septum may dislodge

Screw caps, which are universal, form an excellent seal. A cap screwed onto a vial applies a mechanical force that squeezes the septum, between the vial rim and the cap. The use of screw caps requires no tools.

Step 3

Vial Selection Guide		
Analyte Concentration	**Detection Source**	**Recommended Product**
µg/mL	UV, RI (non-MS)	LC/GC Certified Vials
100's ng/mL	Older single quadrupole and MS/MS	LCMS Certified Vials
1 ng/mL and lower	MS/MS, Tof	TruView LCMS Certified Vials

Type 1, 33-Expansion Borosilicate Glass

Analytical laboratories use type 1, 33-expansion glass, the most chemically-inert glass obtainable, in for high-quality test results. Composed primarily of silicone and oxygen, with trace amounts of boron and sodium, the expansion coefficient of this glass is approximately 33×10^{-7} °C. All of our clear glass vials are made using type 1, 33-expansion glass.

Type 1, 51-Expansion Glass

More alkaline than type 1, 33-expansion glass, type 1, 51-expansion glass, is nonetheless adequate for use in many laboratories. Composed primarily of silicone and oxygen, with trace amounts of boron, its expansion coefficient is 51×10^{-7} °C. All of our amber glassware is made using type 1, 51-expansion glass.

Deactivated Glass (DV)

For highly polar analytes that may associate with the polar glass surface, deactivated vials are an effective choice. These glass vials are treated with gas-phase, reactive organosilane, producing a hydrophobic glass surface. Deactivated vials can be stored, dry, indefinitely.

Polypropylene Plastic

Nonreactive polypropylene plastic (PP) are useful where glass is not an appropriate option. The vials can be incinerated while sealed, minimizing personal exposure to potentially hazardous substances. The maximum-temperature use is 135 °C.



Sample Plates and Seals

SAMPLE PLATES

We offer a selection of 96- and 384-well sample plates for use in autosamplers. The plates are SBS/ANSI compliant, for robot compatible systems. The 96-well plates can also serve as collection plates for 96-well SPE and filtration-plate formats. All of our plates are made of polypropylene, for chemical resistance. We also offer 96-well plates fitted with glass inserts that maintain sample in contact only with a glass surface. The glass inserts are also available in deactivated glass format. Refer to the vials section for information about glass and deactivated glass.

The sample plates can be centrifuged to the following maximum centrifugal forces. Exceeding this limit can deform the plates. A deformed plate can cause autosampler error and instrument shutdown.



Ordering Information

96-well Plates

Description	Maximum Centrifugal Force	P/N
96-well Plate, 350 µL per well	5000 g	186002643
96-well Plate, 700 µL per well	2000 g	186005837
96-well Plate, 800 µL per well	2000 g	186002481
96-well Plate, 2 mL per well	5000 g	186002482
384-well Plate, 100 µL per well	5000 g	186002631
384-well Plate, 250 µL per well	5000 g	186002632

SEALS

Waters offers a selection of cap mats, heat seals, and an adhesive seal for plates.

Polypropylene Cap Mats

The selection of polypropylene cap mats fit all 96-well plates and offer the chemical resistance of polypropylene.

Silicone/PTFE Cap Mats

Silicone/PTFE cap mats, manufactured in slit and non-slit versions, are available for 96-well plates, including those fitted with glass inserts. We recommend using the slit versions in autosamplers, where they promote proper venting, and accuracy of sample draw. We recommend the non-slit versions for long-term sample storage.

Clear Polyester Heat Seal

The clear polyester seal, usable between -80 °C and 80 °C, is effective for most sample solvents and buffers, including DMSO. To use the seal, place its shiny side facing up, and then use a heat sealer to apply heat in both directions for two to three seconds.



Aluminum Foil Heat Seal

The aluminum foil heat seal is a polyester/aluminum laminate. The addition of the aluminum layer reduces the gas permeability of the seal. For long-term storage, the aluminum foil heat seal is a better choice for reducing evaporative loss. The seal is usable over the temperature range from -200 °C to 90 °C. Position the seal with its white side facing up, and then apply heat, in both directions for three seconds, using a heat sealer.

Adhesive Seal

The adhesive seal is a polyolefin film with a synthetic rubber adhesive. This seal is ideal for protein and peptide analyses, where samples are in buffers. The adhesive, which is usable between -80 °C and 80 °C, is resistant to low concentrations (0–30%) of polar organic solvents. No heat sealing equipment is needed to apply the seal.

Vials and Accessories for ACQUITY UPLC Systems

The ACQUITY UPLC Systems family continues to evolve and expand, providing various solutions for improved resolution, sensitivity, and throughput. Several different UPLC sample managers are available, each of which offer a choice of needle type, to meet the requirements of a laboratory's workflow. Following is the approved selection of vials, plates, and plate seals for current ACQUITY UPLC System configurations.

Compatibility Tables

The tables below recommend vials and plates for the ACQUITY UPLC System configurations.

Fixed Loop Needle	Flow Through Needle
Vials: ACQUITY UPLC, ACQUITY UPLC M-Class, nanoACQUITY UPLC, ACQUITY UPC²* and ACQUITY UPLC I-Class FL; Sample Managers	Vials: ACQUITY UPLC H-Class, ACQUITY UPLC I-Class FTN, ACQUITY Arc® UHPLC, and ACQUITY Advanced Polymer Chromatography
Plates: ACQUITY UPLC, ACQUITY UPLC M-Class, nanoACQUITY UPLC, and ACQUITY UPLC I-Class FL; Metal and Metal Tip Needles	Plates: ACQUITY UPLC H-Class, ACQUITY UPLC I-Class FTN, and ACQUITY Arc UHPLC
ACQUITY UPLC, ACQUITY UPLC M-Class, nanoACQUITY UPLC, ACQUITY UPC² and ACQUITY UPLC I-Class FL; PEEK and PEEKsil Needles	

Residual Volumes

All residual volumes shown in the following table are calculated at the default needle placement setting. For sample-limited applications, you can adjust the needle placement via the software, in the Advanced Settings dialog box of the sample manager's instrument method editor (see figure on the following page). In the case of flow through needles (FTN), exercise care when specifying a lower needle-placement setting: FTN needle tips are susceptible to damage caused by striking against hard surfaces, resulting in sealing or carryover problems.

Default Needle Placement		
Needle Type	**Plates**	**Vials**
FTN	2 mm	4 mm
FL	2 mm	2 mm

APPLICATION AREA: Bioanalytical Impurity Analysis

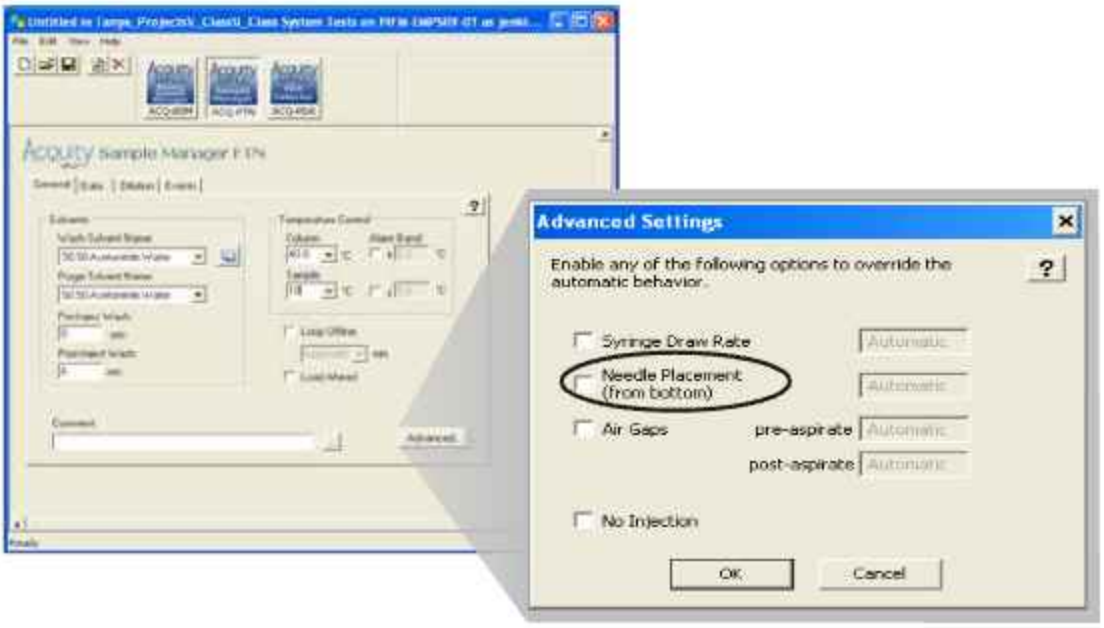
"Absolutely a must have for any discovery laboratory doing UPLC work. Robust, highly reproducible, great after purchase care, lots of options in terms of tubing/line compatibility, injection settings, extensions, etc. Lots of detectors available."

REVIEWER: Michal Kliman

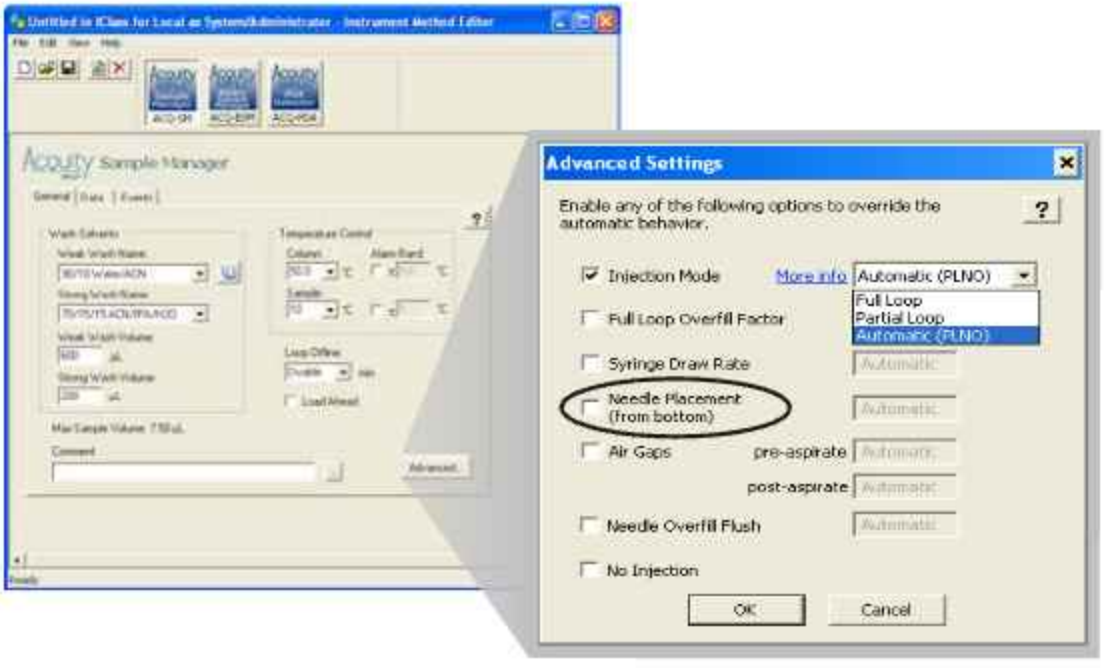
ORGANIZATION: InVision Biomedical Group

★★★★★

Flow Through Needle (FTN)



Fixed Loop Needle (FL)



QUICK SELECTION GUIDE: FIXED-LOOP-NEEDLE ACQUITY SYSTEMS

The tables below, which show the most frequently purchased vials and plates for fixed-loop-needle ACQUITY® Systems, serve as a quick selection guide.

Ordering Information

Vials for ACQUITY UPLC, ACQUITY UPLC I-Class, ACQUITY UPLC M-Class, nanoACQUITY UPLC, and ACQUITY UPC²

Fixed Loop (FL), All Needles	Clear	Amber	Max Recovery	Amber Max	300 µL PP	750 µL PP	Clear Glass with Septumless Cap	Total Recovery
12 × 32 mm								
Vial Number	1	2	3	4	5	6	7	8
TruView LCMS Certified Combination Packs								
Vial, Cap, and Pre-slit Silicone/ PTFE Septum	186005666CV	186005661CV	186005662CV	186005670CV	–	–	–	186005663CV
LCMS Certified Combination Packs								
Vial, Cap, and Pre-slit Silicone/ PTFE Septum	600000668CV	600000669CV	600000670CV	600000755CV	–	–	–	600000671CV
LC/GC Certified Combination Packs								
Bonded Pre-slit Silicone/PTFE Septum	186000307C	186000847C	186000327C	186003866C	–	–	–	186000385C
Combination with PE Septumless Cap	186004132C	186004133C	186004168C	–	–	–	186004132C	186004167C
Combination Packs								
Bonded Pre-slit Silicone/PTFE Septum Deactivated	186000307DV	186000847DV	186000327DV	–	–	–	–	186000385DV
Bonded Pre-slit Silicone/PTFE Septum	–	–	–	–	186002639	186005221	–	–
Combination with PE Septumless Cap	–	–	–	–	186004112	–	–	–
Injectable Volumes								
Max	1600 µL	1600 µL	1100 µL	1100 µL	210 µL	530 µL	1600 µL	950 µL
Residual	165 µL	165 µL	22 µL	22 µL	20 µL	70 µL	165 µL	4 µL
Vial Selection from Chromatography Data System	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder
Storage Cap								
Black Solid 9 mm Cap with Silicone/ PTFE Liner for Sample Storage	186007187	186007187	186007187	186007187	186007187	186007187	186007187	186007187

ACQUITY Sample Organizer Accessories

Description	P/N
Vial Holder, 48-well, 2 mL Vial	700011047
Label, 48-well, 2 mL Vial, Open Access	615003783

For the complete selection of vials and accessories for ACQUITY Systems, refer to page 56.

Plates for ACQUITY UPLC, ACQUITY UPLC I-Class, ACQUITY UPLC M-Class, and nanoACQUITY UPLC

Fixed Loop (FL), Metal and Metal Tip Needles	96-well Plates				384-well Plates	
Well Shape						
Plates	**186002643**	**186005837**	**186002481**	**186002482**	**186002632**	**186002631**
Pack Size	100	25	50	50	50	50
Well Volume	350 µL	700 µL	800 µL	2 mL	250 µL	100 µL
Sealing Options						
PTFE/Silicone Pre-slit, 5/pk	186006332	186006332	186006332	186006335	—	—
Polypropylene Cap Mat, 50/pk	—	186002483	186002483	186002484	—	—
Clear Polyester Heat Seal, 100/pk	186002788	186002788	186002788	186002788	186002788	186002788
Aluminum Foil Laminate Heat Seal, 100/pk	186002789	186002789	186002789	186002789	186002789	186002789
Adhesive Seal, 100/pk	186006336	186006336	186006336	186006336	186006336	186006336
Number of Plates in Sample Organizer	21	10	10	7	10	21
Shape	round	round	round	square	square	square
Bottom	round	conical	conical	conical	conical	conical
Material	PP	PP	PP	PP	PP	PP
Height of Plate	14 mm	31 mm	31 mm	42.5 mm	22 mm	15.5 mm
Well Depth	11.25 mm	27 mm	27 mm	39 mm	19.5 mm	12.3 mm
Residual Volume in ACQUITY at Default Needle Placement of 2 mm	35 µL	8 µL	15 µL	20 µL	15 µL	15 µL
Plate Selection from Chromatography Data System	ANSI-96-well 350 µL	ANSI-96-well 1 mL	ANSI-96-well 1 mL	ANSI-96-well 2 mL	ANSI-384-well 250 µL	ANSI-384-well 100 µL

	96-well Glass Inserts	
Glass Insert 96-well Plates	**700 µL**	**1 mL**
Plate for Quick Load Inserts, 20/pk	186001438	186001438
Quick-Load Glass Insert, 1/pk	186001437(DV)	186001436(DV)
96-well Plate with Inserts	186000349(DV), 1/pk	186000855(DV), 18/pk
Pre-slit PTFE Silicone Seal, 5/pk (Clear)—Seals Against Plate Wall	186006335	—
Clear Polyester Heat Seal, 100/pk	186002788	—
Aluminum Foil Laminate Heat Seal, 100/pk	186002789	—
Adhesive Seal,* 100/pk	186006336	—
Residual Volume in ACQUITY at Default Needle Placement of 2 mm	15 µL	15 µL
Plate Selection from Chromatography Data System	ANSI-96-well 700 µL Glass Insert	ANSI-96-well 1 mL Glass Insert

*Adhesive seal is designed for use with buffer solutions and can tolerate alcohols and acetonitrile content in buffers.
When (DV) appears beside a number, a deactivated version of the part can be ordered by adding a DV to the right of the part number.

Plates for ACQUITY UPLC, ACQUITY UPLC I-Class, ACQUITY UPLC M-Class, nanoACQUITY UPLC, and ACQUITY UPC²

Fixed Loop (FL), PEEK and PEEKsil Needles	96-well Plates				384-well Plates	
Well Shape						
Plates	**186002643**	**186005837**	**186002481**	**186002482**	**186002632**	**186002631**
Pack Size	100	25	50	50	50	50
Well Volume	350 µL	700 µL	800 µL	2 mL	250 µL	100 µL
Sealing Options						
Polypropylene Cap Mat, 50/pk	–	186002483	186002483	186002484	–	–
Clear Polyester Heat Seal, 100/pk	186002788	186002788	186002788	186002788	186002788	186002788
Aluminum Foil Laminate Heat Seal, 100/pk	186002789	186002789	186002789	186002789	186002789	186002789
Adhesive Seal,* 100/pk	186006336	186006336	186006336	186006336	186006336	186006336
Number of Plates in Sample Organizer	21	10	10	7	10	21
Shape	round	round	round	square	square	square
Bottom	round	conical	conical	conical	conical	conical
Material	PP	PP	PP	PP	PP	PP
Height of Plate	14 mm	31 mm	31 mm	42.5 mm	22 mm	15.5 mm
Well Depth	11.25 mm	27 mm	27 mm	39 mm	19.5 mm	12.3 mm
Residual Volume in ACQUITY at Default Needle Placement of 2 mm	35 µL	8 µL	15 µL	20 µL	15 µL	15 µL
Plate Selection from Chromatography Data System	ANSI-96-well 350 µL	ANSI-96-well 1 mL	ANSI-96-well 1 mL	ANSI-96-well 2 mL	ANSI-384-well 250 µL	ANSI-384-well 100 µL

*Adhesive seal is designed for use with buffer solutions and can tolerate alcohols and acetonitrile content in buffers.

	96-well Glass Inserts
Glass Insert 96-well Plates	**700 µL**
Plate for Quick Load Inserts, 20/pk	186001438
Quick-Load Glass Insert, 1/pk	186001437(DV)
96-well Plate with Inserts	186000349(DV), 1/pk
Clear Polyester Heat Seal, 100/pk	186002788
Aluminum Foil Laminate Heat Seal, 100/pk	186002789
Adhesive Seal,* 100/pk	186006336
Residual Volume in ACQUITY at Default Needle Placement of 2 mm	15 µL
Plate Selection from Chromatography Data System	ANSI-96-well 700 µL Glass Insert

*Adhesive seal is designed for use with buffer solutions and can tolerate alcohols and acetonitrile content in buffers.
When (DV) appears beside a number, a deactivated version of the part can be ordered by adding a DV to the right of the part number.

Plate Selection

Chromatographic system: Plate selection indicates a preprogrammed geometric plate configuration, with the proper x, y, and z dimensions for the plate. Select the proper plate from the drop-down menu.



QUICK SELECTION GUIDE: FLOW-THROUGH-NEEDLE ACQUITY SYSTEMS

The tables below, which show the most frequently purchased vials and plates for flow-through-needle ACQUITY Systems, serve as a quick selection guide.

Ordering Information

Vials for ACQUITY UPLC H-Class, ACQUITY UPLC I-Class, ACQUITY Arc, and ACQUITY APC™ Systems

Flow Through Needles (FTN)	Clear	Amber	Max Recovery	Amber Max	300 µL PP	750 µL PP	Clear Glass with Septumless Cap	Total Recovery
12 × 32 mm								
Vial Number	1	2	3	4	5	6	7	8
TruView LCMS Certified Combination Packs								
Vial, Cap, and Pre-slit Silicone/ PTFE Septum	186005666CV	186005661CV	186005662CV	186005670CV	–	–	–	186005663CV
LCMS Certified Combination Packs								
Vial, Cap, and Pre-slit Silicone/ PTFE Septum	600000668CV	600000669CV	600000670CV	600000755CV	–	–	–	600000671CV
LC/GC Certified Combination Packs								
Bonded Pre-slit Silicone/PTFE Septum	186000307C	186000847C	186000327C	186003886C	–	–	–	186000385C
Combination with PE Septumless Cap	186004132C	186004133C	186004168C	–	–	–	186004132C	186004167C
Combination Packs								
Bonded Pre-slit Silicone/PTFE Septum Deactivated	186000307DV	186000847DV	186000327DV	–	–	–	–	186000385DV
Bonded Pre-slit Silicone/PTFE Septum	–	–	–	–	186002639	186005221	–	–
Combination with PE Septumless Cap	–	–	–	–	186004112	–	–	–
Injectable Volumes								
Max	1450 µL	1450 µL	1365 µL	1365 µL	290 µL	610 µL	1450 µL	940 µL
Residual	360 µL	360 µL	135 µL	135 µL	10 µL	90 µL	360 µL	10 µL
Vial Selection from Chromatography Data System	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder	ANSI-48-vial 2 mL Holder
Storage Cap								
Black Solid 9 mm Cap with Silicone/ PTFE Liner for Sample Storage	186007187	186007187	186007187	186007187	186007187	186007187	186007187	186007187

ACQUITY Sample Organizer Accessories

Description	P/N
Vial Holder, 48-well, 2 mL Vial	700011047
Label, 48-well, 2 mL Vial, Open Access	615003783

For the complete selection of vials and accessories for ACQUITY Systems, refer to page 56.

Plates for ACQUITY UPLC H-Class and ACQUITY UPLC I-Class

Flow Through Needle	96-well Plates				384-well Plates
Well Shape					
Plates	**186002643**	**186005837**	**186002481**	**186002482**	**186002632**
Pack Size	100	25	50	50	50
Well Volume	350 µL	700 µL	800 µL	2 mL	250 µL
Sealing Options					
PTFE/Silicone Pre-slit, 5/pk	186006332	186006332	186006332	186006335	—
Clear Polyester Heat Seal, 100/pk	186002788	186002788	186002788	186002788	186002788
Aluminum Foil Laminate Heat Seal, 100/pk	186002789	186002789	186002789	186002789	186002789
Adhesive Seal,* 100/pk	186006336	186006336	186006336	186006336	186006336
Number of Plates in Sample Organizer	21	10	10	7	10
Shape	round	round	round	square	square
Bottom	round	conical	conical	conical	conical
Material	PP	PP	PP	PP	PP
Height of Plate	14 mm	31 mm	31 mm	42.5 mm	22 mm
Well Depth	11.25 mm	27 mm	27 mm	39 mm	19.5 mm
Residual Volume in ACQUITY at Default Needle Placement of 2 mm	35 µL	8 µL	15 µL	20 µL	15 µL
Plate Selection from Chromatography Data System	ANSI-96-well 350 µL	ANSI-96-well 1 mL	ANSI-96-well 1 mL	ANSI-96-well 2 mL	ANSI-384-well 250 µL
Plate Selection from Chromatography Data System	ANSI-96-well 350 µL	ANSI-96-well 1 mL	ANSI-96-well 1 mL	ANSI-96-well 2 mL	ANSI-384-well 250 µL

*Adhesive seal is designed for use with buffer solutions and can tolerate alcohols and acetonitrile content in buffers.

	96-well Glass Inserts	
Glass Insert 96-well Plates	**700 µL**	**1 mL**
Plate for Quick Load Inserts, 20/pk	186001438	186001438
Quick-Load Glass Insert, 1/pk	186001437(DV)	186001436(DV)
96-well Plate with Inserts	186000349(DV), 1/pk	186000855(DV), 18/pk
Pre-slit PTFE Silicone Seal, 5/pk (Clear)—Seals Against Plate Wall	186006335	—
Clear Polyester Heat Seal, 100/pk	186002788	—
Aluminum Foil Laminate Heat Seal, 100/pk	186002789	—
Adhesive Seal,* 100/pk	186006336	—
Residual Volume in ACQUITY at Default Needle Placement of 2 mm	15 µL	15 µL
Plate Selection from Chromatography Data System	ANSI-96-well 700 µL Glass Insert	ANSI-96-well 1 mL Glass Insert

*Adhesive seal is designed for use with buffer solutions and can tolerate alcohols and acetonitrile content in buffers.
When (DV) appears beside a number, a deactivated version of the part can be ordered by adding a DV to the right of the part number.

Vials and Accessories for Alliance HPLC Systems



Alliance HPLC System.

WATERS AUTOSAMPLER VIALS, PLATES, AND SEALS FOR USE WITH ALLIANCE HPLC SYSTEMS

We offer a complete selection of vials, including certified and low-recovery vials suited to the needle designs used in Alliance® Systems. We also offer a complete line of plate and seal options for the Alliance 2790/2795 HTS System.

SETTINGS FOR ALLIANCE HPLC VIALS AND LOW VOLUME INSERTS (LVI)

The Waters Alliance Separations Module is set initially to accept vials with a bottom thickness of less than 1.6 mm. Any vial that does not meet this criterion must not be used without first adding a positive needle-offset value to the sample draw depth specified in the software. Failure to do so can cause vial breakage or needle damage.

Alliance 2690 and 2695 Needle Offset

Settings for Alliance 2690 and 2695	
Vial	**Needle Offset (add)**
300 µL Polypropylene Vial	1 mm
750 µL Polypropylene Vial	1 mm
Crimp Cap Vial	1 mm
Low Volume Insert and Vial	1 mm

APPLICATION AREA: R&D

"I have used several brands of HPLC and Waters systems/software are the most versatile and dependable I have used. The support and service I receive are the best I have experienced."

REVIEWER: Vic Granat

ORGANIZATION: Sterling Pharmaceutical Services

TRUSTED REVIEWS

★★★★★

QUICK SELECTION GUIDE: ALLIANCE HPLC SYSTEMS

This selection of 12 × 32 mm vials are the most commonly ordered vials by customers using Waters Alliance Separations Modules. This page is intended to be a quick selection guide. For the complete selection of vials and accessories for Alliance Systems, turn to page 56.

Ordering Information

Vials for Alliance 2690/2695/e2695 and 2790/2795 Systems

	Clear	Amber	Max Recovery	300 µL PP	10 mm Cap Clear	Total Recovery	Amber Max	Clear Glass with Septumless Cap
12 × 32 mm								
Vial Number	9	10	11	12	13	14	15	16
Compatible Systems								
Alliance 2690/2695	•	•	–	•	•	•	–	•
Alliance 2790/2795	•	•	•	•	–	–	•	•
TruView LCMS Certified Combination Packs								
Vial, Cap, and Pre-slit Silicone/ PTFE Septum	186005666CV	186005661CV	186005662CV	–	–	186005663CV	186005670CV	–
LCMS Certified Combination Packs								
Vial, Cap, and Pre-slit Silicone/ PTFE Septum	600000668CV	600000669CV	600000670CV	–	–	600000671CV	600000755CV	–
LC/GC Certified Combination Packs								
Bonded Pre-slit Silicone/PTFE Septum	186000307C	186000847C	186000327C	186002639*	–	186000385C	186003886C	–
Silicone/PTFE Septum	–	–	–	–	WAT270946C	–	–	–
Combination with PE Septumless Cap	–	–	–	–		–	–	186004132C
Combination Packs								
Combination Deactivated	186000307DV	186000847DV	186000327DV	–	–	186000385DV	–	–
Injectable Volumes Alliance 2690/2695								
Max	1100 µL	1100 µL	–	280 µL	1100 µL	950 µL	–	1100 µL
Residual	750 µL	750 µL	–	20 µL	750 µL	9 µL	–	750 µL
Injectable Volumes Alliance 2790/2795								
Max	1700 µL	1700 µL	1500 µL	290 µL	1700 µL	–	1500 µL	1700 µL
Residual	170 µL	170 µL	22 µL	10 µL	170 µL	–	22 µL	170 µL
Insert								
150 µL with Poly Spring	WAT094171(DV)	WAT094171(DV)	–	–	WAT094171(DV)	–	–	WAT094171(DV)
Max Volume Injection/ Max Residual Volume	144 µL/6 µL	144 µL/6 µL	–	–	144 µL/6 µL	–	–	144 µL/6 µL
Storage Cap								
Black Solid 9 mm Cap with Silicone/ PTFE Liner for Sample Storage	186007187	186007187	186007187	186007187	–	186007187	186007187	186007187

*Not certified.
When (DV) appears beside a number, a deactivated version of the part can be ordered by adding a DV to the right of the part number.

Complete Listing of 12 × 32 mm Vials and Accessories

Screw Cap Vials	Clear	Amber	Max Recovery	300 µL PP	750 µL PP	10 mm Cap Clear	Total Recovery	Amber Max
12 × 32 mm								
Vial Number	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Compatible Systems								
Alliance 2690/2695	•	•	–	•	•	•	•	–
Alliance 2790/2795	•	•	•	•	•	–	–	•
ACQUITY	•	•	•	•	•	–	•	•
TruView LCMS Certified Combination Packs								
Vial, Cap, and Silicone/PTFE Septum	186005660CV	186005667CV	186005668CV	–	–	–	186005669CV	186005664CV
Vial, Cap, and Pre-slit Silicone/ PTFE Septum	186005666CV	186005661CV	186005662CV	–	–	–	186005663CV	186005670CV
LCMS Certified Combination Packs								
Vial, Cap, and Silicone/PTFE Septum	600000751CV	600000752CV	600000749CV	–	–	–	600000750CV	600000754CV
Vial, Cap, and Pre-slit Silicone/ PTFE Septum	600000668CV	600000669CV	600000670CV	–	–	–	600000671CV	600000755CV
LC/GC Certified Combination Packs								
Bonded Silicone/PTFE Septum	186000272C	186000846C	186000326C	186002640*	186005220*	WAT270946C	186000384C	186003885C
Combination Deactivated*	186000272DV	186000846DV	186000326DV	–		WAT270946DV	186000384DV	–
Bonded Pre-slit Silicone/PTFE Septum	186000307C	186000847C	186000327C	186002639*	186005221*	–	186000385C	186003886C
Combination Deactivated*	186000307DV	186000847DV	186000327DV	–	–	–	186000385DV	–
Combination with PE Septumless Cap	186004132C	186004133C	186004168C	186004112*	–	–	186004167C	–
LC/GC Certified Combination Pack with Cap and PTFE Septum	186007193C	186007194C	186007195C	–	–	–	186007197C	186007196C
Certified Combination Pack with Cap and LB Silicone/PTFE Septum	186007199C	186007200C	186007201C	–	–	–	186007203C	186007202C
Vials Only								
Vials Only	186000273	186000848	186002802	186002626	186005219	WAT063300	186002805	–
Deactivated Vials Only	186000273DV	186000848DV	–	–	–	WAT063300DV	–	–
Injectable Volumes Alliance 2690/2695								
Max	1100 µL	1100 µL	–	280 µL	400 µL	1100 µL	950 µL	–
Residual	750 µL	750 µL	–	20 µL	300 µL	750 µL	9 µL	–
Injectable Volumes Alliance 2790/2795								
Max	1700 µL	1700 µL	1500 µL	290 µL	530 µL	1700 µL	–	1500 µL
Residual	170 µL	170 µL	22 µL	10 µL	170 µL	170 µL	–	22 µL

*Not certified.

Complete Listing of 12 × 32 mm Vials and Accessories

	Clear	Amber	Max Recovery	300 µL PP	750 µL PP	10 mm Cap Clear	Total Recovery	Amber Max
12 × 32 mm								
Vial Number	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Compatible Systems								
Alliance 2690/2695	•	•	–	•	•	•	•	–
Alliance 2790/2795	•	•	•	•	•	–	–	•
ACQUITY	•	•	•	•	•	–	•	•
Inserts								
300 µL with Poly Spring	WAT094170(DV)	WAT094170(DV)	–	–	–	WAT094170(DV)	–	–
Max Volume Injection/ Max Residual Volume	230 µL/20 µL	230 µL/20 µL	–	–	–	230 µL/20 µL	–	–
150 µL with Poly Spring	WAT094171(DV)	WAT094171(DV)	–	–	–	WAT094171(DV)	–	–
Max Volume Injection/ Max Residual Volume	144 µL/6 µL	144 µL/6 µL	–	–	–	144 µL/6 µL	–	–
Black Screw Cap for TruView Vials								
PTFE/Silicone Septum	186005826	186005826	186005826	–	–	–	186005826	186005826
Pre-slit PTFE/Silicone Septum	186005827	186005827	186005827	–	–	–	186005827	186005827
Light Blue Screw Cap for LCMS Certified Vials								
PTFE/Silicone Septum	186005828	186005828	186005828	–	–	–	186005828	186005828
Pre-slit PTFE/Silicone Septum	186005829	186005829	186005829	–	–	–	186005829	186005829
Screw Cap and Septum-Silicone/PTFE								
PE Septumless Cap	186004169	186004169	186004169	186004169	186004169	–	186004169	186004169
Blue LectraBond	186000274	186000274	186000274	186000274	186000274	–	186000274	186000274
Red LectraBond	186002129	186002129	186002129	186002129	186002129	–	186002129	186002129
Green LectraBond	186002130	186002130	186002130	186002130	186002130	–	186002130	186002130
White LectraBond	186002456	186002456	186002456	186002456	186002456	–	186002456	186002456
Black Cap with PTFE Septum, 100/pk	186007198	186007198	186007198	186007198	186007198	–	186007198	186007198
Screw Cap and Pre-slit Septum-Silicone/PTFE								
Blue LectraBond	186000305	186000305	186000305	186000305	186000305	–	186000305	186000305
Red LectraBond	186002128	186002128	186002128	186002128	186002128	–	186002128	186002128
Green LectraBond	186002127	186002127	186002127	186002127	186002127	–	186002127	186002127
White LectraBond	186002457	186002457	186002457	186002457	186002457	–	186002457	186002457
For Dissolution System								
Pre-assembled Vial, Cap, and Pre-slit Septum	186000989(DV)	186003455	–	–	–	–	–	–
Storage Cap								
Black Solid 9 mm Cap with Silicone/ PTFE Liner for Sample Storage	186007187	186007187	186007187	186007187	186007187	–	186007187	186007187

When (DV) appears beside a number, a deactivated version of the part can be ordered by adding a DV to the right of the part number.

Snap and Crimp Cap Vials	Clear	Amber	Max Recovery	300 µL PP	750 µL PP	Clear Glass Crimp	Amber Crimp	Total Recovery
12 × 32 mm								
Vial Number	25	26	27	28	29	30	31	32
Compatible Systems								
Alliance 2690/2695	•	•	–	•	•	•	•	•
Alliance 2790/2795	•	•	•	•	•	•	•	–
ACQUITY	•	•	•	•	•	•	•	•
Combination Packs								
Vial, Cap, and Silicone/wPTFE Septum	–	–	–	186002642	186005223	–	–	186000234(DV)
Vial, Cap, and Pre-slit Silicone/PTFE Septum	–	–	–	186002641	186005222	–	–	–
Vials								
Vials Only	WAT094219	WAT094220	186000984	186002628	186005224	WAT094222	WAT094223	186000302
Deactivated Vials Only	WAT094219DV	WAT094220DV	186000984DV	–	–	WAT094222DV	WAT094223DV	186000302DV
Injectable Volumes Alliance 2690/2695								
Max	1100 µL	1100 µL	–	280 µL	400 µL	1100 µL	1100 µL	950 µL
Residual	750 µL	750 µL	–	20 µL	300 µL	750 µL	750 µL	9 µL
Injectable Volumes Alliance 2790/2795								
Max	1700 µL	1700 µL	1500 µL	290 µL	530 µL	1700 µL	1700 µL	–
Residual	170 µL	170 µL	22 µL	10 µL	170 µL	170 µL	170 µL	–
Inserts								
300 µL with Poly Spring	WAT094170(DV)	WAT094170(DV)	–	–	–	WAT094170(DV)	WAT094170(DV)	–
Max Volume Injection/Max Residual Volume	230 µL/20 µL	230 µL/20 µL	–	–	–	230 µL/20 µL	230 µL/20 µL	–
150 µL with Poly Spring	WAT094171(DV)	WAT094171(DV)	–	–	–	WAT094171(DV)	WAT094171(DV)	–
Max Volume Injection/Max Residual Volume	144 µL/6 µL	144 µL/6 µL	–	–	–	144 µL/6 µL	144 µL/6 µL	–
Snap Cap and Septum–Silicone/PTFE								
Blue	186000303	186000303	186000303	186000303	186000303	–	–	186000303
Black	186002649	186002649	186002649	186002649	186002649	–	–	186002649
Red	186002650	186002650	186002650	186002650	186002650	–	–	186002650
Snap Cap and Pre-slit Septum–Silicone/PTFE								
Blue	186000304	186000304	186000304	186000304	186000304	–	–	186000304
Black	186002648	186002648	186002648	186002648	186002648	–	–	186002648
Red	186002647	186002647	186002647	186002647	186002647	–	–	186002647
Snap Cap and PTFE Septum								
Blue	186000328	186000328	186000328	186000328	186000328	–	–	186000328
Black	186002645	186002645	186002645	186002645	186002645	–	–	186002645
Red	186002646	186002646	186002646	186002646	186002646	–	–	186002646
Crimp Cap								
Crimp Cap Silicone/PTFE Septum	–	–	–	–	–	PSL404219	PSL404219	–
Crimp Cap PTFE/Silicone/PTFE Septum	–	–	–	–	–	PSL404231	PSL404231	–
Crimp Cap with Silicone/PTFE Septa	–	–	–	–	–	186006967	186006967	–
Crimper	–	–	–	–	–	PSL904301	PSL904301	–

All items come in quantities of 100 unless otherwise noted.
When (DV) appears beside the part number, a deactivated version of this product can be ordered by adding DV to the right of the part number.

Plates for Alliance 2790/2795 Systems

	96-well Plates				384-well Plates	
Well Shape						
Plates	**186002643**	**186005837**	**186002481**	**186002482**	**186002632**	**186002631**
Pack Size	100	25	50	50	50	50
Well Volume	350 µL	700 µL	800 µL	2 mL	250 µL	100 µL
Sealing Options						
PTFE/Silicone, 5/pk	186006333	186006333	186006333	186006334	–	–
PTFE/Silicone Pre-slit, 5/pk	186006332	186006332	186006332	186006335	–	–
Polypropylene Cap Mat, 50/pk	186002483	186002483	186002483	186002484	–	–
Clear Polyester Heat Seal, 100/pk	186002788	186002788	186002788	186002788	186002788	186002788
Aluminum Foil Laminate Heat Seal, 100/pk	186002789	186002789	186002789	186002789	186002789	186002789
Adhesive Seal,* 100/pk	186006336	186006336	186006336	186006336	186006336	186006336
Number of Plates in Sample Organizer	21	10	10	7	10	21
Shape	round	round	round	square	square	square
Bottom	round	conical	conical	conical	conical	conical
Material	PP	PP	PP	PP	PP	PP
Height of Plate	14 mm	31 mm	31 mm	42.5 mm	22 mm	15.5 mm
Well Depth	11.25 mm	27 mm	27 mm	39 mm	19.5 mm	12.3 mm
Residual Volume in Alliance 2795 at Default Needle Placement of 2 mm	35 µL	8 µL	15 µL	20 µL	15 µL	15 µL

*Adhesive seal is designed for use with buffer solutions and can tolerate alcohols and acetonitrile content in buffers.





Roller for Cap Mats

Description	P/N
Roller for Cap Mats	186002633

Holder for 12 × 32 mm Vials

Description	P/N
Holder for 12 × 32 mm Vials, 5/pk	186004487

AUTOSAMPLER VIALS FOR WATERS SYSTEMS

Vials for Waters 717 Autosampler

	4 mL Screw Neck	Amber Screw Neck	Total Recovery	PP Screw Neck Vial	PP Conical	Glass Shell Vial	Amber Glass Shell Vial
15 × 45 mm							
48-position Carousel	33	34	35	36	37	38	39
Combination Packs							
Vial, Cap, and LectraBond PTFE/Silicone Septum	186000838C	186001133C	186002629C	–	–	–	–
Combination Deactivated	186000838DV	186001133DV	–	–	–	–	–
Vial, Cap, and LectraBond Pre-slit PTFE/ Silicone Septum	186000839C	186001134C	186002630C	–	–	–	–
Combination Deactivated	186000839DV	186001134DV	–	–	–	–	–
Vial and PE Snap Cap	–	–	–	–	186004031	WAT025051	WAT025050
Components							
Vials Only	186000840(DV)	186001135(DV)	186002520	186000999[1]	–	–	–
Max Volume Injection/Max Residual Volume	2400 µL/1600 µL	2400 µL/1600 µL	3000 µL/40 µL	2000 µL/1000 µL	2950 µL/50 µL	2400 µL/1600 µL	2400 µL/1600 µL
Cap LectraBond PTFE/Silicone 100/pk	186000841	186000841	186000841	–	–	–	–
Screw Cap with Bonded PTFE/Silicone Septum, 1000/pk	–	–	–	186000965	–	–	–
Cap LectraBond Pre-slit PTFE/Silicone, 100/pk	186000842	186000842	186000842	–	–	–	–
Black Phenol Cap, 144/pk	WAT072711	WAT072711	WAT072711	–	–	–	–
PTFE Septum, 1440/pk	WAT073005	WAT073005	WAT073005	–	–	–	–
PTFE Septum, 144/pk	WAT072714	WAT072714	WAT072714	–	–	–	–
Self Sealing Septum, 144/pk	WAT022861	WAT022861	WAT022861	–	–	–	–
250 µL Glass Insert[2]	WAT072704(DV)	WAT072704(DV)	–	–	–	–	–
Max Volume Injection/Max Residual Volume	244 µL/6 µL	244 µL/6 µL	–	–	–	–	–
250 µL Glass Insert, 144/pk[2]	WAT015199(DV)	WAT015199(DV)	–	–	–	–	–
Max Volume Injection/Max Residual Volume	230 µL/20 µL	230 µL/20 µL	–	–	–	–	–
250 µL Plastic Conical Insert (PMP), 144/pk[2]	WAT072030	WAT072030	–	–	–	–	–
Max Volume Injection/Max Residual Volume	230 µL/20 µL	230 µL/20 µL	–	–	–	–	–
Springs for LVI, 100/pk	WAT072708	WAT072708	–	–	–	–	–
Storage Cap							
Solid Black Cap with Silicone/ PTFE Liner for Sample Storage	186007224	186007224	186007224	–	–	–	–

[1] Item contains 1000 vials.

[2] Inserts requires springs, p/n: WAT072708.

When (DV) appears beside the part number, a deactivated version of this product can be ordered by adding DV to the right of the part number.

Vials for Waters 717 Autosampler

	1 mL Shell	Amber	Total Recovery	PP Conical
8 × 40 mm				
96-position Carousel	40	41	42	43
Components				
Shell Vial and Snap Cap	WAT025054C	WAT025053C	186000837C	WAT022476*
Shell Vial and Snap Cap Deactivated	WAT025054DV	WAT025053DV	186000837DV	—
Pack Size	250	250	100	100
Max Volume Injection/Max Residual Volume	600 µL/400 µL	600 µL/400 µL	700 µL/6 µL	650 µL/50 µL
150 µL Glass Insert (requires spring)	WAT072294(DV)	WAT072294(DV)	—	—
Max Volume Injection/Max Residual Volume	144 µL/6 µL	144 µL/6 µL	—	—
PE Snap Cap, 1000/pk	WAT078515	WAT078515	WAT078515	WAT078515
200 µL PE Vial Insert with Poly Spring, 1000/pk	186001728	186001728	—	—
1 mL Shell Vial Assembled for Dissolution System, 500/pk	WAT022479	—	—	—

*Vials not certified.
All items come in quantities of 100 unless otherwise noted. When (DV) appears beside the part number, a deactivated version of this product can be ordered by adding DV to the right of the part number.

Vials for GPC 2000

	4 mL Screw Cap	10 mL Screw Neck
		
Vial Number	75	76
Components	**P/N**	**P/N**
Vial	186000840	186001420
Black Screw Cap	WAT072711*	186001421
PTFE Septum	WAT072714*	186001422
Black Solid Cap with Silicone/PTFE Liner for Sample Storage, 4 mL	186007224	—

*Item contains 144 pieces.



PATROL UPLC® Process Analysis System.

Vials for Aqua Analysis System

Components	P/N
22 mL Vial with Pre-slit Silicone/PTFE Septum, 100/pk	186004108
Solid Cap, PTFE/Silicone Liner, 100/pk	186004109
Mailing Box for 22 mL vials, 100/pk	186004111

Vials for PATROL UPLC Process Analysis System

Components	P/N
15 × 75 mm Clear Glass with PTFE/Silicone Non-slit Septum, 100/pk	186004902C
15 × 75 mm Clear Glass with PTFE/Silicone Slit Septum, 100/pk	186004903C
15 × 75 mm Clear Glass Total Recovery Vial only, 100/pk	186007573

Screw Cap Vials for Waters 2707 Autosampler and 2777 Sample Manager

	Clear	Amber	Max Recovery	Amber Max	300 µL PP	10 mL Screw Neck
12 × 32 mm						
Vial Number	**44**	**45**	**46**	**47**	**48**	**49**
LCMS Certified Combination Packs						
Vial, Cap, and Pre-slit Silicone/PTFE Septum	600000668CV	600000669CV	600000670CV	600000755CV	–	–
LC/GC Certified Combination Packs						
Bonded Pre-slit Silicone/PTFE Septum	186000307C	186000847C	186000327C	186003886C	–	–
Bonded Pre-slit Silicone/PTFE Septum Deactivated	186000307DV	186000847DV	186000327DV	–	–	–
Bonded Silicone/PTFE Septum	186000272C	186000846C	186000326C	186003885C	–	–
Combination Packs						
Bonded Pre-slit Silicone/PTFE Septum	–	–	–	–	186002639	–
Bonded Silicone/PTFE Septum	–	–	–	–	186002640	–
Injectable Volumes ACQUITY UPLC						
Max	1600 µL	1600 µL	1100 µL	1100 µL	240 µL	–
Residual	150 µL	150 µL	10 µL	10 µL	10 µL	–
Components						
150 µL with Poly Spring	WAT094171	WAT094171	–	–	–	–
Max Volume Injection/Max Residual Volume	144 µL/6 µL	144 µL/6 µL	–	–	–	–
22 × 45 mm Clear Glass Vial	–	–	–	–	–	186001420
Cap with X-Slit PTFE Silicone Septa	–	–	–	–	–	186004632
Storage Cap						
Black Solid 9 mm Cap with Silicone/PTFE Liner for Sample Storage	186007187	186007187	186007187	186007187	186007187	–

All items come in quantities of 100 unless otherwise noted. For more details, see vials descriptions on page 67.

Plates for Waters 2707 Autosampler

	96-well Plates				384-well Plates	
Well Shape						
Plates	**186002643**	**186005837**	**186002481**	**186002482**	**186002632**	**186002631**
Pack Size	100	25	50	50	50	50
Well Volume	350 µL	700 µL	800 µL	2 mL	250 µL	100 µL
Sealing Options						
PTFE/Silicone, 5/pk	186006333	186006333	186006333	186006334	–	–
PTFE/Silicone, Pre-slit, 5/pk	186006332	186006332	186006332	186006335	–	–
Polypropylene Cap Mat, 50/pk	186002483	186002483	186002483	186002484	–	–
Clear Polyester Heat Seal, 100/pk	186002788	186002788	186002788	186002788	186002788	186002788
Aluminum Foil Laminate Heat Seal, 100/pk	186002789	186002789	186002789	186002789	186002789	186002789
Adhesive Seal,* 100/pk	186006336	186006336	186006336	186006336	186006336	186006336
Residual Volume	125 µL	20 µL	40 µL	60 µL	40 µL	40 µL

*Adhesive seal is designed for use with buffer solutions and can tolerate alcohols and acetonitrile content in buffers.

AUTOSAMPLER VIALS FOR COMPATIBLE SYSTEMS

Waters high-quality vials are compatible with other manufacturers' autosamplers. The following tables serve as a quick selection guide.

Ordering Information

Snap and Crimp Cap (9 mm) Vials for Compatible Systems

	Clear	Amber	Max Recovery	Qsert Vial	PP 300 µL	PP 750 µL	Clear Crimp	Amber Crimp
12 × 32 mm								
Vial Number	60	61	62	63	64	65	66	67
Compatible Systems								
Agilent Technologies, Beckman, Dynatech, Finnigan, Fisons, Gilson, Hitachi, LDC, Perkin-Elmer, Shimadzu, Spectra-Physics, Varian	•	•	•	•	•	•	•	•
CTC, Spark, Thermal Separations	–	–	–	–	–	–	•	•
Combination Packs								
Vial, Cap, and Silicone/PTFE Septum	–	–	–	186001124(DV)	186002642	186005223	–	–
Vial, Cap, and Pre-slit Silicone/PTFE Septum	–	–	–	186001125(DV)	186002641	186005222	–	–
Vial, Cap, and PTFE Septum	–	–	–	186001127(DV)	–	–	–	–
Vials Only								
Vials Only	WAT094219	WAT094220	186000964	–	186002628	186005224	WAT094222	WAT094223
Deactivated Vials Only	WAT094219DV	WAT094220DV	186000984DV	–	–	–	WAT094222DV	WAT094223DV
Inserts								
300 µL with Poly Spring	WAT094170(DV)	WAT094170(DV)	–	–	–	–	WAT094170(DV)	WAT094170(DV)
150 µL with Poly Spring	WAT094171(DV)	WAT094171(DV)	–	–	–	–	WAT094171(DV)	WAT094171(DV)
Snap Cap and Septum-Silicone/PTFE								
Blue	186000303	186000303	186000303	186000303	186000303	186000303	–	–
Black	186002649	186002649	186002649	186002649	186002649	186002649	–	–
Red	186002650	186002650	186002650	186002650	186002650	186002650	–	–
Snap Cap and Pre-slit Septum-Silicone/PTFE								
Blue	186000304	186000304	186000304	186000304	186000304	186000304	–	–
Black	186002648	186002648	186002648	186002648	186002648	186002648	–	–
Red	186002647	186002647	186002647	186002647	186002647	186002647	–	–
Snap Cap and PTFE Septum								
Blue	186000328	186000328	186000328	186000328	186000328	186000328	–	–
Black	186002645	186002645	186002645	186002645	186002645	186002645	–	–
Red	186002646	186002646	186002646	186002646	186002646	186002646	–	–
Crimp Cap								
Crimp Cap Silicone/PTFE Septum	–	–	–	–	–	–	PSL404219	PSL404219
Crimp Cap PTFE/Silicone/PTFE Septum	–	–	–	–	–	–	PSL404231	PSL404231

All items come in quantities of 100 unless otherwise noted. When (DV) appears beside the part number, a deactivated version of this product can be ordered by adding DV to the right of the part number.

For the complete selection of 12 × 32 mm vials refer to page 56.

Screw Cap Vials for Compatible Systems

	Clear	Amber	Amber Max Recovery	Clear Glass Max Recovery	Qsert Vial	Amber Qsert	PP 300 µL	PP 750 µL	10 mm Cap	PP 250 µL 8 mm Cap
12 × 32 mm										
Vial Number	50	51	52	53	54	55	56	57	58	59
Compatible Systems										
Agilent Technologies	•	•	•	•	•	•	•	•	–	–
Alcott, Antek, CTC, Spark Thermal Separations	–	–	–	–	–	–	–	–	•	•
Beckman, Dynatech, Finnigan, Fisons, Gilson	•	•	•	•	•	•	•	•	–	–
Hitachi, LDC, Perkin-Elmer, Shimadzu, Spectra-Physics, Thermo, Varian	•	•	•	•	•	•	•	•	•	•
LCMS Certified Combination Packs										
Vial, Cap, and Silicone/PTFE Septum	600000751CV	600000752CV	600000754CV	600000749CV	–	–	–	–	–	–
Vial, Cap, and Pre-slit Silicone/PTFE Septum	600000668CV	600000669CV	600000755CV	600000670CV	–	–	–	–	–	–
LC/GC Certified Combination Packs										
Bonded Silicone/PTFE Septum	186000272C	186000846C	186003885C	186000326C	186001126C	186001130C	–	–	WAT270946C[1]	–
Combination Deactivated[2]	186000272DV	186000846DV	–	186000326DV	186001126DV	186001130DV	–	–	WAT270946DV	–
Bonded Pre-slit Silicone/PTFE Septum	186000307C	186000847C	186003886C	186000327C	186001128C	186001131C	–	–	–	–
Combination Deactivated[2]	186000307DV	186000847DV	–	186000327DV	186001128DV	186001131DV	–	–	–	–
Combination Packs										
Bonded Silicone/PTFE Septum	–	–	–	–	–	–	186002640	186005220	–	–
Bonded Pre-slit Silicone/PTFE Septum	–	–	–	–	–	–	186002639	186005221	–	–
Vials Only										
Vials Only	186000273	186000848	–	186002802	186002804	186002803	186002626	186005219	WAT063300	WAT094172
Deactivated Vials Only	186000273DV	186000848DV	–	–	–	–	–	–	WAT063300DV	–
Inserts										
300 µL with Poly Spring	WAT094170	WAT094170	–	–	–		–	–	WAT094170	–
300 µL with Poly Spring Deactivated	WAT094170DV	WAT094170DV	–	–	–	–	–	–	WAT094170DV	–
150 µL with Poly Spring	WAT094171	WAT094171	–	–	–	–	–	–	WAT094171	–
150 µL with Poly Spring Deactivated	WAT094171DV	WAT094171DV	–	–	–	–	–	–	WAT094171DV	–

[1] Septum not bonded.
[2] Not certified.
All items come in quantities of 100 unless otherwise noted.

Screw Cap Vials for Compatible Systems

	Clear	Amber	Amber Max Recovery	Clear Glass Max Recovery	Qsert Vial	Amber Qsert	PP 300 µL	PP 750 µL	10 mm Cap	PP 250 µL 8 mm Cap
12 × 32 mm										
Vial Number	50	51	52	53	54	55	56	57	58	59
Compatible Systems										
Agilent Technologies	•	•	•	•	•	•	•	•	–	–
Alcott, Antek, CTC, Spark Thermal Separations	–	–	–	–	–	–	–	–	•	•
Beckman, Dynatech, Finnigan, Fisons, Gilson	•	•	•	•	•	•	•	•	–	–
Hitachi, LDC, Perkin-Elmer, Shimadzu, Spectra-Physics, Thermo, Varian	•	•	•	•	•	•	•	•	•	•
Cap and Septum										
PE Septumless Caps	186004169	186004169	186004169	186004169	186004169	186004169	186004169	186004169	–	–
Black Cap	–	–	–	–	–	–	–	–	WAT058875	186004717
Cap and Septum, Silicone/PTFE, Assembled	–	–	–	–	–	–	–	–	–	WAT094174
Septum Only, PTFE/Silicone, Pre-slit	–	–	–	–	–	–	–	–	–	WAT058876
Septum Only, Silicone/PTFE	–	–	–	–	–	–	–	–	WAT058874	WAT210685
Septum Only, PTFE	–	–	–	–	–	–	–	–	–	WAT058885
Screw Cap and Septum–Silicone/PTFE										
Blue LectraBond	186000274	186000274	186000274	186000274	186000274	186000274	186000274	186000274	–	–
Red LectraBond	186002129	186002129	186002129	186002129	186002129	186002129	186002129	186002129	–	–
Green LectraBond	186002130	186002130	186002130	186002130	186002130	186002130	186002130	186002130	–	–
Screw Cap and Pre-slit Septum–Silicone/PTFE										
Blue LectraBond	186000305	186000305	186000305	186000305	186000305	186000305	186000305	186000305	–	–
Red LectraBond	186002128	186002128	186002128	186002128	186002128	186002128	186002128	186002128	–	–
Green LectraBond	186002127	186002127	186002127	186002127	186002127	186002127	186002127	186002127	–	–
Storage Cap										
Black Solid Cap 9 mm with Silicone/PTFE Liner	186007187	186007187	186007187	186007187	186007187	186007187	186007187	186007187	–	–

All items come in quantities of 100 unless otherwise noted.

Vials for Compatible Systems

	4 mL Screw Neck	Amber Screw Neck	Total Recovery	PP Screw Neck Vial	PP Snap Cap	Glass Shell Vial	Amber Glass Shell Vial
15 × 45 mm							
Vial Number	**68**	**69**	**70**	**71**	**72**	**73**	**74**
Compatible Systems							
Bruker, Kontron, Perkin-Elmer, Shimadzu, Tosoh, Unicam	•	•	•	•	•	•	•
Combination Packs							
Vial, Cap, and LectraBond PTFE/Silicone Septum	186000838C	186001133C	186002629C	–	–	–	–
Combination Deactivated	186000838DV	186001133DV	–	–	–	–	–
Vial, Cap, and LectraBond Pre-slit PTFE/Silicone Septum	186000839C	186001134C	186002630C		–	–	–
Combination Deactivated	186000839DV	186001134DV	–	–	–	–	–
Vial and PE Snap Cap	–	–	–	–	186004031	WAT025051	WAT025050
Components							
Vials Only	186000840	186001135	186002520	186000999[1]	–	–	–
Deactivated Vials Only	186000840DV	186001135DV	–	–	–	–	–
LectraBond Cap and Septum							
Black Cap PTFE/Silicone, 100/pk	186000841	186000841	186000841	–	–	–	–
Screw Cap with Bonded PTFE/Silicone Septum, 1000/pk	–	–	–	186000965	–	–	–
Black Cap Pre-slit PTFE/Silicone, 100/pk	186000842	186000842	186000842	–	–	–	–
Caps, Septa, and Inserts							
Black Phenol Cap, 144/pk	WAT072711	WAT072711	WAT072711	–	–	–	–
PTFE Septum, 1440/pk	WAT073005	WAT073005	WAT073005	–	–	–	–
PTFE Septum, 144/pk	WAT072714	WAT072714	WAT072714	–	–	–	–
Self Sealing Septum, 144/pk	WAT022861	WAT022861	WAT022861	–	–	–	–
250 µL Glass Insert	WAT072704	WAT072704	WAT072704	–	–	–	–
250 µL Glass Insert Deactivated	WAT072704DV	WAT072704DV	WAT072704DV	–	–	–	–
250 µL Glass Insert, 144/pk	WAT015199	WAT015199	WAT015199	–	–	–	–
250 µL Glass Insert, Deactivated, 144/pk	WAT015199DV	WAT015199DV	WAT015199DV	–	–	–	–
250 µL Plastic Conical Insert (PMP), 144/pk	WAT072030	WAT072030	WAT072030	–	–	–	–
Springs for LVI, 100/pk	WAT072708	WAT072708	WAT072708	–	–	–	–
Storage Cap							
Black Solid Cap with Silicone/PTFE Liner for Sample Storage, 100/pk	186007224	186007224	186007224	–	–	–	–

[1]Item contains 1000 vials.

Vial Descriptions

Vials for ACQUITY UPLC Systems

Vial Number	Screw Cap 12 x 32 mm Vials for ACQUITY UPLC Systems
1	Clear 12 x 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
2	Amber 12 x 32, Type 1, 51-Expansion Glass Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
3	Waters Clear Maximum Recovery Vial, 12 x 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
4	Waters Amber Maximum Recovery Vial, 12 x 32, Type 1, 51-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
5	Polypropylene 12 x 32, 300 µL Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap). Reformulate clean PP vial.
6	Polypropylene 12 x 32, 750 µL Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap). Reformulate clean PP vial.
7	Clear 12 x 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design, (6 mm opening, 9 mm septumless cap).
8	Waters Total Recovery Vial, 12 x 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).

Vials for Alliance Systems

Vial Number	Most Commonly Used Vials for Alliance Systems
9	Clear 12 x 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
10	Amber 12 x 32, Type 1, 51-Expansion Glass Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
11	Clear Maximum Recovery Vial 12 x 32, Type 1 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
12	Polypropylene 12 x 32, 300 µL Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap). Reformulate clean PP vial.
13	Clear 12 x 32, Type 1, 33-Expansion Glass, Screw Neck (7 mm opening, 10 mm cap).
14	Total Recovery Vial Clear 12 x 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
15	Amber Maximum Recovery Vial, 12 x 32, Type 1 51-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
16	Clear 12 x 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design, (6 mm opening, 9 mm septumless cap).

Vial Number	Screw Cap 12 x 32 mm Vials for Alliance Systems
17	Clear 12 x 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
18	Amber 12 x 32, Type 1, 51-Expansion Glass Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
19	Clear Maximum Recovery Vial 12 x 32, Type 1 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
20	Polypropylene 12 x 32, 300 µL Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap). Reformulate clean PP vial.
21	Polypropylene 12 x 32, 750 µL Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap). Reformulate clean PP vial.
22	Clear 12 x 32, Type 1, 33-Expansion Glass, Screw Neck (7 mm opening, 10 mm cap).
23	Total Recovery Vial Clear 12 x 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
24	Amber Maximum Recovery Vial, 12 x 32, Type 1 51-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).

Vial Number	Snap Cap 12 x 32 mm Vials for Alliance Systems
25	Clear 12 x 32, Type 1, 33-Expansion Glass, Snap Cap Vial (6 mm opening, 9 mm cap).
26	Amber 12 x 32, Type 1, 51-Expansion Glass Snap Cap Vial (6 mm opening, 9 mm cap).
27	Clear Maximum Recovery Vial 12 x 32, Type 1, 33-Expansion Glass, Snap Cap Vial (6 mm opening, 9 mm cap).
28	Polypropylene 12 x 32, 300 µL Snap Cap Vial (6 mm opening, 9 mm cap). Reformulate clean PP vial.
29	Polypropylene 12 x 32, 750 µL Snap Cap Vial (6 mm opening, 9 mm cap). Reformulate clean PP vial.
30	Clear 12 x 32, Type 1, 33-Expansion Glass, Crimp Top Vial (6 mm opening, 12 mm cap).
31	Amber 12 x 32, Type 1, 51-Expansion Glass, Crimp Top Vial (6 mm opening, 12 mm cap).
32	Total Recovery Vial Clear 12 x 32, Type 1, 33-Expansion Glass, Snap Cap Vial (6 mm opening, 9 mm cap).

Vial Number	Vials for Waters 717 Autosampler: 15 × 45 mm Vials
33	Clear 15 × 45, Type 1, 33-Expansion Glass, Screw Neck Vial.
34	Amber 15 × 45, Type 1, 51-Expansion Glass, Screw Neck Vial.
35	Total Recovery Screw Neck Vial Clear Glass 15 × 45, Type 1, 33-Expansion Glass.
36	Polypropylene 15 × 45, 3 mL Round Bottom Screw Neck Vial, 1000/pk.
37	Polypropylene Snap Cap Vial with Conical Bottom, PE Snap Caps.
38	4 mL Glass Shell Vial with Polyethylene Snap Cap, Type 1, 51-Expansion Glass.
39	4 mL Amber Shell Vial with Polyethylene Snap Cap, Type 1, 51-Expansion Glass.

Vial Number	Vials for Waters 717 Autosampler: 8 × 40 mm Vials
40	1 mL Clear Glass Shell Vial (8 × 40 mm) Type 1, 51-Expansion Glass with Polyethylene Snap Cap, 250/pk.
41	1 mL Amber Glass Shell Vial (8 × 40 mm) Type 1, 51-Expansion Glass with Polyethylene Snap Cap, Type 1, 250/pk.
42	Total Recovery Clear Glass Vial (8 × 40 mm) with Polyethylene Snap Cap, Type 1, 51-Expansion Glass.
43	650 µL Polypropylene Vial (8 × 40 mm) with Polyethylene Snap Cap.

Vials for Compatible Systems

Vial Number	Vials for Waters 2707 Autosampler
44	Clear 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
45	Amber 12 × 32, Type 1, 51-Expansion Glass Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
46	Waters Maximum Recovery Vial, 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
47	Waters Amber Maximum Recovery Vial, 12 × 32, Type 1, 51-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
48	Polypropylene 12 × 32, 300 µL Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap). Reformulate clean PP vial.
49	Clear 22 × 45 mm Type I, 33-Expansion Glass Screw Neck Vial.

Vial Number	Screw Cap 12 × 32 mm Vials for Compatible Systems
50	Clear 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
51	Amber 12 × 32, Type 1, 51-Expansion Glass Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
52	Amber Maximum Recovery Vial 12 × 32, Type 1, 51-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
53	Clear Maximum Recovery Vial 12 × 32, Type 1, 33-Expansion Glass, Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap).
54	Qsert Vial Clear Screw Cap Glass Vial, Quick Thread Design with Fused in Glass Insert (6 mm opening, 9 mm cap).
55	Qsert Vial Amber Screw Cap Glass Vial, Quick Thread Design with Fused in Glass Insert (6 mm opening, 9 mm cap).
56	Polypropylene 12 × 32, 300 µL Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap). Reformulate clean PP vial.
57	Polypropylene 12 × 32, 750 µL Screw Neck with Quick Thread Design (6 mm opening, 9 mm cap). Reformulate clean PP vial.
58	Clear 12 × 32, Type 1, 33-Expansion Glass, Screw Neck (6 mm opening, 10 mm cap).
59	Polypropylene 12 × 32, 250 µL Screw Neck Vial (6 mm opening, 8 mm cap).

Vial Number	Snap and Crimp Cap 12 × 32 mm (9 mm Cap) Vials for Compatible Systems
60	Clear 12 × 32, Type 1, 33-Expansion Glass, Snap Cap Vial (6 mm opening, 9 mm cap).
61	Amber 12 × 32, Type 1, 51-Expansion Glass Snap Cap Vial (6 mm opening, 9 mm cap).
62	Maximum Recovery Vial 12 × 32, Type 1, 33-Expansion Glass, Snap Cap Vial (6 mm opening, 9 mm cap).
63	Qsert Vial Clear Snap Cap Glass Vial with Fused in Glass Insert (6 mm opening, 9 mm cap).
64	Polypropylene 12 × 32, 300 µL Snap Cap Vial (6 mm opening, 9 mm cap). Reformulate clean PP vial.
65	Polypropylene 12 × 32, 750 µL Snap Cap Vial (6 mm opening, 9 mm cap). Reformulate clean PP vial.
66	Clear 12 × 32, Type 1, 33-Expansion Glass, Crimp Top Vial (6 mm opening, 12 mm cap).
67	Amber 12 × 32, Type 1, 51-Expansion Glass, Crimp Top Vial (6 mm opening, 12 mm cap).

Vial Number	15 x 45 mm Vials for Compatible Systems: Vials and Accessories
68	Clear 15 x 45, Type 1, 33-Expansion Glass, Screw Neck Vial.
69	Amber 15 x 45, Type 1, 51-Expansion Glass, Screw Neck Vial.
70	Waters Total Recovery Screw Neck Vial Clear Glass 15 x 45 mm, Type 1, 33-Expansion Glass.
71	Polypropylene 15 x 45, 3 mL Screw Neck Vial.
72	Polypropylene Snap Cap Vial with Conical Bottom, PE Snap Caps.
73	4 mL Glass Shell Vial with Polyethylene Snap Cap, Type 1, 51-Expansion Glass.
74	4 mL Amber Shell Vial with Polyethylene Snap Cap, Type 1, 51-Expansion Glass.

Vial Number	15 x 45 mm Vials for Compatible Systems: GPC 2000 Vials
75	4 mL Glass Screw Neck Vial, Type 1, 33-Expansion Glass for GPC 2000.
76	10 mL Screw Neck Glass Vial for GPC 2000.

Vials Troubleshooting Guide

Problem	Impact	Solution
Septum dislodged during shipment or use	• Need to insert septum or rerun analysis • Loss of time	• Check to see if needle is piercing in center of septa • Check to see if needle is sharp
Vacuum forms in vial during sample draw	• Sample spill over • Sample draw reproducibility problems	• Use pre-slit septa, which provides proper venting, eliminating sample spill over and insuring reproducible sample draw volumes
Sample-limited applications require the use of cumbersome low-volume inserts	• Increased labor required for inserting the LVI into the vial leads to delays in sample processing • Increased labor time and difficulty when pipetting into small neck opening of LVI • Additional handling increases chance of contamination • Increased costs from purchasing multiple components: vial, cap, and LVI	• Use Waters Total Recovery Vial and Maximum Recovery Vial: • No need to use LVIs • Wide neck opening for easy sample pipetting • One less handling step reduces chance of contamination • Only need one component, saving storage space and costs
Need to perform multiple injections with minimum residual volume in each vial requires LVI to obtain minimum residual volume, but maximum capacity is only 300 µL	• Increased labor to fill additional sample vials • Increased cost to purchase additional sample vials and LVIs	• Use Waters Total Recovery Vial and Maximum Recovery Vial • The increased capacity and low residual volume allows you to perform multiple injections with minimum residual volume in a single vial
Need to use glass inserts in a 96-well plate format but it requires capping each insert one-at-a-time	• Delay in sample processing	• The glass inserts in the Waters 96-well format allows for the use of a sealing cap mat, saving time and labor
Frequent needle damage	• Downtime causing missed deadlines • Cost of repairs	• All Waters vials have dimensional specifications that eliminate the potential of needle damage
Laboratory owns HPLC instruments from several different manufacturers	• Purchasing several different vials • Increased number of purchase orders • Unable to take advantage of quantity discounts, leading to higher costs	• The tight dimensional tolerances on all Waters vials and accessories make them ideal for use with virtually all HPLC systems • Reduce the number of purchase orders and take advantage of quantity discounts by buying all your sample vials from Waters
Analyte compounds are sticking to the glass surface of the vial	• Loss of sample • Loss of time • Need to run the analysis again	• Deactivated glass vials and inserts: Waters uses a gas phase deactivation process that renders the glass surface inert. Unlike other deactivated vials, the surface modification is permanent, resulting in an indefinite shelf life
Inconsistent quality between laboratory sites	• N/A	• Waters vials are distributed worldwide from the same source

Beware of Poor Quality Look-Alike Vials

- Only Waters Alliance Total Recovery Vials and Maximum Recovery Vials utilize a proprietary manufacturing process, ensuring that the slope of the internal taper will deliver all of the sample to the bottom of the vial
- The bottom thickness is held to a close tolerance, eliminating needle damage caused by bottoming out

Certified Containers

Certified Containers are designed to provide every chromatography and mass spectrometry scientist with mobile phase containers free from extraneous peaks and background noise that may result from high total organic carbon (TOC). This added attention to detail results in the cleanest and highest quality mobile phase reservoirs, which can be extremely critical when high sensitivity is required. Each Certified Container is constructed of Type 1, Class A borosilicate glass processed to contain <15 ppb TOC, making them ultra-clean for high sensitivity chromatography or mass spectrometry analysis. To maintain this level of cleanliness after manufacture, each Certified Container is individually sealed in a Mylar bag to prevent particulate and phthalate contamination. Each container is supplied with a Certificate of Analysis documenting TOC level.



Ordering Information

Certified Containers

Description	Contents	P/N
Certified Container Kit	Kit includes: (4) 1 L certified containers, (3) 500 mL certified containers (1) certified container cap kit	186007088
Certified Container, 1000 mL Volume	1 certified container	186007089
Certified Container, 500 mL Volume	1 certified container	186007090
Certified Container Cap Kit	Certified container cap kit contains 7 solid caps and 7 open caps with liners and plugs	205000642
Certified Container Low Volume Kit	Kit includes: (5) 250 mL certified containers, (1) 500 mL certified container, (1) certified container cap kit	186007278

Related Parts to Certified Containers

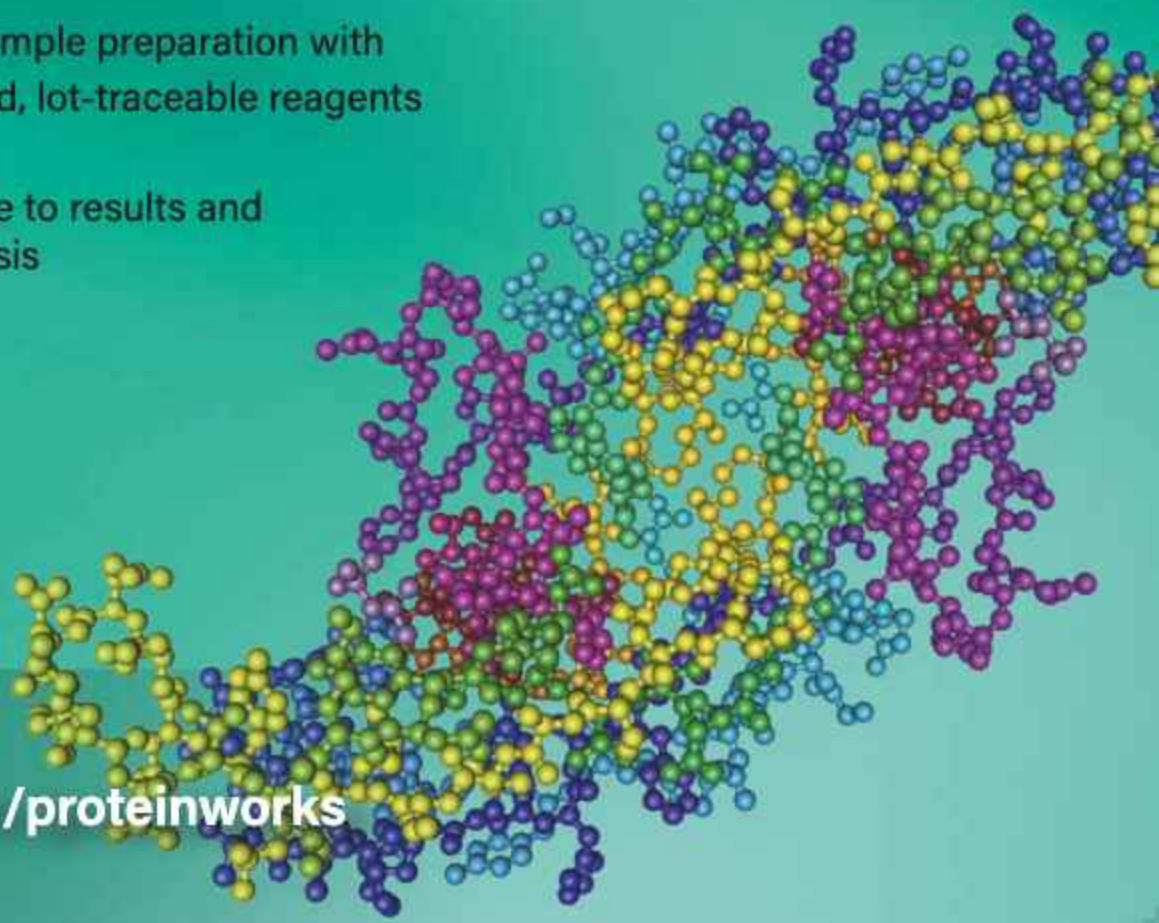
Description	P/N
Solvent Bottle Caps, 1 L, 4/pk	WAT062479
Solvent Bottle Caps, 4 L, 4/pk	WAT062341
Stainless Steel Filter Assembly	PSL613457
Tubing, Clear Teflon, 1/16 in. I.D. × 25 ft	WAT077043
Tubing, Green Teflon, 1/16 in. I.D. × 25 ft	WAT077044
ACQUITY/Alliance Bottle Accessory Kit	205000589
Alliance Bottle Tray Kit	205000329

For additional information, please go to www.waters.com/certifiedcontainers

ProteinWorks Digest Kits

Take the complexity out of protein quantification

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- Standardized approach to protein quantification
- Simplified sample preparation with pre-measured, lot-traceable reagents
- Reduced time to results and cost of analysis



waters.com/proteinworks

See page 298 for more information.

How to Choose a Column



"You can trust that products made today will be the same as products made 30 years from now."

– Mike Costello, Senior Master Scheduler, Taunton, MA, U.S.A.

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How to Choose a Column

Separation scientists continue to search for innovative solutions to improve chromatographic performance. With a wide array of column choices and formats, they have the ability to select the ideal column for their application. The following section introduces Waters' particle technologies and column formats to help you choose the best column to deliver throughput, resolution, and efficiency for your next chromatographic challenge.

Particle Technology

Reproducibility and transferability are the cornerstones of Waters' BEH, CSH,™ HSS, and solid-core particle technologies. Our premier lines of scalable LC columns exhibit all of the chemical and physical characteristics you would expect from modern LC packing materials.

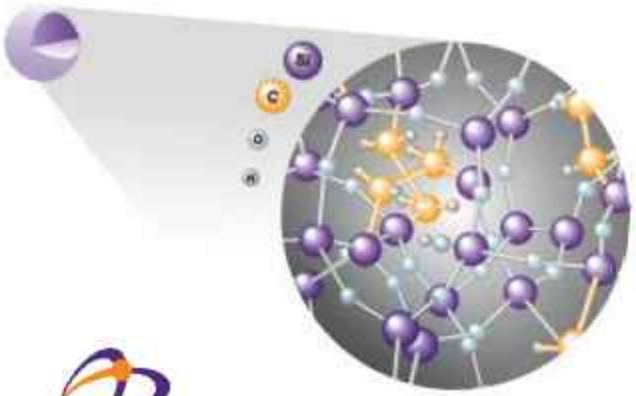





BEH Technology	CSH Technology	HSS Technology	Solid-Core Technology
▪ High retentivity for basic compounds ▪ Exceptional peak shape at elevated pH ▪ Good universal column choice for a wide variety of compounds ▪ Stable across a wide pH range ▪ For separations at high temperatures (80 °C)	▪ Good separations for basic compounds under low pH conditions ▪ Excellent MS performance with formic acid as a mobile phase modifier ▪ Fast pH switching and column equilibration	▪ High retentivity for polar organic compounds and metabolites ▪ Balanced retention of polar and hydrophobic analytes ▪ High strength silica for mechanical stability	▪ Maximum efficiency ▪ Increased sensitivity ▪ Seamless scalability from UPLC to UHPLC to HPLC

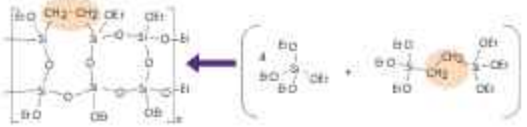
ETHYLENE BRIDGED HYBRID (BEH) PARTICLE TECHNOLOGY

Ethylene Bridged Hybrid (BEH) columns lead the industry for chromatographic versatility, chemical resistance, and mechanical stability. You can use them at extremes of pH and temperature to enhance retention and specificity for complex mixtures of acidic, alkaline, and neutral species. The BEH-particle family includes general-purpose and application-specific bonded phases that serve application areas that rely on ACQUITY UPLC, ACQUITY UPC², ACQUITY APC, and XBridge Columns.



BEH Technology™

Particle Synthesis



*US Patents 6,686,035; 7,223,473; 7,250,214.

Refer to "Ethylene-Bridged [BEH Technology™] Hybrids and Their Use in Liquid Chromatography" whitepaper (720001169EN) for further detail.

CHARGED SURFACE HYBRID (CSH) PARTICLE TECHNOLOGY

Columns packed with charged surface hybrid particles manifest the best attributes of BEH particles. CSH stationary phases provide chromatographic selectivity and superior performance in the presence of mobile phases of low ionic strength. The optimized surface charge, pore properties, and bonded phases make charged-surface, hybrid-based columns ideal for rapid method development. ACQUITY UPLC CSH and XSelect® CSH HPLC Columns offer easily scaled analytical solutions, from sub-2-µm to preparative-particle dimensions.

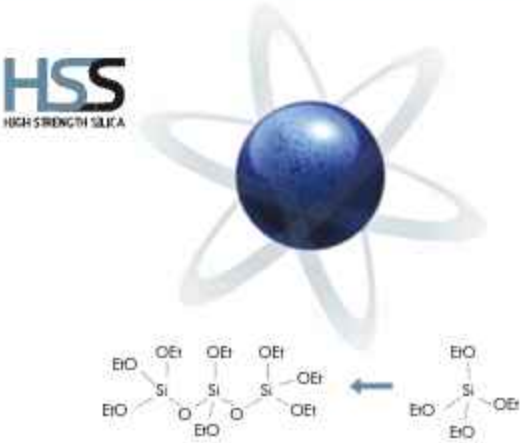
The Charged-Surface Hybrid Particle



Unbonded BEH Particle | Apply Controlled Surface Charge | Bond and End Cap

HIGH STRENGTH SILICA (HSS) PARTICLE TECHNOLOGY

High-strength silica [HSS] technology was developed specifically to complement the chromatographic performance of BEH and CSH particles. Compared with the ethylene-bridged BEH and CSH particles, the HSS particle's higher silanophilicity (100% silica) offers chromatographers significant advantages, including increased retention of polar compounds and significantly different selectivity. Additionally, as its name implies, the HSS particle possesses the mechanical strength to operate at pressures as high as 18,000 psi (1240 bar). ACQUITY UPLC HSS and XSelect HSS Columns are the first choice for proven silica-based chromatographic performance.



SOLID-CORE PARTICLE TECHNOLOGY

Compared to columns packed with fully-porous particles, those packed with superficially porous particles demonstrate higher chromatographic efficiency and lower backpressures. The optimized porous layer that surrounds the solid-silica substrate gives rise to the key benefits of speed and efficiency. UPLC columns packed with CORTECS® 1.6 µm particles yield maximum efficiency when used with the ultra-low dispersion ACQUITY UPLC instrument platform. Fully scalable CORTECS Columns packed with 2.7 µm particles offer maximum flexibility, providing increased efficiencies at the backpressure limits of UHPLC and HPLC operation.



Column Selection

Our quality mission is to ensure that the Waters' columns you use today are the most reproducible and reliable LC columns available. As a primary manufacturer of silica and hybrid particles, scientists can be assured of consistent column performance, batch-to-batch reproducibility, and product availability over the life of the analytical method.

The following table lists all brands of Waters columns that are registered according to classifications prescribed in the United States Pharmacopeia (USP).

USP "L" COLUMN LISTING

L1	Octadecylsilane (ODS or C_{18}) chemically bonded to porous silica or ceramic particles—1.5 to 10 µm in diameter.		
Brand	**Particle Size**	**Type**	**Page**
AccQ•Tag Ultra	1.7 µm	Spherical	245
ACQUITY UPLC BEH C_{18}	1.7 µm	Spherical	96
ACQUITY UPLC BEH Shield RP18	1.7 µm	Spherical	96
ACQUITY UPLC CSH C_{18}	1.7 µm	Spherical	91
ACQUITY UPLC HSS C_{18}	1.7 µm	Spherical	102
ACQUITY UPLC HSS C_{18} SB	1.8 µm	Spherical	102
ACQUITY UPLC HSS T3	1.8 µm	Spherical	102
ACQUITY UPLC Oligonucleotide C_{18}	1.7 µm	Spherical	258
Atlantis T3	3, 5, 10 µm	Spherical	156, 208
Atlantis dC_{18}	3, 5, 10 µm	Spherical	156, 208
CORTECS C_{18}	2.7 µm	Spherical	116
CORTECS C_{18}+	2.7 µm	Spherical	116
CORTECS Shield RP18	2.7 µm	Spherical	117
CORTECS T3	2.7 µm	Spherical	117
CORTECS UPLC C_{18}	1.6 µm	Spherical	88
CORTECS UPLC C_{18}+	1.6 µm	Spherical	88
CORTECS UPLC Shield RP18	1.6 µm	Spherical	88
CORTECS UPLC T3	1.6 µm	Spherical	88
Delta-Pak C_{18}	5 µm	Spherical	174
µBondapak C_{18}	10 µm	Irregular	175
µBondapak C_{18} Radial-Pak	10 µm	Irregular	22

L1	Octadecylsilane (ODS or C_{18}) chemically bonded to porous silica or ceramic particles—1.5 to 10 µm in diameter.		
Brand	**Particle Size**	**Type**	**Page**
Nova-Pak C_{18}	4, 6 µm	Spherical	173, 190, 223
Prep Nova-Pak HR C_{18}	6 µm	Spherical	214
Resolve C_{18}	5, 10 µm	Spherical	174, 222
SunFire C_{18}	2.5, 3.5, 5, 10 µm	Spherical	132, 159, 205
Symmetry C_{18}	3.5, 5 µm	Spherical	167
SymmetryPrep C_{18}	5, 7 µm	Spherical	212
Symmetry300 C_{18}	3.5, 5 µm	Spherical	163
SymmetryShield RP18	3.5, 5 µm	Spherical	163
Waters Spherisorb ODS1	3, 5, 10 µm	Spherical	171, 213
Waters Spherisorb ODS2	3, 5, 10 µm	Spherical	171, 213
Waters Spherisorb ODSB	5 µm	Spherical	171
XBridge Peptide BEH, 130Å	3.5, 5, 10 µm	Spherical	268
XBridge Peptide BEH, 300Å	3.5, 5, 10 µm	Spherical	268
XBridge C_{18}	2.5, 3.5, 5, 10 µm	Spherical	122, 140, 197
XBridge Oligonucleotide C_{18}	2.5 µm	Spherical	200, 258
XBridge Shield RP18	2.5, 3.5, 5, 10 µm	Spherical	122, 141, 198
XSelect CSH C_{18}	2.5, 3.5, 5 µm	Spherical	126, 148
XSelect HSS C_{18}	2.5, 3.5, 5 µm	Spherical	128, 149
XSelect HSS C_{18} SB	2.5, 3.5, 5 µm	Spherical	128, 150
XSelect HSS T3	2.5, 3.5, 5 µm	Spherical	128, 150
XTerra MS C_{18}	2.5, 3.5, 5, 10 µm	Spherical	133, 167, 209
XTerra Shield RP18	3.5, 5, 10 µm	Spherical	168, 210

( ) - Denotes particle sizes available outside of L class.

Source: United States Pharmacopeia.

L2
Octadecylsilane (ODS or C_{18}) chemically bonded to silica gel of a controlled surface porosity bonded to a solid spherical core—30 to 50 µm in diameter.

L3
Porous silica particles—1.5 to 10 µm in diameter.

Brand	Particle Size	Type	Page
ACQUITY UPLC BEH HILIC	1.7 µm	Spherical	97
Atlantis HILIC Silica	3, 5 µm	Spherical	157
CORTECS UPLC HILIC	1.6 µm	Spherical	89
CORTECS HILIC	2.7 µm	Spherical	116
Nova-Pak	4, 6 µm	Spherical	173, 214
µPorasil	10 µm	Spherical	175
Resolve	5, 10 µm	Spherical	174, 222
SunFire Silica	5, 10 µm	Spherical	159, 205
Waters Spherisorb	3, 5, 10 µm	Spherical	171, 213
XBridge BEH HILIC	2.5, 3.5, 5, 10 µm	Spherical	123, 142, 198

L4
Silica gel of a controlled surface porosity bonded to a solid spherical core—30 to 50 µm in diameter.

L5
Alumina of controlled surface porosity bonded to a solid spherical core—30 to 50 µm in diameter.

L6
Strong cation exchanger packing-sulfonated fluorocarbon polymer coated on a solid spherical core—30 to 50 µm in diameter.

L7
Octylsilane (C_8) chemically bonded to porous silica particles—1.5 to 10 µm in diameter.

Brand	Particle Size	Type	Page
ACQUITY UPLC BEH C_8	1.7 µm	Spherical	96
Nova-Pak C_8	4, 6 µm	Spherical	173, 223
Resolve C_8	10 µm	Spherical	222
Waters Spherisorb C_8	3, 5, 10 µm	Spherical	170, 213
SunFire C_8	3.5, 5, 10 µm	Spherical	159, 205
Symmetry C_8	3.5, 5, 7 µm	Spherical	162
SymmetryShield RP8	3.5, 5 µm	Spherical	163, 213
SymmetryPrep C_8	7 µm	Spherical	212
XBridge BEH C_8	2.5, 3.5, 5, 10 µm	Spherical	122, 149, 197
XTerra MS C_8	2.5, 3.5, 5, 10 µm	Spherical	133, 167, 210
XTerra Shield RP8	3.5, 5, 10 µm	Spherical	168, 211

L8
An essentially monomolecular layer of aminopropylsilane (NH_2) chemically bonded to totally porous silica gel support—3 to 10 µm in diameter.

Brand	Particle Size	Type	Page
µBondapak NH_2	10 µm	Irregular	175
High Performance Carbohydrate Analysis	3, 5 µm	—	177
Waters Spherisorb NH_2	3, 5, 10 µm	Spherical	171, 213

L9
3 to 10 µm irregular, totally porous silica gel having a chemically bonded strongly acidic cation exchanger coating (SCX).

Brand	Particle Size	Type	Page
Waters Spherisorb SCX	5, 10 µm	Spherical	172, 214

L10
Nitrile groups (CN) chemically bonded to porous silica particles—3 to 10 µm in diameter.

Brand	Particle Size	Type	Page
µBondapak CN	10 µm	Irregular	175
Nova-Pak CN HP	4 µm	Spherical	173
Resolve CN	10 µm	Spherical	222
Waters Spherisorb CN	3, 5, 10 µm	Spherical	172, 214
XSelect HSS CN	3.5, 5 µm	Spherical	151

L11
Phenyl groups chemically bonded to porous silica particles—1.5 to 10 µm in diameter.

Brand	Particle Size	Type	Page
ACQUITY UPLC CSH Phenyl-Hexyl	1.7 µm	Spherical	91
ACQUITY UPLC BEH Phenyl	1.7 µm	Spherical	97
µBondapak Phenyl	10 µm	Irregular	175
Nova-Pak Phenyl	4 µm	Spherical	173
XBridge BEH Phenyl	2.5, 3.5, 5 µm	Spherical	122, 141, 198
Waters Spherisorb Phenyl	3, 5, 10 µm	Spherical	171, 214
XSelect CSH Phenyl-Hexyl	2.5, 3.5, 5 µm	Spherical	126, 149, 202
XTerra Phenyl	3.5, 5 µm	Spherical	168

L12
A strong anion exchanger packing made by chemically bonding a quaternary amine to a solid silica spherical core—30 to 50 µm in diameter.

Brand	Particle Size	Type	Page
AccellPlus QMA	50 µm	Irregular	19

L13
Trimethylsilane (C_1) chemically bonded to porous silica particles—3 to 10 µm in diameter.

Brand	Particle Size	Type	Page
Waters Spherisorb C_1	3, 5, 10 µm	Spherical	171, 213

L14
Silica gel having a chemically bonded, strongly basic quaternary ammonium anion exchanger (SAX) coating—5 to 10 µm in diameter.

Brand	Particle Size	Type	Page
Waters Spherisorb SAX	5, 10 µm	Spherical	172, 214

( ) - Denotes particle sizes available outside of L class.

Source: United States Pharmacopeia.

L15 Hexylsilane (C_6) chemically bonded to a totally porous silica particle—3 to 10 µm in diameter.

Brand	Particle Size	Type	Page
Waters Spherisorb C_6	3, 5, 10 µm	Spherical	171, 213

L16 Dimethylsilane (C_2) chemically bonded to a totally porous silica particle—5 to 10 µm in diameter.

L17 Strong cation exchange resin consisting of sulfonated, cross-linked styrene divinylbenzene copolymer in the hydrogen form—7 to 11 µm in diameter.

Brand	Particle Size	Type	Page
Fast Fruit Juice	N/A	N/A	178
IC-Pak Ion-Exclusion	7 µm	Spherical	178
IC-Pak Cation	10 µm	Irregular	181
Shodex RSpak DC-613	6 µm	Spherical	176

L18 Amino (NH_2) and Cyano (CN) groups chemically bonded to porous silica particles—3 to 10 µm in diameter.

L19 Strong cation exchange resin consisting of sulfonated, cross-linked styrene divinylbenzene copolymer in the calcium form—about 9 µm in diameter.

Brand	Particle Size	Type	Page
Sugar-Pak 1	9 µm	Spherical	177
Shodex SC-1011	7 µm	Spherical	177

L20 Dihydroxypropane groups chemically bonded to porous silica particles—3 to 10 µm in diameter.

Brand	Particle Size	Type	Page
BioSuite 125, 250, 450Å	4, 5, 8, 10, (13), (17) µm	Spherical	294
Insulin HMWP	—	N/A	278

L21 A rigid, spherical styrene-divinylbenzene copolymer—5 to 10 µm in diameter.

Brand	Particle Size	Type	Page
Shodex RSpak 613	6 µm	Spherical	176
Styragel HR 0.5, 1, 2, 3, and 4	—	Spherical	304
Styragel HR 4E	—	Spherical	304
Styragel 5E	—	Spherical	304

L22 A cation-exchange resin made of porous polystyrene with sulfonic acid groups—about 10 µm in size.

Brand	Particle Size	Type	Page
IC-Pak Ion-Exclusion	7 µm	Spherical	178
Shodex RSpak DC 613	6 µm	Spherical	176
Shodex SP-0810	8 µm	Spherical	177

L23 An anion-exchange resin made of porous polymethacrylate or polyacrylate gel with quaternary ammonium groups—about 10 µm in size.

Brand	Particle Size	Type	Page
BioSuite Q AXC	10, 13 µm	Spherical	293
BioSuite DEAE	(2.5), 10, 13 µm	Spherical	293
BioSuite Q-PEEK	10 µm	Spherical	293
IC-Pak Anion	10 µm	Spherical	181
Protein-Pak Q 8HR	8 µm	Spherical	295

L24 A semi-rigid hydrophilic gel consisting of vinyl polymers with numerous hydroxyl groups on the matrix surface—32 to 63 µm in diameter.

L25 Packing having the capacity to separate compounds with a molecular weight range from 100 to 5000 (as determined by polyethylene oxide), applied to neutral, anionic and cationic water-soluble polymers. A polymethacrylate resin base, cross-linked with polyhydroxylated ether (surface contained some residual carboxyl groups), was found suitable.

Brand	Particle Size	Type	Page
Ultrahydrogel DP, + 120	10 µm	Spherical	314

L26 Butylsilane (C_4) chemically bonded to porous silica particles—3 to 10 µm in diameter.

Brand	Particle Size	Type	Page
Delta-Pak C_4, 100Å and 200Å	5 µm	Spherical	174
Symmetry300 C_4	3.5, 5 µm	Spherical	163
XBridge BEH C_4, 300Å	3.5, 5, 10 µm	Spherical	200, 287

L27 Porous silica particles—30 to 50 µm in diameter.

Brand	Particle Size	Type	Page
Porasil	37–55 µm	Irregular	175

L28 A multifunctional support which consists of a high purity, 100Å, spherical silica substrate that has been bonded with anionic (amine) functionality in addition to a conventional reversed-phase C_4 functionality.

L29 Gamma alumina, reversed-phase, low carbon percentage by weight alumina-based polybutadiene spherical particles—5 µm in diameter with a pore diameter of 80Å.

L30 Ethylsilane chemically bonded to a totally porous silica particle—3 to 10 µm in diameter.

L31 A strong anion-exchange resin-quaternary amine bonded on latex particles attached to a core of 8.5 µm macroporous particles having a pore size of 2000Å and consisting of ethylvinylbenzene cross-linked with 55% divinyl benzene.

L32 A chiral-ligand exchange packing—L proline copper complex covalently bonded to irregularly shaped silica particles—5 to 10 µm in diameter.

( ) - Denotes particle sizes available outside of L class.

Source: United States Pharmacopeia.

L33
Packing having the capacity to separate proteins of 4000 to 400,000 daltons. It is spherical, silica-based and processed to provide pH stability.

Brand	Particle Size	Type	Page
ACQUITY UPLC Protein BEH SEC Column, 125Å	1.7 µm	Spherical	279
ACQUITY UPLC Protein BEH SEC Column, 200Å	1.7 µm	Spherical	279

L34
Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the lead form—about 9 µm in diameter.

Brand	Particle Size	Type	Page
Shodex SP-0810	N/A	Spherical	177

L35
Zirconium-stabilized spherical silica packing with a hydrophilic (diol-type) molecular mono layer bonded phase having a pore size of 150Å.

L36
3,5-dinitrobenzoyl derivative of L-phenylglycine covalently bonded to a 5 µm aminopropyl silica.

L37
Packing having the capacity to separate proteins by molecular size over a range of 2000 to 40,000 daltons. It is a polymethacrylate gel.

Brand	Particle Size	Type	Page
Ultrahydrogel 250	N/A	Spherical	314

L38
A methacrylate-based size-exclusion packing for water soluble samples.

Brand	Particle Size	Type	Page
Ultrahydrogel	N/A	Spherical	314

L39
A hydrophilic-polyhydroxymethacrylate gel of totally porous spherical resin.

Brand	Particle Size	Type	Page
Ultrahydrogel	N/A	Spherical	314

L40
Cellulose tris-3,5-dimethylphenylcarbamate coated porous silica particles—5 to 20 µm in diameter.

L41
Immobilized α1-acid glycoprotein on spherical silica particles—5 µm in diameter.

L42
Octylsilane and octadecylsilane groups chemically bonded to porous silica particles—5 µm in diameter.

L43
Pentafluorophenyl groups chemically bonded to silica particles—5 to 10 µm in diameter.

Brand	Particle Size	Type	Page
XSelect CSH Fluoro-Phenyl	5 µm	Spherical	148, 202
XSelect HSS PFP	5 µm	Spherical	151

L44
A multifunctional support, which consists of a high purity, 60Å, spherical silica substrate that has been bonded with a cationic exchanger, sulfonic acid functionality in addition to a convention reversed-phase C_8 functionality.

L45
Beta cyclodextrin bonded to porous silica particles—5 to 10 µm in diameter.

L46
Polystyrene/divinylbenzene substrate agglomerated with quaternary amine functionalized latex beads—10 µm in diameter.

L55
A strong cation-exchange resin made of porous silica coated with polybutadiene-maleic acid copolymer—about 5 µm in diameter.

Brand	Particle Size	Type	Page
IC-Pak C M/D	N/A	N/A	181

L59
Packing having the capacity to separate proteins by molecular weight over the range of 10 to 500 kDa. It is spherical (10 µm), silica-based, and processed to provide hydrophilic characteristics and pH stability.

Brand	Particle Size	Type	Page
BioSuite 125, 250, 450Å Series	4–17 µm	Spherical	294

( ) - Denotes particle sizes available outside of L class.

Source: United States Pharmacopeia.

Column Configurations for Any LC System

COLUMN NOMENCLATURE

Our fully-scalable particle technologies ensure that our LC columns perform with a broad range of chromatographic instrumentation. Depending on the goals of a separation, the instrument platform used, or the sample type, you can choose the most suitable column that is matched to your system's configuration without adversely affecting the chromatographic result.

The following table serves as a guide for selecting an appropriate LC column according to instrument classification.

Nano/Micro	UPLC	UHPLC	HPLC	Preparative
ACQUITY UPLC M-CLASS BEH (1.7 µm)	ACQUITY UPLC BEH (1.7 µm)	XBridge BEH *XP* (2.5 µm)	XBridge BEH (3.5, 5 µm)	XBridge BEH OBD (5, 10 µm)
ACQUITY UPLC M-CLASS CSH (1.7 µm)	ACQUITY UPLC CSH (1.7 µm)	XSelect CSH *XP* (2.5 µm)	XSelect CSH *XP* (3.5, 5 µm)	XSelect CSH OBD (5, 10 µm)
ACQUITY UPLC M-CLASS HSS (1.8 µm)	ACQUITY UPLC HSS (1.8 µm)	XSelect HSS *XP* (2.5 µm)	XSelect HSS *XP* (3.5, 5 µm)	XSelect HSS OBD (5 µm)
—	CORTECS UPLC (1.6 µm)	CORTECS (2.7 µm)	—	—

COLUMN CONFIGURATIONS

System dispersion, the combined effect of tubing and its connections, sample valves, flow cells, and column end-fittings, is inherent in every chromatographic system. Dispersion causes sample peaks to broaden, owing to dilution, that begins at the injector and ends at the detector's outflow. As the size of particles in an LC column are reduced or the internal diameter and length of the column is decreased, the potential peak broadening in a non-optimized LC system increases. Optimum column configuration, therefore, depends mainly on the extent of sample dispersion within the LC system.

The following table summarizes the characteristics of Waters LC Systems and matches the column configuration that maintains chromatographic efficiency.







System	NANO/MICRO	UPLC	UHPLC	HPLC	PREPARATIVE
Dispersion	1 µL	<20 µL	22–29 µL	>40 µL	—
Routine Pressure	<15,000 psi	<18,000 psi	<10,000 psi	<4000 psi	<4000 psi
Particle Size	<2 µm	<2 µm	2–3 µm	3–5 µm	>5 µm
Column I.D.	75–300 µm	2.1 mm (1.0 mm)	3.0 mm (2.1 mm)	4.6 mm (3.0 mm)	>7.8 mm
Column Length	50–250 mm	<150 mm	50–150 mm	75–300 mm	50–300 mm

When you transfer LC methods, instrument bandspread is one of the most practical LC-instrument parameters to determine. Knowing the bandspread value helps you develop your own compatible methods, allowing you to seamlessly scale column dimensions or transfer methods between different instrumentation platforms and laboratory functions. The following table recommends column configurations based on nominal instrument bandspread values.

System	Bandspread*	Recommended Column Particle Sizes and I.D.s
Shimadzu Prominence UFLC	41 µL	XBridge 3.5, 5 µm XSelect 3.5, 5 µm CORTECS 2.7 µm **3.0–4.6 mm I.D.**
Alliance 2695 HPLC	29 µL	
Agilent 1260 UHPLC (600 bar)	28 µL	
Thermo Accela UHPLC	21 µL	XBridge 2.5, 3.5, 5 µm XSelect 2.5, 3.5, 5 µm CORTECS 2.7 µm **3.0 mm I.D.**
Agilent 1290 UHPLC (1200 bar)	17 µL	
ACQUITY Arc	23 µL	XBridge 2.5, 3.5, 5 µm XSelect 2.5, 3.5, 5 µm CORTECS 2.7 µm **3.0 mm I.D.**
ACQUITY UPLC	12 µL	ACQUITY UPLC BEH 1.7 µm ACQUITY UPLC CSH 1.7 µm ACQUITY UPLC HSS 1.8 µm CORTECS UPLC 1.6 µm **2.1 mm I.D.**
ACQUITY UPLC H-Class with Column Manager	12 µL	
ACQUITY UPLC H-Class	9 µL	
ACQUITY UPLC I-Class (FTN)	7.5 µL	ACQUITY UPLC BEH 1.7 µm ACQUITY UPLC CSH 1.7 µm ACQUITY UPLC HSS 1.8 µm CORTECS UPLC 1.6 µm **1.0–2.1 mm I.D.**
ACQUITY UPLC I-Class (FL)	5.5 µL	

*These data are based on nominal values for unmodified systems. As such, they are intended for reference only. Any adjustment to a system's plumbing, connectivity, and configuration changes the instrument bandspread, affecting the quality of chromatography.

Sub-2-µm UPLC Columns

Sub-2-µm UPLC Columns



"Everything I do while on-site, I am thinking of the end customer."

– Maria Hickey, Quality Engineer, Wexford, Ireland

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Sub-2-µm UPLC Columns



UltraPerformance Liquid Chromatography

UltraPerformance Liquid Chromatography (UPLC) combines innovations in both instrumentation and column technology, providing significant increases in resolution, speed, and sensitivity.

Column efficiency can be increased in two ways: by reducing the size of stationary-phase particles and by utilizing solid-core particle technology. The result is significant improvements in the resolution, speed, and sensitivity of separations. These gains are maximized when UPLC Columns are used in conjunction with low-dispersive ACQUITY UPLC Instruments. A momentous advance in LC technology, the ACQUITY UPLC System maximizes column efficiency by maintaining ultra-low system dispersion. Now narrow-bore columns packed with small particles, of 1.6–1.8 µm size, can achieve maximum performance while operating at pressures as high as 1240 bar (12,400 pK_a; 18,000 psi).

Our UPLC Column Family of sub-2-µm particles continues to evolve. Among its offerings are solid-core and fully porous particle substrates (CORTECS, BEH 125Å, 130Å, 200Å, 300Å, and 450Å; HSS; and CSH) consisting of 28 chemistries, scalable between HPLC, UHPLC, and UPLC particle sizes. Additionally, we offer nine application-directed UPLC Chemistries for SEC, amino acid analysis, proteins, peptides, oligonucleotides, and glycan analysis. Our vast range of selectivity choices, for both small-molecule and biopharmaceutical applications, ensures a UPLC Column for any application.

APPLICATION AREA: Explosives Analysis

"This column is both robust and reasonably priced. I have been running EPA 8330B explosive analysis on the same column for months with little sign of degradation. Most importantly, in conjunction with a Waters UPLC, productivity has jumped close to 400% due to runtime reductions from ~45 mins on an HPLC to ~10 mins with this column."

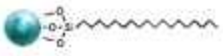
REVIEWER: Jason Schlaff
ORGANIZATION: RTI Laboratories

★★★★☆

CORTECS UPLC Columns

CORTECS UPLC 1.6 µm Solid-Core Particle Columns are the performance standard. The sub-2-µm, solid-core particle technology provides the highest column efficiencies when used with low-dispersive UPLC instrumentation. There are seven unique CORTECS chemistries to choose from, available in either reversed-phase or HILIC, that provide flexibility to rapidly separate a wide array of compounds. CORTECS UPLC 1.6 µm Solid-Core Columns produce sharper, narrower peaks when compared with fully porous particles of similar size. They are the best column choice for increased resolution, speed, and sensitivity.

Column Characteristics

	C_{18}+	C_{18}	Shield RP18
	UPLC: 1.6 µm	**UPLC: 1.6 µm**	**UPLC: 1.6 µm**
Particle/Ligand			
Ligand Density*	2.4 µmol/m²	2.7 µmol/m²	3.2 µmol/m²
Carbon Load*	5.7%	6.6%	6.4%
Endcap Style	Proprietary	Proprietary	Proprietary
USP Class No.	L1	L1	L1
pH Range	2–8	2–8	2–8
Temperature Limits	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
Surface Area*	100 m²/g	100 m²/g	100 m²/g
Performance Standards	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360
Application Standards	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363

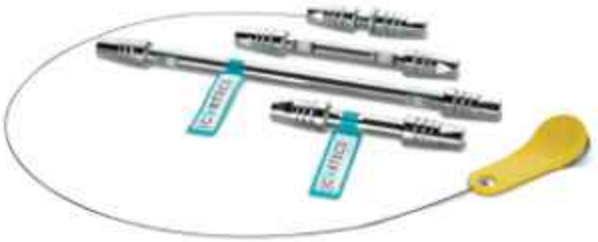
*Expected or approximate value.

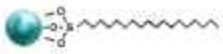
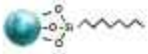
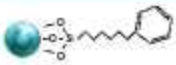
DID YOU KNOW...

We offer CORTECS Columns packed with 2.7 µm particles to use with HPLC and UHPLC systems.

For more information, see page 114.

CORTECS COLUMNS



T3	C_8	Phenyl	HILIC
UPLC: 1.6 µm	UPLC: 1.6 µm	UPLC: 1.6 µm	UPLC: 1.6 µm
			
1.6 µmol/m²	3.4 µmol/m²	3.2 µmol/m²	N/A
4.7%	4.5%	5.9%	Unbonded
Proprietary	Proprietary	Proprietary	N/A
L1	L7	L11	L3
2-8	2-8	2-8	1-5
Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
100 m²/g	100 m²/g	100 m²/g	100 m²/g
Neutrals QC Reference Material p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**HILIC QC Reference Material** p/n: 186007226
Reversed-Phase QC Reference Material p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	–

APPLICATION AREA: Pharmacokinetics and Metabolism of Drugs

"The product is of great quality and retention time and pressure are optimal."

REVIEWER: Attilio Crea

ORGANIZATION: Menarini Ricerche SpA

TRUSTED REVIEWS

★★★★★

Ordering Information

CORTECS UPLC 1.6 µm Columns

	Dimension	P/N (1/pk)	Dimension	P/N (3/pk)
	Particle Size: 1.6 µm		Particle Size: 1.6 µm	
C_{18}+	2.1 × 30 mm	186007113	2.1 × 30 mm	176003166
	2.1 × 50 mm	186007114	2.1 × 50 mm	176003167
	2.1 × 75 mm	186007115	2.1 × 75 mm	176003168
	2.1 × 100 mm	186007116	2.1 × 100 mm	176003169
	2.1 × 150 mm	186007117	2.1 × 150 mm	176003170
	3.0 × 30 mm	186007118	3.0 × 30 mm	176003171
	3.0 × 50 mm	186007119	3.0 × 50 mm	176003172
	3.0 × 75 mm	186007120	3.0 × 75 mm	176003173
	3.0 × 100 mm	186007121	3.0 × 100 mm	176003174
	3.0 × 150 mm	186007122	3.0 × 150 mm	176003175
C_{18}	2.1 × 30 mm	186007092	2.1 × 30 mm	176003146
	2.1 × 50 mm	186007093	2.1 × 50 mm	176003147
	2.1 × 75 mm	186007094	2.1 × 75 mm	176003148
	2.1 × 100 mm	186007095	2.1 × 100 mm	176003149
	2.1 × 150 mm	186007096	2.1 × 150 mm	176003150
	3.0 × 30 mm	186007097	3.0 × 30 mm	176003151
	3.0 × 50 mm	186007098	3.0 × 50 mm	176003152
	3.0 × 75 mm	186007099	3.0 × 75 mm	176003153
	3.0 × 100 mm	186007100	3.0 × 100 mm	176003154
	3.0 × 150 mm	186007102	3.0 × 150 mm	176003155
T3	2.1 × 30 mm	186008496	2.1 × 30 mm	176003891
	2.1 × 50 mm	186008497	2.1 × 50 mm	176003892
	2.1 × 75 mm	186008498	2.1 × 75 mm	176003893
	2.1 × 100 mm	186008499	2.1 × 100 mm	176003894
	2.1 × 150 mm	186008500	2.1 × 150 mm	176003895
	3.0 × 30 mm	186008501	3.0 × 30 mm	176003896
	3.0 × 50 mm	186008502	3.0 × 50 mm	176003897
	3.0 × 75 mm	186008503	3.0 × 75 mm	176003898
	3.0 × 100 mm	186008504	3.0 × 100 mm	176003899
	3.0 × 150 mm	186008505	3.0 × 150 mm	176003900
Shield RP18	2.1 × 30 mm	186008691	2.1 × 30 mm	176003927
	2.1 × 50 mm	186008692	2.1 × 50 mm	176003928
	2.1 × 75 mm	186008693	2.1 × 75 mm	176003929
	2.1 × 100 mm	186008694	2.1 × 100 mm	176003930
	2.1 × 150 mm	186008695	2.1 × 150 mm	176003931
	3.0 × 30 mm	186008701	3.0 × 30 mm	176003932
	3.0 × 50 mm	186008702	3.0 × 50 mm	176003933
	3.0 × 75 mm	186008703	3.0 × 75 mm	176003934
	3.0 × 100 mm	186008704	3.0 × 100 mm	176003935
	3.0 × 150 mm	186008705	3.0 × 150 mm	176003936

CORTECS UPLC 1.6 µm Columns *Continued*

	Dimension	P/N (1/pk)	Dimension	P/N (3/pk)
	Particle Size: 1.6 µm		Particle Size: 1.6 µm	
C_8	2.1 × 30 mm	186008398	2.1 × 30 mm	176003829
	2.1 × 50 mm	186008399	2.1 × 50 mm	176003830
	2.1 × 75 mm	186008400	2.1 × 75 mm	176003831
	2.1 × 100 mm	186008401	2.1 × 100 mm	176003832
	2.1 × 150 mm	186008402	2.1 × 150 mm	176003833
	3.0 × 30 mm	186008408	3.0 × 30 mm	176003834
	3.0 × 50 mm	186008409	3.0 × 50 mm	176003835
	3.0 × 75 mm	186008410	3.0 × 75 mm	176003836
	3.0 × 100 mm	186008411	3.0 × 100 mm	176003837
	3.0 × 150 mm	186008412	3.0 × 150 mm	176003838
Phenyl	2.1 × 30 mm	186008378	2.1 × 30 mm	176003819
	2.1 × 50 mm	186008379	2.1 × 50 mm	176003820
	2.1 × 75 mm	186008380	2.1 × 75 mm	176003821
	2.1 × 100 mm	186008381	2.1 × 100 mm	176003822
	2.1 × 150 mm	186008382	2.1 × 150 mm	176003823
	3.0 × 30 mm	186008388	3.0 × 30 mm	176003824
	3.0 × 50 mm	186008389	3.0 × 50 mm	176003825
	3.0 × 75 mm	186008390	3.0 × 75 mm	176003826
	3.0 × 100 mm	186008391	3.0 × 100 mm	176003827
	3.0 × 150 mm	186008392	3.0 × 150 mm	176003828
HILIC	2.1 × 30 mm	186007103	2.1 × 30 mm	176003156
	2.1 × 50 mm	186007104	2.1 × 50 mm	176003157
	2.1 × 75 mm	186007105	2.1 × 75 mm	176003158
	2.1 × 100 mm	186007106	2.1 × 100 mm	176003159
	2.1 × 150 mm	186007107	2.1 × 150 mm	176003160
	3.0 × 30 mm	186007108	3.0 × 30 mm	176003161
	3.0 × 50 mm	186007109	3.0 × 50 mm	176003162
	3.0 × 75 mm	186007110	3.0 × 75 mm	176003163
	3.0 × 100 mm	186007111	3.0 × 100 mm	176003164
	3.0 × 150 mm	186007112	3.0 × 150 mm	176003165

CORTECS UPLC VanGuard™ Pre-columns (Guard Columns), 3/pk

	Dimension	P/N		Dimension	P/N
	Particle Size: 1.6 µm			Particle Size: 1.6 µm	
C_{18}+	2.1 × 5 mm	186007125	C_8	2.1 × 5 mm	186008423
C_{18}	2.1 × 5 mm	186007123	Phenyl	2.1 × 5 mm	186008420
T3	2.1 × 5 mm	186008508	HILIC	2.1 × 5 mm	186007124
Shield RP18	2.1 × 5 mm	186008713			

Quality Control Reference Materials

Description	P/N
Neutrals QC Reference Material	186006360
Reversed-Phase QC Reference Material	186006363
HILIC QC Reference Material	186007226

ACQUITY UPLC Columns In-Line Filter Unit

Description	P/N
In-line filter holder and six, 0.2 µm stainless steel replacement filters	205000343
(For 205000343) 0.2 µm stainless steel replacement filters (×5), with end nuts	700002775

CSH Technology



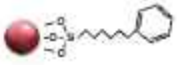
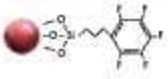
ACQUITY UPLC Columns

ACQUITY UPLC Columns are designed to work seamlessly with ACQUITY UPLC Instrumentation. The sub-2-µm, fully porous particles technologies, BEH, CSH, and HSS provide high efficiencies along with the widest sub-2-µm selectivity space. Rugged base-particle technologies provide best-in-class column stability and ultimate flexibility for high-throughput method development.

ACQUITY UPLC CSH COLUMNS

Reversed-phase bonded phases typically have poor peak shape for basic compounds when using formic acid, even at analytical mass loads; but, ACQUITY UPLC CSH Columns are the exception. When used with formic acid or other low-ionic-strength, acidic mobile phases, these rugged columns provide superior peak shape for basic analytes. The controlled, low-level, positive surface charge bonded to the ethylene-bridged hybrid (BEH) particles provides excellent peak shape for basic analytes—without the need for the use of ion-pairing reagents.

Column Characteristics

	CSH C_{18} 130Å	CSH Phenyl-Hexyl, 130Å	CSH Fluoro-Phenyl, 300Å
	UPLC: 1.7 µm	UPLC: 1.7 µm	UPLC: 1.7 µm
Particle/Ligand			
Ligand Density*	2.3 µmol/m²	2.3 µmol/m²	2.3 µmol/m²
Carbon Load*	15%	14%	10%
Endcap Style	Proprietary	Proprietary	None
USP Class No.	L1	L11	L43
pH Range	1–11	1–11	1–8
Temperature Limits	Low pH = 80 °C, High pH = 45 °C	Low pH = 80 °C, High pH = 45 °C	Low pH = 60 °C, High pH = 45 °C
Surface Area*	185 m²/g	185 m²/g	185 m²/g
Performance Standards	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360
Application Standards	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363

*Expected or approximate value.
XSelect Columns are also available in HPLC particle sizes (XSelect HPLC CSH and HSS), refer to pages 126 and 128.

Ordering Information

ACQUITY UPLC CSH Columns

	Dimension	P/N (1/pk)	Dimension	P/N (3/pk)
	Particle Size: 1.7 µm		Particle Size: 1.7 µm	
CSH C_{18}	1.0 × 50 mm	186005292	1.0 × 50 mm	176002136
	1.0 × 100 mm	186005293	1.0 × 100 mm	176002137
	1.0 × 150 mm	186005294	1.0 × 150 mm	176002138
	2.1 × 30 mm	186005295	2.1 × 30 mm	176002139
	2.1 × 50 mm	186005296	2.1 × 50 mm	176002140
	2.1 × 75 mm	186005620	2.1 × 100 mm	176002141
	2.1 × 100 mm	186005297	2.1 × 150 mm	176002142
	2.1 × 150 mm	186005298	3.0 × 30 mm	176002143
	3.0 × 30 mm	186005299	3.0 × 50 mm	176002144
	3.0 × 50 mm	186005300	3.0 × 100 mm	176002145
	3.0 × 75 mm	186005623	3.0 × 150 mm	176002146
	3.0 × 100 mm	186005301		
	3.0 × 150 mm	186005302		
CSH Fluoro-Phenyl	1.0 × 50 mm	186005349	1.0 × 50 mm	176002150
	1.0 × 100 mm	186005347	1.0 × 100 mm	176002148
	1.0 × 150 mm	186005348	1.0 × 150 mm	176002149
	2.1 × 30 mm	186005350	2.1 × 30 mm	176002151
	2.1 × 50 mm	186005351	2.1 × 50 mm	176002152
	2.1 × 75 mm	186005622	2.1 × 100 mm	176002153
	2.1 × 100 mm	186005352	2.1 × 150 mm	176002154
	2.1 × 150 mm	186005353	3.0 × 30 mm	176002155
	3.0 × 30 mm	186005354	3.0 × 50 mm	176002156
	3.0 × 50 mm	186005355	3.0 × 100 mm	176002157
	3.0 × 75 mm	186005625	3.0 × 150 mm	176002158
	3.0 × 100 mm	186005356		
	3.0 × 150 mm	186005357		
CSH Phenyl-Hexyl	1.0 × 50 mm	186005404	1.0 × 50 mm	176002161
	1.0 × 100 mm	186005402	1.0 × 100 mm	176002159
	1.0 × 150 mm	186005403	1.0 × 150 mm	176002160
	2.1 × 30 mm	186005405	2.1 × 30 mm	176002162
	2.1 × 50 mm	186005406	2.1 × 50 mm	176002163
	2.1 × 75 mm	186005621	2.1 × 100 mm	176002164
	2.1 × 100 mm	186005407	2.1 × 150 mm	176002165
	2.1 × 150 mm	186005408	3.0 × 30 mm	176002166
	3.0 × 30 mm	186005409	3.0 × 50 mm	176002167
	3.0 × 50 mm	186005410	3.0 × 100 mm	176002168
	3.0 × 75 mm	186005624	3.0 × 150 mm	176002169
	3.0 × 100 mm	186005411		
	3.0 × 150 mm	186005412		

ACQUITY UPLC CSH VanGuard Pre-columns (Guard Columns), 3/pk

	Dimension	P/N
	Particle Size: 1.7 µm	
CSH C_{18}	2.1 × 5 mm	186005303
CSH Fluoro-Phenyl	2.1 × 5 mm	186005358
CSH Phenyl-Hexyl	2.1 × 5 mm	186005413

ACQUITY UPLC Peptide CSH C_{18} Columns

	Dimension	P/N
	Particle Size: 1.7 µm	
CSH C_{18} 130Å	1.0 × 50 mm	186006933
	1.0 × 100 mm	186006934
	1.0 × 150 mm	186006935
	2.1 × 50 mm	186006936
	2.1 × 100 mm	186006937
	2.1 × 150 mm	186006938

ACQUITY UPLC Peptide CSH C_{18} VanGuard Columns, 3/pk

	Dimension	P/N
	Particle Size: 1.7 µm	
CSH C_{18}	2.1 × 5 mm	186006939
	2.1 × 5 mm	176003067[1]

[1]Kit includes column and one vial of Cytochrome c Digestion Standard, p/n: 186006371.

ACQUITY UPLC Columns In-Line Filter Unit

Description	P/N
In-line filter holder and six, 0.2 µm stainless steel replacement filters	205000343
(For 205000343) 0.2 µm stainless steel replacement filters (×5), with end nuts	700002775

Quality Control Reference Materials

Description	P/N
Neutrals QC Reference Material	186006360
Reversed-Phase QC Reference Material	186006363

APPLICATION AREA: Pesticide Residues in Environmental Matrices

"Waters' CSH (Charged Surface Hybrid) columns offer a significant advantage over other types of columns. It offers superior peak shape for nearly all basic compounds, increased loading capacity (meaning more concentrated samples or higher injection volume), rapid column equilibration after changing mobile-phase pH (allows switching between mobile phases for changing retention order), and it is very stable at extreme pH ranges. Overall, it is a very good column that can be used for a variety of analysis."

REVIEWER: Tom Phillips

ORGANIZATION: State Chemist Section, Maryland Department of Agriculture

TRUSTED REVIEWS

★★★★★

For more information on ACQUITY UPLC Peptide Columns, refer to page 262.

A Single Column Chemistry for Multiple Glycoprotein Analyses

The ACQUITY UPLC Glycoprotein BEH Amide, 300Å, 1.7 µm Column offers:

- Optimized wide-pore, HILIC stationary phase for resolving glycoforms from intact or digested glycoproteins
- Generation of domain specific glycan linkages with or without MS
- Elucidation of site specific glycan occupancy
- High resolution glycopeptide mapping without limitations due to peptide/glycan size or composition
- Improved resolution in separations of large, released N-glycans (EPO, Factor IX)
- QC tested with Waters Glycoprotein Performance Test Standard



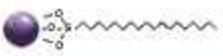
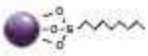
waters.com/glycoprotein

See page 250 for more information.

ACQUITY UPLC BEH Columns

ACQUITY UPLC BEH Columns provide unprecedented levels of peak asymmetry, efficiency, and chemical stability. Available in both reversed-phase and HILIC, with chemistries that provide selectivity for many small-molecule compounds, these robust columns can operate at conditions of extreme pH. With the ruggedness to operate under extreme pH conditions, ACQUITY UPLC BEH Columns enable the ability to utilize a wide pH range to influence retention, selectivity, and sensitivity of ionizable compounds.

Column Characteristics

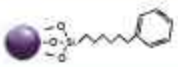
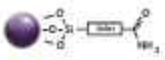
	BEH C_{18}	BEH C_8	BEH Shield RP18
	UPLC: 1.7 µm	UPLC: 1.7 µm	UPLC: 1.7 µm
Particle/Ligand			
Ligand Density	3.1 µmol/m²	3.2 µmol/m²	3.3 µmol/m²
Carbon Load	18%	13%	17%
Endcap Style	Proprietary	Proprietary	TMS
USP Class No.	L1	L7	L1
pH Range	1–12	1–12	2–11
Temperature Limits	Low pH = 80 °C, High pH = 60 °C	Low pH = 60 °C, High pH = 60 °C	Low pH = 50 °C, High pH = 45 °C
Surface Area	185 m²/g	185 m²/g	185 m²/g
Performance Standards	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360
Application Standards	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363

*Expected or approximate value.

BEH Technology is also available in HPLC particle sizes (XBridge HPLC BEH), please refer to pages 137 and 196.

BEH Technology™



BEH Phenyl	BEH HILIC	BEH Amide
UPLC: 1.7 µm	UPLC: 1.7 µm	UPLC: 1.7 µm
		
3.0 µmol/m²	N/A	7.5 µmol/m²
15%	Unbonded	12%
Proprietary	N/A	None
L11	L3	L68
1-12	1-9	2-11
Low pH = 80 °C, High pH = 60 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 90 °C, High pH = 90 °C
185 m²/g	185 m²/g	185 m²/g
Neutrals QC Reference Material p/n: 186006360	**HILIC QC Reference Material** p/n: 186007226	**HILIC QC Reference Material** p/n: 186007226
Reversed-Phase QC Reference Material p/n: 186006363	**HILIC QC Reference Material** p/n: 186007226	–

APPLICATION AREA: Characterization of Stationary Phases

"This column really offers what the company promises: high efficient and fast separations with a long column life time even at high pressures. Thanks Waters!"

REVIEWER: Annamaria Sepsey
ORGANIZATION: University of Pecs

TRUSTED REVIEWS

★★★★★

Ordering Information

ACQUITY UPLC BEH Columns

	Dimension	P/N (1/pk)	Dimension	P/N (3/pk)
	Particle Size: 1.7 µm		Particle Size: 1.7 µm	
BEH C_{18}	1.0 × 50 mm	186002344	1.0 × 50 mm	176000861
	1.0 × 100 mm	186002346	1.0 × 100 mm	176000862
	1.0 × 150 mm	186002347	1.0 × 150 mm	176001044
	2.1 × 30 mm	186002349	2.1 × 30 mm	176001304
	2.1 × 50 mm	186002350	2.1 × 50 mm	176000863
	2.1 × 75 mm	186005604	2.1 × 100 mm	176000864
	2.1 × 100 mm	186002352	2.1 × 150 mm	176001048
	2.1 × 150 mm	186002353	3.0 × 30 mm	176001794
	3.0 × 30 mm	186004659	3.0 × 50 mm	176001795
	3.0 × 50 mm	186004660	3.0 × 100 mm	176001796
	3.0 × 75 mm	186005609	3.0 × 150 mm	176001797
	3.0 × 100 mm	186004661		
	3.0 × 150 mm	186004690		
BEH Shield RP18	1.0 × 50 mm	186002851	1.0 × 50 mm	176000874
	1.0 × 100 mm	186002852	1.0 × 100 mm	176000875
	1.0 × 150 mm	186003373	1.0 × 150 mm	176001045
	2.1 × 30 mm	186003909	2.1 × 30 mm	176001309
	2.1 × 50 mm	186002853	2.1 × 50 mm	176000876
	2.1 × 75 mm	186005605	2.1 × 100 mm	176000877
	2.1 × 100 mm	186002854	2.1 × 150 mm	176001049
	2.1 × 150 mm	186003376	3.0 × 30 mm	176001802
	3.0 × 30 mm	186004667	3.0 × 50 mm	176001803
	3.0 × 50 mm	186004668	3.0 × 100 mm	176001804
	3.0 × 75 mm	186005610	3.0 × 150 mm	176001805
	3.0 × 100 mm	186004669		
	3.0 × 150 mm	186004670		
BEH C_8	1.0 × 50 mm	186002875	1.0 × 50 mm	176000882
	1.0 × 100 mm	186002876	1.0 × 100 mm	176000883
	1.0 × 150 mm	186003374	1.0 × 150 mm	176001046
	2.1 × 30 mm	186003910	2.1 × 30 mm	176001310
	2.1 × 50 mm	186002877	2.1 × 50 mm	176000884
	2.1 × 75 mm	186005606	2.1 × 100 mm	176000885
	2.1 × 100 mm	186002878	2.1 × 150 mm	176001050
	2.1 × 150 mm	186003377	3.0 × 30 mm	176001798
	3.0 × 30 mm	186004663	3.0 × 50 mm	176001799
	3.0 × 50 mm	186004664	3.0 × 100 mm	176001800
	3.0 × 75 mm	186005611	3.0 × 150 mm	176001801
	3.0 × 100 mm	186004665		
	3.0 × 150 mm	186004666		

ACQUITY UPLC BEH Columns *Continued*

	Dimension	P/N (1/pk)	Dimension	P/N (3/pk)
	Particle Size: 1.7 µm		Particle Size: 1.7 µm	
BEH Phenyl	1.0 × 50 mm	186002882	1.0 × 50 mm	176000905
	1.0 × 100 mm	186002883	1.0 × 100 mm	176000906
	1.0 × 150 mm	186003375	1.0 × 150 mm	176001047
	2.1 × 30 mm	186003911	2.1 × 30 mm	176001311
	2.1 × 50 mm	186002884	2.1 × 50 mm	176000907
	2.1 × 75 mm	186005607	2.1 × 100 mm	176000908
	2.1 × 100 mm	186002885	2.1 × 150 mm	176001051
	2.1 × 150 mm	186003378	3.0 × 30 mm	176001806
	3.0 × 30 mm	186004671	3.0 × 50 mm	176001807
	3.0 × 50 mm	186004672	3.0 × 100 mm	176001808
	3.0 × 75 mm	186005612	3.0 × 150 mm	176001809
	3.0 × 100 mm	186004673		
	3.0 × 150 mm	186004674		
BEH HILIC	1.0 × 50 mm	186003457	1.0 × 50 mm	176001089
	1.0 × 100 mm	186003458	1.0 × 100 mm	176001090
	1.0 × 150 mm	186003459	1.0 × 150 mm	176001091
	2.1 × 50 mm	186003460	2.1 × 50 mm	176001092
	2.1 × 75 mm	186005608	2.1 × 100 mm	176001093
	2.1 × 100 mm	186003461	2.1 × 150 mm	176001094
	2.1 × 150 mm	186003462	3.0 × 50 mm	176001810
	3.0 × 50 mm	186004675	3.0 × 100 mm	176001811
	3.0 × 75 mm	186005613	3.0 × 150 mm	176001812
	3.0 × 100 mm	186004676		
	3.0 × 150 mm	186004677		
BEH Amide	1.0 × 50 mm	186004848	1.0 × 50 mm	176001914
	1.0 × 100 mm	186004849	1.0 × 100 mm	176001915
	1.0 × 150 mm	186004850	1.0 × 150 mm	176001916
	2.1 × 30 mm	186004839	2.1 × 30 mm	176001906
	2.1 × 50 mm	186004800	2.1 × 50 mm	176001907
	2.1 × 75 mm	186005657	2.1 × 100 mm	176001908
	2.1 × 100 mm	186004801	2.1 × 150 mm	176001909
	2.1 × 150 mm	186004802	3.0 × 30 mm	176001910
	3.0 × 30 mm	186004803	3.0 × 50 mm	176001911
	3.0 × 50 mm	186004804	3.0 × 100 mm	176001912
	3.0 × 75 mm	186005658	3.0 × 150 mm	176001913
	3.0 × 100 mm	186004805		
	3.0 × 150 mm	186004806		

ACQUITY UPLC BEH VanGuard Pre-columns (Guard Columns), 3/pk

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH C_{18}	2.1 × 5 mm	186003975
BEH Shield RP18	2.1 × 5 mm	186003977
BEH C_8	2.1 × 5 mm	186003978
BEH Phenyl	2.1 × 5 mm	186003979
BEH HILIC	2.1 × 5 mm	186003980
BEH Amide	2.1 × 5 mm	186004799

Quality Control Reference Materials

Description	P/N
Neutrals QC Reference Materials	186006360
Reversed-Phase QC Reference Materials	186006363
HILIC QC Reference Materials	186007226

ACQUITY UPLC Glycan BEH Amide Columns

	Dimension	P/N (1/pk)
	Particle Size: 1.7 µm	
BEH Amide, 130Å	2.1 × 50 mm	186004740
	2.1 × 100 mm	186004741
	2.1 × 150 mm	186004742
BEH Amide, 300Å	2.1 × 50 mm	176003700[1]
	2.1 × 100 mm	176003701[1]
	2.1 × 150 mm	176003702[1]

[1]Kit includes column and one vial of Waters Glycoprotein Performance Test Standard, p/n: 186008010.

ACQUITY UPLC Glycan BEH Amide VanGuard Columns, 3/pk

	Dimension	P/N (1/pk)
	Particle Size: 1.7 µm	
BEH Amide, 130Å	2.1 × 5 mm	186004739
BEH Amide, 300Å	2.1 × 5 mm	176003699[1]

[1]Kit includes column and one vial of Waters Glycoprotein Performance Test Standard, p/n: 186008010.

ACQUITY UPLC Peptide BEH C_{18} Columns

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH C_{18}, 130Å	2.1 × 50 mm	186003554
	2.1 × 100 mm	186003555
	2.1 × 150 mm	186003556
	2.1 × 300 mm	186005792
BEH C_{18}, 300Å	1.0 × 50 mm	186005592
	1.0 × 100 mm	186005593
	1.0 × 150 mm	186005594
	2.1 × 50 mm	186003685
	2.1 × 100 mm	186003686
	2.1 × 150 mm	186003687

ACQUITY UPLC Peptide BEH C_{18} VanGuard Pre-Columns, 3/pk

	Dimension	P/N (1/pk)
	Particle Size: 1.7 µm	
BEH C_{18}, 130Å	2.1 × 5 mm	186003975
BEH C_{18}, 300Å	2.1 × 5 mm	186004629

For more information on ACQUITY UPLC Protein Columns, refer to page 276.

ACQUITY UPLC Protein BEH SEC Columns

	Dimension	Type	P/N (1/pk)
		Particle Size: 1.7 µm	
BEH SEC, 125Å	4.6 × 30 mm	Guard Column	186006504
	4.6 × 150 mm	Column	186006505
	4.6 × 150 mm	Column and Standard[2]	176003906
	4.6 × 300 mm	Column	186006506
	4.6 × 300 mm	Column and Standard[2]	176003907
BEH SEC, 200Å	2.1 × 150 mm	Column	186008471
	4.6 × 30 mm	Guard Column	186005793
	4.6 × 150 mm	Column	186005225
	4.6 × 150 mm	Column and Standard[2]	176003904
	4.6 × 300 mm	Column	186005226
	4.6 × 300 mm	Column and Standard[2]	176003905
		Particle Size: 2.5 µm	
BEH SEC, 450Å	4.6 × 30 mm	Guard Column	186006850
	4.6 × 300 mm	Column	186006852

[1] Includes one BEH200 SEC standard.
[2] Includes one BEH125 SEC standard.

ACQUITY UPLC Protein SEH SEC Column Accessories

Description	P/N
ELSD Outlet Tubing (0.004" I.D. × 6" length)	430001562
SEC UPLC Connection Tubing (0.005" I.D. × 1.75" length), 2/pk	186006613

ACQUITY UPLC Columns In-Line Filter Unit

Description	P/N
In-line filter holder and six, 0.2 µm stainless steel replacement filters	205000343
(For 205000343) 0.2 µm stainless steel replacement filters (×5), with end nuts	700002775

APPLICATION AREA: Peptide and Small Molecule Analytical Purposes

"The column very well-kept the reproducibility and the separation robustness even after ten thousand injections. Peak shapes are well-maintained at concentrations very close to lowest limit of quantification, no or very minimum peak smoothing is needed. After-sales cares are very professional and eager to help solving problems. When the column is conjugated with guard column and in-line filter, the life-time and separation reproducibility are ensured. Little expensive in the beginning, but definitely worth it in the long run."

REVIEWER: Yao Chen
ORGANIZATION: University of Kansas

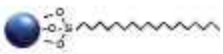
★★★★½

TRUSTED REVIEWS

ACQUITY UPLC HSS Columns

ACQUITY UPLC HSS Columns incorporate the first silica-based sub-2-µm particle designed to withstand the high pressures required for UPLC separations. Available in five bonded phases, this robust particle technology maximizes the selectivity space. The ample array of bonded phases associated with ACUITY UPLC HSS Columns enable traditional hydrophobic, reversed-phase interactions as well as dipole-dipole, aromatic, and hydrogen-bonding interactions.

Column Characteristics

	HSS C_{18}	HSS C_{18} SB
	UPLC: 1.8 µm	**UPLC: 1.8 µm**
Particle/Ligand		
Ligand Density	3.2 µmol/m²	1.6 µmol/m²
Carbon Load	15%	8%
Endcap Style	Proprietary	None
USP Class No.	L1	L1
pH Range	1–8	2–8
Temperature Limits	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
Surface Area	230 m²/g	230 m²/g
Performance Standards	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360
Application Standards	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363

*Expected or approximate value.

APPLICATION AREA: Metabolic Profiling of Urine Samples

"We love this column. It is robust, reliable and durable. It is one of our favourite standard column to do high-throughput metabolomic profiling analysis."

REVIEWER: Verena Horneffer

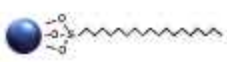
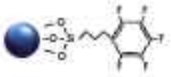
ORGANIZATION: Clinical Phenome Centre

★★★★★

TRUSTED REVIEWS

HSS
HIGH STRENGTH SILICA



HSS T3	HSS PFP	HSS CN
UPLC: 1.8 µm	UPLC: 1.8 µm	UPLC: 1.8 µm
		
1.6 µmol/m²	3.2 µmol/m²	2.0 µmol/m²
11%	7%	5%
Proprietary	None	None
L1	L43	L30
2–8	2–8	2–8
Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
230 m²/g	230 m²/g	230 m²/g
Neutrals QC Reference Material p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360
Reversed-Phase QC Reference Material p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	—

Ordering Information

ACQUITY UPLC HSS Columns

	Dimension	P/N (1/pk)	Dimension	P/N (3/pk)
	Particle Size: 1.8 µm		Particle Size: 1.8 µm	
HSS T3	1.0 × 50 mm	186003535	1.0 × 50 mm	176001127
	1.0 × 100 mm	186003536	1.0 × 100 mm	176001129
	1.0 × 150 mm	186003537	1.0 × 150 mm	176001130
	2.1 × 30 mm	186003944	2.1 × 30 mm	176001375
	2.1 × 50 mm	186003538	2.1 × 50 mm	176001131
	2.1 × 75 mm	186005614	2.1 × 100 mm	176001132
	2.1 × 100 mm	186003539	2.1 × 150 mm	176001133
	2.1 × 150 mm	186003540	3.0 × 30 mm	176001813
	3.0 × 30 mm	186004678	3.0 × 50 mm	176001814
	3.0 × 50 mm	186004679	3.0 × 100 mm	176001815
	3.0 × 75 mm	186005617	3.0 × 150 mm	176001816
	3.0 × 100 mm	186004680		
	3.0 × 150 mm	186004681		
HSS C_{18}	1.0 × 50 mm	186003529	1.0 × 50 mm	176001121
	1.0 × 100 mm	186003530	1.0 × 100 mm	176001122
	1.0 × 150 mm	186003531	1.0 × 150 mm	176001123
	2.1 × 30 mm	186003987	2.1 × 30 mm	176001398
	2.1 × 50 mm	186003532	2.1 × 50 mm	176001124
	2.1 × 75 mm	186005615	2.1 × 100 mm	176001125
	2.1 × 100 mm	186003533	2.1 × 150 mm	176001126
	2.1 × 150 mm	186003534	3.0 × 30 mm	176001817
	3.0 × 30 mm	186004682	3.0 × 50 mm	176001818
	3.0 × 50 mm	186004683	3.0 × 100 mm	176001819
	3.0 × 75 mm	186005618	3.0 × 150 mm	176001820
	3.0 × 100 mm	186004684		
	3.0 × 150 mm	186004685		
HSS C_{18} SB	1.0 × 50 mm	186004114	1.0 × 50 mm	176001556
	1.0 × 100 mm	186004115	1.0 × 100 mm	176001557
	1.0 × 150 mm	186004116	1.0 × 150 mm	176001558
	2.1 × 30 mm	186004117	2.1 × 30 mm	176001559
	2.1 × 50 mm	186004118	2.1 × 50 mm	176001560
	2.1 × 75 mm	186005616	2.1 × 100 mm	176001561
	2.1 × 100 mm	186004119	2.1 × 150 mm	176001562
	2.1 × 150 mm	186004120	3.0 × 30 mm	176001821
	3.0 × 30 mm	186004686	3.0 × 50 mm	176001822
	3.0 × 50 mm	186004687	3.0 × 100 mm	176001823
	3.0 × 75 mm	186005619	3.0 × 150 mm	176001824
	3.0 × 100 mm	186004826		
	3.0 × 150 mm	186004689		

For more information on Peptide HSS Columns, refer to page 271.

ACQUITY UPLC HSS Columns *Continued*

	Dimension	P/N (1/pk)	Dimension	P/N (3/pk)
	Particle Size: 1.8 µm		Particle Size: 1.8 µm	
HSS Cyano	1.0 × 50 mm	186005982	1.0 × 50 mm	176002703
	1.0 × 100 mm	186005983	1.0 × 100 mm	176002704
	1.0 × 150 mm	186005984	1.0 × 150 mm	176002705
	2.1 × 30 mm	186005985	2.1 × 30 mm	176002706
	2.1 × 50 mm	186005986	2.1 × 50 mm	176002707
	2.1 × 75 mm	186005987	2.1 × 75 mm	176002708
	2.1 × 100 mm	186005988	2.1 × 100 mm	176002709
	2.1 × 150 mm	186005989	2.1 × 150 mm	176002710
	3.0 × 30 mm	186005990	3.0 × 30 mm	176002711
	3.0 × 50 mm	186005991	3.0 × 50 mm	176002712
	3.0 × 75 mm	186005992	3.0 × 75 mm	176002713
	3.0 × 100 mm	186005993	3.0 × 100 mm	176002714
	3.0 × 150 mm	186005994	3.0 × 150 mm	176002715
HSS PFP	1.0 × 50 mm	186005961	1.0 × 50 mm	176002690
	1.0 × 100 mm	186005962	1.0 × 100 mm	176002691
	1.0 × 150 mm	186005963	1.0 × 150 mm	176002692
	2.1 × 30 mm	186005964	2.1 × 30 mm	176002693
	2.1 × 50 mm	186005965	2.1 × 50 mm	176002694
	2.1 × 75 mm	186005966	2.1 × 75 mm	176002695
	2.1 × 100 mm	186005967	2.1 × 100 mm	176002696
	2.1 × 150 mm	186005968	2.1 × 150 mm	176002697
	3.0 × 30 mm	186005969	3.0 × 30 mm	176002698
	3.0 × 50 mm	186005970	3.0 × 50 mm	176002699
	3.0 × 75 mm	186005971	3.0 × 75 mm	176002700
	3.0 × 100 mm	186005972	3.0 × 100 mm	176002701
	3.0 × 150 mm	186005973	3.0 × 150 mm	176002702

ACQUITY UPLC HSS VanGuard Pre-columns (Guard Columns), 3/pk

	Dimension	P/N		Dimension	P/N
	Particle Size: 1.8 µm			Particle Size: 1.8 µm	
HSS C_{18}	2.1 × 5 mm	186003981	HSS PFP	2.1 × 5 mm	186005974
HSS C_{18} SB	2.1 × 5 mm	186004136	HSS Cyano	2.1 × 5 mm	186005995
HSS T3	2.1 × 5 mm	186003976			

Quality Control Reference Materials

Description	P/N
Neutrals QC Reference Materials	186006360
Reversed-Phase QC Reference Materials	186006363

ACQUITY UPLC Columns In-Line Filter Unit

Description	P/N
In-line filter holder and six, 0.2 µm stainless steel replacement filters	205000343
(For 205000343) 0.2 µm stainless steel replacement filters (×5), with end nuts	700002775

ACQUITY UPLC and CORTECS 1.6 µm Method Validation Kits

The reproducibility of a chromatographic column's performance significantly affects the long-term reliability and robustness of an analytical method. Reproducibility, however, is beyond the direct control of analysts. Yet all isn't lost. Our long-established, highly controlled particle- and column-manufacturing processes ensure batch-to-batch and column-to-column reproducibility that provide confidence in the continued use of your methods. ACQUITY UPLC Method Validation Kits include three batches of chromatographic media (derived from different base particles) to evaluate the quality, reliability, and consistency of your method.

Ordering Information

CORTECS UPLC Columns Method Validation Kits (MVK)*

	Dimension	P/N
	Particle Size: 1.6 µm	
C_8	2.1 × 30 mm	186008403
	2.1 × 50 mm	186008404
	2.1 × 75 mm	186008405
	2.1 × 100 mm	186008406
	2.1 × 150 mm	186008407
	3.0 × 30 mm	186008413
	3.0 × 50 mm	186008414
	3.0 × 75 mm	186008415
	3.0 × 100 mm	186008416
	3.0 × 150 mm	186008417
C_{18}+	2.1 × 30 mm	186007176
	2.1 × 50 mm	186007177
	2.1 × 75 mm	186007178
	2.1 × 100 mm	186007179
	2.1 × 150 mm	186007180
	3.0 × 30 mm	186007181
	3.0 × 50 mm	186007182
	3.0 × 75 mm	186007183
	3.0 × 100 mm	186007184
	3.0 × 150 mm	186007185
C_{18}	2.1 × 30 mm	186007156
	2.1 × 50 mm	186007157
	2.1 × 75 mm	186007158
	2.1 × 100 mm	186007159
	2.1 × 150 mm	186007160
	3.0 × 30 mm	186007161
	3.0 × 50 mm	186007162
	3.0 × 75 mm	186007163
	3.0 × 100 mm	186007164
	3.0 × 150 mm	186007165

	Dimension	P/N
	Particle Size: 1.6 µm	
HILIC	2.1 × 30 mm	186007166
	2.1 × 50 mm	186007167
	2.1 × 75 mm	186007168
	2.1 × 100 mm	186007169
	2.1 × 150 mm	186007170
	3.0 × 30 mm	186007171
	3.0 × 50 mm	186007172
	3.0 × 75 mm	186007173
	3.0 × 100 mm	186007174
	3.0 × 150 mm	186007175
Phenyl	2.1 × 30 mm	186008383
	2.1 × 50 mm	186008384
	2.1 × 75 mm	186008405
	2.1 × 100 mm	186008386
	2.1 × 150 mm	186008387
	3.0 × 30 mm	186008393
	3.0 × 50 mm	186008394
	3.0 × 75 mm	186008395
	3.0 × 100 mm	186008396
	3.0 × 150 mm	186008397
T3	2.1 × 30 mm	186008529
	2.1 × 50 mm	186008530
	2.1 × 75 mm	186008531
	2.1 × 100 mm	186008536
	2.1 × 150 mm	186008537
	3.0 × 30 mm	186008538
	3.0 × 50 mm	186008539
	3.0 × 75 mm	186008540
	3.0 × 100 mm	186008541
	3.0 × 150 mm	186008542

*Each kit contains three columns from three batches of material.

CORTECS UPLC Columns Method Validation Kits (MVK)* *Continued*

	Dimension	P/N
	Particle Size: 1.6 µm	
Shield RP18	2.1 × 30 mm	186008696
	2.1 × 50 mm	186008697
	2.1 × 75 mm	186008698
	2.1 × 100 mm	186008699
	2.1 × 150 mm	186008700
	3.0 × 30 mm	186008706
	3.0 × 50 mm	186008707
	3.0 × 75 mm	186008708
	3.0 × 100 mm	186008709
	3.0 × 150 mm	186008710

ACQUITY UPLC Method Validation Kits*

	Dimension	P/N
	Particle Size: 1.7 µm	
CSH C_{18}	2.1 × 50 mm	186005571
	2.1 × 100 mm	186005572
	2.1 × 150 mm	186006016
	3.0 × 50 mm	186005573
	3.0 × 100 mm	186005574
CSH Phenyl-Hexyl	2.1 × 50 mm	186005579
	2.1 × 100 mm	186005580
	2.1 × 150 mm	186006017
	3.0 × 50 mm	186005581
	3.0 × 100 mm	186005582
CSH Fluoro-Phenyl	2.1 × 50 mm	186005575
	2.1 × 100 mm	186005576
	2.1 × 150 mm	186006018
	3.0 × 50 mm	186005577
	3.0 × 100 mm	186005578
BEH C_{18}	2.1 × 50 mm	186004044
	2.1 × 100 mm	186004045
	2.1 × 150 mm	186006019
	3.0 × 50 mm	186004691
	3.0 × 100 mm	186004692
BEH C_8	2.1 × 50 mm	186004046
	2.1 × 100 mm	186004047
	2.1 × 150 mm	186006020
	3.0 × 50 mm	186004693
	3.0 × 100 mm	186004694

*Each kit contains three columns from three batches of material.

ACQUITY UPLC Method Validation Kits* *Continued*

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH Shield RP18	2.1 × 50 mm	186004048
	2.1 × 100 mm	186004049
	2.1 × 150 mm	186006021
	3.0 × 50 mm	186004695
	3.0 × 100 mm	186004696
BEH Phenyl	2.1 × 50 mm	186004050
	2.1 × 100 mm	186004052
	2.1 × 150 mm	186006022
	3.0 × 50 mm	186004697
	3.0 × 100 mm	186004698
BEH HILIC	2.1 × 50 mm	186004053
	2.1 × 100 mm	186004054
	2.1 × 150 mm	186006023
	3.0 × 50 mm	186004699
	3.0 × 100 mm	186004700
BEH Amide	2.1 × 50 mm	186004807
	2.1 × 100 mm	186004808
	2.1 × 150 mm	186006024
	3.0 × 50 mm	186004809
	3.0 × 100 mm	186004810
	Particle Size: 1.8 µm	
HSS T3	2.1 × 50 mm	186004055
	2.1 × 100 mm	186004056
	2.1 × 150 mm	186006025
	3.0 × 50 mm	186004701
	3.0 × 100 mm	186004702
HSS C_{18}	2.1 × 50 mm	186004057
	2.1 × 100 mm	186004058
	2.1 × 150 mm	186006026
	3.0 × 50 mm	186004703
	3.0 × 100 mm	186004704
HSS C_{18} SB	2.1 × 50 mm	186004137
	2.1 × 100 mm	186004138
	2.1 × 150 mm	186006027
	3.0 × 50 mm	186004705
	3.0 × 100 mm	186004709

ACQUITY UPLC Method Validation Kits* *Continued*

	Dimension	P/N
	Particle Size: 1.8 µm	
HSS Cyano	2.1 × 50 mm	186005996
	2.1 × 100 mm	186005997
	3.0 × 50 mm	186005998
	3.0 × 100 mm	186005999
HSS PFP	2.1 × 50 mm	186005975
	2.1 × 100 mm	186005976
	3.0 × 50 mm	186005977
	3.0 × 100 mm	186005978

ACQUITY UPLC Glycan BEH Amide Method Validation Kits*

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH Amide, 130Å	2.1 × 100 mm	186004907
BEH Amide, 300Å	2.1 × 100 mm	176003703[†]

*Each kit contains three columns from three different batches of material.
[†]Kit includes column and one vial of Waters Glycoprotein Performance Test Standard, p/n: 186008010.

ACQUITY UPLC Peptide BEH C_{18} Method Validation Kits*

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH C_{18}, 130Å	2.1 × 100 mm	186004896
	2.1 × 150 mm	186006517
BEH C_{18}, 300Å	2.1 × 100 mm	186004897
	2.1 × 150 mm	186006516

*Each kit contains three columns from three different batches of material.

ACQUITY UPLC Peptide CSH C_{18} Method Validation Kits[†]*

	Dimension	P/N
	Particle Size: 1.7 µm	
CSH C_{18}, 130Å	1.0 × 50 mm	176003061
	1.0 × 100 mm	176003062
	1.0 × 150 mm	176003063
	2.1 × 50 mm	176003064
	2.1 × 100 mm	176003065
	2.1 × 150 mm	176003066

*Each kit contains three columns from three different batches of material.
[†]Kit includes column and one vial of Cytochrome c Digestion Standard, p/n: 186006371.

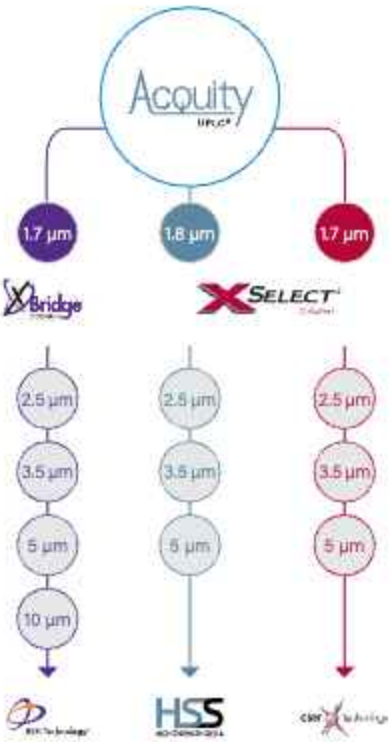
ACQUITY UPLC Peptide CSH C_{18} Method Validation Kit[†]*

	Dimension	P/N
	Particle Size: 1.7 µm	
CSH C_{18}	2.1 × 150 mm	186006940
	2.1 × 150 mm	176003068[†]

*Each kit contains three columns from three different batches of material.
[†]Kit includes columns and one vial of Cytochrome c Digestion Standard, p/n: 186006371.

ACQUITY UPLC Method Transfer Kits

Method Transfer Kits are designed to preserve the integrity of a separation as it is transferred between UPLC and HPLC platforms. Based on the concept of maintaining column length (L) to particle size (dp) ratio (L/dp), these kits provide an ACQUITY UPLC Column with an HPLC column of equivalent selectivity and resolving power. Using the ACQUITY UPLC Columns Calculator, methods can be fully transferred from HPLC to UPLC or from UPLC to HPLC.



Ordering Information

ACQUITY UPLC Method Transfer Kits*

Package Name	UPLC Column 2.1 mm I.D.	HPLC Column 4.6 mm I.D.	P/N
CSH C_{18} 1.7–5 µm	50 mm, 1.7 µm	150 mm, 5 µm	186005529
CSH Phenyl-Hexyl 1.7–5 µm	50 mm, 1.7 µm	150 mm, 5 µm	186005530
CSH Fluoro-Phenyl 1.7–5 µm	50 mm, 1.7 µm	150 mm, 5 µm	186005531
BEH C_{18} 1.7–5 µm	50 mm, 1.7 µm	150 mm, 5 µm	186004958
BEH Shield RP18 1.7–5 µm	50 mm, 1.7 µm	150 mm, 5 µm	186004959
BEH HILIC 1.7–5 µm	50 mm, 1.7 µm	150 mm, 5 µm	186004960
HSS C_{18} 1.8–5 µm	50 mm, 1.8 µm	150 mm, 5 µm	186004961
HSS T3 1.8–5 µm	50 mm, 1.8 µm	150 mm, 5 µm	186004962
HSS C_{18} SB 1.8–5 µm	50 mm, 1.8 µm	150 mm, 5 µm	186004963
CSH C_{18} 1.7–3.5 µm	50 mm, 1.7 µm	100 mm, 3.5 µm	186005532
CSH Phenyl-Hexyl 1.7–3.5 µm	50 mm, 1.7 µm	100 mm, 3.5 µm	186005533
CSH Fluoro-Phenyl 1.7–3.5 µm	50 mm, 1.7 µm	100 mm, 3.5 µm	186005534
BEH C_{18} 1.7–3.5 µm	50 mm, 1.7 µm	100 mm, 3.5 µm	186004964
BEH Shield RP18 1.7–3.5 µm	50 mm, 1.7 µm	100 mm, 3.5 µm	186004965
BEH HILIC 1.7–3.5 µm	50 mm, 1.7 µm	100 mm, 3.5 µm	186004966
BEH Amide 1.7–3.5 µm	50 mm, 1.7 µm	100 mm, 3.5 µm	186004967
HSS C_{18} 1.8–3.5 µm	50 mm, 1.8 µm	100 mm, 3.5 µm	186004968
HSS T3 1.8–3.5 µm	50 mm, 1.8 µm	100 mm, 3.5 µm	186004969
HSS C_{18} SB 1.8–3.5 µm	50 mm, 1.8 µm	100 mm, 3.5 µm	186004970
HSS Cyano 1.8–5 µm	50 mm, 1.8 µm	150 mm, 5 µm	186006000
HSS PFP 1.8–5 µm	50 mm, 1.8 µm	150 mm, 5 µm	186005979
HSS Cyano 1.8–3.5 µm	50 mm, 1.8 µm	100 mm, 3.5 µm	186006001
HSS PFP 1.8–3.5 µm	50 mm, 1.8 µm	100 mm, 3.5 µm	186005980

*Each kit contains one UPLC column and one HPLC column.

ACQUITY UPLC High Res Method Transfer Kits*

Package Name	UPLC Column 2.1 mm I.D.	HPLC Column 4.6 mm I.D.	P/N
CSH C_{18} 1.7–3.5 µm	100 mm, 1.7 µm	150 mm, 3.5 µm	186005535
CSH Phenyl-Hexyl 1.7–3.5 µm	100 mm, 1.7 µm	150 mm, 3.5 µm	186005536
CSH Fluoro-Phenyl 1.7–3.5 µm	100 mm, 1.7 µm	150 mm, 3.5 µm	186005537
BEH C_{18} 1.7–3.5 µm	100 mm, 1.7 µm	150 mm, 3.5 µm	186004971
BEH Shield RP18 1.7–3.5 µm	100 mm, 1.7 µm	150 mm, 3.5 µm	186004972
BEH HILIC 1.7–3.5 µm	100 mm, 1.7 µm	150 mm, 3.5 µm	186004973
BEH Amide 1.7–3.5 µm	100 mm, 1.7 µm	150 mm, 3.5 µm	186004974
HSS C_{18} 1.8–3.5 µm	100 mm, 1.8 µm	150 mm, 3.5 µm	186004975
HSS T3 1.8–3.5 µm	100 mm, 1.8 µm	150 mm, 3.5 µm	186004976
HSS C_{18} SB 1.8–3.5 µm	100 mm, 1.8 µm	150 mm, 3.5 µm	186004977
HSS Cyano 1.8–3.5 µm	100 mm, 1.8 µm	150 mm, 3.5 µm	186006002
HSS PFP 1.8–3.5 µm	100 mm, 1.8 µm	150 mm, 3.5 µm	186005981

*Each kit contains one UPLC column and one HPLC column.

DID YOU KNOW...

You can download the ACQUITY UPLC Columns Calculator from the ACQUITY UPLC Online Community at **www.waters.com/myuplc**

ACQUITY UPLC Method Development Kits

With a seemingly endless number of method parameters to try, developing a new chromatographic method can be an overwhelming, time-consuming experience. Finding a column that reliably and robustly delivers the desired separation results is essential to any method development strategy. The UPLC Columns in our Method Development Kits cover a broad range of selectivity, facilitating all method-development approaches.

Package Name	Chemistries	Method Development Strategy
Maximum Selectivity UPLC Method Development Kit	CSH C_{18}, CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, HSS C_{18} SB	The widest selectivity offering for method development at low and high pH. Best choice for low ionic strength additives (i.e., formic acid).
High and Low pH, Widest Selectivities UPLC Columns Kit	BEH C_{18}, BEH C_8, BEH Shield RP18, BEH Phenyl	Maximize separation selectivity by exploring low and high mobile-phase pH.
UPLC Method Development Kit	BEH C_{18}, BEH Shield RP18, BEH Phenyl, HSS T3	Maximize separation selectivity by exploring low and high mobile phase pH (BEH columns) and accommodate for the retention of polar compounds (HSS T3 columns).
L1 UPLC Columns Kit	BEH C_{18}, BEH Shield RP18, HSS C_{18}, HSS T3	C_{18} columns that differ in silanol activity and hydrophobicity within the US Pharmacopeia L1 classification.
Mass Spec UPLC Columns Kit	BEH C_{18}, HSS C_{18}, HSS T3, HSS C_{18} SB	Straight-chain-alkyl C_{18} columns that differ in silanol activity, shape, selectivity, and hydrophobicity, and exhibit no MS bleed.
Low pH, Widest Selectivities UPLC Columns Kit	BEH Shield RP18, BEH Phenyl, HSS C_{18}, HSS C_{18} SB	A diverse grouping of column selectivities for the development of a reversed-phase method in low-pH mobile phases.
Maximum Selectivity RP and HILIC UPLC Method Development Kit	CSH C_{18}, CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, BEH Amide	Offers the widest separation selectivity by combining CSH reversed-phase and HILIC stationary phases to retain analytes encompassing a broad range of polarity.
UPLC RP and HILIC Method Development Kit	BEH C_{18}, BEH Shield RP18, BEH Amide, HSS C_{18} SB	A novel approach that maximizes separation selectivity by combining distinct RP and HILIC stationary phases to retain analytes encompassing a broad range of polarity.
UPLC HILIC Method Development Kit	BEH Amide, BEH HILIC	Effortlessly develop HILIC methods at low pH (bases) or high pH (acids) for polar and/or ionizable compounds.

ACQUITY UPLC Method Development Kits

Package Name	Qty.	Chemistries	Particle Size(s)	Dimension	P/N
Maximum Selectivity UPLC	4/pk	CSH C_{18}, CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, HSS C_{18} SB	CSH: 1.7 µm; HSS: 1.8 µm	2.1 × 50 mm	176002123
Maximum Selectivity UPLC	4/pk	CSH C_{18}, CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, HSS C_{18} SB	CSH: 1.7 µm; HSS: 1.8 µm	2.1 × 100 mm	176002124
Maximum Selectivity UPLC	4/pk	CSH C_{18}, CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, HSS C_{18} SB	CSH: 1.7 µm; HSS: 1.8 µm	3.0 × 50 mm	176002125
Maximum Selectivity UPLC	4/pk	CSH C_{18}, CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, HSS C_{18} SB	CSH: 1.7 µm; HSS: 1.8 µm	3.0 × 100 mm	176002126
High and Low pH, Widest Selectivities UPLC Columns Kit	4/pk	BEH C_{18}, BEH C_8, BEH Shield RP18, BEH Phenyl	BEH: 1.7 µm	2.1 × 50 mm	176001042
High and Low pH, Widest Selectivities UPLC Columns Kit	4/pk	BEH C_{18}, BEH C_8, BEH Shield RP18, BEH Phenyl	BEH: 1.7 µm	2.1 × 100 mm	176001043
High and Low pH, Widest Selectivities UPLC Columns Kit	4/pk	BEH C_{18}, BEH C_8, BEH Shield RP18, BEH Phenyl	BEH: 1.7 µm	3.0 × 50 mm	176001881
High and Low pH, Widest Selectivities UPLC Columns Kit	4/pk	BEH C_{18}, BEH C_8, BEH Shield RP18, BEH Phenyl	BEH: 1.7 µm	3.0 × 100 mm	176001882
UPLC	4/pk	BEH C_{18}, BEH Shield RP18, BEH Phenyl, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 50 mm	176001603
UPLC	4/pk	BEH C_{18}, BEH Shield RP18, BEH Phenyl, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 100 mm	176001604
UPLC	4/pk	BEH C_{18}, BEH Shield RP18, BEH Phenyl, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 50 mm	176001883
UPLC	4/pk	BEH C_{18}, BEH Shield RP18, BEH Phenyl, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 100 mm	176001884
L1 UPLC Columns Kit	4/pk	BEH C_{18}, BEH Shield RP18, HSS C_{18}, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 50 mm	176001605
L1 UPLC Columns Kit	4/pk	BEH C_{18}, BEH Shield RP18, HSS C_{18}, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 100 mm	176001606
L1 UPLC Columns Kit	4/pk	BEH C_{18}, BEH Shield RP18, HSS C_{18}, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 50 mm	176001885
L1 UPLC Columns Kit	4/pk	BEH C_{18}, BEH Shield RP18, HSS C_{18}, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 100 mm	176001886
Mass Spec UPLC Columns Kit	4/pk	BEH C_{18}, HSS C_{18}, HSS C_8 SB, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 50 mm	176001607
Mass Spec UPLC Columns Kit	4/pk	BEH C_{18}, HSS C_{18}, HSS C_8 SB, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 100 mm	176001608
Mass Spec UPLC Columns Kit	4/pk	BEH C_{18}, HSS C_{18}, HSS C_8 SB, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 50 mm	176001887
Mass Spec UPLC Columns Kit	4/pk	BEH C_{18}, HSS C_{18}, HSS C_8 SB, HSS T3	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 100 mm	176001888
Low pH, Widest Selectivities UPLC Columns Kit	4/pk	BEH Shield RP18, BEH Phenyl, HSS C_{18}, HSS C_8 SB	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 50 mm	176001609
Low pH, Widest Selectivities UPLC Columns Kit	4/pk	BEH Shield RP18, BEH Phenyl, HSS C_{18}, HSS C_8 SB	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 100 mm	176001610
Low pH, Widest Selectivities UPLC Columns Kit	4/pk	BEH Shield RP18, BEH Phenyl, HSS C_{18}, HSS C_8 SB	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 50 mm	176001889
Low pH, Widest Selectivities UPLC Columns Kit	4/pk	BEH Shield RP18, BEH Phenyl, HSS C_{18}, HSS C_8 SB	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 100 mm	176001890
Maximum Selectivity RP and HILIC	4/pk	CSH C_{18}, CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, BEH Amide	CSH: 1.7 µm; BEH: 1.7 µm	2.1 × 50 mm	176002127
Maximum Selectivity RP and HILIC	4/pk	CSH C_{18}, CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, BEH Amide	CSH: 1.7 µm; BEH: 1.7 µm	2.1 × 100 mm	176002128
Maximum Selectivity RP and HILIC	4/pk	CSH C_{18}, CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, BEH Amide	CSH: 1.7 µm; BEH: 1.7 µm	3.0 × 50 mm	176002129
Maximum Selectivity RP and HILIC	4/pk	CSH C_{18}, CSH Phenyl-Hexyl, CSH Fluoro-Phenyl, BEH Amide	CSH: 1.7 µm; BEH: 1.7 µm	3.0 × 100 mm	176002130
UPLC RP and HILIC	4/pk	BEH C_{18}, BEH Shield RP18, BEH Amide, HSS C_8 SB	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 50 mm	176001959
UPLC RP and HILIC	4/pk	BEH C_{18}, BEH Shield RP18, BEH Amide, HSS C_8 SB	BEH: 1.7 µm; HSS: 1.8 µm	2.1 × 100 mm	176001960
UPLC RP and HILIC	4/pk	BEH C_{18}, BEH Shield RP18, BEH Amide, HSS C_8 SB	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 50 mm	176001961
UPLC RP and HILIC	4/pk	BEH C_{18}, BEH Shield RP18, BEH Amide, HSS C_8 SB	BEH: 1.7 µm; HSS: 1.8 µm	3.0 × 100 mm	176001962
UPLC HILIC	2/pk	BEH Amide, BEH HILIC	BEH: 1.7 µm	2.1 × 50 mm	176001963
UPLC HILIC	2/pk	BEH Amide, BEH HILIC	BEH: 1.7 µm	2.1 × 100 mm	176001964
UPLC HILIC	2/pk	BEH Amide, BEH HILIC	BEH: 1.7 µm	3.0 × 50 mm	176001965
UPLC HILIC	2/pk	BEH Amide, BEH HILIC	BEH: 1.7 µm	3.0 × 100 mm	176001966

ACQUITY UPLC Column Accessories

Ordering Information

ACQUITY UPLC Columns Replacement Parts

Description	P/N
0.2 µm inlet/outlet frit (×3), for 3.0 mm (I.D.) UPLC columns	700004790
0.2 µm inlet/outlet frits (×3), for 2.1 mm (I.D.) UPLC columns	700003776
0.2 µm inlet/outlet frits (×3), for 1.0 mm (I.D.) UPLC columns	700003775
Inlet end-nut (×1) for 3.0 mm (I.D.) UPLC column	700004792
Outlet end-nut (×1) for 3.0 mm (I.D.) UPLC column	700004791
Inlet end-nut (×1) for 2.1 mm (I.D.) UPLC column	700003779
Outlet end-nut (×1) for 2.1 mm (I.D.) UPLC column	700003780
Inlet end-nut (×1) for 1.0 mm (I.D.) UPLC column	700003777
Outlet end-nut (×1) for 1.0 mm (I.D.) UPLC column	700003778

2.x µm UHPLC Columns

2.x µm UHPLC Columns



"Quality is the final experience you get from Waters."

– Leanne Davey, Technical Operations Manager, Wexford, Ireland

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XTerra HPLC Columns 133

2.x µm UHPLC Columns

Choosing the correct column configuration, one that matches a particular LC system, significantly improves the chromatographic results. System Dispersion is inherent to all chromatographic instrumentation and contributes to measured losses in column efficiency. The cumulative dispersion from tubing, valves, and instrument components such as detector flow cells causes sample peaks to broaden, through dilution, in a process that begins at the sample injector and ends at the detector's outflow. As column particle size is reduced, or the internal diameter and length of the column decreases, the potential peak broadening in a non-optimized LC system increases.

The full benefit of higher-efficiency UHPLC columns is realized only when system dispersion does not substantially degrade column performance. For smaller particle columns, the increased efficiency produces narrower peaks and improves resolution; however, the narrower peaks, are more susceptible to extra-column dispersion. Therefore, matching the column configuration to the system dispersion is critical to maintain separation performance.

Column Selection Guide







System	HPLC	UHPLC	UPLC
Measured Dispersion	>40 µL	22–29 µL	<20 µL
Routine Pressure	<4000 psi	<10,000 psi	<18,000 psi
Particle Size	3–5 µm	2–3 µm	<2 µm
Column I.D.	4.6 mm (3.0 mm)	3.0 mm (2.1 mm)	2.1 mm (1.0 mm)
Column Length	75–250 mm	50–100 mm	≤150 mm

Recommended column dimension matched for Waters LC Systems.

Ideal Column Configurations for Any LC System

When transferring LC methods, instrument bandspread is one of the most practical LC-instrument parameters to determine. Knowing the bandspread value gives the separation scientist the ability to develop compatible methods on any LC system, independent of the instrument manufacturer. The following table recommends column configurations based on nominal instrument bandspread values.

System	LC Technique	Bandspread*	Recommended Column Particle Sizes and I.D.s
Shimadzu Prominence UFLC	HPLC	41 µL	XBridge 3.5, 5 µm; XSelect 3.5, 5 µm; CORTECS 2.7 µm 3.0–4.6 mm I.D.
Alliance 2695 HPLC	HPLC	29 µL	
Agilent 1260 UHPLC (600 bar)	HPLC	28 µL	
Thermo Accela UHPLC	HPLC	21 µL	XBridge 2.5, 3.5, 5 µm; XSelect 2.5, 3.5, 5 µm; CORTECS 2.7 µm 3.0 mm I.D.
Agilent 1290 UHPLC (1200 bar)	UHPLC	17 µL	
ACQUITY Arc	UHPLC	23 µL	XBridge 2.5, 3.5, 5 µm; XSelect 2.5, 3.5, 5 µm; ACQUITY HSS 1.8 µm, CORTECS 2.7 µm 3.0 mm I.D.
ACQUITY UPLC	UHPLC	12 µL	ACQUITY BEH 1.7 µm; ACQUITY CSH 1.7 µm; ACQUITY HSS 1.8 µm, CORTECS 1.6 µm 2.1 mm I.D.
ACQUITY UPLC H-Class w/Column Manager	UPLC	12 µL	
ACQUITY UPLC H-Class	UPLC	9 µL	

*These data are based on nominal values for unmodified systems, and are intended for reference only. Any adjustment to the system's plumbing, connectivity and configuration changes the instrument bandspread.

CORTECS 2.7 µm Columns

CORTECS 2.7 µm Solid-Core Particle Columns maximize resolution and peak capacity for all LC separations. Optimized to extend the performance of HPLC and UHPLC instruments, their innovative solid-core technology and bonding chemistry is available in both reversed-phase and HILIC phases, offering the flexibility to rapidly separate a wide range of compound classes. Compared with columns using fully-porous substrates, the improved efficiency of CORTECS 2.7 µm Solid-Core Columns produces sharper, narrower peaks, allowing faster flow rates at lower operational back-pressure.

Column Characteristics

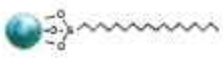
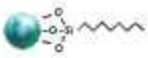
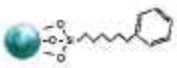
	C_{18}+	C_{18}	Shield RP18
	UPLC: 1.6 µm, UHPLC: 2.7 µm, HPLC: 2.7 µm	UPLC: 1.6 µm, UHPLC: 2.7 µm, HPLC: 2.7 µm	UPLC: 1.6 µm, UHPLC: 2.7 µm
Particle/Ligand			
Ligand Density*	2.4 µmol/m²	2.7 µmol/m²	3.2 µmol/m²
Carbon Load*	5.7%	6.6%	6.4%
Endcap Style	Proprietary	Proprietary	Proprietary
USP Class No.	L1	L1	L1
pH Range	2–8	2–8	2–8
Temperature Limits	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
Surface Area*	100 m²/g	100 m²/g	100 m²/g
Performance Standards	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360
Application Standards	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363

*Expected or approximate value.

For more information on CORTECS Columns, refer to page 86.

CORTECS COLUMNS



T3	C_8	Phenyl	HILIC
UPLC: 1.6 µm, UHPLC: 2.7 µm	UPLC: 1.6 µm, UHPLC: 2.7 µm, HPLC: 2.7 µm	UPLC: 1.6 µm, UHPLC: 2.7 µm, HPLC: 2.7 µm	UPLC: 1.6 µm, UHPLC: 2.7 µm, HPLC: 2.7 µm
			
1.6 µmol/m²	3.4 µmol/m²	3.2 µmol/m²	N/A
4.7%	4.5%	5.9%	Unbonded
Proprietary	Proprietary	Proprietary	N/A
L1	L7	L11	L3
2–8	2–8	2–8	1–5
Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
100 m²/g	100 m²/g	100 m²/g	100 m²/g
Neutrals QC Reference Material p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**HILIC QC Reference Material** p/n: 186007226
Reversed-Phase QC Reference Material p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**HILIC QC Reference Material** p/n: 186007226

APPLICATION AREA: Hormone Assay

"Needed to develop a RP UV method, had one week from start to finish. I tried a few columns before I decided to contact Waters. Waters sent me a CORTECS C_{18} and the results was amazing. Perfect symmetry and repeatability for a method that otherwise needed more time to refine. Saved me a lot of time for this project."

REVIEWER: Tomas Forsberg
ORGANIZATION: Cobra Biologics

★★★★★

TRUSTED REVIEWS

Ordering Information

CORTECS Columns

	Dimension	P/N (1/pk)	P/N (3/pk)
	Particle Size: 2.7 µm		
C_{18}+	2.1 × 30 mm	186007394	176003289
	2.1 × 50 mm	186007395	176003290
	2.1 × 75 mm	186007396	176003291
	2.1 × 100 mm	186007397	176003292
	2.1 × 150 mm	186007398	176003293
	3.0 × 30 mm	186007399	176003294
	3.0 × 50 mm	186007400	176003295
	3.0 × 75 mm	186007401	176003296
	3.0 × 100 mm	186007402	176003297
	3.0 × 150 mm	186007403	176003298
	4.6 × 30 mm	186007404	176003322
	4.6 × 50 mm	186007405	176003323
	4.6 × 75 mm	186007406	176003324
	4.6 × 100 mm	186007407	176003325
	4.6 × 150 mm	186007408	176003326

	Dimension	P/N (1/pk)	P/N (3/pk)
	Particle Size: 2.7 µm		
C_{18}	2.1 × 30 mm	186007364	176003269
	2.1 × 50 mm	186007365	176003270
	2.1 × 75 mm	186007366	176003271
	2.1 × 100 mm	186007367	176003272
	2.1 × 150 mm	186007368	176003273
	3.0 × 30 mm	186007369	176003274
	3.0 × 50 mm	186007370	176003275
	3.0 × 75 mm	186007371	176003276
	3.0 × 100 mm	186007372	176003277
	3.0 × 150 mm	186007373	176003278
	4.6 × 30 mm	186007374	176003312
	4.6 × 50 mm	186007375	176003313
	4.6 × 75 mm	186007376	176003314
	4.6 × 100 mm	186007377	176003315
	4.6 × 150 mm	186007378	176003316

	Dimension	P/N (1/pk)	P/N (3/pk)
	Particle Size: 2.7 µm		
C_8	2.1 × 30 mm	186008348	176003804
	2.1 × 50 mm	186008349	176003805
	2.1 × 75 mm	186008350	176003806
	2.1 × 100 mm	186008351	176003807
	2.1 × 150 mm	186008352	176003808
	3.0 × 30 mm	186008358	176003809
	3.0 × 50 mm	186008359	176003810
	3.0 × 75 mm	186008360	176003811
	3.0 × 100 mm	186008361	176003812
	3.0 × 150 mm	186008362	176003813
	4.6 × 30 mm	186008368	176003814
	4.6 × 50 mm	186008369	176003815
	4.6 × 75 mm	186008370	176003816
	4.6 × 100 mm	186008371	176003817
	4.6 × 150 mm	186008372	176003818

	Dimension	P/N (1/pk)	P/N (3/pk)
	Particle Size: 2.7 µm		
HILIC	2.1 × 30 mm	186007379	176003279
	2.1 × 50 mm	186007380	176003280
	2.1 × 75 mm	186007381	176003281
	2.1 × 100 mm	186007382	176003282
	2.1 × 150 mm	186007383	176003283
	3.0 × 30 mm	186007384	176003284
	3.0 × 50 mm	186007385	176003285
	3.0 × 75 mm	186007386	176003286
	3.0 × 100 mm	186007387	176003287
	3.0 × 150 mm	186007388	176003288
	4.6 × 30 mm	186007389	176003317
	4.6 × 50 mm	186007390	176003318
	4.6 × 75 mm	186007391	176003319
	4.6 × 100 mm	186007392	176003320
	4.6 × 150 mm	186007393	176003321

	Dimension	P/N (1/pk)	P/N (3/pk)
	Particle Size: 2.7 µm		
Phenyl	2.1 × 30 mm	186008318	176003789
	2.1 × 50 mm	186008319	176003790
	2.1 × 75 mm	186008320	176003791
	2.1 × 100 mm	186008321	176003792
	2.1 × 150 mm	186008322	176003793
	3.0 × 30 mm	186008328	176003794
	3.0 × 50 mm	186008329	176003795
	3.0 × 75 mm	186008330	176003796
	3.0 × 100 mm	186008331	176003797
	3.0 × 150 mm	186008332	176003798
	4.6 × 30 mm	186008338	176003799
	4.6 × 50 mm	186008339	176003800
	4.6 × 75 mm	186008340	176003801
	4.6 × 100 mm	186008341	176003802
	4.6 × 150 mm	186008342	176003803

	Particle Size: 2.7 µm		
Shield RP18	2.1 × 30 mm	186008661	176003912
	2.1 × 50 mm	186008662	176003913
	2.1 × 75 mm	186008663	176003914
	2.1 × 100 mm	186008664	176003915
	2.1 × 150 mm	186008665	176003916
	3.0 × 30 mm	186008671	176003917
	3.0 × 50 mm	186008672	176003918
	3.0 × 75 mm	186008673	176003919
	3.0 × 100 mm	186008674	176003920
	3.0 × 150 mm	186008675	176003921
	4.6 × 30 mm	186008681	176003922
	4.6 × 50 mm	186008682	176003923
	4.6 × 75 mm	186008683	176003924
	4.6 × 100 mm	186008684	176003925
	4.6 × 150 mm	186008685	176003926

	Dimension	P/N (1/pk)	P/N (3/pk)
	Particle Size: 2.7 µm		
T3	2.1 × 30 mm	186008481	176003876
	2.1 × 50 mm	186008482	176003877
	2.1 × 75 mm	186008483	176003878
	2.1 × 100 mm	186008484	176003879
	2.1 × 150 mm	186008485	176003880
	3.0 × 30 mm	186008486	176003881
	3.0 × 50 mm	186008487	176003882
	3.0 × 75 mm	186008488	176003883
	3.0 × 100 mm	186008489	176003884
	3.0 × 150 mm	186008490	176003885
	4.6 × 30 mm	186008491	176003886
	4.6 × 50 mm	186008492	176003887
	4.6 × 75 mm	186008493	176003888
	4.6 × 100 mm	186008494	176003889
	4.6 × 150 mm	186008495	176003890

APPLICATION AREA: Agricultural Chemistry

"The CORTECS T3 Column has provided excellent separation of mixed polarity compounds. The column, as expected, has provided excellent selectivity for moderately polar compounds. This is a great column to add to your method development screen!!"

REVIEWER: Justin Shearer
ORGANIZATION: Dow AgroSciences

TRUSTED REVIEWS

★★★★☆

CORTECS Columns Method Validation Kits*

	Dimension	P/N
	Particle Size: 2.7 µm	
C_{18}+	2.1 × 30 mm	186007439
	2.1 × 50 mm	186007440
	2.1 × 75 mm	186007441
	2.1 × 100 mm	186007442
	2.1 × 150 mm	186007443
	3.0 × 30 mm	186007444
	3.0 × 50 mm	186007445
	3.0 × 75 mm	186007446
	3.0 × 100 mm	186007447
	3.0 × 150 mm	186007448
	4.6 × 30 mm	186007449
	4.6 × 50 mm	186007450
	4.6 × 75 mm	186007451
	4.6 × 100 mm	186007452
	4.6 × 150 mm	186007453

	Particle Size: 2.7 µm	
C_{18}	2.1 × 30 mm	186007409
	2.1 × 50 mm	186007410
	2.1 × 75 mm	186007411
	2.1 × 100 mm	186007412
	2.1 × 150 mm	186007413
	3.0 × 30 mm	186007414
	3.0 × 50 mm	186007415
	3.0 × 75 mm	186007416
	3.0 × 100 mm	186007417
	3.0 × 150 mm	186007418
	4.6 × 30 mm	186007419
	4.6 × 50 mm	186007420
	4.6 × 75 mm	186007421
	4.6 × 100 mm	186007422
	4.6 × 150 mm	186007423

*Each Method Validation Kit contains 3 columns, each from a different batch.

	Dimension	P/N
	Particle Size: 2.7 µm	
C_8	2.1 × 30 mm	186008353
	2.1 × 50 mm	186008354
	2.1 × 75 mm	186008355
	2.1 × 100 mm	186008356
	2.1 × 150 mm	186008357
	3.0 × 30 mm	186008363
	3.0 × 50 mm	186008364
	3.0 × 75 mm	186008365
	3.0 × 100 mm	186008366
	3.0 × 150 mm	186008367
	4.6 × 30 mm	186008373
	4.6 × 50 mm	186008374
	4.6 × 75 mm	186008375
	4.6 × 100 mm	186008376
	4.6 × 150 mm	186008377

	Particle Size: 2.7 µm	
HILIC	2.1 × 30 mm	186007424
	2.1 × 50 mm	186007425
	2.1 × 75 mm	186007426
	2.1 × 100 mm	186007427
	2.1 × 150 mm	186007428
	3.0 × 30 mm	186007429
	3.0 × 50 mm	186007430
	3.0 × 75 mm	186007431
	3.0 × 100 mm	186007432
	3.0 × 150 mm	186007433
	4.6 × 30 mm	186007434
	4.6 × 50 mm	186007435
	4.6 × 75 mm	186007436
	4.6 × 100 mm	186007437
	4.6 × 150 mm	186007438

CORTECS Columns Method Validation Kits* *Continued*

	Dimension	P/N
	Particle Size: 2.7 µm	
Phenyl	2.1 × 30 mm	186008323
	2.1 × 50 mm	186008324
	2.1 × 75 mm	186008325
	2.1 × 100 mm	186008326
	2.1 × 150 mm	186008327
	3.0 × 30 mm	186008333
	3.0 × 50 mm	186008334
	3.0 × 75 mm	186008335
	3.0 × 100 mm	186008336
	3.0 × 150 mm	186008337
	4.6 × 30 mm	186008343
	4.6 × 50 mm	186008344
	4.6 × 75 mm	186008345
	4.6 × 100 mm	186008346
	4.6 × 150 mm	186008347

	Particle Size: 2.7 µm	
Shield RP18	2.1 × 30 mm	186008666
	2.1 × 50 mm	186008667
	2.1 × 75 mm	186008668
	2.1 × 100 mm	186008669
	2.1 × 150 mm	186008670
	3.0 × 30 mm	186008676
	3.0 × 50 mm	186008677
	3.0 × 75 mm	186008678
	3.0 × 100 mm	186008679
	3.0 × 150 mm	186008680
	4.6 × 30 mm	186008686
	4.6 × 50 mm	186008687
	4.6 × 75 mm	186008688
	4.6 × 100 mm	186008689
	4.6 × 150 mm	186008690

*Each Method Validation Kit contains 3 columns, each from a different batch.

	Dimension	P/N
	Particle Size: 2.7 µm	
T3	2.1 × 30 mm	186008509
	2.1 × 50 mm	186008510
	2.1 × 75 mm	186008516
	2.1 × 100 mm	186008517
	2.1 × 150 mm	186008518
	3.0 × 30 mm	186008519
	3.0 × 50 mm	186008520
	3.0 × 75 mm	186008521
	3.0 × 100 mm	186008522
	3.0 × 150 mm	186008523
	4.6 × 30 mm	186008524
	4.6 × 50 mm	186008525
	4.6 × 75 mm	186008526
	4.6 × 100 mm	186008527
	4.6 × 150 mm	186008528

CORTECS VanGuard Cartridges

	Dimension	P/N
	Particle Size: 2.7 µm	
C_{18}+	2.1 × 5 mm	186007685
	3.9 × 5 mm	186007687
C_{18}	2.1 × 5 mm	186007682
	3.9 × 5 mm	186007684
C_8	2.1 × 5 mm	186008421
	3.9 × 5 mm	186008422
HILIC	2.1 × 5 mm	186007688
	3.9 × 5 mm	186007690
Phenyl	2.1 × 5 mm	186008418
	3.9 × 5 mm	186008419
Shield RP18	2.1 × 5 mm	186008712
	3.9 × 5 mm	186008711
T3	2.1 × 5 mm	186008506
	3.9 × 5 mm	186008507

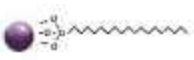
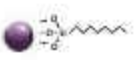
Universal VanGuard Cartridge Holder

Description	P/N
Universal VanGuard Cartridge Holder	186007949

XBridge BEH *XP* Columns

XBridge BEH *XP* [e*X*tended *P*erformance] Columns offer rugged and repeatable performance that maximize efficiency and retention for all HPLC and UHPLC separation conditions. The 2.5 µm particle columns are fully scalable and complement the full range of XBridge BEH particle sizes.

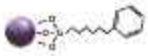
Column Characteristics

	BEH C_{18}, 130Å	BEH C_8, 130Å	BEH Shield RP18, 130Å	Peptide BEH C_{18}, 130Å	Peptide BEH C_{18}, 300Å	Protein BEH C_4, 300Å
	UHPLC: 2.5 µm *XP* HPLC: 3.5, 5, 10 µm	UHPLC: 2.5 µm *XP* HPLC: 3.5, 5, 10 µm	UHPLC: 2.5 µm *XP* HPLC: 3.5, 5, 10 µm	HPLC: 3.5, 5, 10 µm	HPLC: 3.5, 5, 10 µm	HPLC: 3.5 µm
Particle/Ligand						
Ligand Density*	3.1 µmol/m²	3.2 µmol/m²	3.3 µmol/m²	3.1 µmol/m²	3.1 µmol/m²	2.4 µmol/m²
Carbon Load*	18%	13%	17%	18%	12%	8%
Endcap Style	Proprietary	Proprietary	TMS	Proprietary	Proprietary	None
USP Class No.	L1	L7	L1	L1	L1	L26
pH Range	1–12	1–12	2–11	1–12	1–12	1–10
Temperature Limits	Low pH = 80 °C, High pH = 60 °C	Low pH = 60 °C, High pH = 60 °C	Low pH = 50 °C, High pH = 45 °C	Low pH = 80 °C, High pH = 60 °C	Low pH = 80 °C, High pH = 60 °C	Low pH = 80 °C, High pH = 50 °C
Surface Area*	185 m²/g	185 m²/g	185 m²/g	185 m²/g	90 m²/g	90 m²/g
Performance Standards	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Cytochrome *c* Digestion Standard** p/n: 186006371	**Cytochrome *c* Digestion Standard** p/n: 186006371	**MassPREP Protein Standard Mix** p/n: 186004900
Application Standards	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**Peptide Retention Standard** p/n: 186006555	**Peptide Retention Standard** p/n: 186006555	**MassPREP Protein Standard Mix** p/n: 186004900

*Expected or approximate value.
BEH Technology is also available in UPLC particle sizes (ACQUITY UPLC BEH 1.7 µm), please refer to page 94.

For more information on XBridge BEH HPLC Columns, refer to page 137.



Protein BEH SEC, 125Å	Protein BEH SEC, 200Å	Protein BEH SEC, 450Å	Oligonucleotide BEH C_{18}, 130Å	BEH Phenyl, 130Å	BEH HILIC, 130Å	BEH Amide, 130Å
HPLC: 3.5 µm	HPLC: 3.5 µm	HPLC: 3.5 µm	HPLC: 2.5 µm	UHPLC: 2.5 µm *XP* HPLC: 3.5, 5, 10 µm	UHPLC: 2.5 µm *XP* HPLC: 3.5 µm	UHPLC: 2.5 µm *XP* HPLC: 3.5 µm
						
4.9 µmol/m²	5.5 µmol/m²	4.8 µmol/m²	3.1 µmol/m²	3.0 µmol/m²	N/A	7.5 µmol/m²
15%	12%	9%	18%	15%	Unbonded	12%
None	None	None	Proprietary	Proprietary	N/A	None
L33	L33	L33	L1	L11	L3	L68
1–8	1–8	1–8	1–12	1–12	1–9	2–11
Low pH = 60 °C, High pH = 60 °C	Low pH = 60 °C, High pH = 60 °C	Low pH = 60 °C, High pH = 60 °C	Low pH = 60 °C, High pH = 60 °C	Low pH = 60 °C, High pH = 60 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 90 °C, High pH = 90 °C
395 m²/g	220 m²/g	80 m²/g	90 m²/g	185 m²/g	185 m²/g	185 m²/g
BEH 125 Protein Standard Mix p/n: 186006519	**BEH200 SEC Protein Standard Mix** p/n: 186006518	**BEH450 SEC Protein Standard Mix** p/n: 186006842	**MassPREP OST Standard** p/n: 186004135	**Neutrals QC Reference Material** p/n: 186006360	**HILIC QC Reference Material** p/n: 186007226	**HILIC QC Reference Material** p/n: 186007226
BEH 125 Protein Standard Mix p/n: 186006519	**BEH200 SEC Protein Standard Mix** p/n: 186006518	**BEH450 SEC Protein Standard Mix** p/n: 186006842	**MassPREP OST Standard** p/n: 186004135	**Reversed-Phase QC Reference Material** p/n: 186006363	**HILIC QC Reference Material** p/n: 186007226	**HILIC QC Reference Material** p/n: 186007226

Ordering Information

XBridge Analytical Columns

	Dimension	P/N (1/pk)	P/N (3/pk)
	Particle Size: 2.5 µm		
BEH C_{18}	1.0 × 50 mm*	186003118	—
	2.1 × 20 mm *IS**	186003201	—
	2.1 × 30 mm *XP*	186006028	176002546
	2.1 × 50 mm *XP*	186006029	176002547
	2.1 × 75 mm *XP*	186006030	176002548
	2.1 × 100 mm *XP*	186006031	176002549
	2.1 × 150 mm *XP*	186006709	176002879
	3.0 × 30 mm *XP*	186006032	176002550
	3.0 × 50 mm *XP*	186006033	176002551
	3.0 × 75 mm *XP*	186006034	176002552
	3.0 × 100 mm *XP*	186006035	176002553
	3.0 × 150 mm *XP*	186006710	176002880
	4.6 × 30 mm *XP*	186006036	—
	4.6 × 50 mm *XP*	186006037	—
	4.6 × 75 mm *XP*	186006038	—
	4.6 × 100 mm *XP*	186006039	—
	4.6 × 150 mm *XP*	186006711	—

	Dimension	P/N (1/pk)	P/N (3/pk)
	Particle Size: 2.5 µm		
BEH C_8	1.0 × 50 mm*	186003164	—
	2.1 × 20 mm *IS**	186003167	—
	2.1 × 30 mm *XP*	186006040	176002554
	2.1 × 50 mm *XP*	186006041	176002555
	2.1 × 75 mm *XP*	186006042	176002556
	2.1 × 100 mm *XP*	186006043	176002557
	2.1 × 150 mm *XP*	186006712	176002881
	3.0 × 20 mm *IS**	186003168	—
	3.0 × 30 mm *XP*	186006044	176002558
	3.0 × 50 mm *XP*	186006045	176002559
	3.0 × 75 mm *XP*	186006046	176002560
	3.0 × 100 mm *XP*	186006047	176002561
	3.0 × 150 mm *XP*	186006713	176002882
	4.6 × 20 mm *IS**	186003172	—
	4.6 × 30 mm *XP*	186006048	—
	4.6 × 50 mm *XP*	186006049	—
	4.6 × 75 mm *XP*	186006050	—
	4.6 × 100 mm *XP*	186006051	—
	4.6 × 150 mm *XP*	186006714	—

*Recommended maximum pressure of 6000 psi (400 bar).

	Dimension	P/N (1/pk)	P/N (3/pk)
	Particle Size: 2.5 µm		
BEH Shield RP18	1.0 × 50 mm*	186003136	—
	2.1 × 20 mm *IS**	186003139	—
	2.1 × 30 mm *XP*	186006052	176002562
	2.1 × 50 mm *XP*	186006053	176002563
	2.1 × 75 mm *XP*	186006054	176002564
	2.1 × 100 mm *XP*	186006055	176002565
	2.1 × 150 mm *XP*	186006715	176002883
	3.0 × 20 mm *IS**	186003140	—
	3.0 × 30 mm *XP*	186006056	176002566
	3.0 × 50 mm *XP*	186006057	176002567
	3.0 × 75 mm *XP*	186006058	176002568
	3.0 × 100 mm *XP*	186006059	176002569
	3.0 × 150 mm *XP*	186006716	176002884
	4.6 × 20 mm *IS**	186003144	—
	4.6 × 30 mm *XP*	186006060	—
	4.6 × 50 mm *XP*	186006061	—
	4.6 × 75 mm *XP*	186006062	—
	4.6 × 100 mm *XP*	186006063	—
	4.6 × 150 mm *XP*	186006717	—

	Dimension	P/N (1/pk)	P/N (3/pk)
	Particle Size: 2.5 µm		
BEH Phenyl	1.0 × 50 mm*	186003306	—
	2.1 × 30 mm *XP*	186006064	176002570
	2.1 × 50 mm *XP*	186006065	176002571
	2.1 × 75 mm *XP*	186006066	176002572
	2.1 × 100 mm *XP*	186006067	176002573
	2.1 × 150 mm *XP*	186006718	176002885
	3.0 × 30 mm *XP*	186006068	176002574
	3.0 × 50 mm *XP*	186006069	176002575
	3.0 × 75 mm *XP*	186006070	176002576
	3.0 × 100 mm *XP*	186006071	176002577
	3.0 × 150 mm *XP*	186006719	176002886
	4.6 × 20 mm *IS**	186003313	—
	4.6 × 30 mm *XP*	186006072	—
	4.6 × 50 mm *XP*	186006073	—
	4.6 × 75 mm *XP*	186006074	—
	4.6 × 100 mm *XP*	186006075	—
	4.6 × 150 mm *XP*	186006720	—

XBridge Analytical Columns *Continued*

	Dimension	P/N (1/pk)	P/N (3/pk)
	Particle Size: 2.5 µm		
HILIC	2.1 × 30 mm *XP*	186006076	176002578
	2.1 × 50 mm *XP*	186006077	176002579
	2.1 × 75 mm *XP*	186006078	176002580
	2.1 × 100 mm *XP*	186006079	176002581
	2.1 × 150 mm *XP*	186006721	176002887
	3.0 × 30 mm *XP*	186006080	176002582
	3.0 × 50 mm *XP*	186006081	176002583
	3.0 × 75 mm *XP*	186006082	176002584
	3.0 × 100 mm *XP*	186006083	176002585
	3.0 × 150 mm *XP*	186006722	176002888
	4.6 × 30 mm *XP*	186006084	–
	4.6 × 50 mm *XP*	186006085	–
	4.6 × 75 mm *XP*	186006086	–
	4.6 × 100 mm *XP*	186006087	–
	4.6 × 150 mm *XP*	186006723	–
	Particle Size: 2.5 µm		
Amide	2.1 × 30 mm *XP*	186006088	176002586
	2.1 × 50 mm *XP*	186006089	176002587
	2.1 × 75 mm *XP*	186006090	176002588
	2.1 × 100 mm *XP*	186006091	176002589
	2.1 × 150 mm *XP*	186006724	176002889
	3.0 × 30 mm *XP*	186006092	176002590
	3.0 × 50 mm *XP*	186006093	176002591
	3.0 × 75 mm *XP*	186006094	176002592
	3.0 × 100 mm *XP*	186006095	176002593
	3.0 × 150 mm *XP*	186006725	176002890
	4.6 × 30 mm *XP*	186006096	–
	4.6 × 50 mm *XP*	186006097	–
	4.6 × 75 mm *XP*	186006098	–
	4.6 × 100 mm *XP*	186006099	–
	4.6 × 150 mm *XP*	186006726	–

XBridge BEH Glycan Columns

	Dimension	P/N
	Particle Size: 2.5 µm	
BEH Amide, 130Å	2.1 × 50 mm *XP*	186007263
	2.1 × 100 mm *XP*	186007264
	2.1 × 150 mm *XP*	186007265
	3.0 × 30 mm *XP*	186008038
	3.0 × 75 mm *XP*	186008039
	3.0 × 150 mm *XP*	186008040
	4.6 × 50 mm *XP*	186007268
	4.6 × 100 mm *XP*	186007269
	4.6 × 150 mm *XP*	186007270

XBridge Columns Method Validation Kits*

	Dimension	P/N
	Particle Size: 2.5 µm	
BEH C_{18}	2.1 × 50 mm *XP*	186006197
	2.1 × 100 mm *XP*	186006198
	2.1 × 150 mm *XP*	186006757
	3.0 × 50 mm *XP*	186006199
	3.0 × 100 mm *XP*	186006200
	3.0 × 150 mm *XP*	186006758
	4.6 × 50 mm	186004906**
	4.6 × 50 mm *XP*	186006201
	4.6 × 100 mm *XP*	186006202
	4.6 × 150 mm *XP*	186006759
	Particle Size: 2.5 µm	
BEH C_8	2.1 × 50 mm *XP*	186006203
	2.1 × 100 mm *XP*	186006204
	2.1 × 150 mm *XP*	186006760
	3.0 × 50 mm *XP*	186006205
	3.0 × 100 mm *XP*	186006206
	3.0 × 150 mm *XP*	186006761
	4.6 × 50 mm *XP*	186006207
	4.6 × 100 mm *XP*	186006208
	4.6 × 150 mm *XP*	186006762
	Particle Size: 2.5 µm	
BEH Shield RP18	2.1 × 50 mm *XP*	186006209
	2.1 × 100 mm *XP*	186006210
	2.1 × 150 mm *XP*	186006763
	3.0 × 50 mm *XP*	186006211
	3.0 × 100 mm *XP*	186006212
	3.0 × 150 mm *XP*	186006774
	4.6 × 50 mm *XP*	186006213
	4.6 × 100 mm *XP*	186006214
	4.6 × 150 mm *XP*	186006775

* Each Method Validation Kit contains 3 columns, each from a different batch.
**Oligonucleotide Method Validation Kit.

XBridge Columns Method Validation Kits *Continued*

	Dimension	P/N
	Particle Size: 2.7 µm	
Phenyl	2.1 × 50 mm *XP*	186006215
	2.1 × 100 mm *XP*	186006216
	2.1 × 150 mm *XP*	186006776
	3.0 × 50 mm *XP*	186006217
	3.0 × 100 mm *XP*	186006218
	3.0 × 150 mm *XP*	186006777
	4.6 × 50 mm *XP*	186006219
	4.6 × 100 mm *XP*	186006220
	4.6 × 150 mm *XP*	186006778
	Particle Size: 2.5 µm	
HILIC	2.1 × 50 mm *XP*	186006221
	2.1 × 100 mm *XP*	186006222
	2.1 × 150 mm *XP*	186006779
	3.0 × 50 mm *XP*	186006223
	3.0 × 100 mm *XP*	186006224
	3.0 × 150 mm *XP*	186006780
	4.6 × 50 mm *XP*	186006225
	4.6 × 100 mm *XP*	186006226
	4.6 × 150 mm *XP*	186006781
	Particle Size: 2.5 µm	
Amide	2.1 × 50 mm *XP*	186006227
	2.1 × 100 mm *XP*	186006228
	2.1 × 150 mm *XP*	186006782
	3.0 × 50 mm *XP*	186006229
	3.0 × 100 mm *XP*	186006230
	3.0 × 150 mm *XP*	186006783
	4.6 × 50 mm *XP*	186006231
	4.6 × 100 mm *XP*	186006232
	4.6 × 150 mm *XP*	186006784
	Particle Size: 2.5 µm	
Glycan BEH Amide	2.1 × 150 mm *XP*	186007266
	4.6 × 150 mm *XP*	186007271

* Each Method Validation Kit contains 3 columns, each from a different batch.
** Oligonucleotide Method Validation Kit.

XBridge VanGuard Cartridges

	Dimension	P/N
	Particle Size: 2.5 µm	
BEH C_{18}	2.1 × 5 mm	186007772
	3.9 × 5 mm	186007774
BEH C_8	2.1 × 5 mm	186007781
	3.9 × 5 mm	186007783
BEH Shield RP18	2.1 × 5 mm	186007808
	3.9 × 5 mm	186007810
Phenyl	2.1 × 5 mm	186007799
	3.9 × 5 mm	186007801
HILIC	2.1 × 5 mm	186007790
	3.9 × 5 mm	186007792
Amide	2.1 × 5 mm	186007763
	3.9 × 5 mm	186007765

Universal VanGuard Cartridge Holder

Description	P/N
Universal VanGuard Cartridge Holder	186007949

"This variety of column was a workhorse for a test that we were conducting; it was robust enough to keep running without much maintenance involved. The column we were using performed very well under the strict time constraints that we were working with."

REVIEWER: Gregory Rahm Jr.
ORGANIZATION: Q Laboratories

★★★★☆

TRUSTED REVIEWS

XSELECT® Columns

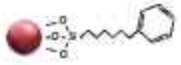
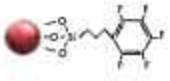


XSelect CSH ***XP*** and HSS ***XP*** HPLC Columns

For the method developer, columns that maximize separation selectivity are among the most powerful tools for influencing chromatographic behavior. The carefully chosen bonded ligands used for XSelect CSH ***XP*** and XSelect HSS ***XP*** Columns redefine the broadly selective phases tailored for modern UHPLC separations. With a selection of two base-particle technologies combined with eight selectivity-optimized bonded phases, XSelect Columns help reduce method development effort.

CSH™ Technology

Column Characteristics

	CSH C_{18} 130Å	CSH Phenyl-Hexyl, 130Å	CSH Fluoro-Phenyl, 300Å
	UHPLC: 2.5 µm ***XP*** HPLC: 3.5, 5, 10 µm	UHPLC: 2.5 µm ***XP*** HPLC: 3.5, 5 µm	UHPLC: 2.5 µm ***XP*** HPLC: 3.5, 5 µm
Particle/Ligand			
Ligand Density*	2.3 µmol/m²	2.3 µmol/m²	2.3 µmol/m²
Carbon Load*	15%	14%	10%
Endcap Style	Proprietary	Proprietary	None
USP Class No.	L1	L11	L43
pH Range	1–11	1–11	1–8
Temperature Limits	Low pH = 80 °C, High pH = 45 °C	Low pH = 80 °C, High pH = 45 °C	Low pH = 60 °C, High pH = 45 °C
Surface Area*	185 m²/g	185 m²/g	185 m²/g
Performance Standards	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360
Application Standards	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363

*Expected or approximate value.

XSelect Columns are also available in UPLC particle sizes (ACQUITY UPLC CSH 1.7 µm and ACQUITY UPLC HSS 1.8 µm), refer to pages 90 and 100.

For more information on XSelect CSH and HSS HPLC Columns, refer to page 146.

Ordering Information

XSelect CSH Analytical Columns

	Dimension	P/N (1/pk)	P/N (3/pk)
	Particle Size: 2.5 µm		
CSH C_{18}	2.1 × 30 mm *XP*	186006100	176002594
	2.1 × 50 mm *XP*	186006101	176002595
	2.1 × 75 mm *XP*	186006102	176002596
	2.1 × 100 mm *XP*	186006103	176002597
	2.1 × 150 mm *XP*	186006727	176002891
	3.0 × 30 mm *XP*	186006104	176002598
	3.0 × 50 mm *XP*	186006105	176002599
	3.0 × 75 mm *XP*	186006106	176002600
	3.0 × 100 mm *XP*	186006107	176002601
	3.0 × 150 mm *XP*	186006728	176002892
	4.6 × 30 mm *XP*	186006108	–
	4.6 × 50 mm *XP*	186006109	–
	4.6 × 75 mm *XP*	186006110	–
	4.6 × 100 mm *XP*	186006111	–
	4.6 × 150 mm *XP*	186006729	–
	Particle Size: 2.5 µm		
CSH Fluoro-Phenyl	2.1 × 30 mm *XP*	186006112	176002602
	2.1 × 50 mm *XP*	186006113	176002603
	2.1 × 75 mm *XP*	186006114	176002604
	2.1 × 100 mm *XP*	186006115	176002605
	2.1 × 150 mm *XP*	186006730	176002893
	3.0 × 30 mm *XP*	186006116	176002606
	3.0 × 50 mm *XP*	186006117	176002607
	3.0 × 75 mm *XP*	186006118	176002608
	3.0 × 100 mm *XP*	186006119	176002609
	3.0 × 150 mm *XP*	186006731	176002894
	4.6 × 30 mm *XP*	186006120	–
	4.6 × 50 mm *XP*	186006121	–
	4.6 × 75 mm *XP*	186006122	–
	4.6 × 100 mm *XP*	186006123	–
	4.6 × 150 mm *XP*	186006732	–

	Dimension	P/N (1/pk)	P/N (3/pk)
	Particle Size: 2.5 µm		
CSH Phenyl-Hexyl	2.1 × 30 mm *XP*	186006124	176002610
	2.1 × 50 mm *XP*	186006125	176002611
	2.1 × 75 mm *XP*	186006126	176002612
	2.1 × 100 mm *XP*	186006127	176002613
	2.1 × 150 mm *XP*	186006733	176002895
	3.0 × 30 mm *XP*	186006128	176002614
	3.0 × 50 mm *XP*	186006129	176002615
	3.0 × 75 mm *XP*	186006130	176002616
	3.0 × 100 mm *XP*	186006131	176002617
	3.0 × 150 mm *XP*	186006734	176002896
	4.6 × 30 mm *XP*	186006132	–
	4.6 × 50 mm *XP*	186006133	–
	4.6 × 75 mm *XP*	186006134	–
	4.6 × 100 mm *XP*	186006135	–
	4.6 × 150 mm *XP*	186006735	–

XSelect CSH Peptide Columns

	Dimension	P/N
	Particle Size: 2.5 µm	
CSH C_{18}, 130Å	2.1 × 50 mm *XP*	186006941
	2.1 × 100 mm *XP*	186006942
	2.1 × 150 mm *XP*	186006943
	4.6 × 50 mm *XP*	186006946
	4.6 × 100 mm *XP*	186006947
	4.6 × 150 mm *XP*	186007038

XSelect CSH Columns Method Validation Kits*

	Dimension	P/N
	Particle Size: 2.5 µm	
CSH C_{18}	2.1 × 50 mm *XP*	186006233
	2.1 × 100 mm *XP*	186006234
	2.1 × 150 mm *XP*	186006785
	3.0 × 50 mm *XP*	186006235
	3.0 × 100 mm *XP*	186006236
	3.0 × 150 mm *XP*	186006786
	4.6 × 50 mm *XP*	186006237
	4.6 × 100 mm *XP*	186006238
	4.6 × 150 mm *XP*	186006787
	Particle Size: 2.5 µm	
CSH Fluoro-Phenyl	2.1 × 50 mm *XP*	186006239
	2.1 × 100 mm *XP*	186006240
	2.1 × 150 mm *XP*	186006788
	3.0 × 50 mm *XP*	186006241
	3.0 × 100 mm *XP*	186006242
	3.0 × 150 mm *XP*	186006789
	4.6 × 50 mm *XP*	186006243
	4.6 × 100 mm *XP*	186006244
	4.6 × 150 mm *XP*	186006790
	Particle Size: 2.5 µm	
CSH Phenyl-Hexyl	2.1 × 50 mm *XP*	186006245
	2.1 × 100 mm *XP*	186006246
	2.1 × 150 mm *XP*	186006791
	3.0 × 50 mm *XP*	186006247
	3.0 × 100 mm *XP*	186006248
	3.0 × 150 mm *XP*	186006792
	4.6 × 50 mm *XP*	186006249
	4.6 × 100 mm *XP*	186006250
	4.6 × 150 mm *XP*	186006793
	Particle Size: 2.5 µm	
Peptide CSH, C_{18}	2.1 × 100 mm *XP*	186006945
	4.6 × 100 mm *XP*	186006966

*Each Method Validation Kit contains 3 columns, each from a different batch.

XSelect CSH VanGuard Cartridges

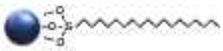
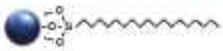
	Dimension	P/N
	Particle Size: 2.5 µm	
CSH C_{18}	2.1 × 5 mm *XP*	186007817
	3.9 × 5 mm *XP*	186007819
CSH Fluoro-Phenyl	2.1 × 5 mm *XP*	186007827
	3.9 × 5 mm *XP*	186007829
CSH Phenyl-Hexyl	2.1 × 5 mm *XP*	186007839
	3.9 × 5 mm *XP*	186007841

Universal VanGuard Cartridge Holder

Description	P/N
Universal VanGuard Cartridge Holder	186007949

HSS
HIGH STRENGTH SILICA

Column Characteristics

	HSS C_{18}	HSS C_{18} SB
	UHPLC: 2.5 µm *XP* HPLC: 3.5, 5 µm	UHPLC: 2.5 µm *XP* HPLC: 3.5, 5 µm
Particle/Ligand		
Ligand Density*	3.2 µmol/m²	1.6 µmol/m²
Carbon Load*	15%	8%
Endcap Style	Proprietary	None
USP Class No.	L1	L1
pH Range	1–8	2–8
Temperature Limits	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
Surface Area*	230 m²/g	230 m²/g
Performance Standards	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360
Application Standards	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363

*Expected or approximate value.
The HSS Technology is available in UPLC particle sizes (ACQUITY UPLC HSS 1.8 µm).

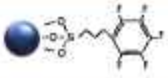
Ordering Information

XSelect HSS Analytical Columns

	Dimension	P/N (1/pk)	P/N (3/pk)
	Particle Size: 2.5 µm		
HSS C_{18}	2.1 × 30 mm *XP*	186006136	176002618
	2.1 × 50 mm *XP*	186006137	176002619
	2.1 × 75 mm *XP*	186006138	176002620
	2.1 × 100 mm *XP*	186006139	176002621
	2.1 × 150 mm *XP*	186006736	176002897
	3.0 × 30 mm *XP*	186006140	176002622
	3.0 × 50 mm *XP*	186006141	176002623
	3.0 × 75 mm *XP*	186006142	176002624
	3.0 × 100 mm *XP*	186006143	176002625
	3.0 × 150 mm *XP*	186006737	176002898
	4.6 × 30 mm *XP*	186006144	–
	4.6 × 50 mm *XP*	186006145	–
	4.6 × 75 mm *XP*	186006146	–
	4.6 × 100 mm *XP*	186006147	–
	4.6 × 150 mm *XP*	186006738	–

	Dimension	P/N (1/pk)	P/N (3/pk)
	Particle Size: 2.5 µm		
HSS C_{18} SB	2.1 × 30 mm *XP*	186006160	176002634
	2.1 × 50 mm *XP*	186006161	176002635
	2.1 × 75 mm *XP*	186006162	176002636
	2.1 × 100 mm *XP*	186006163	176002637
	2.1 × 150 mm *XP*	186006742	176002901
	3.0 × 30 mm *XP*	186006164	176002638
	3.0 × 50 mm *XP*	186006165	176002639
	3.0 × 75 mm *XP*	186006166	176002640
	3.0 × 100 mm *XP*	186006167	176002641
	3.0 × 150 mm *XP*	186006743	176002902
	4.6 × 30 mm *XP*	186006168	–
	4.6 × 50 mm *XP*	186006169	–
	4.6 × 75 mm *XP*	186006170	–
	4.6 × 100 mm *XP*	186006171	–
	4.6 × 150 mm *XP*	186006744	–

	Dimension	P/N (1/pk)	P/N (3/pk)
	Particle Size: 2.5 µm		
HSS T3	2.1 × 30 mm *XP*	186006148	176002626
	2.1 × 50 mm *XP*	186006149	176002627
	2.1 × 75 mm *XP*	186006150	176002628
	2.1 × 100 mm *XP*	186006151	176002629
	2.1 × 150 mm *XP*	186006739	176002899
	3.0 × 30 mm *XP*	186006152	176002630
	3.0 × 50 mm *XP*	186006153	176002631
	3.0 × 75 mm *XP*	186006154	176002632
	3.0 × 100 mm *XP*	186006155	176002633
	3.0 × 150 mm *XP*	186006740	176002900
	4.6 × 30 mm *XP*	186006156	–
	4.6 × 50 mm *XP*	186006157	–
	4.6 × 75 mm *XP*	186006158	–
	4.6 × 100 mm *XP*	186006159	–
	4.6 × 150 mm *XP*	186006741	–

HSS T3	HSS PFP	HSS CN
UHPLC: 2.5 µm *XP* HPLC: 3.5, 5 µm	UHPLC: 2.5 µm *XP* HPLC: 3.5, 5 µm	UHPLC: 2.5 µm *XP* HPLC: 3.5, 5 µm
		
1.6 µmol/m²	3.2 µmol/m²	2.0 µmol/m²
11%	7%	5%
Proprietary	None	None
L1	L43	L10
2–8	2–8	2–8
Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
230 m²/g	230 m²/g	230 m²/g
Neutrals QC Reference Material p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360
Reversed-Phase QC Reference Material p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	–

	Dimension	P/N (1/pk)	P/N (3/pk)
	Particle Size: 2.5 µm		
HSS PFP	2.1 × 30 mm *XP*	186006172	176002642
	2.1 × 50 mm *XP*	186006173	176002643
	2.1 × 75 mm *XP*	186006174	176002644
	2.1 × 100 mm *XP*	186006175	176002645
	2.1 × 150 mm *XP*	186006745	176002903
	3.0 × 30 mm *XP*	186006176	176002646
	3.0 × 50 mm *XP*	186006177	176002647
	3.0 × 75 mm *XP*	186006178	176002648
	3.0 × 100 mm *XP*	186006179	176002649
	3.0 × 150 mm *XP*	186006746	176002904
	4.6 × 30 mm *XP*	186006180	–
	4.6 × 50 mm *XP*	186006181	–
	4.6 × 75 mm *XP*	186006182	–
	4.6 × 100 mm *XP*	186006183	–
	4.6 × 150 mm *XP*	186006747	–

	Dimension	P/N (1/pk)	P/N (3/pk)
	Particle Size: 2.5 µm		
HSS CN	2.1 × 30 mm *XP*	186006184	176002650
	2.1 × 50 mm *XP*	186006185	176002651
	2.1 × 75 mm *XP*	186006186	176002652
	2.1 × 100 mm *XP*	186006187	176002653
	2.1 × 150 mm *XP*	186006748	176002905
	3.0 × 30 mm *XP*	186006188	176002654
	3.0 × 50 mm *XP*	186006189	176002655
	3.0 × 75 mm *XP*	186006190	176002656
	3.0 × 100 mm *XP*	186006191	176002657
	3.0 × 150 mm *XP*	186006749	176002906
	4.6 × 30 mm *XP*	186006192	–
	4.6 × 50 mm *XP*	186006193	–
	4.6 × 75 mm *XP*	186006194	–
	4.6 × 100 mm *XP*	186006195	–
	4.6 × 150 mm *XP*	186006750	–

XSelect HSS Method Validation Kits*

	Dimension	P/N
	Particle Size: 2.7 µm	
HSS C_{18}	2.1 × 50 mm *XP*	186006251
	2.1 × 100 mm *XP*	186006252
	2.1 × 150 mm *XP*	186006794
	3.0 × 50 mm *XP*	186006253
	3.0 × 100 mm *XP*	186006254
	3.0 × 150 mm *XP*	186006795
	4.6 × 50 mm *XP*	186006255
	4.6 × 100 mm *XP*	186006256
	4.6 × 150 mm *XP*	186006796
	Particle Size: 2.5 µm	
HSS C_{18} SB	2.1 × 50 mm *XP*	186006263
	2.1 × 100 mm *XP*	186006264
	2.1 × 150 mm *XP*	186006800
	3.0 × 50 mm *XP*	186006265
	3.0 × 100 mm *XP*	186006266
	3.0 × 150 mm *XP*	186006801
	4.6 × 50 mm *XP*	186006267
	4.6 × 100 mm *XP*	186006268
	4.6 × 150 mm *XP*	186006802
HSS T3	2.1 × 50 mm *XP*	186006257
	2.1 × 100 mm *XP*	186006258
	2.1 × 150 mm *XP*	186006797
	3.0 × 50 mm *XP*	186006259
	3.0 × 100 mm *XP*	186006260
	3.0 × 150 mm *XP*	186006798
	4.6 × 50 mm *XP*	186006261
	4.6 × 100 mm *XP*	186006262
	4.6 × 150 mm *XP*	186006799

	Dimension	P/N
	Particle Size: 2.5 µm	
HSS PFP	2.1 × 50 mm *XP*	186006815
	2.1 × 100 mm *XP*	186006816
	2.1 × 150 mm *XP*	186006803
	3.0 × 50 mm *XP*	186006817
	3.0 × 100 mm *XP*	186006818
	3.0 × 150 mm *XP*	186006804
	4.6 × 50 mm *XP*	186006273
	4.6 × 100 mm *XP*	186006274
	4.6 × 150 mm *XP*	186006805
HSS CN	2.1 × 50 mm *XP*	186006275
	2.1 × 100 mm *XP*	186006276
	2.1 × 150 mm *XP*	186006806
	3.0 × 50 mm *XP*	186006277
	3.0 × 100 mm *XP*	186006278
	3.0 × 150 mm *XP*	186006807
	4.6 × 50 mm *XP*	186006279
	4.6 × 100 mm *XP*	186006280
	4.6 × 150 mm *XP*	186006808

*Each Method Validation Kit contains 3 columns, each from a different batch.

XSelect HSS VanGuard Cartridges

	Dimension	P/N
	Particle Size: 2.5 µm	
HSS C_{18}	2.1 × 5 mm	186007857
	3.9 × 5 mm	186007859
HSS C_{18} SB	2.1 × 5 mm	186007848
	3.9 × 5 mm	186007850
HSS T3	2.1 × 5 mm	186007884
	3.9 × 5 mm	186007886
HSS PFP	2.1 × 5 mm	186007875
	3.9 × 5 mm	186007877
HSS CN	2.1 × 5 mm	186007866
	3.9 × 5 mm	186007868

Universal VanGuard Cartridge Holder

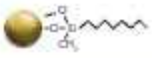
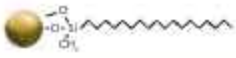
Description	P/N
Universal VanGuard Cartridge Holder	186007949



SunFire HPLC Columns

SunFire® Columns set the standard for the state-of-the-art bonded C_{18} and C_8 silica HPLC columns. Benefiting from years of research and product development, SunFire Columns represent the best in particle and bonding expertise and deliver the industry-leading level of chromatographic performance. The smaller 2.5 µm particle size allows chromatographers to gain improved sensitivity and greater efficiency. SunFire Columns with 2.5 µm particle size enable faster run times while maintaining the same resolution.

Column Characteristics

	C_{18} 100Å	C_8 100Å
	HPLC: 2.5, 3.5, 5, 10 µm	**HPLC: 2.5, 3.5, 5, 10 µm**
Particle/Ligand		
Ligand Density*	3.5 µmol/m²	3.5 µmol/m²
Carbon Load*	12%	16%
Endcap Style	Proprietary	Proprietary
USP Class No.	L7	L1
pH Range	2-8	2-8
Temperature Limits	Low pH = 40 °C, High pH = 40 °C	Low pH = 50 °C, High pH = 40 °C
Surface Area*	340 m²/g	340 m²/g
Performance Standards	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360
Application Standards	**Reversed-Phase QC Reference Material** p/n: 186006363 **HILIC QC Reference Material** p/n: 186007226	**Reversed-Phase QC Reference Material** p/n: 186006363

*Expected or approximate value.
SunFire HPLC Columns are rated for pressures up to 6000 psi (410 bar).

For more information on SunFire Columns, refer to page 158.

Ordering information

SunFire Analytical Columns*

	Dimension	P/N
	Particle Size: 2.5 µm	
C_{18}	2.1 × 30 mm	186003399
	2.1 × 50 mm	186003401
	2.1 × 75 mm	186005634
	3.0 × 30 mm	186003407
	3.0 × 50 mm	186003409
	3.0 × 75 mm	186005636
	4.6 × 50 mm	186003417

	Particle Size: 2.5 µm	
C_8	2.1 × 75 mm	186005635
	3.0 × 50 mm	186003410

*Recommended maximum pressure of 6000 psi (400 bar).

SunFire VanGuard Cartridges

	Dimension	P/N
	Particle Size: 2.5 µm	
C_{18}	2.1 × 5 mm	186007691
	3.9 × 5 mm	186007693
C_8	2.1 × 5 mm	186007700
	3.9 × 5 mm	186007702

Universal VanGuard Cartridge Holder

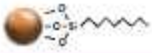
Description	P/N
Universal VanGuard Cartridge Holder	186007949



XTerra HPLC Columns

XTerra MS and Phenyl 2.5 µm Columns combine the best properties of silica- and polymeric-bonded phases with patented Hybrid Particle Technology (HPT), which replaces one out of every three silanol groups with a methyl group during particle synthesis. HPT overcomes the limitations of silica-based materials while maintaining its best attributes for mechanical strength, chemical resistance, and easy scale-up from analytical to preparative chromatography.

Column Characteristics

	MS C_{18}, 125Å	MS C_8, 125Å
	HPLC: 2.5, 3.5, 5, 10 µm	HPLC: 2.5, 3.5, 5, 10 µm
Particle/Ligand		
Carbon Load*	15.5%	12%
Endcap Style	Proprietary	Proprietary
USP Class No.	L1	L7
Performance Standards	Neutrals QC Reference Material p/n: 186006360	Neutrals QC Reference Material p/n: 186006360
Application Standards	Reversed-Phase QC Reference Material p/n: 186006363	Reversed-Phase QC Reference Material p/n: 186006363

XTerra HPLC Columns are rated for pressures up to 6000 psi (410 bar).

Ordering Information

XTerra Analytical Columns*

	Dimension	P/N
	Particle Size: 2.5 µm	
MS C_{18}	2.1 × 30 mm	186000592
	4.6 × 20 mm /S	186001889
	4.6 × 30 mm	186000600
	4.6 × 50 mm	186000602
	4.6 × 75 mm	186000981
	Particle Size: 2.5 µm	
MS C_8	4.6 × 50 mm	186000603

*Recommended maximum pressure of 6000 psi (400 bar).

XTerra VanGuard Cartridges

	Dimension	P/N
	Particle Size: 2.5 µm	
MS C_{18}	2.1 × 5 mm	186007887
	3.9 × 5 mm	186007889
MS C_8	2.1 × 5 mm	186007901
	3.9 × 5 mm	186007903

Universal VanGuard Cartridge Holder

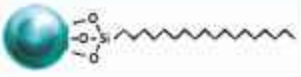
Description	P/N
Universal VanGuard Cartridge Holder	186007949

For more information on XTerra Columns, refer to page 166.

Meet the Members of the CORTECS Family

A Solid-Core Particle that Lives Up to It's Potential

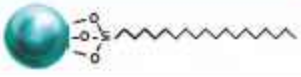
C_{18}+



- General purpose
- High-efficiency
- Reversed-phase column

A positively charged surface delivers excellent peak shape for basic compounds at low pH.

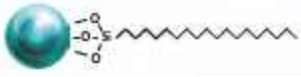
C_{18}



- General purpose
- High-efficiency
- Reversed-phase column

Balanced retention of acids, bases, and neutrals at low and mid-range pH.

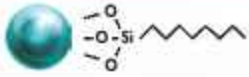
T3



- General purpose
- High-efficiency
- Reversed-phase column

Enables the use of 100% aqueous mobile phase and increased retention of polar compounds.

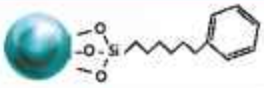
C_8



- General purpose
- High-efficiency
- Reversed-phase column

Similar selectivity but shorter retentivity when compared to C_{18} columns.

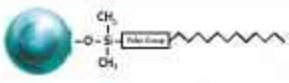
Phenyl



- High-efficiency
- Method development column

Provides alternate selectivity, particularly for polyaromatic compounds.

Shield RP18



- High-efficiency
- Method development column

Provides alternate selectivity, particularly for phenolic compounds.

HILIC



- General purpose
- High-efficiency
- HILIC column

Offers orthogonal selectivity when compared to C_{18} columns.

waters.com/cortecs

See page 114 for more information.

≥3 µm Analytical HPLC Columns

≥3 µm Analytical HPLC Columns



"Everything is done the same way, consistent across board and correctly."

– John Brown, Production Support Operator, Wexford, Ireland

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≥3 µm Analytical HPLC Columns



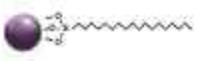
XBridge BEH HPLC Columns

XBridge BEH HPLC Columns are designed for one purpose—to maximize productivity. Whether you are creating a quality-control method or developing a leading-edge LC-MS assay, XBridge Columns are an invaluable help.

- They improve pH stability, increasing column lifetime
- They improve column reliability, ensuring the ruggedness of assays
- They improve particle efficiency, providing unmatched peak shape and capacity

With 10 general-purpose, application-specific sorbents and the widest range of particle sizes available, no other HPLC column family offers the tools you need to meet the most demanding chromatographic challenges. Whether you require robust HPLC methods, seamless UPLC transferability, or preparative scaling for product isolation, count on the versatility of an XBridge Column.

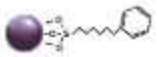
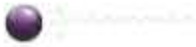
Column Characteristics

	BEH C_{18}, 130Å	BEH Shield RP18, 130Å	BEH C_8, 130Å
	UHPLC: 2.5 µm *XP* HPLC: 3.5, 5, 10 µm	UHPLC: 2.5 µm *XP* HPLC: 3.5, 5, 10 µm	UHPLC: 2.5 µm *XP* HPLC: 3.5, 5, 10 µm
Particle/Ligand			
Ligand Density*	3.1 µmol/m²	3.3 µmol/m²	3.2 µmol/m²
Carbon Load*	18%	17%	13%
Endcap Style	Proprietary	TMS	Proprietary
USP Class No.	L1	L1	L7
pH Range	1–12	2–11	1–12
Temperature Limits	Low pH = 80 °C, High pH = 60 °C	Low pH = 50 °C, High pH = 45 °C	Low pH = 60 °C, High pH = 60 °C
Surface Area*	185 m^2/g	185 m^2/g	185 m^2/g
Performance Standards	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360
Application Standards	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363

*Expected or approximate value.

BEH Technology is also available in UPLC particle sizes (ACQUITY UPLC BEH 1.7 µm), please refer to page 94.

Column Characteristics *Continued*

	BEH Phenyl, 130Å	BEH HILIC, 130Å	BEH Amide, 130Å	Glycan BEH Amide, 130Å	Peptide BEH C_{18}, 130Å
	UHPLC: 2.5 µm *XP* HPLC: 3.5, 5, 10 µm	UHPLC: 2.5 µm *XP* HPLC: 3.5 µm	UHPLC: 2.5 µm *XP* HPLC: 3.5 µm	UHPLC: 2.5 µm *XP* HPLC: 3.5 µm	HPLC: 3.5, 5, 10 µm
Particle/Ligand					
Ligand Density*	3.0 µmol/m²	N/A	7.5 µmol/m²	7.15 µmol/m²	3.1 µmol/m²
Carbon Load*	15%	Unbonded	12%	12%	18%
Endcap Style	Proprietary	N/A	None	None	Proprietary
USP Class No.	L11	L3	L68	L68	L1
pH Range	1–12	1–9	2–11	2–11	1–12
Temperature Limits	Low pH = 80 °C, High pH = 60 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 90 °C, High pH = 90 °C	Low pH = 90 °C, High pH = 90 °C	Low pH = 80 °C, High pH = 60 °C
Surface Area*	185 m²/g	185 m²/g	185 m²/g	194 m²/g	185 m²/g
Performance Standards	**Neutrals QC Reference Material** p/n: 186006360	**HILIC QC Reference Material** p/n: 186007226	**HILIC QC Reference Material** p/n: 186007226	**Glycan Performance Test Standard** p/n: 186006349	**Cytochrome *c* Digestion Standard** p/n: 186006371
Application Standards	**Reversed-Phase QC Reference Material** p/n: 186006363	**HILIC QC Reference Material** p/n: 186007226	**HILIC QC Reference Material** p/n: 186007226	**Glycan Performance Test Standard** p/n: 186006349 **Dextran Calibration Standard** p/n: 186006841	**Peptide Retention Standard** p/n: 186006555

*Expected or approximate value.

BEH Technology is also available in UPLC particle sizes (ACQUITY UPLC BEH 1.7 µm), please refer to page 94.

Oligonucleotide BEH C_{18}, 130Å	Protein BEH C_4, 300Å	Protein BEH SEC, 125Å	Protein BEH SEC, 200Å	Protein BEH SEC, 450Å
HPLC: 2.5 µm	HPLC: 3.5 µm	HPLC: 3.5 µm	HPLC: 3.5 µm	HPLC: 3.5 µm
				
3.1 µmol/m²	2.4 µmol/m²	4.9 µmol/m²	5.5 µmol/m²	4.8 µmol/m²
18%	8%	15%	12%	9%
Proprietary	None	None	None	None
L1	L26	L33	L33	L33
1–12	1–10	1–8	1–8	1–8
Low pH = 80 °C, High pH = 60 °C	Low pH = 80 °C, High pH = 50 °C	Low pH = 60 °C, High pH = 60 °C	Low pH = 60 °C, High pH = 60 °C	Low pH = 60 °C, High pH = 60 °C
90 m²/g	90 m²/g	395 m²/g	220 m²/g	80 m²/g
MassPREP OST Standard p/n: 186004135	**MassPREP Protein Standard Mix** p/n: 186004900	**BEH 125 Protein Standard Mix** p/n: 186006519	**BEH200 SEC Protein Standard Mix** p/n: 186006518	**BEH450 SEC Protein Standard Mix** p/n: 186006842
MassPREP OST Standard p/n: 186004135	**MassPREP Protein Standard Mix** p/n: 186004900	**BEH 125 Protein Standard Mix** p/n: 186006519	**BEH200 SEC Protein Standard Mix** p/n: 186006518	**BEH450 SEC Protein Standard Mix** p/n: 186006842

Ordering Information

XBridge Analytical Columns

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
BEH C_{18}	1.0 × 50 mm	186003126	2.1 × 20 mm *IS*	186003107
	1.0 × 100 mm	186003127	2.1 × 30 mm	186003129
	1.0 × 150 mm	186003128	2.1 × 50 mm	186003108
	2.1 × 20 mm *IS*	186003019	2.1 × 100 mm	186003109
	2.1 × 30 mm	186003020	2.1 × 150 mm	186003110
	2.1 × 50 mm	186003021	3.0 × 20 mm *IS*	186003130
	2.1 × 100 mm	186003022	3.0 × 30 mm	186003111
	2.1 × 150 mm	186003023	3.0 × 50 mm	186003131
	3.0 × 20 mm *IS*	186003024	3.0 × 100 mm	186003132
	3.0 × 30 mm	186003025	3.0 × 150 mm	186003112
	3.0 × 50 mm	186003026	3.0 × 250 mm	186003133
	3.0 × 100 mm	186003027	4.6 × 20 mm *IS*	186003134
	3.0 × 150 mm	186003028	4.6 × 30 mm	186003135
	4.6 × 20 mm *IS*	186003029	4.6 × 50 mm	186003113
	4.6 × 30 mm	186003030	4.6 × 75 mm	186003114
	4.6 × 50 mm	186003031	4.6 × 100 mm	186003115
	4.6 × 75 mm	186003032	4.6 × 150 mm	186003116
	4.6 × 100 mm	186003033	4.6 × 250 mm	186003117
	4.6 × 150 mm	186003034		
	4.6 × 250 mm	186003943		

	Particle Size: 3.5 µm		Particle Size: 5 µm	
BEH C_8	1.0 × 50 mm	186003177	2.1 × 20 mm *IS*	186003186
	1.0 × 100 mm	186003178	2.1 × 30 mm	186003187
	1.0 × 150 mm	186003179	2.1 × 50 mm	186003011
	2.1 × 20 mm *IS*	186003180	2.1 × 100 mm	186003012
	2.1 × 30 mm	186003046	2.1 × 150 mm	186003013
	2.1 × 50 mm	186003047	3.0 × 20 mm *IS*	186003188
	2.1 × 100 mm	186003048	3.0 × 30 mm	186003189
	2.1 × 150 mm	186003049	3.0 × 50 mm	186003190
	3.0 × 20 mm *IS*	186003181	3.0 × 100 mm	186003191
	3.0 × 30 mm	186003182	3.0 × 150 mm	186003014
	3.0 × 50 mm	186003050	3.0 × 250 mm	186003192
	3.0 × 100 mm	186003051	4.6 × 20 mm *IS*	186003193
	3.0 × 150 mm	186003052	4.6 × 30 mm	186003194
	4.6 × 20 mm *IS*	186003183	4.6 × 50 mm	186003015
	4.6 × 30 mm	186003184	4.6 × 75 mm	186003195
	4.6 × 50 mm	186003053	4.6 × 100 mm	186003016
	4.6 × 75 mm	186003185	4.6 × 150 mm	186003017
	4.6 × 100 mm	186003054	4.6 × 250 mm	186003018
	4.6 × 150 mm	186003055		
	4.6 × 250 mm	186003963		

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
BEH Shield RP18	1.0 × 50 mm	186003148	2.1 × 20 mm /S	186003156
	1.0 × 100 mm	186003149	2.1 × 30 mm	186003157
	1.0 × 150 mm	186003150	2.1 × 50 mm	186002999
	2.1 × 20 mm /S	186003151	2.1 × 100 mm	186003002
	2.1 × 30 mm	186003035	2.1 × 150 mm	186003003
	2.1 × 50 mm	186003036	3.0 × 20 mm /S	186003158
	2.1 × 100 mm	186003037	3.0 × 30 mm	186003159
	2.1 × 150 mm	186003038	3.0 × 50 mm	186003160
	3.0 × 20 mm /S	186003152	3.0 × 100 mm	186003004
	3.0 × 30 mm	186003153	3.0 × 150 mm	186003005
	3.0 × 50 mm	186003039	3.0 × 250 mm	186003161
	3.0 × 100 mm	186003040	4.6 × 20 mm /S	186003162
	3.0 × 150 mm	186003041	4.6 × 30 mm	186003163
	4.6 × 20 mm /S	186003154	4.6 × 50 mm	186003006
	4.6 × 30 mm	186003155	4.6 × 75 mm	186003007
	4.6 × 50 mm	186003042	4.6 × 100 mm	186003008
	4.6 × 75 mm	186003043	4.6 × 150 mm	186003009
	4.6 × 100 mm	186003044	4.6 × 250 mm	186003010
	4.6 × 150 mm	186003045		
	4.6 × 250 mm	186003964		

	Particle Size: 3.5 µm		Particle Size: 5 µm	
BEH Phenyl	1.0 × 50 mm	186003317	2.1 × 20 mm /S	186003336
	1.0 × 100 mm	186003318	2.1 × 30 mm	186003337
	1.0 × 150 mm	186003319	2.1 × 50 mm	186003338
	2.1 × 20 mm /S	186003320	2.1 × 100 mm	186003339
	2.1 × 30 mm	186003321	2.1 × 150 mm	186003340
	2.1 × 50 mm	186003322	3.0 × 20 mm /S	186003341
	2.1 × 100 mm	186003323	3.0 × 30 mm	186003342
	2.1 × 150 mm	186003324	3.0 × 50 mm	186003343
	3.0 × 20 mm /S	186003325	3.0 × 100 mm	186003344
	3.0 × 30 mm	186003326	3.0 × 150 mm	186003345
	3.0 × 50 mm	186003327	3.0 × 250 mm	186003346
	3.0 × 100 mm	186003328	4.6 × 20 mm /S	186003347
	3.0 × 150 mm	186003329	4.6 × 30 mm	186003348
	4.6 × 20 mm /S	186003330	4.6 × 50 mm	186003349
	4.6 × 30 mm	186003331	4.6 × 75 mm	186003350
	4.6 × 50 mm	186003332	4.6 × 100 mm	186003351
	4.6 × 75 mm	186003333	4.6 × 150 mm	186003352
	4.6 × 100 mm	186003334	4.6 × 250 mm	186003353
	4.6 × 150 mm	186003335		
	4.6 × 250 mm	186003965		
	4.6 × 250 mm	186003963		

XBridge Analytical Columns *Continued*

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
BEH HILIC	1.0 × 50 mm	186004429	2.1 × 30 mm	186004443
	2.1 × 30 mm	186004431	2.1 × 50 mm	186004444
	2.1 × 50 mm	186004432	2.1 × 100 mm	186004445
	2.1 × 100 mm	186004433	2.1 × 150 mm	186004446
	2.1 × 150 mm	186004434	3.0 × 50 mm	186004447
	3.0 × 50 mm	186004435	3.0 × 100 mm	186004448
	3.0 × 100 mm	186004436	4.6 × 30 mm	186004450
	4.6 × 30 mm	186004438	4.6 × 50 mm	186004451
	4.6 × 50 mm	186004439	4.6 × 100 mm	186004452
	4.6 × 100 mm	186004440	4.6 × 150 mm	186004453
	4.6 × 150 mm	186004441	4.6 × 250 mm	186004454

	Particle Size: 3.5 µm		Particle Size: 5 µm	
BEH Amide	1.0 × 50 mm	186004871	2.1 × 30 mm	186006587
	2.1 × 30 mm	186004858	2.1 × 50 mm	186006588
	2.1 × 50 mm	186004859	2.1 × 100 mm	186006589
	2.1 × 100 mm	186004860	2.1 × 150 mm	186006590
	2.1 × 150 mm	186004861	3.0 × 50 mm	186006591
	3.0 × 30 mm	186004862	3.0 × 100 mm	186006592
	3.0 × 50 mm	186004863	4.6 × 50 mm	186006593
	3.0 × 100 mm	186004864	4.6 × 100 mm	186006594
	4.6 × 30 mm	186004866	4.6 × 150 mm	186006595
	4.6 × 50 mm	186004867	4.6 × 250 mm	186006596
	4.6 × 100 mm	186004868		
	4.6 × 150 mm	186004869		
	4.6 × 250 mm	186004870		

XBridge Glycan Columns

	Dimension	P/N
	Particle Size: 3.5 µm	
BEH Amide, 130Å	2.1 × 50 mm	186007502
	2.1 × 100 mm	186007503
	2.1 × 150 mm	186007504
	4.6 × 50 mm	186007273
	4.6 × 100 mm	186007274
	4.6 × 150 mm	186007275
	4.6 × 250 mm	186007276

XBridge Peptide Columns

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
BEH C_{18}, 130Å	1.0 × 50 mm	186003560	1.0 × 50 mm	186003571
	1.0 × 100 mm	186003561	1.0 × 100 mm	186003572
	1.0 × 150 mm	186003562	1.0 × 150 mm	186003573
	2.1 × 50 mm	186003563	2.1 × 50 mm	186003574
	2.1 × 100 mm	186003564	2.1 × 100 mm	186003575
	2.1 × 150 mm	186003565	2.1 × 150 mm	186003576
	2.1 × 250 mm	186003566	2.1 × 250 mm	186003577
	4.6 × 50 mm	186003567	4.6 × 50 mm	186003578
	4.6 × 100 mm	186003568	4.6 × 100 mm	186003579
	4.6 × 150 mm	186003569	4.6 × 150 mm	186003580
	4.6 × 250 mm	186003570	4.6 × 250 mm	186003581

	Particle Size: 3.5 µm		Particle Size: 5 µm	
BEH C_{18}, 300Å	1.0 × 50 mm	186003604	1.0 × 50 mm	186003615
	1.0 × 100 mm	186003605	1.0 × 100 mm	186003616
	1.0 × 150 mm	186003606	1.0 × 150 mm	186003617
	2.1 × 50 mm	186003607	2.1 × 50 mm	186003618
	2.1 × 100 mm	186003608	2.1 × 100 mm	186003619
	2.1 × 150 mm	186003609	2.1 × 150 mm	186003620
	2.1 × 250 mm	186003610	2.1 × 250 mm	186003621
	4.6 × 50 mm	186003611	4.6 × 50 mm	186003622
	4.6 × 100 mm	186003612	4.6 × 100 mm	186003623
	4.6 × 150 mm	186003613	4.6 × 150 mm	186003624
	4.6 × 250 mm	186003614	4.6 × 250 mm	186003625

	Particle Size: 3.5 µm	
BEH C_4, 300Å	2.1 × 50 mm	186004498
	2.1 × 100 mm	186004499
	2.1 × 150 mm	186004500
	2.1 × 250 mm	186004501
	4.6 × 50 mm	186004502
	4.6 × 100 mm	186004503
	4.6 × 150 mm	186004504
	4.6 × 250 mm	186004505

APPLICATION AREA: Dicarboxylic Acids in Atmospheric Particulate Matter

"I used XBridge Amide 3.5 µm column for HILIC separation of atmospheric dicarboxylic acids. I found it very reproducible over a large period of time (>3 months) while being extensively used during initial method development (use of different mobile phase buffers, pHs and organic solvents), method validation and application to atmospheric particulate matter. After more than 1000 injections with proper change of the guard, the analytical column preserved its initial efficiency and gave me the needed selectivity for separation of the various atmospheric acids. The column is still in good shape and operable. No increase of the column backpressure was observed during its use. We are very satisfied with the product and the level of service provided by Waters representatives."

REVIEWER: Zoran Kitanovski

ORGANIZATION: National Institute of Chemistry

★★★★★

XBridge Columns Method Validation Kits*

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
BEH C_{18}	2.1 × 100 mm	186003766	2.1 × 150 mm	186003771
	3.0 × 100 mm	186003767	3.0 × 100 mm	186003772
	3.0 × 150 mm	186003768	3.0 × 150 mm	186003773
	4.6 × 100 mm	186003769	4.6 × 100 mm	186003774
	4.6 × 150 mm	186003770	4.6 × 150 mm	186003775
			4.6 × 250 mm	186003776
BEH C_8	2.1 × 100 mm	186003777	2.1 × 150 mm	186003782
	3.0 × 100 mm	186003778	3.0 × 100 mm	186003783
	3.0 × 150 mm	186003779	3.0 × 150 mm	186003784
	4.6 × 100 mm	186003780	4.6 × 100 mm	186003785
	4.6 × 150 mm	186003781	4.6 × 150 mm	186003786
			4.6 × 250 mm	186003787
BEH Shield RP18	2.1 × 100 mm	186003788	2.1 × 150 mm	186003793
	3.0 × 100 mm	186003789	3.0 × 100 mm	186003794
	3.0 × 150 mm	186003790	3.0 × 150 mm	186003795
	4.6 × 100 mm	186003791	4.6 × 100 mm	186003796
	4.6 × 150 mm	186003792	4.6 × 150 mm	186003797
			4.6 × 250 mm	186003798
BEH Phenyl	2.1 × 100 mm	186003799	2.1 × 150 mm	186003804
	3.0 × 100 mm	186003800	3.0 × 100 mm	186003805
	3.0 × 150 mm	186003801	3.0 × 150 mm	186003806
	4.6 × 100 mm	186003802	4.6 × 100 mm	186003807
	4.6 × 150 mm	186003803	4.6 × 150 mm	186003808
			4.6 × 250 mm	186003809

*Each Method Validation Kit contains 3 columns, each from a different batch.

XBridge VanGuard Cartridges

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
BEH C_{18}	2.1 × 5 mm	186007766	2.1 × 5 mm	186007769
	3.9 × 5 mm	186007768	3.9 × 5 mm	186007771
BEH C_8	2.1 × 5 mm	186007775	2.1 × 5 mm	186007778
	3.9 × 5 mm	186007777	3.9 × 5 mm	186007780
BEH Shield RP18	2.1 × 5 mm	186007802	2.1 × 5 mm	186007805
	3.9 × 5 mm	186007804	3.9 × 5 mm	186007807
BEH Phenyl	2.1 × 5 mm	186007793	2.1 × 5 mm	186007796
	3.9 × 5 mm	186007795	3.9 × 5 mm	186007798
BEH HILIC	2.1 × 5 mm	186007784	2.1 × 5 mm	186007787
	3.9 × 5 mm	186007786	3.9 × 5 mm	186007789
BEH Amide	2.1 × 5 mm	186007757	2.1 × 5 mm	186007760
	3.9 × 5 mm	186007759	3.9 × 5 mm	186007762

Universal VanGuard Cartridge Holder

Description	P/N
Universal VanGuard Cartridge Holder	186007949

APPLICATION AREA: Pharmaceutical Analysis

"In my opinion XBridge Columns are one of the best available on the market due to its universality. I am using it widely for analytical separations and (especially) for preparative purpose. The major advantages are: broad pH range; high stability at high pH; high durability and low column bleeding."

REVIEWER: Alexey Lapin

ORGANIZATION: Euroscreen SA

TRUSTED REVIEWS

XSelect HPLC Columns

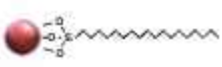
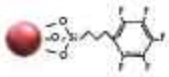
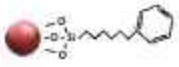
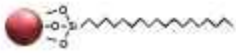
XSelect HPLC Columns are designed for the method-development scientist who requires a diverse selection of sorbents to easily separate the most difficult analyte co-elutions.

XSelect Columns are:

- Designed for selectivity, improving the separation of closely eluting peaks
- Intended for isolation and purification, loading the highest analyte mass of any columns
- Ideal for rapid method development, reducing the time and cost spent developing methods

The base particle, or substrate, critically influences analyte selectivity; the bonded ligand influences selectivity to a lesser extent. Neither the substrate nor the ligand alone provides dramatic selectivity changes. Yet in combination they provide the ultimate means of enhancing analyte selectivity, while ensuring reproducible and robust methods. Accordingly, the XSelect Column family offers the unique optimization of bonded ligands embodied in the technologies of high strength silica (HSS) and charged surface hybrid (CSH).

Column Characteristics

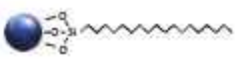
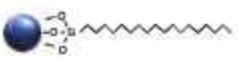
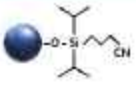
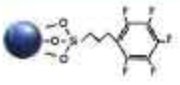
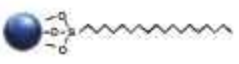
	CSH C_{18}, 130Å	CSH Fluoro-Phenyl, 300Å	CSH Phenyl-Hexyl, 130Å	Peptide CSH C_{18}, 130A
	UHPLC: 2.5 µm *XP* HPLC: 3.5, 5, 10 µm	UHPLC: 2.5 µm *XP* HPLC: 3.5, 5 µm	UHPLC: 2.5 µm *XP* HPLC: 3.5, 5 µm	UHPLC: 2.5 µm *XP* HPLC: 3.5, 5, 10 µm
Particle/Ligand				
Ligand Density*	2.3 µmol/m²	2.3 µmol/m²	2.3 µmol/m²	2.3 µmol/m²
Carbon Load*	15%	10%	14%	15%
Endcap Style	Proprietary	None	Proprietary	Proprietary
USP Class No.	L1	L43	L11	L1
pH Range	1–11	1–8	1–11	1–11
Temperature Limits	Low pH = 80 °C, High pH = 45 °C	Low pH = 60 °C, High pH = 45 °C	Low pH = 80 °C, High pH = 45 °C	Low pH = 80 °C, High pH = 45 °C
Surface Area*	185 m²/g	185 m²/g	185 m²/g	185 m²/g
Performance Standards	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Cytochrome *c* Digestion Standard** p/n: 186006371
Application Standards	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**Peptide Retention Standard** p/n: 186006555

*Expected or approximate value.

XSelect Columns are also available in UPLC particle sizes (ACQUITY UPLC CSH and ACQUITY UPLC HSS), please refer to pages 90 and 100.

XSELECT® Columns



HSS C_{18}, 130Å	HSS C_{18} SB, 130Å	HSS CN, 130Å	HSS PFP, 130Å	HSS T3, 130Å
UHPLC: 2.5 µm *XP* **HPLC: 3.5, 5 µm**	**UHPLC: 2.5 µm *XP*** **HPLC: 3.5, 5 µm**	**UHPLC: 2.5 µm *XP*** **HPLC: 3.5, 5 µm**	**UHPLC: 2.5 µm *XP*** **HPLC: 3.5, 5 µm**	**UHPLC: 2.5 µm *XP*** **HPLC: 3.5, 5 µm**
				
3.2 µmol/m²	1.6 µmol/m²	2.0 µmol/m²	3.2 µmol/m²	1.6 µmol/m²
15%	8%	5%	7%	11%
Proprietary	None	None	None	Proprietary
L1	L1	L10	L43	L1
1–8	2–8	2–8	2–8	2–8
Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
230 m²/g	230 m²/g	230 m²/g	230 m²/g	230 m²/g
Neutrals QC Reference Material p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360
Reversed-Phase QC Reference Material p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	—	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363

Ordering Information

XSelect Analytical Columns

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
CSH C_{18}	1.0 × 50 mm	186005249	2.1 × 30 mm	186005273
	1.0 × 100 mm	186005250	2.1 × 50 mm	186005274
	1.0 × 150 mm	186005251	2.1 × 100 mm	186005275
	2.1 × 30 mm	186005254	2.1 × 150 mm	186005276
	2.1 × 50 mm	186005255	3.0 × 30 mm	186005279
	2.1 × 75 mm	186005644	3.0 × 50 mm	186005280
	2.1 × 100 mm	186005256	3.0 × 100 mm	186005281
	2.1 × 150 mm	186005257	3.0 × 150 mm	186005282
	3.0 × 30 mm	186005260	3.0 × 250 mm	186005283
	3.0 × 50 mm	186005261	4.6 × 30 mm	186005286
	3.0 × 75 mm	186005647	4.6 × 50 mm	186005287
	3.0 × 100 mm	186005262	4.6 × 75 mm	186005288
	3.0 × 150 mm	186005263	4.6 × 100 mm	186005289
	4.6 × 30 mm	186005266	4.6 × 150 mm	186005290
	4.6 × 50 mm	186005267	4.6 × 250 mm	186005291
	4.6 × 75 mm	186005268		
	4.6 × 100 mm	186005269		
	4.6 × 150 mm	186005270		

	Particle Size: 3.5 µm		Particle Size: 5 µm	
CSH Fluoro-Phenyl	1.0 × 50 mm	186005304	2.1 × 30 mm	186005328
	1.0 × 100 mm	186005305	2.1 × 50 mm	186005329
	1.0 × 150 mm	186005306	2.1 × 100 mm	186005330
	2.1 × 30 mm	186005309	2.1 × 150 mm	186005331
	2.1 × 50 mm	186005310	3.0 × 30 mm	186005334
	2.1 × 75 mm	186005646	3.0 × 50 mm	186005335
	2.1 × 100 mm	186005311	3.0 × 100 mm	186005336
	2.1 × 150 mm	186005312	3.0 × 150 mm	186005337
	3.0 × 30 mm	186005315	3.0 × 250 mm	186005338
	3.0 × 50 mm	186005316	4.6 × 30 mm	186005341
	3.0 × 75 mm	186005649	4.6 × 50 mm	186005342
	3.0 × 100 mm	186005317	4.6 × 75 mm	186005343
	3.0 × 150 mm	186005318	4.6 × 100 mm	186005344
	4.6 × 30 mm	186005321	4.6 × 150 mm	186005345
	4.6 × 50 mm	186005322	4.6 × 250 mm	186005346
	4.6 × 75 mm	186005323		
	4.6 × 100 mm	186005324		
	4.6 × 150 mm	186005325		

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
CSH Phenyl-Hexyl	1.0 × 50 mm	186005359	2.1 × 30 mm	186005383
	1.0 × 100 mm	186005360	2.1 × 50 mm	186005384
	1.0 × 150 mm	186005361	2.1 × 100 mm	186005385
	2.1 × 30 mm	186005364	2.1 × 150 mm	186005386
	2.1 × 50 mm	186005365	3.0 × 30 mm	186005389
	2.1 × 75 mm	186005645	3.0 × 50 mm	186005390
	2.1 × 100 mm	186005366	3.0 × 100 mm	186005391
	2.1 × 150 mm	186005367	3.0 × 150 mm	186005392
	3.0 × 30 mm	186005370	3.0 × 250 mm	186005393
	3.0 × 50 mm	186005371	4.6 × 30 mm	186005396
	3.0 × 75 mm	186005648	4.6 × 50 mm	186005397
	3.0 × 100 mm	186005372	4.6 × 75 mm	186005398
	3.0 × 150 mm	186005373	4.6 × 100 mm	186005399
	4.6 × 30 mm	186005376	4.6 × 150 mm	186005400
	4.6 × 50 mm	186005377	4.6 × 250 mm	186005401
	4.6 × 75 mm	186005378		
	4.6 × 100 mm	186005379		
	4.6 × 150 mm	186005380		

	Particle Size: 3.5 µm		Particle Size: 5 µm	
HSS C_{18}	1.0 × 50 mm	186006376	2.1 × 30 mm	186006390
	1.0 × 100 mm	186006377	2.1 × 50 mm	186006391
	1.0 × 150 mm	186006378	2.1 × 100 mm	186006392
	2.1 × 30 mm	186006380	2.1 × 150 mm	186006393
	2.1 × 50 mm	186006381	3.0 × 30 mm	186006395
	2.1 × 75 mm	186006382	3.0 × 50 mm	186006396
	2.1 × 100 mm	186006383	3.0 × 100 mm	186006397
	2.1 × 150 mm	186006384	3.0 × 150 mm	186006398
	3.0 × 30 mm	186004765	3.0 × 250 mm	186006399
	3.0 × 50 mm	186004766	4.6 × 30 mm	186006401
	3.0 × 75 mm	186005642	4.6 × 50 mm	186004852
	3.0 × 100 mm	186004762	4.6 × 75 mm	186006402
	3.0 × 150 mm	186004763	4.6 × 100 mm	186006403
	4.6 × 30 mm	186004771	4.6 × 150 mm	186004773
	4.6 × 50 mm	186004772	4.6 × 250 mm	186004775
	4.6 × 75 mm	186006387		
	4.6 × 100 mm	186004767		
	4.6 × 150 mm	186004768		
	4.6 × 250 mm	186004770		

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
HSS C_{18} SB	1.0 × 50 mm	186006417	2.1 × 30 mm	186006431
	1.0 × 100 mm	186006418	2.1 × 50 mm	186006432
	1.0 × 150 mm	186006419	2.1 × 100 mm	186006433
	2.1 × 30 mm	186006421	2.1 × 150 mm	186006434
	2.1 × 50 mm	186006422	3.0 × 30 mm	186006436
	2.1 × 75 mm	186006423	3.0 × 50 mm	186006437
	2.1 × 100 mm	186006424	3.0 × 100 mm	186006438
	2.1 × 150 mm	186006425	3.0 × 150 mm	186006439
	3.0 × 30 mm	186004746	3.0 × 250 mm	186006440
	3.0 × 50 mm	186004747	4.6 × 30 mm	186006442
	3.0 × 75 mm	186005643	4.6 × 50 mm	186004757
	3.0 × 100 mm	186004743	4.6 × 75 mm	186006443
	3.0 × 150 mm	186004744	4.6 × 100 mm	186006444
	4.6 × 30 mm	186004752	4.6 × 150 mm	186004754
	4.6 × 50 mm	186004753	4.6 × 250 mm	186004756
	4.6 × 75 mm	186006428		
	4.6 × 100 mm	186004748		
	4.6 × 150 mm	186004749		
	4.6 × 250 mm	186004751		

	Particle Size: 3.5 µm		Particle Size: 5 µm	
HSS T3	1.0 × 50 mm	186006458	2.1 × 30 mm	186006472
	1.0 × 100 mm	186006459	2.1 × 50 mm	186006473
	1.0 × 150 mm	186006460	2.1 × 100 mm	186006474
	2.1 × 30 mm	186006462	2.1 × 150 mm	186006475
	2.1 × 50 mm	186006463	3.0 × 30 mm	186006477
	2.1 × 75 mm	186006464	3.0 × 50 mm	186006478
	2.1 × 100 mm	186006465	3.0 × 100 mm	186006479
	2.1 × 150 mm	186006466	3.0 × 150 mm	186006480
	3.0 × 30 mm	186004783	3.0 × 250 mm	186006481
	3.0 × 50 mm	186004784	4.6 × 30 mm	186006483
	3.0 × 75 mm	186005641	4.6 × 50 mm	186004794
	3.0 × 100 mm	186004780	4.6 × 75 mm	186006484
	3.0 × 150 mm	186004781	4.6 × 100 mm	186006485
	4.6 × 30 mm	186004789	4.6 × 150 mm	186004791
	4.6 × 50 mm	186004790	4.6 × 250 mm	186004793
	4.6 × 75 mm	186006469		
	4.6 × 100 mm	186004785		
	4.6 × 150 mm	186004786		
	4.6 × 250 mm	186004788		

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
HSS PFP	1.0 × 50 mm	186005842	2.1 × 30 mm	186005868
	1.0 × 100 mm	186005843	2.1 × 50 mm	186005869
	1.0 × 150 mm	186005844	2.1 × 100 mm	186005871
	2.1 × 30 mm	186005846	2.1 × 150 mm	186005872
	2.1 × 50 mm	186005847	3.0 × 30 mm	186005874
	2.1 × 75 mm	186005848	3.0 × 50 mm	186005875
	2.1 × 100 mm	186005849	3.0 × 100 mm	186005877
	2.1 × 150 mm	186005850	3.0 × 150 mm	186005878
	3.0 × 30 mm	186005852	3.0 × 250 mm	186005879
	3.0 × 50 mm	186005853	4.6 × 30 mm	186005881
	3.0 × 75 mm	186005854	4.6 × 50 mm	186005882
	3.0 × 100 mm	186005855	4.6 × 75 mm	186005883
	3.0 × 150 mm	186005856	4.6 × 100 mm	186005884
	4.6 × 30 mm	186005858	4.6 × 150 mm	186005885
	4.6 × 50 mm	186005859	4.6 × 250 mm	186005886
	4.6 × 75 mm	186005860		
	4.6 × 100 mm	186005861		
	4.6 × 150 mm	186005862		
	4.6 × 250 mm	186005863		

	Particle Size: 3.5 µm		Particle Size: 5 µm	
HSS CN	1.0 × 50 mm	186005901	2.1 × 30 mm	186005928
	1.0 × 100 mm	186005903	2.1 × 50 mm	186005929
	1.0 × 150 mm	186005904	2.1 × 100 mm	186005931
	2.1 × 30 mm	186005906	2.1 × 150 mm	186005932
	2.1 × 50 mm	186005907	3.0 × 30 mm	186005934
	2.1 × 75 mm	186005908	3.0 × 50 mm	186005935
	2.1 × 100 mm	186005909	3.0 × 100 mm	186005937
	2.1 × 150 mm	186005910	3.0 × 150 mm	186005938
	3.0 × 30 mm	186005912	3.0 × 250 mm	186005939
	3.0 × 50 mm	186005913	4.6 × 30 mm	186005941
	3.0 × 75 mm	186005914	4.6 × 50 mm	186005942
	3.0 × 100 mm	186005915	4.6 × 75 mm	186005943
	3.0 × 150 mm	186005916	4.6 × 100 mm	186005944
	4.6 × 30 mm	186005918	4.6 × 150 mm	186005945
	4.6 × 50 mm	186005919	4.6 × 250 mm	186005946
	4.6 × 75 mm	186005920		
	4.6 × 100 mm	186005921		
	4.6 × 150 mm	186005922		
	4.6 × 250 mm	186005923		

XSelect Peptide Columns

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
CSH C_{18}, 130Å	2.1 × 50 mm	186006950	4.6 × 50 mm	186007076
	2.1 × 100 mm	186006951	4.6 × 100 mm	186007077
	2.1 × 150 mm	186006952	4.6 × 150 mm	186007078
	4.6 × 50 mm	186006955		
	4.6 × 100 mm	186006956		
	4.6 × 150 mm	186006957		

XSelect Columns Method Validation Kits*

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
CSH C_{18}	2.1 × 100 mm	186005538	2.1 × 150 mm	186005543
	3.0 × 100 mm	186005539	3.0 × 100 mm	186005544
	3.0 × 150 mm	186005540	3.0 × 150 mm	186005545
	4.6 × 100 mm	186005541	4.6 × 100 mm	186005546
	4.6 × 150 mm	186005542	4.6 × 150 mm	186005547
			4.6 × 250 mm	186005548
CSH Fluoro-Phenyl	2.1 × 100 mm	186005549	2.1 × 150 mm	186005554
	3.0 × 100 mm	186005550	3.0 × 100 mm	186005555
	3.0 × 150 mm	186005551	3.0 × 150 mm	186005556
	4.6 × 100 mm	186005552	4.6 × 100 mm	186005557
	4.6 × 150 mm	186005553	4.6 × 150 mm	186005558
			4.6 × 250 mm	186005559
CSH Phenyl-Hexyl	2.1 × 100 mm	186005560	2.1 × 150 mm	186005565
	3.0 × 100 mm	186005561	3.0 × 100 mm	186005566
	3.0 × 150 mm	186005562	3.0 × 150 mm	186005567
	4.6 × 100 mm	186005563	4.6 × 100 mm	186005568
	4.6 × 150 mm	186005564	4.6 × 150 mm	186005569
			4.6 × 250 mm	186005570
HSS C_{18}	2.1 × 100 mm	186006406	2.1 × 150 mm	186006411
	3.0 × 100 mm	186006407	3.0 × 100 mm	186006412
	3.0 × 150 mm	186006408	3.0 × 150 mm	186006413
	4.6 × 100 mm	186006409	4.6 × 100 mm	186006414
	4.6 × 150 mm	186006410	4.6 × 150 mm	186006415
			4.6 × 250 mm	186006416
HSS C_{18} SB	2.1 × 100 mm	186006447	2.1 × 150 mm	186006452
	3.0 × 100 mm	186006448	3.0 × 100 mm	186006453
	3.0 × 150 mm	186006449	3.0 × 150 mm	186006454
	4.6 × 100 mm	186006450	4.6 × 100 mm	186006455
	4.6 × 150 mm	186006451	4.6 × 150 mm	186006456
			4.6 × 250 mm	186006457

*Each Method Validation Kit contains 3 columns, each from a different batch.

XSelect Columns Method Validation Kits* *Continued*

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
HSS T3	2.1 × 100 mm	186006488	2.1 × 150 mm	186006493
	3.0 × 100 mm	186006489	3.0 × 100 mm	186006494
	3.0 × 150 mm	186006490	3.0 × 150 mm	186006495
	4.6 × 100 mm	186006491	4.6 × 100 mm	186006496
	4.6 × 150 mm	186006492	4.6 × 150 mm	186006497
			4.6 × 250 mm	186006498
HSS PFP	2.1 × 100 mm	186005890	2.1 × 150 mm	186005895
	3.0 × 100 mm	186005891	3.0 × 100 mm	186005896
	3.0 × 150 mm	186005892	3.0 × 150 mm	186005897
	4.6 × 100 mm	186005893	4.6 × 100 mm	186005898
	4.6 × 150 mm	186005894	4.6 × 150 mm	186005899
			4.6 × 250 mm	186005900
HSS CN	2.1 × 100 mm	186005950	2.1 × 150 mm	186005955
	3.0 × 100 mm	186005951	3.0 × 100 mm	186005956
	3.0 × 150 mm	186005952	3.0 × 150 mm	186005957
	4.6 × 100 mm	186005953	4.6 × 100 mm	186005958
	4.6 × 150 mm	186005954	4.6 × 150 mm	186005959
			4.6 × 250 mm	186005960
Peptide CSH C_{18}	2.1 × 100 mm	186006953		
	4.6 × 100 mm	186006959		

*Each Method Validation Kit contains 3 columns, each from a different batch.

APPLICATION AREA: Chemical Fingerprint of Natural Products

"The XSelect HSS T3 Column made difference in my work results!

Several attempts to obtain the chromatographic profile of a natural product extract were performed with other columns, which showed about
10 substances in the chemical fingerprint. The XSelect HSS T3 Column presented a chromatographic profile of my extract with about 20 substances with incredible separation! Including the substance, I was looking for it was trace in the sample and I did not observe it in the analysis carried out
with the other columns. It was a pleasant surprise and I was amazed with the separation profile obtained in LC-MS analyses."

REVIEWER: Ana Amaral

ORGANIZATION: FIOCRUZ

★★★★☆

XSelect VanGuard Cartridges

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
CSH C_{18}	2.1 × 5 mm	186007811	2.1 × 5 mm	186007814
	3.9 × 5 mm	186007813	3.9 × 5 mm	186007816
CSH Fluoro-Phenyl	2.1 × 5 mm	186007820	2.1 × 5 mm	186007824
	3.9 × 5 mm	186007822	3.9 × 5 mm	186007826
CSH Phenyl-Hexyl	2.1 × 5 mm	186007830	2.1 × 5 mm	186007836
	3.9 × 5 mm	186007832	3.9 × 5 mm	186007838
HSS C_{18}	2.1 × 5 mm	186007851	2.1 × 5 mm	186007854
	3.9 × 5 mm	186007853	3.9 × 5 mm	186007856
HSS C_{18} SB	2.1 × 5 mm	186007842	2.1 × 5 mm	186007845
	3.9 × 5 mm	186007844	3.9 × 5 mm	186007847
HSS T3	2.1 × 5 mm	186007878	2.1 × 5 mm	186007881
	3.9 × 5 mm	186007880	3.9 × 5 mm	186007883
HSS PFP	2.1 × 5 mm	186007869	2.1 × 5 mm	186007872
	3.9 × 5 mm	186007871	3.9 × 5 mm	186007874
HSS CN	2.1 × 5 mm	186007860	2.1 × 5 mm	186007863
	3.9 × 5 mm	186007862	3.9 × 5 mm	186007865

Universal VanGuard Cartridge Holder

Description	P/N
Universal VanGuard Cartridge Holder	186007949

Atlantis® Columns

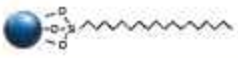
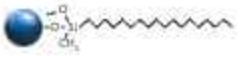


Atlantis HPLC Columns

For polar compounds, Atlantis HPLC Columns provide exceptional performance, versatility, and retention. The balanced retention of Atlantis Columns affords the separation of polar and non-polar analytes while providing:

- Compatibility with 100% aqueous mobile phases
- Polar-compound retention without ion-pairing reagents
- Long column life when used with mobile phases of low pH

Column Characteristics

	T3, 100Å	dC_{18}, 100Å	HILIC Silica, 100Å
	HPLC: 3, 5, 10 µm	HPLC: 3, 5 µm	HPLC: 3, 5 µm
Particle/Ligand			
Ligand Density*	1.6 µmol/m²	1.6 µmol/m²	N/A
Carbon Load*	14%	12%	Unbonded
Endcap Style	Proprietary	Proprietary	N/A
USP Class No.	L1	L1	L3
pH Range	2–8	3–7	1–5
Temperature Limits	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C	Low pH = 45 °C, High pH = 45 °C
Surface Area*	330 m²/g	330 m²/g	330 m²/g
Performance Standards	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**HILIC QC Reference Material** p/n: 186007226
Application Standards	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**HILIC QC Reference Material** p/n: 186007226

*Expected or approximate value.

Ordering Information

Atlantis Analytical Columns

	Dimension	P/N	Dimension	P/N
	Particle Size: 3 µm		Particle Size: 5 µm	
T3	1.0 × 50 mm	186003713	2.1 × 30 mm	186003733
	1.0 × 150 mm	186003714	2.1 × 50 mm	186003734
	2.1 × 20 mm *IS*	186003715	2.1 × 100 mm	186003735
	2.1 × 30 mm	186003716	2.1 × 150 mm	186003736
	2.1 × 50 mm	186003717	3.0 × 50 mm	186003738
	2.1 × 75 mm	186005652	3.0 × 100 mm	186003739
	2.1 × 100 mm	186003718	3.0 × 150 mm	186003740
	2.1 × 150 mm	186003719	3.0 × 250 mm	186003741
	3.0 × 50 mm	186003721	4.6 × 30 mm	186003743
	3.0 × 75 mm	186005653	4.6 × 50 mm	186003744
	3.0 × 100 mm	186003722	4.6 × 75 mm	186003745
	3.0 × 150 mm	186003723	4.6 × 100 mm	186003746
	4.6 × 20 mm *IS*	186003724	4.6 × 150 mm	186003747
	4.6 × 30 mm	186003725	4.6 × 250 mm	186003748
	4.6 × 50 mm	186003726		
	4.6 × 75 mm	186003727		
	4.6 × 100 mm	186003728		
	4.6 × 150 mm	186003729		

	Particle Size: 3 µm		Particle Size: 5 µm	
dC_{18}	2.1 × 20 mm *IS*	186002058	2.1 × 20 mm *IS*	186002059
	2.1 × 30 mm	186001287	2.1 × 50 mm	186001293
	2.1 × 50 mm	186001291	2.1 × 100 mm	186001297
	2.1 × 100 mm	186001295	2.1 × 150 mm	186001301
	2.1 × 150 mm	186001299	3.0 × 100 mm	186001305
	3.0 × 50 mm	186001389	3.0 × 150 mm	186001309
	3.0 × 100 mm	186001303	3.0 × 100 mm	186001305
	3.0 × 150 mm	186001307	3.0 × 150 mm	186001309
	3.9 × 100 mm	186001393	3.0 x 250 mm	186001311
	3.9 × 150 mm	186001317	3.9 x 100 mm	186001395
	4.6 × 20 mm *IS*	186002062	3.9 × 150 mm	186001319
	4.6 × 50 mm	186001329	4.6 × 50 mm	186001331
	4.6 × 75 mm	186001333	4.6 × 75 mm	186001335
	4.6 × 100 mm	186001337	4.6 × 100 mm	186001340
	4.6 × 150 mm	186001342	4.6 × 150 mm	186001344
			4.6 × 250 mm	186001346

APPLICATION AREA: Residue and Metabolism

"Reliable and requires little maintenance. The column has great performance it is reliable and requires little maintenance I recommended as a great tool."

REVIEWER: Christopher Bianca
ORGANIZATION: JRFAmerica

★★★★☆

Atlantis Analytical Columns *Continued*

	Dimension	P/N	Dimension	P/N
	Particle Size: 3 µm		Particle Size: 5 µm	
HILIC Silica	2.1 × 15 mm Direct Connect	186002007	1.0 × 50 mm	186002004
	2.1 × 30 mm	186002009	2.1 × 50 mm	186002012
	2.1 × 50 mm	186002011	2.1 × 100 mm	186002014
	2.1 × 100 mm	186002013	2.1 × 150 mm	186002016
	2.1 × 150 mm	186002015	3.0 × 50 mm	186002018
	3.0 × 50 mm	186002017	4.6 × 50 mm	186002028
	3.0 × 100 mm	186002019	4.6 × 100 mm	186002030
	4.6 × 50 mm	186002027	4.6 × 150 mm	186002032
	4.6 × 100 mm	186002029	4.6 × 250 mm	186002033
	4.6 × 150 mm	186002031		

Atlantis Columns Method Validation Kits*

	Dimension	P/N	Dimension	P/N
	Particle Size: 3 µm		Particle Size: 5 µm	
T3	4.6 × 150 mm	186003751	4.6 × 150 mm	186003754
			4.6 × 250 mm	186003755
HILIC Silica	4.6 × 150 mm	186002315	4.6 × 150 mm	186002314
			4.6 × 250 mm	186002316

*Each Method Validation Kit contains 3 columns, each from a different batch.

Atlantis VanGuard Cartridges

	Dimension	P/N	Dimension	P/N
	Particle Size: 3 µm		Particle Size: 5 µm	
T3	2.1 × 5 mm	186007674	2.1 × 5 mm	186007678
	3.9 × 5 mm	186007676	3.9 × 5 mm	186007680
dC_{18}	2.1 × 5 mm	186007658	2.1 × 5 mm	186007662
	3.9 × 5 mm	186007660	3.9 × 5 mm	186007664
HILIC Silica	2.1 × 5 mm	186007666	2.1 × 5 mm	186007670
	3.9 × 5 mm	186007668	3.9 × 5 mm	186007672

Universal VanGuard Cartridge Holder

Description	P/N
Universal VanGuard Cartridge Holder	186007949



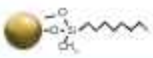
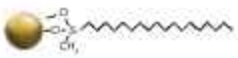
SunFire HPLC Columns

SunFire Columns set the standard for state-of-the-art bonded C_{18} and C_8 silica HPLC columns. Benefiting from years of research and product development, SunFire Columns deliver industry-leading levels of chromatographic performance, representing the best in particle and bonding expertise.

SunFire Columns offer:

- Excellent low-pH stability
- High chromatographic efficiency
- Superior peak shapes for charged analyte species

Column Characteristics

	C_{18} 100Å	C_8 100Å	Silica, 100Å
	HPLC: 2.5, 3.5, 5, 10 µm	HPLC: 2.5, 3.5, 5, 10 µm	HPLC: 5, 10 µm
Particle/Ligand			
Ligand Density*	3.5 µmol/m²	3.5 µmol/m²	N/A
Carbon Load*	12%	16%	N/A
Endcap Style	Proprietary	Proprietary	N/A
USP Class No.	L7	L1	L3
pH Range	2–8	2–8	2–8
Temperature Limits	Low pH = 40 °C, High pH = 40 °C	Low pH = 50 °C, High pH = 40 °C	Low pH =55 °C, High pH = 45 °C
Surface Area*	340 m²/g	340 m²/g	340 m²/g
Performance Standards	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	—
Application Standards	**Reversed-Phase QC Reference Material** p/n: 186006363 **HILIC QC Reference Material** p/n: 186007226	**Reversed-Phase QC Reference Material** p/n: 186006363	—

*Expected or approximate value.

SunFire 2.5 µm Columns can be found on page 131.

Ordering Information

SunFire Analytical Columns

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
C_{18}	2.1 × 50 mm	186002533	2.1 × 50 mm	186002539
	2.1 × 100 mm	186002534	2.1 × 100 mm	186002540
	2.1 × 150 mm	186002535	2.1 × 150 mm	186002541
	3.0 × 50 mm	186002542	3.0 × 50 mm	186002545
	3.0 × 100 mm	186002543	3.0 × 100 mm	186002546
	3.0 × 150 mm	186002544	3.0 × 150 mm	186002547
	4.6 × 20 mm /S	186002549	3.0 × 250 mm	186002548
	4.6 × 50 mm	186002551	4.6 × 30 mm	186002556
	4.6 × 75 mm	186002552	4.6 × 50 mm	186002557
	4.6 × 100 mm	186002553	4.6 × 100 mm	186002558
	4.6 × 150 mm	186002554	4.6 × 150 mm	186002559
			4.6 × 250 mm	186002560

	Particle Size: 3.5 µm		Particle Size: 5 µm	
C_8	2.1 × 50 mm	186002710	2.1 × 50 mm	186002715
	2.1 × 100 mm	186002711	2.1 × 100 mm	186002716
	2.1 × 150 mm	186002712	2.1 × 150 mm	186002717
	3.0 × 50 mm	186002719	3.0 × 50 mm	186002723
	3.0 × 100 mm	186002720	3.0 × 100 mm	186002724
	3.0 × 150 mm	186002721	3.0 × 150 mm	186002725
	4.6 × 30 mm	186002728	4.6 × 30 mm	186002734
	4.6 × 50 mm	186002729	4.6 × 50 mm	186002735
	4.6 × 75 mm	186002730	4.6 × 100 mm	186002736
	4.6 × 100 mm	186002731	4.6 × 150 mm	186002737
	4.6 × 150 mm	186002732	4.6 × 250 mm	186002738

	Particle Size: 5 µm		Particle Size: 10 µm	
Silica	4.6 × 150 mm	186003453	4.6 × 150 mm	186003467
	4.6 × 250 mm	186003454	4.6 × 250 mm	186003468

APPLICATION AREA: API's Impurities

"When combined with LC-MS/MS returns excellent results. It is highly versatile, durable, high performance and with good durability and reliability."

REVIEWER: Paolo Piccinini

ORGANIZATION: LabAnalysis srl

★★★★☆

SunFire Columns Method Validation Kits*

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
C_{18}	4.6 × 100 mm	186002675	4.6 × 150 mm	186002679
	4.6 × 150 mm	186002676	4.6 × 250 mm	186002680
C_8	4.6 × 100 mm	186002740	4.6 × 150 mm	186002744
	4.6 × 150 mm	186002741	4.6 × 250 mm	186002745

*Each Method Validation Kit contains 3 columns, each from a different batch.

SunFire VanGuard Cartridges

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
C_{18}	2.1 × 5 mm	186007694	2.1 × 5 mm	186007697
	3.9 × 5 mm	186007696	3.9 × 5 mm	186007699
C_8	2.1 × 5 mm	186007703	2.1 × 5 mm	186007706
	3.9 × 5 mm	186007705	3.9 × 5 mm	186007708

Universal VanGuard Cartridge Holder

Description	P/N
Universal VanGuard Cartridge Holder	186007949

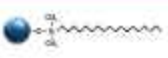


Symmetry HPLC Columns

Symmetry® Columns exceed the standards for HPLC column performance. To ensure their optimum performance, they are packed with high-purity silica using stringently controlled manufacturing processes. No other silica-based LC column brand can match the column-to-column and batch-to-batch reproducibility of Symmetry Columns.

- Symmetry C_{18} and C_8 Columns deliver maximum reproducibility
- SymmetryShield™ RP18 and RP8 Columns provide superior peak shape
- Symmetry300™ C_{18} and C_4 Columns offer high recoveries of peptides and proteins

Column Characteristics

	Symmetry C_8 and SymmetryPrep C_8	Symmetry C_{18} and SymmetryPrep C_{18}	SymmetryShield RP8	SymmetryShield RP18	Symmetry300 C_4	Symmetry300 C_{18}
	HPLC: 3.5, 5, 7 µm	HPLC: 3.5, 5, 7 µm	HPLC: 3.5, 5, 7 µm	HPLC: 3.5, 5, 7 µm	HPLC: 3.5, 5 µm	HPLC: 3.5, 5 µm
Particle/Ligand						
Carbon Load*	12%	19%	15%	17%	2.8%	8.5%
Endcap Style	Proprietary	Proprietary	Proprietary	Proprietary	Proprietary	Proprietary
USP Class No.	L7	L1	L1	L1	L26	L1
Performance Standards	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**MassPREP Protein Standard Mix** p/n: 186004900	**Cytochrome *c* Digestion Standard** p/n: 186006371
Application Standards	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**MassPREP Protein Standard Mix** p/n: 186004900	**Peptide Retention Standard** p/n: 186006555

*Expected or approximate value.

Symmetry, SymmetryShield, and Symmetry300 Analytical Columns

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
Symmetry C_{18}	1.0 × 50 mm	WAT106056	2.1 × 20 mm *IS*	186002070
	1.0 × 150 mm	WAT248059	2.1 × 50 mm	186000206
	2.1 × 30 mm	WAT058973	2.1 × 100 mm	186002608
	2.1 × 50 mm	WAT200650	2.1 × 150 mm	WAT056975
	2.1 × 100 mm	WAT058965	3.0 × 150 mm	WAT054200
	2.1 × 150 mm	WAT106005	3.0 × 250 mm	186000690
	3.0 × 50 mm	186002612	3.9 × 20 mm *IS*	186002086
	3.0 × 100 mm	186000696	3.9 × 150 mm	WAT046980
	3.0 × 150 mm	186000695	4.6 × 20 mm *IS*	186002094
	3.9 × 20 mm *IS*	186002082	4.6 × 50 mm	186000207
	4.6 × 20 mm *IS*	186002090	4.6 × 100 mm	186002616
	4.6 × 30 mm	186000271	4.6 × 150 mm	WAT045905
	4.6 × 50 mm	WAT200625	4.6 × 250 mm	WAT054275
	4.6 × 75 mm	WAT066224		
	4.6 × 100 mm	WAT066220		
	4.6 × 150 mm	WAT200632		
	4.6 × 250 mm	186005794		

	Particle Size: 3.5 µm		Particle Size: 5 µm	
Symmetry C_8	2.1 × 30 mm	WAT058977	2.1 × 50 mm	186000212
	2.1 × 50 mm	WAT200624	2.1 × 100 mm	186002609
	2.1 × 100 mm	WAT058961	2.1 × 150 mm	WAT056955
	2.1 × 150 mm	WAT106011	3.0 × 150 mm	WAT054230
	3.0 × 100 mm	186000698	3.0 × 250 mm	186000691
	3.0 × 150 mm	186000697	3.9 × 20 mm *IS*	186002087
	3.9 × 20 mm *IS*	186002083	3.9 × 150 mm	WAT046970
	4.6 × 30 mm	186000270	4.6 × 50 mm	186000213
	4.6 × 50 mm	WAT200620	4.6 × 100 mm	186002617
	4.6 × 75 mm	WAT066200	4.6 × 150 mm	WAT045995
	4.6 × 100 mm	WAT066204	4.6 × 250 mm	WAT054270
	4.6 × 150 mm	WAT200630		

Symmetry, SymmetryShield, and Symmetry300 Analytical Columns *Continued*

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
SymmetryShield RP18	2.1 × 30 mm	186000171	2.1 × 50 mm	186000217
	2.1 × 50 mm	186000172	2.1 × 100 mm	186000998
	2.1 × 100 mm	186000173	2.1 × 150 mm	186000111
	2.1 × 150 mm	186000174	3.0 × 150 mm	186000692
	3.0 × 50 mm	186002614	3.0 × 250 mm	186000693
	3.0 × 100 mm	186000700	3.9 × 20 mm *IS*	186002088
	3.0 × 150 mm	186000699	3.9 × 150 mm	186000108
	3.9 × 20 mm *IS*	186002084	4.6 × 50 mm	186000218
	4.6 × 50 mm	186000177	4.6 × 100 mm	186002618
	4.6 × 75 mm	186000178	4.6 × 150 mm	186000109
	4.6 × 100 mm	186000179	4.6 × 250 mm	186000112
	4.6 × 150 mm	186000180		

	Particle Size: 3.5 µm		Particle Size: 5 µm	
SymmetryShield RP8	2.1 × 50 mm	WAT094257	2.1 × 50 mm	186000223
	2.1 × 100 mm	WAT058969	2.1 × 150 mm	WAT094245
	2.1 × 150 mm	WAT106008	3.0 × 150 mm	WAT094243
	3.0 × 100 mm	186000703	3.0 × 250 mm	186000694
	3.0 × 150 mm	186000702	3.9 × 20 mm *IS*	186002089
	3.0 × 100 mm	186000703	3.9 × 150 mm	WAT200655
	3.0 × 150 mm	186000702	4.6 × 50 mm	186000224
	4.6 × 50 mm	WAT094260	4.6 × 100 mm	186002619
	4.6 × 75 mm	WAT094263	4.6 × 150 mm	WAT200662
	4.6 × 100 mm	WAT094266	4.6 × 250 mm	WAT200670
	4.6 × 150 mm	WAT094269		

	Particle Size: 3.5 µm		Particle Size: 5 µm	
Symmetry300 C_{18}	2.1 × 50 mm	186000187	2.1 × 150 mm	WAT106172
	2.1 × 100 mm	186000188	4.6 × 50 mm	WAT106209
	2.1 × 150 mm	186000200	4.6 × 150 mm	WAT106157
	4.6 × 50 mm	186000201	4.6 × 250 mm	WAT106151
	4.6 × 75 mm	186000189		
	4.6 × 100 mm	186000190		
	4.6 × 150 mm	186000197		

	Particle Size: 3.5 µm		Particle Size: 5 µm	
Symmetry300 C_4	2.1 × 50 mm	186000277	2.1 × 150 mm	186000285
	2.1 × 100 mm	186000278	3.9 × 150 mm	186000286
	2.1 × 150 mm	186000279	4.6 × 50 mm	186000287
	4.6 × 50 mm	186000280	4.6 × 150 mm	186000288
	4.6 × 75 mm	186000281	4.6 × 250 mm	186000289
	4.6 × 100 mm	186000282		
	4.6 × 150 mm	186000283		

Symmetry, SymmetryShield, and Symmetry300 Method Validation Kits*

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
Symmetry C_{18}	4.6 × 150 mm	WAT094240	3.9 × 150 mm	WAT047210
			4.6 × 150 mm	WAT054448
			4.6 × 250 mm	WAT054450
Symmetry C_8	4.6 × 150 mm	WAT094237	3.9 × 150 mm	WAT046955
			4.6 × 150 mm	WAT054435
			4.6 × 250 mm	WAT054438
SymmetryShield RP18	4.6 × 150 mm	186000181	4.6 × 150 mm	186000103
			4.6 × 250 mm	186000102
SymmetryShield RP8	4.6 × 150 mm	WAT094278	4.6 × 250 mm	WAT210591
Symmetry300 C_{18}	4.6 × 150 mm	186000195	3.9 × 150 mm	WAT106187
			4.6 × 150 mm	WAT106190
			4.6 × 250 mm	WAT106184
Symmetry300 C_4	4.6 × 150 mm	186000291	3.9 × 150 mm	186000293
			4.6 × 150 mm	186000294
			4.6 × 250 mm	186000295

*Each Method Validation Kit contains 3 columns, each from a different batch.

Symmetry, SymmetryShield, and Symmetry300 Cartridge Method Validation Kits*

	Dimension	P/N
	Particle Size: 5 µm	
Symmetry C_{18}	3.9 × 150 mm	WAT054452[1]
	4.6 × 150 mm	WAT054454[1]
Symmetry RP8	3.9 × 150 mm	WAT010582[1]
Symmetry300 C_{18}	3.9 × 150 mm	WAT106181[1]

[1] Requires Cartridge End-fittings.
*Each Method Validation Kit contains 3 columns, each from a different batch.

Symmetry VanGuard Cartridges

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
Symmetry C_{18}	2.1 × 5 mm	186007725	2.1 × 5 mm	186007729
	3.9 × 5 mm	186007727	3.9 × 5 mm	186007731
Symmetry C_8	2.1 × 5 mm	186007733	2.1 × 5 mm	186007737
	3.9 × 5 mm	186007735	3.9 × 5 mm	186007739
SymmetryShield RP18	2.1 × 5 mm	186007749	2.1 × 5 mm	186007753
	3.9 × 5 mm	186007751	3.9 × 5 mm	186007755
SymmetryShield RP8	2.1 × 5 mm	186007741	2.1 × 5 mm	186007745
	3.9 × 5 mm	186007743	3.9 × 5 mm	186007747
Symmetry300 C_{18}	2.1 × 5 mm	186007709	2.1 × 5 mm	186007713
	3.9 × 5 mm	186007711	3.9 × 5 mm	186007715
Symmetry300 C_4	2.1 × 5 mm	186007717	2.1 × 5 mm	186007721
	3.9 × 5 mm	186007719	3.9 × 5 mm	186007723

Universal VanGuard Cartridge Holder

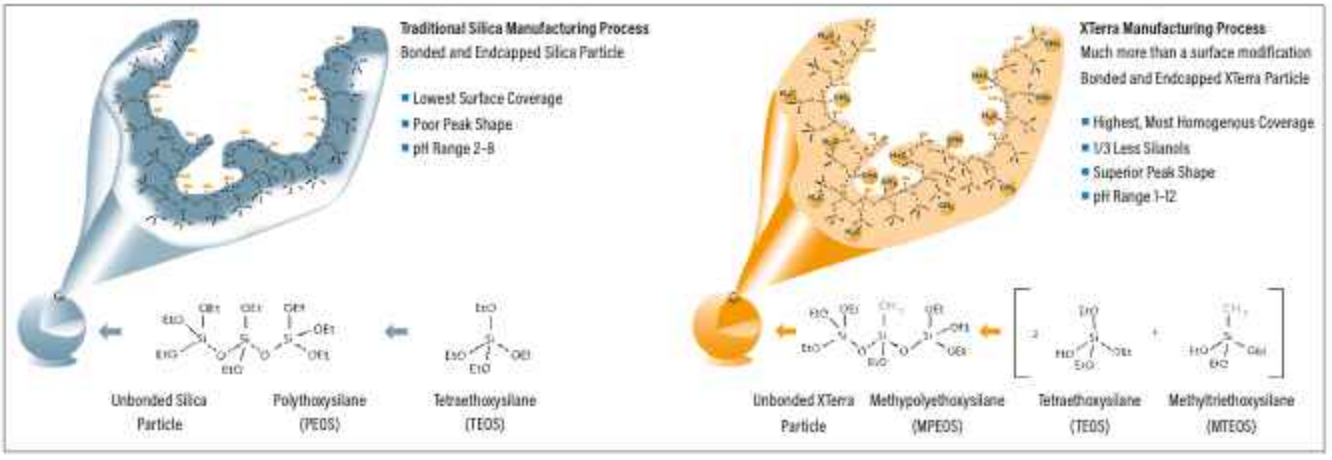
Description	P/N
Universal VanGuard Cartridge Holder	186007949



XTerra HPLC Columns

XTerra MS, Shield RP, and Phenyl Columns combine the best properties of silica- and polymeric-bonded phases with patented Hybrid Particle Technology (HPT), which replaces one out of every three silanol groups with a methyl group during particle synthesis. HPT overcomes the limitations of silica-based materials while maintaining its best attributes for mechanical strength, chemical resistance, and easy scale-up from analytical to preparative chromatography.

Traditional Silica vs. XTerra Manufacturing Process



Column Characteristics

	MS C_{18}, 125Å	Shield RP18, 125Å	MS C_8, 125Å	Shield RP8, 125Å	Phenyl, 125Å
	HPLC: 3.5, 5 µm	HPLC: 3.5, 5 µm	HPLC: 3.5, 5 µm	HPLC: 3.5, 5 µm	HPLC: 3.5, 5 µm
Particle/Ligand					
Carbon Load*	15.5%	15%	12%	13.5%	12%
Endcap Style	Proprietary	Proprietary	Proprietary	Proprietary	Proprietary
USP Class No.	L1	L1	L7	L7	L11
Performance Standards	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360	**Neutrals QC Reference Material** p/n: 186006360
Application Standards	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363	**Reversed-Phase QC Reference Material** p/n: 186006363

*Expected or approximate value.

For XTerra 2.5 µm Columns, please refer to page 133.

Ordering Information

XTerra Analytical Columns

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
MS C_{18}	2.1 × 20 mm /S	186001923	2.1 × 20 mm /S	186001979
	2.1 × 30 mm	186000398	2.1 × 50 mm	186000446
	2.1 × 50 mm	186000400	2.1 × 100 mm	186000450
	2.1 × 100 mm	186000404	2.1 × 150 mm	186000454
	2.1 × 150 mm	186000408	2.1 × 250 mm	186000458
	3.0 × 30 mm	186000412	3.0 × 50 mm	186000462
	3.0 × 50 mm	186000414	3.0 × 100 mm	186000466
	3.0 × 100 mm	186000418	3.0 × 150 mm	186000470
	3.0 × 150 mm	186000422	3.0 × 250 mm	186000474
	3.9 × 100 mm	186000426	3.9 × 150 mm	186000478
	4.6 × 20 mm /S	186001891	4.6 × 30 mm	186000878
	4.6 × 30 mm	186000430	4.6 × 50 mm	186000482
	4.6 × 50 mm	186000432	4.6 × 100 mm	186000486
	4.6 × 100 mm	186000436	4.6 × 150 mm	186000490
	4.6 × 150 mm	186000440	4.6 × 250 mm	186000494
	4.6 × 250 mm	186001470		

	Particle Size: 3.5 µm		Particle Size: 5 µm	
MS C_8	2.1 × 30 mm	186000399	2.1 × 50 mm	186000447
	2.1 × 50 mm	186000401	2.1 × 100 mm	186000451
	2.1 × 100 mm	186000405	2.1 × 150 mm	186000455
	2.1 × 150 mm	186000409	2.1 × 250 mm	186000459
	3.0 × 30 mm	186000413	3.0 × 50 mm	186000463
	3.0 × 50 mm	186000415	3.0 × 100 mm	186000467
	3.0 × 100 mm	186000419	3.0 × 150 mm	186000471
	3.0 × 150 mm	186000423	3.9 × 150 mm	186000479
	3.9 × 20 mm /S	186001898	4.6 × 30 mm	186000879
	4.6 × 50 mm	186000433	4.6 × 50 mm	186000483
	4.6 × 100 mm	186000437	4.6 × 100 mm	186000487
	4.6 × 150 mm	186000441	4.6 × 150 mm	186000491
	4.6 × 250 mm	186001471	4.6 × 250 mm	186000495

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
Shield RP18	2.1 × 20 mm *IS*	186001925	2.1 × 20 mm *IS*	186001982
	2.1 × 50 mm	186000402	2.1 × 50 mm	186000448
	2.1 × 100 mm	186000406	2.1 × 100 mm	186000452
	2.1 × 150 mm	186000410	2.1 × 150 mm	186000456
	3.0 × 50 mm	186000416	2.1 × 250 mm	186000460
	3.0 × 100 mm	186000420	3.0 × 50 mm	186000464
	3.0 × 150 mm	186000424	3.0 × 100 mm	186000468
	3.9 × 20 mm *IS*	186001902	3.0 × 150 mm	186000472
	3.9 × 100 mm	186000428	3.0 × 250 mm	186000476
	4.6 × 20 mm *IS*	186001893	3.9 × 150 mm	186000480
	4.6 × 50 mm	186000434	4.6 × 30 mm	186001909
	4.6 × 100 mm	186000438	4.6 × 20 mm *IS*	186001994
	4.6 × 150 mm	186000442	4.6 × 50 mm	186000484
	4.6 × 250 mm	186001472	4.6 × 100 mm	186000488
			4.6 × 150 mm	186000492
			4.6 × 250 mm	186000496

	Particle Size: 3.5 µm		Particle Size: 5 µm	
Shield RP8	2.1 × 50 mm	186000403	2.1 × 50 mm	186000449
	2.1 × 100 mm	186000407	2.1 × 100 mm	186000453
	2.1 × 150 mm	186000411	2.1 × 150 mm	186000457
	3.0 × 50 mm	186000417	2.1 × 250 mm	186000461
	3.0 × 100 mm	186000421	3.0 × 50 mm	186000465
	3.0 × 150 mm	186000425	3.0 × 100 mm	186000469
	3.9 × 100 mm	186000429	3.0 × 150 mm	186000473
	4.6 × 20 mm *IS*	186001894	3.9 × 20 mm *IS*	186001991
	4.6 × 50 mm	186000435	3.9 × 150 mm	186000481
	4.6 × 100 mm	186000439	4.6 × 50 mm	186000485
	4.6 × 150 mm	186000443	4.6 × 100 mm	186000489
	4.6 × 250 mm	186001473	4.6 × 150 mm	186000493
			4.6 × 250 mm	186000497

	Particle Size: 3.5 µm		Particle Size: 5 µm	
Phenyl	2.1 × 50 mm	186001179	3.9 × 150 mm	186001184
	2.1 × 100 mm	186001180	4.6 × 50 mm	186001144
	2.1 × 150 mm	186001181	4.6 × 100 mm	186001145
	3.0 × 50 mm	186001141	4.6 × 150 mm	186001146
	3.0 × 100 mm	186001142	4.6 × 250 mm	186001147
	3.0 × 150 mm	186001143		
	3.9 × 100 mm	186001177		
	3.9 × 150 mm	186001178		
	4.6 x 50 mm	186001138		
	4.6 × 100 mm	186001139		
	4.6 × 150 mm	186001140		
	4.6 × 250 mm	186001474		

XTerra Columns Method Validation Kits*

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
MS C_{18}	4.6 × 150 mm	186000826	4.6 × 150 mm	186000829
			4.6 × 250 mm	186000830
Shield RP18	4.6 × 150 mm	186000861	4.6 × 150 mm	186000862
			4.6 × 250 mm	186000863

*Each Method Validation Kit contains 3 columns, each from a different batch.

XTerra VanGuard Cartridges

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
MS C_{18}	2.1 × 5 mm	186007892	2.1 × 5 mm	186007896
	3.9 × 5 mm	186007894	3.9 × 5 mm	186007899
MS C_8	2.1 × 5 mm	186007905	2.1 × 5 mm	186007909
	3.9 × 5 mm	186007735	3.9 × 5 mm	186007739
Shield RP18	2.1 × 5 mm	186007929	2.1 × 5 mm	186007933
	3.9 × 5 mm	186007931	3.9 × 5 mm	186007935
Shield RP8	2.1 × 5 mm	186007941	3.9 × 5 mm	186007947
	3.9 × 5 mm	186007943		
Phenyl	2.1 × 5 mm	186007917	2.1 × 5 mm	186007921
	3.9 × 5 mm	186007919	3.9 × 5 mm	186007923

Universal VanGuard Cartridge Holder

Description	P/N
Universal VanGuard Cartridge Holder	186007949

TRUSTED REVIEWS

APPLICATION AREA: Analysis of Mycotoxins

"With these columns, I am able to achieve great, reproducible results with amazing accuracy."

REVIEWER: Jeremy Kotowicz
ORGANIZATION: USDA

★★★★☆

Waters Spherisorb Columns

Waters Spherisorb® Columns are produced in a wide range of particle sizes (3, 5, and 10 µm) and bonded phases. Their high quality bonded phases afford many different and unique separation selectivities. Analytical columns are supplied with industry-standard, Parker-style, column end-fittings.



Column Characteristics

	ODS2 (C_8), 80Å	ODS1 (C_8), 80Å	ODSB (C_{18}), 80Å	C_4, 80Å	C_2, 80Å	C_1, 80Å
	HPLC: 3, 5, 10 µm	HPLC: 3, 5, 10 µm	HPLC: 5 µm	HPLC: 3, 5, 10 µm	HPLC: 3, 5, 10 µm	HPLC: 3, 5, 10 µm
Ligand Density*	3.0 µmol/m²	1.5 µmol/m²	3.0 µmol/m²	3.0 µmol/m²	3.4 µmol/m²	3.0 µmol/m²
Carbon Load*	Unbonded	12%	18%	12%	8%	15%
Endcap Style	Proprietary	None	Proprietary	Proprietary	Proprietary	None
USP Class No.	L1	L1	L1	L7	L15	L13
Surface Area*	220 m²/g	220 m²/g	220 m²/g	220 m²/g	220 m²/g	220 m²/g

*Expected or approximate value.

	NH_2 (Amino), 80Å	Phenyl, 80Å	CN Nitrile, 80Å	OD/CN, 80Å	W (Silica), 80Å	SCX, 80Å	SAX, 80Å
	HPLC: 3, 5, 10 µm	HPLC: 3, 5, 10 µm	HPLC: 3, 5, 10 µm	HPLC: 5 µm	HPLC: 3, 5, 10 µm	HPLC: 5, 10 µm	HPLC: 5, 10 µm
Ligand Density*	2.6 µmol/m²	2.7 µmol/m²	3.3 µmol/m²	1.2 µmol/m²	—	—	—
Carbon Load*	12%	9%	18%	18%	18%	18%	18%
Endcap Style	None	None	None	Proprietary	—	Proprietary	Proprietary
USP Class No.	L8	L11	L10	—	L3	L9	L14
Surface Area*	220 m²/g	220 m²/g	220 m²/g	220 m²/g	220 m²/g	220 m²/g	220 m²/g

*Expected or approximate value.

For Spherisorb Preparative Columns, please refer to page 213.

Ordering Information

Waters Spherisorb Columns

	Dimension	P/N	Dimension	P/N
	Particle Size: 3 µm		Particle Size: 5 µm	
ODS1	2.0 × 100 mm	PSS833422	4.0 × 125 mm	PSS845541
	2.0 × 150 mm	PSS833423	4.0 × 250 mm	PSS845542
	4.6 × 50 mm	PSS833411	4.6 × 100 mm	PSS830612
	4.6 × 100 mm	PSS833412	4.6 × 150 mm	PSS830613
	4.6 × 150 mm	PSS833413	4.6 × 250 mm	PSS830615

	Particle Size: 3 µm		Particle Size: 5 µm	
ODS2	2.0 × 100 mm	PSS832122	4.0 × 125 mm	PSS845543
	2.0 × 150 mm	PSS832123	4.0 × 250 mm	PSS845277
	4.6 × 50 mm	PSS832111	4.6 × 50 mm	PSS831911
	4.6 × 60 mm	PSS839853	4.6 × 100 mm	PSS831912
	4.6 × 100 mm	PSS832112	4.6 × 150 mm	PSS831913
	4.6 × 150 mm	PSS832113	4.6 × 250 mm	PSS831915

	Particle Size: 3 µm		Particle Size: 5 µm	
C_8	2.0 × 100 mm	PSS832222	4.0 × 125 mm	PSS845280
	2.0 × 150 mm	PSS832223	4.0 × 250 mm	PSS845281
	4.6 × 50 mm	PSS832211	4.6 × 100 mm	PSS831812
	4.6 × 100 mm	PSS832212	4.6 × 150 mm	PSS831813
	4.6 × 150 mm	PSS832213	4.6 × 250 mm	PSS831815

	Particle Size: 3 µm		Particle Size: 5 µm	
C_6	4.6 × 150 mm	PSS833113	4.0 × 125 mm	PSS845284
			4.6 × 100 mm	PSS831012
			4.6 × 250 mm	PSS831015

	Particle Size: 3 µm		Particle Size: 5 µm	
C_1	4.6 × 50 mm	PSS832911	4.0 × 250 mm	PSS845289
	4.6 × 150 mm	PSS832913	4.6 × 100 mm	PSS832612
			4.6 × 150 mm	PSS832613
			4.6 × 250 mm	PSS832615

	Particle Size: 3 µm		Particle Size: 5 µm	
NH_2	2.0 × 100 mm	PSS832322	4.0 × 250 mm	PSS845301
	4.6 × 50 mm	PSS832311	4.6 × 150 mm	PSS831113
	4.6 × 100 mm	PSS832312	4.6 × 250 mm	PSS831115
	4.6 × 150 mm	PSS832313		

	Particle Size: 3 µm		Particle Size: 5 µm	
Phenyl	4.6 × 150 mm	PSS833713	4.0 × 125 mm	PSS845292
			4.0 × 250 mm	PSS845293
			4.6 × 250 mm	PSS830815

	Dimension	P/N	Dimension	P/N
	Particle Size: 3 µm		Particle Size: 5 µm	
CN Normal Phase	2.0 × 100 mm	PSS832422	4.0 × 125 mm	PSS845296
	4.6 × 100 mm	PSS832412	4.0 × 250 mm	PSS845297
	4.6 × 150 mm	PSS832413	4.6 × 50 mm	PSS830911
			4.6 × 100 mm	PSS830912
			4.6 × 150 mm	PSS830913
			4.6 × 250 mm	PSS830915
	Particle Size: 3 µm			
CN Reversed Phase	4.6 × 150 mm	PSS830908		
	4.6 × 250 mm	PSS830909		
	Particle Size: 3 µm		Particle Size: 5 µm	
W Silica	4.6 × 100 mm	PSS832012	2.0 × 250 mm	PSS830125
	4.6 × 150 mm	PSS832013	4.0 × 125 mm	PSS845539
			4.0 × 250 mm	PSS845540
			4.6 × 50 mm	PSS830111
			4.6 × 250 mm	PSS830115
	Particle Size: 5 µm			
SAX	4.0 × 125 mm	PSS845304		
	4.0 × 250 mm	PSS845305		
	4.6 × 50 mm	PSS832711		
	4.6 × 150 mm	PSS832713		
	4.6 × 250 mm	PSS832715		
SCX	4.0 × 125 mm	PSS845308		
	4.0 × 250 mm	PSS845309		
	4.6 × 50 mm	PSS837511		
	4.6 × 100 mm	PSS837512		
	4.6 × 150 mm	PSS837513		
	4.6 × 250 mm	PSS837515		
OD/CN	4.6 × 150 mm	PSS837813		
	4.6 × 250 mm	PSS837815		

Nova-Pak Columns

The bonded phases of Nova-Pak® Columns, available in 4- and 6 µm particle sizes, offer high resolution and fast, efficient chromatography. When used with relatively short column lengths, the smaller particles reduce solvent consumption while retaining their ability to resolve complex mixtures. Steel analytical columns packed with 4 µm particles are available in 75-, 150-, and 300-mm lengths. Packed with high efficiency 6 µm particles, semi-preparative Prep Nova-Pak HR Columns provide an unparalleled range of separation possibilities. Their faster separations produce concentrated fractions, and they require less solvent, significantly reducing costs.

Column Characteristics

	C_{18}, 60Å	C_{18}, 60Å	Phenyl, 60Å	CN, 60Å	Silica, 60Å
	HPLC: 4 µm	HPLC: 4 µm	HPLC: 4 µm	HPLC: 4 µm	HPLC: 4 µm
Carbon Load*	4%	7%	5%	2%	N/A
Endcap Style	Proprietary	Proprietary	Proprietary	Proprietary	None
USP Class No.	L7	L1	L11	L10	L3
Performance Standards	Neutrals QC Reference Material p/n: 186006360	Neutrals QC Reference Material p/n: 186006360	Neutrals QC Reference Material p/n: 186006360	—	—
Application Standards	Reversed-Phase QC Reference Material p/n: 186006363	Reversed-Phase QC Reference Material p/n: 186006363	Reversed-Phase QC Reference Material p/n: 186006363	—	—

*Expected or approximate value.

Ordering Information

Nova-Pak Columns

	Dimension	P/N
	Particle Size: 4 µm	
Nova-Pak C_{18}	2.1 × 150 mm	WAT023655
	3.9 × 75 mm	WAT011670
	3.9 × 150 mm	WAT086344
	3.9 × 300 mm	WAT011695
	4.6 × 150 mm	WAT044375
Nova-Pak C_8	2.1 × 150 mm	WAT052735
	3.9 × 75 mm	WAT035877
	3.9 × 150 mm	WAT035876
Nova-Pak Phenyl	2.1 × 150 mm	WAT052740
	3.9 × 75 mm	WAT011675
	3.9 × 150 mm	WAT010656

	Dimension	P/N
	Particle Size: 4 µm	
Nova-Pak CN-HP	3.9 × 75 mm	WAT010270
	3.9 × 150 mm	WAT044245
	3.9 × 300 mm	WAT056920
Nova-Pak Silica	2.1 × 150 mm	WAT052745
	3.9 × 150 mm	WAT010025

Nova-Pak Analytical Method Validation Kit

	Dimension	P/N
	Particle Size: 4 µm	
Nova-Pak C_{18}	3.9 x 150 mm	WAT052770



For NovaPak Preparative Columns, please refer to page 214.

Resolve Columns

The non-endcapped Resolve Packing is significantly different compared to other Waters packing materials. The change in chromatographic behavior is most commonly noticed with polar compounds, which are typically more retained. For basic compounds, ion-pairing reagents are added to the mobile phase to reduce excessive tailing.

Ordering Information

Resolve Columns

	Dimension	P/N
	Particle Size: 5 µm	
C_{18}	3.9 × 300 mm	WAT011740[1]
	3.9 × 150 mm	WAT085710[1]

[1]Requires Guard-Pak Holders, p/n: WAT088141.

Column Characteristics

	C_{18}, 90Å	C_{18}, 90Å	Silica, 90Å	CN, 90Å
	HPLC: 5, 10 µm	HPLC: 5, 10 µm	HPLC: 10 µm	HPLC: 10 µm
Carbon Load*	5%	10%	10%	3%
Endcap Style	L7	L1	L3	L10
USP Class No.	None	None	None	None
Performance Standards	Neutrals QC Reference Material p/n: 186006360	Neutrals QC Reference Material p/n: 186006360	–	–
Application Standards	Reversed-Phase QC Reference Material p/n: 186006363	Reversed-Phase QC Reference Material p/n: 186006363	–	–

*Expected or approximate value.

For Resolve Radial Compression Columns and PrepPak Cartridges, please refer to page 222.

Delta-Pak Columns

Delta-Pak™ Columns are ideal for separating and isolating peptides, proteins, and natural products. Optimized for large-molecule separations and available in two pore sizes, they provide consistent and predictable scaling, from milligram quantities to gram quantities, between column formats.

Ordering Information

Delta-Pak Columns

	Dimension	P/N
	Particle Size: 5 µm	
Delta-Pak C_{18}	3.9 × 150 mm	WAT011793
Delta-Pak C_4	3.9 × 150 mm	WAT011794

Column Characteristics

	C_{18}, 100Å	C_{18}, 300Å	C_4, 100Å	C_4, 300Å
	HPLC: 5, 15 µm	HPLC: 5, 15 µm	HPLC: 5, 15 µm	HPLC: 5, 15 µm
Carbon Load*	17%	7%	7%	3%
Endcap Style	L1	L1	L26	L26
USP Class No.	Proprietary	Proprietary	Proprietary	Proprietary
Performance Standards	Neutrals QC Reference Material p/n: 186006360	Neutrals QC Reference Material p/n: 186006360	MassPREP Protein Standard Mix p/n: 186004900	MassPREP Protein Standard Mix p/n: 186004900
Application Standards	Reversed-Phase QC Reference Material p/n: 186006363	Reversed-Phase QC Reference Material p/n: 186006363	MassPREP Protein Standard Mix p/n: 186004900	MassPREP Protein Standard Mix p/n: 186004900

*Expected or approximate value.

For Delta-Pak Preparative Columns, please refer to page 216.

µBondapak Columns

Waters makes the only column that contains the µBondapak® C_{18} packing material. Other column manufacturers claim their products exhibit "µBondapak-like" selectivity. Yet none of them ever passed Waters' stringent QC batch tests. Since 1973, µBondapak and Bondapak® packing materials have demonstrated year-to-year reproducibility, which is why µBondapak remains among the most frequently referenced column brands.

Column Characteristics

	C_{18}, 125Å	CN, 125Å	NH_2, 125Å	Phenyl, 125Å
	HPLC: 10 µm	HPLC: 10 µm	HPLC: 10 µm	HPLC: 10 µm
Carbon Load*	10%	6%	3.5%	8%
Endcap Style	L1	L1	L8	L11
USP Class No.	Proprietary	Proprietary	None	Proprietary
Performance Standards	**Neutrals QC Reference Material** p/n: 186006360	–	–	**Neutrals QC Reference Material** p/n: 186006360
Application Standards	**Reversed-Phase QC Reference Material** p/n: 186006363	–	–	**Reversed-Phase QC Reference Material** p/n: 186006363

*Expected or approximate value.

Ordering Information

µBondapak/Bondapak

	Dimension	P/N
	Particle Size: 10 µm	
C_{18}, 125Å	3.9 × 150 mm	WAT086684
	3.9 × 300 mm	WAT027324
	4.6 × 150 mm	WAT044370
	4.6 × 300 mm	186000925
CN, 125Å	3.9 × 150 mm	WAT086688
	3.9 × 300 mm	WAT084042

	Dimension	P/N
	Particle Size: 10 µm	
NH_2, 125Å	3.9 × 300 mm	WAT084040
Phenyl, 125Å	3.9 × 150 mm	WAT086680
	3.9 × 300 mm	WAT027198

For µBondapak/Bondapak and µPorasil/Porasil Preparative Columns, please refer to page 215.

µPorasil/Porasil Columns

µPorasil™ and Porasil™ particles were one of the first commercially available, fully porous packing materials used for LC separations.

In contrast to the reversed-phase separation ability of µBondapak C_{18}, the non-bonded, silica-based material in µPorasil Columns was produced to provide normal-phase separations for a wide array of sample types.

Column Characteristics

	Silica, 125Å
	HPLC: 10, 15–20 µm
Carbon Load*	N/A
Endcap Style	L3
USP Class No.	None

*Expected or approximate value.

Ordering Information

µPorasil/Porasil

	Dimension	P/N
	Particle Size: 10 µm	
µPorasil, 125Å	3.9 × 300 mm	WAT027477

Shodex RSpak Polymer Reversed-Phase Columns

Shodex RSpak Columns are packed with porous polymeric particles that remain stable in a pH range of 2–12. Similar to conventional polymer-based materials, the DS-613 sorbent works well with samples that are more hydrophobic than hydrophilic, and which, consequently, require relatively high concentrations of organic modifiers. DE-613 columns, with a polymethacrylate packing, are more hydrophilic than hydrophobic, and work well with mobile phases containing relatively high concentrations of water. The least hydrophobic sorbent is used for the DE-613 columns.

For weakly cationic species, the DC-613 column is a cation exchanger with unique selectivity (mixed-mode, ion-exchange, and reversed-phase partition chromatography).

Ordering Information

Shodex RSpak D Series Columns

Description	Base-polymer	Functional Group	Dimension	P/N
DS-613	Polystyrene	None	6 × 150 mm	WAT034220
DE-613	Polymethacrylate	None	6 × 150 mm	WAT034221
DC-613	Polystyrene	Sulfonated	6 × 150 mm	WAT034223
DS-G Pre-column	–	–	4.6 × 10 mm	WAT034224
DE-G Pre-column	–	–	4.6 × 10 mm	WAT034225
DC-G Pre-column	–	–	4.6 × 10 mm	WAT034227

Application-Specific Columns

SUGAR AND CARBOHYDRATE ANALYSIS

High-Performance Carbohydrate Analysis Cartridge Column, p/n: WAT044355

Waters High-Performance Carbohydrate Cartridge Column, with reusable end-fittings, is packed with a 4 µm, spherical silica. This column was developed to separate five monosaccharides and disaccharides with baseline resolution in less than 12 minutes. The 4.6 mm I.D. × 250 mm High-Performance Carbohydrate Cartridge Column offers optimal speed, resolution, and longevity. The pre-packed, disposable cartridge column requires reusable end-fittings, which are available separately.

Carbohydrate Analysis Column, p/n: WAT084038

The Carbohydrate Analysis Column uses a covalently bonded amino packing on a silica substrate. It is best suited for low-molecular-weight sugars such as mono-, di-, and tri-saccharides.

Sugar Pak I Column, p/n: WAT085188

The Sugar Pak I Column separates monosaccharides and sugar alcohols via a strong cation-exchange mechanism. The resin is based on a sulfonated styrene-divinylbenzene polymer that provides pH stability by means of a calcium counter ion.

Waters offers a range of columns for the analysis of sugars, carbohydrates, organic acids, and alcohols. Refer to the following tables for ordering information.

Typical Applications for Sugar and Carbohydrate Columns

Cartridge/ Column	Carbohydrate Analysis Column	SAM™ I Reagent with Silica Cartridge	Sugar-Pak™ I, SC-1011, SP-0810	SH-1011, IC-Pak™ Ion-Exclusion Fast Fruit Juice	Dextro-Pak™	KS-800 series
Mode	Partition	Partition	Ion exchange/ size exclusion	Ion exchange/ size exclusion	Reversed phase	Size exclusion
Eluent	65–85% acetonitrile/ water ambient to 70 °C	70–80% acetonitrile/water 0.1% SAM I ambient	Water 75–95 °C	0.01 N phosphoric acid 50–60 °C	Water ambient	–
Application	Mono-, di- and tri-saccharides up to DP 8 sugars and sugar alcohols	Mono-, di- and tri-saccharides	Mono-, di-, oligosaccharides and sugar alcohols	Sugar acids, sugar alcohols, organic acids	Hydrolysed syrups, derivatized sugars	Mono- through oligosaccharides such as syrups
Elution Order	Smallest elute first	Smallest elute first	Largest elute first	Largest and most acidic elute first	Smallest elute first	Largest elute first

Guide to Shodex Sugar Columns

S	C	18	2	1
Type of Column	Cation	% Cross Linkage	Pore Size	0 - Gel Type
S = sugar	H = H^+	—	1 = 20Å	1 - Semimacropore gel
	C = Ca^{2+}	—	2 = 50Å	2 - Permanent pore gel
	P = Pb^{2+}	—	3 = 100Å	
	Z = Zn^{2+}	—	4 = 500Å	
	—	—	5 = 1000Å	
Example:				
S	C	10	1	1
Sugar column	Ca^{2+}	10% cross linkage	20Å	Semimacropore gel

Ordering Information

SAM I Reagent Column

Description	Dimension	Qty.	P/N
SAM I Reagent	7.8 × 300 mm	1/pk	WAT010873

Columns for Alcohols and Carbohydrates

Description	Dimension	Particle Size	Qty.	P/N
Carbohydrate Analysis Column	—	—	1/pk	WAT084038
Dextro-Pak Cartridge Column	8.0 × 100 mm	—	1/pk	WAT085650
High-Performance Carbohydrate Sentry Guard Column	3.9 × 20 mm	4 µm	2/pk	WAT046895[1]
SC-1011 Column	8.0 × 300 mm	—	1/pk	WAT034238
SC-1011P Pre-column	6.0 × 50 mm	—	1/pk	WAT034244
SH-1011	8.0 × 300 mm	—	1/pk	WAT034236
SH-1011P Pre-column	6.0 × 50 mm	—	1/pk	WAT034243
SP-0810 Column	8.0 × 300 mm	—	1/pk	WAT036954
SP-0810P Pre-column	6.0 × 50 mm	—	1/pk	WAT034245
Sugar-Pak 1 Column	6.5 × 300 mm	—	1/pk	WAT085188
Sugar-Pak 1 Guard-Pak Inserts	—	—	10/pk	WAT015209[2]
Shodex KS-801	—	7 µm	1/pk	WAT034276

[1] Requires Sentry Guard Holder, p/n: WAT046905.
[2] Requires Guard-Pak Holder, p/n: WAT088141.

High-Performance Carbohydrate Analysis Cartridge Column

Description	Dimension	P/N
High-Performance Carbohydrate Cartridge Column (requires end-fittings)	4.6 × 250 mm	WAT044355
Sentry Integrated Guard Holder (for Waters cartridge columns)	—	WAT046905

FERMENTATION ANALYSIS, ORGANIC ACIDS, ALCOHOLS, AND CARBOHYDRATES

The ion-exclusion mode is ideally suited for the separation of monosaccharides, organic acids, or sugar acids. The column packings are sulfonated styrene divinylbenzene resins in the hydrogen form (IC-Pak Ion-Exclusion or SH-1011), and the mobile phase is a dilute acid such as 0.01 N phosphoric acid using column temperatures of 50–60 °C.

In this mode, the Fast Juice column can effectively separate glycerol, acetic acid, and ethanol in grape or other fruit juice. The column can also analyze the degree of microbial defect, the extent of natural fermentation in grapes, and the amount of sulfite in various foods and beverages. The IC-Pak Ion-exclusion Column can separate a wide range of organic acids while the Shodex SH Column separates acids as well as larger carbohydrates.

The analysis of alcohols and organic acids is important, for they typically help determine the flavor characteristics of beverages such as wine, beer, and some distilled spirits. The presence of alcohols in fruit juices can indicate product deterioration. The Shodex KC-811 Column, which provides ion-exchange and reversed-phase chromatography modes, is packed with a sulfonated, rigid, styrene-divinylbenzene copolymer. With high efficiency, this packing separates low-molecular-weight organic acids and water-soluble organics such as alcohols, aldehydes, and nitriles. The column provides ion-exclusion and reversed-phase mode of chromatography. Typical mobile phases, run at 1 mL/min at 45–80 °C, are composed of aqueous solutions containing 1% phosphoric acid, acetic acid, or perchloric acid.

Shodex KC-811 Column Retention Chart for Organic Acids

Sample	Retention Time	Sample	Retention Time
Oxalic Acid	5.20	ß- Hydroxy-propionic Acid	8.60
Maleic Acid	5.80	D-Glucuronic Acid	8.65
a-Ketoglutaric Acid	5.90	Fumaric Acid	8.95
Citric Acid	6.20	Formic Acid	9.20
Tartaric Acid	6.55	Acetic Acid	9.80
Pyruvic Acid	6.65	Adipic Acid	9.80
trans-Aconitic Acid	6.95	Levulinic Acid	10.00
Glyoxylic Acid	7.00	Mesaconic Acid	10.40
Malic Acid	7.05	Pyroglutamic Acid	10.70
Malonic Acid	7.07	Propionic Acid	11.25
Citraconic Acid	7.20	Acrylic Acid	11.60
Succinic Acid	8.00	Pivalic Acid	14.05
Glycolic Acid	8.40	Methacrylic Acid	14.10
Itaconic	8.50	trans-Crotonic Acid	15.65
Lactic Acid	8.60		

Eluent: Water with 0.1% phosphoric acid, Temperature: 60 °C, Flow rate: 1 mL/min.

Ordering Information

Columns for Fermentation Analysis, Organic Acids, Alcohols, and Carbohydrates

Description	Dimension	Qty.	P/N
Fast Fruit Juice Analysis	8.0 × 100 mm	1/pk	WAT010639
Fast Fruit Juice Guard-Pak Inserts	—	10/pk	WAT015207[1]
IC-Pak Ion-Exclusion	7.8 × 300 mm	1/pk	WAT010290
SC-1011 Column	8.0 × 300 mm	1/pk	WAT034238
SC-1011P Pre-column	6.0 × 50 mm	1/pk	WAT034244
KC-811	8.0 × 300 mm	1/pk	WAT034298
KC-811 Pre-column	6.0 × 50 mm	1/pk	WAT035501

[1]Requires 7.8 × 10 mm Cartridge Holder, p/n: 186000708.

FREE FATTY ACID ANALYSIS

The Waters Free Fatty Acid HP Column uses a phenyl-bonded packing and a simple isocratic elution method to separate free fatty acids on the basis of carbon-chain length and degree of saturation. The short column dimension (3.9 × 150 mm) significantly reduces analysis time and increases sensitivity.

Column performance is based on:

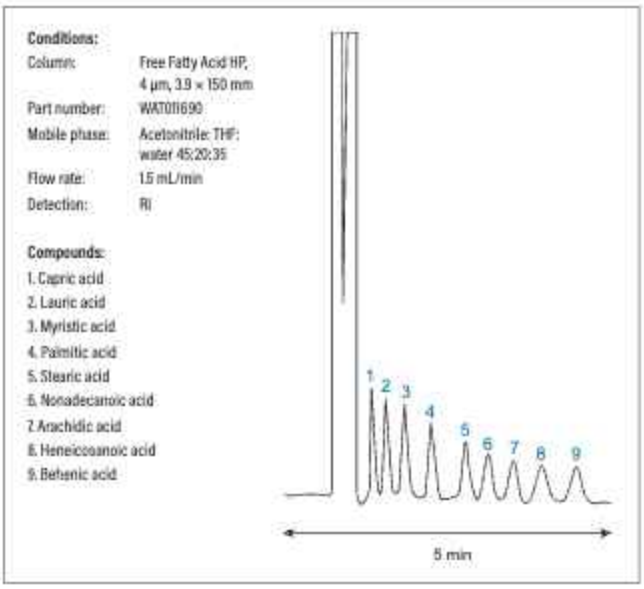
- Straight chain saturated acids, which elute in order of increasing carbon number
- Unsaturated acids which elute before the analogous saturated compound
- Carbon number and chain configuration: the greater the unsaturation, the earlier the elution

Ordering Information

Free Fatty Acid HP Column

Description	Dimension	Particle Size	Qty.	P/N
Free Fatty Acid HP	3.9 × 150 mm	4 µm	1/pk	WAT011690

Fatty Acid Standards



CARBAMATE ANALYSIS KITS



Waters Carbamate Analysis Kits for environmental and food testing include the Waters Carbamate Column, Oasis HLB Cartridges, vials, and reference standards. When used, in part, with regulated methods, these proven kits simplify your analysis while increasing your confidence in the result.

Ordering Information

Carbamate Analysis Kits

Description	P/N
Carbamate Analysis Kit for Environmental Testing	176001740
Carbamate Analysis Kit for Food Testing	186004719

Carbamate Analysis Column for Pesticides

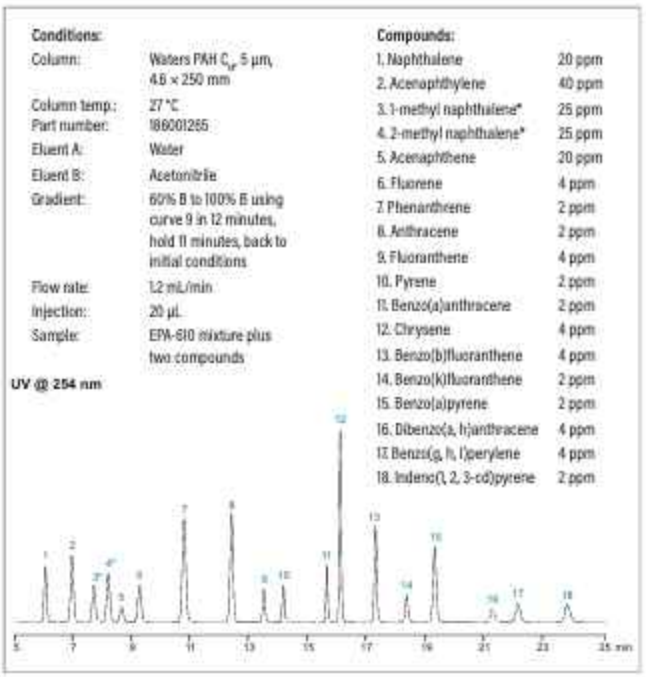
Description	Dimension	Qty.	P/N
Carbamate Analysis	3.9 × 150 mm	1/pk	WAT035577

Waters PAH Columns

Waters PAH Columns are optimized for the HPLC analysis of polyaromatic hydrocarbons to achieve baseline resolution for 16 target analytes in fewer than 25 minutes. These columns are available in seven dimensions (including a capillary format) and two particle sizes. A complete certificate of analysis accompanies each, backed by world-class ISO 9002-registered documentation.

POLYAROMATIC HYDROCARBON ANALYSIS USING WATERS PAH COLUMNS

PAH Analysis According to Florida Administrative Code 17.700





Ordering Information

PAH Columns

	Dimension	P/N	Dimension	P/N
	Particle Size: 3 µm		Particle Size: 5 µm	
C_{18}	4.6 × 50 mm	186001260	2.1 × 150 mm	186001261
			2.1 × 250 mm	186001262
			3.0 × 250 mm	186001263
			4.6 × 150 mm	186001264
			4.6 × 250 mm	186001265

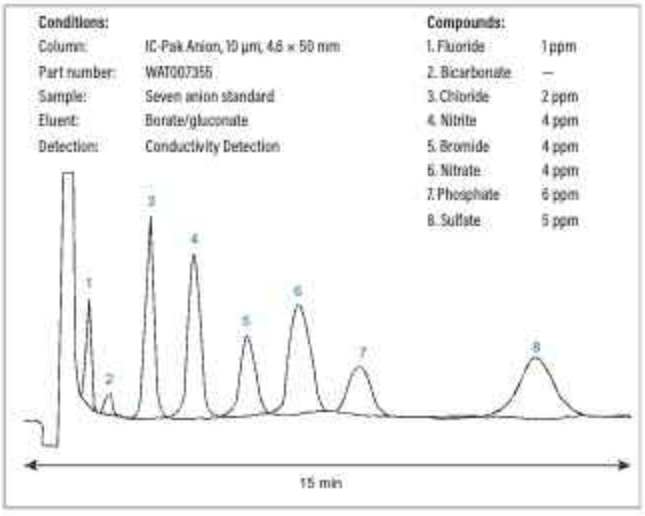
Ion Analysis

Waters IC-Pak resin-based columns separate a full range of ions from complex sample matrices. They offer an exceptional linear loading range, from less than 1.0 ppb to greater than 400 ppm, without dilution and without pH limitations on eluent or sample.

Recommended IC-Pak Columns:

- IC-Pak Anion Columns, for analysis of inorganic anions
- IC-Pak Ion-exclusion Columns, for weak acid anions and organic acids
- IC-Pak Cation Columns, sulfonated styrene-divinylbenzene based resin, for monovalent and divalent cation analysis
- IC-Pak C M/D Columns

IC-Pak Anion Column



The IC-Pak Anion column is a configuration of 10 µm anion-exchange packing material and a short column length which makes this the column of choice for rapid routine analyses.

Ordering Information

IC-Pak Anion, Cation and Ion-Exclusion Columns

Description	Dimension	Qty.	P/N
IC-Pak Anion	4.6 × 50 mm	1/pk	WAT007355
IC-Pak Anion HR	4.6 × 75 mm	1/pk	WAT026765
IC-Pak Anion HC	4.6 × 150 mm	1/pk	WAT026770
IC-Pak Anion Guard-Pak Kit (Guard-Pak Holder and 5 inserts)	—	1/pk	WAT007357
IC-Pak Anion Concentrator Inserts	—	5/pk	WAT007358[1]
IC-Pak Anion Guard-Pak Inserts	—	5/pk	WAT010551[1]
IC-Pak C M/D Column	3.9 × 150 mm	1/pk	WAT036570
IC-Pak C M/D Guard-Pak Inserts	—	10/pk	WAT044250[2]
IC-Pak Cation Column	4.6 × 50 mm	1/pk	WAT007354
IC-Pak Cation Guard Column	4.6 × 50 mm	1/pk	WAT007356[2]
IC-Pak Cation Concentrator Inserts	—	5/pk	WAT010565

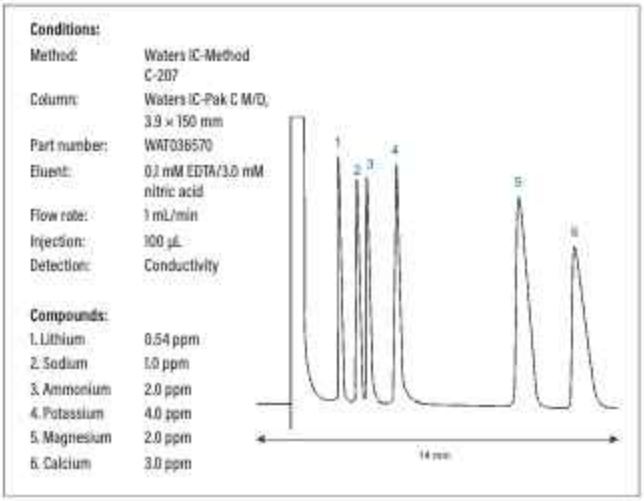
[1]Requires Guard-Pak Holder, p/n: WAT088141.

Ion-Exclusion Columns

Description	Dimension	Qty.	P/N
IC-Pak Ion-Exclusion Column	7.8 × 150 mm	1/pk	WAT010295
IC-Pak Ion-Exclusion Column	7.8 × 300 mm	1/pk	WAT010290
IC-Pak Ion-Exclusion Guard-Pak Inserts	—	10/pk	WAT020770[1]

[1]Requires Guard-Pak Holder, p/n: WAT088141.

IC-Pak C M/D Cation Column

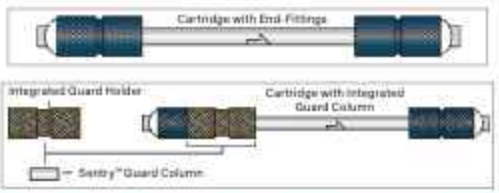


Cartridge Columns, Fittings, and Accessories

WATERS CARTRIDGE COLUMNS AND GUARD HOLDER

Ordering Information

Cartridge Columns



Applicable Column Dimension	Cartridge End-Fitting P/N
2.1 × 50 mm, 2.1 × 100 mm, 2.1 × 150 mm, 2.1 × 250 mm	700000117
3.0 × 50 mm, 3.0 × 100 mm, 3.0 × 150 mm, 3.0 × 250 mm	WAT037525
3.9 × 50 mm, 3.9 × 100 mm, 3.9 × 150 mm, 3.9 × 250 mm	WAT037525
4.6 × 50 mm, 4.6 × 100 mm, 4.6 × 150 mm, 4.6 × 250 mm	WAT037525

Integrated Sentry Guard Holder to go with Cartridge End-Fittings (see above).

Cartridge Columns

Description	Dimension	Particle Size	Qty.	P/N
High-Performance Carbohydrate Cartridge Column (requires end-fittings)	4.6 × 250 mm	4 µm	1/pk	WAT044355
µBondapak/Bondapak Cartridge Columns	4.6 × 250 mm	10 µm	1/pk	WAT052860

[1]Requires End Connector Kit, p/n: WAT037525.

Nova-Pak Cartridge Columns

Dimension	Type	Particle Size	Qty.	C_8	C_{18}	CN-HP
3.9 x 150 mm	Cartridge	4 µm	1/pk	WAT036985[2]	WAT036975[2]	–
4.6 x 150 mm	Cartridge	4 µm	1/pk	WAT052855[2]	WAT052845[2]	WAT044455[2]
4.6 x 250 mm	Cartridge	4 µm	1/pk	WAT052850[2]	WAT052840[2]	WAT044460[2]

[1]Requires End Connector Kit, p/n: WAT037525.

Symmetry, SymmetryShield, and Cartridge Columns

Dimension	Type	Particle Size	Qty.	Symmetry C_{18}	Symmetry C_8	SymmetryShield RP18	SymmetryShield RP8
2.1 x 100 mm	Cartridge	3.5 µm	1/pk	186000151[1]	–	–	–
4.6 x 75 mm	Cartridge	3.5 µm	1/pk	WAT066260[1]	–	–	–
4.6 x 100 mm	Cartridge	3.5 µm	1/pk	WAT066265[1]	WAT066215[1]	186000170[1]	–
3.9 x 50 mm	Cartridge	5 µm	1/pk	WAT054220[1]	–	–	–
3.9 x 150 mm	Cartridge	5 µm	1/pk	WAT054205[1]	WAT054235[1]	186000106[1]	–
4.6 x 150 mm	Cartridge	5 µm	1/pk	WAT054210[1]	WAT054255[1]	186000110[1]	–
4.6 x 250 mm	Cartridge	4 µm	1/pk	WAT054215[1]	WAT054245[1]	186000113[1]	WAT200661[1]

[1]Requires Cartridge End-fittings.

XTerra Cartridge Columns

Dimension	Type	Particle Size	Qty.	MS C_{18}	MS C_8	RP18	RP8
3.0 x 150 mm	Cartridge	3.5 µm	1/pk	186000518[1]	–	–	–
4.6 x 50 mm	Cartridge	3.5 µm	1/pk	186000526[1]	–	–	–
4.6 x 100 mm	Cartridge	3.5 µm	1/pk	186000530[1]	186000531[1]	186000532[1]	–
4.6 x 150 mm	Cartridge	3.5 µm	1/pk	186000534[1]	–	186000536[1]	–
2.1 x 150 mm	Cartridge	5 µm	1/pk	186000546[1]	–	–	–
3.9 x 150 mm	Cartridge	5 µm	1/pk	186000570[1]	–	186000572[1]	–
4.6 x 150 mm	Cartridge	5 µm	1/pk	186000578[1]	–	186000580[1]	–
4.6 x 250 mm	Cartridge	5 µm	1/pk	186000582[1]	–	186000584[1]	186000585[1]

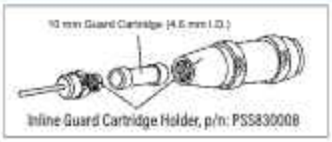
[1]Requires End Connector Kit, p/n: WAT037525.

Ordering Information



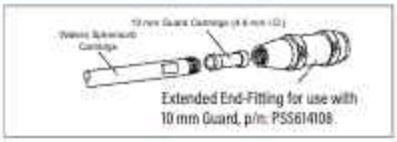
1. 30 mm Stand Alone Guard/Column shown with end-fittings (end-fittings not included)
2. Guard holder end-fitting for use with 10 mm Integral Guard, p/n: PSS614108
3. 10 mm Integral Guard Column
4. Column Coupler, p/n: PSS614102 (for use with cartridge columns only)

In-line Guard Cartridge Holder



Inline Guard Cartridge Holder, p/n: PSS830008

Extended End-fitting for Use with 10 mm Guard Cartridges



Extended End-Fitting for use with 10 mm Guard, p/n: PSS614108

Description	Qty.	P/N
Removable Column End-fitting	2/pk	PSS614100
Frit Assembly (2 µm)	5/pk	PSS614103
Frit Assembly (0.5 µm)	5/pk	PSS614104
Column Coupler	2/pk	PSS614102
Long Tail End-fitting	2/pk	PSS614101
Extended End-fitting for use with 10 mm Integral Guard	1/pk	PSS614108
Nylon Column Plugs for storage of Complete Column	1/pk	WAT015674
Nylon Column Caps for storage of Replacement Cartridge Column	10/pk	PSS614113
Inline 10 mm Guard Cartridge Holder Kit for use with above items	—	PSS830008

Waters Spherisorb Guard Columns

Waters Spherisorb Guard columns provide cost effective column protection for all Waters Spherisorb Analytical Columns.

Waters Spherisorb Guard Cartridges* and Cartridge Columns

Dimension	Type	Particle Size	Qty.	ODS1	ODS2	ODS B	C_8	C_2	C_1	NH_2
3.0 x 125 mm	Cartridge	5 µm	1/pk	—	PSS839546[1]	—	—	—	—	—
4.6 x 50 mm	Cartridge	5 µm	1/pk	PSS83850[1]	—	—	—	—	—	—
4.6 x 100 mm	Cartridge	5 µm	1/pk	—	PSS839537[1]	—	—	—	—	—
4.6 x 150 mm	Cartridge	5 µm	1/pk	—	PSS839538[1]	—	—	—	—	—
4.6 x 250 mm	Cartridge	5 µm	1/pk	PSS839510[1]	PSS839540[1]	—	—	—	—	PSS839530[1]
10 × 4.6 mm	Guard	5 µm	3/pk	PSS830073	PSS830053	PSS830059	PSS830074	PSS830075	PSS830076	PSS830079
30 × 4.6 mm	Guard	5 µm	3/pk	—	PSS839458	—	—	—	—	PSS839478

Dimension	Type	Particle Size	Qty.	CN Normal Phase	W Silica	SAX	SCX
10 × 4.6 mm	Guard	5 µm	3/pk	PSS830077	PSS830051	PSS830055	PSS830057
30 × 4.6 mm	Guard	5 µm	3/pk	PSS839476	PSS839451	PSS839465	PSS839471

*Requires In-line Guard Cartridge Holder, p/n: PSS830008.
[1] Requires End Connector Kit, p/n PSS614100.

VANGUARD PRE-COLUMNS AND CARTRIDGES



Using a guard column extends the life of analytical columns without compromising chromatographic performance. Waters offers VanGuard Column Protection products in multiple particle sizes and stationary phases, making them ideally suited for the physical and chemical protection of all analytical columns.

Vanguard Columns offer:

- Minimal chromatographic effects and optimized performance
- Superior protection for UPLC, UHPLC, and HPLC columns with particle sizes between 16 and 5 µm
- Compatible operating pressures up to 18,000 psi (1240 bar)

Selection Guide

VanGuard Column Protection Cartridge/Pre-column selection based on analytical column I.D.			
Column I.D.	**Particle Size**	**VanGuard Format**	**VanGuard Dimension**
2.1 mm	<2 µm	Pre-column	2.1 × 5 mm
2.1 mm	>2 µm	Cartridge Column	2.1 × 5 mm
3.0 mm	>2 µm	Cartridge Column	2.1 × 5 mm
3.9 mm	>2 µm	Cartridge Column	3.9 × 5 mm
4.6 mm	>2 µm	Cartridge Column	3.9 × 5 mm

Ordering Information

VanGuard Pre-columns (Guard Columns)

Chemistry	Particle Size	Dimension	P/N (3/pk)
BEH C_{18}	1.7 µm	2.1 × 5 mm	186003975
BEH Shield RP18	1.7 µm	2.1 × 5 mm	186003977
BEH C_8	1.7 µm	2.1 × 5 mm	186003978
BEH Phenyl	1.7 µm	2.1 × 5 mm	186003979
BEH HILIC	1.7 µm	2.1 × 5 mm	186003980
BEH Amide	1.7 µm	2.1 × 5 mm	186004799
CORTECS C_{18}+	1.6 µm	2.1 × 5 mm	186007125
CORTECS C_{18}	1.6 µm	2.1 × 5 mm	186007123
CORTECS HILIC	1.6 µm	2.1 × 5 mm	186007124
CORTECS Shield RP18	1.6 µm	2.1 × 5 mm	186008713
CORTECS T3	1.6 µm	2.1 × 5 mm	186008508
CSH C_{18}	1.7 µm	2.1 × 5 mm	186005303
CSH Fluoro-Phenyl	1.7 µm	2.1 × 5 mm	186005358
CSH Phenyl-Hexyl	1.7 µm	2.1 × 5 mm	186005413
HSS C_{18}	1.8 µm	2.1 × 5 mm	186003981
HSS C_{18} SB	1.8 µm	2.1 × 5 mm	186004136
HSS T3	1.8 µm	2.1 × 5 mm	186003976
HSS PFP	1.8 µm	2.1 × 5 mm	186005974
HSS Cyano	1.8 µm	2.1 × 5 mm	186005995

Recommended VanGuard Cartridge

Brand	Particle Size	Analytical Columns	
		2.1 and 3.0 mm I.D.	3.9 and 4.6 mm I.D.
Atlantis	3 and 5 µm	2.1 × 5 mm	3.9 × 5 mm
CORTECS	2.7 µm	2.1 × 5 mm	3.9 × 5 mm
SunFire	2.5, 3.5, and 5 µm	2.1 × 5 mm	3.9 × 5 mm
Symmetry	3.5 and 5 µm	2.1 × 5 mm	3.9 × 5 mm
XBridge	2.5, 3.5, and 5 µm	2.1 × 5 mm	3.9 × 5 mm
XSelect CSH	2.5, 3.5, and 5 µm	2.1 × 5 mm	3.9 × 5 mm
XSelect HSS	2.5, 3.5, and 5 µm	2.1 × 5 mm	3.9 × 5 mm
XTerra	2.5, 3.5, and 5 µm	2.1 × 5 mm	3.9 × 5 mm



Universal VanGuard Cartridge Holder

Description	P/N
Universal VanGuard Cartridge Holder	186007949

Atlantis VanGuard Cartridges

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
T3	2.1 × 5 mm	186007674	2.1 × 5 mm	186007678
	3.9 × 5 mm	186007676	3.9 × 5 mm	186007680
dC_{18}	2.1 × 5 mm	186007658	2.1 × 5 mm	186007662
	3.9 × 5 mm	186007660	3.9 × 5 mm	186007664
HILIC Silica	2.1 × 5 mm	186007666	2.1 × 5 mm	186007670
	3.9 × 5 mm	186007668	3.9 × 5 mm	186007672

SunFire VanGuard Cartridges

	Dimension	P/N	Dimension	P/N	Dimension	P/N
	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
C_{18}	2.1 × 5 mm	186007691	2.1 × 5 mm	186007694	2.1 × 5 mm	186007697
	3.9 × 5 mm	186007693	3.9 × 5 mm	186007696	3.9 × 5 mm	186007699
C_8	2.1 × 5 mm	186007700	2.1 × 5 mm	186007703	2.1 × 5 mm	186007706
	3.9 × 5 mm	186007702	3.9 × 5 mm	186007705	3.9 × 5 mm	186007708

For SunFire Analytical Columns, please refer to pages 132 and 159.

Symmetry VanGuard Cartridges

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm	
Symmetry C_{18}	2.1 × 5 mm	186007725	2.1 × 5 mm	186007729
	3.9 × 5 mm	186007727	3.9 × 5 mm	186007731
Symmetry C_8	2.1 × 5 mm	186007733	2.1 × 5 mm	186007737
	3.9 × 5 mm	186007735	3.9 × 5 mm	186007739
SymmetryShield RP18	2.1 × 5 mm	186007749	2.1 × 5 mm	186007753
	3.9 × 5 mm	186007751	3.9 × 5 mm	186007755
SymmetryShield RP8	2.1 × 5 mm	186007741	2.1 × 5 mm	186007745
	3.9 × 5 mm	186007743	3.9 × 5 mm	186007747
Symmetry300 C_{18}	2.1 × 5 mm	186007709	2.1 × 5 mm	186007713
	3.9 × 5 mm	186007711	3.9 × 5 mm	186007715
Symmetry300 C_4	2.1 × 5 mm	186007717	2.1 × 5 mm	186007721
	3.9 × 5 mm	186007719	3.9 × 5 mm	186007723

XBridge VanGuard Cartridges

	Dimension	P/N	Dimension	P/N	Dimension	P/N
	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
BEH C_{18}	2.1 × 5 mm	186007772	2.1 × 5 mm	186007766	2.1 × 5 mm	186007769
	3.9 × 5 mm	186007774	3.9 × 5 mm	186007768	3.9 × 5 mm	186007771
BEH C_8	2.1 × 5 mm	186007781	2.1 × 5 mm	186007775	2.1 × 5 mm	186007778
	3.9 × 5 mm	186007783	3.9 × 5 mm	186007777	3.9 × 5 mm	186007780
BEH Shield RP18	2.1 × 5 mm	186007808	2.1 × 5 mm	186007802	2.1 × 5 mm	186007805
	3.9 × 5 mm	186007810	3.9 × 5 mm	186007804	3.9 × 5 mm	186007807
Phenyl	2.1 × 5 mm	186007799	2.1 × 5 mm	186007793	2.1 × 5 mm	186007796
	3.9 × 5 mm	186007801	3.9 × 5 mm	186007795	3.9 × 5 mm	186007798
HILIC	2.1 × 5 mm	186007790	2.1 × 5 mm	186007784	2.1 × 5 mm	186007787
	3.9 × 5 mm	186007792	3.9 × 5 mm	186007786	3.9 × 5 mm	186007789
Amide	2.1 × 5 mm	186007763	2.1 × 5 mm	186007757	2.1 × 5 mm	186007760
	3.9 × 5 mm	186007765	3.9 × 5 mm	186007759	3.9 × 5 mm	186007762

For XBridge Analytical Columns, please refer to pages 124 and 140.

XSelect VanGuard Cartridges

	Dimension	P/N	Dimension	P/N	Dimension	P/N
	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
CSH C_{18}	2.1 × 5 mm *XP*	186007817	2.1 × 5 mm	186007811	2.1 × 5 mm	186007814
	3.9 × 5 mm *XP*	186007819	3.9 × 5 mm	186007813	3.9 × 5 mm	186007816
CSH Fluoro-Phenyl	2.1 × 5 mm *XP*	186007827	2.1 × 5 mm	186007820	2.1 × 5 mm	186007824
	3.9 × 5 mm *XP*	186007829	3.9 × 5 mm	186007822	3.9 × 5 mm	186007826
CSH Phenyl-Hexyl	2.1 × 5 mm *XP*	186007839	2.1 × 5 mm	186007830	2.1 × 5 mm	186007836
	3.9 × 5 mm *XP*	186007841	3.9 × 5 mm	186007832	3.9 × 5 mm	186007838
HSS C_{18}			2.1 × 5 mm	186007851	2.1 × 5 mm	186007854
			3.9 × 5 mm	186007853	3.9 × 5 mm	186007856
HSS C_{18} SB			2.1 × 5 mm	186007842	2.1 × 5 mm	186007845
			3.9 × 5 mm	186007844	3.9 × 5 mm	186007847
HSS T3			2.1 × 5 mm	186007878	2.1 × 5 mm	186007881
			3.9 × 5 mm	186007880	3.9 × 5 mm	186007883
HSS PFP			2.1 × 5 mm	186007869	2.1 × 5 mm	186007872
			3.9 × 5 mm	186007871	3.9 × 5 mm	186007874
HSS CN			2.1 × 5 mm	186007860	2.1 × 5 mm	186007863
			3.9 × 5 mm	186007862	3.9 × 5 mm	186007865

For XSelect Analytical Columns, please refer to pages 126 and 148.

XTerra VanGuard Cartridges

	Dimension	P/N	Dimension	P/N	Dimension	P/N
	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
MS C_{18}	2.1 × 5 mm	186007887	2.1 × 5 mm	186007892	2.1 × 5 mm	186007896
	3.9 × 5 mm	186007889	3.9 × 5 mm	186007894	3.9 × 5 mm	186007899
MS C_8	2.1 × 5 mm	186007901	2.1 × 5 mm	186007905	2.1 × 5 mm	186007909
	3.9 × 5 mm	186007903	3.9 × 5 mm	186007907	3.9 × 5 mm	186007911
Shield RP18			2.1 × 5 mm	186007929	2.1 × 5 mm	186007933
			3.9 × 5 mm	186007931	3.9 × 5 mm	186007935
Shield RP8			2.1 × 5 mm	186007941	3.9 × 5 mm	186007947
			3.9 × 5 mm	186007943		
Phenyl			2.1 × 5 mm	186007917	2.1 × 5 mm	186007921
			3.9 × 5 mm	186007919	3.9 × 5 mm	186007923

For XTerra Analytical Columns, please refer to pages 133 and 167.

WATERS SENTRY GUARD CARTRIDGES

Waters Sentry Guard Cartridges are widely used as a cost-effective way to prolong HPLC column life by reducing particulate matter and chemical contaminants. Two holder designs are offered, one for use as an integrated part of the Waters cartridge column, with reusable end-fittings, the other for use with any HPLC column. Both designs allow the replacement of Sentry Guard Cartridges without tools.



Ordering Information

Waters Cartridge and Guard Column Guide

Guard Columns Universal Sentry Guard Holder Kits



Dimension	P/N
2.1 × 10 mm	WAT097958
2.1 × 20 mm	186000262
3.0 × 20 mm	WAT046910
3.9 × 20 mm	WAT046910
4.6 × 20 mm	WAT046910

Sentry Guard Holders and Replacement Parts*

Description	P/N
Integrated Guard Holder (for Waters Cartridge Columns)	WAT046905
Replacement Parts	
O-ring Kit for Sentry 2.1 mm Guard Holder, 2/pk	WAT097954
O-Ring Kit for Sentry 3.0, 3.9, 4.6 mm Guard Holder, 2/pk	WAT023401
Rigid Connector for Sentry 2.1 mm Guard Holder	WAT022681

*50 mm and 75 mm long Cartridge Columns must use the Universal Guard Holder.

µBondapak/Bondapak Sentry Guard Cartridges

	Dimension	P/N (2/pk)
	Particle Size: 10 µm	
C_{18}	3.9 × 20 mm	WAT044480[2]
CN	3.9 × 20 mm	WAT046855[2]
NH_2	3.9 × 20 mm	WAT046865[2]
Phenyl	3.9 × 20 mm	WAT046850[2]

[2]Requires 3.0 × 20 mm/4.6 × 20 mm Universal Sentry Guard Holder, p/n: WAT046910.

µPorasil/Porasil Sentry Guard Cartridges

	Dimension	P/N (2/pk)
	Particle Size: 10 µm	
µPorasil	3.9 × 20 mm	WAT046860[1]

[1]Requires 2.1 x 10 mm Universal Sentry Guard Holder, p/n: WAT097958.

Delta-Pak Sentry Guard Cartridges

	Dimension	P/N (2/pk)
	Particle Size: 5 µm	
C_4, 100Å	3.9 × 20 mm	WAT046875[2]
C_4, 300Å	3.9 × 20 mm	WAT046885[2]
C_{18}, 100Å	3.9 × 20 mm	WAT046880[2]
C_{18}, 300Å	3.9 × 20 mm	WAT046890[2]

[2]Requires 3.0 x 20 mm/4.6 x 20 mm Universal Sentry Guard Holder, p/n: WAT046910.

Nova-Pak Sentry Guard Cartridges

	Dimension	P/N (2/pk)
	Particle Size: 4 µm	
C_8	3.9 × 20 mm	WAT046830[2]
C_{18}	3.9 × 20 mm	WAT044380[2]
CN-HP	3.9 × 20 mm	WAT046840[2]
Phenyl	3.9 × 20 mm	WAT046835[2]
Silica	3.9 × 20 mm	WAT046845[2]

[2]Requires 3.0 x 20 mm/4.6 x 20 mm Universal Sentry Guard Holder, p/n: WAT046910.

Resolve Sentry Guard Cartridges

	Dimension	P/N (2/pk)
	Particle Size: 5 µm	
C_{18}	3.9 × 20 mm	WAT046915[1]

[1]Requires 2.1 x 10 mm Universal Sentry Guard Holder, p/n: WAT097958.

Atlantis Sentry Guard Cartridges

	Dimension	P/N (2/pk)	Dimension	P/N (2/pk)
	Particle Size: 3 µm		Particle Size: 5 µm	
T3	2.1 × 10 mm	186003756[1]	4.6 × 20 mm	186003761[2]
	4.6 × 20 mm	186003758[2]		
dC_{18}	2.1 × 10 mm	186001377[1]	4.6 × 20 mm	186001323[2]
	4.6 × 20 mm	186001321[2]		
HILIC Silica	2.1 × 10 mm	186002005[1]		

[1] Requires 2.1 × 10 mm Universal Sentry Guard Holder, p/n: WAT097958.
[2] Requires 3.0 × 20 mm/4.6 × 20 mm Universal Sentry Guard Holder, p/n: WAT046910.

SunFire Sentry Guard Cartridges

	Dimension	P/N (2/pk)	Dimension	P/N (2/pk)
	Particle Size: 3.5 µm		Particle Size: 5 µm	
C_8	2.1 × 10 mm	186002708[1]	2.1 × 10 mm	186002713[1]
	3.0 × 20 mm	186002718[2]	3.0 × 20 mm	186002722[2]
	4.6 × 20 mm	186002727[2]	4.6 × 20 mm	186002733[2]
C_{18}	2.1 × 10 mm	186002530[1]	2.1 × 10 mm	186002536[1]
	3.0 × 20 mm	186002681[2]	3.0 × 20 mm	186002683[2]
	4.6 × 20 mm	186002682[2]	4.6 × 20 mm	186002684[2]

[1] Requires 2.1 × 10 mm Universal Sentry Guard Holder, p/n: WAT097958.
[2] Requires 3.0 × 20 mm/4.6 × 20 mm Universal Sentry Guard Holder, p/n: WAT046910.

Symmetry, SymmetryShield, and Symmetry300 Sentry Guard Cartridges

	Dimension	P/N (2/pk)	Dimension	P/N (2/pk)
	Particle Size: 3.5 µm		Particle Size: 5 µm	
Symmetry C_8	2.1 × 10 mm	WAT106128[1]	3.9 × 20 mm	WAT054250[2]
Symmetry C_{18}	2.1 × 10 mm	WAT106127[1]	3.9 × 20 mm	WAT054225[2]
SymmetryShield RP8	2.1 × 10 mm	WAT106129[1]	3.9 × 20 mm	WAT200675[2]
SymmetryShield RP18	2.1 × 10 mm	186000169[1]	3.9 × 20 mm	186000107[2]
	3.9 × 20 mm	186000701		
Symmetry300 C_4	2.1 × 10 mm	186000275[1]	3.9 × 20 mm	186000284[2]
Symmetry300 C_{18}	2.1 × 10 mm	186000198[1]	3.9 × 20 mm	WAT106166[2]

[1] Requires 2.1 × 10 mm Universal Sentry Guard Holder, p/n: WAT097958.
[2] Requires Sentry Guard Holders.

XBridge Sentry Guard Cartridges

	Dimension	P/N (2/pk)	Dimension	P/N (2/pk)
	Particle Size: 3.5 µm		Particle Size: 5 µm	
BEH C_8	3.0 × 20 mm	186003078[2]	2.1 × 10 mm	186003080[1]
	4.6 × 20 mm	186003079[2]	3.0 × 20 mm	186003081[2]
			4.6 × 20 mm	186003082[2]
BEH C_{18}	3.0 × 20 mm	186003060[2]	2.1 × 10 mm	186003062[1]
	4.6 × 20 mm	186003061[2]	3.0 × 20 mm	186003063[2]
			4.6 × 20 mm	186003064[2]
BEH Shield RP18	3.0 × 20 mm	186003069[2]	2.1 × 10 mm	186003071[1]
	4.6 × 20 mm	186003070[2]	3.0 × 20 mm	186003072[2]
			4.6 × 20 mm	186003073[2]

[1]Requires 2.1 × 10 mm Universal Sentry Guard Holder, p/n: WAT097958.
[2]Requires 3.0 × 20 mm/4.6 × 20 mm Universal Sentry Guard Holder, p/n: WAT046910.

XSelect Sentry Guard Cartridges

	Dimension	P/N (2/pk)	Dimension	P/N (2/pk)
	Particle Size: 3.5 µm		Particle Size: 5 µm	
CSH C_{18}	2.1 × 10 mm	186005252[1]	4.6 × 20 mm	186005285[2]
	3.0 × 20 mm	186005258[2]		
	4.6 × 20 mm	186005264[2]		
HSS T3	2.1 × 10 mm	186006470[1]	4.6 × 20 mm	186004792[2]
	3.0 × 20 mm	186004782[2]		
	4.6 × 20 mm	186004787[2]		

[1]Requires 2.1 × 10 mm Universal Sentry Guard Holder, p/n: WAT097958.
[2]Requires 3.0 × 20 mm/4.6 × 20 mm Universal Sentry Guard Holder, p/n: WAT046910.

XTerra Sentry Guard Cartridges

	Dimension	P/N (2/pk)	Dimension	P/N (2/pk)
	Particle Size: 3.5 µm		Particle Size: 5 µm	
MS C_{18}	3.9 × 20 mm	186000644	2.1 × 20 mm	186000652[1]
	4.6 × 10 mm	186001927	3.0 × 20 mm	186000656
			3.9 × 20 mm	186000660[2]
			4.6 × 10 mm	186001920[4]

	Dimension	P/N (2/pk)	Dimension	P/N (2/pk)
	Particle Size: 3.5 µm		Particle Size: 5 µm	
MS C_8	—	—	3.9 × 20 mm	186000661[2]
RP18	3.9 × 20 mm	186000646	2.1 × 20 mm	186000654[3]
			3.0 × 20 mm	186000658
			3.9 × 20 mm	186000662[2]

[1]Requires 3.0 × 20 mm/4.6 × 20 mm Universal Sentry Guard Holder, p/n: WAT046910.
[2]Requires Cartridge Column Holder, p/n: 186000262.
[3]Requires In-line Guard Cartridge Holder, p/n: PSS830008.

WATERS GUARD-PAK HOLDER AND INSERTS

Waters Guard-Pak™ Holder is a compact, stand-alone housing for our unique disposable Guard-Pak Inserts. Installed in-line with your HPLC system immediately before the analytical column, the Guard-Pak Holder and inserts protect analytical LC columns against the gradual accumulation of particulates and chemical contaminants originating from the sample.



Ordering Information

Guard-Pak Holder

Description	P/N
Guard-Pak Holder	WAT088141
Guard-Pak Holder Connector	WAT080046
In-line Filters, 5/pk	WAT032472

Guard-Pak Inserts

Description	Particle size	Qty.	Pore Size	P/N
Bondapak C_{18}	10 µm	10/pk	125Å	WAT088070[1]
Bondapak NH_2	10 µm	10/pk	125Å	WAT026760[1]
Bondapak Phenyl	10 µm	10/pk	125Å	WAT026745[1]
Nova-Pak C_8	4 µm	10/pk	60Å	WAT015220[1]
Nova-Pak C_{18}	4 µm	10/pk	60Å	WAT035880[1]
Resolve C_{18}	10 µm	10/pk	90Å	WAT085824[1]

[1]Requires Guard-Pak Holder, p/n: WAT088141.

≥5 µm Preparative HPLC Columns

≥5 µm Preparative HPLC Columns



"Your only as good as your last product."

– James Browne, Continuous Improvement Program Manager/Lean/6-Sigma Program Manager, Wexford, Ireland

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≥5 µm Preparative HPLC Columns

From Productivity Comes Predictability

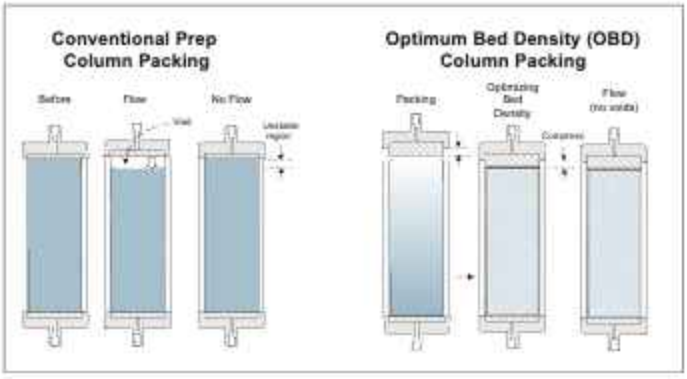
Why struggle with inconsistencies in column-to-column performance, unpredictable column lifetimes, lost samples, repeat purification runs, and poor scalability from small- to large-volume columns?



Increase your productivity through higher recoveries and longer column lifetimes. With Optimum Bed Density (OBD™) Preparative Columns, you can:

- Achieve fast, efficient, lab-scale separations, for greater throughput
- Directly scale from UPLC, UHPLC, or HPLC screening to lab-scale purification
- Select robust chromatographic particles designed for purification

The OBD Column Design

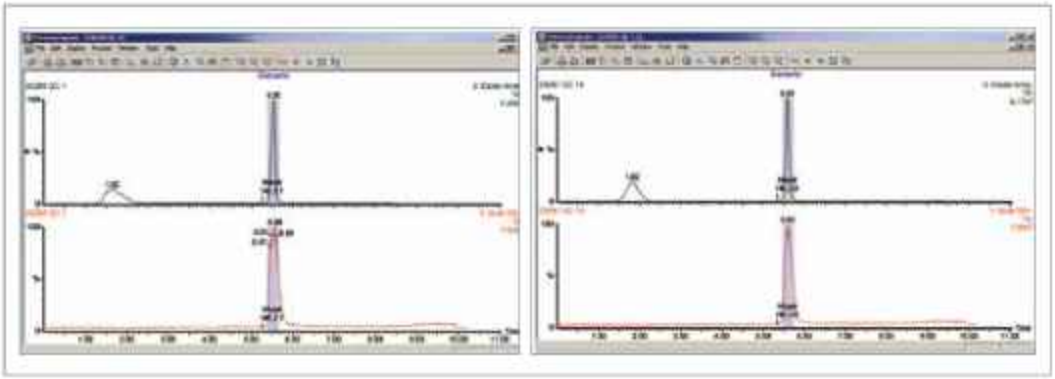


The OBD Preparative Column design and packing process results in predictable, uniform density profiles throughout the column. During the final capping process, our established procedures do not over compress or disrupt, in any non-uniform way, eliminating the potential for voids.

COLUMN STABILITY AND RELIABILITY—LONG, PREDICTABLE LIFETIMES

The demand for rapid, high-purity, compound isolation assumes confidence in the integrity and stability of preparative columns. Complex, sparingly-soluble starting materials are often dissolved in strong solvents, such as DMSO. The combination of poor solubility and pressure shocks associated with large injection volumes of pure organic solvent are the primary contributors to early column failure and chromatographic bed collapse. The OBD design exhibits exceptional resistance to mechanical chromatographic bed failure and delivers consistent column-to-column performance, reducing cost by extending lifetimes.

Data From a High-throughput Drug Discovery Laboratory



Data from a high-throughput drug discovery laboratory: 7000 injections on an XBridge BEH C_{18} OBD Prep Column, 130Å, 5 µm, 19 × 50 mm.

HOW TO CHOOSE THE RIGHT OBD PREPARATIVE COLUMN

STEP 1

Once the analytical separation has been optimized, a loading study on the analytical column is performed to determine the capacity of the particular packing material. The large scale separation should be identical to the small scale separation, therefore the maximum sample load will be dependent upon the complexity of the analytical separation.

STEP 2

Determine how much mass you need to purify or isolate.

STEP 3

Use these simple equations to determine the required column size for purification.

Note: Preparative HPLC system maximum flow rate and back pressure need to be considered and can limit column size.

Scale-Up Factor

$$\text{Scale-up factor} = \frac{(\text{Diameter preparative})^2 \times \text{Length preparative}}{(\text{Diameter analytical})^2 \times \text{Length analytical}}$$

Example: Scaling up from a 4.6 × 150 mm column to a 19 × 150 mm column:

$$\text{Scale-up factor} = \frac{(19)^2 \times 150}{(4.6)^2 \times 150} = 17.1$$

Applying the scale-up factor, you can predict that an approximately range of 17 to 135 mg of sample could be applied to the larger (19 × 150 mm) column (packed with the same material as the analytical column). This range is based on an analytical column (4.6 mm I.D.) mass load of 1 to 8 mg.

Flow Rate

$$\text{Flow rate (prep)} = \text{Flow rate (analytical)} \times \frac{(\text{Diameter preparative})^2}{(\text{Diameter analytical})^2} \times \frac{\text{Particle size (analytical)}}{\text{Particle size (preparative)}}$$

The calculated flow rate may be used for the larger column to ensure the same linear velocity of the mobile phases as used in the analytical run. However, reasonable rates are based on column diameters. Systems will be limited by increasing backpressure with increasing column length and decreasing particle size.

Gradient Duration (GD)

$$\text{GD (prep)} = \frac{(\text{GD analytical}) \times (\text{Length preparative})}{(\text{Length analytical})} \times \frac{(\text{Diameter preparative})^2}{(\text{Diameter analytical})^2} \times \frac{(\text{Flow rate analytical})}{(\text{Flow rate preparative})}$$

MASS LOADING

Many factors affect the mass capacity of preparative columns. The listed capacities represent an 'average' estimate.

Capacity is:

- Higher for strongly retained material
- Higher for simple mixtures
- Lower where higher resolution is required
- Very strongly dependent on loading conditions
  - Limited by loading volume
  - Limited by diluent solvent strength

Approximate Mass Loading Capacities (mg) for OBD Preparative Columns (Gradient Mode)

	Diameter (mm)				
Length (mm)	4.6	10	19	30	50
50	3 mg	15 mg	45 mg	110 mg	310 mg
75	–	–	–	165 mg	–
100	5 mg	25 mg	90 mg	225 mg	620 mg
150	8 mg	40 mg	135 mg	335 mg	930 mg
250	13 mg	60 mg	225 mg	560 mg	1550 mg
Reasonable flow rate (mL/min)	1.4	6.6	24	60	164
Reasonable injection volume (µL)	20	100	350	880	2450



Reasonable flow rates are based on column diameter. Systems will be limited by increasing backpressure with increasing column length and decreasing particle size.

Reasonable injection volumes are based on column diameter at a length of 50 mm with relatively strong solvents. Increased length is compatible with larger injections, but not proportionately so. Weaker solvents significantly increase injection volume.

Mass loading capacities for peptides and purifications depend strongly on the sequence and may be estimated at 5–20% of listed values.

Waters OBD Preparative Columns Calculator

This convenient online scale-up tool provides:

- Mass load scaling
- Gradient scaling with appropriate flow rate scale-up and predicting volume consumption
- Calculations for split flow rations for those using mass spectrometer driven chromatography
- Focused gradient UPLC or UHPLC to preparative method transfer

To try this tool, visit www.waters.com/prepcalculator





XBridge OBD Preparative Columns

THE BENCHMARK FOR RUGGEDNESS AND LONGEVITY IN LC METHODS

XBridge HPLC Columns include 10 general and application-specific sorbents that cover a wide range of particles sizes for analytical and preparative HPLC applications. With these versatile columns, you can use mobile phases in a wide pH range to quickly develop robust methods. In doing so, you benefit from high pH and temperature stability, for increased mass loading of basic compounds.

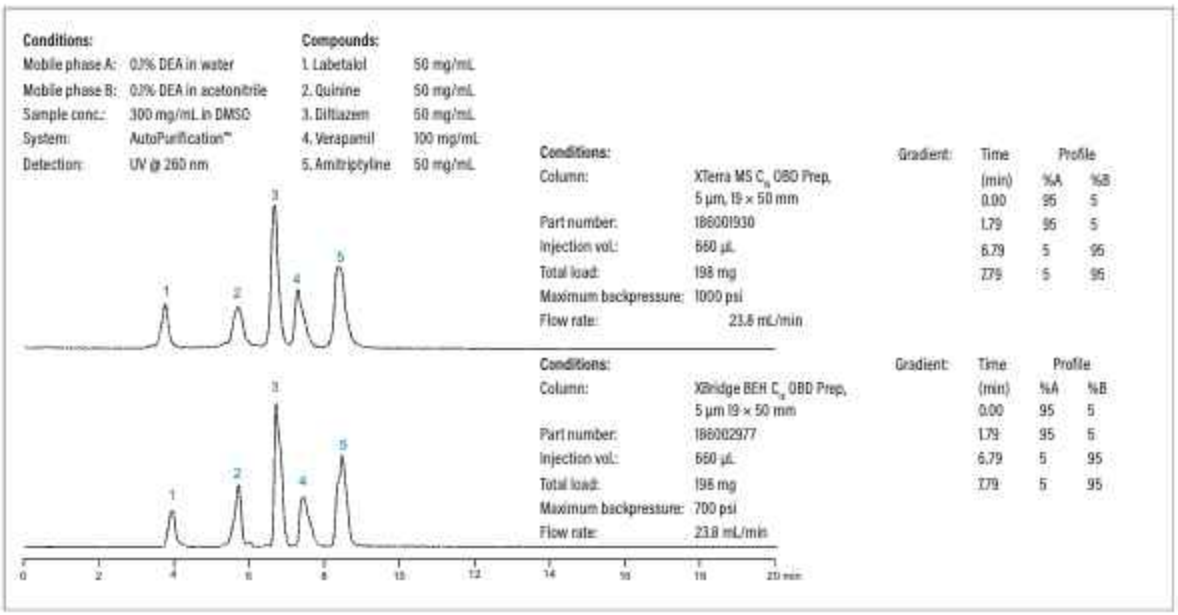
XBridge OBD Preparative Columns offer:

- Available as BEH C_{18}, BEH C_8, BEH Shield RP18,BEH Phenyl, BEH HILIC, and BEH Amide column chemistries
- Improved pH stability and increased column lifetimes
- Proven mechanical stability of OBD Column Technology
- Wide range of selectivity for both reversed-phase LC and HILIC separations
- Scalability from analytical to preparative applications

Columns for biomolecule purifications:

- XBridge Peptide BEH C_{18}, 130Å and 300Å Preparative Columns are QC tested for demanding peptide applications
- XBridge Protein BEH C_4, 300Å Preparative Columns are QC tested for protein applications
- XBridge Oligonucleotide BEH C_{18}, 130Å, 2.5 µm Preparative Columns are QC tested for excellent resolution of oligonucleotides

Maximum Efficiency/30% Lower Backpressure



XBridge OBD Preparative Columns deliver the same high loading capacity and reliability expected of our XTerra Preparative Products, with a significantly reduced column backpressure.

For more information on XBridge HPLC Columns, refer to page 120 for 2.5 µm and page 137 for 3–5 µm column offerings.

Ordering Information

XBridge Preparative Columns and Guard Cartridges

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 10 µm		
BEH C_{18}	10 × 10 mm	Guard Cartridge	186002972[1]	10 × 10 mm	Guard Cartridge	186003889[1]
	10 × 50 mm	OBD Column	186008164	19 × 10 mm	Guard Cartridge	186003892[2]
	10 × 100 mm	OBD Column	186008165	30 × 10 mm	Guard Cartridge	186006892[3]
	10 × 150 mm	OBD Column	186008166	10 × 150 mm	OBD Column	186008210
	10 × 250 mm	OBD Column	186008167	10 × 250 mm	OBD Column	186008211
	19 × 10 mm	Guard Cartridge	186002975[2]	19 × 50 mm	OBD Column	186003893
	19 × 50 mm	OBD Column	186002977	19 × 100 mm	OBD Column	186003901
	19 × 100 mm	OBD Column	186002978	19 × 150 mm	OBD Column	186003894
	19 × 150 mm	OBD Column	186002979	19 × 250 mm	OBD Column	186003895
	19 × 250 mm	OBD Column	186004021	30 × 75 mm	OBD Column	186004711
	30 × 10 mm	Guard Cartridge	186006893[3]	30 × 100 mm	OBD Column	186003930
	30 × 50 mm	OBD Column	186002980	30 × 150 mm	OBD Column	186003896
	30 × 75 mm	OBD Column	186002981	30 × 250 mm	OBD Column	186003897
	30 × 100 mm	OBD Column	186002982	50 × 50 mm	OBD Column	186003898
	30 × 150 mm	OBD Column	186003284	50 × 100 mm	OBD Column	186003902
	30 × 250 mm	OBD Column	186004025	50 × 150 mm	OBD Column	186003899
	50 × 50 mm	OBD Column	186003933	50 × 250 mm	OBD Column	186003900
	50 × 100 mm	OBD Column	186003937			
	50 × 150 mm	OBD Column	186003929			
	50 × 250 mm	OBD Column	186004107			

	Particle Size: 5 µm			Particle Size: 10 µm		
BEH C_8	10 × 10 mm	Guard Cartridge	186002991[1]	10 × 10 mm	Guard Cartridge	186004003[1]
	10 × 50 mm	OBD Column	186008172	19 × 10 mm	Guard Cartridge	186004006[2]
	10 × 100 mm	OBD Column	186008173	30 × 10 mm	Guard Cartridge	186006894[3]
	10 × 150 mm	OBD Column	186008174	10 × 150 mm	OBD Column	186008215
	10 × 250 mm	OBD Column	186008175	10 × 250 mm	OBD Column	186008216
	19 × 10 mm	Guard Cartridge	186002992[2]	19 × 50 mm	OBD Column	186004007
	19 × 50 mm	OBD Column	186002993	19 × 100 mm	OBD Column	186004008
	19 × 100 mm	OBD Column	186002994	19 × 150 mm	OBD Column	186004009
	19 × 150 mm	OBD Column	186002995	19 × 250 mm	OBD Column	186004010
	19 × 250 mm	OBD Column	186004023	30 × 150 mm	OBD Column	186004011
	30 × 10 mm	Guard Cartridge	186006895[3]	30 × 250 mm	OBD Column	186004012
	30 × 50 mm	OBD Column	186002996	50 × 50 mm	OBD Column	186004013
	30 × 75 mm	OBD Column	186003269	50 × 100 mm	OBD Column	186004014
	30 × 100 mm	OBD Column	186002997	50 × 150 mm	OBD Column	186004015
	30 × 150 mm	OBD Column	186003083	50 × 250 mm	OBD Column	186004016
	50 × 50 mm	OBD Column	186003934			
	50 × 100 mm	OBD Column	186003938			

[1] Requires 10 × 10 mm Cartridge Holder, p/n: 289000779.
[2] Requires 19 × 10 mm Cartridge Holder, p/n: 186000709.
[3] Requires 30 × 10 mm Prep Guard Holder, p/n: 186006912.

XBridge Preparative Columns and Guard Cartridges *Continued*

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 10 µm		
BEH Shield RP18	10 × 10 mm	Guard Cartridge	186002983[1]	10 × 10 mm	Guard Cartridge	186003988[1]
	10 × 50 mm	OBD Column	186008168	19 × 10 mm	Guard Cartridge	186003991[2]
	10 × 100 mm	OBD Column	186008169	30 × 10 mm	Guard Cartridge	186006897[3]
	10 × 150 mm	OBD Column	186008170	10 × 150 mm	OBD Column	186008213
	10 × 250 mm	OBD Column	186008171	10 × 250 mm	OBD Column	186008214
	19 × 10 mm	Guard Cartridge	186002984[2]	19 × 50 mm	OBD Column	186003992
	19 × 50 mm	OBD Column	186002985	19 × 100 mm	OBD Column	186003993
	19 × 100 mm	OBD Column	186002986	19 × 150 mm	OBD Column	186003994
	19 × 150 mm	OBD Column	186002987	19 × 250 mm	OBD Column	186003995
	19 × 250 mm	OBD Column	186004022	30 × 150 mm	OBD Column	186003996
	30 × 10 mm	Guard Cartridge	186006898[3]	30 × 250 mm	OBD Column	186003997
	30 × 50 mm	OBD Column	186002988	50 × 50 mm	OBD Column	186003998
	30 × 75 mm	OBD Column	186003262	50 × 100 mm	OBD Column	186003999
	30 × 100 mm	OBD Column	186002989	50 × 150 mm	OBD Column	186004001
	30 × 150 mm	OBD Column	186002990	50 × 250 mm	OBD Column	186004002
	50 × 50 mm	OBD Column	186003935			
	50 × 100 mm	OBD Column	186003939			

	Particle Size: 5 µm			Particle Size: 10 µm		
BEH Phenyl	10 × 10 mm	Guard Cartridge	186003354[1]	19 × 250 mm	OBD Column	186004024
	10 × 50 mm	OBD Column	186008176	30 × 10 mm	Guard Cartridge	186006891[3]
	10 × 100 mm	OBD Column	186008177	30 × 50 mm	OBD Column	186003277
	10 × 150 mm	OBD Column	186008178	30 × 75 mm	OBD Column	186003278
	10 × 250 mm	OBD Column	186008179	30 × 100 mm	OBD Column	186003279
	19 × 10 mm	Guard Cartridge	186003355[2]	30 × 150 mm	OBD Column	186003276
	19 × 50 mm	OBD Column	186003356	50 × 50 mm	OBD Column	186003936
	19 × 100 mm	OBD Column	186003357	50 × 100 mm	OBD Column	186003940
	19 × 150 mm	OBD Column	186003358			

	Particle Size: 5 µm			Particle Size: 10 µm		
BEH HILIC	10 × 10 mm	Guard Cartridge	186004720[1]	30 × 50 mm	OBD Column	186004727
	10 × 50 mm	OBD Column	186008217	30 × 100 mm	OBD Column	186004728
	10 × 100 mm	OBD Column	186008218	30 × 150 mm	OBD Column	186004729
	19 × 10 mm	Guard Cartridge	186004723[2]	30 × 250 mm	OBD Column	186004731
	19 × 50 mm	OBD Column	186004724	50 × 50 mm	OBD Column	186004732
	19 × 100 mm	OBD Column	186004725	50 × 100 mm	OBD Column	186004733
	19 × 150 mm	OBD Column	186004726	50 × 150 mm	OBD Column	186004734
	19 × 250 mm	OBD Column	186004730	50 × 250 mm	OBD Column	186004735
	30 × 10 mm	Guard Cartridge	186006896[3]			

[1]Requires 10 × 10 mm Cartridge Holder, p/n: 289000779.
[2]Requires 19 × 10 mm Cartridge Holder, p/n: 186000709.
[3]Requires 30 × 10 mm Prep Guard Holder, p/n: 186006912.

XBridge Preparative Columns and Guard Cartridges *Continued*

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 10 µm		
BEH Amide	10 × 10 mm	Guard Cartridge	186006597[1]	19 × 150 mm	OBD Column	186006605
	10 × 50 mm	OBD Column	186008260	19 × 250 mm	OBD Column	186006606
	10 × 100 mm	OBD Column	186008261	30 × 10 mm	Guard Cartridge	186006890[3]
	10 × 150 mm	OBD Column	186008262	30 × 50 mm	OBD Column	186006607
	10 × 250 mm	OBD Column	186008263	30 × 75 mm	OBD Column	186006608
	19 × 10 mm	Guard Cartridge	186006598[2]	30 × 100 mm	OBD Column	186006609
	19 × 50 mm	OBD Column	186006603	30 × 150 mm	OBD Column	186006610
	19 × 100 mm	OBD Column	186006604	30 × 250 mm	OBD Column	186006611

[1] Requires 10 × 10 mm Cartridge Holder, p/n: 289000779.
[2] Requires 19 × 10 mm Cartridge Holder, p/n: 186000709.
[3] Requires 30 × 10 mm Prep Guard Holder, p/n: 186006912.

XBridge Peptide BEH, Preparative Columns and Guard Cartridges

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 10 µm		
BEH C_{18} 130Å	10 × 10 mm	Guard Cartridge	186004469[1]	4.6 x 50 mm	OBD Column	186003648
	10 × 50 mm	OBD Column	186008186	4.6 x 100 mm	OBD Column	186003649
	10 × 100 mm	OBD Column	186008187	4.6 x 150 mm	OBD Column	186003650
	10 × 150 mm	OBD Column	186008188	4.6 x 250 mm	OBD Column	186003651
	10 × 250 mm	OBD Column	186008189	10 x 10 mm	Guard Cartridge	186004465[1]
	19 × 10 mm	Guard Cartridge	186004468[2]	10 × 50 mm	OBD Column	186008194
	19 × 50 mm	OBD Column	186003586	10 × 100 mm	OBD Column	186008195
	19 × 100 mm	OBD Column	186003587	10 × 150 mm	OBD Column	186008196
	19 × 150 mm	OBD Column	186003945	10 × 250 mm	OBD Column	186008197
				19 × 10 mm	Guard Cartridge	186004464[2]
				19 × 50 mm	OBD Column	186003656
				19 × 150 mm	OBD Column	186003657
				19 × 250 mm	OBD Column	186003658
				30 × 50 mm	OBD Column	186003659
				30 × 100 mm	OBD Column	186003660
				30 × 150 mm	OBD Column	186003661
				30 × 250 mm	OBD Column	186003662

[1] Requires 10 x 10 mm Cartridge Holder, p/n: 289000779.
[2] Requires 19 x 10 mm Cartridge Holder, p/n: 186000709.

XBridge Peptide BEH, Preparative Columns and Guard Cartridges *Continued*

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 10 µm		
BEH C_{18} 300Å	10 × 10 mm	Guard Cartridge	186004471[1]	4.6 x 50 mm	OBD Column	186003663
	10 × 50 mm	OBD Column	186008190	4.6 x 100 mm	OBD Column	186003664
	10 × 100 mm	OBD Column	186008191	4.6 x 150 mm	OBD Column	186003665
	10 × 150 mm	OBD Column	186008192	4.6 x 250 mm	OBD Column	186003666
	10 × 250 mm	OBD Column	186008193	10 × 10 mm	Guard Cartridge	186004467[1]
	19 × 10 mm	Guard Cartridge	186004470[2]	10 × 50 mm	OBD Column	186008198
	19 × 50 mm	OBD Column	186003630	10 × 100 mm	OBD Column	186008199
	19 × 100 mm	OBD Column	186003631	10 × 150 mm	OBD Column	186008200
	19 × 150 mm	OBD Column	186003946	10 × 250 mm	OBD Column	186008201
				19 × 10 mm	Guard Cartridge	186004466[2]
				19 × 50 mm	OBD Column	186003671
				19 × 150 mm	OBD Column	186003672
				19 × 250 mm	OBD Column	186003673
				30 × 50 mm	OBD Column	186003674
				30 × 100 mm	OBD Column	186003675
				30 × 150 mm	OBD Column	186003676
				30 × 250 mm	OBD Column	186003677

[1]Requires 10 × 10 mm Cartridge Holder, p/n: 289000779.
[2]Requires 19 × 10 mm Cartridge Holder, p/n: 186000709.

XBridge Protein BEH, Preparative Columns and Guard Cartridges *Continued*

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 10 µm		
BEH C_4 300Å	10 × 10 mm	Guard Cartridge	186007305[1]	10 × 10 mm	Guard Cartridge	186007325[1]
	10 × 50 mm	OBD Column	186008272	10 × 50 mm	OBD Column	186008276
	10 × 100 mm	OBD Column	186008273	10 × 100 mm	OBD Column	186008277
	10 × 150 mm	OBD Column	186008274	10 × 150 mm	OBD Column	186008278
	10 × 250 mm	OBD Column	186008275	10 × 250 mm	OBD Column	186008279
	19 × 10 mm	Guard Cartridge	186007310[2]	19 × 10 mm	Guard Cartridge	186007330[2]
	19 × 50 mm	OBD Column	186007311	19 × 50 mm	OBD Column	186007331
	19 × 100 mm	OBD Column	186007312	19 × 100 mm	OBD Column	186007332
	19 × 150 mm	OBD Column	186007313	19 × 150 mm	OBD Column	186007333
	19 × 250 mm	OBD Column	186007314	19 × 250 mm	OBD Column	186007334
	30 × 10 mm	Guard Cartridge	186007315[3]	30 × 10 mm	Guard Cartridge	186007335[3]
	30 × 50 mm	OBD Column	186007316	30 × 50 mm	OBD Column	186007336
	30 × 75 mm	OBD Column	186007317	30 × 75 mm	OBD Column	186007337
	30 × 100 mm	OBD Column	186007318	30 × 100 mm	OBD Column	186007338
	30 × 150 mm	OBD Column	186007319	30 × 150 mm	OBD Column	186007339
	30 × 250 mm	OBD Column	186007320	30 x 250 mm	OBD Column	186007340

[1]Requires 10 × 10 mm Cartridge Holder, p/n: 289000779.
[2]Requires 19 × 10 mm Cartridge Holder, p/n: 186000709.
[3]Requires 30 × 10 mm Prep Guard Holder, p/n: 186006912.

XBridge Oligonucleotide BEH, Preparative Column

	Dimension	Type	P/N
	Particle Size: 2.5 µm		
BEH C_{18} 130Å	10 × 50 mm	OBD Column	186008212

XSELECT® Columns



HSS CSH Technology OBD

XSelect OBD Preparative Columns

VERSATILITY AND SELECTIVITY

XSelect HPLC Columns offer the opportunity to scale from analytical to preparative applications, taking advantage of alternative selectivity through different column chemistries and methods specifying different pH scales.

XSelect OBD Preparative Columns are:

- Available as CSH C_{18}, CSH Fluoro-Phenyl, CSH Phenyl-Hexyl, HSS C_{18}, HSS C_{18} SB, and HSS T3 Column Chemistries
- Designed for selectivity, improving the separation of closely eluting peaks
- Intended for isolation and purification, improving throughput with high-mass loading
- Ideal for rapid method development, reducing the time and cost required to develop screening methods

Columns for peptide purifications:

- Improve peak shape and mass loading using the QC-tested XSelect Peptide CSH C_{18} Columns

Columns Designed for Isolation and Purification

LC Conditions:

Columns:	ACQUITY UPLC CSH C_{18}, 1.7 µm, 2.1 × 50 mm
Part number:	186005296
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile

Gradient:

Time (min)	Flow (mL/min)	Profile %A	%B	Curve
Initial	0.9	95	5	Initial
2.00	0.9	5	95	6
2.50	0.9	5	95	6
2.51	0.9	95	5	6
3.50	0.9	95	5	6

Injection vol.:	1 µL
Sample conc.:	800 µg/mL for crude mix
Sample diluent:	50/50 methanol/water
Column temp.:	40 °C
Weak needle wash:	95/5 water/acetonitrile
Strong needle wash:	95/5 acetonitrile/water
Detection:	UV @ 220 nm
Sampling rate:	20 points/sec
Filter time Constant:	0.1 sec
System:	ACQUITY UPLC with ACQUITY UPLC PDA Detector

Preparative Conditions:

Column:	XSelect CSH C_{18} OBD Prep, 5 µm, 19 × 100 mm
Part number:	186005421
Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile

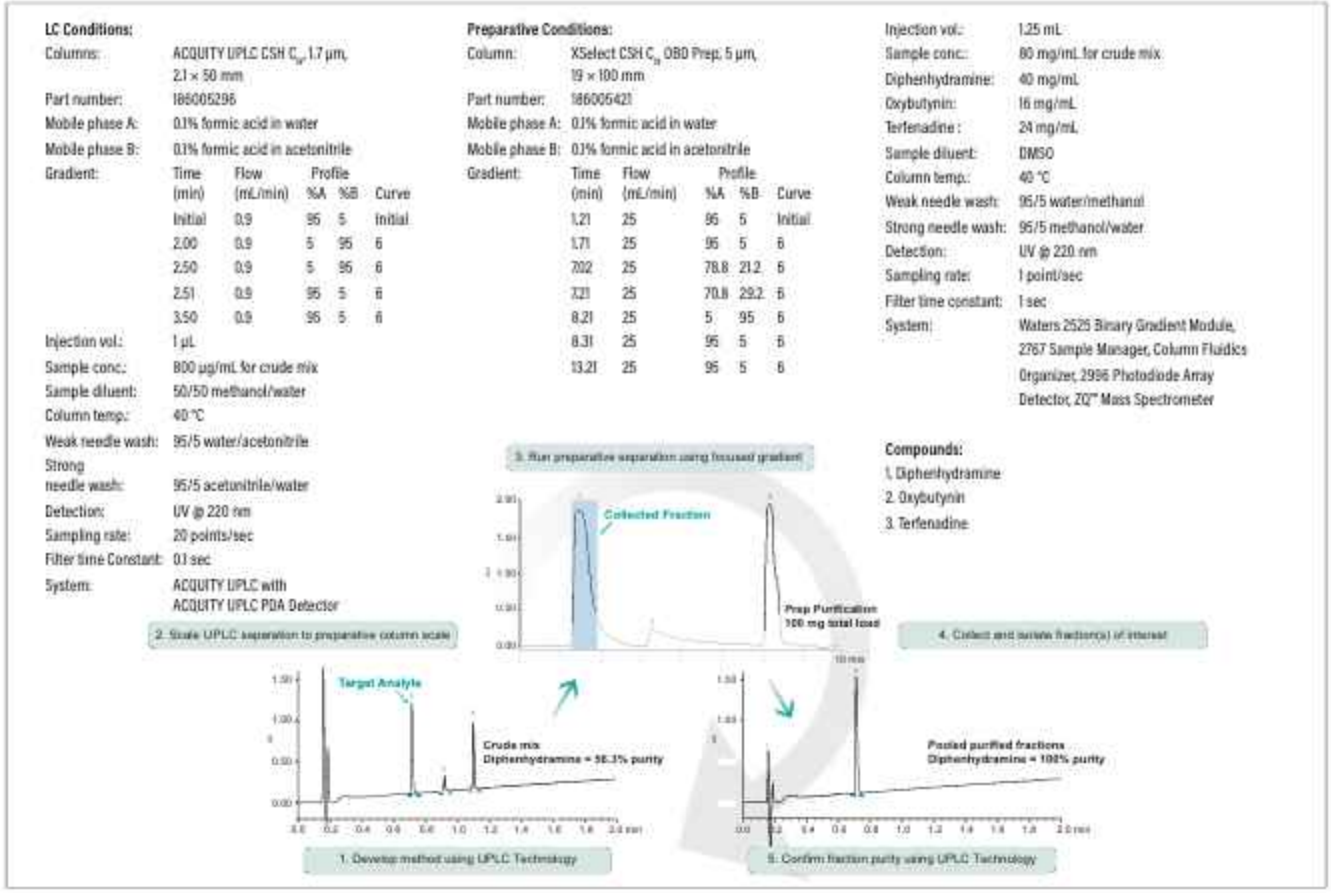
Gradient:

Time (min)	Flow (mL/min)	Profile %A	%B	Curve
1.21	25	96	5	Initial
1.71	25	96	5	6
7.02	25	78.8	21.2	6
7.21	25	70.8	29.2	6
8.21	25	5	95	6
8.31	25	96	5	6
13.21	25	96	5	6

Injection vol.:	1.25 mL
Sample conc.:	80 mg/mL for crude mix
Diphenhydramine:	40 mg/mL
Oxybutynin:	16 mg/mL
Terfenadine :	24 mg/mL
Sample diluent:	DMSO
Column temp.:	40 °C
Weak needle wash:	95/5 water/methanol
Strong needle wash:	95/5 methanol/water
Detection:	UV @ 220 nm
Sampling rate:	1 point/sec
Filter time constant:	1 sec
System:	Waters 2525 Binary Gradient Module, 2767 Sample Manager, Column Fluidics Organizer, 2996 Photodiode Array Detector, ZQ™ Mass Spectrometer

Compounds:

1. Diphenhydramine
2. Oxybutynin
3. Terfenadine



Using CSH Technology throughout the entire process, methods can be developed quickly with ACQUITY UPLC CSH Columns and UPLC Technology and then transferred to preparative-scale XSelect OBD Preparative Columns for isolation and purification. The purity of the isolated fraction(s) can then be measured/confirmed using ACQUITY UPLC CSH Columns and UPLC Technology.

Ordering Information

XSelect Preparative Columns and Guard Cartridges

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 5 µm		
CSH C_{18}	10 × 10 mm	Guard Cartridge	186005491[1]	30 × 10 mm	Guard Cartridge	186006899[3]
	10 × 50 mm	OBD Column	186008236	30 × 50 mm	OBD Column	186005423
	10 × 100 mm	OBD Column	186008237	30 × 75 mm	OBD Column	186005424
	10 × 150 mm	OBD Column	186008238	30 × 100 mm	OBD Column	186005425
	10 × 250 mm	OBD Column	186008239	30 × 150 mm	OBD Column	186005426
	19 × 10 mm	Guard Cartridge	186005418[2]	30 × 250 mm	OBD Column	186005493
	19 × 50 mm	OBD Column	186005420	50 × 50 mm	OBD Column	186005494
	19 × 100 mm	OBD Column	186005421	50 × 100 mm	OBD Column	186005495
	19 × 150 mm	OBD Column	186005422	50 × 150 mm	OBD Column	186005496
	19 × 250 mm	OBD Column	186005492	50 × 250 mm	OBD Column	186005497
	Particle Size: 5 µm			Particle Size: 5 µm		
CSH Fluoro-Phenyl	10 × 10 mm	Guard Cartridge	186005498[1]	30 × 10 mm	Guard Cartridge	186006900[3]
	10 × 50 mm	OBD Column	186008240	30 × 50 mm	OBD Column	186005436
	10 × 100 mm	OBD Column	186008241	30 × 75 mm	OBD Column	186005437
	10 × 150 mm	OBD Column	186008242	30 × 100 mm	OBD Column	186005438
	10 × 250 mm	OBD Column	186008243	30 × 150 mm	OBD Column	186005439
	19 × 10 mm	Guard Cartridge	186005431[2]	30 × 250 mm	OBD Column	186005500
	19 × 50 mm	OBD Column	186005433	50 × 50 mm	OBD Column	186005501
	19 × 100 mm	OBD Column	186005434	50 × 100 mm	OBD Column	186005502
	19 × 150 mm	OBD Column	186005435	50 × 150 mm	OBD Column	186005503
	19 × 250 mm	OBD Column	186005499	50 × 250 mm	OBD Column	186005504
	Particle Size: 5 µm			Particle Size: 5 µm		
CSH Phenyl-Hexyl	10 × 10 mm	Guard Cartridge	186005505[1]	30 × 10 mm	Guard Cartridge	186006901[3]
	10 × 50 mm	OBD Column	186008244	30 × 50 mm	OBD Column	186005520
	10 × 100 mm	OBD Column	186008245	30 × 75 mm	OBD Column	186005450
	10 × 150 mm	OBD Column	186008246	30 × 100 mm	OBD Column	186005451
	10 × 250 mm	OBD Column	186008247	30 × 150 mm	OBD Column	186005452
	19 × 10 mm	Guard Cartridge	186005444[2]	30 × 250 mm	OBD Column	186005507
	19 × 50 mm	OBD Column	186005446	50 × 50 mm	OBD Column	186005508
	19 × 100 mm	OBD Column	186005447	50 × 100 mm	OBD Column	186005509
	19 × 150 mm	OBD Column	186005448	50 × 150 mm	OBD Column	186005510
	19 × 250 mm	OBD Column	186005506	50 × 250 mm	OBD Column	186005511
	Particle Size: 5 µm			Particle Size: 5 µm		
HSS C_{18}	10 × 10 mm	Guard Cartridge	186004776[1]	10 × 100 mm	OBD Column	186008223
	10 × 50 mm	OBD Column	186008222	10 × 150 mm	OBD Column	186008224
	Particle Size: 5 µm			Particle Size: 5 µm		
HSS C_{18} SB	10 × 10 mm	Guard Cartridge	186004758[1]	10 × 100 mm	OBD Column	186008220
	10 × 50 mm	OBD Column	186008219	10 × 150 mm	OBD Column	186008221

[1] Requires 10 × 10 mm Cartridge Holder, p/n: 289000779.
[2] Requires 19 × 10 mm Cartridge Holder, p/n: 186000709.
[3] Requires 30 × 10 mm Prep Guard Holder, p/n: 186006912.

XSelect Preparative Columns and Guard Cartridges *Continued*

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 5 µm		
HSS T3	10 × 10 mm	Guard Cartridge	186004795[1]	10 × 150 mm	OBD Column	186008227
	10 × 50 mm	OBD Column	186008225	10 × 250 mm	OBD Column	186008280
	10 × 100 mm	OBD Column	186008226			

[1]Requires 10 × 10 mm Cartridge Holder, p/n: 289000779.

XSelect Peptide CSH, Preparative Columns and Guard Cartridges

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 5 µm		
CSH C_{18} 130Å	4.6 × 50 mm	Column	186007076[4]	19 × 250 mm	OBD Column	186007031
	4.6 × 100 mm	Column	186007077[4]	19 × 10 mm	Guard	186007019[3]
	4.6 × 150 mm	Column	186007078[4]	30 × 50 mm	OBD Column	186007026
	10 × 50 mm	OBD Column	186008264	30 × 100 mm	OBD Column	186007025
	10 × 100 mm	OBD Column	186008265	30 × 150 mm	OBD Column	186007023
	10 × 150 mm	OBD Column	186008266	30 × 250 mm	OBD Column	186007024
	10 × 250 mm	OBD Column	186008267	50 × 50 mm	OBD Column	186007030
	10 × 10 mm	Guard	186007015[1]	50 × 100 mm	OBD Column	186007027
	19 × 50 mm	OBD Column	186007022	50 × 150 mm	OBD Column	186007028
	19 × 100 mm	OBD Column	186007020	50 × 250 mm	OBD Column	186007029
	19 × 150 mm	OBD Column	186007021			

[1]Requires 10 × 10 mm Cartridge Holder, p/n: 289000779.
[3]Requires 19 × 10 mm Cartridge Holder, p/n: 186000709.
[4]For use in developing lab-scale preparative chromatography.

For more information on XSelect Columns, refer to page 125 for 2.5 µm and page 146 for 3–5 µm column offerings.



SunFire OBD Preparative Columns

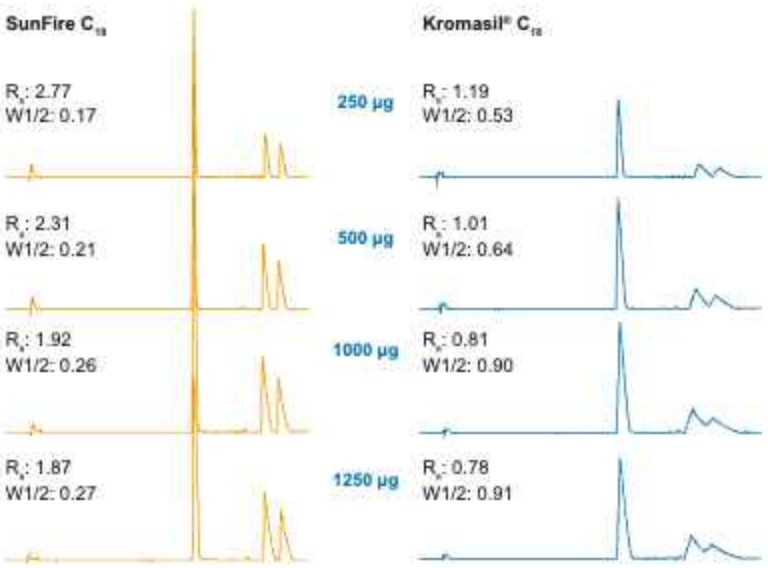
HIGH-MASS LOADING

SunFire C_{18}, C_8, and Silica Columns provide significant mass-loading capacity. The OBD design ensures the column's excellent performance, scalability and serviceable life.

SunFire OBD Preparative Columns offer:

- Easy scale-up from analytical to preparative chromatography
- High-mass loading
- Low-pH stability
- Excellent column life and stability
- Superior peak shapes

High Mass Loading of SunFire Sorbents Enables the Use of Smaller Preparative Column Dimensions



Conditions:

Column:	SunFire C_8, 5 µm, 4.6 × 150 mm
Part number:	186002559
Mobile phase A:	0.1% TFA in water
Mobile phase B:	0.1% TFA in acetonitrile
Gradient:	15 min linear gradient from 20% B to 85% B, 2 min initial holding time
Flow rate:	1 mL/min
Injection vol.:	10 µL
Detection:	UV @ 254 nm
System:	Alliance HT 2795

Compounds:

1. Ketoconazole
2. Econazole
3. Miconazole

Sample Concentration: As indicated in the table, dissolved in DMSO

Analyte	mg/mL	mg/mL	mg/mL	mg/mL
Ketoconazole	25	20	10	5
Econazole	50	40	20	10
Miconazole	50	40	20	10
Total Concentration	125	100	50	25

For more information on SunFire Columns, refer to page 131 for 2.5 µm and page 158 for 3–5 µm column offerings.

Ordering Information

SunFire Preparative Columns and Guard Cartridges

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 10 µm		
C_{18}	10 × 10 mm	Guard Cartridge	186002565[1]	10 × 10 mm	Guard Cartridge	186002663[1]
	10 × 50 mm	OBD Column	186008152	10 × 50 mm	OBD Column	186008208
	10 × 100 mm	OBD Column	186008153	10 × 150 mm	OBD Column	186008156
	10 × 150 mm	OBD Column	186008154	10 × 250 mm	OBD Column	186008157
	10 × 250 mm	OBD Column	186008155	19 × 10 mm	Guard Cartridge	186002666[2]
	19 × 10 mm	Guard Cartridge	186002569[2]	19 × 50 mm	OBD Column	186002667
	19 × 50 mm	OBD Column	186002566	19 × 150 mm	OBD Column	186002668
	19 × 100 mm	OBD Column	186002567	19 × 250 mm	OBD Column	186002669
	19 × 150 mm	OBD Column	186002568	30 × 10 mm	Guard Cartridge	186006884[3]
	19 × 250 mm	OBD Column	186004027	30 × 50 mm	OBD Column	186003854
	30 × 10 mm	Guard Cartridge	186006885[3]	30 × 100 mm	OBD Column	186003971
	30 × 50 mm	OBD Column	186002570	30 × 150 mm	OBD Column	186002670
	30 × 75 mm	OBD Column	186002571	30 × 250 mm	OBD Column	186002671
	30 × 100 mm	OBD Column	186002572	50 × 50 mm	OBD Column	186002871
	30 × 150 mm	OBD Column	186002797	50 × 100 mm	OBD Column	186003972
	30 × 250 mm	OBD Column	186003969	50 × 150 mm	OBD Column	186002672
	50 × 50 mm	OBD Column	186002867	50 × 250 mm	OBD Column	186002673
	50 × 100 mm	OBD Column	186002869			
	50 × 150 mm	OBD Column	186003941			
	50 × 250 mm	OBD Column	186003970			

	Particle Size: 5 µm			Particle Size: 10 µm		
C_8	10 × 10 mm	Guard Cartridge	186002750[1]	10 × 10 mm	Guard Cartridge	186002758[1]
	10 × 50 mm	OBD Column	186008158	10 × 50 mm	OBD Column	186008209
	10 × 100 mm	OBD Column	186008159	10 × 150 mm	OBD Column	186008162
	10 × 150 mm	OBD Column	186008160	10 × 250 mm	OBD Column	186008163
	10 × 250 mm	OBD Column	186008161	19 × 10 mm	Guard Cartridge	186002761[2]
	19 × 10 mm	Guard Cartridge	186002754[2]	19 × 150 mm	OBD Column	186002763
	19 × 50 mm	OBD Column	186002751	19 × 250 mm	OBD Column	186002764
	19 × 100 mm	OBD Column	186002752	30 × 10 mm	Guard Cartridge	186006886[3]
	19 × 150 mm	OBD Column	186002753	30 × 50 mm	OBD Column	186003853
	19 × 250 mm	OBD Column	186004028	30 × 150 mm	OBD Column	186002765
	30 × 10 mm	Guard Cartridge	186006887[3]	30 × 250 mm	OBD Column	186002766
	30 × 50 mm	OBD Column	186002755	50 × 50 mm	OBD Column	186002872
	30 × 75 mm	OBD Column	186002756	50 × 150 mm	OBD Column	186002767
	30 × 100 mm	OBD Column	186002757	50 × 250 mm	OBD Column	186002768
	30 × 150 mm	OBD Column	186002795			
	50 × 50 mm	OBD Column	186002868			
	50 × 100 mm	OBD Column	186002870			

[1] Requires 10 × 10 mm Cartridge Holder, p/n: 289000779.
[2] Requires 19 × 10 mm Cartridge Holder, p/n: 186000709.
[3] Requires 30 × 10 mm Prep Guard Holder, p/n: 186006912.

SunFire Preparative Columns and Guard Cartridges *Continued*

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 10 µm		
Silica	10 × 10 mm	Guard Cartridge	186003429[1]	10 × 10 mm	Guard Cartridge	186003441[1]
	10 × 50 mm	OBD Column	186008180	10 × 150 mm	OBD Column	186008184
	10 × 100 mm	OBD Column	186008181	10 × 250 mm	OBD Column	186008185
	10 × 150 mm	OBD Column	186008182	19 × 10 mm	Guard Cartridge	186003444[2]
	10 × 250 mm	OBD Column	186008183	19 × 50 mm	OBD Column	186003445
	19 × 10 mm	Guard Cartridge	186003434[2]	19 × 150 mm	OBD Column	186003446
	19 × 50 mm	OBD Column	186003431	19 × 250 mm	OBD Column	186003447
	19 × 100 mm	OBD Column	186003432	30 × 10 mm	Guard Cartridge	186006888[3]
	19 × 150 mm	OBD Column	186003433	30 × 50 mm	OBD Column	186003855
	19 × 250 mm	OBD Column	186004029	30 × 150 mm	OBD Column	186003448
	30 × 10 mm	Guard Cartridge	186006889[3]	30 × 250 mm	OBD Column	186003449
	30 × 50 mm	OBD Column	186003435	50 × 50 mm	OBD Column	186003450
	30 × 75 mm	OBD Column	186003436	50 × 150 mm	OBD Column	186003451
	30 × 100 mm	OBD Column	186003437	50 × 250 mm	OBD Column	186003452
	30 × 150 mm	OBD Column	186003438			
	50 × 50 mm	OBD Column	186003439			
	50 × 100 mm	OBD Column	186003440			

[1]Requires 10 × 10 mm Cartridge Holder, p/n: 289000779.
[2]Requires 19 × 10 mm Cartridge Holder, p/n: 186000709.
[3]Requires 30x 10 mm Cartridge Holder, p/n: 186006912.

SunFire Preparative Scouting Columns

	Dimension	P/N
	Particle Size: 10 µm	
C_{18}	4.6 × 150 mm	186003390
	4.6 × 250 mm	186003391

	Particle Size: 5 µm		Particle Size: 10 µm	
Silica	4.6 × 150 mm	186003453	4.6 × 150 mm	186003467
	4.6 × 250 mm	186003454	4.6 × 250 mm	186003468

Atlantis® Columns



Atlantis OBD Preparative Columns

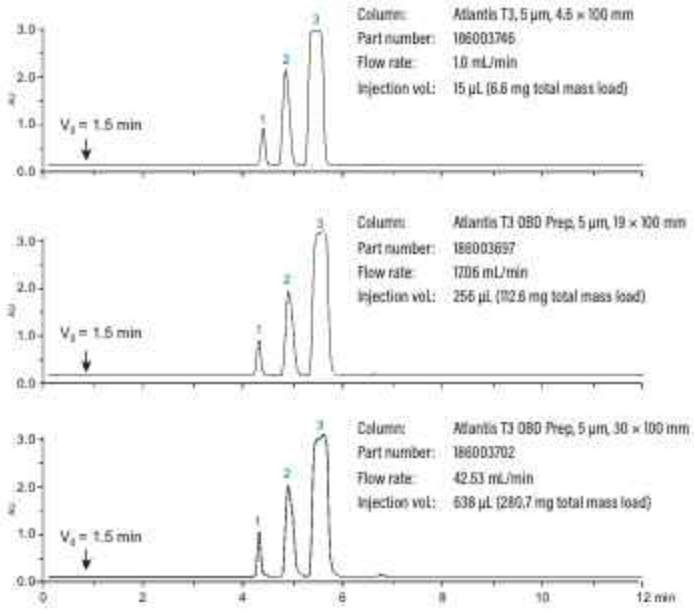
RETENTION OF POLAR COMPOUNDS

Atlantis HPLC Columns provide balanced retention for broad analyte mixtures and exceptional performance, versatility, and retention for polar compounds.

Atlantis OBD Preparative Columns offer:

- Available as T3, HILIC, and dC_{18} column chemistries
- Compatibility with 100% aqueous mobile phases
- Long column life when used with mobile phases of low pH
- Polar-compound retention without ion-pairing reagents

Beta Blockers



Compounds:

1. Atenolol	40 mg/mL in DMSO
2. Metoprolol	200 mg/mL in DMSO
3. Propranolol	200 mg/mL in DMSO

Conditions:

Mobile phase A:	0.1% formic acid in water
Mobile phase B:	0.1% formic acid in acetonitrile
Detection:	UV @ 280 nm
System:	2525 Binary Gradient Module, 2767 Sample Manager, 2996 PDA (AutoPurification flow cell)
Temperature:	Ambient

Analytical Gradient Table:

Gradient:	Time (min)	Profile %A	%B
	0.0	100	0
	1.0	100	0
	2.0	82	18
	6.0	28	72
	8.0	28	72
	8.1	0	100
	10.0	0	100
	10.1	100	0
	15.0	100	0

Preparative Gradient Table:

Gradient:	Time (min)	Profile %A	%B
	0.0	100	0
	2.0	100	0
	3.0	82	18
	7.0	28	72
	9.0	28	72
	9.1	0	100
	11.0	0	100
	11.1	100	0
	16.0	100	0

For more information on Atlantis Analytical Columns, refer to page 155.

Ordering Information

Atlantis Preparative Columns and Guard Cartridges

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 10 µm		
T3	10 × 10 mm	Guard Cartridge	186003695[1]	10 × 10 mm	Guard Cartridge	186003706[1]
	10 × 50 mm	OBD Column	186008202	10 × 150 mm	OBD Column	186008206
	10 × 100 mm	OBD Column	186008203	10 × 250 mm	OBD Column	186008207
	10 × 150 mm	OBD Column	186008204	19 × 10 mm	Guard Cartridge	186003710[2]
	10 × 250 mm	OBD Column	186008205	19 × 50 mm	OBD Column	186003707
	19 × 10 mm	Guard Cartridge	186003699[2]	19 × 150 mm	OBD Column	186003708
	19 × 50 mm	OBD Column	186003696	19 × 250 mm	OBD Column	186003709
	19 × 100 mm	OBD Column	186003697	30 × 10 mm	Guard Cartridge	186006878[3]
	19 × 150 mm	OBD Column	186003698	30 × 75 mm	OBD Column	186004712
	19 × 250 mm	OBD Column	186004026	30 × 150 mm	OBD Column	186003711
	30 × 10 mm	Guard Cartridge	186006879[3]	30 × 250 mm	OBD Column	186003712
	30 × 50 mm	OBD Column	186003700	50 × 50 mm	OBD Column	186004083
	30 × 75 mm	OBD Column	186003701	50 × 100 mm	OBD Column	186004084
	30 × 100 mm	OBD Column	186003702	50 × 150 mm	OBD Column	186004085
	30 × 150 mm	OBD Column	186003703	50 × 250 mm	OBD Column	186004086
	50 × 50 mm	OBD Column	186004080			
	50 × 100 mm	OBD Column	186004081			
	50 × 150 mm	OBD Column	186004082			

	Particle Size: 5 µm			Particle Size: 10 µm		
HILIC	19 × 10 mm	Guard Cartridge	186003956[2]	30 × 10 mm	Guard Cartridge	186006877[3]
	19 × 50 mm	OBD Column	186003957	30 × 50 mm	OBD Column	186003960
	19 × 100 mm	OBD Column	186003958	30 × 100 mm	OBD Column	186003961
	19 × 150 mm	OBD Column	186003959	30 × 150 mm	OBD Column	186003962

	Particle Size: 5 µm			Particle Size: 10 µm		
dC_{18}	10 × 10 mm	Guard Cartridge	186002300[1]	10 × 10 mm	Guard Cartridge	186002452[1]
	10 × 50 mm	OBD Column	186008146	10 × 150 mm	OBD Column	186008149
	10 × 100 mm	OBD Column	186008148	10 × 250 mm	OBD Column	186008151
	19 × 10 mm	Guard Cartridge	186001361[2]	19 × 10 mm	Guard Cartridge	186001363[2]
	19 × 50 mm	OBD Column	186001365	19 × 150 mm	OBD Column	186001369
	19 × 100 mm	OBD Column	186001367	19 × 250 mm	OBD Column	186001371
	19 × 150 mm	OBD Column	186002800	30 × 10 mm	Guard Cartridge	186006875[3]
	19 × 250 mm	OBD Column	186004030	30 × 250 mm	OBD Column	186002418
	30 × 10 mm	Guard Cartridge	186006876[3]			
	30 × 50 mm	OBD Column	186001373			
	30 × 75 mm	OBD Column	186002455			
	30 × 150 mm	OBD Column	186002801			

[1]Requires 10 × 10 mm Cartridge Holder, p/n: 289000779.
[2]Requires 19 × 10 mm Cartridge Holder, p/n: 186000709.
[3]Requires 30 × 10 mm Prep Guard Holder, p/n: 186006912.



XTerra OBD Preparative Columns

XTerra HPLC Columns offer rugged material of high mechanical strength and high efficiency. They provide excellent peak shape for bases and easy scale-up from analytical to preparative chromatography.

XTerra OBD Preparative Columns offer:

- Available as MS C_{18}, MS C_8, Shield RP18, and Shield RP8 column chemistries
- High mechanical strength
- Excellent chemical stability for both low and high pH purifications
- Excellent peak shape for bases

Ordering Information

XTerra Preparative Columns and Guard Cartridges

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 10 µm		
MS C_{18}	7.8 × 10 mm	Guard Cartridge	186001168[3]	7.8 × 10 mm	Guard Cartridge	186001172[3]
	7.8 × 50 mm	Column	186001152	7.8 × 150 mm	Column	186001160
	7.8 × 100 mm	Column	186001156	7.8 × 300 mm	Column	186001164
	7.8 × 150 mm	Column	186001475	10 × 10 mm	Guard Cartridge	186001002[1]
	10 × 10 mm	Guard Cartridge	186001001[1]	10 × 150 mm	Column	186008129
	10 × 50 mm	Column	186008103	10 × 250 mm	Column	186008133
	10 × 100 mm	Column	186008107	10 × 300 mm	Column	186008137
	10 × 150 mm	Column	186008141	19 × 10 mm	Guard Cartridge	186001034[2]
	19 × 10 mm	Guard Cartridge	186001104[2]	19 × 50 mm	OBD Column	186002254
	19 × 50 mm	Column	186001930	19 × 150 mm	Column	186002255
	19 × 100 mm	Column	186001934	19 × 250 mm	OBD Column	186002259
	19 × 150 mm	Column	186002379	19 × 300 mm	Column	186002263
	30 × 10 mm	Guard Cartridge	186006903[4]	30 × 10 mm	Guard Cartridge	186006902[4]
	30 × 50 mm	Column	186001938	30 × 150 mm	Column	186002267
	30 × 100 mm	Column	186001942	30 × 250 mm	OBD Column	186002271
	50 × 50 mm	Column	186002218	30 × 300 mm	Column	186002275
	50 × 100 mm	Column	186002222	50 × 50 mm	OBD Column	186002279
				50 × 150 mm	Column	186002843
				50 × 250 mm	OBD Column	186002847

[1] Requires 10 × 10 mm Cartridge Holder, p/n: 289000779.
[2] Requires 19 × 10 mm Cartridge Holder, p/n: 186000709.
[4] Requires 30 × 10 mm Prep Guard Holder, p/n: 186006912.
[3] Requires 7.8 × 10 mm Cartridge Holder, p/n: 186000708.

For more information on XTerra Columns, refer to page 133 for 2.5 µm and page 166 for 3–5 µm column offerings.

XTerra Preparative Columns and Guard Cartridges *Continued*

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 10 µm		
MS C_8	7.8 × 10 mm	Guard Cartridge	186001169[5]	7.8 × 10 mm	Guard Cartridge	186001173[5]
	7.8 × 50 mm	Column	186001153	7.8 × 150 mm	Column	186001161
	7.8 × 100 mm	Column	186001157	7.8 × 300 mm	Column	186001165
	7.8 × 150 mm	Column	186001476	10 × 150 mm	Column	186008130
	10 × 50 mm	Column	186008104	10 × 250 mm	Column	186008134
	10 × 150 mm	Column	186008142	10 × 300 mm	Column	186008138
	19 × 10 mm	Guard Cartridge	186001105[2]	19 × 10 mm	Guard Cartridge	186001035[2]
	19 × 50 mm	Column	186001931	19 × 150 mm	Column	186002256
	19 × 100 mm	Column	186001935	19 × 250 mm	OBD Column	186002260
	19 × 150 mm	Column	186002380	19 × 300 mm	Column	186002264
	30 × 10 mm	Guard Cartridge	186006904[3]	30 × 150 mm	Column	186002268
	30 × 50 mm	Column	186001939	30 × 250 mm	OBD Column	186002272
	30 × 75 mm	Column	186002388	30 × 300 mm	Column	186002276
	30 × 100 mm	Column	186001943	50 × 50 mm	OBD Column	186002280
	50 × 50 mm	Column	186002219	50 × 150 mm	Column	186002844
	50 × 100 mm	Column	186002223	50 × 250 mm	OBD Column	186002848

	Particle Size: 5 µm			Particle Size: 10 µm		
Shield RP18	7.8 × 10 mm	Guard Cartridge	186001170[5]	7.8 × 10 mm	Guard Cartridge	186001174[5]
	7.8 × 50 mm	Column	186001154	7.8 × 150 mm	Column	186001162
	7.8 × 100 mm	Column	186001158	7.8 × 300 mm	Column	186001166
	7.8 × 150 mm	Column	186001477	10 × 10 mm	Guard Cartridge	186001007[1]
	10 × 10 mm	Guard Cartridge	186001006[1]	10 × 150 mm	Column	186008131
	10 × 50 mm	Column	186008105	10 × 250 mm	Column	186008135
	10 × 100 mm	Column	186008128	10 × 300 mm	Column	186008139
	10 × 150 mm	Column	186008143	19 × 10 mm	Guard Cartridge	186001036[2]
	19 × 10 mm	Guard Cartridge	186001106[2]	19 × 150 mm	Column	186002257
	19 × 50 mm	Column	186001932	19 × 250 mm	OBD Column	186002261
	19 × 100 mm	Column	186001936	19 × 300 mm	Column	186002265
	19 × 150 mm	Column	186002381	30 × 10 mm	Guard Cartridge	186006905[3]
	30 × 10 mm	Guard Cartridge	186006906[3]	30 × 150 mm	Column	186002269
	30 × 50 mm	Column	186001940	30 × 250 mm	OBD Column	186002273
	30 × 75 mm	Column	186002389	30 × 300 mm	Column	186002277
	30 × 100 mm	Column	186001944	50 × 50 mm	OBD Column	186002281
	50 × 50 mm	Column	186002220	50 × 150 mm	Column	186002845
	50 × 100 mm	Column	186002224	50 × 250 mm	OBD Column	186002849

[1] Requires 10 × 10 mm Cartridge Holder, p/n: 289000779.
[2] Requires 19 × 10 mm Cartridge Holder, p/n: 186000709.
[3] Requires 30 × 10 mm Prep Guard Holder, p/n: 186006912.
[5] Requires 7.8 × 10 mm Cartridge Holder, p/n: 186000708.

XTerra Preparative Columns and Guard Cartridges *Continued*

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 10 µm		
Shield RP8	7.8 × 10 mm	Guard Cartridge	186001171[3]	7.8 × 10 mm	Guard Cartridge	186001175[3]
	7.8 × 50 mm	Column	186001155	7.8 × 150 mm	Column	186001163
	7.8 × 100 mm	Column	186001159	7.8 × 300 mm	Column	186001167
	7.8 × 150 mm	Column	186001478	10 × 10 mm	Guard Cartridge	186001009[1]
	10 × 10 mm	Guard Cartridge	186001008[1]	10 × 150 mm	Column	186008132
	10 × 50 mm	Column	186008106	10 × 250 mm	Column	186008136
	10 × 150 mm	Column	186008144	10 × 300 mm	Column	186008140
	19 × 10 mm	Guard Cartridge	186001107[2]	19 × 10 mm	Guard Cartridge	186001037[2]
	19 × 50 mm	Column	186001933	19 × 150 mm	Column	186002258
	19 × 100 mm	Column	186001937	19 × 250 mm	OBD Column	186002262
	19 × 150 mm	Column	186002382	19 × 300 mm	Column	186002266
	30 × 50 mm	Column	186001941	30 × 150 mm	Column	186002270
	30 × 75 mm	Column	186002390	30 × 250 mm	OBD Column	186002274
	30 × 100 mm	Column	186001945	30 × 300 mm	Column	186002278
	50 × 50 mm	Column	186002221	50 × 50 mm	OBD Column	186002282
	50 × 100 mm	Column	186002225	50 × 150 mm	Column	186002846
				50 × 250 mm	OBD Column	186002850

[1] Requires 10 × 10 mm Cartridge Holder, p/n: 289000779.
[2] Requires 19 × 10 mm Cartridge Holder, p/n: 186000709.
[3] Requires 7.8 × 10 mm Cartridge Holder, p/n: 186000708.

Symmetry Preparative Columns

Symmetry Columns provide a high standard of reproducibility and total confidence in the long-term compliance of your HPLC methods. The SymmetryPrep™ family includes SymmetryPrep (C_{18} and C_8), SymmetryShield (RP18 and RP8), and Symmetry300 (C_{18}) Columns.

Symmetry Preparative Columns offer:

- High capacity
- High efficiency
- The ability to scale up methods from Symmetry analytical columns with particles of 35 and 5 µm

Ordering Information

Symmetry Preparative Columns and Guard Cartridges

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 7 µm		
SymmetryPrep C_{18}	7.8 × 10 mm	Guard Cartridge	186000711[1]	7.8 × 10 mm	Guard Cartridge	186000713[1]
	7.8 × 50 mm	Column	186000208	7.8 × 150 mm	Column	WAT066288
	7.8 × 100 mm	Column	186000209	7.8 × 300 mm	Column	WAT066235
	19 × 10 mm	Guard Cartridge	186000715[2]	19 × 10 mm	Guard Cartridge	186000717[2]
	19 × 50 mm	Column	186000210	19 × 150 mm	Column	WAT066240
	19 × 100 mm	Column	186000211	19 × 300 mm	Column	WAT066245
	30 × 100 mm	Column	186000236			

	Particle Size: 5 µm			Particle Size: 7 µm		
SymmetryPrep C_8	7.8 × 10 mm	Guard Cartridge	186000712[1]	7.8 × 10 mm	Guard Cartridge	186000714[1]
	7.8 × 50 mm	Column	186000214	7.8 × 150 mm	Column	WAT066285
	7.8 × 100 mm	Column	186000215	7.8 × 300 mm	Column	WAT066225
	19 × 100 mm	Column	186000229	19 × 10 mm	Guard Cartridge	186000718[2]
	30 × 50 mm	Column	186000237	19 × 150 mm	Column	WAT066228
	30 × 100 mm	Column	186000238	19 × 300 mm	Column	WAT066230

	Particle Size: 5 µm			Particle Size: 7 µm		
SymmetryShield RP18	19 × 10 mm	Guard Cartridge	186001835[2]	19 × 150 mm	Column	186001839
	19 × 50 mm	Column	186001836	19 × 300 mm	Column	186001840
	19 × 100 mm	Column	186001837			
	19 × 150 mm	Column	186001838			

[1] Requires 19 × 10 mm Cartridge Holder, p/n: 186000709.
[2] Requires 7.8 × 10 mm Cartridge Holder, p/n: 186000708.

For more information on Symmetry Analytical Columns, refer to page 161.

Symmetry Preparative Columns and Guard Cartridges *Continued*

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 7 µm		
SymmetryShield RP8	19 × 10 mm	Guard Cartridge	186001841[2]	19 × 150 mm	Column	186001845
	19 × 50 mm	Column	186001842	19 × 300 mm	Column	186001846
	19 × 100 mm	Column	186001843			
	19 × 150 mm	Column	186001844			

	Particle Size: 5 µm			Particle Size: 5 µm		
Symmetry300 C_{18}	19 × 10 mm	Guard Cartridge	186001847[2]	19 × 100 mm	Column	186001849
	19 × 50 mm	Column	186001848	19 × 150 mm	Column	186001850

[1]Requires 19 × 10 mm Cartridge Holder, p/n: 186000709.
[2]Requires 7.8 × 10 mm Cartridge Holder, p/n: 186000708.

Spherisorb Preparative Columns

Spherisorb Columns are frequently referenced in scientific literature. To date, more than 2000 published abstracts acknowledge the use of Spherisorb Columns. These articles provide a tremendous range of validated methods and applications of significant use in method development.

Ordering Information

Spherisorb Preparative Columns and Guard Cartridges

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 10 µm		
ODS1	10 × 250 mm	OBD Column	186008284	10 × 250 mm	OBD Column	186008285
	20 × 250 mm	Column	PSS830695	20 × 250 mm	Column	PSS830795
ODS2	10 × 250 mm	OBD Column	186008292	10 × 250 mm	OBD Column	186008294
	20 × 250 mm	Column	PSS831995	20 × 250 mm	Column	PSS832595
C_8	10 × 250 mm	OBD Column	186008291	10 × 250 mm	OBD Column	186008297
	20 × 250 mm	Column	PSS831895	20 × 250 mm	Column	PSS832895
C_5	10 × 250 mm	OBD Column	186008288	20 × 250 mm	Column	PSS833295
	20 × 250 mm	Column	PSS831095			
C_1	10 × 250 mm	OBD Column	186008295	20 × 250 mm	Column	PSS833095
	20 × 250 mm	Column	PSS832695			
NH_2	10 × 250 mm	OBD Column	186008289	10 × 250 mm	OBD Column	186008299
	20 × 250 mm	Column	PSS831195	20 × 250 mm	Column	PSS833695

For more information on Spherisorb Columns, refer to page 170.

Spherisorb Preparative Columns and Guard Cartridges *Continued*

	Dimension	Type	P/N	Dimension	Type	P/N
	Particle Size: 5 µm			Particle Size: 10 µm		
Phenyl	10 × 250 mm	OBD Column	186008286	10 × 250 mm	OBD Column	186008300
	20 × 250 mm	Column	PSS830895	20 × 250 mm	Column	PSS833895
CN Normal Phase	10 × 250 mm	OBD Column	186008287	10 × 250 mm	OBD Column	186008298
	20 × 250 mm	Column	PSS830995	20 × 250 mm	Column	PSS833595
Silica	10 × 250 mm	OBD Column	186008281	10 × 250 mm	OBD Column	186008282
	20 × 250 mm	Column	PSS830195	20 × 250 mm	Column	PSS830295
SAX	10 × 250 mm	OBD Column	186008296	10 × 250 mm	OBD Column	186008301
	20 × 250 mm	Column	PSS832795	20 × 250 mm	Column	PSS833995
SCX	10 × 250 mm	OBD Column	186008302	10 × 250 mm	OBD Column	186008303
	20 × 250 mm	Column	PSS837595	20 × 250 mm	Column	PSS837695

Nova-Pak Preparative Columns

Nova-Pak HR, 6 µm, ultra high-efficiency packing materials are available as shorter columns to facilitate separation, making it faster, lowering solvent consumption, and producing fractions of greater concentration. The preparative Nova-Pak HR material provides the same selectivity and retention characteristics as the analytical Nova-Pak 4 µm material. The Nova-Pak HR packing materials for preparative use are ideal for separating a wide range of compounds such as organic synthesis intermediates or natural products.

Ordering Information

Prep Nova-Pak HR Preparative Columns

	Dimension	P/N
	Particle Size: 6 µm	
C_{18}, 60Å	3.9 × 300 mm	WAT038500
	7.8 × 300 mm	WAT025820
	19 × 300 mm	WAT025822
Silica, 60Å	3.9 × 300 mm	WAT038501
	7.8 × 300 mm	WAT025821
	19 × 300 mm	WAT025823

For more information on Nova-Pak Columns, refer to page 173.

µBondapak, Bondapak, µPorasil, and Porasil Columns

The popular µBondapak C_{18} chemistry and µPorasil silica packing materials are offered in the 10 µm particle size. Bondapak and Porasil are available in two particle sizes, 15–20 µm and 37–55 µm, providing easy transfer of chromatography methods and the means to optimize resolution, throughput, and cost. Existing 10 µm µBondapak or µPorasil chromatography can serve as a starting point for scaled-up separations.

The preparative Bondapak HC_{18} HA (high-carbon load, high-activity silica) is a highly carbon-loaded packing that differs in selectivity from that of the standard Bondapak packing materials. The higher carbon load on the silica surface typically results in a higher loading capability. Bondapak HC_{18} HA is available in the 37–55 µm particle size.

The Porasil Silica Family of packing materials provides a cost-effective means for scaling up to preparative processes. µPorasil 10 µm, Porasil 15-20 µm, and Porasil 37-55 µm can be scaled up to Prep Silica 55-105 µm columns.

Ordering Information

µBondapak/Bondapak Preparative Columns

	Dimension	P/N
	Particle Size: 10 µm	
C_{18}, 125Å	2.1 × 300 mm	WAT086609
	3.9 × 150 mm	WAT086684
	3.9 × 300 mm	WAT027324
	4.6 × 150 mm	WAT044370
	4.6 × 300 mm	186000925
	7.8 × 300 mm	WAT084176
	19 × 150 mm	WAT088500
	19 × 300 mm	WAT025828
	Particle Size: 15–20 µm	
	3.9 × 150 mm	WAT025875
	7.8 × 300 mm	WAT025832
	19 × 300 mm	WAT025834
	Particle Size: 10 µm	
CN, 125Å	3.9 × 150 mm	WAT086688
	3.9 × 300 mm	WAT084042
	7.8 × 300 mm	WAT084177
	Particle Size: 10 µm	
NH_2, 125Å	3.9 × 300 mm	WAT084040
	7.8 × 300 mm	WAT084178
	Particle Size: 10 µm	
Phenyl, 125Å	3.9 × 150 mm	WAT086680
	3.9 × 300 mm	WAT027198
	7.8 × 300 mm	WAT084179

µPorasil/Porasil and Preparative Columns

	Dimension	P/N
	Particle Size: 10 µm	
µPorasil, 125Å	3.9 × 150 mm	WAT086692
	3.9 × 300 mm	WAT027477
	7.8 × 300 mm	WAT084175
	19 × 150 mm	WAT091648
	19 × 300 mm	WAT025829
	Particle Size: 15–20 µm	
Porasil, 125Å	3.9 × 300 mm	WAT025874
	19 × 300 mm	WAT025835

For µBondapak/Bondapak and µPorasil/Porasil Analytical Columns, please refer to page 175.

Delta-Pak Preparative Columns

Delta-Pak packing materials are ideal for separating peptides, proteins, and natural products. Isolating and purifying a peptide is usually a multi-step procedure in which fractions from a first run are re-chromatographed on the same preparative column to obtain pure product. Delta-Pak packing materials are based on a highly stable, bonded, end-capped 5- and 15 µm packing. The 5 µm packing is available in analytical-scale dimensions, for preliminary preparative chromatographic studies; peptide mapping; and fraction-purity assays. The chemistry characteristics of the packing materials are independent of the particle size.

Ordering Information

Delta-Pak Radial Compression Column Segments and, PrepPak Cartridges*

	Dimension	Type	P/N
	Particle Size: 15 µm		
Delta-Pak C_{18}, 100Å	8.0 × 100 mm	Column	WAT025846
	25 × 100 mm	Column	WAT038506
	25 × 10 mm	Guard, 2/pk	WAT038520
	40 × 100 mm	Column	WAT037688
	40 × 10 mm	Guard, 2/pk	WAT037842
Delta-Pak C_{18}, 300Å	8.0 × 100 mm	Column	WAT025845
	25 × 100 mm	Column	WAT038507
	25 × 10 mm	Guard, 2/pk	WAT038522
	40 × 100 mm	Column	WAT037692
	40 × 10 mm	Guard, 2/pk	WAT037845
Delta-Pak C_4, 100Å	8.0 × 100 mm	Column	WAT025848
	25 × 100 mm	Column	WAT038508
	25 × 10 mm	Guard, 2/pk	WAT038524
	40 × 100 mm	Column	WAT037696
Delta-Pak C_4, 300Å	25 × 100 mm	Column	WAT038509
	25 × 10 mm	Guard, 2/pk	WAT038526
	40 × 100 mm	Column	WAT037700
	40 × 10 mm	Guard, 2/pk	WAT037851

*All column segments and cartridges require the appropriate holder/module, see page 220.

Delta-Pak Preparative Columns

	Dimension	P/N
	Particle Size: 15 µm	
Delta-Pak C_{18}, 100Å	3.9 × 300 mm	WAT011797
	7.8 × 300 mm	WAT011798
	19 × 300 mm	WAT011799
	30 × 300 mm	WAT011800
	50 × 300 mm	WAT011801
Delta-Pak C_{18}, 300Å	3.9 × 300 mm	WAT011802
	7.8 × 300 mm	WAT011803
	19 × 300 mm	WAT011804
	30 × 300 mm	WAT011805
Delta-Pak C_4, 100Å	3.9 × 300 mm	WAT011807
	7.8 × 300 mm	WAT011808
	19 × 300 mm	WAT011809
	30 × 300 mm	WAT011810
Delta-Pak C_4, 300Å	3.9 × 300 mm	WAT011812
	7.8 × 300 mm	WAT011813
	19 × 300 mm	WAT011814
	30 × 300 mm	WAT011815

Preparative Guard Cartridge Holders

Ordering Information

Purification and Isolation Cartridge Holders

Description	P/N
7.8 × 10 mm Cartridge Holder	186000708
10 × 10 mm Cartridge Holder	289000779
19 × 10 mm Cartridge Holder	186000709
30 × 10 mm Prep Guard Holder	186006912
Replacement O-ring 7.8 mm, 2/pk	700001019
Replacement O-ring 10 mm, 2/pk	700001436
Replacement O-ring 19 mm, 2/pk	700001020
Replacement O-ring 30 mm, 2/pk	700009231

19 × 10 mm Prep Guard Holder and Cartridge



30 × 10 mm Prep Guard Holder and Cartridge



For more information on Delta-Pak Columns, refer to page 174.

Preparative Standards

HOW DO YOU KNOW YOUR CHROMATOGRAPHIC SYSTEM IS IN PROPER WORKING ORDER?

Quality Control Reference Materials (QC Reference Materials) contain mixtures of standards specifically chosen to provide an easy and reliable way to monitor the performance of any chromatographic system. Using a QC Reference Material, you can be assured that your column and system are ready to analyze your samples. Regular use of QC Reference Materials also provides an opportunity to benchmark your chromatographic systems and trend performance over time, making it easier to proactively identify problems and resolve them faster.

Literature References

Title	Literature Code
Quality Control Reference Material and Benchmarking Instrument Performance white paper	720004535EN
Troubleshooting Common System Problems Using Waters Neutrals Quality Control Reference Material application note	720004635EN

Chromatographic analyses are inherently complex. Variables such as mobile-phase composition, column type, and detection method influence their outcome. Waters has formulated specific QC Reference Material mixtures that account for these variables while testing the performance of chromatographic columns and systems.

Ordering Information

Quality Control Reference Materials

Product Name	Intended Use	Chromatographic Mode	Systems	Contents	P/N
Preparative Chromatography Mix Standard	Provides chromatographic performance information inclusive of mobile-phase pH using 1 void marker, 1 acidic, 1 basic, and 1 neutral probes.	Reversed-phase	All Purification Systems	**5 mg/mL each:** Diclofenac sodium salt Diphenhydramine hydrochloride Flavone in a 1 mL solution of DMSO. Store at room temperature.	186006703
AutoPurification System Standard	Tests the performance of fraction collectors, both UV and MS directed, using 3 dyes.	Reversed-phase	All Purification Systems with Fraction Collectors	**3 ampoules of test mix containing:** 2500 µg/mL thionin 3000 µg/mL thioflavin 2500 µg/mL crystal violet in a 10 mL solution of 25/75 water/methanol. Store at room temperature.	716000765

For details about standards specific to calibration, qualification, and the tuning of instruments (as well as a more comprehensive listing of standards and reagents), consult the Analytical Standards and Reagents e-Catalog at asr.waters.com.

Preparative Bulk Material

Waters offers various kinds of bulk packing materials for lab-to-process scale purifications. All are manufactured in accordance with our ISO 9001-certified manufacturing processes and cGMP (current Good Manufacturing Practices) guidelines, ensuring long-term reproducible material.

Bulk materials are available packaged in quantities of 100 g to 5 kg. For larger quantity purchases, inquire about pricing and availability.

Ordering Information

Reversed-phase Bulk Packings

	Qty.	P/N
	Particle Size: 10 µm	
XBridge BEH C_{18}, 130Å	1 kg	186008658
SunFire C_{18}, 100Å	1 kg	186007650
	Particle Size: 15–20 µm	
Bondapak C_{18}, 125Å	100 g	WAT020739
	1 kg	WAT020740
	5 kg	WAT020741
	Particle Size: 37–55 µm	
	100 g	WAT030632
	1 kg	WAT030633
	5 kg	WAT030634
	Particle Size: 37–55 µm	
Bondapak HC_{18} HA, 125Å	100 g	WAT035672
	1 kg	WAT035674
	5 kg	WAT035676
	Particle Size: 55–105 µm	
Prep C_{18}, 125Å	100 g	WAT020594
	1 kg	WAT010001
	5 kg	WAT020595
	25 kg	WAT020596

Normal-phase Bulk Packings

	Qty.	P/N
	Particle Size: 10 µm	
µPorasil Silica, 125Å	5 kg	186005791
	Particle Size: 15–20 µm	
Porasil Silica, 125Å	100 g	WAT020731
	1 kg	WAT020732
	5 kg	WAT020733
	25 kg	WAT020734
	Particle Size: 37–55 µm	
	100 g	WAT020721
	1 kg	WAT020722
	5 kg	WAT020723
	25 kg	WAT020724
	Particle Size: 55–105 µm	
Prep Silica, 125Å	100 g	WAT020587
	1 kg	WAT010004
	5 kg	WAT020588
	25 kg	WAT020589

Gas Chromatography Packings

Versatile PoraPak Gas Chromatography Column packing materials simplify the analysis of many complex compounds, from atmospheric gases to organics. Consisting of polymer beads, these unique packings are chemically and physically stable. Consistent particle size, porosity, and surface area ensure analytical reproducibility. The columns also provide unequaled separation capability, with high resolution and low, constant retention volumes.

VERSATILITY FOR SPECIALTY APPLICATIONS

To optimize separation of even the most complex matrices, PoraPak packing materials offer several physical and chemical variations.

Special characteristics of Waters unique GC packings include:

- Fast analysis, with compounds eluting in distinctive bands with no tailing
- The ability to sustain elevated temperatures, permitting temperature programming without adverse effects, to retention, reproducibility, and column life
- The ability to accommodate large sample loads required for preparative and trace analysis while maintaining characteristically high column efficiency

Ordering Information

GC PoraPak Porous Polymer Packing

Type	Polarity	Surface Area (m^2/g)	Density (g/cm^3)	Single Temp. Program	Particle Size Mesh	Qty.	P/N
P	Nonpolar	100–200	0.26	250 °C	50–80	20 g	WAT027053
					80–100	20 g	WAT027054
					100–120	20 g	WAT027055
PS	Nonpolar	100–200	0.26	250 °C	50–80	20 g	WAT027083
					80–100	20 g	WAT027084
					100–120	20 g	WAT027085
Q	Slightly nonpolar to moderate	500–600	0.34	250 °C	50–80	26 g	WAT027059
					80–100	26 g	WAT027060
					100–120	26 g	WAT027061
QS	Slightly nonpolar to moderate	500–600	0.34	250 °C	50–80	26 g	WAT027089
					80–100	26 g	WAT027090
					100–120	26 g	WAT027091
R	Moderate polar monomer: vinyl pyrrolidone	450–600	0.32	250 °C	50–80	24 g	WAT027065
					80–100	24 g	WAT027066
					100–120	24 g	WAT027067
S	Moderate polar monomer: vinyl pyridine	300–450	0.35	250 °C	50–80	26 g	WAT027071
					80–100	26 g	WAT027072
					100–120	26 g	WAT027073
N	Polar monomer: vinyl pyrrolidone	250–350	0.41	190 °C	50–80	29 g	WAT027047
					80–100	29 g	WAT027048
					100–120	29 g	WAT027049
T	Highly polar monomer: ethyleneglycol dimethacrylate	225–350	0.39	190 °C	50–80	31 g	WAT027077
					80–100	31 g	WAT027078
					100–120	31 g	WAT027079

Radial-Compression-Module Products

We carry a complete inventory of accessories and spare parts for Waters' patented radial compression modules, for use with the 5 mm and 8 mm I.D. Radial-Pak™ Column segments, the 25 mm and 40 mm I.D. PrepLC™ Column segments, and the 47 mm I.D. PrepPak® Cartridges.

Ordering Information



8 x 100 Cartridge Holder (p/n: WAT082887) for 8 × 100 mm and 5 × 100 mm Radial-Pak Column Segments.



(p/n: WAT015814)

8 x 100 Cartridge Holder, Parts, and Accessories

Dimension	P/N
8 x 100 Cartridge Holder	WAT082887
8 x 100 Extension Kit (Includes 1 Extension Tube, Union, O-rings)	WAT038646
Column Segment Union	WAT038849
O-ring for Extension Tube	WAT038851
Connector Tubing Assembly (Non-metallic)	WAT088919
Connector Assembly (Stainless Steel)	WAT082892
Washer for Connectors, 10/pk	WAT005147
Pressure Relief Plug	WAT088027
Check Valve	WAT082888
O-ring (Large) for Connector, 10/pk	WAT005130
O-ring (Small) for Connector (Normal-phase), 4/pk	WAT015797
O-ring (Small) for Connector (Reversed-phase), 10/pk	WAT005129
O-ring for Filling Port, 10/pk	WAT005129
O-ring for Pressure Piston	WAT088494
Gripper Ring Replacement Kit (Includes 10 Gripper Rings, 20 Washers, 10 Ferrules, and Tool)	WAT021908

*All column segments and cartridges require the appropriate holder/module.

PrepLC 25 mm Module, Parts, and Accessories

Dimension	P/N
PrepLC 25 mm Module	WAT015814
PrepLC 25 mm Extension Kit (Includes 1 Extension Tube, Union, O-rings)	WAT022180
Extension Tube	WAT019311
O-ring for Extension Tube	WAT015831
O-ring (Large) for Connector	WAT015833
O-ring (Small) for Connector (Normal-phase)	WAT015848
O-ring (Small) for Connector (Reversed-phase)	WAT015834
O-ring for Filling Port, 10/pk	WAT005129
O-ring for Pressure Piston	WAT015854
Union Coupling Assembly	WAT015860
Union, 1/8 to 1/16" Tubing, 5/pk	WAT005137

*All column segments and cartridges require the appropriate holder/module.

PrepLC Assemblies

Description	P/N
PrepLC 40 mm Assembly (Includes PrepLC Universal Base and PrepLC 40 mm Chamber)	WAT022441
PrepLC Universal Base	WAT027577
PrepLC 40 mm Chamber (Includes O-rings, Spacer, and Union)	WAT027578
PrepLC 40 mm Extension Kit (Includes Extension Tube, Union, and O-rings)	WAT022365
PrepLC 25 mm Chamber (Includes O-rings, Spacer, and Union)	WAT033994
PrepLC 25 mm Extension Kit (Includes 1 Extension Tube, Union, and O-rings)	WAT022180
PrepLC Scale-up Kit with Capability for 40 mm or 25 × 300 Length Includes: 1 - PrepLC Universal Base 2 - PrepLC Chambers (One each of 40 mm and 25 mm) 2 - PrepLC 25 mm Extension Kits 2 - PrepLC 40 mm Extension Kits	WAT022440

PrepLC Assembly*
40 × 100 mm

PrepLC Assembly*
25 × 100 mm



(p/n: WAT022440)

PrepLC Spare Parts

Description	P/N
PrepLC Universal Base Spare Parts	
O-ring Removal Tool	WAT082853
O-ring for Pressure Piston	WAT022281
O-ring for Filling Port	WAT005129
Filling Port Plug	WAT027509
Ferrules and Compression Fittings (Stainless Steel), 5/pk	WAT025604
PrepLC 40 mm Chamber Spare Parts	
Column Segment Union	WAT033996
Cartridge Spacer	WAT033997
O-ring, Base Plate (Small)	WAT022453
O-ring, Base Plate (Large)	WAT022454
O-ring, Chamber Top	WAT022280
O-ring (Normal-phase) Cartridge, Top and Bottom, Spacers, and Unions	WAT027519
O-ring (Normal-phase) Chamber, Bottom	WAT022299
O-ring (Normal-phase) Inner Connector, Top and Bottom	WAT022297
O-ring (Reversed-phase) Cartridge, Top and Bottom, Spacers, and Unions	WAT027518
O-ring (Reversed-phase) Chamber, Bottom	WAT022283
O-ring (Reversed-phase) Inner Connector, Top and Bottom	WAT015835
O-ring, Extension Tube	WAT022454
PrepLC 25 mm Chamber Spare Parts	
Column Segment Union	WAT015860
Segment Spacer	WAT015859
O-ring, Base Plate (Small)	WAT022276
O-ring, Base Plate (Large)	WAT015831
O-ring, Chamber Top	WAT015833
O-ring (Normal-phase) Cartridge Top and Bottom, Spacers, and Unions	WAT015848
O-ring (Normal-phase) Chamber Bottom	WAT022298
O-ring (Normal-phase) Inner Connector, Top and Bottom	WAT022297
O-ring (Reversed-phase) Cartridge, Top and Bottom, Spacers, and Union	WAT015834
O-ring (Reversed-phase) Chamber Bottom	WAT022282
O-ring (Reversed-phase) Inner Connector, Top and Bottom	WAT015835
Tubing Fluid Path Kit* (PEEK) (Includes Inner Connectors, Tubing, Ferrules, and Compression Screws)	WAT022400

*For applications where a metal-free flow path is needed.

RADIAL COMPRESSION MODULE CARTRIDGES

Ordering Information



PrepPak Cartridges*

	Dimension	P/N
	Particle Size: 15–20 µm	
Bondapak C_{18}, 125Å	47 × 300 mm	WAT091784
Bondapak C_{18}, 300Å	47 × 300 mm	WAT038571
	Particle Size: 37–55 µm	
Bondapak HC_{18} HA, 125Å	47 × 300 mm	WAT038570
	Particle Size: 55–105 µm	
Bondapak NH_2a, 125Å	47 × 300 mm	WAT091631
	Particle Size: 15 µm	
Delta-Pak C_{18}, 100Å	47 × 300 mm	WAT015401
Delta-Pak C_{18}, 300Å	47 × 300 mm	WAT010988
	Particle Size: 15 µm	
Delta-Pak C_4, 100Å	47 × 300 mm	WAT011633
Delta-Pak C_4, 300Å	47 × 300 mm	WAT011669
	Particle Size: 55–105 µm	
Prep C_{18}, 125Å	47 × 300 mm	WAT025876
	Particle Size: 37–55 µm	
Porasil Silica (single), 125Å	47 × 300 mm	WAT025853
	Particle Size: 37–55 µm	
Porasil Silica (10/case), 125Å	47 × 300 mm	WAT025877
PrepPak 1000 Module for 47 × 300 mm PrepPak Cartridges		WAT089592

*All column segments and cartridges require the appropriate holder/module, see page 220.

Delta-Pak Radial Compression Column Segments and, PrepPak Cartridges*

	Dimension	Type	P/N
	Particle Size: 15 µm		
Delta-Pak C_{18}, 100Å	8 × 100 mm	Column	WAT025846
	25 × 100 mm	Column	WAT038506
	25 × 10 mm	Guard, 2/pk	WAT038520
	40 × 100 mm	Column	WAT037688
	40 × 10 mm	Guard, 2/pk	WAT037842
Delta-Pak C_{18}, 300Å	8 × 100 mm	Column	WAT025845
	25 × 100 mm	Column	WAT038507
	25 × 10 mm	Guard, 2/pk	WAT038522
	40 × 100 mm	Column	WAT037692
	40 × 10 mm	Guard, 2/pk	WAT037845
Delta-Pak C_4, 100Å	8 × 100 mm	Column	WAT025848
	25 × 100 mm	Column	WAT038508
	25 × 10 mm	Guard, 2/pk	WAT038524
	40 × 100 mm	Column	WAT037696
Delta-Pak C_4, 300Å	25 × 100 mm	Column	WAT038509
	25 × 10 mm	Guard, 2/pk	WAT038526
	40 × 100 mm	Column	WAT037700
	40 × 10 mm	Guard, 2/pk	WAT037851

*All column segments and cartridges require the appropriate holder/module, see page 220.

Resolve Radial Compression Column Segments and PrepPak Cartridges*

	Dimension	P/N
	Particle Size: 5 µm	
C_{18}, 90Å	8 × 100 mm	WAT084624[1]
	Particle Size: 10 µm	
	5 × 100 mm	WAT084620
	8 × 100 mm	WAT084720
	Particle Size: 10 µm	
C_8, 90Å	5 × 100 mm	WAT085672
	8 × 100 mm	WAT085670

	Dimension	P/N
	Particle Size: 5 µm	
Silica, 90Å	8 × 100 mm	WAT084634
	Particle Size: 10 µm	
	5 × 100 mm	WAT084630
	8 × 100 mm	WAT084730
	Particle Size: 10 µm	
CN, 90Å	5 × 100 mm	WAT084626
	8 × 100 mm	WAT084636

[1]Requires 8 × 100 Cartridge Holder, p/n: WAT082887.

Nova-Pak and Prep Nova-Pak Radial Compression Column Segments and PrepPak Cartridges

	Dimension	P/N
Nova-Pak Radial-Pak Column Segments*	**Particle Size: 4 µm**	
Nova-Pak C_{18}, 60Å	5 × 100 mm	WAT080100
	8 × 100 mm	WAT086342
Nova-Pak C_8, 60Å	5 × 100 mm	WAT035890
	8 × 100 mm	WAT035884
Nova-Pak Phenyl, 60Å	5 × 100 mm	WAT010657
	8 × 100 mm	WAT010658
Nova-Pak CN HP, 60Å	5 × 100 mm	WAT010224
	8 × 100 mm	WAT010223
Nova-Pak Silica, 60Å	5 × 100 mm	WAT010986
	8 × 100 mm	WAT010987

*Requires 8 x 100 mm Cartridge Holder, p/n: WAT082887.

Prep Nova-Pak HR Radial-Pak Column Segments	**Particle Size: 6 µm**	
Prep Nova-Pak HR C_{18}, 60Å	8 × 100 mm	WAT025843
Prep Nova-Pak HR Silica, 60Å	8 × 100 mm	WAT025844

Prep Nova-Pak HR PrepLC 25 mm Column Segments	**Particle Size: 6 µm**	
Prep Nova-Pak HR C_{18}, 60Å	25 × 100 mm	WAT038510
Prep Nova-Pak HR Silica, 60Å	25 × 100 mm	WAT038511

Prep Nova-Pak HR 25 × 10 Guard-Pak Inserts, 2/pk	**Particle Size: 6 µm**	
Prep Nova-Pak HR C_{18}, 60Å	25 × 10 mm	WAT038528
Prep Nova-Pak HR Silica, 60Å	25 × 10 mm	WAT038530

Prep Nova-Pak HR PrepLC 40 mm Column Segments	**Particle Size: 6 µm**	
Prep Nova-Pak HR C_{18}, 60Å	40 × 100 mm	WAT037704
Prep Nova-Pak HR Silica, 60Å	40 × 100 mm	WAT037708

Prep Nova-Pak HR 40 × 10 Guard-Pak Inserts, 2/pk	**Particle Size: 6 µm**	
Prep Nova-Pak HR C_{18}, 60Å	40 × 10 mm	WAT037854
Prep Nova-Pak HR Silica, 60Å	40 × 10 mm	WAT037857

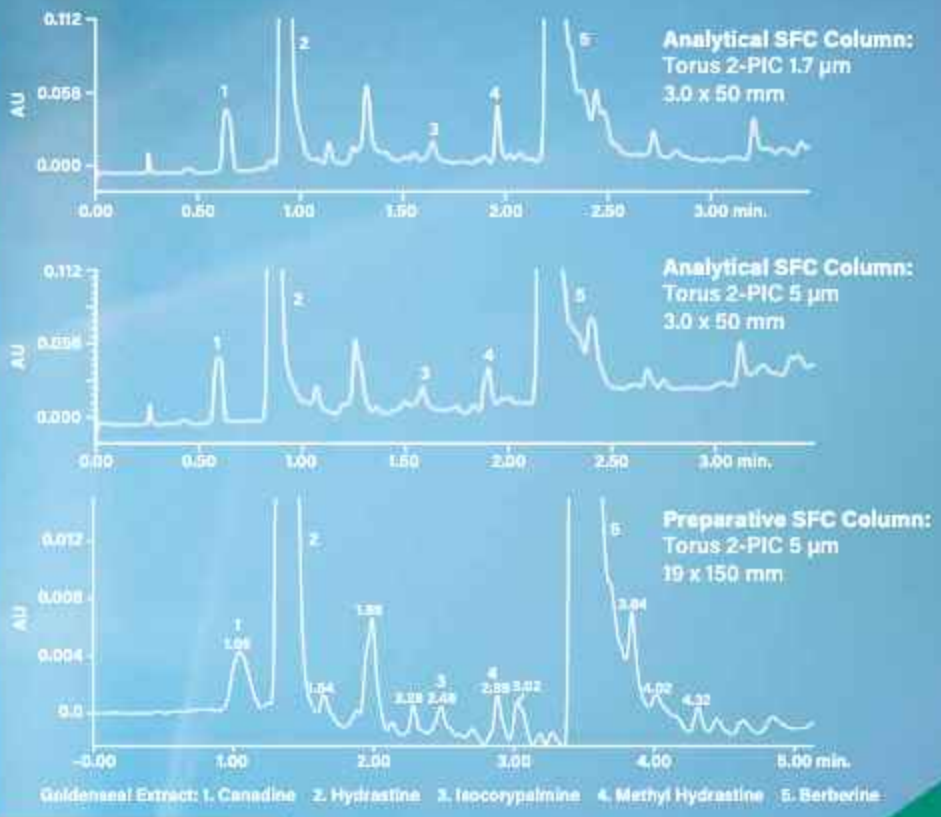
Scale SFC from Analytical to Preparative with Torus Columns

NEW ACHIRAL SFC COLUMNS

- Access the power of normal-phase chromatography with the ease and reliability of reversed-phase chromatography
- Rugged SFC Preparative Columns for exceptional column lifetimes
- Unequaled speed and unparalleled confidence

Torus Columns are available in four scalable chemistries:

- Torus 2-PIC 1.7 µm → Torus 2-PIC 5 µm
- Torus DEA 1.7 µm → Torus DEA 5 µm
- Torus DIOL 1.7 µm → Torus DIOL 5 µm
- Torus 1-AA 1.7 µm → Torus 1-AA 5 µm



Torus™

SFC



See page 228 for more information.

SFC Analytical and Preparative Columns

SFC Analytical and Preparative Columns



"Quality is everybody's responsibility."

– Patricia Walsh, Column Manufacturing Production Manager, Wexford, Ireland

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SFC Analytical and Preparative Columns

Torus, Trefoil, and Viridis Columns for Achiral and Chiral SFC Separations

The Torus,™ Trefoil,® and Viridis® Column Chemistries, combined with Waters SFC instrumentation, will enable separation scientists to better access the power of normal-phase chromatography with the ease and reliability of reversed-phase chromatography. These achiral and chiral SFC column chemistries provide the ability to handle achiral and chiral separations with unequaled speed and unparalleled confidence.



Column Characteristics

Column	Particle Shape	Particle Size	Pore Volume	Pore Size	Surface Area	Carbon Load	Chemistry
Torus Analytical & Preparative Achiral SFC Columns							
Torus 2-PIC	Spherical	1.7, 5 µm	0.7 cc/g	130Å	185 m^2/g	–	2-Picolylamine
Torus DEA	Spherical	1.7, 5 µm	0.7 cc/g	130Å	185 m^2/g	–	Diethylamine
Torus DIOL	Spherical	1.7, 5 µm	0.7 cc/g	130Å	185 m^2/g	–	Diol
Torus 1-AA	Spherical	1.7, 5 µm	0.7 cc/g	130Å	185 m^2/g	–	1-Aminoanthracene
Trefoil Analytical Chiral SFC Column							
Trefoil AMY1	Spherical	2.5 µm	–	–	–	–	Amylose tris-(3, 5-dimethylphenylcarbamate)
Trefoil CEL1	Spherical	2.5 µm	–	–	–	–	Cellulose tris-(3, 5-dimethylphenylcarbamate)
Trefoil CEL2	Spherical	2.5 µm	–	–	–	–	Cellulose tris-(3-chloro-4-methylphenylcarbamate)
Viridis Analytical & Preparative Achiral SFC Columns							
Viridis BEH 2-EP	Spherical	1.7, 3.5, 5 µm	0.7 cc/g	130Å	185 m^2/g	9%	2-Ethylpyridine
Viridis BEH	Spherical	1.7, 3.5, 5 µm	0.7 cc/g	130Å	185 m^2/g	N/A	Unbonded
Viridis CSH Fluoro-Phenyl	Spherical	1.7, 3.5, 5 µm	0.7 cc/g	130Å	185 m^2/g	10%	CSH fluoro-phenyl
Viridis HSS C_{18} SB	Spherical	1.8, 3.5 µm	0.7 cc/g	100Å	230 m^2/g	8.5%	C_{18}
Viridis Silica 2-EP	Spherical	5 µm	0.9 cc/g	100Å	340 m^2/g	8%	2-Ethylpyridine
Viridis Silica	Spherical	5 µm	0.9 cc/g	100Å	340 m^2/g	N/A	Unbonded

The use of compressed liquid CO_2 as the primary mobile phase in convergence chromatography unleashes the powerful orthogonal capability of normal-phase separations. Gradient separations performed across the widest polarity range bring the full detection capabilities of mass spectrometry into everyday use as a mainstream technique. You can now separate most compounds and mixtures soluble in organic solvents and, in addition, separate structural analogs, isomers, and enantiomeric and diastereomeric mixtures—all of which are notoriously difficult to separate by other means.

Torus Columns for Achiral SFC Separations

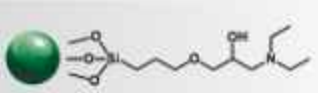
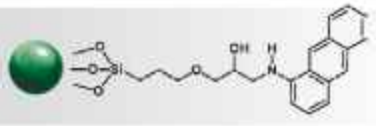
Torus 5 µm Preparative Columns offer:

- Excellent peak shapes
- A wide range of unique selectivities with unique ligands
- Highest efficiency and QC-ready robustness
- Waters OBD Technology

Torus™

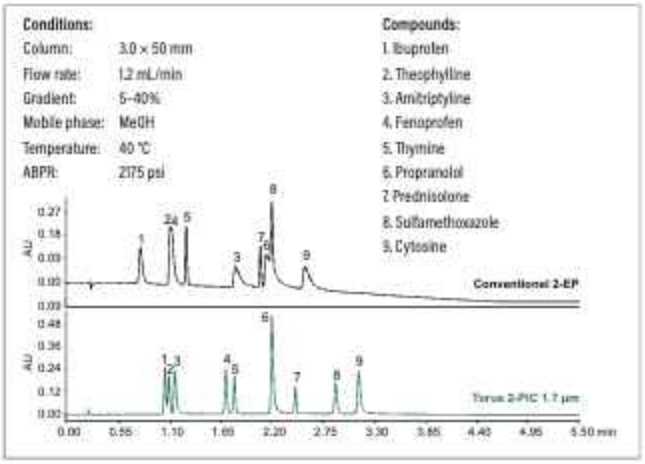
Torus Columns are designed for achiral SFC separations, offer a wide range of selectivity, excellent peak shape, and are suited for method transfer and method scale-up. Torus Columns are offered in 1.7 and 5 µm chemistries in both analytical and preparative column formats.

The Torus Phases are based on patent-pending two-stage functionalization of ethylene bridged hybrid (BEH) particles. The initial bonding provides a hydrophilic surface that controls the retention characteristics of the sorbent, and is responsible for minimizing unwanted surface interactions, which lead to retention and selectivity changes over time. The second step of the functionalization is responsible for the individual selectivity and peak shape characteristics of each of the Torus Chemistries. The results of these steps are a series of stationary phases with broad ranging selectivities, which maintain robust chromatographic performance over the lifetime of the column.

Torus 2-PIC, 1.7 µm and 5 µm Columns 2-Picolylamine	
Torus DEA, 1.7 µm and 5 µm Columns Diethylamine	
Torus DIOL, 1.7 µm and 5 µm Columns High Density Diol	
Torus 1-AA, 1.7 µm and 5 µm Columns 1-Aminoanthracene	

TORUS 2-PIC (2-PICOLYLAMINE)

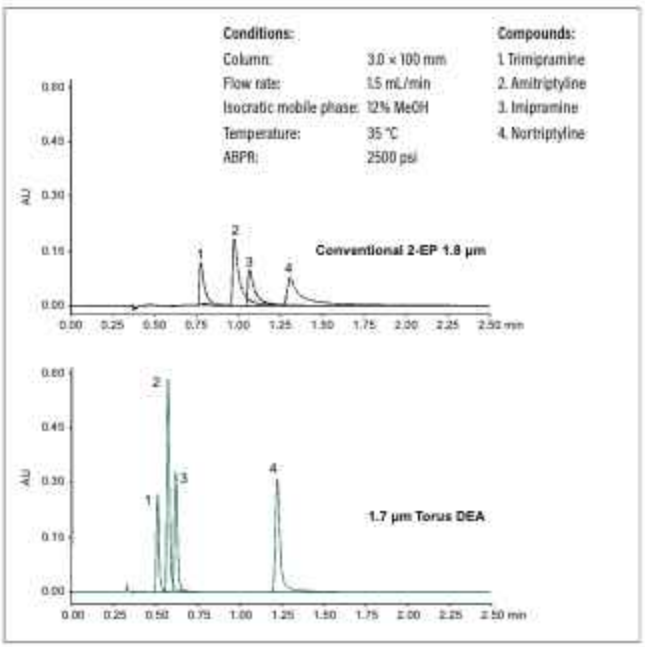
Torus 2-PIC Columns were designed for general use and are the first choice for a wide range of applications with acidic and basic compounds. The Torus 2-PIC phase demonstrates enhanced performance compared to conventional 2-ethylpyridine (2-EP), displaying improved peak shape, added retention, and novel selectivity.



Torus 2-PIC has excellent peak shape characteristics for wide ranges of acidic and basic compounds.

TORUS DEA (DIETHYLAMINE)

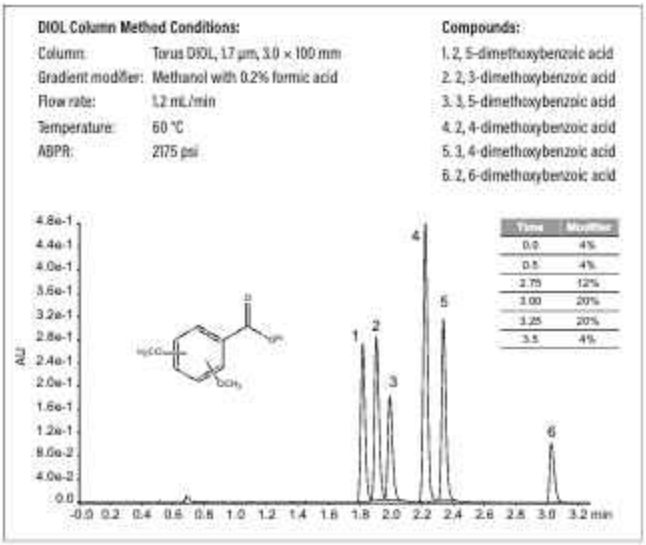
Torus DEA Columns are designed to be orthogonal to the Torus 2-PIC phase. Designed to provide superior peak shape for very strong bases, these columns provide a complementary selectivity to the 2-PIC stationary phase.



Torus DEA exhibits excellent peak shape for strong basic compounds when compared to a silica 2-EP column.

TORUS DIOL (HIGH-DENSITY DIOL)

Torus DIOL Columns were developed to provide additional selectivity choices. High-density diol surface bonding offers chromatography performance similar to that of traditional, unbonded silica phases, and adds overall method robustness when utilized with additives.



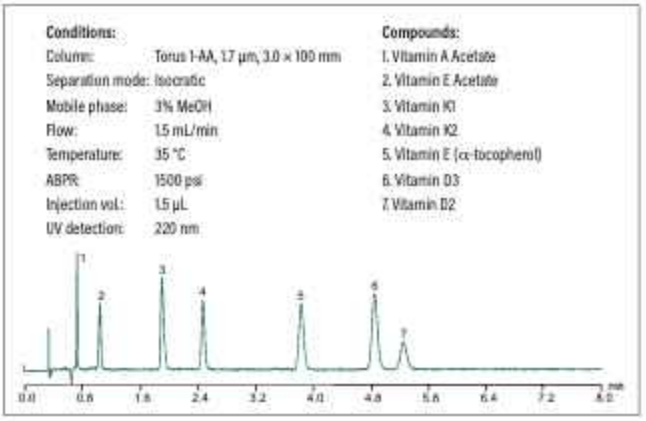
Torus DIOL Columns show good peak shapes for acidic compounds, as demonstrated by the separation of six isomeric forms of dimethoxybenzoic acid.

TORUS 1-AA (1-AMINOANTHRACENE)

Torus 1-AA Columns are designed to be the superior choice for separating neutral compounds such as polar and non-polar steroids, and hydrophobic compounds such as lipids and fat-soluble vitamins. This chemistry also provides an orthogonal selectivity (S >90) to the 2-PIC phase, making it very useful in method development.

Torus 1-AA Columns are best used for:

- Hydrophobic (lipophilic) compounds
- Free fatty acids
- Fat-soluble vitamins
- Lipids
- Natural products
- Steroids



Torus 1-AA Column shows good peak shape and resolution of fat-soluble vitamins.

Torus Columns for Achiral Method Development

For method development, it is crucial to have a series of columns that have significantly differing selectivities and good retentivity. The Torus Chemistries were specifically chosen to provide a breadth of selectivities for acids, bases, and neutral analytes. For more information on achiral SFC method development, visit **www.waters.com/torus** and view the webcast titled "Torus Columns for Achiral Method Development".

Visit www.waters.com/torus

Ordering Information

Torus Analytical Columns

	Torus 2-PIC	Torus DEA	Torus DIOL	Torus 1-AA
Dimension		**Particle Size: 1.7 µm**		
VanGuard Pre-column, 2.1 × 5 mm, 3/pk	186007604	186007622	186007613	186007631
2.1 × 50 mm	186007596	186007614	186007605	186007623
2.1 × 75 mm	186007597	186007615	186007606	186007624
2.1 × 100 mm	186007598	186007616	186007607	186007625
2.1 × 150 mm	186007599	186007617	186007608	186007626
3.0 × 50 mm	186007600	186007618	186007609	186007627
3.0 × 75 mm	186007601	186007619	186007610	186007628
3.0 × 100 mm	186007602	186007620	186007611	186007629
3.0 × 150 mm	186007603	186007621	186007612	186007630

Dimension		**Particle Size: 5 µm**		
2.1 × 150 mm	186008543	186008563	186008554	186008572
3.0 × 50 mm	186008544	186008564	186008555	186008573
3.0 × 100 mm	186008545	186008565	186008556	186008574
3.0 × 150 mm	186008546	186008566	186008557	186008575
3.0 × 250 mm	186008549	186008567	186008558	186008576
4.6 × 50 mm	186008550	186008568	186008559	186008577
4.6 × 100 mm	186008551	186008569	186008560	186008578
4.6 × 150 mm	186008552	186008570	186008561	186008579
4.6 × 250 mm	186008553	186008571	186008562	186008580

Torus Column Method Development Kits

Dimension	**Particle Size: 1.7 µm**
Torus Column Screening Kit, 2.1 × 50 mm (2-PIC, DEA, DIOL, 1-AA), 4/pk	176003579
Torus Column Method Development Kit, 3.0 × 100 mm (2-PIC, DEA, DIOL, 1-AA), 4/pk	176003580

Torus Preparative Achiral SFC Columns

Combining state-of-the-art media manufacturing with industry-leading column technology, Torus Achiral Columns impart a new level of robustness to laboratory-scale purification.

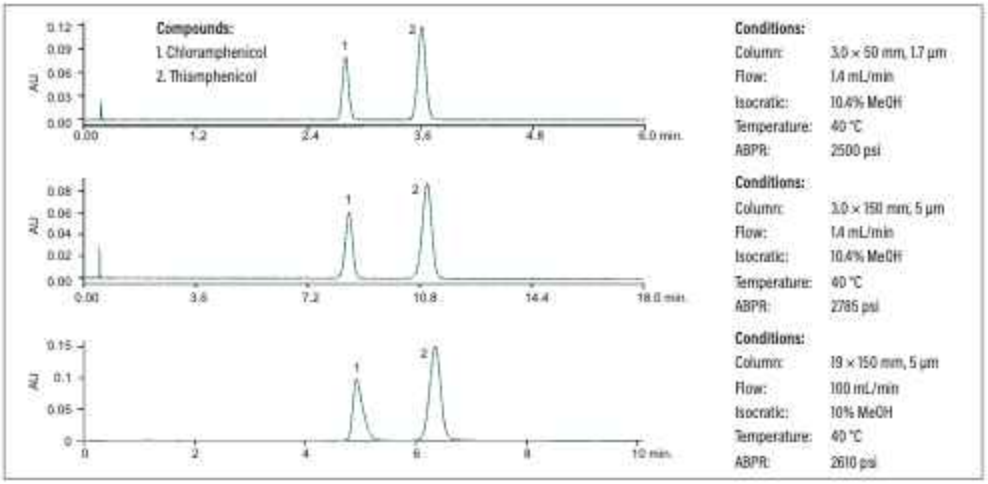
You can base a scale-up of screening methods on any of the four Torus analytical-column chemistries to perform 5 µm Torus Preparative SFC Separations.

Torus 2-PIC 1.7 µm Columns → Torus 2-PIC 5 µm Preparative Columns

Torus DEA 1.7 µm Columns → Torus DEA 5 µm Preparative Columns

Torus DIOL 1.7 µm Columns → Torus DIOL 5 µm Preparative Columns

Torus 1-AA 1.7 µm Columns → Torus 1-AA 5 µm Preparative Columns



Scale-up of an analytical method from a Torus 2-PIC, 1.7 µm column of two closely related antibiotics, chloramphenicol and thiamphenicol, to a Torus 2-PIC, 5 µm, preparative column.

Ordering Information

Torus OBD Preparative Columns

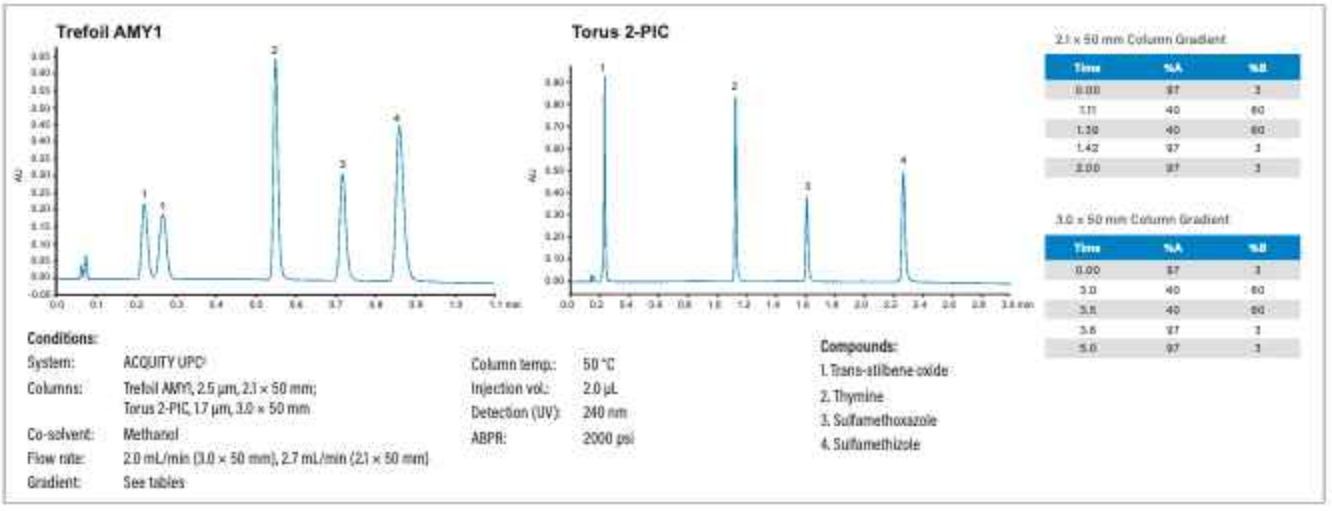
	Torus 2-PIC	Torus DIOL	Torus DEA	Torus AA
Dimension		**Particle Size: 5 µm**		
OBD 10 × 50 mm	186008581	186008598	186008615	186008632
OBD 10 × 100 mm	186008582	186008599	186008616	186008633
OBD 10 × 150 mm	186008583	186008600	186008617	186008634
OBD 10 × 250 mm	186008584	186008601	186008618	186008635
19 × 10 mm Guard Cartridge*	186008741	186008742	186008743	186008744
OBD 19 × 50 mm	186008585	186008602	186008619	186008636
OBD 19 × 100 mm	186008586	186008603	186008620	186008637
OBD 19 × 150 mm	186008587	186008604	186008621	186008638
OBD 19 × 250 mm	186008588	186008605	186008622	186008639
30 × 10 mm Guard Cartridge**	186008650	186008651	186008652	186008653
OBD 30 × 50 mm	186008589	186008606	186008623	186008640
OBD 30 × 75 mm	186008590	186008607	186008624	186008641
OBD 30 × 100 mm	186008591	186008608	186008625	186008642
OBD 30 × 150 mm	186008592	186008609	186008626	186008643
OBD 30 × 250 mm	186008593	186008610	186008627	186008644
OBD 50 × 50 mm	186008594	186008611	186008628	186008645
OBD 50 × 100 mm	186008595	186008612	186008629	186008646
OBD 50 × 150 mm	186008596	186008613	186008630	186008648
OBD 50 × 250 mm	186008597	186008614	186008631	186008649

* Requires 19 mm I.D. Prep Guard Holder, p/n: 186008745.
** Requires 30 mm I.D. Prep Guard Holder, p/n: 186008912.

ACQUITY UPC² System: Quality Control Reference Materials

The Quality Control Reference Materials (QC Reference Materials) for the ACQUITY UPC² System provide a simple, reliable way to monitor a system's performance. Prepared for use with Trefoil and Torus Columns, this four-component mixture is optimized to ensure these key aspects of performance:

- The efficacy of chiral separation (by means of a chiral compound included in the mixture)
- The performance of mass spectrometry (by means of an ionizing compound included in the mixture)
- The well-separated nature of compounds in a wide elution range
- The detectability of all compounds by UV



Single QC Reference Material for Trefoil and Torus Columns, on an ACQUITY UPC² System.

HOW DO YOU KNOW YOUR CHROMATOGRAPHIC SYSTEM IS OPERATING PROPERLY?

QC Reference Materials contain mixtures of standards chosen to provide an easy and reliable way to monitor the performance of any chromatographic system. They assure you that your column and system are ready to analyze samples. Regular use of QC Reference Materials also provides an opportunity to benchmark chromatographic systems and note their performance over time, making it easier to proactively identify problems and correct them sooner.

Ordering Information

Quality Control Reference Materials

Product Name	Intended Use	Chromatographic Mode	System	Contents	P/N
UPC² QC Reference Material	Provides chromatographic performance information inclusive of mobile-phase pH for both chiral and achiral modes.	Convergence Chromatography, SFC • chiral • achiral	ACQUITY UPC²	1. 0.50 mg/mL (+/-) trans-stilbene oxide 2. 0.50 mg/mL thymine 3. 0.50 mg/mL sulfamethoxazole 4. 0.50 mg/mL sulfamethizole In a 1 mL solution of 75:25 ACN:MeOH Store refrigerated 2–5 °C	186007950

Standards for SFC and ACQUITY UPC² Systems

Description	P/N
Waters Prep 15/30 SFC System Test Mix and Internal Standard	700005675
Waters Prep 100 SFC System Test Mix and Internal Standard	700005674

Standards for ACQUITY UPC² Systems

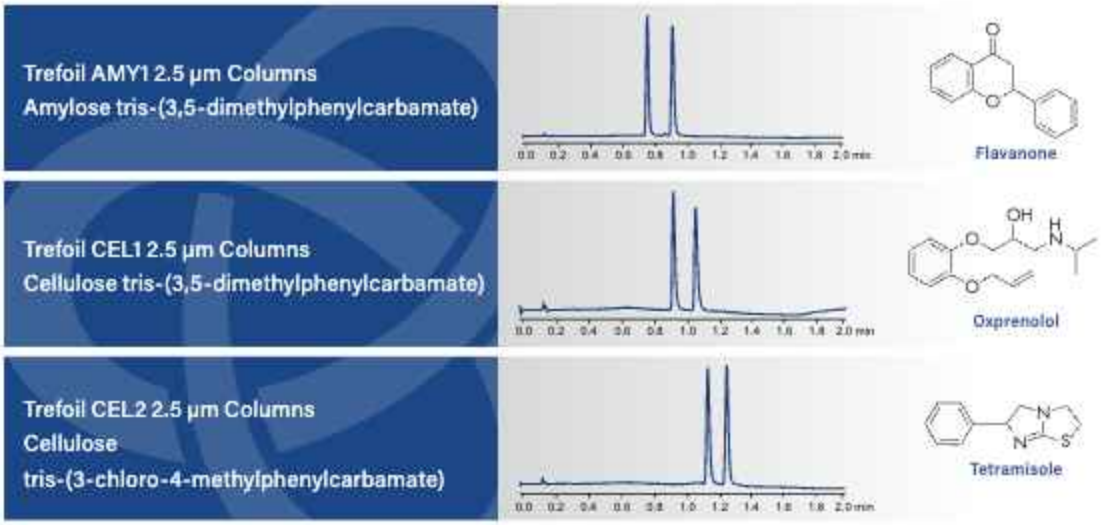
Description	Contents	P/N
UPC² Standard Mix	2 mg/mL each: 3-benzoylpyridine, cortisone, 4-nitroaniline, 4, 4'-biphenol in methanol, 1 mL	186006372
UPC² Gradient Standard	1 mg/mL coumarin, 1 mg/mL flavone, 2 mg/mL caffeine, 1 mg/mL thymine, 2 mg/mL prednisone in 2-propanol, 1 mL	186006551
UPC² Caffeine Standard	1.0 mg/mL caffeine in 2-propanol, 2 mL	186006614
UPC² Standards Kit	1.0 mg/mL caffeine in 2-propanol, 2 mL 1 mg/mL coumarin, 1 mg/mL flavone, 2 mg/mL caffeine, 1 mg/mL thymine, 2 mg/mL prednisone in 2-propanol, 1 mL	176002811
UPC² Flavone Standard	1 mg/mL in 2-propanol, 2 mL	186006523
UPC² Flurbiprofen Standard	1 mg/mL in 2-propanol, 2 mL	186006524
UPC² Ibuprofen Standard	1 mg/mL in 2-propanol, 2 mL	186006521
UPC² Ketoprofen Standard	1 mg/mL in 2-propanol, 2 mL	186006522

Trefoil Columns for Chiral SFC Separations

Trefoil Columns offer:

- Optimized particle size, column dimensions, and flow rates for the ACQUITY UPC² System
- The full advantage of mass-spectrometry detection
- Faster results when following method-development protocols
- High quality, consistent, and reproducible columns

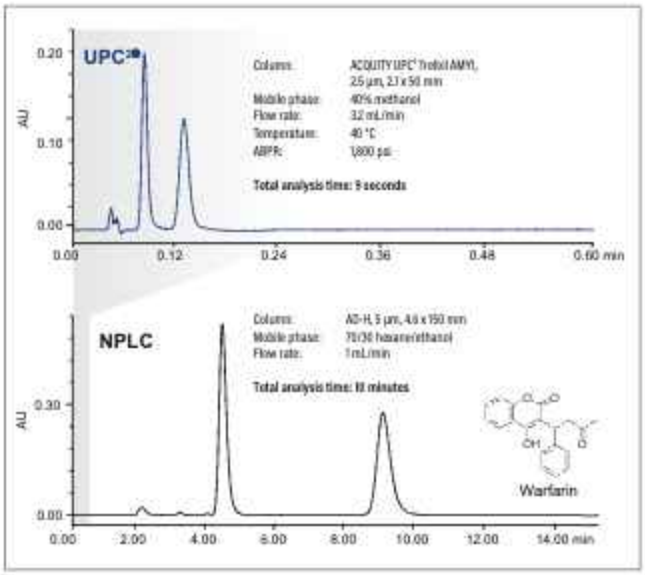
Trefoil modified polysaccharide-based stationary phases provide broad spectrum chiral selectivity. Trefoil AMY1, Trefoil CEL1, and Trefoil CEL2 Column Chemistries are complementary to each other and independently offer different retention characteristics for separating chiral compounds. Selectivity can be further enhanced by blends of modifiers and additives that most favorably modulate chiral recognition. These columns are designed to separate enantiomers and their stereoisomers, metabolites, degradants, and impurities with greater resolution and speed.



Chiral separations were all run using the 2-minute screening method.

TRANSFER NORMAL-PHASE METHODS TO CONVERGENCE CHIRAL METHODS

Legacy normal-phase chiral methods can be easily transferred to the ACQUITY UPC² System using Trefoil Columns. Many of these old methods have undesirable characteristics such as long run times and often use chlorinated solvents in combination with THF or hexane which are costly to purchase and dispose of. With simple redevelopment, new cost effective methods can be obtained using inexpensive and non-toxic compressed liquid CO_2 as the primary mobile phase and can be coupled to mass spectrometers for greater information.



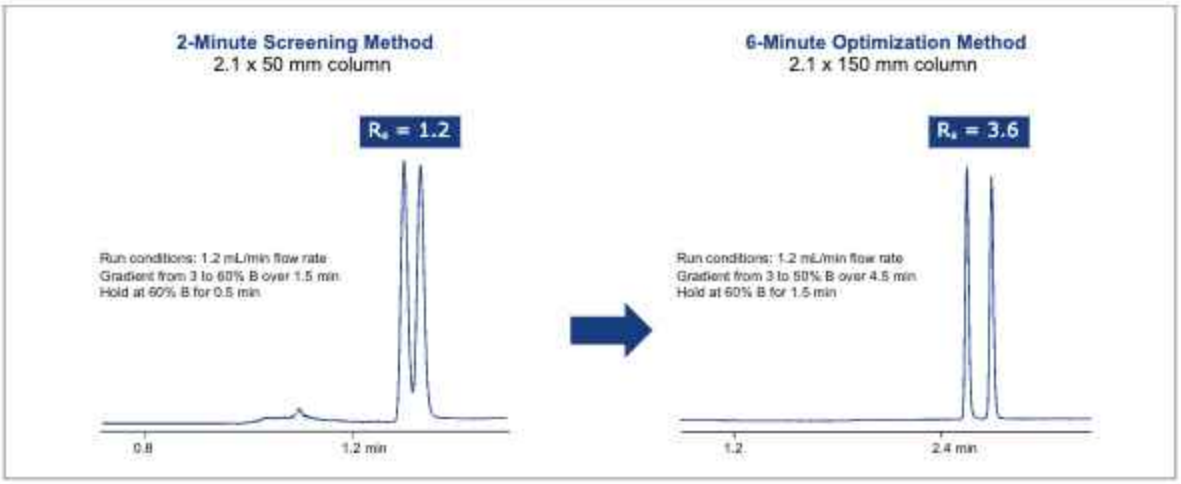
ACQUITY UPC² System with Trefoil Columns can be more than 30 times faster, use 75 times less solvent per run, and cost 100 times less per analysis.

DID YOU KNOW...

CHIRAL METHODS USING TREFOIL COLUMNS

Faster method development is possible when taking advantage of the dependable, high performance, low dispersion analytical ACQUITY UPC² System when used together with the Trefoil chiral stationary phases. Using short, narrow bore columns with a small number of well selected co-solvents and mass spectrometry compatible additives enables this holistic combination to achieve routine gradient screening runs in 2 minutes. To view a webcast to gain information on the Trefoil Columns Method Development Strategy, please visit **www.waters.com/trefoil**





An example of the increased resolution expected when you transition from the two-minute screening method to the six-minute optimization method.

Ordering Information

Trefoil Columns

	Trefoil AMY1	Trefoil CEL1	Trefoil CEL2
Dimension		**Particle Size: 2.5 µm**	
2.1 × 50 mm	186007457	186007461	186007654
2.1 × 150 mm	186007458	186007462	186007655
3.0 × 50 mm	186007459	186007463	186007656
3.0 × 150 mm	186007460	186007464	186007657

Trefoil Column Method Development Kits

	P/N
Description	**Particle Size: 2.5 µm**
Trefoil Column Screening Kit, 2.1 × 50 mm (AMY1, CEL1, CEL2), 3/pk	176003577
Trefoil Column Optimization Kit, 3.0 × 150 mm (AMY1, CEL1, CEL2), 3/pk	176003578

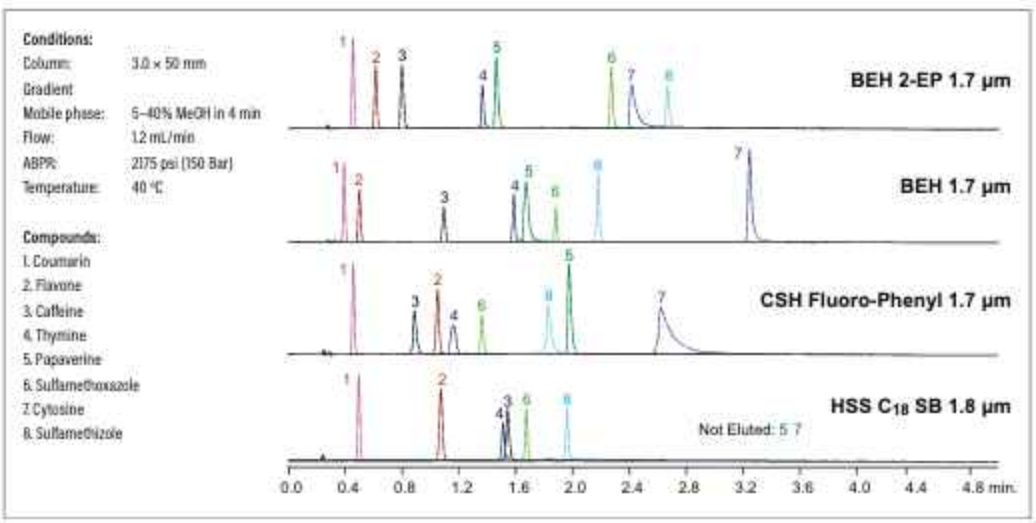
Viridis Columns

VIRIDIS HYBRID AND HSS SFC COLUMNS

Viridis Columns offer an added range of achiral SFC selectivities. These columns are based on the patented Ethylene Bridged Hybrid (BEH) particle technology, Charged Surface Hybrid (CSH) particle technology, and High-Strength Silica (HSS) particle technology. The reduction and control of surface silanol activity on Viridis Particles delivers, under SFC conditions, excellent peak shapes - even for well-retained basic achiral compounds.

- Viridis BEH 2-EP, 1.7, 3.5, and 5 µm Columns 2-Ethylpyridine
- Viridis BEH, 1.7, 3.5, and 5 µm Columns
- Viridis CSH Fluoro-Phenyl, 1.7, 3.5, and 5 µm Columns
- Viridis HSS C_{18} SB, 1.7, and 3.5 µm Columns





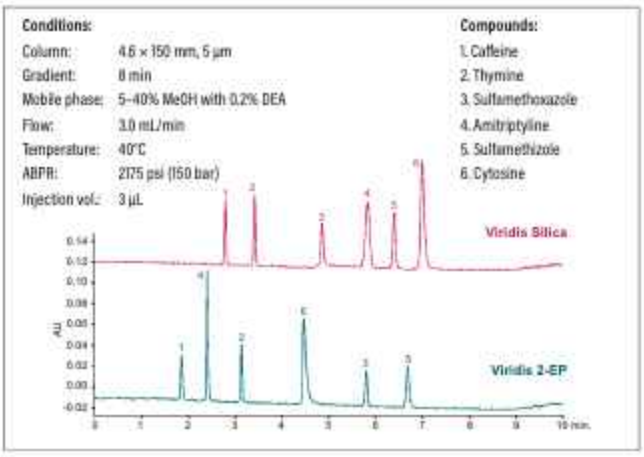
Viridis Analytical Columns provide multiple selectivities.

VIRIDIS SILICA-BASED SFC COLUMNS

Based on Waters long history of chromatographic silica production, the Viridis Silica Columns are designed to be highly reproducible and predictable based on tight product specifications and very low metal content. They are available for both analytical screening and in preparative column dimensions for purification. Separation methods can be optimized and scaled up to Viridis Preparative OBD Columns.

- Viridis Silica 2-EP, 5 µm 2-Ethylpyridine
- Viridis Silica, 5 µm

Widely used in achiral SFC separations exhibiting good retention, peak shape, and selectivity properties both with and without the use of additives.



Viridis SFC Preparative Columns.

Ordering Information

Viridis BEH, CSH, and HSS 1.7 µm and 1.8 µm Columns

	Viridis BEH 2-EP	Viridis BEH	Viridis CSH Fluoro-Phenyl	Viridis HSS C_{18} SB
Dimension	**Particle Size: 1.7 µm**			**Particle Size: 1.8 µm**
2.1 x 50 mm	186006576	186006558	186006567	186006617
2.1 x 75 mm	186006577	186006559	186006568	186006618
2.1 x 100 mm	186006578	186006560	186006569	186006619
2.1 x 150 mm	186006579	186006561	186006570	186006620
3.0 x 50 mm	186006580	186006562	186006571	186006621
3.0 x 75 mm	186006581	186006563	186006572	186006622
3.0 x 100 mm	186006582	186006564	186006573	186006623
3.0 x 150 mm	186006688	186006686	186006687	186006685
VanGuard Pre-column, 2.1 x 5 mm, 3/pk	186006575	186006557	186006566	186006616

Viridis BEH, CSH, and HSS 3.5 µm Columns

	Viridis BEH 2-EP	Viridis BEH	Viridis CSH Fluoro-Phenyl	Viridis HSS C_{18} SB
Dimension	**Particle Size: 3.5 µm**			
2.1 x 50 mm	186006652	186006634	186006643	186006625
2.1 x 75 mm	186006653	186006635	186006644	186006626
2.1 x 100 mm	186006654	186006636	186006645	186006627
2.1 x 150 mm	186006655	186006637	186006646	186006628
3.0 x 50 mm	186006656	186006638	186006647	186006629
3.0 x 75 mm	186006657	186006639	186006648	186006630
3.0 x 100 mm	186006658	186006640	186006649	186006631
3.0 x 150 mm	186006659	186006641	186006650	186006632
VanGuard Pre-column, 2.1 x 5 mm, 3/pk	186006651	186006633	186006642	186006624

Viridis Analytical SFC Columns

	Viridis BEH 2-EP	Viridis BEH	Viridis CSH Fluoro-Phenyl	Viridis Silica 2-EP	Viridis Silica
Dimension			**Particle Size: 5 µm**		
2.1 × 150 mm	186006545	186006544	186006543	186006542	186006541
3.0 × 50 mm	186005750	186005719	186005688	186005800	186005804
3.0 × 100 mm	186005751	186005720	186005689	186005801	186005805
3.0 × 150 mm	186005752	186005721	186005690	186005802	186005806
3.0 × 250 mm	186005753	186005722	186005691	186005803	186005807
4.6 × 50 mm	186005754	186005723	186005692	186004935	186004908
4.6 × 100 mm	186005755	186005724	186005693	186004936	186004909
4.6 × 150 mm	186005756	186005725	186005694	186004937	186004910
4.6 × 250 mm	186005757	186005726	186005695	186004938	186004911

Viridis Preparative SFC Columns

	Viridis BEH 2-EP	Viridis BEH	Viridis CSH Fluoro-Phenyl	Viridis Silica 2-EP	Viridis Silica
Dimension			**Particle Size: 5 µm**		
OBD 10 × 50 mm	186008256	186008252	186008248	186008232	186008228
OBD 10 × 100 mm	186008257	186008253	186008249	186008233	186008229
OBD 10 × 150 mm	186008258	186008254	186008250	186008234	186008230
OBD 10 × 250 mm	186008259	186008255	186008251	186008235	186008231
OBD 19 × 50 mm	186005762	186005731	186005700	186004943	186004916
OBD 19 × 100 mm	186005763	186005732	186005701	186004944	186004917
OBD 19 × 150 mm	186005764	186005733	186005702	186004945	186004918
OBD 19 × 250 mm	186005765	186005734	186005703	186004946	186004919
30 × 10 mm Guard Cartridge*	186006909	186006910	186006911	186006908	186006907
OBD 30 × 50 mm	186005766	186005735	186005704	186004947	186004920
OBD 30 × 75 mm	186005767	186005736	186005705	186004948	186004921
OBD 30 × 100 mm	186005768	186005737	186005706	186004949	186004922
OBD 30 × 150 mm	186005769	186005738	186005707	186004950	186004923
OBD 30 × 250 mm	186005770	186005739	186005708	186004951	186004924
OBD 50 × 50 mm	186005771	186005740	186005709	186004952	186004925
OBD 50 × 100 mm	186005772	186005741	186005710	186004953	186004926
OBD 50 × 150 mm	186005773	186005742	186005711	186004954	186004927
OBD 50 × 250 mm	186005774	186005743	186005712	186004955	186004928

*Requires 30 mm I.D. Prep Guard Holder, p/n: 186006912.

Viridis Method Development Kits

Description	P/N
Viridis Method Development Kit, 3.0 x 100 mm (BEH 2-EP, BEH, CSH Fluoro-Phenyl, HSS C_{18} SB), 4/pk	176003050
Viridis Column Screening Kit, 2.1 x 50 mm (BEH 2-EP, BEH, CSH Fluoro-Phenyl, HSS C_{18} SB), 4/pk	176003091

Quality Control Reference Materials

Product Name	Intended Use	Chromatographic Mode	System	Contents	P/N
UPC² QC Reference Material	Provides chromatographic performance information inclusive of mobile-phase pH for both chiral and achiral modes	Convergence Chromatography, SFC • chiral • achiral	ACQUITY UPC²	1. 0.50 mg/mL (+/-) trans-stilbene oxide 2. 0.50 mg/mL thymine 3. 0.50 mg/mL sulfamethoxazole 4. 0.50 mg/mL sulfamethizole In a 1 mL solution of 75:25 ACN:MeOH Store refrigerated 2–5 °C	186007950

Standards

Description	Contents	P/N
Waters Prep 15/30 SFC System Test Mix and Internal Standard		700005675
Waters Prep 100 SFC System Test Mix and Internal Standard		700005674
UPC² Standard Mix	2 mg/mL each: 3-benzoylpyridine, cortisone, 4-nitroaniline, 4, 4'-biphenol in methanol, 1 mL	186006372
UPC² Gradient Standard	1 mg/mL coumarin, 1 mg/mL flavone, 2 mg/mL caffeine, 1 mg/mL thymine, 2 mg/mL prednisone in 2-propanol, 1 mL	186006551
UPC² Caffeine Standard	1.0 mg/mL caffeine in 2-propanol, 2 mL	186006614
UPC² Standards Kit	1.0 mg/mL caffeine in 2-propanol, 2 mL 1 mg/mL coumarin, 1 mg/mL flavone, 2 mg/mL caffeine, 1 mg/mL thymine, 2 mg/mL prednisone in 2-propanol, 1 mL	176002811
UPC² Flavone Standard	1 mg/mL in 2-propanol, 2 mL	186006523
UPC² Flurbiprofen Standard	1 mg/mL in 2-propanol, 2 mL	186006524
UPC² Ibuprofen Standard	1 mg/mL in 2-propanol, 2 mL	186006521
UPC² Ketoprofen Standard	1 mg/mL in 2-propanol, 2 mL	186006522

Biomolecule Purification, Characterization, and Analyses

Biomolecule Purification, Characterization, and Analyses



"Quality is always about having a consistent product."

– Aoife Hayes, Technical Service Manager, Wexford, Ireland

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Biomolecule Purification, Characterization, and Analyses

Innovative HPLC, UHPLC, and UPLC Chemistry Consumables for Bioseparations

Advances in genomics, proteomics, metabolomics, and molecular and system biology increase our understanding of biological processes. Scientific and technological progress have revolutionized the diagnosis and treatment of disease, and it continues to do so. A leading supplier of analytical instrumentation, software, chemistry products, and services and support, Waters is uniquely positioned to provide researchers the technological means to tackle substantial analytical challenges that various biomolecules present. Keenly aware of today's challenges, our scientists and engineers are committed to the relentless pursuit of innovative, intelligent, imaginative solutions that manifest themselves in a range of problem solving applications, from proteomics and biomarker discovery to the commercialization of advanced biopharmaceuticals.

We continue to develop columns and sample-preparation consumables that support the HPLC, UHPLC, UPLC, and LC-MS analysis of peptides, proteins, oligonucleotides, amino acids, and glycoprotein associated glycans. Our comprehensive family of chemistries and consumables includes these offerings:

- Peptide columns for nano, capillary, analytical, and preparative peptide applications
- Protein size-exclusion, ion-exchange, hydrophobic-interaction, hydrophilic-interaction, and reversed-phase columns for analytical HPLC, UHPLC, UPLC, and laboratory-scale purification applications
- AccQ•Tag™ Ultra chemistry, specific for Waters UPLC Amino Acid Analysis Solution as well as Pico•Tag® and AccQ•Tag chemistries for HPLC-based amino acid analyses
- Oligonucleotide columns for synthetic oligonucleotide and DNA/RNA fragment isolations and analyses
- ACQUITY UPLC Glycoprotein BEH Amide 300Å Columns for the analyses of intact glycoproteins, glycoprotein fragments, and glycopeptides
- Above columns designed and quality-control tested with relevant biomolecules to help ensure column-to-column consistency
- GlycoWorks™ *Rapi*Fluor-MS® sample preparation kits, standards, and Waters Glycan BEH Amide 130Å Columns for the analysis of released glycans
- Analytical standards and reagents consumables and kits for MS and LC-MS applications of peptides, proteins, and other biomolecules

Amino Acids

The constituents of proteins, amino acids are the intermediates in many metabolic pathways. Qualitative and quantitative amino acid analysis (AAA) is used to determine the concentration of proteins, identify proteins, and detect structural variants. Amino acid composition is a critical component of the nutritional value of foods and feeds. The same analytical tools are used to monitor cell culture and fermentation processes. AAA is also used as a clinical diagnostic tool for assessing inborn errors of metabolism and nutritional status.

Reversed-phase chromatography provides good selectivity for separating amino acids. The most common approach to reversed-phase AAA includes pre-column derivatization. The derivatized amino acids are better retained on the reversed-phase column and are, therefore, more easily separated. Most common derivatization reagents react with amines. Some react only with primary amines, but the most useful ones also react with secondary amines so that proline and hydroxyproline are also measured. In addition to improving chromatography, derivatization can render amino acids readily detectable by UV absorbance or fluorescence.

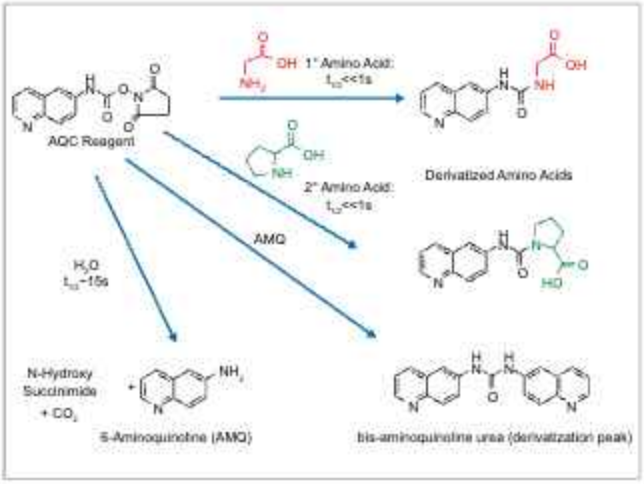
Waters offers an UPLC as well as HPLC-based method for AAA that employ pre-column derivatization and reversed-phase chromatography for accurate identification and quantitation of free or amino acids hydrolyzed from protein digests: AccQ•Tag (HPLC-based) and AccQ•Tag Ultra (UPLC-based). Hundreds of published papers report the successful application of our AccQ-Fluor pre-column chemistry for amino acid derivatization. The stable derivatized AAs are then resolved on our AccQ•Tag or AccQ•Tag Ultra C_{18} Column with on-line detection of the resolved amino acids, using UV absorbance or fluorescence detection.

ACCQ•TAG ULTRA DERIVATIZATION REACTION

The following steps describe the AccQ•Tag Ultra derivatization process:

- Starting material is AccQ•Tag Ultra Reagent Powder
  - 6-aminoquinolyl-N-hydroxysuccinimidyl carbamate (AQC)
  - US Patent #5,296,599 and European Patent #EP 0 533 200 B1
- AQC reacts rapidly with both primary and secondary amines
- Excess reagent reacts more slowly with water, forming 6-aminoquinoline (AMQ)
- AMQ reacts slowly with excess AQC reagent, forming a bis urea
- Derivatized amino acids are separated chromatographically from the by-products
- Requires no vacuum drying, sample prep, or extraction

Chemistry of the AccQ•Tag Derivatization Reaction





Waters AccQ-Tag Based HPLC and UPLC Methods for Amino Acid Analysis

AccQ•Tag Method	AccQ•Tag Ultra Chemistry Package
Introduced 1992	Introduced 2006
■ Designed for use with HPLC systems ■ Suitable for protein and peptide identification and quantitation, for monitoring cell culture media, and for determining the nutritional content of foods and feeds ■ Based on AccQ•Tag derivatization of primary and secondary amino acids ■ Quality-control tested for use on HPLC with fluorescence detection	■ Designed specifically for use with the UPLC Amino Acid Analysis Solution ■ AccQ•Tag Ultra Chemistry Package is part of a complete solution that includes instrument, software, and support for amino acid analysis of protein hydrolysates, cell culture media, foods, and feeds ■ Based on AccQ•Tag derivatization of primary and secondary amino acids in aqueous conditions ■ Reagents, columns, and eluents quality-control tested using a well defined amino acid separation and analysis

AccQ•Tag Amino Acid Analysis Turn-Key Solution

The HPLC and UPLC-based Amino Acid Analysis Solutions are holistically designed. As such, they offer a total application solution optimized for accurate, reliable, and reproducible analyses of amino acids. These solutions bring to bear Waters extensive experience in separation science, derivatization chemistries, and information management. In doing so, they ensure accurate and precise qualitative and quantitative results. For protein characterization, cell-culture monitoring, and nutritional analysis of foods and feeds, they provide performance-qualified, rugged, and reliable methodologies that guarantee reproducible results day-to-day, instrument-to-instrument, and lab-to-lab. In addition, the mobile phases and methods are directly compatible with electrospray mass spectrometry. No adjustment is necessary to produce an MS TIC that exactly matches the UV trace.

The UPLC Amino Acid Analysis Solution comprises these elements:

- ACQUITY UPLC (binary), ACQUITY UPLC H-Class (quaternary), or ACQUITY UPLC H-Class Bio (quaternary) System with a tunable UV detector, for enhanced chromatographic resolution and maximum-sensitivity detection
- AccQ•Tag Ultra derivatization chemistries, including quality-controlled columns, reagents, and eluents
- Empower® 2 pre-configured projects, methods, and report templates
- Installation and application training and support
- Application-specific performance qualification
- Connections INSIGHT® ISDP instrument diagnostics, to ensure continuous, consistent, and reliable operation
- Standards and kits, to validate and troubleshoot

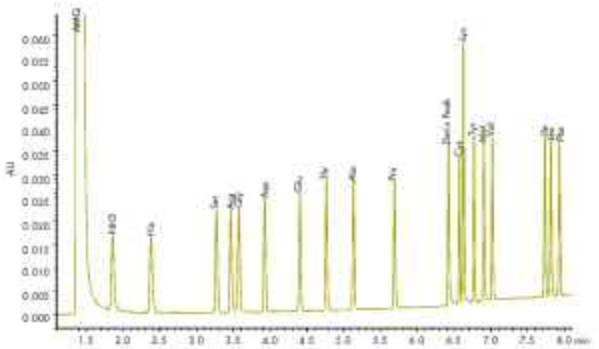
Accurate Amino Acid Analyses from Varied Sample Matrices

The UPLC Amino Acid Analysis Solution includes two complete methods that rely on the same instrumentation and column chemistry. The first is suitable for amino acids derived from protein hydrolysates The second method is suitable for the larger number of free amino acids found in process samples, such as cell culture or fermentation broths

The methods differ in the dilution of the AccQ•Tag Ultra Eluent A and the temperature of the separation column. You need not adjust for pH or modify the composition of eluent A or B.

Hydrolysate Standard 10 pmol/µL

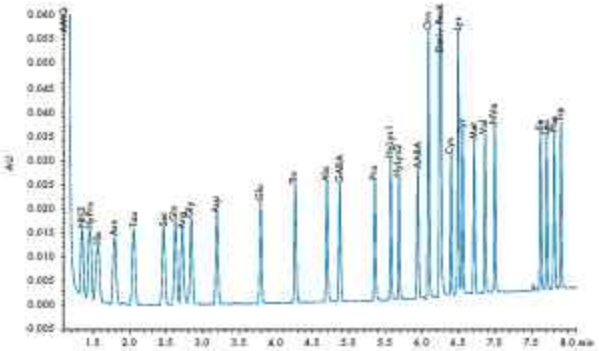
Conditions:	
Sample:	10 pmol Hydrolysate Standard
Column:	AccQ-Tag Ultra C_{18} 1.7 µm, 2.1 × 100 mm
Part number:	186003837
Temperature:	55 °C
Eluent A:	AccQ-Tag Ultra Eluent A—1:20 dilution
Eluent B:	AccQ-Tag Ultra Eluent B
Flow rate:	0.7 mL/min
Gradient:	UPLC Amino Acid Analysis Solution Hydrolysate Gradient (provided in the UPLC Amino Acid Analysis Solution System Guide)
Detection:	UV @ 260 nm



Separation of standard amino acids using the UPLC Amino Acid Analysis Solution.

Cell Culture Standard 10 pmol/µL

Conditions:	
Sample:	10 pmol Cell Culture Standard
Column:	AccQ-Tag Ultra C_{18} 1.7 µm, 2.1 × 100 mm
Part number:	186003837
Temperature:	60 °C
Eluent A:	AccQ-Tag Ultra Eluent A—1:10 dilution
Eluent B:	AccQ-Tag Ultra Eluent B
Flow rate:	0.7 mL/min
Gradient:	UPLC Amino Acid Analysis Solution Cell Culture Gradient (provided in the UPLC Amino Acid Analysis Solution System Guide)
Detection:	UV @ 260 nm



Separation of the larger set of standard amino acids using the UPLC Amino Acid Analysis Solution Cell Culture Method. No modification of mobile phase pH or composition is required.

AccQ•Tag Ultra Amino Acid Analysis Using UPLC

AccQ•Tag Ultra chemistry differs from the AccQ•Tag HPLC method described on page 246. Though the components of the two derivatization kits are identical, the UPLC-based protocol and quality-control tests are based on the actual UPLC separation and UV detection protocols. Both methods begin with the same derivatization chemistry, yet they differ in all other details. Thus their components are not interchangeable. Moreover, the AccQ•Tag Ultra C_{18} UPLC Column differs entirely from that of the HPLC-based AccQ•Tag C_{18} Column. The AccQ•Tag Ultra C_{18} Column relies on our 1.7 µm hybrid-silica, BEH Technology particles, which provide excellent column efficiency and resolution. Our eCord™ Intelligent Chip Technology, which automatically records the history of the AccQ•Tag Ultra C_{18} Column's use, is permanently attached to the column with the information being downloaded to the used ACQUITY UPLC System.

By comparison, the AccQ•Tag C_{18} Column contains a 100% silica-based, C_{18}-ligand, on a 4 µm particle. Each batch of material is specifically tested in the AccQ•Tag method to help ensure it will satisfactorily perform the separation. Mobile phases used with the AccQ•Tag C_{18} HPLC Column differ from those used with AccQ•Tag Ultra method, each being optimized for its respective column and detection technique.

Compared with traditional HPLC methods, the UPLC Amino Acid Analysis Solution results in sharper as well as better resolved peaks. This improved resolution results in a rugged method where peak identification is unambiguous and quantitation simplified. The better resolution helps deliver a more reliable and accurate method. Moreover, the UPLC technology, with its significantly higher throughput (faster than HPLC by a factor of between three and five) gives rise to quicker, more informed decisions, and thus more analyses per unit time. Use of the AccQ•Tag Ultra chemistry without the rest of the application solution is not supported as an Amino Acid Analysis method.

AccQ•Tag Ultra Amino Acid Analysis Kits and Accessories for UPLC AAA Analysis

Description	Qty.	P/N
ACQUITY UPLC AAA Application Kit This kit is intended to enable existing ACQUITY UPLC Systems for AAA applications.		176001279
Kit contains:		
Amino Acid Standard, Hydrolysate	10 × 1 mL	
Sample Tubes	4 × 72/pk	
Total Recovery Vials with Caps	3 × 100/pk	
Column Stabilizer Kit, 150 mm		
AccQ•Tag Ultra Derivatization Kit		
AccQ•Tag Ultra C_{18} Column, 1.7 µm, 2.1 × 100 mm		
AccQ•Tag Ultra Eluent A, Concentrate	950 mL	
AccQ•Tag Ultra Eluent B	950 mL	
Tube Inlet .0025 I.D. PEEK Nut PDA Assembly		
2 µL Sample Loop		
Column In-line Filter Kit		
UPLC AAA Solution Information Set		
UPLC AAA Application Solution Startup Tests		
Cert., AAA Application and Familiarization		
UPLC AAA H-Class Applications Kit This kit is intended to enable existing ACQUITY UPLC H-Class Systems for AAA applications.		176002983
Kit includes:		
AccQ•Tag Ultra Derivatization Kit, 250 Analyses		
AccQ•Tag Ultra C_{18} Column, 1.7 µm, 2.1 × 100 mm		
AccQ•Tag Ultra Eluent A, Concentrate	950 mL	
AccQ•Tag Ultra Eluent B	950 mL	
Amino Acid Standard, Hydrolysate	10 × 1 mL	
Total Recovery Vials	3 × 100 vials/pk	
Tube Inlet 0.0025 I.D. PEEK Nut PDA Assembly		
Column In-line Filter Kit		
UPLC AAA H-Class Solution Information Set		
AAA Application and Familiarization Service		

Description	Qty.	P/N
AccQ•Tag Ultra Chemistry Kit The refill kit recharges the AccQ•Tag Ultra chemistries that are part of the application kit. As such, Waters offers it to those who already purchased the AccQ•Tag Ultra Application Solution. The kit applies to both ACQUITY UPLC and ACQUITY UPLC H-Class AAA Application Solutions. It should not be purchased as part of an initial system.		176001235
Kit includes:		
AccQ•Tag Ultra Derivatization Kit, 250 Analyses		
AccQ•Tag Ultra C_{18} Column, 1.7 µm, 2.1 × 100 mm		
AccQ•Tag Ultra Eluent A, Concentrate	950 mL	
AccQ•Tag Ultra Eluent B	950 mL	
Amino Acid Standard, Hydrolysate	10 × 1 mL	
Sample Tubes	4 × 72/pk	
Total Recovery Vials with Caps	3 × 100/pk	
AccQ•Tag Ultra Derivatization Kit, 250 Analyses		186003836
AccQ•Tag Ultra Borate Buffer	5 × 6 mL	
AccQ•Tag Ultra Derivatization Reagent Powder	5 × 3 mg	
AccQ•Tag Ultra Reagent Diluent	5 × 4 mL	
Amino Acid Standard, Hydrolysate A standard mixture containing 18 amino acids (17 hydrolysate amino acids each at 2.5 mM and cystine at 1.25 mM)	10 × 1 mL	WAT088122
Sample Tubes	4 × 72/pk	WAT007571
Total Recovery Vials with Caps	3 × 100/pk	186000384C
AccQ•Tag Ultra C_{18} Column, 1.7 µm, 2.1 × 100 mm		186003837
AccQ•Tag Ultra Eluent A, Concentrate	950 mL	186003838
AccQ•Tag Ultra Eluent B	950 mL	*186003839*

The AccQ•Tag Solution is accurate and easy to use. Neutral score for aftersales as have had no need to use - website good though.*

REVIEWER: Andy Downer
ORGANIZATION: HPA (PD)

★★★★☆

AccQ•Tag Amino Acid Analysis Using HPLC

The HPLC-based, AccQ•Tag method requires the same pre-column derivatization step as used in the AccQ•Tag Ultra method. The AccQ•Fluor™ reagent, 6-aminoquinolyl-N-hydroxysuccinimidyl carbamate (AQC), derivatizes primary and secondary amines in a simple, single-step reaction that yields highly stable fluorescent adducts. Waters offers the AccQ•Tag method as a system package consisting of pre-packaged reagents and extensive documentation.

The AccQ•Tag Chemistry Package contains the items needed to perform as many as 250 amino acid analyses of protein and peptide hydrolysates.

AccQ•Tag Derivatization Kit

The AccQ•Tag derivatization kit contains five sets of the derivatizing reagents. Each set includes one vial of the following items:

- AccQ•Fluor borate buffer—Added to samples, the borate buffer ensures the optimum pH for derivatization
- AccQ•Fluor reagent powder—6-aminoquinolyl-N-hydroxysuccinimidyl carbamate (AQC), shipped dry, for maximum stability
- AccQ•Fluor reagent diluent—The acetonitrile diluent is used to reconstitute the reagent for derivatization

AccQ•Tag Amino Acid Analysis Column

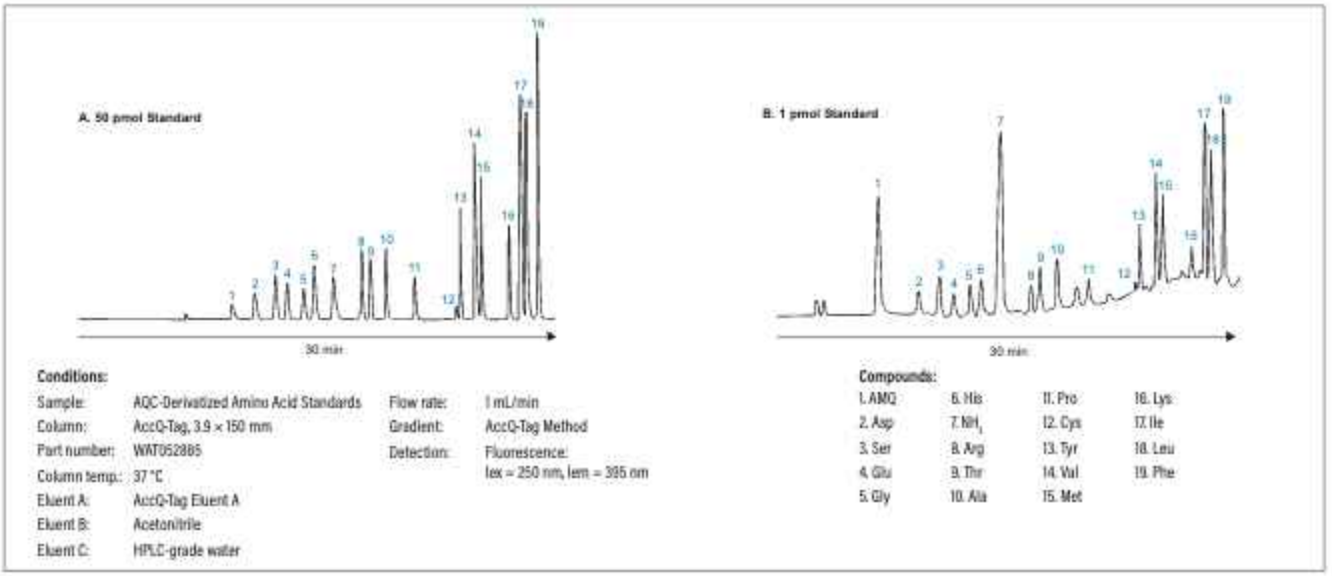
The AccQ•Tag C_{18} Column is a high-efficiency HPLC column that is tested and certified for use specifically in the AccQ•Tag method. This column separates the amino acid derivatives produced by the AccQ•Fluor derivatization reaction.

Ordering Information

AccQ•Tag Amino Acid Analysis Kits and Accessories for HPLC and UHPLC AAA Analysis

Description	Qty.	P/N
AccQ•Tag Chemistry Kit		WAT052875
Kit for up to 250 analyses includes:		
AccQ•Fluor Reagent 1	5 × 6 mL	
AccQ•Fluor Reagent 2A	5 × 3 mg	
AccQ•Fluor Reagent 2B	5 × 3 mL	
AccQ•Tag C_{18} Column, 3.9 × 150 mm		
AccQ•Tag Eluent A, Concentrate	2 × 1 L	
Sample Tubes	4 × 72/pk	
Amino Acid Standard, Hydrolysate	10 × 1 mL	
AccQ•Tag User Guide		
Amino Acid Standard, Hydrolysate A standard mixture containing 18 amino acids (17 hydrolysate amino acids, each at 2.5 mM concentration and cystine at 1.25 mM concentration).	10 × 1 mL	WAT088122
AccQ•Tag Eluent A Concentrate	1 L	WAT052890
AccQ•Tag Eluent B	1 L	WAT052895
AccQ•Fluor Reagent Kit		WAT052880
Kit includes:		
AccQ•Fluor Reagent 1	5 × 6 mL	
AccQ•Fluor Reagent 2A	5 × 3 mg	
AccQ•Fluor Reagent 2B	5 × 4 mL	
The components of this kit are not available separately		
AccQ•Tag C_{18}, 3.9 × 150 mm Column		WAT052885
AccQ•Tag User Guide		WAT052874

AccQ•Tag Analysis of Hydrolysate Amino Acids Using p/n: WAT088122



Application of the AccQ•Tag method to the analysis of hydrolysate amino acids is illustrated. The high-purity reagents provided in the AccQ•Tag Chemistry Package minimize background amino acid content (6-aminoquinoline, or AMQ), making high-sensitivity analysis possible.

Glycans and Glycoproteins



Waters offers many robust, reproducible analytical solutions that provide complementary, information-rich data, for glycoprotein analysis.

Consolidating Complementary Techniques to Streamline Glycan Analysis

For analyzing all structural levels of glycoproteins, we offer complete approaches according to workflow:

- Intact glycoprotein profiling (e.g., glycan occupancy determinations)
- Middle up/down - Subunit analysis
- Glycopeptide mapping
- Released and labeled glycan analysis
- Monosaccharide/sialic acid composition

Column Chemistries:

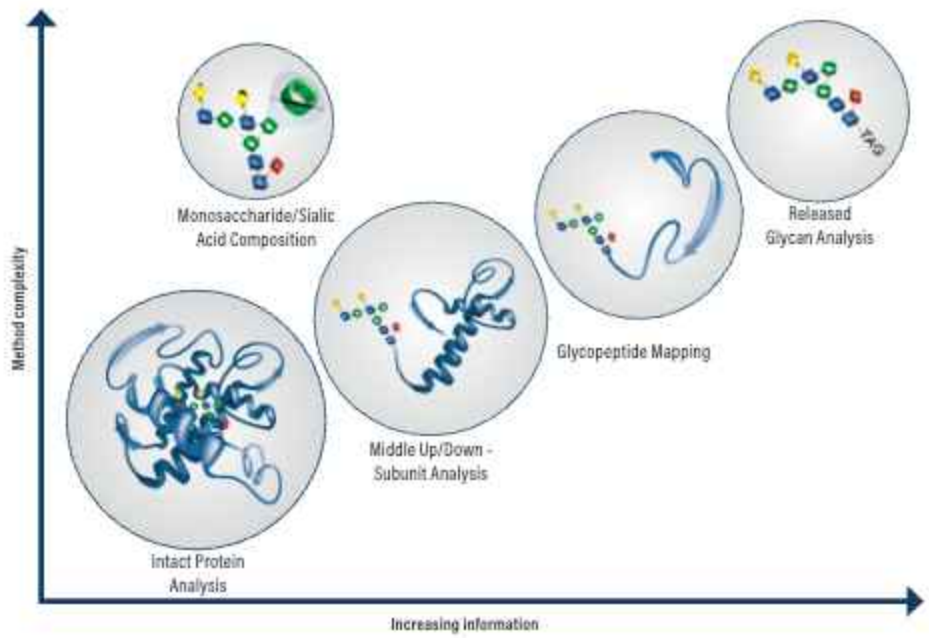
Our industry-leading UPLC Column Chemistries share the mechanical stability of our bridged-ethylene hybrid particle (i.e., BEH Technology and ligand-binding technology), to help ensure consistent column-to-column performance in validated methods. The small, 1.7 µm, particle size of their fully porous packing material is responsible, in part, for the columns' high resolving power.

The column offerings include:

- ACQUITY UPLC Glycan BEH Amide 130Å, 17 µm Column, for released N-glycans
- XBridge Glycan BEH Amide 130Å, 35 µm and 25 µm ***XP*** Columns for HPLC and UHPLC analysis of released N-glycans
- ACQUITY UPLC Glycoprotein BEH Amide 300Å, 17 µm Column for large biomolecules

Sample Preparation and Standards:

The GlycoWorks Sample Preparation product line offers kits and standards for released N-glycan analyses that are fast, simple, and robust. Using one of these kits together with our *Rapi*Fluor-MS label produces fluorescent and mass spectrometric analyses capabilities of unprecedented sensitivity.



Waters ACQUITY UPLC Glycan BEH Amide 130Å, 1.7 µm Column; XBridge Glycan BEH Amide 130Å, 3.5 µm; and 2.5 µm *XP* HPLC and UHPLC Columns

Hydrophilic-interaction liquid chromatography (HILIC), with fluorescence detection, is a well-recognized, reliable technique that effectively separates and makes quantitation of isolated glycans possible after their derivatization with fluorescent labels. Our ACQUITY UPLC Glycan BEH Amide 130Å, 1.7 µm Column and new GlycoWorks Labeling and Sample Preparation consumables were designed for the HILIC-based separation of glycans labeled with either 2-aminobenzamide (2-AB) or with Waters *Rapi*Fluor-MS (RFMS) reagent. Retention of 2-AB or RFMS–labeled oligosaccharides is based on the relative hydrophilicities of each labeled species.

The columns confer these additional benefits:

- Capability to separate both neutral and charged (e.g., highly sialylated) labeled glycans using a binary gradient improve component resolution in less time, compared with existing HPLC or UHPLC methods
- Available well-defined methods for LC and LC-MS applications quality-control tested using a labeled, released N-glycan standard from the 2-AB Glycan Performance Test Standard (p/n: 186006349), to help ensure consistent batch-to-batch performance

ACQUITY UPLC Glycan BEH Amide 130Å, 1.7 µm Column Separation of 2-AB Labeled Glycan Performance Standard

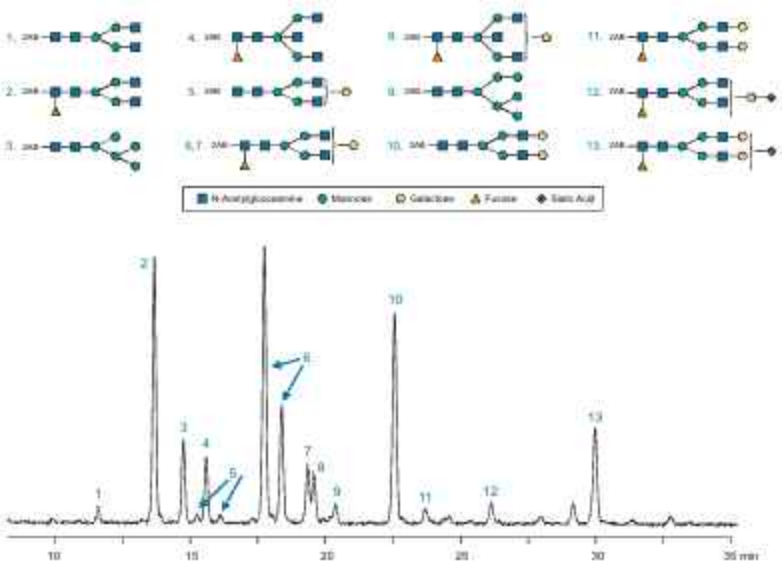
UPLC Conditions:

Sample:	Glycan Performance Standard
Part number:	186006349
Sample conc.:	10 pmol/µL
Sample vol.:	1.5 µL
Injection mode:	Partial loop
System:	ACQUITY UPLC
Column:	ACQUITY UPLC Glycan BEH Amide, 1.7 µm, 2.1 × 150 mm
Part number:	186004742
Eluent A:	100 mM ammonium formate, pH 4.5
Eluent B:	Acetonitrile
Column temp.:	60 °C
Detection:	Fluorescence: λex = 330 nm, λem = 420 nm

Gradient:

Time (min)	Flow rate (mL/min)	Profile %A	%B	Curve
Initial	0.5	25	75	6
46.5	0.5	40	60	6
48	0.25	100	0	6
49	0.25	100	0	6
50	0.5	25	75	6
63	0.5	25	75	6

Instrument cont.: Mixer (p/n: 205000403).
Needle (p/n: 205000507).
No in-line filter. No VanGuard Column.



The N-linked glycans from pooled human IgG contain high mannose as well as neutral, and sialylated complex structures. The chromatogram shows 35 minutes of a one hour analysis. This challenging sample includes high mannose, bisecting GlcNAc and sialylated species.

Ordering Information

ACQUITY UPLC Glycan BEH Amide, 130Å Columns

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH Amide, 130Å	2.1 × 5 mm	186004739*
	2.1 × 50 mm	186004740
	2.1 × 100 mm	186004741
	2.1 × 150 mm	186004742

*VanGuard Pre-column, 3/pk.

ACQUITY UPLC Glycan BEH Amide, 130Å Method Validation Kits*

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH Amide, 130Å	2.1 × 100 mm	186004907

*Each Method Validation Kit contains 3 columns, each from a different batch.

XBridge BEH Glycan 130Å Columns

	Dimension	P/N	Dimension	P/N
	Particle Size: 2.5 µm		Particle Size: 3.5 µm	
BEH Amide, 130Å	2.1 × 5 mm	186007252*	2.1 × 10 mm	186007505[1,2]
	2.1 × 50 mm *XP*	186007263	2.1 × 50 mm	186007502
	2.1 × 100 mm *XP*	186007264	2.1 × 100 mm	186007503
	2.1 × 150 mm *XP*	186007265	2.1 × 150 mm	186007504
	3.0 × 30 mm *XP*	186008038	4.6 × 20 mm	186007272[1,3]
	3.0 × 75 mm *XP*	186008039	4.6 × 50 mm	186007273
	3.0 × 150 mm *XP*	186008040	4.6 × 100 mm	186007274
	4.6 × 20 mm	186007267[1,3]	4.6 × 150 mm	186007275
	4.6 × 50 mm *XP*	186007268	4.6 × 250 mm	186007276
	4.6 × 100 mm *XP*	186007269		
	4.6 × 150 mm *XP*	186007270		

*VanGuard Pre-column, 3/pk.
[1] Sentry Guard Cartridge, 2/pk.
[2] Requires 2.1 × 10 mm Universal Sentry Guard Holder, part number WAT097958.
[3] Requires 4.6 × 20 mm Universal Sentry Guard Holder, part number WAT046910.

XBridge Glycan BEH Amide 130Å Method Validation Kits*

	Dimension	P/N	Dimension	P/N
	Particle Size: 2.5 µm		Particle Size: 3.5 µm	
BEH Amide, 130Å	2.1 × 150 mm	186007266	4.6 × 150 mm	186007277
	4.6 × 150 mm	186007271		

*Each Method Validation Kit contains 3 columns, each from a different batch.

Standards

Description	P/N
2-AB Glycan Performance Test Standard	186006349
*Rapi*Fluor-MS Glycan Performance Test Standard	186007983

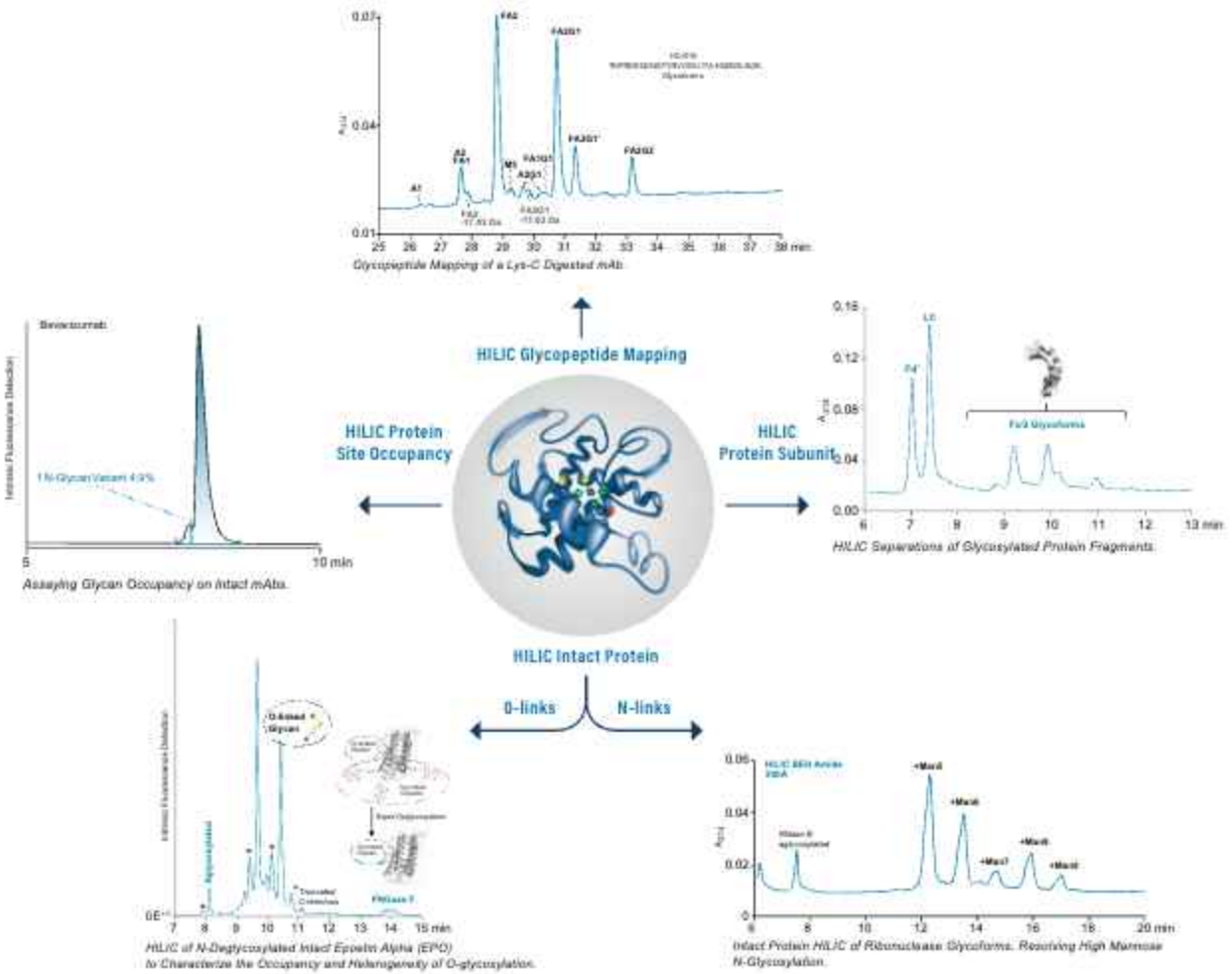
HILIC FOR LARGE MOLECULE GLYCOPROTEIN ANALYSIS

ACQUITY UPLC Glycoprotein BEH Amide 300Å, 1.7 µm Column

HILIC has been widely used to separate small, polar compounds. Now, with a wider pore particle, the technique can be a powerful LC-based separation method for large biomolecules, such as glycoproteins and glycopeptides. Using our ACQUITY UPLC Glycoprotein BEH Amide 300Å, 1.7 µm Column, you can obtain novel yet complementary glycan-related information about biotherapeutic proteins at the intact glycoprotein, glycoprotein subunit, or glycopeptide level.

The ACQUITY UPLC Glycoprotein BEH Amide 300Å, 1.7 µm Column includes these capabilities and features:

- Optimized wide-pore, HILIC stationary phase, for resolving intact protein or protein fragment glycoforms
- Ability to generate domain-specific glycan linkages, with or without MS detection
- Elucidation of site-specific glycan occupancy of monoclonal antibody biotherapeutics
- High resolution glycopeptide mapping without limitations brought about by peptide/glycan size or composition
- Improved resolution in separating large, released N-glycans (EPO, factor IX)
- Quality-control tested, using Waters Glycoprotein Performance Test Standard (p/n: 186008010), to help ensure consistent batch-to-batch and column-to-column performance



Reversed-Phase vs. HILIC-Based Analysis of a Lys-C Digest of Trastuzumab

LC Conditions:

LC system:	ACQUITY UPLC H-Class Bio System
Sample temp.:	10 °C
Vials:	Polypropylene 12 × 32 mm Screw Neck, 300 µL volume (p/n: 186002640)

Reversed-Phase LC

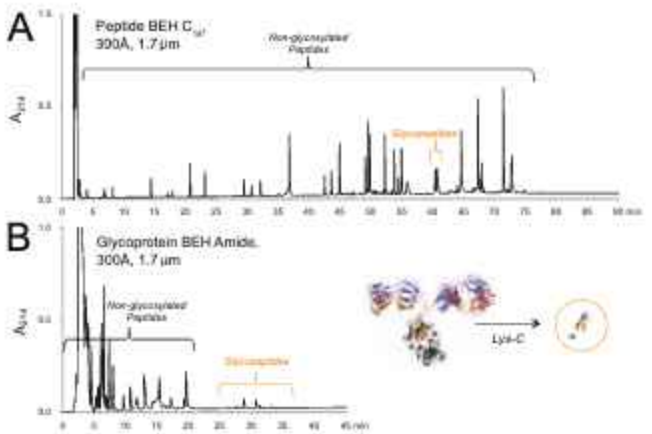
Column:	ACQUITY UPLC Peptide BEH C_{18} 300Å, 1.7 µm, 2.1 × 150 mm			
Part number:	186003687			
Column temp.:	60 °C			
Injection:	RP injection volume: 24.2 µL (aqueous digest)			
Flow rate:	0.2 mL/min			
Mobile phase A:	0.1% (v/v) TFA, water			
Mobile phase B:	0.1% (v/v) TFA, acetonitrile			
Gradient:	Time	%A	%B	Curve
	0.0	98.0	2.0	6
	95.0	50.0	50.0	6

HILIC LC Conditions:

Column:	ACQUITY UPLC Glycoprotein BEH Amide, 300Å, 1.7 µm, 2.1 × 150 mm Column Kit (p/n: 176003702) that contains Glycoprotein Performance Test Standard (p/n: 186008010)			
Column temp.:	30 °C			
Injection volume:	100–250 µL (Aqueous digests were diluted with 4 parts acetonitrile and 0.1 part dimethylsulfoxide to obtain a miscible, HILIC compatible diluent.			
Flow rate:	0.2 mL/min			
Mobile phase A:	0.1% (v/v) TFA, water			
Mobile phase B:	0.1% (v/v) TFA, acetonitrile			
Gradient:	Time	%A	%B	Curve
	0.0	20.0	80.0	6
	60.0	50.0	50.0	6

MS Conditions:

MS system:	SYNAPT® G2-S HDMS®
Ionization mode:	ESI+
Analyzer mode:	Resolution (~20 K)
Capillary voltage:	3.0 kV
Cone voltage:	25 V
Source temp.:	120 °C
Desolvation temp.:	350 °C
Desolvation gas flow:	800 L/Hr
Acquisition:	50–2500 m/z, 0.1 sec scan rate
Data management:	MassLynx® Software v4.1/UNIFI® v1.7



A traditional reversed-phase separation of the Lys-C digest using an ACQUITY UPLC Peptide BEH C_{18} 300Å, 1.7 µm, 2.1 × 150 mm Column (top) vs. a HILIC separation of the Lys-C digest using an ACQUITY UPLC Glycoprotein BEH Amide, 300Å, 1.7 µm, 2.1 × 150 mm Column (bottom). In each analysis, 9.2 µg of the Lys-C digest was separated using the same gradient slope and injecting sample from a diluent comprised of either approximately 0.2% TFA in 80:20 acetonitrile/water (HILIC) or 100% water (reversed-phase). For more information, reference application note 720005409EN.

Ordering Information

ACQUITY UPLC Glycoprotein BEH Amide 300Å Columns and Kits (Includes the Glycoprotein Performance Test Standard)

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH Amide, 300Å	2.1 × 5 mm	176003699*
	2.1 × 50 mm	176003700
	2.1 × 100 mm	176003701
	2.1 × 150 mm	176003702

*VanGuard Pre-column 3/pk.

ACQUITY UPLC Glycoprotein BEH Amide 300Å Method Validation Kits* (Includes the Glycoprotein Performance Test Standard)

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH Amide, 300Å	2.1 × 100 mm	176003703

*Each Method Validation Kit contains 3 columns, each from a different batch.

Standards

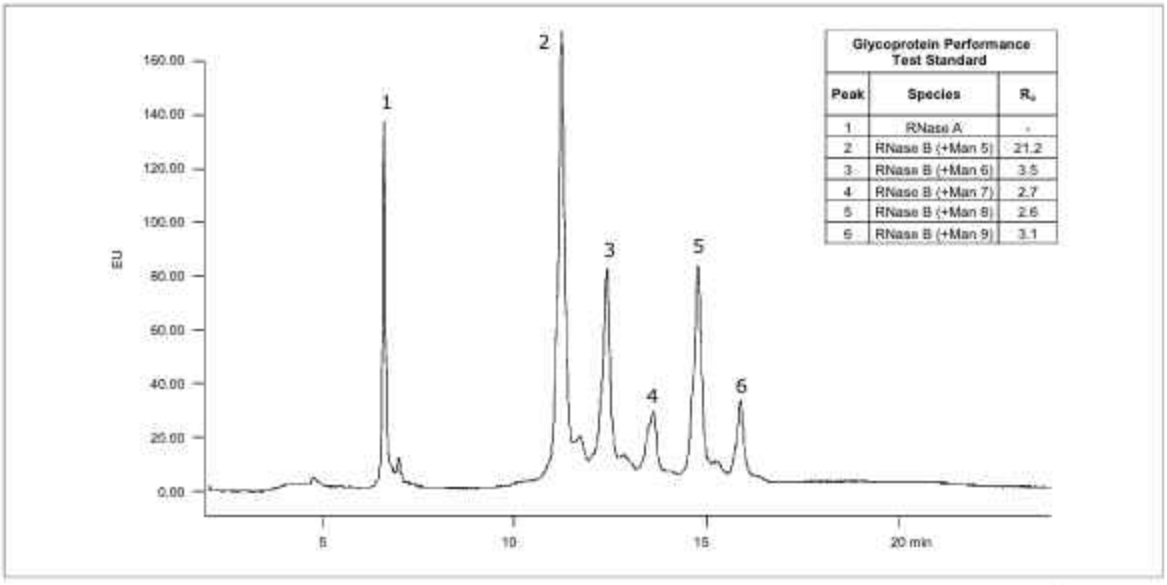
Description	P/N
Glycoprotein Performance Test Standard	186008010
Intact mAb Mass Check Standard	186006552

BENCHMARKING, METHOD DEVELOPMENT, AND TROUBLESHOOTING: GLYCOPROTEIN PERFORMANCE TEST STANDARD



Glycoprotein Performance Test Standard

The Waters Glycoprotein Performance Test Standard is a formulation of aglycosylated and high mannose glycoforms of ribonuclease (RNase). It is intended for use as a material to condition and monitor the performance of ACQUITY UPLC Glycoprotein BEH Amide 300Å, 1.7 µm Columns.



Glycoprotein Performance Test Standard		
Peak	Species	R_s
1	RNase A	-
2	RNase B (+Man 5)	21.2
3	RNase B (+Man 6)	3.5
4	RNase B (+Man 7)	2.7
5	RNase B (+Man 8)	2.6
6	RNase B (+Man 9)	3.1

Separation of the Glycoprotein Performance Test Standard (RNase A + RNase B glycoforms) using an ACQUITY UPLC Glycoprotein BEH Amide, 300Å, 1.7 µm, 2.1 × 150 mm Column. Fluorescence detection at Ex 280 nm and Em 320 nm and a column temperature of 45 °C were employed in this example.

Ordering Information

Glycoprotein Performance Test Standard

Description	Qty.	P/N
Glycoprotein Performance Test Standard	1/pk	186008010

Visit www.waters.com/glycans to learn more.

APPLICATION AREA: Glycoprofiling

"Amazing product! Really simplifies the work flow (you can process 24 samples in less than half a day), extremely high sensitivity and resolution by HILIC, MS compatible - for precise assignment of glycan peaks. Also - the final sample volume of 400 µL gives the flexibility of measuring duplicates/triplicates by both HILIC and MS. It cannot be compared with 2-AB labelling, millions of times better! The price is higher than for 2-AB labelling, but the overall benefits for this product are incomparable."

REVIEWER: Gina Popa

ORGANIZATION: Abzena

TRUSTED REVIEWS

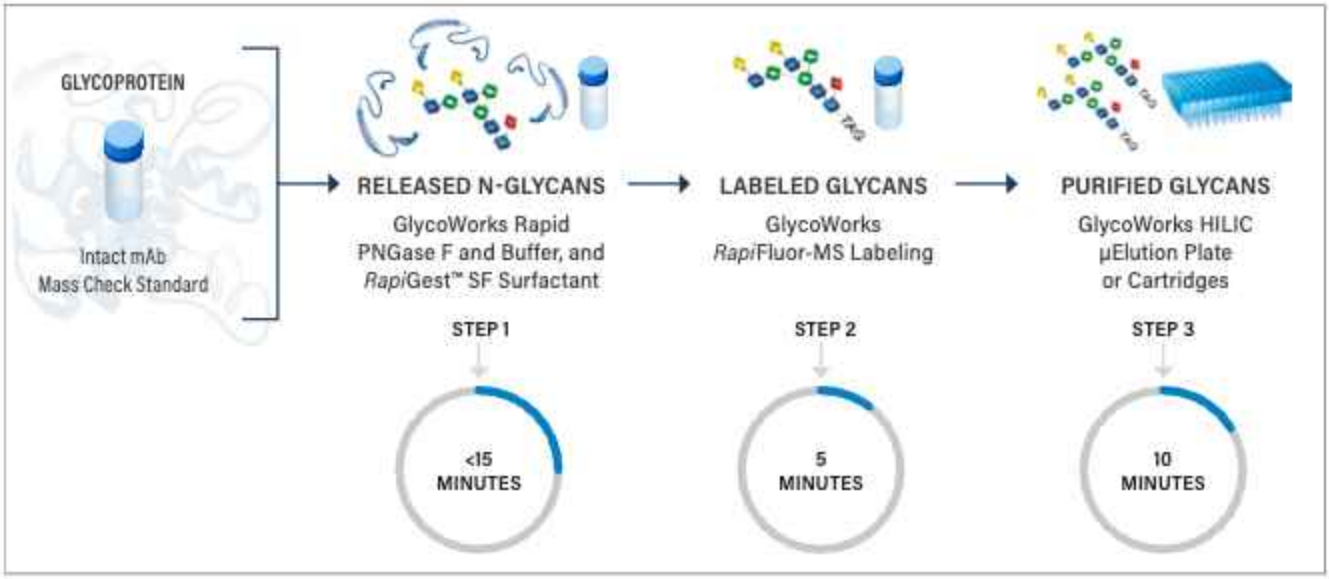
★★★★★

RELEASED N-GLYCAN SAMPLE PREPARATION WITH GLYCOWORKS

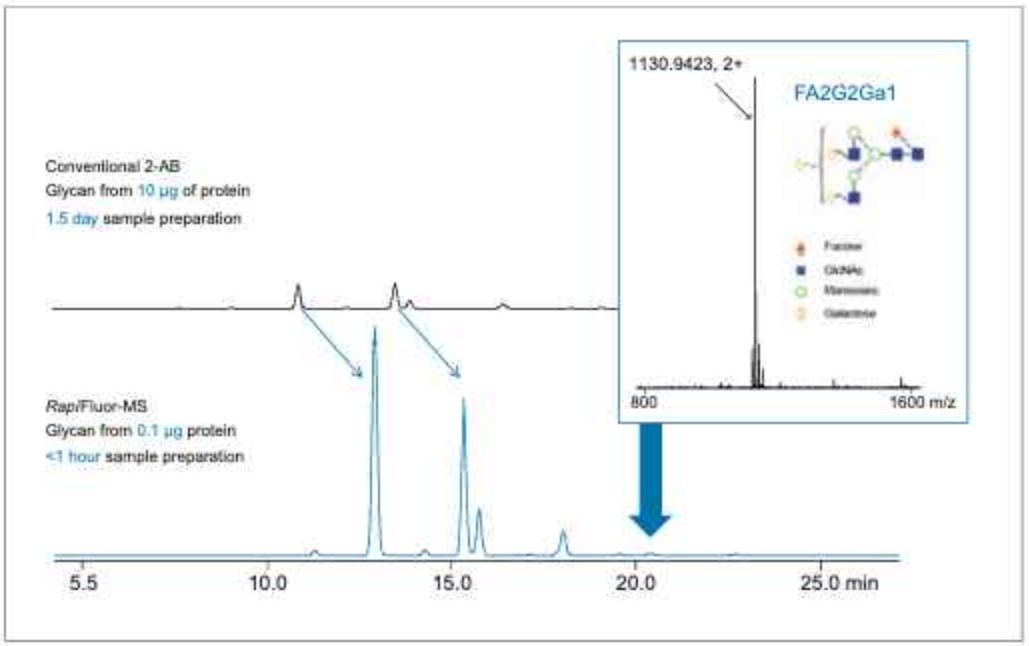
Waters GlycoWorks consumables offer a more convenient, comprehensive, and effective sample-preparation solution for glycan analysis.

- The GlycoWorks *Rapi*Fluor-MS N-Glycan Kit ensures easy, quick preparation of released, labeled N-glycan samples
- Streamlined protocols minimize errors and sample loss
- Greatly improved FLR and MS signal intensities help easily identify low-abundance N-linked glycans
- Complete modules for processing 96 samples with flexibility of processing between 8 and 24 samples at a time depending on laboratory demands
- Support easy training of analysts and the transferring of methods throughout an organization

3 Steps, as Little as 30 Minutes



Glycan Characterization by UPLC FLR with Xevo® G2-XS QTof Mass Spectrometer



Un-ionized form of acids and bases give most retention. Retention of neutral analytes not affected by pH.

Ordering Information

GlycoWorks *Rapi*Fluor-MS Released N-Glycan Sample Preparation Kits

Description	P/N
96 Sample Kits	
GlycoWorks *Rapi*Fluor-MS N-Glycan Starter Kit—96 Sample Kit contains these items: GlycoWorks Deglycosylation Module, GlycoWorks Labeling Module, GlycoWorks Cleanup Module, GlycoWorks Sample Collection Module, ACQUITY UPLC Glycan BEH Amide, 130Å 1.7 µm, 2.1 × 150 Column, and Ammonium Formate Solution—Glycan Analysis	176003635
GlycoWorks *Rapi*Fluor-MS N-Glycan Kit—96 Sample Kit contains these items: GlycoWorks Deglycosylation Module, GlycoWorks Labeling Module, GlycoWorks Cleanup Module, and GlycoWorks Sample Collection Module	176003606
GlycoWorks *Rapi*Fluor-MS N-Glycan Basic Kit—96 Sample Kit contains: GlycoWorks Deglycosylation Module, GlycoWorks Labeling Module, and GlycoWorks Cleanup Module	176003910
24 Sample Kits	
GlycoWorks *Rapi*Fluor-MS N-Glycan Starter Kit—24 sample Kit contains these items: GlycoWorks Deglycosylation Module (24 sample), GlycoWorks Labeling Module (24 sample), GlycoWorks Cleanup Module, GlycoWorks Sample Collection Module, ACQUITY UPLC Glycan BEH Amide 130Å, 1.7 µm, 2.1 × 150 mm Column, and Ammonium Formate Solution—Glycan Analysis	176003712
GlycoWorks *Rapi*Fluor-MS N-Glycan Kit—24 sample Kit contains these items: GlycoWorks Deglycosylation Module (24 sample), GlycoWorks Labeling Module (24 sample), GlycoWorks Cleanup Module, and GlycoWorks Sample Collection Module	176003713
GlycoWorks *Rapi*Fluor-MS N-Glycan Basic Kit—24 sample Kit contains these items: GlycoWorks Deglycosylation Module (24 sample), GlycoWorks Labeling Module (24 sample), and GlycoWorks Cleanup Module	176003911
GlycoWorks *Rapi*Fluor-MS N-Glycan Refill Kit—24 sample Refill Kit contains one of each: GlycoWorks Deglycosylation Module (25 sample) and the GlycoWorks Labeling Module (24 sample)	176003714



GlycoWorks RapiFluor-MS N-Glycan Kit—96 Sample.

*Rapi*Fluor-MS Released N-Glycan Standards and Accessories

Description	P/N
*Rapi*Fluor-MS Dextran Calibration Ladder 50 µg/vial	186007982
*Rapi*Fluor-MS Glycan Performance Test Standard 400 pmol total/vial	186007983
*Rapi*Fluor-MS High Mannose Standard	186008317
*Rapi*Fluor-MS Sialylated Glycan Performance Test Standard 400 pmol total/vial	186008660
Intact mAb Mass Check Standard*	186006552
Ammonium Formate Solution—Glycan Analysis 5050 mM	186007081
GlycoWorks Rapid Buffer—5 mL	186008100
*Rapi*Gest SF 3 mg Vial	186008090
*Rapi*Gest SF 10 mg Vial	186002123

* Control Standard included in kit.
** Essential for kit use.

Description	P/N
96-Well Plate Extraction Manifold	186001831
Vacuum Manifold Shims** 3/set	186007986
Positive Pressure Manifold Spacer for the GlycoWorks*Rapi*Fluor-MS N-Glycan Kit* 1/pk	186007987
Vacuum Pump 220 v/240 v 50 Hz	725000604
Positive Pressure Manifold	186006961
Modular Heat Block for 1 mL Tubes/96 wells	186007985
ACQUITY UPLC Glycan BEH Amide, 130Å, 1.7 µm, 2.1 × 150 mm Column	186004742

Ordering Information



Reductive Amination Glycan Sample Preparation Kit and Standards

Description	P/N
GlycoWorks Reductive Amination High-throughput Prep Kit	176003090
GlycoWorks HILIC µElution Plate 96-well	186002780
*Rapi*Gest SF 1 mg Vial	186001860
GlycoWorks Control Standard, 100 µg Vial	186007033
GlycoWorks Reagent Kit	186007034
Manifold Waste Tray	600001282
GlycoWorks Reductive Amination Single Use Prep Kit	176003119
GlycoWorks HILIC 1 cc Cartridge (10/pk)	186007080
*Rapi*Gest SF 1 mg Vial	186001860
GlycoWorks Reagent Kit	186007034
2-AB Glycan Performance Test Standard	186006349
2-AB Dextran Calibration Ladder	186006841
2-AA Dextran Calibration Ladder	186007279
GlycoWorks HILIC 1 cc Cartridge, 20/pk	186007080
GlycoWorks HILIC 1 cc Flangeless Cartridge 20/pk	186007239
GlycoWorks HILIC µElution Plate	186002780
GlycoWorks Reagent Kit	186007034
GlycoWorks SPE Reagents	186007992
Ammonium Formate Solution—Glycan Analysis 5050 mM	186007081

TRUSTED REVIEWS

APPLICATION AREA: Characterization of monoclonal antibody and antibody-drug conjugate N-glycosylation

"*Rapi*Fluor-MS has provided the ability to characterize N-glycans with greater precision and confidence. It has also enabled the identification of previously unknown glycan structures and modifications, thanks to its compatibility with MS technology. Novel approaches such as *Rapi*Fluor are sometimes met with apprehension, due to lack of experience with the technology. However, *Rapi*Fluor-MS has demonstrated its utility in a number of application areas with confidence and experience continuing to grow on a weekly basis. Adoption of novel labelling technology can require extensive evaluation and comparison to legacy workflows. Information on how *Rapi*Fluor-MS compares to traditional reductive amination (2AA, 2AB, and APTS) as well as alternative separation techniques such as CE-LIF would further support *Rapi*Fluor-MS as complementary approach for glycan characterization."

REVIEWER: Eoin Cosgrave
ORGANIZATION: Seattle Genetics

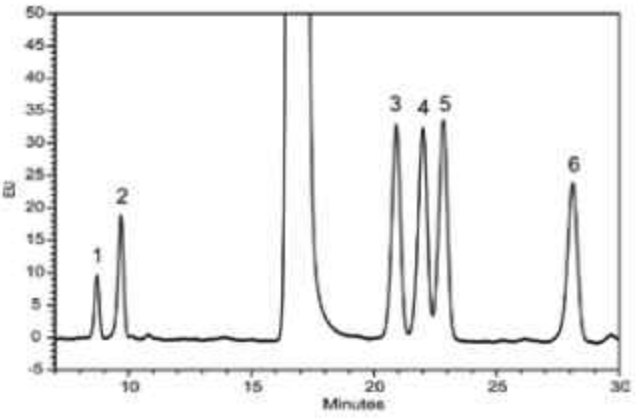
★★★★☆

COLUMNS FOR MONOSACCHARIDE AND SIALIC ACID ANALYSES FROM GLYCOPROTEINS

Monosaccharide Analyses

Apart from charged sialic acid species, the primary monosaccharides found in N-linked and O-links glycans are the neutral monosaccharides N-acetylglucosamine (GlcNAc), N-acetylgalactosamine (GalNAc), galactose (Gal), glucose (Glc), mannose (Man), and fucose (Fuc). Analyses of non-charged monosaccharides frequently begins by acid hydrolysis of the glycan by incubation with trifluoroacetic acid or hydrochloric acid. Usually, a three-hour incubation at 100 °C with 2M trifluoroacetic acid releases all of the monosaccharides; however, during hydrolysis, the N-acetyl groups on GlcNAc and GalNAc are hydrolyzed to glucosamine (GlcN) and galactosamine (GalN). Following hydrolysis, the released monosaccharides are derivatized using 2-aminobenzoic acid (2-AA), as detailed in the Waters application note: Future Proofing the Biopharmaceutical QC Laboratory: Chromatographic Scaling of HPLC Monosaccharide Analyses Using the ACQUITY UPLC H-Class Bio System (p/n: 720005255EN). As the application note explains, this method can reliably generate sensitive, high-resolution, and quantitative monosaccharide analyses independent of a laboratory's available LC instrumentation.

HPLC-Based analyses of 2-AA Labeled Monosaccharides from Acid Hydrolyzed Bovine Fetuin



Conditions:

LC system:	ACQUITY UPLC H-Class
Sample:	Acid Hydrolyzed Bovine Fetuin followed by 2-AA derivatization
Injection:	4.6 µL
Column:	XBridge BEH C_{18}, 130Å, 5 µm, 4.6 × 100 mm (p/n: 186003115)
Mobile phase A:	0.2% N-butylamine, 0.5% phosphoric acid, and 1% THF in water
Mobile phase B:	Acetonitrile with 0.1% trifluoroacetic acid
Flow rate:	0.48 mL/min
Gradient:	See table
Excitation wavelength:	360 nm
Emission wavelength:	425 nm
Column temp.:	30 °C

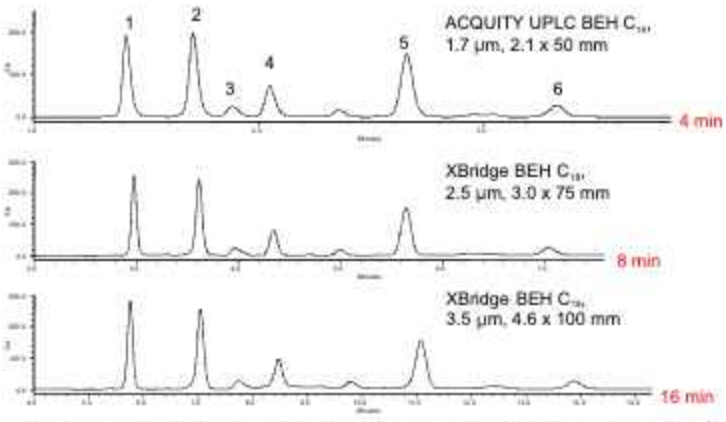
Measurement	Particle Size (µm)			
	5	3.5	2.5	1.7
Column I.D. (mm)	4.6	4.6	2.1	2.1
Column Length (mm)	100	100	100	100
Average Width	0.340	0.180	0.125	0.076
T_0	20.00	9.89	14.02	6.80
P_c	58	75	81	90
GlcNAc	8.71	5.84	4.40	2.85
GalNAc	9.69	6.48	4.87	3.15
Gal	20.92	14.32	10.87	7.08
Man	22.01	15.09	11.46	7.46
Glc	22.83	15.66	11.82	7.78
Fuc	28.12	19.39	14.70	9.74
GlcNAc	3.65	3.83	3.69	3.67
GalNAc	8.26	8.52	8.23	8.31
Gal	22.17	22.48	22.45	22.06
Man	23.04	23.07	23.05	22.72
Glc	23.76	23.89	23.88	23.61
Fuc	29.11	29.21	29.71	29.62
Rs				
GlcNAc, GalNAc	1.12	1.13	1.13	1.15
GalNAc, Gal	2.26	2.38	2.47	2.67
Gal, Man	1.05	1.06	1.06	1.06
Man, Glc	1.04	1.04	1.04	1.05
Glc, Fuc	1.24	1.25	1.26	1.28
GlcNAc, GalNAc	2.62	3.10	3.18	3.32
GalNAc, Gal	21.03	27.12	30.69	33.25
Gal, Man	1.62	2.10	2.48	2.62
Man, Glc	1.20	1.53	1.90	2.22
Glc, Fuc	7.34	8.89	11.41	12.78

HPLC analysis of monosaccharides. A separation performed with a Waters XBridge BEH C_{18} 130Å, 5 µm Column as detailed in Waters Applications Note: 720005255EN. Monosaccharides are identified as follows: (1) N-acetylglucosamine (GlcNAc), (2) N-acetylgalactosamine (GalNAc), (3) Galactose (Gal), (4) Mannose (Man), (5) Glucose (Glc), and (6) Fucose (Fuc).

Sialic Acid Analyses

A diverse range of sialic acids are found in nature, but the two major sialic acids species found on N and O-linked glycans contained in biopharmaceuticals are N-acetyl-neuraminic acid (Neu5Ac) and N-glycolyl-neuraminic acid (Neu5Gc). Since sialylation can enhance serum half-life as well as affect biological activity, it is important to accurately monitor both the quantitative levels and types of sialic acids during all stages of the product life cycle. Many LC-based methods begin with the release of the targeted sialic acids under milder acid hydrolysis conditions (e.g., 2 M acetic acid for 2 hours at 80 °C). The released sialic acids can be then derivatized with 1, 2-diamino-4, 5-methylenedioxybenzene-2HCl (DMB) dye. Of particular importance is the fact that DMB labeled sialic acids are light sensitive and liable to degradation and should be analyzed within 24 hours of labeling. This can become a significant problem if a large number of samples need to be analyzed using traditional HPLC-based techniques that can take more than 30 minutes per sample analysis.

UPLC vs. HPLC-Based Analyses Of DMB-Labeled, Sialic Acid Test Mix



1. Neu5Gc, 2. Neu5Ac, 3. Neu5,7Ac2, 4. Neu5,Gc9Ac, 5. Neu5,9Ac2, 6. Neu5,7,(8)9Ac3

Conditions:			
LC system:	ACQUITY UPLC		
Mobile phase:	Acetonitrile:Methanol:Water (9:7:84)		
Detection:	Fluorescence : λex = 373, λem = 448		
Sample:	Prozyme GLYKO Sialic Acid Reference Panel		
Wash solvents:	Acetonitrile:Methanol:Water (9:7:84)		
Columns:	ACQUITY UPLC BEH C_{18}, 1.7 µm	XBridge BEH C_{18}, 2.5 µm	XBridge C_{18}, 3.5 µm
Configuration:	2.1 × 50 mm	3.0 × 75 mm	4.6 × 100 mm
Flow rate:	0.38	0.26	0.43
Loop size:	2 µL	2 µL	10 µL
Injection vol.:	0.7 µL	2.0 µL	6.7 µL
Run time:	6.0 min	12.5 min	24.0 min

Geometric scaling of DMB-labeled sialic acid standards on XBridge BEH C_{18} 130Å, 3.5 µm particle (bottom), 2.5 µm particle (middle), and ACQUITY UPLC BEH C_{18} 130Å, 1.7 µm particle (top).

Note the higher throughput and improved component resolution associate with the 1.7 µm particle technology.

Ordering Information

ACQUITY UPLC BEH 130Å Columns

	Dimension	P/N
	Particle Size: 1.7 µm	
C_{18} 130Å	2.1 × 50 mm	186002350
	2.1 × 100 mm	186002352
	2.1 × 150 mm	186004742

XBridge BEH 130Å Columns

	Dimension	P/N	Dimension	P/N	Dimension	P/N
	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
C_{18} 130Å	2.1 × 100 mm *XP*	186006031	2.1 × 100 mm	186003033	4.6 × 100 mm	186003115
	3.0 × 100 mm *XP*	186006035				
	3.0 × 150 mm *XP*	186006710				

DNA, RNA, and Oligonucleotides

Our Oligonucleotide Separation Columns are packed with our second-generation, hybrid-silica BEH Technology particles, functionalized with C_{18}. These columns are widely used to separate synthetic DNA and RNA species. The separation of detritylated synthetic oligonucleotide samples relies on the well established method of ion-pair, reversed-phase chromatography. In these separations, gradient elution results in the less hydrophobic species eluting prior to sequences of increasing hydrophobicities. The 1.7 µm UPLC particles or 2.5 µm HPLC/UHPLC particles available in several column dimensions, provide exceptional sample resolution and superior column life while providing the flexibility required to perform various laboratory-scale isolations.

Waters Oligonucleotide Separation Columns offer these benefits:

- Separation efficiencies equivalent to or exceeding those of PAGE, CGE, or ion-exchange HPLC methods
- The ability to correct failure sequences from detritylated full-length products
- Column scalability, for laboratory-scale isolation needs
- Exceptional column life, for reduced cost per analysis
- Quality-control tested with MassPREP™ Oligonucleotide Standard (p/n: 186004135), to help ensure performance consistency

In addition, our manufacturing and quality-control testing procedures help ensure consistent batch-to-batch and column-to-column performance, regardless of application demands.

Exceptional Resolution of Oligonucleotide Mixtures

Our ACQUITY UPLC Oligonucleotide C_{18}, 1.7 µm Columns (designed for use with an ACQUITY UPLC System) and XBridge Oligonucleotide C_{18}, 2.5 µm Columns are well-suited for the analysis of detritylated oligonucleotides by means of ion-pair, reversed-phase chromatography. As indicated (see figure on page 259), separations are comparable to those obtained by capillary gel electrophoresis (CGE), in terms of component resolution, yet UPLC technology significantly decreases analyses times. The ability to resolve large oligonucleotide sequences (e.g., N from N-1) is possible because of the enhanced resolving power obtained using sub-3 µm, BEH Technology particles. In addition, quantitation from failure sequences is possible by characterizing the molecular weight of the separated, target oligonucleotide product using the column in conjunction with hyphenated-mass spectrometry methods and MS-compatible eluents.



Ordering Information

ACQUITY UPLC Oligonucleotide 130Å Columns*

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH C_{18} 130Å	2.1 × 50 mm	186003949
	2.1 × 100 mm	186003950
	2.1 × 150 mm	186005516

*For use on Waters ACQUITY UPLC Systems.

ACQUITY UPLC Oligonucleotide BEH 130Å Method Validation Kits*

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH C_{18} 130Å	2.1 × 100 mm	186004898

*Each Method Validation Kit contains 3 columns, each from a different batch.

XBridge Oligonucleotide BEH 130Å Columns*

	Dimension	P/N
	Particle Size: 2.5 µm	
BEH C_{18} 130Å	2.1 × 50 mm	186003952
	4.6 × 50 mm	186003953
	10 × 50 mm	186008212*

*OBD Column.

XBridge Oligonucleotide BEH 130Å Method Validation Kits*

	Dimension	P/N
	Particle Size: 2.5 µm	
BEH C_{18}	4.6 × 50 mm	186004906

*Each Method Validation Kit contains 3 columns, each from a different batch.

APPLICATION AREA: Chromatography

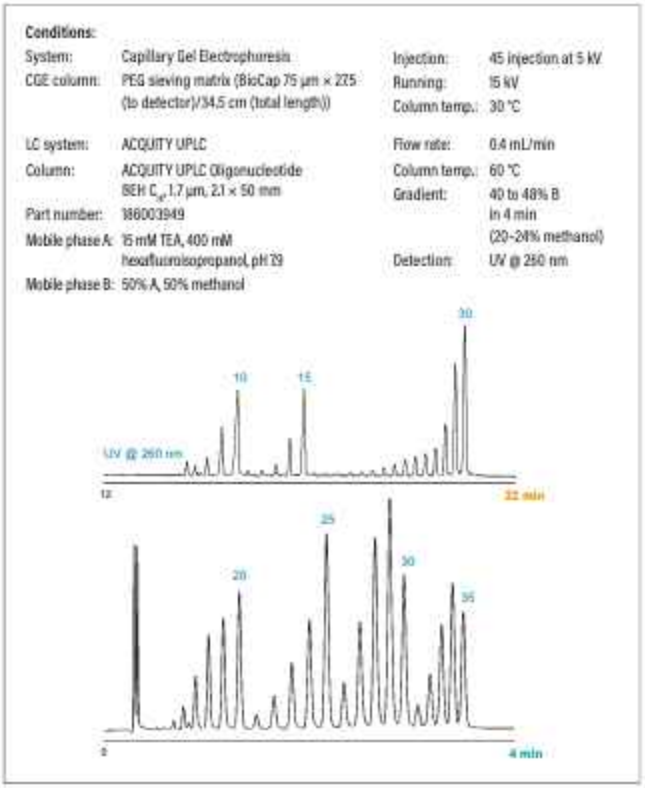
"This column has good separation and high resolution at different conditions. The new stationary phase provides for various chromatographic application. My next research I will be using it. I recommend this product to all my colleague."

REVIEWER: Berkant Kayan
ORGANIZATION: Aksaray University

TRUSTED REVIEWS

★★★★☆

Separation of Detritylated Oligodeoxythymidine Ladders by Capillary Gel Electrophoresis (CGE) vs. Ion-Pair, Reversed-Phase Chromatography



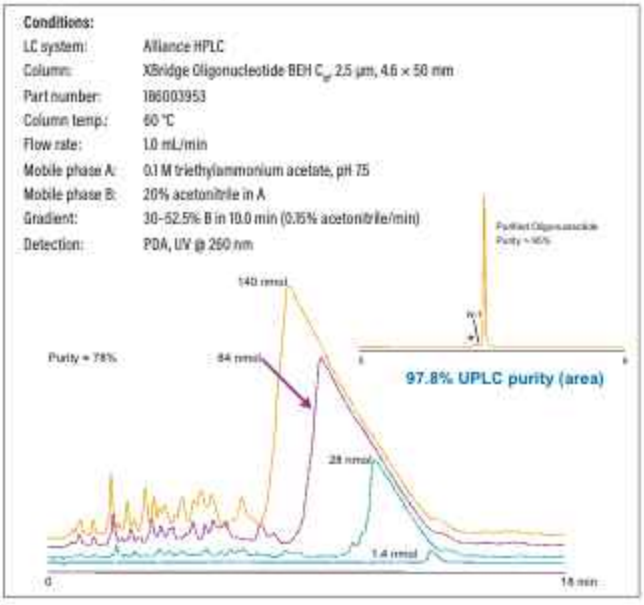
Scalable DNA and RNAi Separations with Good Product Recovery

Our XBridge Oligonucleotide BEH C_{18}, 130Å Columns constitute the logical choice for detritylated oligonucleotide purifications, and we offer them in various dimensions to meet laboratory-scale isolation requirements. The choice of a particular XBridge Oligonucleotide C_{18} Column dimension and operating flow rate depends primarily on the scale of the synthesis reaction mixture. For example, a 4.6 × 50 mm column containing XBridge Oligonucleotide BEH C_{18}, 130Å, 2.5 µm material is an excellent selection when oligonucleotide mass loads are less than or equal to 0.2 µmol. We recommend selecting the column size appropriate for the amount of oligonucleotide sample loaded. Doing so maximizes component resolution and recovery of the target product from undesired failure sequences.

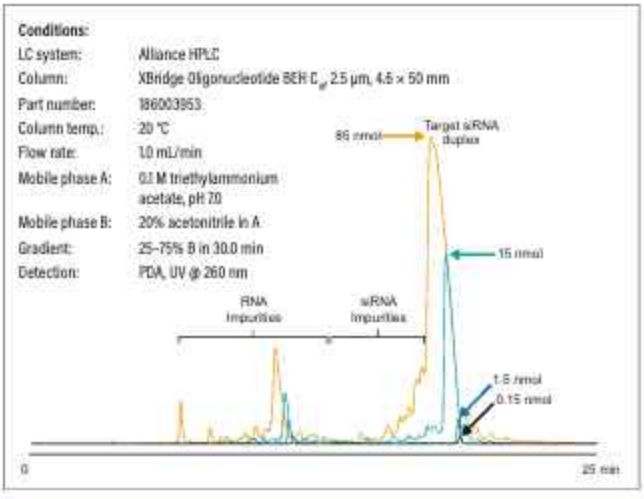
Researchers involved in gene silencing often find it necessary to work with high-purity RNA. Crude synthetic oligonucleotides used for gene knockout are typically purified. The figure below illustrates a laboratory-scale purification of 21mer RNA at various column loads. Using an oligonucleotide column chemistry and a Waters Alliance LC System, you can purify large quantities of crude, single stranded RNA. Doing so produces material of high purity (ca. 95%), with an estimated yield of 55%, based on the ratio of sample present in the collected peak area to that present in the total peak area.

In addition, XBridge Oligonucleotide Columns are well suited for analysis and purification of siRNA. As shown in the figure below, siRNA is well resolved from single-stranded RNA and truncated duplexes.

Purification of Single Stranded RNA



Purification of siRNA Duplex from Impurities



Dimensions	Approx Mass Load**	Yield***	Flow Rate
2.1 × 50 mm	0.04 µmoles	0.2 mg	0.2 mL/min
4.6 × 50 mm	0.20 µmoles	1.0 mg	1.0 mL/min
10 × 50 mm	1.00 µmoles	4.5 mg	4.5 mL/min
19 × 50 mm*	4.00 µmoles	16.0 mg	16.0 mL/min
30 × 50 mm*	9.00 µmoles	40.0 mg	40.0 mL/min
50 × 50 mm*	25.00 µmoles	110.0 mg	110.0 mL/min

**Oligonucleotide custom column.*
***Values are only approximates and vary depending on oligonucleotide length, base composition, and "heart-cutting" fraction collection method used.*
****Estimated for average oligonucleotide MW and synthesis yield.*

COLUMNS FOR LARGE DNA/RNA SPECIES

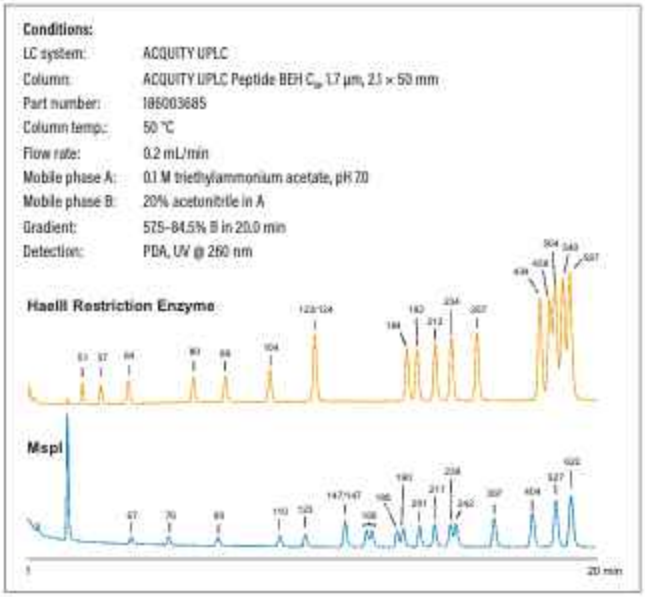
Molecular biology methods for manipulation of DNA generally rely on restriction enzymes, polymerase-chain reaction (PCR), and sequencing techniques. Those methods usually convert genomic DNA into shorter, double-stranded DNA sequences (dsDNA) typically 100–1000 base pairs (bp) in length. Often, slab-gel or capillary electrophoresis is used to analyze or isolate the dsDNA molecules. Our ACQUITY UPLC BEH C_{18}, 300Å Reversed-phase or Gen-Pak™ FAX Anion-exchange Columns, which are particularly well suited for various analytical and small-scale purifications, offer a practical alternative to traditional electrophoretic methods.

Ordering Information

ACQUITY UPLC BEH C_{18}, 300Å Columns for DNA/RNA Fragments

	Dimension	P/N
	Particle Size: 1.7 µm	
ACQUITY UPLC BEH C_{18}, 300Å	2.1 × 50 mm	186003685

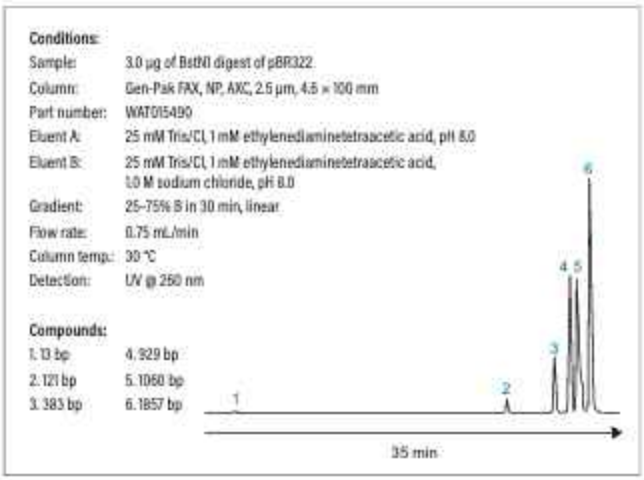
Separation of Duplex DNA Fragments: HaeIII and MspI Restriction Enzyme Digests of pBR322 Plasmid



GEN-PAK FAX ANION-EXCHANGE COLUMNS

Our Gen-Pak FAX Columns offer the highest resolution available for anion-exchange HPLC of nucleic acids. The Gen-Pak FAX Column contains a weak anion exchanger. Based on DEAE functionalized nonporous resin, it contains 2.5 µm particles and is well-suited for analytical and micro-preparative applications.

Separation of DNA Restriction Fragments

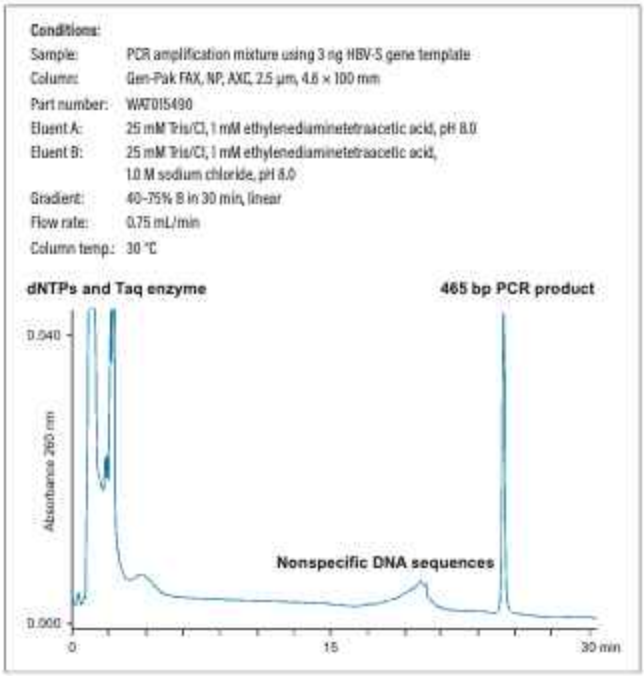


Ordering Information

Gen-Pak FAX HPLC Column

Description	Dimension	P/N
Gen-Pak FAX Column	4.6 × 100 mm	WAT015490
Gen-Pak FAX Replacement Inlet Filter	—	WAT015715

Chromatography of a PCR Amplification Mixture Generated using 3 ng and 1 fg of HBV S-Gene Template



BENCHMARKING, METHOD DEVELOPMENT, AND TROUBLESHOOTING: MASSPREP OLIGONUCLEOTIDE STANDARD

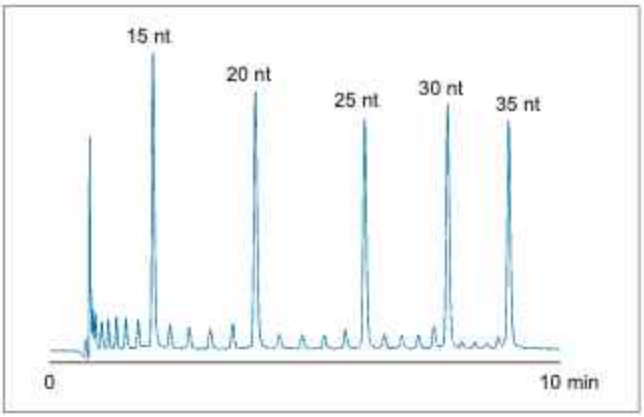


The MassPREP Oligonucleotide Standard offers these benefits:

- Eliminates staff time and reduces laboratory cost to create and test a defined mixture of synthetic oligonucleotide standards for column and/or instrument performance testing
- Each batch of MassPREP Oligonucleotide Standard is manufactured and QC tested using a stringent set of criteria to help ensure expected product consistency

The pre-packaged MassPREP Oligonucleotide Standard verifies HPLC/UPLC instrument and column performance for the analysis of synthetic oligonucleotides. Approximate equimolar amounts of oligodeoxythymidines of nucleotide (nt) length 15, 20, 25, 30, and 35 are lyophilized and packaged in 1.5-mL LC vials. The vials contain approximately 1 nmole of each oligonucleotide. They are vacuum-sealed, in foil pouches, to reduce the extent of degradation that can occur by excessive exposure to light and air.

Separation of MassPREP Oligonucleotide Standard on ACQUITY UPLC Oligonucleotide BEH C_{18}, 1.7 µm Column



Waters ACQUITY UPLC analysis of MassPREP Oligonucleotide Standard on an ACQUITY UPLC Oligonucleotide C_{18}, 130Å, 1.7 µm Column. The main components are labeled. Small peaks eluting between labeled oligonucleotides are failure sequences (N-1, N-2, etc.) generated during the oligonucleotide syntheses. The ACQUITY UPLC System is equipped with a 50 µL standard mixer and a PDA detector (260 nm).

Ordering Information

MassPREP Oligonucleotide Standard

Description	Qty.	P/N
MassPREP Oligonucleotide Standard	1/pk	186004135

OASIS µELUTION PLATES

Oligonucleotide Desalting by Solid-Phase Extraction

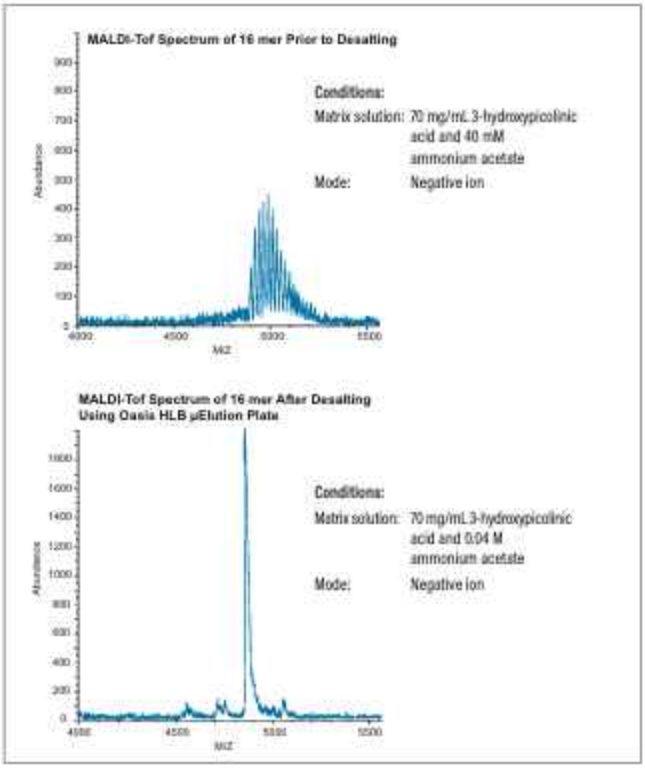
Our Oasis µElution Plates to desalt oligonucleotides by solid-phase extraction offer these benefits:

- Removes salt prior to MS analysis
- Low elution volumes
- High sensitivity
- Sample concentrating
- High throughput



Desalting synthetic oligonucleotides is essential for MS analysis (QC, genotyping applications, and SNP analysis). Oasis µElution Plates are an excellent choice for high-throughput analyses performed with minimal sample. The Oasis µElution Plate combines patented plate design, proven chemistries, and generic protocols, permitting elution volumes as low as 25 µL. Now you can perform SPE cleanup and concentration of extremely small sample volumes. The Oasis Hydrophilic-Lipophilic-Balanced (HLB) sample-extraction products incorporate a patented copolymer. Made from a balanced ratio of two monomers, the lipophilic divinylbenzene and the hydrophilic N-vinylpyrrolidone, the copolymer is ideally suited for this application.

Effective Use of Oasis HLB for Oligonucleotide Desalting Prior to MALDI-Tof MS



Ordering Information

Oligonucleotide Sample Preparation Plate

Description	P/N
Oasis HLB µElution Plate (for Oligonucleotides)	186001828BA

Peptide Separations

The desired separation, accurate quantitation, and correct identification of peptides, ranging from proteomic investigations to biotherapeutic mAb characterization, is challenging. To be successful, scientists acknowledge the importance of separation synergies that occur when a defined column, instrument, and method are assembled to address specific application needs.

Reversed-phase (RP) chromatography has become the separation mode of choice for many of these challenging applications. It offers relatively high resolving power and provides outstanding quantitative (UV) and qualitative (ESI-MS) information. In RP-based peptide separations, the size of the peptide as well as the hydrophobicity of the amino-acid side chains determine the elution order. Consequently, small, less hydrophobic peptide sequences elute first using a gradient of increasing organic solvent concentration.

PEPTIDE BEH C_{18} (130Å, 300Å), PEPTIDE CSH C_{18} (130Å), AND PEPTIDE HSS T3 (100Å) COLUMNS

Waters Ethylene-Bridged Hybrid (BEH) and Charged Surface Hybrid (CSH) column technologies can be effectively used to generate high quality UPLC, UHPLC, or HPLC peptide separations via reversed-phase chromatography. Their effective use in either TFA- or FA-containing eluents makes them well suited for either LC or LC-MS applications. Our Peptide HSS T3 Columns are designed for separations where silica-based selectivities are desired or when increased retention of hydrophilic peptides are required.

Hybrid Particles

Silica Particles







BEH (Ethylene-Bridged Hybrid)

Trifunctional C_{18} ligand, fully end-capped, and bonded to the Ethylene-Bridged Hybrid (BEH) particles.

- Ideally suited for separation of a wide range of peptides: large and small, acidic and basic, hydrophilic and hydrophobic
- Stable across a wide pH range (pH 1–11) so neutral or alkaline pH eluents can be used to alter peptide separation selectivities
- High temperature stability (up to 80 °C) expands method development capabilities
- Outstanding peak capacity and superior peak shape in trifluoroacetic acid (TFA) or formic acid (FA) ion pair eluents when compared to use of 100% silica based C_{18} columns
- Two pore sizes (130Å and 300Å) provide different separation selectivities for a wide range of peptides and small proteins

CSH (Charged Surface Hybrid)

Trifunctional C_{18} ligand, fully end-capped, bonded to Charged Surface Hybrid (CSH) particles.

- Outstanding peak capacities with formic acid for LC-MS based applications
- Excellent performance with TFA for optical based applications
- Accepts greater peptide mass loads than many competitive technologies for detection of low-level impurities
- Offers unique selectivity when compared to Waters Peptide BEH C_{18} Columns
- Optimal for separations from pH 1–5
- The 130Å pore size is best suited for compounds less than 10,000 Daltons

HSS (High Strength Silica)

Trifunctional C_{18} ligand, fully end-capped, bonded to High Strength Silica (HSS) particles.

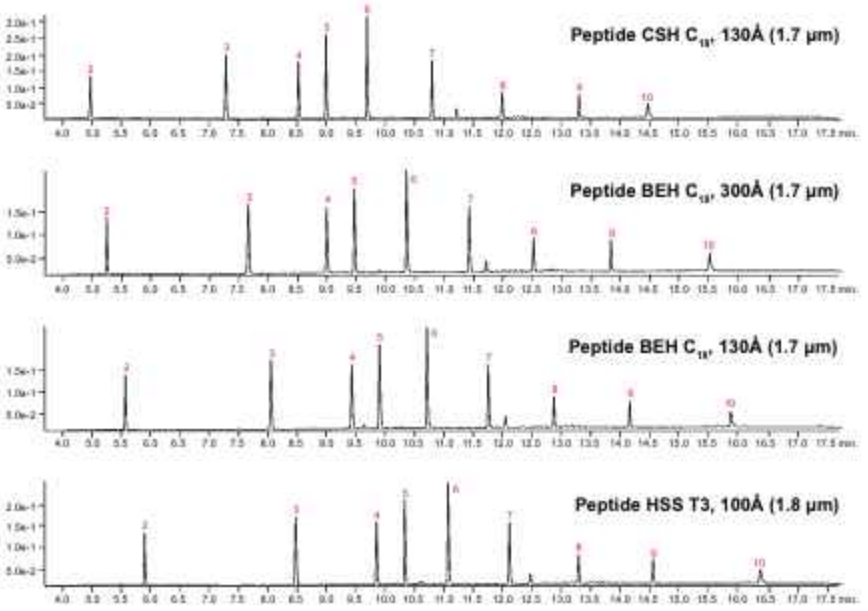
- Viable option when either the hybrid-based, Peptide BEH C_{18} or Peptide CSH C_{18} do not meet a specific peptide application need
- Ideal choice for the separation of small, hydrophilic peptides since retentivity is greater than that obtained using Waters hybrid-based peptide separation columns

Three Outstanding Peptide Column Chemistries that Address Varied Peptide Separations

Separation of Peptide Standards Using 0.1% TFA Ion Pairing on Waters Peptide Separation Columns

Peptides contained in Waters MassPREP Peptide Std Mix, p/n: 186002337, were separated on 4.6 × 150 mm columns containing Waters Peptide CSH C_{18} 130Å (1.7 µm), Peptide BEH C_{18} 300Å (1.7 µm), Peptide BEH C_{18} 130Å (1.7 µm), or Peptide HSS T3 100Å (1.8 µm) UPLC-based particles on a Waters H-Class Bio System using a gradient of increasing acetonitrile concentration with 0.1% TFA ion-pairing. Flow at 0.4 mL/min.

The MassPREP Peptide Standard Mixture contains allantoin (a void volume marker) and nine carefully selected peptides with a broad range of polarities and isoelectric points. (1 = Allantoin 158 Da, (Not shown in figure since elutes at column void volume), 2 = RASG-1: 1, 000 Da, 3 = Angiotensin frag.1–7: 898 Da, 4 = Bradykinin: 1060 Da, 5 = Angiotensin II: 1046 Da, 6 = Angiotensin I: 1296 Da, 7 = Renin: 1758 Da, 8 = Enolase T35: 1872 Da, 9 = Enolase T37: 2827 Da, 10 = Melittin: 2846)



See page 273 for the molecular weight, pK_a, and sequence of each peptide used in this study.

Separation of Peptide Standards Using 0.1% FA Ion Pairing on Waters Peptide Separation Columns

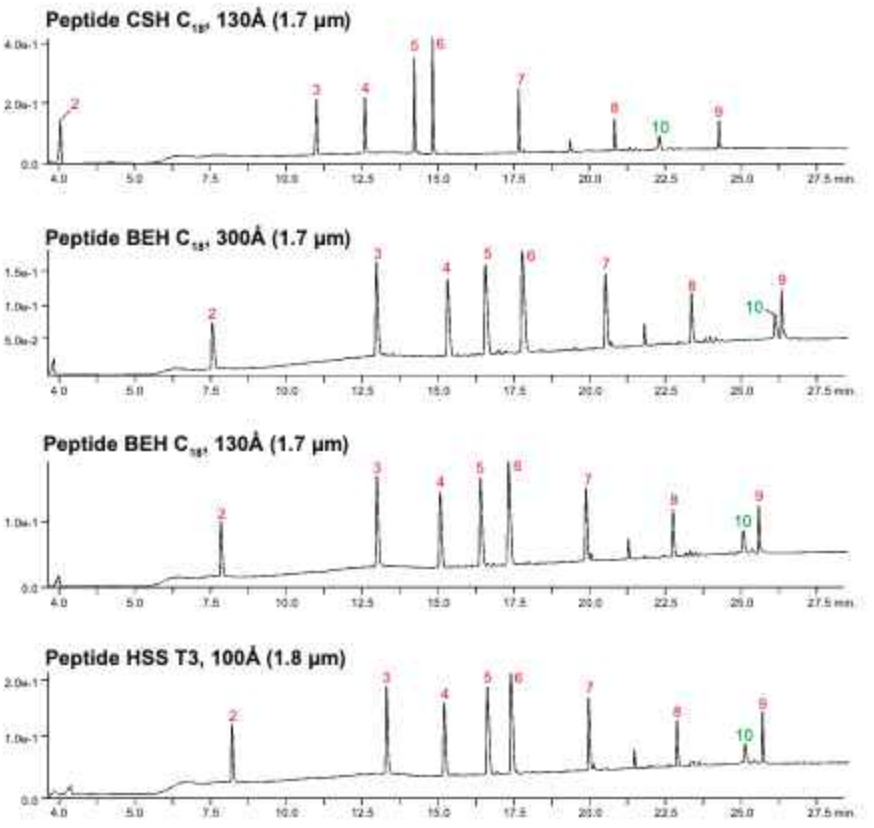
Peptides contained in Waters MassPREP Peptide Std Mix, p/n: 186002337, were separated on 4.6 × 150 mm columns containing Waters Peptide CSH C_{18} 130Å (1.7 µm), Peptide BEH C_{18} 300Å (1.7 µm), Peptide BEH C_{18} 130Å (1.7 µm), or Peptide HSS T3 100Å (1.8 µm) UPLC-based particles on a Waters H-Class Bio System using a gradient of increasing acetonitrile concentration with 0.1% FA ion-pairing. Flow at 0.2 mL/min.

Sample as above.

Notes:

1) Different peptide separation selectivities and comparative retention time differences among the tested columns.

Elution order of peaks 9 and 10 switch when run in 0.1 FA vs 0.1% TFA



PEPTIDE CSH C_{18}, 130Å COLUMNS

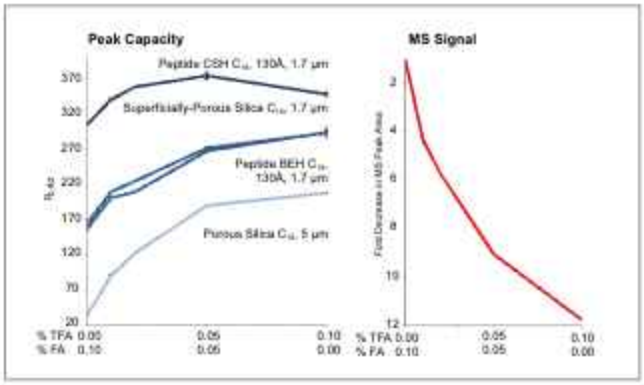
Charged Surface Hybrid Particles Deliver Superior Peptide Separations in LC and LC-MS Applications

Waters patented synthesis process for its Charged Surface Hybrid (CSH) Technology particles imparts a low-level, positive charge to the surface of each particle. For that reason, when using our Peptide CSH C_{18}, 130Å Columns, you must ensure a mobile-phase pH of less than 5, to enable peptide/CSH surface-charge interactions. CSH Technology allows the columns to be successfully used with standard eluents containing trifluoroacetic acid or a weaker acid modifier, such as formic acid. You no longer need to compromise between selecting a reversed-phase eluent that delivers sharp, symmetrically separated peaks (e.g., 0.1% trifluoroacetic acid) and one that minimizes reduction of MS signal (e.g., 0.1% formic acid). Additionally, the ability of the CSH C_{18}, 130Å column chemistry to accept greater peptide mass loads than many other columns enhances the ability to detect potentially important low-level constituents of the major component, or components, of interest.

Superior Performance in Eluents Containing Formic Acid or Trifluoroacetic Acid

Waters Peptide CSH C_{18}, 130Å particles contain a low and carefully-defined concentration of positive charges that yield comparatively excellent peak shape for peptide separations that rely on mobile phases that contain formic acid or trifluoroacetic acid . The fact that the performance of a Peptide CSH C_{18}, 130Å Column exhibits little dependence on strong ion-pairing agents makes it ideal for LC or LC-MS applications.

Comparative Averaged Peptide Peak Capacities on Selected Reversed-Phase Columns with Differing Concentrations of Formic Acid and Trifluoroacetic Acid

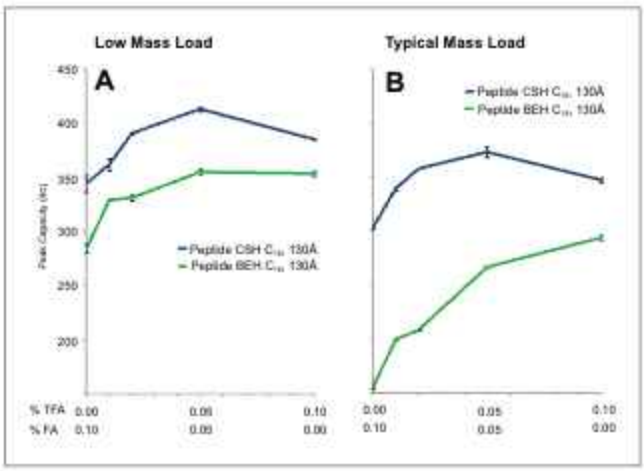


Effect of trifluoroacetic acid on peak capacity and MS signal. (A) Peak capacity as a function of acid modifier. Values were derived from two replicates. (B) Fold decrease in MS peak area as a function of acid modifier. Waters MassPREP Peptide Standard Mixture (p/n: 186002337) was used in study.

Excellent Mass Loading of Complex Peptide Samples

One of the inherent performance advantages of our CSH Technology is improved sample-mass loadability, the quantity of analyte that you can load onto a column before peak shape deteriorates. At typical mass loads, Peptide CSH C_{18}, 130Å delivers a remarkably better performance than many existing C_{18} offerings. When loading 10× less sample, the difference in performance was less pronounced. Improved peptide-mass loadability is an excellent column asset for challenging separations, particularly for those that involve mixtures that comprise species present at vastly different concentrations.

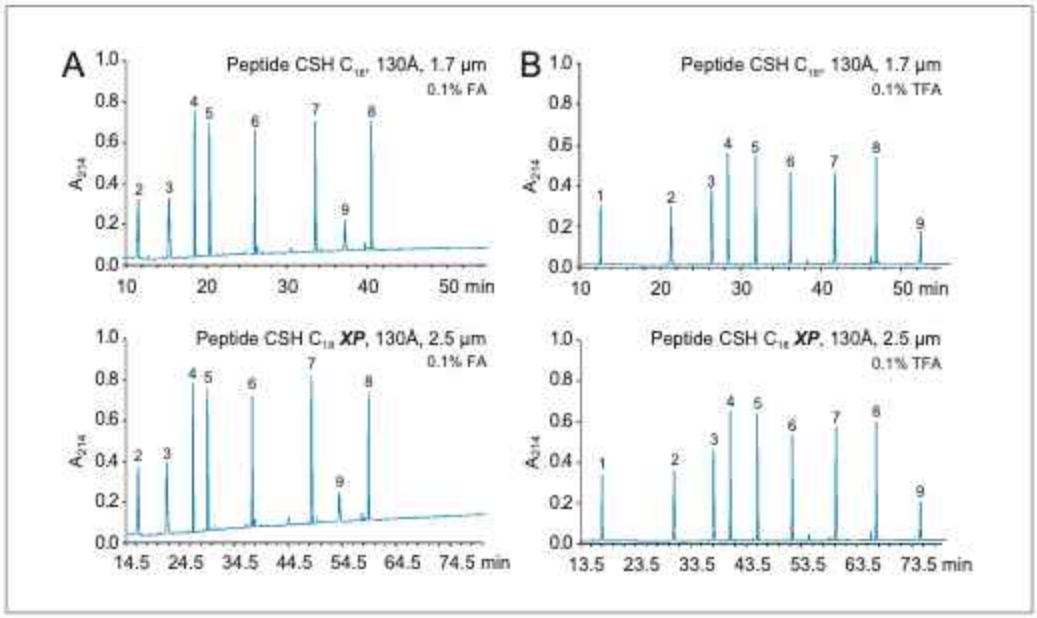
Comparative Averaged Peptide Peak Capacities on Peptide CSH C_{18}, 130Å vs. Peptide BEH C_{18}, 130Å Based Columns (2.1 × 150 mm) at Two Peptide Mass Loads and Differing Concentrations of Formic Acid and Trifluoroacetic Acid



Effect of column mass load on separated peptide peak capacity in formic acid, trifluoroacetic acid, and eluent blends of formic acid and trifluoroacetic acid. (A) approximate sample load of 0.06 µg peptide mixture. (B) approx. 0.6 µg peptide mixture. Values were derived from two replicates. Waters MassPREP Peptide Standard Mixture (p/n: 186002337) was used in the study.

A need persists for columns compatible with LC instrumentation. We recommend the use of low-dispersion LC instrumentation to extract full performance from a well-packed column containing 1.7 µm particles. The recent introduction of Waters e***X***tended ***P***erformance (***XP***) Columns packed with 2.5 µm ***XP*** particles improves the productivity of existing HPLC instrumentation. You can scale high peak capacity peptide separations performed using a Peptide CSH C_{18}, 130Å, 1.7 µm Column to a Peptide CSH C_{18}, 130Å, 2.5 µm ***XP*** Column simply by altering flow rate and gradient time. As shown below, you can readily employ CSH Technology for high peak capacity peptide separations using either HPLC, UHPLC, or UPLC instrumentation.

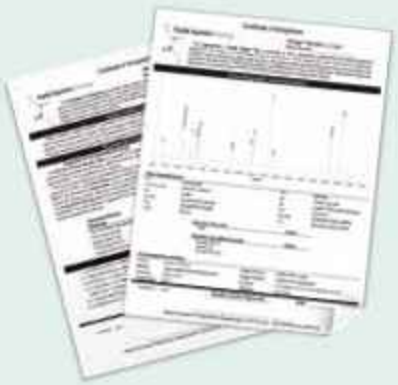
Comparative Separation of MassPREP Peptide Standard Mixture on ACQUITY UPLC Peptide CSH C_{18}, 130Å, 1.7 µm vs. XSelect Peptide CSH C_{18}, 130Å, 2.5 µm *XP* in Eluents Containing Formic Acid or 0.1% Trifluoroacetic Acid



Chromatograms of Waters MassPREP Peptide Standard Mixture (p/n: 185002337) obtained with (A) 0.1% formic acid and (B) 0.1% trifluoroacetic acid mobile phases. The method for the Peptide CSH C_{18} XP, 130Å, 2.5 µm Column was scaled from the method for the CSH C_{18} 130Å, 1.7 µm Column by decreasing flow rate and increasing gradient time by a factor of 1.5. Generated back-pressure on the XSelect Peptide CSH C_{18} XP, 130Å, 2.5 µm, 2.1 × 150 mm Column was 3000 psi (205 bar); back-pressure on the ACQUITY UPLC Peptide CSH C_{18} 130Å, 1.7 µm, 2.1 × 150 mm Column was 8000 psi (550 bar).

Increased Assurance with Waters Peptide Columns

Waters rigorously tests each batch of our synthesized Peptide BEH C_{18}, 130Å; Peptide BEH C_{18}, 300Å; Peptide CSH C_{18}, 130Å; and Peptide HSS T3 100Å particles used in our manufactured columns. To pass, each batch of material must satisfactorily separate a complex protein digest using a gradient separation with well-defined pass/fail criteria. In addition, each and every manufactured column is tested and must exceed established packed column efficiency values before accepted for customer purchase. In combination, these tests (results available in Certificate of Analysis documentation) help ensure consistent batch-to-batch and column-to-column performance.

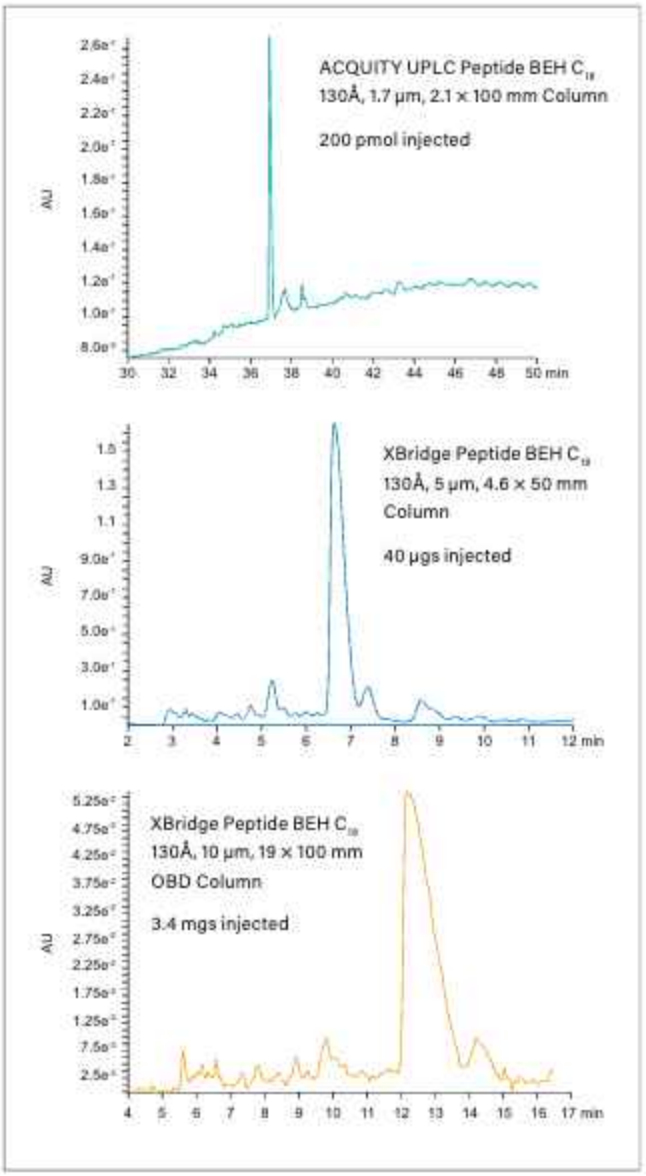


Certificate of analysis information includes a labeled chromatogram of the gradient separation of a tryptic digest of bovine cytochrome c (p/n: 186005371) using eluents that contain 0.1% formic acid. You can purchase the same protein digest test mixture to ensure the proper performance of your Peptide CSH C_{18}, 130Å Column.

Simplifying Column Choice for Peptide Purifications

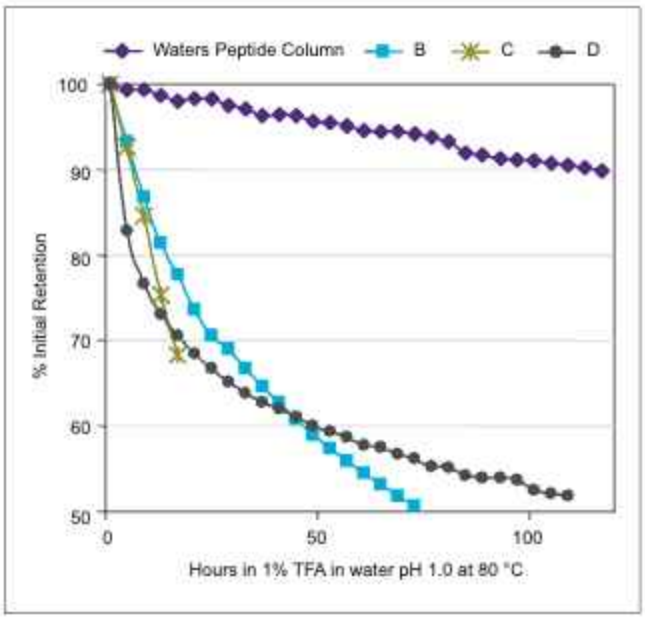
Our peptide columns are versatile. Often, a single C_{18}-based chemistry can separate a wide range of peptides, requiring little time and expense to obtain satisfactory results. We offer peptide packings in many particle sizes and column dimensions. (See the "Peptide Preparative Column Selection Guide," below.)

Separation of 13 Residue Peptides at Various Sample Loads



Offered in many particle sizes and column configurations, our peptide columns are well-suited for various laboratory-scale purification needs.

Long-Term Stability



We tested several peptide columns to observe how they performed when injections were repeated, comparing them with the performance columns B, C, and D, made by other manufactures. (Retention was monitored to determine column lifetime.)

Peptide Preparative Column Selection Guide

OBD Prep Columns, 5 µm and 10 µm				
130Å and 300Å				
I.D. (mm)	Length (mm)	µmoles of a Single Peptide	Weight of a Single Peptide (mg)	Typical Flow Rate (mL/min)
10	50	0.25–5	0.5–10	4.5–9
10	100	0.25–5	0.5–10	4.5–9
10	150	0.25–5	0.5–10	4.5–9
10	250	0.25–5	0.5–10	4.5–9
19	50	1–18	2.0–36	16–32
19	100	1–18	2.0–36	16–32
19	150	1–18	2.0–36	16–32
19	250	1–18	2.0–36	16–32

OBD Prep Columns, 10 µm				
130Å and 300Å				
I.D. (mm)	Length (mm)	µmoles of a Single Peptide	Weight of a Single Peptide (mg)	Typical Flow Rate (mL/min)
30	50	2.5–25	5–100	40–80
30	100	2.5–25	5–100	40–80
30	150	2.5–25	5–100	40–80
30	250	2.5–25	5–100	40–80

Peptide Packing Material in OBD Columns for Maximum Chemical and Physical Stability

When columns fail, they do so both physically and chemically. For columns used with low-pH mobile phases, the usual cause of abbreviated column life is hydrolysis of the bonded phase, which manifests itself as significant changes in peptide retention. Our BEH Technology Columns incorporate proprietary procedures for bonding and end-capping that yield stable bonded phases. In low-pH stability tests, BEH C_{18} columns showed only minimal retention loss. Our patented Optimum Bed Density (OBD) Technology, developed to create packed beds that are the most stable of any available, regardless of manufacturer, ensures the physical stability of these columns. Visit **www.waters.com/OBD** for details about OBD Technology.

Ordering Information

ACQUITY UPLC Peptide BEH C_{18} Columns

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH C_{18}, 130Å	2.1 × 5 mm	186003975*
	2.1 × 50 mm	186003554
	2.1 × 100 mm	186003555
	2.1 × 150 mm	186003556
	Particle Size: 1.7 µm	
BEH C_{18}, 300Å	1.0 × 50 mm	186005592
	1.0 × 100 mm	186005593
	1.0 × 150 mm	186005594
	2.1 × 5 mm	186004629*
	2.1 × 50 mm	186003685
	2.1 × 100 mm	186003686
	2.1 × 150 mm	186003687

*VanGuard Pre-column, 3/pk.

ACQUITY UPLC Peptide BEH C_{18} Method Validation Kits*

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH C_{18}, 130Å	2.1 × 100 mm	186004896
	2.1 × 150 mm	186006516
	Particle Size: 1.7 µm	
BEH C_{18}, 300Å	2.1 × 100 mm	186004897
	2.1 × 150 mm	186006516

*Each Method Validation Kit contains 3 columns, each from a different batch.

In-Line Filters

Description	P/N
In-line Filter Holder and (6) 0.2 µm Stainless Steel Replacement Filters	205000343
0.2 µm Stainless Steel Replacement Filters and End Nuts for 205000343, 5/pk	700002775

XBridge Peptide BEH C_{18} Method Validation Kits*

	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		**Particle Size: 5 µm**	
BEH C_{18}, 130Å	4.6 × 100 mm	186004904	4.6 × 100 mm	186005463
	Particle Size: 3.5 µm		**Particle Size: 5 µm**	
BEH C_{18}, 300Å	4.6 × 100 mm	186004905	4.6 × 100 mm	186005464

*Each Method Validation Kit contains 3 columns, each from a different batch.

XBridge Peptide BEH C_{18} Columns

	Dimension	P/N	Dimension	P/N	Dimension	P/N
	Particle Size: 3.5 µm		Particle Size: 5 µm		Particle Size: 10 µm	
BEH C_{18} 130Å	1.0 × 50 mm	186003560	1.0 × 50 mm	186003571	4.6 × 50 mm	186003648
	1.0 × 100 mm	186003561	1.0 × 100 mm	186003572	4.6 × 100 mm	186003649
	1.0 × 150 mm	186003562	1.0 × 150 mm	186003573	4.6 × 150 mm	186003650
	2.1 × 50 mm	186003563	2.1 × 50 mm	186003574	4.6 × 250 mm	186003651
	2.1 × 100 mm	186003564	2.1 × 100 mm	186003575	10 × 10 mm	186004465*[1]
	2.1 × 150 mm	186003565	2.1 × 150 mm	186003576	10 × 50 mm	186008194
	2.1 × 250 mm	186003566	2.1 × 250 mm	186003577	10 × 100 mm	186008195
	4.6 × 50 mm	186003567	4.6 × 50 mm	186003578	10 × 150 mm	186008196
	4.6 × 100 mm	186003568	4.6 × 100 mm	186003579	10 × 250 mm	186008197
	4.6 × 150 mm	186003569	4.6 × 150 mm	186003580	19 × 10 mm	186004464*[2]
	4.6 × 250 mm	186003570	4.6 × 250 mm	186003581	19 × 50 mm	186003656
			10 × 10 mm	186004469*[1]	19 × 150 mm	186003657
			10 × 50 mm	186008186	19 × 250 mm	186003658
			10 × 100 mm	186008187	30 × 10 mm	186006880*[3]
			10 × 150 mm	186008188	30 × 50 mm	186003659
			10 × 250 mm	186008189	30 × 100 mm	186003660
			19 × 10 mm	186004468*[2]	30 × 150 mm	186003661
			19 × 50 mm	186003586	30 × 250 mm	186003662
			19 × 100 mm	186003587		
			19 × 150 mm	186003945		

	Particle Size: 3.5 µm		Particle Size: 5 µm		Particle Size: 10 µm	
BEH C_{18} 300Å	1.0 × 50 mm	186003604	1.0 × 50 mm	186003615	4.6 × 50 mm	186003663
	1.0 × 100 mm	186003605	1.0 × 100 mm	186003616	4.6 × 100 mm	186003664
	1.0 × 150 mm	186003606	1.0 × 150 mm	186003617	4.6 × 150 mm	186003665
	2.1 × 50 mm	186003607	2.1 × 50 mm	186003618	4.6 × 250 mm	186003666
	2.1 × 100 mm	186003608	2.1 × 100 mm	186003619	10 × 10 mm	186004467*[1]
	2.1 × 150 mm	186003609	2.1 × 150 mm	186003620	10 × 50 mm	186008198
	2.1 × 250 mm	186003610	2.1 × 250 mm	186003621	10 × 100 mm	186008199
	4.6 × 50 mm	186003611	4.6 × 50 mm	186003622	10 × 150 mm	186008200
	4.6 × 100 mm	186003612	4.6 × 100 mm	186003623	10 × 250 mm	186008201
	4.6 × 150 mm	186003613	4.6 × 150 mm	186003624	19 × 10 mm	186004466*[2]
	4.6 × 250 mm	186003614	4.6 × 250 mm	186003625	19 × 50 mm	186003671
			10 × 10 mm	186004471*[1]	19 × 150 mm	186003672
			10 × 50 mm	186008190	19 × 250 mm	186003673
			10 × 100 mm	186008191	30 × 50 mm	186003674
			10 × 150 mm	186008192	30 × 100 mm	186003675
			10 × 250 mm	186008193	30 × 150 mm	186003676
			19 × 10 mm	186004470*[1]	30 × 250 mm	186003677
			19 × 50 mm	186003630	30 × 10 mm	186006882*[3]
			19 × 100 mm	186003631		
			19 × 150 mm	186003946		

*Guard Cartridge.
[1] Requires 10 × 10 mm Prep Guard Holder, p/n: 289000779.
[2] Requires 19 × 10 mm Prep Guard Holder, p/n: 186000709.
[3] Requires 30 × 10 mm Prep Guard Holder, p/n: 186006912.

ACQUITY UPLC Peptide CSH C_{18} Columns and Kits

	Dimension	Column P/N	Kit P/N[1]
	Particle Size: 1.7 µm		
CSH C_{18}, 130Å	1.0 × 50 mm	186006933	176003061
	1.0 × 100 mm	186006934	176003062
	1.0 × 150 mm	186006935	176003063
	2.1 × 50 mm	186006936	176003064
	2.1 × 100 mm	186006937	176003065
	2.1 × 150 mm	186006938	176003066

[1] Kit includes Peptide CSH C_{18}, 130Å Column plus one vial of Cytochrome *c* Digestion Standard, p/n: 186006371.

ACQUITY UPLC Peptide CSH C_{18} Method Validation Kits*

	Dimension	Column P/N	Kit P/N[1]
	Particle Size: 1.7 µm		
CSH C_{18}, 130Å	2.1 × 150 mm	186006940	176003068

*Each Method Validation Kit contains 3 columns, each from a different batch.
[1] Kit includes Peptide CSH C_{18}, 130Å Column plus one vial of Cytochrome *c* Digestion Standard, p/n: 186006371.

ACQUITY UPLC Peptide CSH C_{18} VanGuard Columns

	Dimension	Column P/N	Kit P/N[1]
	Particle Size: 1.7 µm		
CSH C_{18}, 130Å	2.1 × 50 mm	186006939	176003067

[1] Kit includes Peptide CSH C_{18}, 130Å Column plus one vial of Cytochrome *c* Digestion Standard, p/n: 186006371.

XSelect Peptide CSH C_{18} Columns and Kits

	Dimension	Column P/N	Kit P/N[1]	Dimension	Column P/N	Kit P/N[1]	Dimension	P/N (1/pk)
	Particle Size: 2.5 µm			Particle Size: 3.5 µm			Particle Size: 5 µm	
CSH, C_{18}, 130Å	2.1 × 50 mm *XP*	186006941	176003069	2.1 × 10 mm[2,4]	186006954	176003081	4.6 × 50 mm	186007076
	2.1 × 100 mm *XP*	186006942	176003070	2.1 × 50 mm	186006950	176003077	4.6 × 100 mm	186007077
	2.1 × 150 mm *XP*	186006943	176003071	2.1 × 100 mm	186006951	176003078	4.6 × 150 mm	186007078
	4.6 × 50 mm *XP*	186006946	176003074	2.1 × 150 mm	186006952	176003079	10 × 10 mm*	186007015
	4.6 × 100 mm *XP*	186006947	176003075	4.6 × 20 mm[3,4]	186006958	176003085	10 × 50 mm*	186008264
	4.6 × 150 mm *XP*	186007038	176003093	4.6 × 50 mm	186006955	176003082	10 × 100 mm*	186008265
				4.6 × 100 mm	186006956	176003083	10 × 150 mm*	186008266
				4.6 × 150 mm	186006957	176003084	10 × 250 mm*	186008267
							19 × 10 mm*	186007019**
							19 × 50 mm*	186007022
							19 × 100 mm*	186007020
							19 × 150 mm*	186007021
							19 × 250 mm*	186007031
							30 × 50 mm*	186007026
							30 × 100 mm*	186007025
							30 × 150 mm*	186007023
							30 × 250 mm*	186007024
							50 × 50 mm*	186007030
							50 × 100 mm*	186007027
							50 × 150 mm*	186007028
							50 × 250 mm*	186007029

* OBD Column.
** Requires 19 × 10 mm Cartridge Holder, p/n: 186000709.
[1] Kit includes Peptide CSH C_{18}, 130Å Column plus one vial of Cytochrome c Digestion Standard, p/n: 186006371.
[2] Requires 2.1 × 10 mm Universal Sentry Guard Holder, p/n: WAT097958.
[3] Requires 4.6 × 20 mm Universal Sentry Guard Holder, p/n: WAT046910.
[4] 2/pk.

ACQUITY UPLC Peptide CSH C_{18} Columns and Kits*

	Dimension	Column P/N	Kit P/N[1]	Dimension	Column P/N	Kit P/N[1]
	Particle Size: 2.5 µm			Particle Size: 3.5 µm		
CSH C_{18}, 130Å	2.1 × 100 mm	186006945	176003073	2.1 × 100 mm	186006953	176003080
	4.6 × 100 mm	186006966	176003076	4.6 × 100 mm	186006959	176003086

*Each Method Validation Kit contains 3 columns, each from a different batch.
[1] Kit includes Peptide CSH C_{18}, 130Å Column plus one vial of Cytochrome c Digestion Standard, p/n: 186006371.

XSelect Peptide CSH C_{18} VanGuard Pre-Column

	Dimension	Column P/N	Kit P/N[1]
	Particle Size: 2.5 µm		
CSH, C_{18}, 130Å	2.1 × 100 mm	186006944	176003072

[1] Kit includes Peptide CSH C_{18}, 130Å Column plus one vial of Cytochrome c Digestion Standard, p/n: 186006371.

Purification and Isolation Cartridge Holders and Replacement O-rings

Description	Qty.	P/N
10 × 10 mm Cartridge Holder	1/pk	289000779
19 × 10 mm Cartridge Holder	1/pk	186000709
Replacement O-ring 7.8 mm	2/pk	700001019
Replacement O-ring 10 mm	2/pk	700001436

ACQUITY UPLC HSS T3 Columns and Kits

	Dimension	Column P/N	Kit P/N[1]
	Particle Size: 1.8 µm		
HSS T3, 100Å	1.0 × 50 mm	186008751	176003992
	1.0 × 100 mm	186008752	176003993
	1.0 × 150 mm	186008753	176003994
	2.1 × 50 mm	186008754	176003995
	2.1 × 100 mm	186008755	176003996
	2.1 × 150 mm	186008756	176003997

[1]Kit includes Peptide HSS T3 Column plus one vial of Cytochrome c Digestion Standard, p/n: 186006371.

ACQUITY UPLC HSS T3 VanGuard Column

	Dimension	P/N
	Particle Size: 1.8 µm	
HSS T3, 100Å	2.1 × 5 mm	186008757

ACQUITY UPLC HSS T3 Method Validation Kits*

	Dimension	P/N
	Particle Size: 1.8 µm	
HSS T3, 100Å	2.1 × 150 mm	186008782

*Each Method Validation Kit contains 3 columns, each from a different batch.

XSelect HSS T3 Columns

	Dimension	Column P/N	Kit P/N[1]	Dimension	Column P/N	Kit P/N[1]
	Particle Size: 2.5 µm			Particle Size: 5 µm		
HSS T3, 100Å	2.1 × 50 mm	186008758	176003998	2.1 × 50 mm	186008774	176004016
	2.1 × 100 mm	186008759	176003999	2.1 × 100 mm	186008775	176004017
	2.1 × 150 mm	186008760	176004006	2.1 × 150 mm	186008776	176004018
	4.6 × 50 mm	186008762	176004007	4.6 × 50 mm	186008778	176004019
	4.6 × 100 mm	186008763	176004008	4.6 × 100 mm	186008779	176004020
	4.6 × 150 mm	186008764	176004009	4.6 × 150 mm	186008780	176004021

[1]Kit includes Peptide HSS T3 Column plus one vial of Cytochrome c Digestion Standard, p/n: 186006371.

XSelect HSS T3 VanGuard Columns

	Dimension	P/N	Dimension	P/N
	Particle Size: 2.5 µm		Particle Size: 5 µm	
HSS T3, 100Å	2.1 × 5 mm	186008761	2.1 × 5 mm	186008777
	3.9 × 5 mm	186008765	3.9 × 5 mm	186008781

XSelect Peptide HSS T3 Method Validation Kits*

	Dimension	P/N	Dimension	P/N	Dimension	P/N
	Particle Size: 2.5 µm		Particle Size: 3.5 µm		Particle Size: 5 µm	
HSS T3, 100Å	2.1 × 150 mm	186008783	2.1 × 150 mm	186008785	2.1 × 150 mm	186008787
	4.6 × 150 mm	186008784	4.6 × 150 mm	186008786	4.6 × 150 mm	186008788

*Each Method Validation Kit contains 3 columns, each from a different batch.

DID YOU KNOW...

HSS T3 products will be available Q1 2017.

Contact your local sales representative for more information.

BENCHMARKING, METHOD DEVELOPMENT, AND TROUBLESHOOTING: CYTOCHROME *c* DIGESTION STANDARD

The Cytochrome *c* Digestion Standard was prepared by digesting Bovine Heart Cytochrome *c* (UniProt #P62894) with sequencing-grade trypsin. Recommended for benchmarking system performance, this standard is also used to quality-control test the column.



Ordering Information

Cytochrome *c* Digestion Standard

Description	P/N
Cytochrome *c* Digestion Standard	186006371

THERAPEUTIC PEPTIDE METHOD DEVELOPMENT KIT

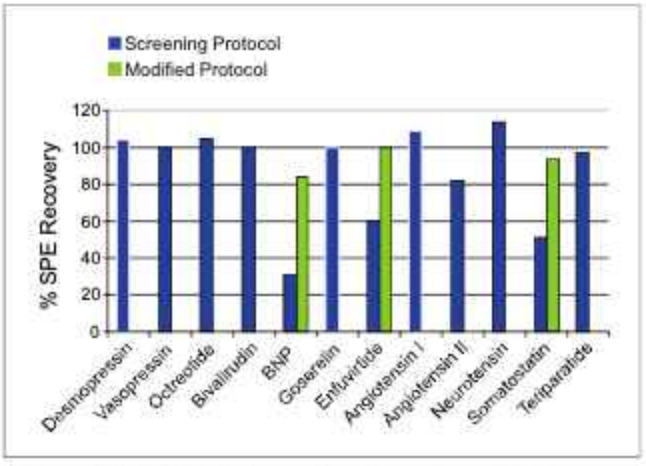
We developed the Therapeutic Peptide Method Development Kit to simplify sample preparation and also for developing LC methods for analyzing therapeutic peptides in plasma. The kit contains an Oasis Peptide µElution Method Development Plate, a peptide C_{18}, 300Å reversed-phase column and the detailed screening protocol used to generate data. We also created a comprehensive method development training seminar. The seminar addresses all aspects of the method development process, from MS conditions to the final validation of a method for extracting the peptide Desmopressin from human plasma.



Our peptide columns are quality-control tested using a cytochrome *c* tryptic digest, helping to ensure batch-to-batch consistency in validated methods. They are ideally suited for separating a wide range of peptides: large and small, acidic and basic, hydrophilic and hydrophobic.

Visit **www.waters.com/pepkit** for more information, or contact your local Waters sales office.

High Recovery of Peptides



The innovative Oasis µElution Plate format allows for as much as a 15-fold increase in the concentration of sample, increasing the possibility of reaching the required sensitivity levels for bioanalytical assays. The low, 25 µL, elution volume eliminates the need for evaporation and reconstitution, significantly reducing the potential loss of analyte by its adsorption to the walls of the collection plate, chemical instability, or both.

Ordering Information

Therapeutic Peptide Method Development Kits

Description	Qty./Box	P/N
UPLC Therapeutic Peptide Method Development Kit		176001835
Oasis µElution Method Development Plate	1	186004713
ACQUITY UPLC Peptide BEH C_{18}, 300Å, 1.7 µm, 2.1 × 50 mm Column	1	186003685
96-well 1 mL Collection Plate and Cap Mat	3	600001043
HPLC Peptide Therapeutic Peptide Method Development Kit		176001836
Oasis µElution Method Development Plate	1	186004713
XBridge Peptide BEH C_{18}, 300Å, 3.5 µm, 2.1 × 50 mm Column	1	186003607
96-well 1 mL Collection Plate and Cap Mat	3	600001043
Available Waters Products Not Included in Kit:		
Oasis MAX 96-well µElution Plate	1	186001829
Oasis WCX 96-well µElution Plate	1	186002499
96-well 1 mL Collection Plate	50	186002481
Cap Mats for 1 mL Collection Plate	50	186002483
Disposable Reservoir Tray	25	WAT058942
Extraction Manifold for 96-well Plates	1	186001831
Vacuum Box Gasket Kit (includes foam top gaskets and orange O-rings)	2	186003522
SPE Vacuum Pump 115 V, 60 Hz	1	725000417
SPE Vacuum Pump 240 V, 50 Hz	1	725000418

BENCHMARKING, METHOD DEVELOPMENT, AND TROUBLESHOOTING: MASSPREP PEPTIDE STANDARD

The MassPREP Peptide Standard Mixture contains a void volume (VO) column marker and nine, carefully selected peptides, each with a broad range of polarities and isoelectric points. The MassPREP Peptide Standard is useful for testing UPLC and HPLC columns and systems dedicated to peptide separations.

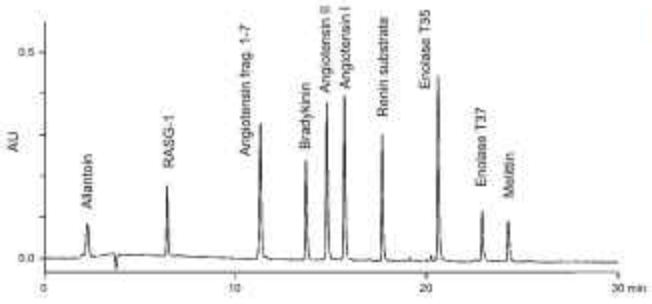


Ordering Information

MassPREP Peptide Standards

Description	P/N
MassPREP Peptide Mixture	186002337
MassPREP Peptide Mixture, 5/pk	186002338
Quantitative Peptide Standard PN	186006555

Baseline HPLC Resolution of Nine Peptides Contained in MassPREP Peptide Standard Mixture



Peak #	Component Name	Molecular Weight* (g/mol)	pK_a	Peptide Sequence
1	Allantoin (V_o marker)	158.0440	–	–
2	RASG-1	1000.4838	9.34	RGDSPASSKP
3	Angiotensin frag.1-7	899.4661	7.35	DRVYIHP
4	Bradykinin	1059.5613	12.00	RPPGFSPFR
5	Angiotensin II	1045.5345	7.35	DRVYIHPF
6	Angiotensin I	1295.6775	7.01	DRVYIHPFHL
7	Renin substrate	1757.0253	7.01	DRVYIHPFHLLVYS
8	Enolase T35	1871.0604	7.34	WLTGPQLADLYHSLMK
9	Enolase T37	2827.2806	3.87	YPIVSIEDPFAEDDWEAWSHFFK
10	Melittin	2845.7381	12.00	GIGAVLKVLTTGLPALISWIKRKRQQ

Peptide Analysis on a BioSuite™ C_{18}, 3 µm, 2.1 × 150 mm Column; Eluent A: 0.02% TFA in water; Eluent B: 0.018% TFA in acetonitrile; Gradient: 0–50% B in 30 minutes; Flow: 0.20 mL/min.; Temp: 40 °C.

*Monoisotopic molecular weight.

Waters offers a variety of carefully formulated, quality-control tested peptide standards that help confirm the performance of a column and LC system before you use it to analyze valuable samples.

PHOSPHORYLATED PEPTIDE STANDARDS AND SAMPLE PREPARATION KITS

By offering the option to use pure peptides the MassPREP Phosphopeptide Standards provide you the means to exercise greater control over sample preparation. In addition, the MassPREP Phosphopeptide Enrichment Kit allows for selective enrichment of phosphopeptides from complex matrices.



Ordering Information

MassPREP Phosphopeptide Standards and Kits

Description	P/N
MassPREP Phosphopeptide Standard Enolase	186003285
MassPREP Enolase Digest with Phosphopeptides Mix	186003286
MassPREP Phosphopeptide Sample Kit—Enolase	186003287
MassPREP Phosphopeptide Enrichment Kit	186003864
MassPREP Phosphopeptide enrichment µElution plate	186003820
MassPREP Enhancer (5 vials)	186003863

For the complete offering of MassPREP Digestion Standards please visit asr.waters.com

DELTA-PAK HPLC AND UHPLC COLUMNS

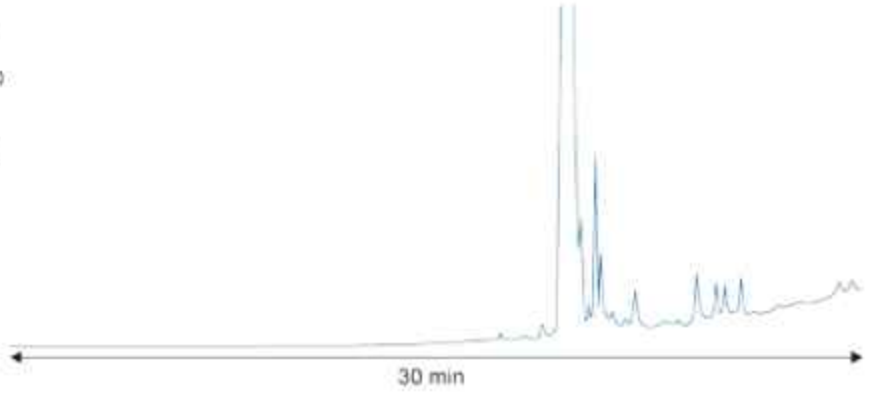
Our Delta-Pak packings are based on a highly stable 5 or 15 µm spherical silica that is bonded and end-capped. As such, they are ideal for separating peptides, proteins, and natural products. We offer Delta-Pak packings in different pore-size materials (100Å and 300Å) and with a C_{18} or C_4 bonded phase. Visit **waters.com/biosep** for more information.

Synthetic Peptide Separation on Delta-Pak C_{18} HPLC Column

Conditions:

Column:	Delta-Pak C_{18}, 300Å, 5 µm, 3.9 × 150 mm
Part number:	WAT011793
Sample:	Synthetic peptide-neurotensin (5 mg/mL)
Injection:	10 µL (50 µg)
Mobile phase A:	Water with 0.1% trifluoroacetic acid
Mobile phase B:	Acetonitrile with 0.1% trifluoroacetic acid
Gradient:	0–2 min, 5% B
Conditions:	2–27 min, 5–9% B, 30–31 min, 90–5% B
Flow rate:	1 mL/min
Detection:	UV @ 230 nm

Note: Waters Delta-Pak C_{18}, 300Å Columns (available in 5 and 15 µm particle sizes) are well suited for the analysis and laboratory-scale isolation of synthetic peptide mixtures.



Ordering Information

Delta-Pak Analytical HPLC and UHPLC Columns and Guards

Dimension	Type	Particle Size	Pore Size	Delta-Pak C_{18}	Delta-Pak C_4
2.1 × 150 mm	Column	5 µm	300Å	WAT023650	—
3.9 × 20 mm	Guard, 2/pk	5 µm	100Å	WAT046880[1]	WAT046875[1]
3.9 × 20 mm	Guard, 2/pk	5 µm	300Å	WAT046890[1]	WAT046885[1]
3.9 × 20 mm	Guard, 10/pk	5 µm	100Å	WAT036870[1]	—
3.9 × 150 mm	Column	5 µm	100Å	WAT011795	WAT011796
3.9 × 150 mm	Cartridge, 10/pk	5 µm	300Å	WAT036875[2]	WAT036865[2]
3.9 × 150 mm	Column	5 µm	300Å	WAT011793	WAT011794
Guard-Pak Holder					WAT088141
Guard-Pak In-Line Filters, 5/pk					WAT032472

[1] Requires 3.9 × 20 mm/4.6 × 20 mm Universal Sentry Guard Holder, p/n: WAT046910.
[2] Requires Guard-Pak Holder, p/n: WAT088141.

Delta-Pak Preparative HPLC and UHPLC Guard Columns

Dimension	Type	Particle Size	Pore Size	Delta-Pak C_{18}	Delta-Pak C_4
3.9 × 300 mm	Column	15 µm	100Å	WAT011797	WAT011807
3.9 × 300 mm	Column	15 µm	300Å	WAT011802	WAT011812
7.8 × 300 mm	Column	15 µm	100Å	WAT011798	WAT011808
7.8 × 300 mm	Column	15 µm	300Å	WAT011803	WAT011813
19 × 300 mm	Column	15 µm	100Å	WAT011799	WAT011809
19 × 300 mm	Column	15 µm	300Å	WAT011804	WAT011814
30 × 300 mm	Column	15 µm	100Å	WAT011800	WAT011810
30 × 300 mm	Column	15 µm	300Å	WAT011805	WAT011815
50 × 300 mm	Column	15 µm	100Å	WAT011801	—

Delta-Pak Radial Compression Preparative HPLC and UHPLC Column Segments and PrepPak Cartridges*

Dimension	Type	Particle Size	Pore Size	Delta-Pak C_{18}	Delta-Pak C_4
8 × 100 mm	Column	15 µm	100Å	WAT025846	WAT025848
8 × 100 mm	Column	15 µm	300Å	WAT025845	—
25 × 100 mm	Column	15 µm	100Å	WAT038506	WAT038508
25 × 100 mm	Column	15 µm	300Å	WAT038507	WAT038509
25 × 10 mm	Guard, 2/pk	15 µm	100Å	WAT038520	WAT038524
25 × 10 mm	Guard, 2/pk	15 µm	300Å	WAT038522	WAT038526
40 × 100 mm	Column	15 µm	100Å	WAT037688	WAT037696
40 × 100 mm	Column	15 µm	300Å	WAT037692	WAT037700
40 × 10 mm	Guard, 2/pk	15 µm	100Å	WAT037842	—
40 × 10 mm	Guard, 2/pk	15 µm	300Å	WAT037845	WAT037851

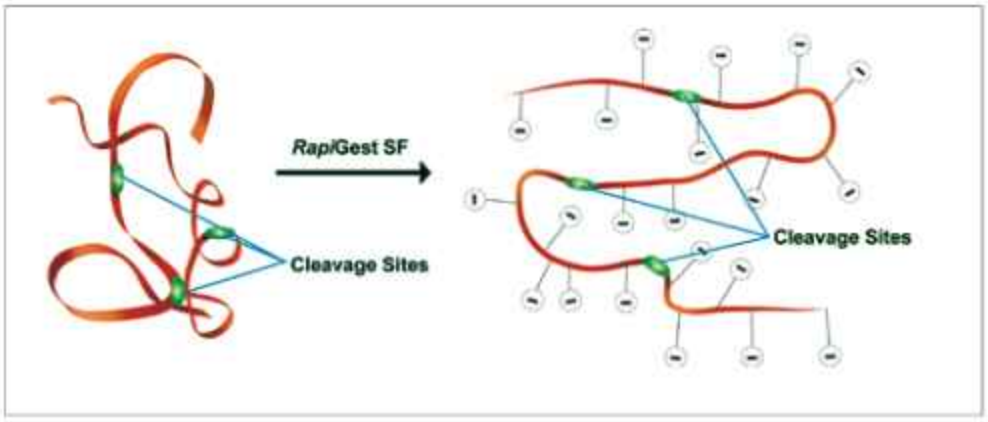
*All column segments and cartridges require the appropriate holder/module.

*Rapi*Gest SF SURFACTANT FOR PROTEIN DIGESTIONS



*Rapi*Gest SF (surfactant) radically enhances the speed and recovery of protein enzymatic digestions. A patented, anionic surfactant, *Rapi*Gest accelerates the production of peptides generated by proteases, such as trypsin, Asp-N, Glu-C, and Lys-C. Many hydrophobic proteins resist proteolysis because their cleavage sites are inaccessible to endoproteases. *Rapi*Gest, a mild denaturant, helps solubilize and unfold proteins, rendering them more easily cleaved without denaturing or inhibiting common proteolytic enzymes.

How *Rapi*Gest SF Works



Waters RapiGest SF accelerates the in-solution production of peptides generated by proteases such as trypsin, Asp-N, Glu-C, and Lys-C.

Ordering Information

*Rapi*Gest Surfactant

Description	P/N
*Rapi*Gest SF 1 mg vial	186001860
*Rapi*Gest SF 1 mg vial (5/pk)	186001861
*Rapi*Gest SF 3 mg vial	186008090
*Rapi*Gest SF 10 mg vial	186002123
*Rapi*Gest SF 50 mg vial	186002122
*Rapi*Gest SF Custom	186002118

DID YOU KNOW...

We offer a wide variety of quantitative peptide standards.

Visit asr.waters.com to find out more.

Protein Separations

Many of today's leading pharmaceutical drugs are protein based with monoclonal antibodies, biosimilars, and antibody drug conjugates leading an extensive list of internationally approved drug entities. Consequently, comprehensive LC and LC-MS protein characterization methods are necessary to help ensure the efficacy and safety of these biotherapeutics. These methods frequently involve the use of orthogonal separation techniques that include size exclusion, ion exchange, hydrophobic interaction, as well as hydrophilic interaction chromatography. HPLC methods are well recognized for their ability to resolve compounds of similar composition. However, the synergistic use of LC columns containing sub-2-µm particles on instruments designed to maintain enhanced component resolution have resulted in the ability to generate higher quality and more detailed information.

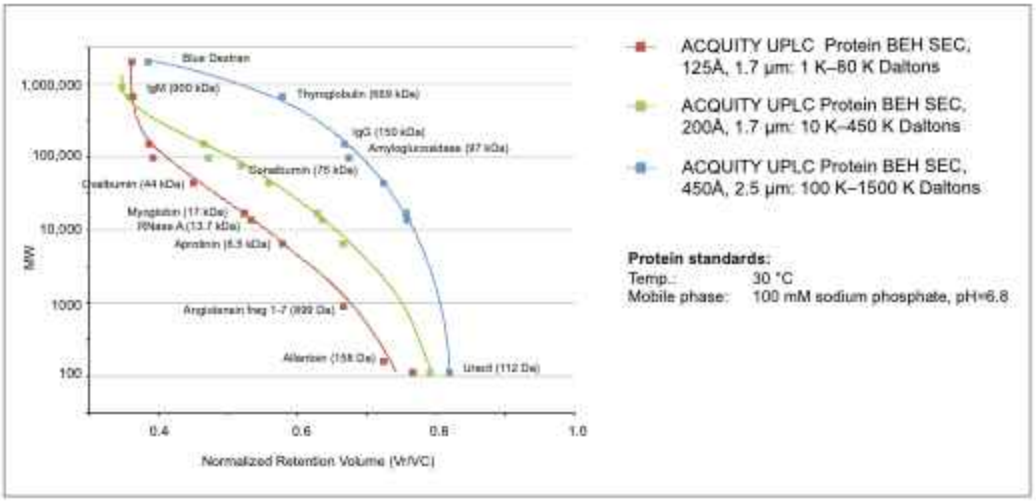
ACQUITY UPLC SEC SYSTEM SOLUTION

The performance capabilities of our ACQUITY UPLC Technology surpasses those of traditional LC separations, proving itself a major asset in increasing the productivity of laboratories around the world. The latest addition to the application-driven, UPLC portfolio is the ACQUITY UPLC SEC System Solution, enabled by our unique ethylene-bridged-hybrid (BEH), diol-coated, particle technology. That technology offers these benefits:

- The ability to determine aggregation levels in therapeutic monoclonal antibodies as much as 10× faster than traditional HPLC-based size-exclusion chromatography (SEC)
- A fully optimized column chemistry that significantly reduces the requirement for mobile phases of high-salt concentration
- Tested using BEH protein standards, ensuring unmatched batch-to-batch consistency and increased confidence in validated methods
- For 125Å, 200Å, and 450Å SEC columns, Waters Protein Standard Mixes provide additional validation (p/n: 186006519, 186006518, and 186006842, respectively)

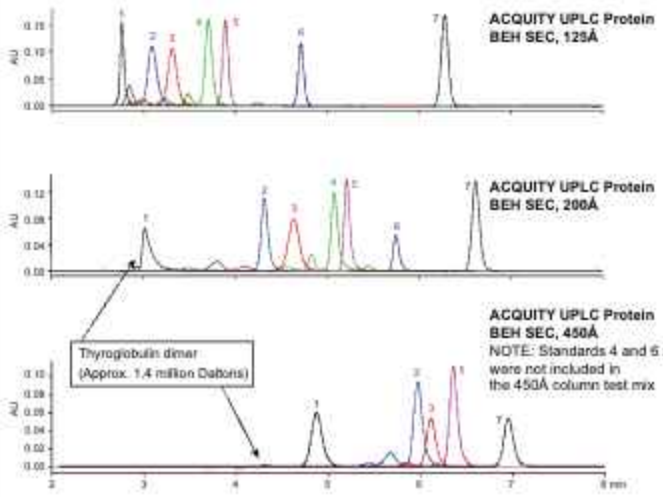
UPLC Technology improves the quality of collected data while increasing sample throughput and productivity. If you manufacture biotherapeutics or biosimilars, you can now choose the most appropriate Protein BEH SEC Column (i.e., 125Å, 200Å, and 450Å pore size) to satisfy your application requirements.

Calibration Curves on ACQUITY UPLC Protein BEH SEC, 125Å, 200Å, and 450Å Columns



Size-exclusion chromatography (SEC) separates compounds according to, primarily, their relative size in solution. Calibration curves for UPLC-based SEC columns describe how various pore sizes perform with defined protein and peptides of known molecular weight.

Separation of Protein and Peptide Standards on ACQUITY UPLC Protein BEH SEC, 125Å, 200Å, and 450Å Columns



Columns	ACQUITY UPLC Protein BEH SEC, 125Å, 1.7 µm; ACQUITY UPLC Protein BEH SEC, 200Å, 1.7 µm	ACQUITY UPLC Protein BEH SEC, 450Å, 2.5 µm
Column configuration	4.6 × 150 mm	
Mobile phase	100 mM Sodium Phosphate Buffer, pH 6.8	
Weak needle wash	100% Milli-Q Water	
Strong needle wash	100% Milli-Q Water	
Seal wash	90/10 water/methanol	
Samples: Diluted in mobile phase	Thyroglobulin 0.3 mg/mL, BSA 0.3 mg/mL, Ovalbumin 0.3 mg/mL, Carbonic Anhydrase 0.3 mg/mL, Myoglobin 0.3 mg/mL, Angiotensin Frag. 1–7 0.1 mg/mL, Uracil 0.1 mg/mL	Thyroglobulin 3 mg/mL, BSA 5 mg/mL, Ovalbumin 3 mg/mL, Myoglobin 3 mg/mL, Uracil 0.1 mg/mL
Injection vol.	2 µL, Full Loop	
Flow rate	0.3 mL/min	
Column temp.	ambient	
Detection wavelength	UV @ 220 nm	UV @ 280 nm

Compounds:

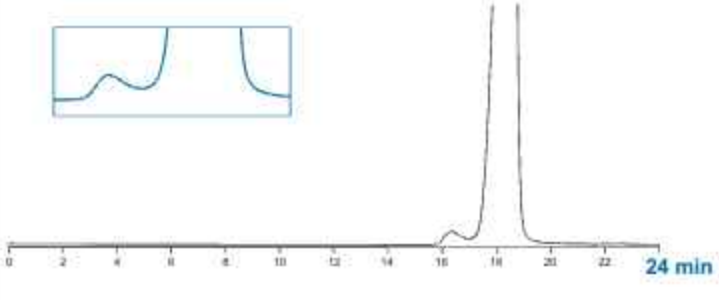
1. Thyroglobulin (670 K)
2. BSA (66 K)
3. Ovalbumin (44 K)
4. Carbonic Anhydrase (29 K)
5. Myoglobin (17 K)
6. Angiotensin Frag 1-7 (899 K)
7. Uracil (112)

Waters offers a family of BEH-based, diol-coated SEC columns of varying pore size to address the molecular weight range of analytes to be separated.

SEC Analysis of Insulin

Size-exclusion chromatography is the USP and EP standard method for analyzing covalent HMW insulin in therapeutic preparations. Compared with traditional HPLC-based SEC methods, a Waters Protein BEH SEC, 125Å, 1.7 µm Column, when used with Waters UltraPerformance LC® instrumentation (shown below), significantly improves the resolution of insulin components. Moreover, it does so as it reduces analysis time and use of mobile phase.

Insulin Analyses by Traditional HPLC-SEC vs. UPLC-SEC



Conditions:

Column:	Waters Insulin HMWP SEC, 125Å, 10 µm, 7.8 × 300 mm
Part number:	WAT201549
Sample:	Insulin, human recombinant (Sigma I-2643) (4 mg/mL)
Injection:	100 µL
Eluent:	L-arginine (1 gm/liter)/acetic acid/acetonitrile (65/15/20, v/v/v)
Flow:	0.5 mL/min (isocratic)
Detection:	UV @ 276 nm

Waters Alliance HPLC System



Conditions:

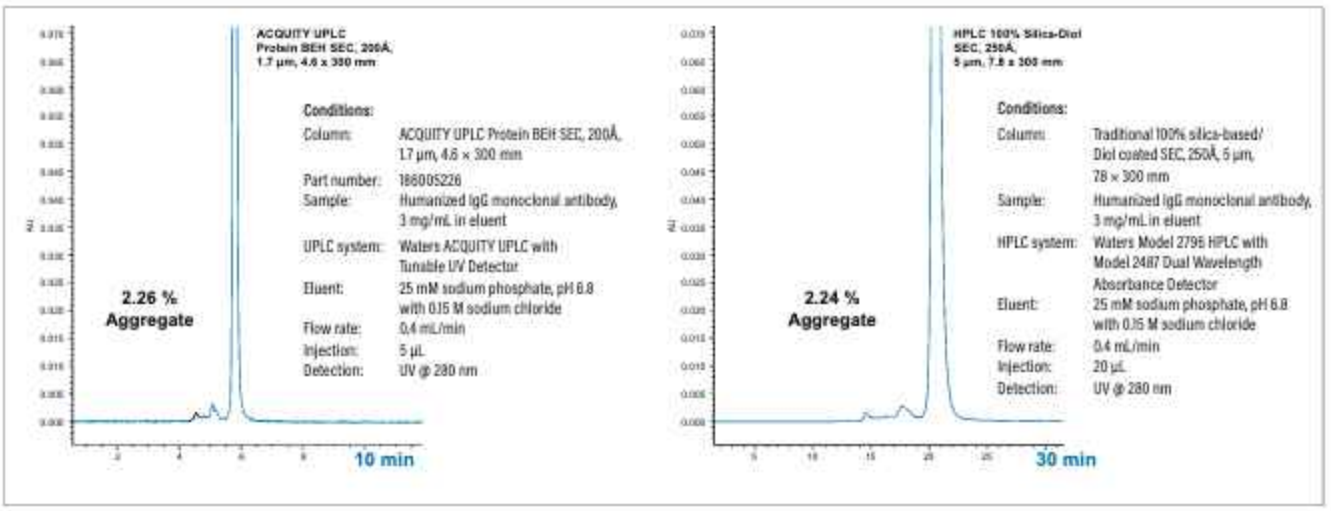
Column:	Waters ACQUITY UPLC Protein BEH SEC, 125Å, 1.7 µm, 4.6 × 300 mm
Part number:	186006506
Sample:	Insulin, human recombinant (Sigma I-2643) (4 mg/mL)
Injection:	5 µL
Eluent:	L-arginine (1 gm/liter)/acetic acid/acetonitrile (65/15/20, v/v/v)
Flow:	0.4 mL/min (isocratic)
Detection:	UV @ 276 nm

Waters ACQUITY UPLC System



Compared with traditional HPLC-based SEC technology for the analysis of earlier-eluting insulin aggregates from desired monomer species, Waters ACQUITY UPLC BEH SEC Technology demonstrates improved component resolution in less time.

Comparative UPLC-Based SEC Benefits vs. Use of Traditional HPLC SEC for Biotherapeutic Characterization



Compared with traditional HPLC-based SEC technology, Waters ACQUITY UPLC BEH SEC Technology delivers a comparable determination of mAb aggregate vs. monomer content in significantly less time, promoting higher sample throughput.

WATERS INSULIN HMWP HPLC AND UHPLC COLUMNS

We designed our Insulin HMWP Column for use in the manufacture and quality control of insulin products. This column is tested for its performance analyzing impurities whose molecular masses exceed that of insulin.

Ordering Information

Waters Insulin HMWP SEC HPLC and UHPLC Columns

Description	Dimension	P/N
Waters Insulin HMWP Column	7.8 × 300 mm	WAT201549
Protein-Pak 125 Sentry Guard Column, 2/pk (requires holder)	3.9 × 20 mm	186000926
Sentry Universal Guard Column Holder	—	WAT046910

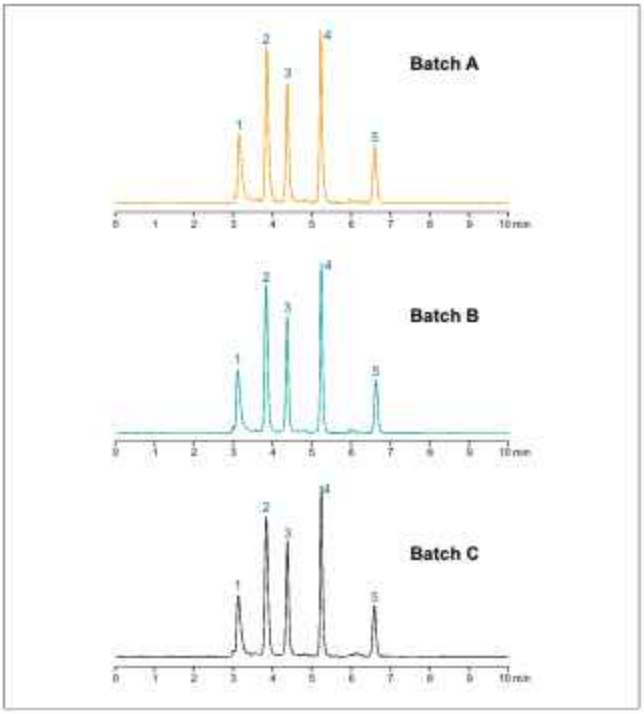
Tested to perform in the method published in PharmaEuropa Vol. 8, No. 3, September 1996.

Stringent Manufacturing Quality Assurance Delivers Confidence in Results

We synthesize all chemistries for our ACQUITY UPLC Columns from high-quality raw materials in state-of-the-art, ISO-certified manufacturing facilities. The chemistries are extensively quality-control tested throughout their synthesis. In addition, we test each batch of Protein BEH SEC, 200Å, 1.7 µm material using relevant proteins, to help ensure batch-to-batch consistency. Thus we earn your supreme confidence in the efficacy of our columns when used for validated methods.



Waters ISO 2001 Manufacturing and Testing Processes Help Ensure Outstanding ACQUITY UPLC Protein BEH SEC, 200Å, 1.7 µm Batch-to-Batch Reproducibility



Waters BEH Protein Standards (125Å, 200Å, and 450Å formulated mixtures) are used to in quality-control testing of our Protein BEH SEC columns, helping to ensure consistent batch-to-batch and column-to-column performance.

Ordering Information

ACQUITY UPLC Protein BEH SEC Columns and Kits

	Dimension	Column P/N	Kit P/N[1]
	Particle Size: 2.5 µm		
BEH SEC, 450Å	4.6 × 150 mm	186006851	176002996
	4.6 × 300 mm	186006852	176002997
	4.6 × 30 mm	186006850*	–

*Guard column.
[1] Kit includes Peptide BEH SEC, 450Å Column plus one vial of BEH450 SEC Standard, p/n: 186006642.

	Particle Size: 1.7 µm		
BEH SEC, 200Å	2.1 × 150 mm	186008471	–
	4.6 × 150 mm	186005225	176003904
	4.6 × 300 mm	186005226	176003905
	4.6 × 30 mm	186005793*	–

*Guard column.
[1] Kit includes Peptide BEH SEC, 200Å Column plus one vial of BEH200 SEC Standard, p/n: 186006518.

BEH SEC, 125Å	**Particle Size: 1.7 µm**		
	4.6 × 150 mm	186006505	176003906
	4.6 × 300 mm	186006506	176003907
	4.6 × 30 mm	186006504*	–

*Guard column.
[1] Kit includes Peptide BEH SEC, 125Å Column plus one vial of BEH125 SEC Standard, p/n: 186006519.

Tubing

Description	P/N
ELSD Outlet Tubing (0.004" I.D. × 6" length)	430001562
0.005 × 1.75" SEC UPLC Connection Tubing, 2/pk	186006613

XBRIDGE PROTEIN BEH SEC, 125Å, 200Å, AND 450Å COLUMNS AND PROTEIN STANDARD TEST MIXTURES

We developed our series of XBridge Protein BEH SEC, 125Å, 200Å, or 450Å, 3.5 µm Columns to complement our line of UPLC-based SEC offerings. These columns are for use with traditional HPLC-based instrumentation and methods for peptide or protein size-exclusion chromatography. The Ethylene-Bridged Hybrid (BEH)-based particle technology and diol-bonded surface coating are identical to those used for the HPLC- and UHPLC-based SEC chemistries in our UPLC-based SEC columns. Thus you can easily transfer methods based on laboratory instrumentation and component resolution or sample throughput needs.

All of Waters BEH-based SEC columns are manufactured in a cGMP, ISO 9001 certified facility that observes stringent manufacturing protocols and uses ultra-pure reagents. Each batch of manufactured material undergoes a series of standard quality-control measurements (e.g., particle and pore size distribution). Application-specific testing follows, using appropriate peptide and protein test mixtures. On every batch-approved, packed SEC column, we perform a packed-column efficiency test. The test further ensures the reproducible, batch-to-batch and column-to-column performance required for columns used in research or as part of a demanding, validated method.

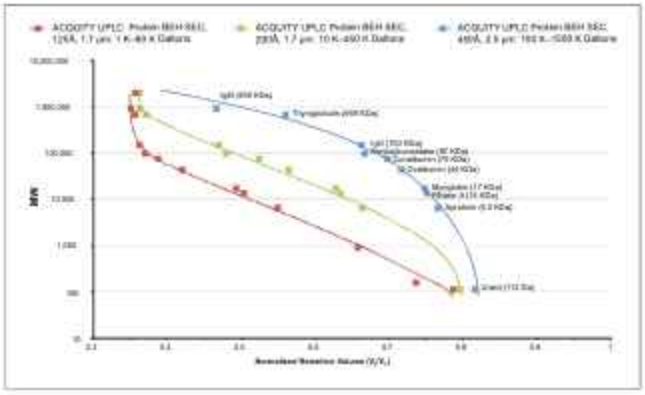


Following are some of the benefits that BEH-based SEC columns offer:

- Outstanding resolution of peptide and protein mixtures (from 1 to 1,000,000 Daltons) obtained on high-efficient, packed columns containing 35 µm particles or pores of 125Å, 200Å, or 450Å
- Compared with SEC columns containing 100% silica particles, BEH-based SEC columns are stable at pH values greater than 7 Moreover, they exhibit fewer undesired, secondary, ionic interactions between the SEC particle and a peptide or protein
- Each is shipped with Waters SEC Protein Standard Mix, to help you establish or confirm acceptable instrument and column performance

HPLC- and UHPLC-based columns complement existing UPLC-based SEC Columns, to assist in method transfers based on users' application and throughput needs

Calibration Curves on XBridge Protein BEH SEC, 125Å, 200Å, and 450Å Columns



Size-exclusion chromatography (SEC) separates compounds based, primarily, on their relative size in solution. Calibration curves on Waters HPLC-based, SEC Columns of different pore size, using defined protein and peptides of known molecular weight, help you select the most appropriate SEC column for a specific application.

BENCHMARKING, METHOD DEVELOPMENT, AND TROUBLESHOOTING: BEH SEC PROTEIN STANDARDS



We designed the BEH SEC Protein Standards to help benchmark sets of columns. Each standard contains carefully chosen proteins that are unique to the chemistry of the column set, a chemistry that we at Waters have incrementally and meticulously developed over many years. The standards are used as a quality control to test HPLC or UPLC columns. Thus they are an ideal choice for benchmarking a new column. Moreover, when run periodically, the standards afford you the opportunity to monitor column performance over time.

We offer standards for these columns:

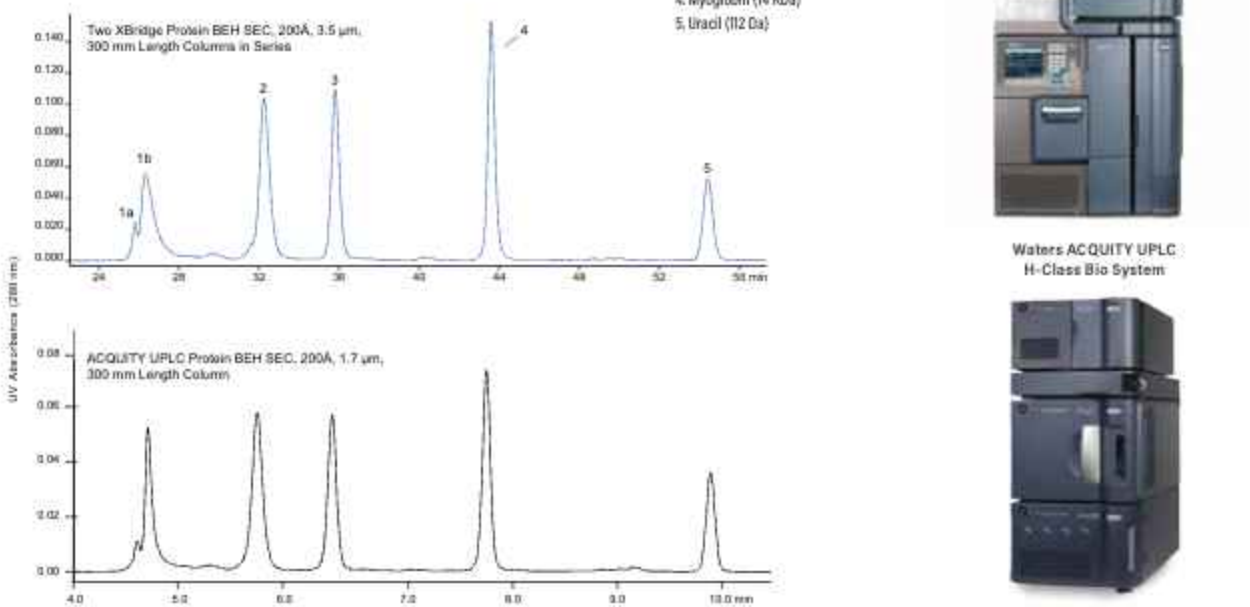
- ACQUITY UPLC and XBridge Protein BEH SEC, 125Å
- ACQUITY UPLC and XBridge Protein BEH SEC, 200Å
- ACQUITY UPLC and XBridge Protein BEH SEC, 450Å

Ordering Information

ACQUITY UPLC BEH SEC Protein Standards

Description	P/N
BEH125 SEC Protein Standard Mix	186006519
BEH200 SEC Protein Standard Mix	186006518
BEH450 SEC Protein Standard Mix	186006842

Scalable Separations Using UPLC- vs. HPLC-Based SEC Columns



Comparison of separations of Waters BEH200 SEC Protein Standard Mix (p/n: 186006518) on two XBridge Protein BEH SEC, 200Å, 3.5 µm HPLC Columns (300 mm length × 7.8 mm I.D.) run in series using an Alliance HPLC System (top panel) and on an ACQUITY UPLC Protein BEH SEC, 200Å, 1.7 µm Column (300 mm length × 4.6 mm I.D.) using an ACQUITY UPLC H-Class Bio System (bottom panel). The flow rates were scaled, on the basis of particle diameter and column I.D., to 0.42 mL/min for the two HPLC columns run in series, and 0.3 mL/min for the UPLC column. Sample loads were also adjusted, for column volume.

Ordering Information

XBridge Protein BEH SEC Columns and Guard Kits

	Dimension	Kit P/N[1]
	Particle Size: 3.5 µm	
BEH SEC, 450Å	7.8 mm × 30 mm	176003597*
	7.8 mm × 150 mm	176003598
	7.8 mm × 300 mm	176003599

*Guard column.
[1] Kit includes Peptide BEH SEC, 450Å Column plus one vial of BEH450 SEC Standard, p/n: 186006842.

	Particle Size: 3.5 µm	
BEH SEC, 200Å	7.8 mm × 30 mm	176003594*
	7.8 mm × 150 mm	176003595
	7.8 mm × 300 mm	176003596

*Guard column.
[1] Kit includes Peptide BEH SEC, 200Å Column plus one vial of BEH200 SEC Standard, p/n: 186006518.

	Particle Size: 3.5 µm	
BEH SEC, 125Å	7.8 mm × 30 mm	176003591*
	7.8 mm × 150 mm	176003592
	7.8 mm × 300 mm	176003593

*Guard column.
[1] Kit includes Peptide BEH SEC, 125Å Column plus one vial of BEH125 SEC Standard, p/n: 186006519.

Tubing and End-fittings

Description	P/N
Straight Connection Tubing and End-fittings for XBridge Protein BEH SEC Column	WAT022681
U-Bend Connection Tubing and End-fittings for XBridge Protein BEH SEC Column	WAT084080

PROTEIN BEH C_4, 300Å COLUMNS

Analyzing and characterizing protein samples requires the detection of small chemical differences between large molecules. Most often, such analyses have relied on an array of analytical techniques, each sensitive to a different property of the protein. Reversed-phase HPLC has not been fully exploited in these tests. The separation of proteins often yields relatively broad, asymmetrical peaks with poor recovery and significant carryover. To address these unsatisfactory results, we designed our reversed-phase, Ethylene-bridged Hybrid (BEH Technology) Protein Separation Technology Columns specifically for the high-resolution analysis of proteins.

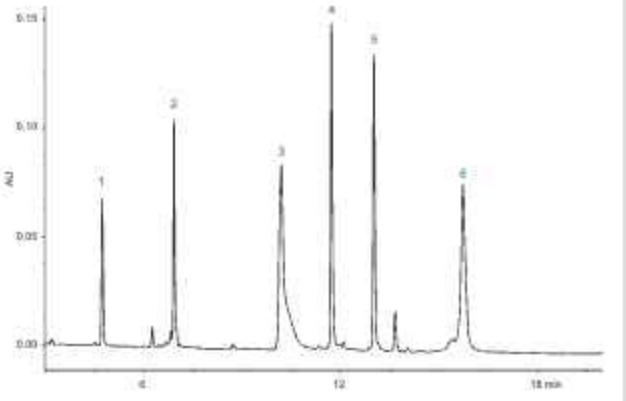
Our family of Protein BEH C_4, 300Å Columns for protein separations offer these benefits:

- They separate proteins of various sizes, hydrophobicities, and isoelectric points
- They maximize recovery and minimize protein carryover, owing to unique chemistries
- They tolerate extreme pH and temperature
- They address instrumentation and application needs (HPLC/UHPLC 3.5 µm column and UPLC 1.7 µm column)
- They are available, as preparative columns, in 5 and 10 µm particle sizes
- They are quality-control tested with MassPREP Protein Standard Mix (p/n: 186004900)
- They are compatible for use with ESI-MS, for protein identification



300Å C_4 Columns Developed for Protein Chromatography

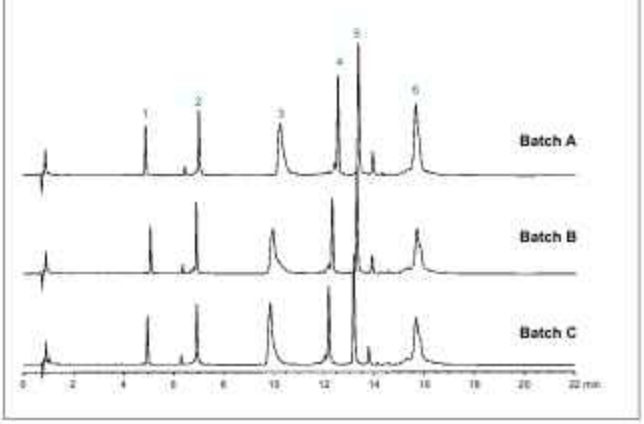
Conditions:		Compounds:	
Column:	XBridge Protein BEH C_4, 300Å, 3.5 µm, 2.1 × 50 mm	1. Ribonuclease A	0.04 mg/mL
Part number:	186004498	2. Cytochrome c	0.06 mg/mL
Sample:	MassPREP Protein Standard, 0.1% TFA in 5% acetonitrile	3. Bovine Serum Albumin	0.20 mg/mL
Part number:	186004900	4. Myoglobin	0.13 mg/mL
Mobile phase A:	0.1% trifluoroacetic acid in water	5. Enolase	0.22 mg/mL
Mobile phase B:	0.075% trifluoroacetic acid in 71.4% acetonitrile	6. Phosphorylase b	0.59 mg/mL
Flow rate:	0.2 mL/min		
Gradient:	28–100% B in 25 min		
Column temp.:	40 °C		
Injection:	5 µL		
Detection:	UV @ 220 nm		



Protein BEH C_4, 300Å Columns can be used with proteins of wide-ranging properties. This protein mix was chosen to represent a range of isoelectric points, molecular weights, and hydrophobicities.

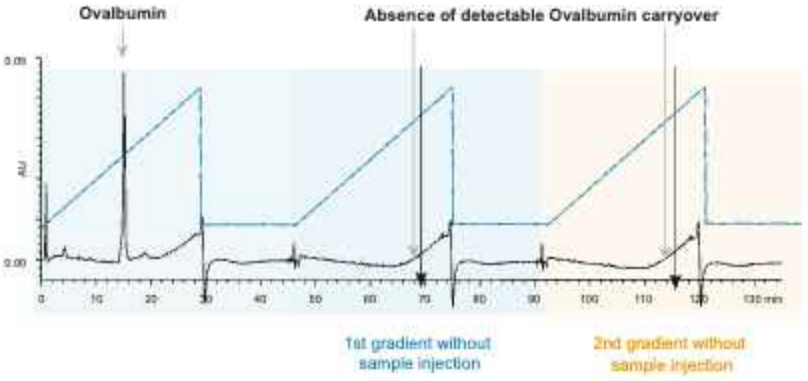
Batch-to-Batch Reproducibility

Conditions:		Compounds:
Column:	ACQUITY UPLC Protein BEH C_4, 300Å, 1.7 µm, 2.1 × 50 mm	1. Ribonuclease
Part number:	186004495	2. Cytochrome c
Sample:	MassPREP Protein Standard, 0.1% TFA in 5% acetonitrile	3. BSA
Part number:	186004900	4. Myoglobin
Eluent A:	0.1% trifluoroacetic acid in 100% HPLC grade water	5. Enolase
Eluent B:	0.075% trifluoroacetic acid in 71.4% acetonitrile	6. Phosphorylase b
Flow rate:	0.2 mL/min	
Gradient:	28–100% B in 25 min	
Column temp.:	40 °C	
Detection:	UV @ 220 nm	



We use the MassPREP Protein Standard Mixture to quality-control test ACQUITY UPLC Protein BEH C_4, 300Å Columns. The mixture helps ensure consistent batch-to-batch and column-to-column performance.

Minimal Protein Carryover

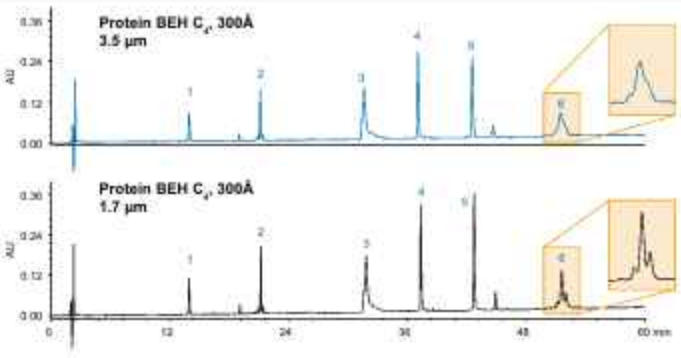


Conditions:

Columns:	ACQUITY UPLC Protein BEH C_4 300Å, 1.7 µm, 2.1 mm × 50 mm
Part number:	186004495
Sample:	1.3 µg Ovalbumin injected
Eluent A:	0.1% trifluoroacetic acid in 100% HPLC-grade water
Eluent B:	0.075% trifluoroacetic acid in 71.4% acetonitrile
Flow rate:	0.2 mL/min
Gradient:	28–100% B in 25 min, hold at 100 %B for 2 min then re-equilibrate column at 28% B for 18 min, gradient restarted at 45 min and at 90 min
Column temp.:	40 °C
Detection:	UV @ 220 nm

Column carryover was tested by running multiple gradients following a single injection. Protein peaks observed during the first gradient are not found in subsequent gradients.

Improved Protein Resolution with UPLC Technology



Conditions:

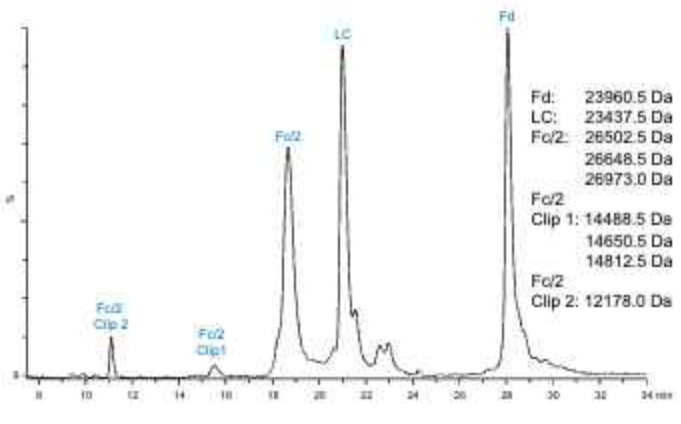
Columns:	ACQUITY UPLC Protein BEH C_4 300Å, 1.7 µm (top), 3.5 µm (bottom), 2.1 × 150 mm
Part numbers:	186004497 (1.7 µm); 186004500 (3.5 µm)
Sample:	MassPREP Protein Standard, 0.1% TFA in 5% acetonitrile
Part number:	186004900
Mobile phase A:	0.1% trifluoroacetic acid in water
Mobile phase B:	0.1% trifluoroacetic acid in 100% acetonitrile
Flow rate:	0.2 mL/min
Gradient:	20–55% B in 60 min
Column temp.:	80 °C
Injection:	3.3 µL
Detection:	UV @ 220 nm

Compounds:

1. Ribonuclease A	0.04 mg/mL
2. Cytochrome *c*	0.06 mg/mL
3. Bovine Serum Albumin	0.20 mg/mL
4. Myoglobin	0.13 mg/mL
5. Enolase	0.22 mg/mL
6. Phosphorylase b	0.59 mg/mL

Two separations were performed, traditional and UPLC. The traditional separation used a Protein BEH C_4 300Å Column packed with 3.5 µm particles. The UPLC separation used a Protein BEH C_4 300Å Column packed with 1.7 µm particles. The UPLC separation evidences sharper peaks for all proteins in the test mixture. The multiple peaks around phosphorylase, at approximately 50 minutes, attest to this improved resolution. The comparison was performed fitting both columns onto a UPLC system, to preserve the minimized band broadening. The benefits of the small-particle UPLC BEH C_4 300Å Column would be lost without the optimized ACQUITY UPLC System.

Protein BEH C_4 300Å Columns for Protein Characterization with UPLC-MS



Conditions:

Column:	ACQUITY UPLC Protein BEH C_4 300Å, 1.7 µm, 2.1 × 50 mm
Part number:	186004495
Sample:	Lys-C digested (limited) reduced monoclonal antibody
Eluent A:	0.1% formic acid in 100% HPLC grade water
Eluent B:	0.1% formic acid in 100% acetonitrile
Flow rate:	0.2 mL/min
Gradient:	5% B for 5 min then 5–21% B in 0.1 min, then 21–29% B in 30 min
Column temp.:	80 °C

Waters LCT™ Premier XE MS Detection

Capillary voltage:	3200 V
Cone voltage:	45 V
Source temp.:	150 °C
Desolvation temp.:	350 °C
Desolvation gas:	900 L/h

The large fragments obtained through LysC digestion of a monoclonal antibody can be separated on the ACQUITY UPLC Protein BEH C_4 300Å Column coupled directly to ESI/Tof MS for identification of the individual peptide products.

Note: ACQUITY UPLC Protein BEH C_4 300Å, 1.7 µm Columns are designed for use with the ACQUITY UPLC System. The benefits of the small-particle packing in ACQUITY UPLC Protein BEH C_4 300Å, 1.7 µm Columns are realized only with the low system volume and low detector dispersion of an ACQUITY UPLC System.

BENCHMARKING, METHOD DEVELOPMENT, AND TROUBLESHOOTING: MASSPREP PROTEIN STANDARD MIX

The MassPREP Protein Standard Mix consists of carefully chosen proteins encompassing a wide range of properties. These mixtures contain proteins that vary in isoelectric points, molecular weights, and hydrophobicities. These characteristics provide an attractive intact protein validation mixture that you can use for many varied applications. The mixture is particularly useful as a benchmarking standard for ACQUITY UPLC Protein BEH C_4, 300Å Columns.

MassPREP Protein Standard Mix		
Protein Sample	**Molecular Weight (MW)**	**Isoelectric Point (pI)**
Ribonuclease A, Bovine Pancrease	13.7 K	9.6
Cytochrome *c*, Horse Heart, 96%	12.4 K	10.25
Albumin, Bovine Serum, 96–99%	66.4 K	5.8
Myoglobin, Horse Heart >90%	16.7 K	6.53
Enolase from Baker's Yeast (S. cerevisiae)	46.7 K	6.53
Phosphorylase b, Rabbit Muscle	97.0 K	7.18

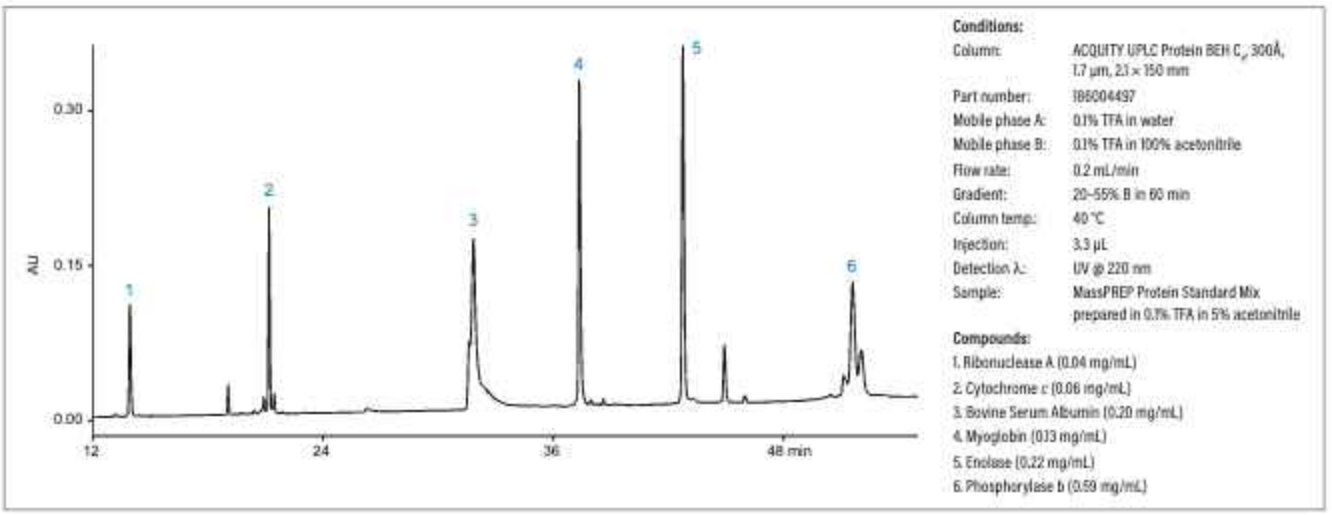


Ordering Information

Protein Standards

Description	P/N
MassPREP Protein Standard Mix	186004900
Intact mAb Mass Check Standard	186006552

MassPREP Protein Standard Mix on an ACQUITY UPLC Protein BEH C_4, 300Å, 1.7 µm, 2.1 × 150 mm Column



Waters carefully formulated and quality-control tested MassPREP Protein Standard Mix can help you confirm adequate performance of a reversed-phase column and LC system before you analyze valuable samples.

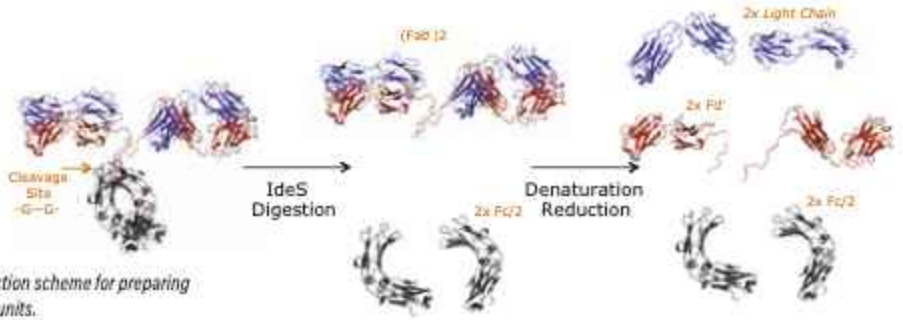
MassPREP Protein Standard Mix Certificate of Analysis

We issue all Waters analytical standards and reagents a certificate of analysis that documents relevant, lot-specific information. We often include a chromatogram that reflects data acquired as you would when using the standard.



ACQUITY UPLC GLYCOPROTEIN BEH AMIDE, 300Å COLUMN

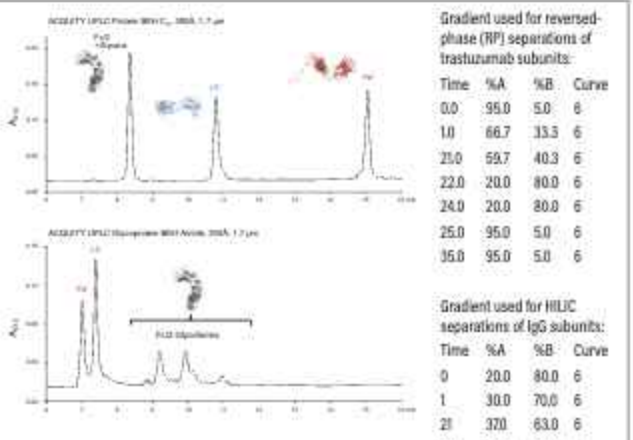
In what is commonly referred to as a middle-up or middle-down analysis, native mAbs can be proteolyzed into subunits, facilitating their characterization. One increasingly popular way to produce subunit digests of mAbs is via the IdeS protease (immunoglobulin-degrading enzyme of Streptococcus pyogenes). With high fidelity, IdeS cleaves at a conserved sequence motif in the hinge region of humanized mAbs. On reduction, it cleanly produces three, 25k Da mAb fragments. These fragments are amenable to mass spectrometry and useful for localizing different attributes of therapeutic mAbs (below).



IdeS digestion and reduction scheme for preparing IgG LC, Fd', and Fc/2 subunits.

IdeS-produced subunits from different drug products exhibit diagnostic RP retention times, so IdeS digestion, combined with reversed-phase (RP) chromatography on a Waters ACQUITY UPLC Protein BEH C_4, 300Å Column has been used, successfully, as a simple identity test for mAbs and fusion proteins. Note, however, that many IgG modifications more strongly elicit changes in the hydrophilicity of a mAb along with its capacity for hydrogen bonding.

Compared with the reversed-phase based separation of glycoprotein subunits, HILIC-based chromatography on Waters ACQUITY UPLC Glycoprotein BEH Amide, 300Å, 1.7 µm Columns offers additional information related to a mAb digest, as shown in the figures below.



Gradient used for reversed-phase (RP) separations of trastuzumab subunits:

Time	%A	%B	Curve
0.0	95.0	5.0	6
1.0	66.7	33.3	6
21.0	59.7	40.3	6
22.0	20.0	80.0	6
24.0	20.0	80.0	6
25.0	95.0	5.0	6
35.0	95.0	5.0	6

Gradient used for HILIC separations of IgG subunits:

Time	%A	%B	Curve
0	20.0	80.0	6
1	30.0	70.0	6
21	37.0	63.0	6
22	100.0	0.0	6
24	100.0	0.0	6
25	20.0	80.0	6
35	20.0	80.0	6

Conditions:

LC system: ACQUITY UPLC H-Class Bio System

Columns: Top: ACQUITY UPLC Protein BEH C_4, 300Å, 1.7 µm, 2.1 × 150 mm (p/n: 186004497)
Bottom: ACQUITY UPLC Glycoprotein BEH Amide, 300Å, 1.7 µm, 2.1 × 150 mm Column Kit (p/n: 176003702) that contains Glycoprotein Performance Test Standard (p/n: 186008010)

Sample temp.: 5 °C

Column temp.: 45 °C

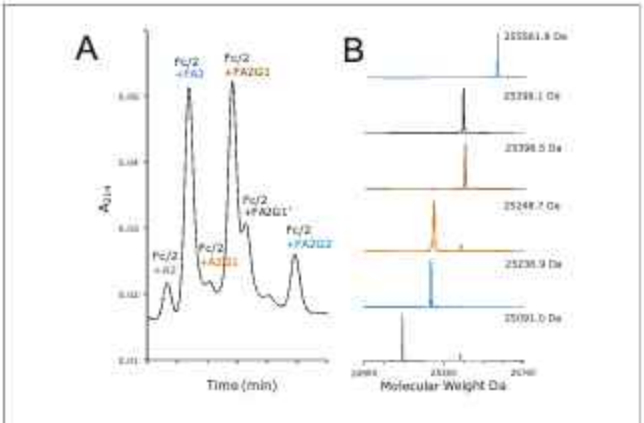
Flow rate: 0.2 mL/min

Mobile phase A: 0.1% (v/v) TFA, water

Mobile phase B: 0.1% (v/v) TFA, acetonitrile

Injection vol.: ≤1.2 µL (aqueous diluents)

Trastuzumab subunit separations. (A) 1 µg of reduced IdeS digested, mAb sample separated using an ACQUITY UPLC Protein BEH C_4, 300Å, 1.7 µm Column (0.7 µL aqueous injection). (B) 1 µg of reduced IdeS digested, mAb sample separated using an ACQUITY UPLC Glycoprotein BEH Amide, 300Å, 1.7 µm Column (0.7 µL aqueous injection).



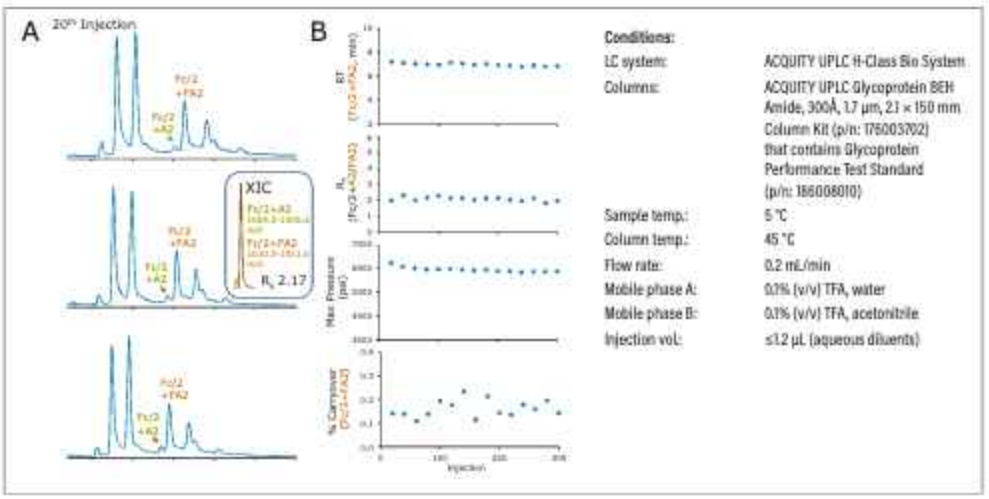
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Species	MW_{Avg} Theoretical (Da)	MW_{Avg} Observed (Da)
Fd'	25383.6	25383.3
LC	23443.1	23443.1
Fc/2+A2	25090.2	25091.0
Fc/2+FA2	25236.2	25236.9
Fc/2+A2G1	25252.3	25248.7
Fc/2+FA2G1	25398.3	25398.5
Fc/2+FA2G1'	25398.3	25398.1
Fc/2+FA2G2	25560.4	25561.8

Profiling trastuzumab Fc/2 subunit glycoforms. (A) Retention window corresponding to the glycoform separation space. (B) Deconvoluted ESI mass spectra for the HILIC chromatographic peaks. Chromatographic peaks are labeled with the same color as their corresponding mass spectra. (C) Molecular weights for the observed trastuzumab subunits.

LIFETIME TESTING OF ACQUITY UPLC GLYCOPROTEIN BEH AMIDE, 300Å, 1.7 µm COLUMNS FOR PROFILING IGG SUBUNIT GLYCOFORMS

Data collected, below, from a series of 300 sequential injections of a reduced, IdeS-digested trastuzumab sample demonstrate the ability of our BEH Amide 300Å, 1.7 µm Column to accurately and consistently perform separations over time. The use scenario was potentially challenging because the reduced, IdeS-digested mAb sample contains both high concentrations of guanidine denaturant and TCEP reducing agent. Total-ion chromatograms corresponding to the 20th, 180th, and 300th injections are displayed. In these analyses, particular attention was paid to the half-height resolution of the Fc/2+A2 and Fc/2+FA2 species, which was assessed every 20th separation using extracted-ion chromatograms (XICs). In this testing, several additional chromatographic parameters were also monitored. Those parameters included the retention time of the Fc/2+FA2 species, the maximum system pressure observed during the chromatographic run, and the percent carryover of the most abundant glycoform. Plots of these parameters underscore the consistency of the subunit separation during the column's lifetime.



Lifetime testing of an ACQUITY UPLC Glycoprotein BEH Amide, 300Å, 1.7 µm, 2.1 × 150 mm Column for sequential injections of reduced, IdeS-digested trastuzumab. (A) Total ion chromatograms (TICs) from the 20th, 180th, and 300th injections. Example extracted ion chromatograms (XICs) for Fc/2+A2 and Fc/2+FA2 that were used to measure resolution. (B) Chromatographic parameters observed during the 300 injection column lifetime test. Each panel shows results for each 20th injection, including retention time (RT) of the FA2 glycoform, Rs between A2 and FA2 glycoforms, maximum pressure during the run, and percent carryover, as measured by a repeat gradient and XICs.

ACQUITY UPLC Glycoprotein BEH Amide, 300Å, 1.7 µm Column Consistency

To help ensure batch-to-batch and column-to-column consistency in validated methods, each batch of material selected for use in the ACQUITY UPLC Glycoprotein BEH Amide, 300Å, 1.7 µm Column offering is quality-control tested using our Glycoprotein Performance Test Standard, p/n: 186008010. We ship this standard (at no additional cost) with each column, to help benchmark method development or troubleshoot the column and instrumentation.



Ordering Information

ACQUITY UPLC Glycoprotein BEH Amide, 300Å Columns and Standards

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH Amide, 300Å	2.1 × 100 mm	176003701
	2.1 × 150 mm	176003702

*3/pk with standard.

ACQUITY UPLC Glycoprotein BEH Amide, 300Å VanGuard Pre-Column (with standards)

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH Amide, 300Å	2.1 × 5 mm	176003699*
	2.1 × 50 mm	176003700

ACQUITY UPLC Glycoprotein BEH Amide, 300Å Method Validation Kit

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH Amide, 300Å	2.1 × 100	176003703*

*3/pk with standard.

Glycoprotein Performance Test Standard

Description	P/N
Glycoprotein Performance Test Standard	186008010

XBridge Protein BEH C_4 Columns

	Dimension	P/N	Dimension	P/N	Dimension	P/N	Dimension	P/N
	Particle Size: 1.7 µm		Particle Size: 3.5 µm		Particle Size: 5 µm		Particle Size: 10 µm	
BEH C_4, 300Å	1.0 × 50 mm	186005589	–	–	–	–	–	–
	1.0 × 100 mm	186005590	–	–	–	–	–	–
	1.0 × 150 mm	186005591	–	–	–	–	–	–
	2.1 × 50 mm	186004495	2.1 × 50 mm	186004498	10 × 10 mm	186007305*[1]	10 × 10 mm	186007325*[1]
	2.1 × 100 mm	186004496	2.1 × 100 mm	186004499	10 × 50 mm	186008272	10 × 50 mm	186008276
	2.1 × 150 mm	186004497	2.1 × 150 mm	186004500	10 × 100 mm	186008273	10 × 100 mm	186008277
			2.1 × 250 mm	186004501	10 × 150 mm	186008274	10 × 150 mm	186008278
			4.6 × 50 mm	186004502	10 × 250 mm	186008275	10 × 250 mm	186008279
			4.6 × 100 mm	186004503	19 × 10 mm	186007310*[2]	19 × 10 mm	186007330*[2]
			4.6 × 150 mm	186004504	19 × 50 mm	186007311	19 × 50 mm	186007331
			4.6 × 250 mm	186004505	19 × 100 mm	186007312	19 × 100 mm	186007332
					19 × 150 mm	186007313	19 × 150 mm	186007333
					19 × 250 mm	186007314	19 × 250 mm	186007334
					30 × 10 mm	186007315*[3]	30 × 10 mm	186007335*[3]
					30 × 50 mm	186007316	30 × 50 mm	186007336
					30 × 75 mm	186007317	30 × 75 mm	186007337
					30 × 100 mm	186007318	30 × 100 mm	186007338
					30 × 150 mm	186007319	30 × 150 mm	186007339
					30 × 250 mm	186007320	30 × 250 mm	186007340

*Guard Cartridge.
[1] Requires 10 × 10 mm Prep Guard Holder, p/n: 288000779.
[2] Requires 19 × 10 mm Prep Guard Holder, p/n: 186000709.
[3] Requires 30 × 10 mm Prep Guard Holder, p/n: 186006912.

ACQUITY UPLC Protein BEH C_4 VanGuard Pre-Columns

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH C_4, 300Å	2.1 × 5 mm	186004623

ACQUITY UPLC Protein BEH C_4 Method Validation Kits*

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH C_4, 300Å	2.1 × 100 mm	186004899
	2.1 × 150 mm	186006549

*Each Method Validation Kit contains 3 columns, each from a different batch.

XBridge Protein BEH C_4 Sentry Guards

	Dimension	P/N
	Particle Size: 3.5 µm	
BEH C_4, 300Å	2.1 × 10 mm	186007230[1]
	4.6 × 20 mm	186007235[2]

[1] Requires 2.1 × 10 mm Universal Sentry Guard Holder, p/n: WAT097958.
[2] Requires 4.6 × 20 mm Universal Sentry Guard Holder, p/n: WAT046910.

XBridge Protein BEH C_4 Method Validation Kits*

	Dimension	P/N
	Particle Size: 3.5 µm	
BEH C_4, 300Å	4.6 × 100 mm	186005465

*Each Method Validation Kit contains 3 columns, each from a different batch.

Note: ACQUITY UPLC Protein BEH C_4, 300Å, 1.7 µm Columns are designed for use with the ACQUITY UPLC System. The benefits of the small particle packing in ACQUITY UPLC Protein BEH C_4, 300Å, 1.7 µm Columns are only realized with the low system volume and low detector dispersion of an ACQUITY UPLC System.

MASSPREP ON-LINE DESALTING DEVICES

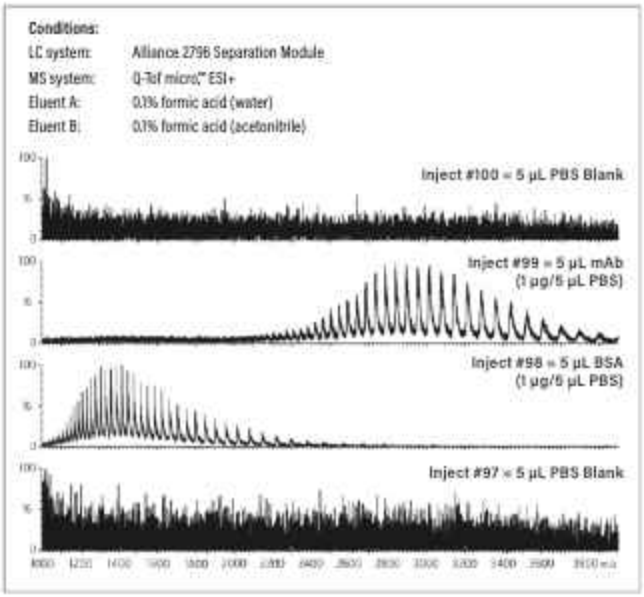
Our MassPREP On-Line Desalting Devices offer these benefits:

- Effective desalting of proteins, yielding improved LC-MS results
- Fast on-line method for high-throughput applications
- Excellent protein recoveries without detectable carryover
- Greater than 100 injections from a single cartridge



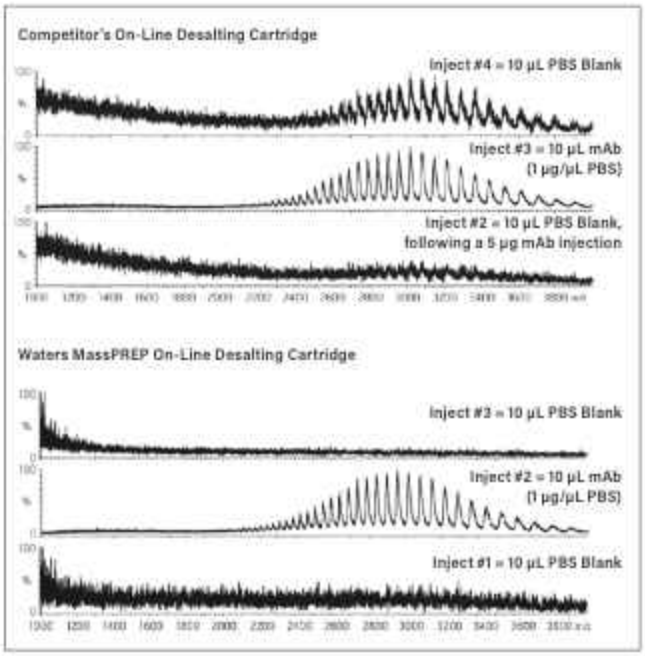
Nonvolatile salts (e.g., NaCl) can suppress ionization of intact proteins, leading to poor detection sensitivity. Consequently, you must remove these salts from the LC eluate or, alternatively, minimize their presence significantly before they are introduced into the mass spectrometer. The MassPREP on-line desalting column can effectively desalt proteins before an LC-MS analysis. The reversed-phase phenyl material contained in MassPREP on-line column successfully "traps" proteins, allowing the salts to be washed to waste before the elution of protein into the mass spectrometer. Achievable cycle times for an optimized LC-MS method are as low as four minutes for intact antibodies and 10 minutes for reduced species.

MassPREP On-Line Desalting Cartridge (2.1 × 10 mm)



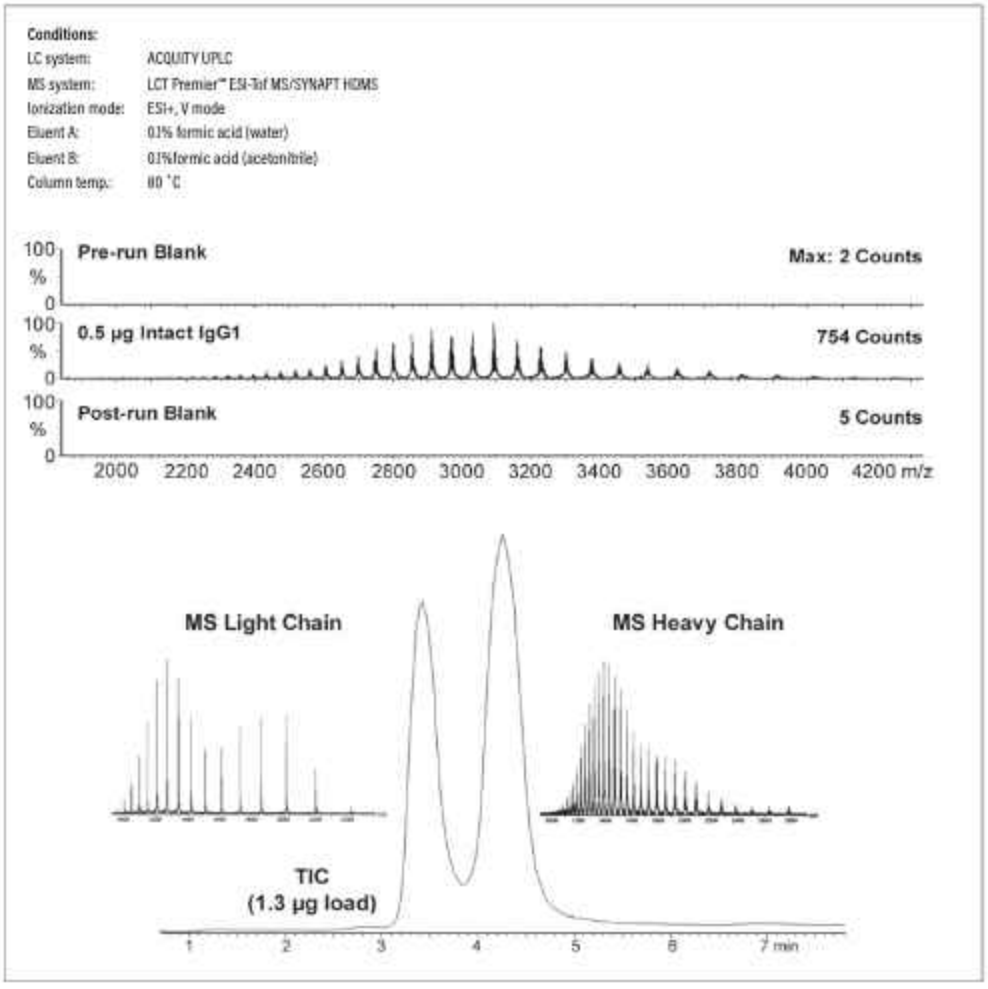
Over a series of 100 injections, satisfactory results were obtained for BSA and a mAb, as shown for injections #97–100 on a MassPREP On-line Desalting Cartridge. Reference Waters Application Note: Desalting of Proteins Using MassPREP On-line Desalting Cartridges Prior to Mass Spectrometry [2005] (p/n: 720001077EN).

Excellent Recovery with No Detectable Carryover



Column-related carryover, from previous protein-sample injections, can compromise the integrity of collected LC-MS data. Compared with results obtained using a competitive, on-line desalting cartridge (top), the MassPREP on-line desalting cartridge (bottom) affords excellent sample recovery.

MassPREP Micro Desalting Column (2.1 x 5 mm)



Combined ESI-Tof mass spectra of an intact IgG1 antibody from a 4-minute LC-MS analysis. The results reveal no detectable carryover following a 0.5 µg injection of the antibody.

Total ion chromatogram (TIC) from UPLC-MS analysis of light and heavy chains from a reduced IgG1 antibody. A 10-minute LC-MS run largely resolved the earlier eluting light chain from the later eluting glycosylated heavy chains.

Ordering Information

MassPREP On-Line Desalting Devices

Description	Dimension	Qty.	P/N
MassPREP Micro Desalting Column	2.1 x 5 mm	1/pk	186004032*!
MassPREP On-Line Desalting Cartridge	2.1 x 10 mm	2/pk	186002785*
UPLC Intact Mass Analysis Application Kit** (Includes MassPREP Micro Desalting Column and ACQUITY Tubing Kit)	—	1/pk	176001519

* Reference UPLC Intact Mass Analysis Application Kit Manual, p/n: 715001664.
** Required for use of MassPREP On-line Desalting Cartridge.
! Requires 2.1 x 10 mm Universal Sentry Guard Holder, p/n: WAT097958.

IEX CATION AND ANION TEST STANDARDS

These standards are specially designed for either Cation- or Anion-Exchange Chromatography and each provide a unique set of 3 proteins found to provide good chromatographic separation based on the charge state being utilized.

Ordering Information

IEX Standards

Description	P/N
IEX Anion Test Standard	186006869
IEX Cation Test Standard	186006870

PROTEIN-PAK HI RES ION-EXCHANGE (IEX) COLUMNS FOR ACQUITY UPLC APPLICATIONS

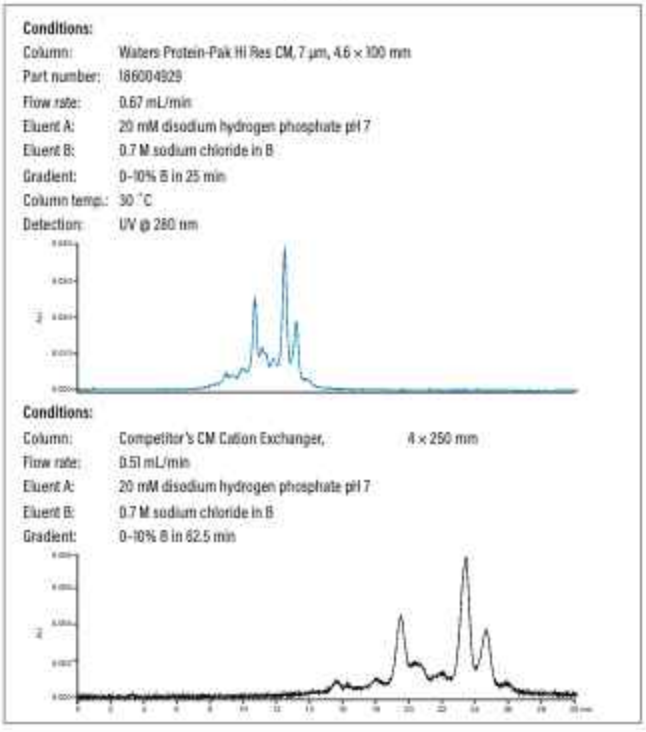
To help you characterize recombinant proteins, monoclonal antibodies, and other biological compounds, we developed our Protein-Pak™ Hi Res Ion-Exchange (IEX) Columns. The nonporous, high compound binding capacity of their particles yields outstanding resolution of charged species faster than many traditional, porous IEX offerings. In addition, we quality control test our columns using defined protein standards, to ensure consistent batch-to-batch performance.

Protein-Pak Hi Res Ion-Exchange (IEX) Columns offer these benefits:

- Designed for the characterization of protein charge variants and other biocompounds
- Two cation exchangers (carboxymethyl and sulfopropyl) and one anion exchanger (quaternary ammonium) that address selectivity needs
- Nonporous, high capacity, stationary phases deliver fast separations that address high-throughput needs
- Quality-control tested using protein standards to ensure batch-to-batch consistency
- eCord enabled, to help monitor column use on ACQUITY UPLC Systems

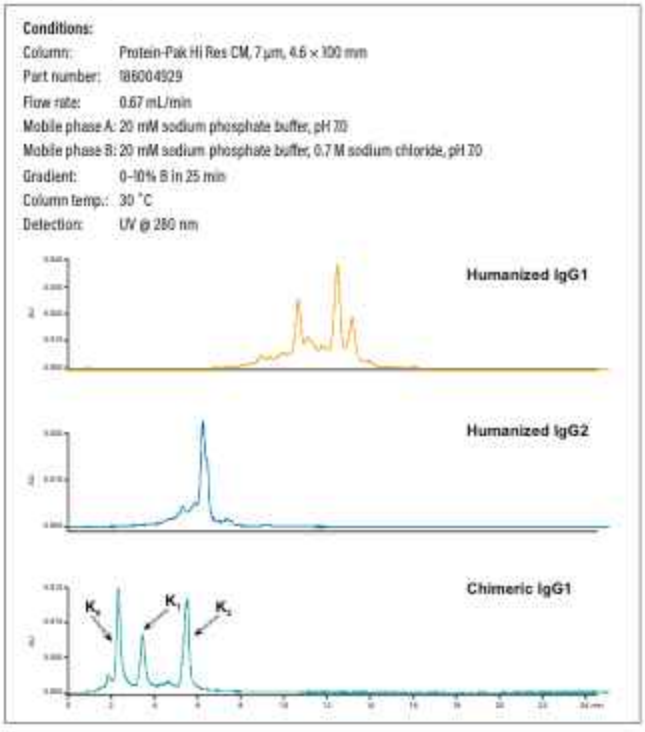


Resolved Monoclonal Antibody (mAb) Isoform Separation



Cation-exchange chromatography is a useful tool for the characterizing and quantifying mAb or recombinant protein variants. Use of Waters Protein-Pak Hi Res CM Column on an ACQUITY UPLC System increases sample throughput while maintaining resolution between the intended product and undesired variants.

Protein-Pak Hi Res CM Analysis of Three mAbs Containing Different Levels of Variants



Sequence, production, storage, and shipping conditions influence the degree of variants contained in a biotherapeutic protein. Waters Protein-Pak Hi Res CM Column can successfully resolve variations that could involve as little as a single amino acid change (K_0 = No terminal lysines, K_1 = One terminal Lysine, and K_2 = Two terminal Lysines).

Ordering Information

Protein-Pak Hi Res UPLC Columns

Description	Dimension	P/N
Protein-Pak Hi Res CM, 7 µm	4.6 × 100 mm	186004929
Protein-Pak Hi Res SP, 7 µm	4.6 × 100 mm	186004930
Protein-Pak Hi Res Q, 5 µm	4.6 × 100 mm	186004931

Note: Only when Protein-Pak Hi Res IEX Columns are combined with the ACQUITY UPLC System are the full performance benefits realized. See Waters service notes, p/n: 715002147A, for ACQUITY UPLC System configuration guidelines for ion-exchange chromatography.

APPLICATION OF WATERS UPLC TECHNOLOGY FOR BIOTHERAPEUTIC CHARACTERIZATION

ACQUITY UPLC has proven itself an asset in laboratories around the world, providing the means to transcend the abilities of conventional LC separations. UPLC sets new standards in resolution, sensitivity, and throughput by being the first holistically designed system that maximizes rapid, high-resolution analyses. It has fueled hundreds of peer-reviewed papers; it helps laboratories conserve resources; and it has served the needs of regulatory agencies around the globe. ACQUITY UPLC makes your laboratory simultaneously more sustainable and more efficient.

Manufacturing Consistency for Enhanced Assurance

The ability to perform identical high-quality separations regardless of column lot is critically important to the successful development and commercialization of biotherapeutics. Each batch of Protein-Pak Hi Res IEX material is tested with a relevant mixture of protein standards, helping to ensure consistent column-to-column performance.

Novel IEX Particles Ideal for Biomolecule Characterizations

Protein-Pak Hi Res IEX Columns contain nonporous, pH-tolerant, hydrophilic particles whose surface consists of a multi-layered network of either anion (5 µm) or cation (7 µm) exchange groups. This innovative particle and bonding chemistry produces particles with greater protein loading capacities than those associated with many traditional monodisperse, nonporous resins. These columns, therefore, can resolve complex mixtures of biomolecules in comparatively brief analyses, compared with alternative porous or nonporous IEX columns.

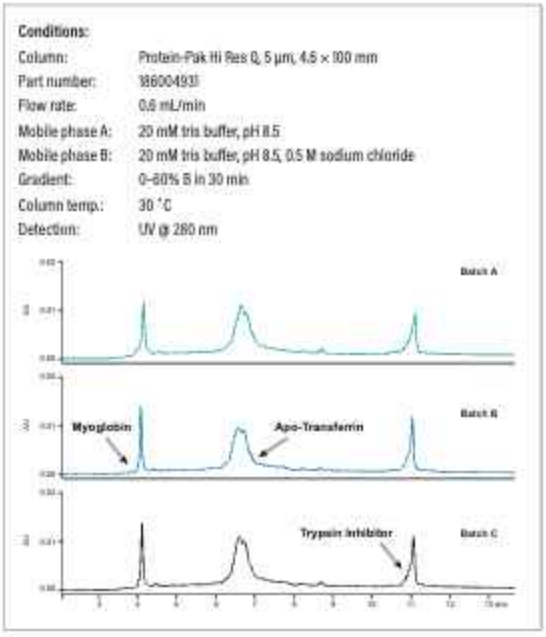
Column	Protein-Pak Hi Res Q	Protein-Pak Hi Res CM	Protein-Pak Hi Res SP
Ion exchange	**Strong Anion**	**Weak Cation**	**Strong Cation**
Functional group	Quaternary ammonium	Carboxymethyl	Sulfopropyl
Matrix	Hydrophilic polymer	Hydrophilic	–
Polymer	Hydrophilic polymer	–	–
Particle size	5 µm	7 µm	7 µm
Pore size	Non porous	Non porous	Non porous
Dimensions	4.6 × 100 mm	4.6 × 100 mm	4.6 × 100 mm
Counter ion	Cl-	Na+	Na+
pH range	3–10	3–10	3–10
Temperature	10–60 °C	10–60 °C	10–60 °C
pK_a	10.5	4.9	2.3
Flow rates	0.3–0.6 mL/min	0.5–1.4 mL/min	0.5–1.4 mL/min
Approximate protein binding capacity, in milligrams/per column (i.e., BSA for Hi Res Q column, Lysozyme for Hi Res CM and Hi Res SP columns)*	58	33	25

*For optimal resolution of complex samples, do not exceed 20% of the column's protein binding capacity.



ACQUITY UPLC Technology for biotherapeutic characterization.

Protein-Pak Hi Res IEX Column Batch-to-Batch Reproducibility



Each batch of Protein-Pak Hi Res SP, CM, and Q Column packing material is chromatography-tested using a relevant protein standard mixture to help ensure consistent and predictable performance.

PROTEIN-PAK HI RES HIC COLUMN AND HIC PROTEIN STANDARD

Our Protein-Pak Hi Res HIC (Hydrophobic Interaction Chromatography) Columns contain nonporous, polymethacrylate-based particles (2.5 µm) functionalized with a butyl-ligand coating. These particles are well-suited to characterizing proteins and biotherapeutics, including monoclonal antibodies (mAb) and antibody drug conjugates (ADC).

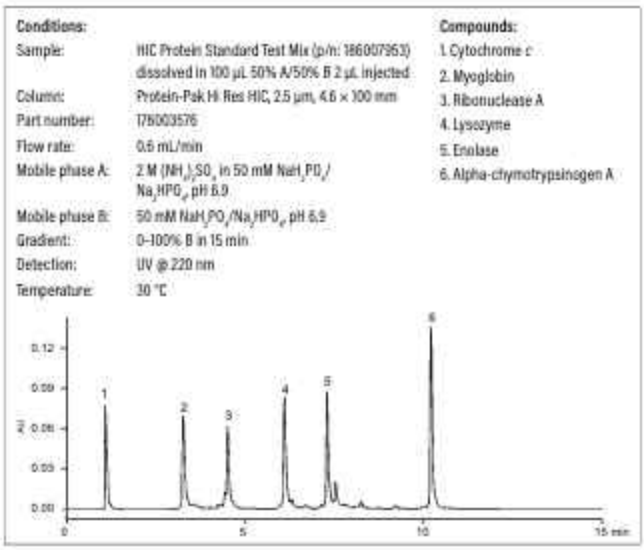
Though reversed-phase chromatography is a frequently used bioanalytical technique, HIC nevertheless offers attractive orthogonal separation advantages. In reversed-phase LC, proteins are retained by hydrophobic interaction with alkyl groups (e.g., C_{18}) on the packing material. The butyl ligand density on our Protein-Pak Hi Res HIC Column is comparatively less, therefore, resulting in fewer protein-ligand hydrophobic interactions. Consequently, elution based on HIC is possible using gradients of decreasing salt concentration at physiological pH values. Thus, use of denaturing organic solvent eluents that are used in reversed-phase based separations (e.g., acetonitrile in 0.1% trifluoroacetic acid) can be eliminated thus allowing various biotherapeutics such as acid-labile, cysteine-linked, ADCs, to be analyzed in non-denaturing conditions.

In addition to our HIC column, Waters also offers the HIC Protein Standard Test Mix for use in verifying HPLC/UPLC instrument and/or Protein-Pak Hi Res HIC Column performance prior to the analysis of valuable samples. The standard mixture contains a carefully chosen set of six proteins that provide good chromatographic representation when used with a gradient of decreasing salt concentration. When used on a regular basis, this intact protein validation mixture helps monitor system and column performance. The Protein-Pak Hi Res HIC Column and HIC Protein Standard offer these benefits:

- Ideally suited for hydrophobic-based separations, for protein characterization using non-denaturing conditions
- Addresses high-throughput needs nonporous particles help deliver fast, efficient separations on an appropriately configured LC
- Shipped together with Waters Protein Test Standard to help ensure acceptable HIC column and instrument performance before analyzing valuable samples
- Successfully used to analyze cysteine-based, antibody drug conjugates

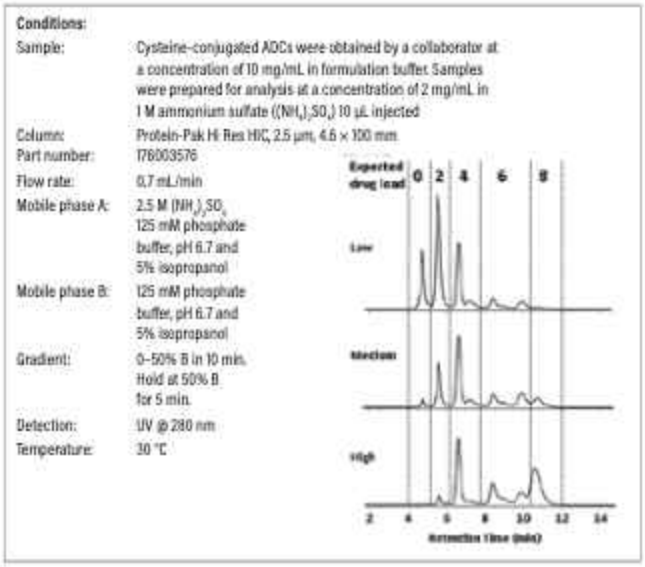


Protein-Pak Hi Res HIC Column and HIC Protein Standard



Using a gradient of decreasing salt concentration and non-denaturing eluents, Waters Protein-Pak Hi Res HIC Column is well suited to separate proteins of various molecular weights and hydrophobic interactions.

Separation of ADC Samples on Protein-Pak Hi Res HIC Column



Monitoring drug-load variability. Three batches of cysteine-linked ADCs were synthesized, each with a different level of drug conjugation (low, medium, high), and separated using hydrophobic interaction chromatography. The drug load distribution shifted from low to high, corresponding to an increase in the load of the hydrophobic drug.

Ordering Information

Protein-Pak Hi Res HIC Columns and HIC Protein Standards

Description	Dimension	P/N
Protein-Pak Hi Res HIC, 2.5 µm Column and HIC Protein Standard	4.6 × 35 mm	176003575
Protein-Pak Hi Res HIC, 2.5 µm Column and HIC Protein Standard Mix	4.6 × 100 mm	176003576
HIC Protein Test Standard	—	186007953

BIOSUITE HPLC COLUMNS FOR PROTEIN AND PEPTIDE SEPARATIONS

Waters BioSuite HPLC Columns for protein and peptide separations contain high-performance chemistries dedicated to the isolation, analysis, and characterization of biomolecules. Separation offerings include ion-exchange, size-exclusion, hydrophobic interaction, and reversed-phase columns and support Waters, array of LC and LC-MS systems for the characterization and lab-scale isolation of biotherapeutics and other related compounds.

- Ion-exchange, size exclusion, hydrophobic interaction, and reversed-phase column offerings
- Excellent resolution and recovery of proteins and peptides
- Available in different particle and pore sizes
- Scalable from analytical to 'lab-scale' preparative applications



Ordering information

BioSuite IEX HPLC Columns

Description	Matrix	Pore Size	Exclusion Limit (Daltons) against Polyethylene Glycol	Inner Diameter	Length	Column Volume (mL)	# Approx. Protein Binding Capacity Per Pre-packed Column	P/N
BioSuite Q-PEEK, 10 µm AXC	Polymer	4000Å	>5,000,000	4.6 mm	50 mm	0.83	58 mg[1]	186002176
BioSuite SP-PEEK, 7 µm CXC	Polymer	1300Å	>4,000,000	4.6 mm	50 mm	0.83	58 mg[2]	186002182
BioSuite DEAE, 2.5 µm NP AXC	Polymer	N/A	500	4.6 mm	35 mm	0.58	2.9 mg[1]	186002179
BioSuite SP, 2.5 µm NP CXC	Polymer	N/A	500	4.6 mm	35 mm	0.58	2.9 mg[3]	186002183
BioSuite Q, 10 µm AXC	Polymer	1000Å	1,000,000	7.5 mm	75 mm	3.31	331 mg[1]	186002177
BioSuite Q, 13 µm AXC	Polymer	1000Å	1,000,000	21.5 mm	150 mm	54.45	5445 mg[1]	186002178
BioSuite DEAE, 10 µm AXC	Polymer	1000Å	1,000,000	7.5 mm	75 mm	3.31	99 mg[1]	186002180
BioSuite DEAE, 13 µm AXC	Polymer	1000Å	1,000,000	21.5 mm	150 mm	54.45	1633 mg[1]	186002181
BioSuite SP, 10 µm CXC	Polymer	1000Å	1,000,000	7.5 mm	75 mm	3.31	132 mg[2]	186002184
BioSuite SP, 13 µm CXC	Polymer	1000Å	1,000,000	21.5 mm	150 mm	54.45	2178 mg[2]	186002185
BioSuite CM, 10 µm CXC	Polymer	1000Å	1,000,000	7.5 mm	75 mm	3.31	149 mg[3]	186002186
BioSuite CM, 13 µm CXC	Polymer	1000Å	1,000,000	21.5 mm	150 mm	54.45	2450 mg[3]	186002187

[1]Data generated with BSA.
[2]Data generated with Gamma Globulin.
[3]Data generated with Hemoglobin.

Note: For best resolution of complex samples, do not exceed 20% of the column's protein binding capacity.

BioSuite Hydrophobic-Interaction Chromatography HPLC and UHPLC Columns

Description	Matrix	Diameter Width	Diameter Length	P/N
BioSuite Phenyl 10 µm HIC	Polymer	7.5 mm	75 mm	186002159
BioSuite Phenyl 13 µm HIC	Polymer	21.5 mm	150 mm	186002160

BioSuite pC_{18} and pPhenyl HPLC and UHPLC Columns

Description	Matrix	Diameter Width	Diameter Length	P/N
BioSuite pC_{18}, 2.5 µm NP RPC	Polymer	4.6 mm	35 mm	186002152
BioSuite pC_{18}, 500, 7 µm RPC	Polymer	2.0 mm	150 mm	186002153
BioSuite pC_{18}, 500, 7 µm RPC	Polymer	4.6 mm	150 mm	186002154
BioSuite pC_{18}, 500, 13 µm RPC	Polymer	21.5 mm	150 mm	186002155
BioSuite pPhenyl, 1000, 10 µm RPC	Polymer	2.0 mm	75 mm	186002156
BioSuite pPhenyl, 1000, 10 µm RPC	Polymer	4.6 mm	75 mm	186002157
BioSuite pPhenyl, 1000, 13 µm RPC	Polymer	21.5 mm	150 mm	186002158

BioSuite SEC HPLC and UHPLC Columns

Description	Matrix	Diameter Width	Diameter Length	Column Volume	Suggested Volume Load for Maximum Multicomponent Resolution*	Multicomponent Resolution**	P/N
BioSuite 125Å, 4 µm UHR SEC	Silica	4.6 mm	300 mm	4.98 mL	Less than 8 mg/mL	Less than 40 µL	186002161
BioSuite 250Å, 4 µm UHR SEC	Silica	4.6 mm	300 mm	4.98 mL	Less than 8 mg/mL	Less than 80 µL	186002162
BioSuite UHR Guard SEC	Silica	4.6 mm	35 mm	–	–	–	186002163
BioSuite 125Å, 5 µm HR SEC	Silica	7.8 mm	300 mm	14.33 mL	Less than 8 mg/mL	Less than 200 µL	186002164
BioSuite 250Å, 5 µm HR SEC	Silica	7.8 mm	300 mm	14.33 mL	Less than 8 mg/mL	Less than 200 µL	186002165
BioSuite 450Å, 8 µm HR SEC	Silica	7.8 mm	300 mm	14.33 mL	Less than 8 mg/mL	Less than 200 µL	186002166
BioSuite HR Guard SEC	Silica	6.0 mm	40 mm	–	–	–	186002167
BioSuite 125Å, 10 µm SEC	Silica	7.5 mm	300 mm	13.25 mL	Less than 8 mg/mL	Less than 200 µL	186002168
BioSuite 125Å, 13 µm SEC	Silica	21.5 mm	300 mm	108.9 mL	Less than 8 mg/mL	Less than 1.6 mL	186002169
BioSuite 250Å, 10 µm SEC	Silica	7.5 mm	300 mm	13.25 mL	Less than 8 mg/mL	Less than 200 µL	186002170
BioSuite 250Å, 13 µm SEC	Silica	21.5 mm	300 mm	108.9 mL	Less than 8 mg/mL	Less than 1.6 mL	186002171
BioSuite 450Å, 13 µm SEC	Silica	7.5 mm	300 mm	13.25 mL	Less than 8 mg/mL	Less than 200 µL	186002172
BioSuite 450Å, 17 µm SEC	Silica	21.5 mm	300 mm	108.9 mL	Less than 8 mg/mL	Less than 1.6 mL	186002173
BioSuite Guard SEC	Silica	7.5 mm	75 mm	–	–	–	186002174
BioSuite Guard SEC	Silica	21.5 mm	75 mm	–	–	–	186002175

* Using a BSA protein standard in a 50 mM phosphate buffer containing salt (either 0.1 M NaCl or 0.1 M Na_2SO_4) eluent. Useful protein mass loads will vary depending upon separation eluent, complexity of sample, and on the type of proteins contained in mixture. In general, maximum component resolution is obtained by injecting the smallest possible volume of a dilute protein solution.

** Operating flow rates for BioSuite Ultra-High Resolution (UHR) SEC Columns (4.6 mm I.D.) are from 0.1–0.4 mL/min. Use of an HPLC system (e.g. Waters Alliance HPLC System) capable of operating at these flows is essential for optimal UHR SEC Column performance.

PROTEIN-PAK SIZE-EXCLUSION HPLC COLUMNS

Protein-Pak Packings are based on a 10 µm diol-bonded silica and are available in a selection of pore sizes and column configurations.

The Protein-Pak Size-Exclusion Columns can be expected to resolve proteins that differ in molecular weight by a factor of two and to distinguish proteins differing by as little as 15% in molecular weight. The degree of resolution is more dependent on the sample mass and volume than the interaction between the sample and the stationary phase. Ideally, there should be no interaction between the stationary phase and the sample molecules. Secondary interactions are most often ionic and can, therefore, be reduced by increasing the ionic strength of thee mobile phase. Typical, salt concentrations range to 0.2-0.5 M NaCl. It may also be useful in some cases to consider adding 10-20% methanol to eliminate hydrophobic and other hydrogen-bonding interactions.

Ordering Information

Protein-Pak SEC HPLC Columns and Guards

Steel Column	Dimension	MW Range	P/N
Protein-Pak 60	7.8 x 300 mm	1,000–20,000	WAT085250
Protein-Pak 60	19 x 300 µm	1,000–20,000	WAT025830
Protein-Pak 125	7.8 x 300 mm	2,000–80,000	WAT084601
Protein-Pak 125	19 x 300 mm	2,000–80,000	WAT025831
Protein-Pak 300SW	7.5 x 300 mm	10,000–300,000	WAT080013
Protein-Pak 125 Sentry Guard Column, 3.9 x 20 mm, 2/pk (requires holder)			186000926
Sentry Universal Guard Column Holder			WAT046910

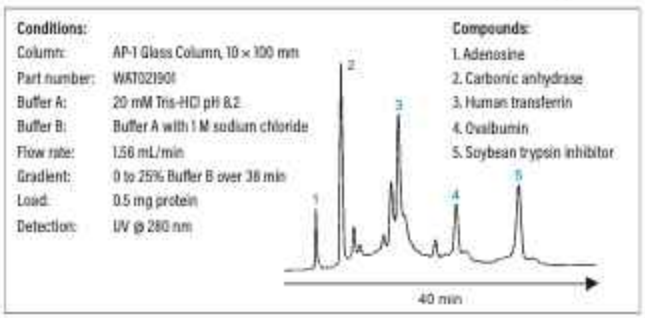
Glass Column	Dimension	MW Range	P/N
Protein-Pak 200SW	8.0 x 300 mm	500–60,000	WAT011786
Protein-Pak 300SW	8.0 x 300 mm	10,000–300,000	WAT011787

PROTEIN-PAK HIGH RESOLUTION (HR) ION-EXCHANGE GLASS COLUMNS

Waters Protein-Pak HR packing materials are based on rigid, hydrophilic, polymethacrylate particles with large, 1000Å pores. The naturally hydrophilic polymer reduces nonspecific adsorption, resulting in quantitative recovery of protein mass and bioactivity. Compatible with buffers in the pH range 2–12, these packings can withstand exposure to caustic solutions, such as 0.1 to 1.0 M sodium hydroxide. Likewise, they withstand exposure to acetic solutions, such as 20% acetic acid, for cleaning purposes.

The Protein-Pak HR 8 µm and 15 µm packing materials are available, pre-packed, in Waters Advanced Purification (AP) Glass Columns, in a 5 mm I.D. mini-column or in a 10 mm I.D. × 100 mm column. The 5 mm I.D. column is also available in a 50 mm length. These columns are compatible, with the use of an adapter kit, with any HPLC and FPLC system.

Protein Resolution on Protein-Pak DEAE 15HR Anion-Exchange Column



Waters Advanced Purification (AP) Glass Columns, containing Protein-Pak DEAE 15 µm particles, are well suited for the analysis or laboratory-scale purification of various protein mixtures.

We offer these Protein-Pak HR ion exchangers:

- Q, a strong anion exchanger
- SP, a strong cation exchanger
- DEAE, a weak anion exchanger
- CM, a weak cation exchanger

The principal difference between weak and strong ion-exchangers lies not in their respective protein binding capacities but in their pH range of operation. The useful pH range of operation of weak ion exchangers tends to be more restricted that that of strong ion-exchangers.

Properties of Protein-Pak HR Columns

	Protein-Pak Q HR[1]	Protein-Pak DEAE HR[2]	Protein-Pak CM HR[3]	Protein-Pak SP HR[4]
Type of material	Polymer	Polymer	Polymer	Polymer
Protein binding capacity	60 mg/mL	40 mg/mL	25 mg/mL	40 mg/mL
Ion-exchange capacity	200 µeq/mL	250 µeq/mL	175 µeq/mL	225 µeq/mL
Nominal pK	11.7	9.0	5.7	2.2
Typical protein recovery	>95%	>95%	>95%	>95%
Typical recovery of biological activity	>90%	>90%	>90%	>90%
pH stability	2–12	2–12	2–12	2–12

[1] For best resolution do not exceed 20% of the protein binding capacity.
[2] Bovine serum albumin in 20 mM Tris/Cl pH 8.2 was used to measure protein binding capacity of Protein-Pak Q and DEAE HR.
[3] Cytochrome c in 25 mM MES pH 5.0 was used to measure protein binding capacity of Protein-Pak SP and CM HR.
[4] Same conditions as CM. Protein binding capacity of Protein-Pak SP 40 HR is 20 mg/mL.

Protein-Pak HR Ion-Exchange Glass Columns

Ion-Exchange Packing	Particle Size	Pore Size	Dimension	Particle Type	P/N
Protein-Pak Q 8HR	8 µm	1000Å	5.0 × 50 mm	Polymeric strong anion exchanger	WAT039575
			5.0 × 100 mm		WAT039630
			10 × 100 mm		WAT035980
Protein-Pak Q 15HR	15 µm	1000Å	5.0 × 50 mm	Polymeric strong anion exchanger	WAT039782
			10 × 100 mm		WAT037663
Protein-Pak DEAE 8HR	8 µm	1000Å	5.0 × 50 mm	Polymeric weak anion exchanger	WAT039791
			5.0 × 100 mm		WAT039783
			10 × 100 mm		WAT035650
Protein-Pak DEAE 15HR	15 µm	1000Å	5.0 × 50 mm	Polymeric weak anion exchanger	WAT039780
			5.0 × 100 mm		WAT039786
			10 × 100 mm		WAT038564
Protein-Pak SP 8HR	8 µm	1000Å	5.0 × 50 mm	Polymeric strong cation exchanger	WAT039570
			5.0 × 100 mm		WAT039625
			10 × 100 mm		WAT035655
Protein-Pak SP 15HR	15 µm	1000Å	10 × 100 mm	Polymeric strong cation exchanger	WAT038567
Protein-Pak CM 8HR	8 µm	1000Å	5.0 × 50 mm	Polymeric weak cation exchanger	WAT039790
			5.0 × 100 mm		WAT039785
			10 × 100 mm		WAT035970
Protein-Pak CM 15HR	15 µm	1000Å	5.0 × 50 mm	Polymeric weak cation exchanger	WAT039787

ADVANCED PURIFICATION (AP) GLASS COLUMNS

Made of biocompatible glass and polymeric materials, our AP series of glass columns are easily used with silica, polymer, or soft gel packings. To optimize flow and ensure uniform sample distribution onto the packed bed, each column incorporates a distributor. A replaceable filter protects the column packing from large-particulate contaminants. We offer, in various sizes, empty AP Glass Columns of the same design, ensuring the predictable transfer of methods among them. AP Glass Columns are compatible with both analytical and preparative HPLC and FPLC systems.



Ordering Information

Advanced Purification (AP) Glass Columns

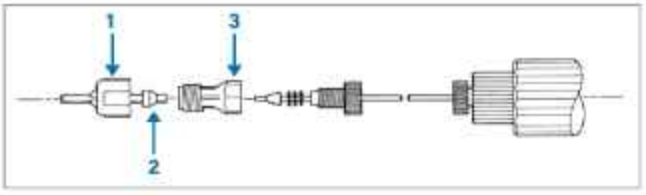
Dimension	Bed Volume (mL)	Flow Rate (mL/min)	Pressure Rating (psi/MPa)	P/N
5.0 × 50 mm	0.8–1.2	0–4	1500 psi/10 MPa	WAT064-01
5.0 × 100 mm	1.8–2.2	0–4	1500 psi/10 MPa	WAT064-02
10 × 100 mm	5–8	0–4	1500 psi/10 MPa	WAT021901
10 × 200 mm	13–16	0–4	1500 psi/10 MPa	WAT021902
10 × 300 mm	21–24	0–4	1500 psi/10 MPa	WAT021903
10 × 600 mm	45–48	0–4	1500 psi/10 MPa	WAT021906
20 × 100 mm	22–31	4–16	1000 psi/6.8 MPa	WAT027501
20 × 200 mm	53–62	4–16	1000 psi/6.8 MPa	WAT027502
20 × 300 mm	85–94	4–16	1000 psi/6.8 MPa	WAT027503
20 × 600 mm	179–188	4–16	1000 psi/6.8 MPa	WAT027506
50 × 100 mm	137–196	16–100	500 psi/3.4 MPa	WAT023321
50 × 200 mm	333–392	16–100	500 psi/3.4 MPa	WAT023332
50 × 300 mm	530–589	16–100	500 psi/3.4 MPa	WAT023323
50 × 600 mm	1118–1177	16–100	500 psi/3.4 MPa	WAT023326

ADVANCED PURIFICATION (AP) GLASS COLUMN ACCESSORIES AND SPARE PARTS

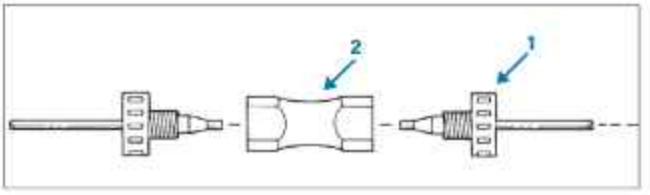
Waters AP Glass Columns feature non-metallic construction and an adjustable bed height with easy-to-use coarse and fine adjustments. The AP Glass Columns are available in various dimensions.

Ordering Information

Connection of an AP MiniColumn and an AP-1 Column to 1/8" OD Tubing



Description	Qty.	P/N
1 Collet and Nut Assembly (3/8-24)	10/pk	WAT005138
2 Ferrule 1/8" Tube	10/pk	WAT005136
3 Union 3/8-24 × "Z" Fitting	5/pk	WAT005137



Description	Qty.	P/N
1 Compression Screw and Ferrule "Z" Fitting, Plastic	1/pk	WAT082708
2 Union "Z" Fitting, Plastic	1/pk	WAT082745

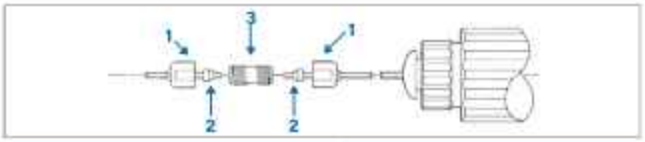
AP MiniColumn Accessories and Spare Parts

Description	Dimension	P/N
Glass Tube	5.0 × 50 mm	WAT038802
	5.0 × 100 mm	WAT038803
Column Jacket	5.0 × 50 mm	WAT038804
	5.0 × 100 mm	WAT038805
Filters, 10/pk	—	WAT038806
O-rings, 13/pk (includes 10 inlet/outlet and 3 funnel)	—	WAT038807
Inlet Connector Assembly	—	WAT038800

AP-1 Column Accessories and Spare Parts

Description	Dimension	P/N
Glass Tube	10 × 100 mm	WAT021992
	10 × 200 mm	WAT022033
	10 × 300 mm	WAT022034
	10 × 600 mm	WAT022035
Plastic Shield	10 × 100 mm	WAT021927
	10 × 200 mm	WAT021945
	10 × 300 mm	WAT021946
	10 × 600 mm	WAT021947
O-rings, 5/pk	—	WAT021907
Filters, 10/pk	—	WAT021910
Replacement Tubing (Tefzel) (1/16 in. O.D. × 0.009 in. I.D. × 10 feet) (1.6 mm O.D. × 0.23 mm I.D. × 3 m)	—	WAT021950
Inlet Connector Assembly	—	WAT021904

Connection of an AP-2 and an AP-5 Column to 1/8" OD Tubing

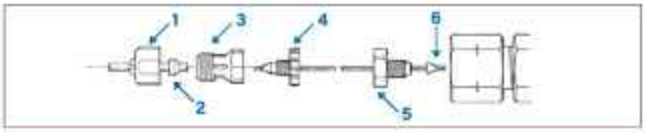


Description	Qty.	P/N
1 Collet and Nut Assembly (3/8-24)	10/pk	WAT005138
2 Ferrule 1/8" Tube	10/pk	WAT005136
3 Union 3/8-24 × 3/8-24	1/pk	WAT082734

AP-2 Column Accessories and Spare Parts

Description	Dimension	P/N
Glass Tube	20 × 100 mm	WAT019891
	20 × 200 mm	WAT019892
	20 × 300 mm	WAT019893
Plastic Shield	20 × 100 mm	WAT027542
	20 × 200 mm	WAT027543
	20 × 300 mm	WAT027544
O-rings, 5/pk	–	WAT027528
Filters, 2/pk	–	WAT027530
Replacement Tubing (Tefzel) (1/8 in. O.D. × 0.040 in. I.D. × 10 feet) (3.2 mm O.D. × 1.02 mm I.D. × 3 m)	–	WAT023344
Inlet Connector Assembly	–	WAT027525
Distributors/Inserts, 5/pk	–	700004715

Connection of a Protein-Pak Steel Column to 1/16" and 1/8" OD Tubing



Description	Qty.	P/N
1 Collet and Nut Assembly (3/8-24)	10/pk	WAT005138
2 Ferrule 1/8" Tube	10/pk	WAT005136
3 Union 3/8-24 × "Z" Fitting	5/pk	WAT005137
4 Compression Screw and Ferrule "Z" Fitting, Plastic	1/pk	WAT082708
5 Compression Screw "Z" Fitting, Steel	10/pk	WAT005070
6 Ferrule 1/16" Steel	10/pk	WAT005063

ACCELLPLUS PREPPAK CARTRIDGES (47 X 300 MM)

Economical, convenient preparative separations in the 500 mg to 10 g range. For a complete listing of Waters products for preparative chromatography, visit **www.waters.com**

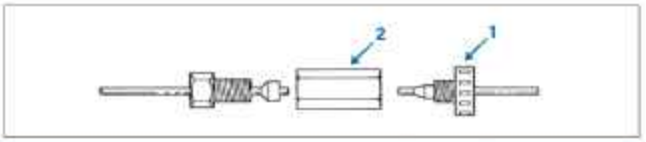
Ordering Information

AccellPlus PrepPak Cartridges (47 x 300 mm)

Description	Particle Size	Pore Size	P/N
AccellPlus™ CM*	40 µm	300Å	WAT036545
PrepPak 1000 Module	–	–	WAT089592

*Requires PrepPak 1000 Module.

Connection of Pharmacia Fitting to 1/16" OD Tubing

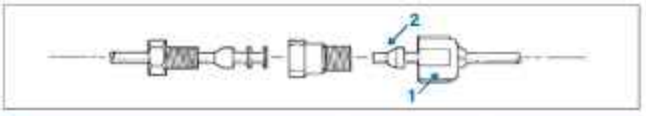


Description	Qty.	P/N
1 Compression Screw and Ferrule "Z" Fitting, Plastic	1/pk	WAT082708
2 Union, Plastic	1/pk	WAT021951

AP-5 Column Accessories and Spare Parts

Description	Dimension	P/N
Glass Tube	50 × 100 mm	WAT019876
	50 × 200 mm	WAT019877
	50 × 300 mm	WAT019878
Plastic Shield	50 × 100 mm	WAT023370
	50 × 200 mm	WAT023371
	50 × 300 mm	WAT023372
	50 × 600 mm	WAT023373
O-rings, 5/pk	–	WAT023345
Filter, 2/pk	–	WAT023343
Replacement Tubing (Tefzel) 1/8 in. O.D. × 0.040 in. I.D. × 10 feet) (3.2 mm O.D.×1.02 mm I.D. × 3 m)	–	WAT023344
Inlet Connector Assembly	–	WAT023349
Outlet Connector Assembly	–	WAT023348
Collet and Nut Assembly	–	WAT023346
Ferrule, 10/pk	–	WAT023347
Funnel Assembly	–	WAT023396

Connection of 1/8" or 1/16" Flanged Type Fitting to 1/8" OD Tubing



Description	Qty.	P/N
1 Collet and Nut Assembly (3/8-24)	10/pk	WAT005138
2 Ferrule 1/8" Tube	10/pk	WAT005136

ACCELLPLUS ION-EXCHANGE BULK PACKINGS

For all preparative isolations based ionic interactions, particularly proteins, enzymes, and immunoglobulins.

Ordering Information

AccellPlus Ion-Exchange Bulk Packings

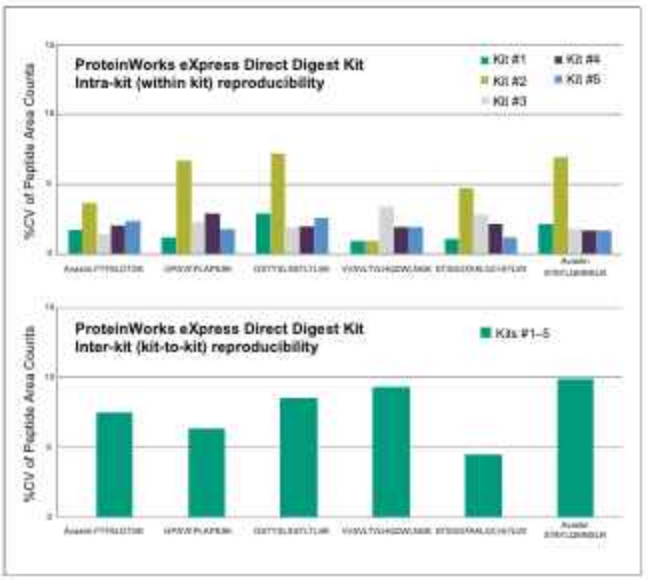
Description	Particle Size	Pore Size	Qty.	P/N
AccellPlus QMA	40 µm	300Å	100 g	WAT010742
Anion Exchanger	–	–	500 g	WAT010741
AccellPlus CM	40 µm	300Å	100 g	WAT010740
Cation Exchanger	–	–	500 g	WAT010739

SAMPLE PREPARATION WITH PROTEINWORKS FOR LARGE MOLECULE QUANTIFICATION

ProteinWorks™ Sample Preparation Kits enable laboratories to routinely achieve standardized, reproducible, and highly sensitive protein quantification via the surrogate peptide approach.

- Easy sample preparation for a wide variety of proteins including biomarkers and antibodies
- Pre-measured, lot-traceable reagents
- Standardized protocol that has built in flexibility for both 3 and 5 step digestion (reduction & alkylation)
- Reproducible and highly effective protein digests with the ProteinWorks Express Digest Kits
- Achieve your best sensitivity by combining the digest kits with the ProteinWorks µElution SPE Cleanup Kit

Take the Variability out of your results





Ordering Information

Description	P/N
ProteinWorks eXpress Digest Kit (for the digestion of immunopurified plasma and serum samples)	176003689
ProteinWorks eXpress Digest Start-Up Kit (eXpress Digest Kit with µElution SPE Cleanup Kit and Intact mAb Check Standard)	176003696
ProteinWorks eXpress Direct Digest Kit (for the direct digestion of whole, non-immunopurified plasma and serum samples)	176003688
ProteinWorks eXpress Direct Digest Start-Up Kit (eXpress Direct Digest Kit with µElution SPE Cleanup Kit and Intact mAb Check Standard)	176003695
ProteinWorks µElution SPE Cleanup Kit (for post-digestion cleanup and sample concentration at the peptide level)	186008304
Intact mAb Check Standard	186006552
Modular Heat Block for 1 mL Tubes	186007985
ACQUITY UPLC Peptide BEH C_{18}, 300Å, 1.7 µm, 2.1 × 150 mm	186003687
96-well Sample Collection Plate, 700 µL Round Well	186005837
Polypropylene Cap Mat, Round Well	186002483
96-well Extraction Plate Vacuum Manifold	186001831
Positive Pressure 96-Processor	186006961

Visit www.waters.com/proteinworks to learn more.

Size-Exclusion Chromatography Columns and Standards

Size-Exclusion Chromatography Columns and Standards



"It is rewarding walking through a lab and seeing a product that you helped to make."

– Brian Nussdorfer, Process Chemist, Taunton, MA, U.S.A

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Size-Exclusion Chromatography Columns and Standards

For over 50 years, Waters has continuously improved GPC (Gel Permeation Chromatography), and SEC (Size Exclusion Chromatography), refining instrumentation, packing materials, and technology. Among the resultant innovations are size-exclusion techniques that expand beyond the original polymer analysis. These include applications for separating small and large molecules from interfering matrices such as those in foods, pharmaceutical preparations, and natural products.

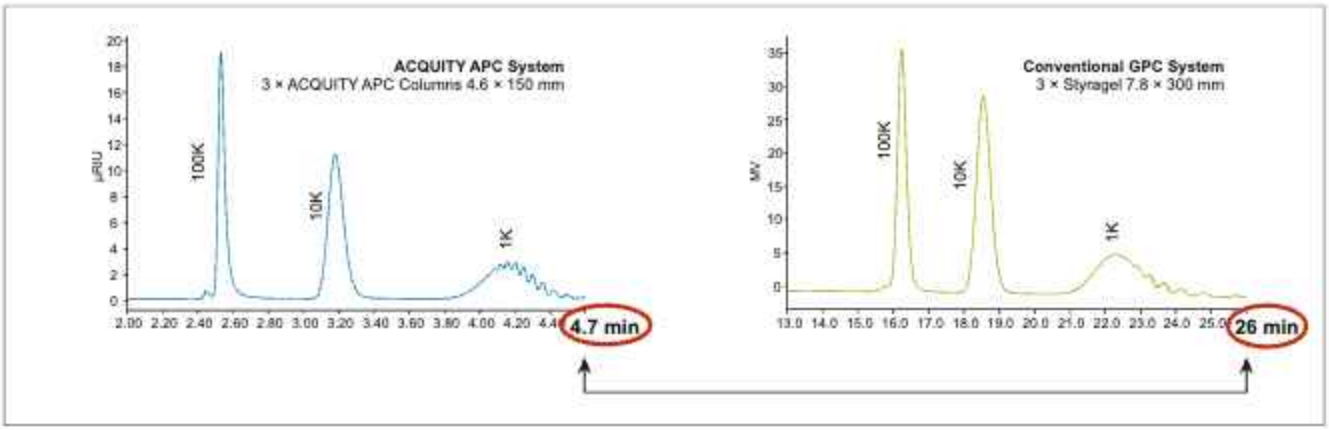
As a market leader and a primary manufacturer of chromatographic instrumentation and consumables, Waters will continue to influence the field of separation science, providing the highest quality products and expert applications support.

GPC Columns for Non-Aqueous Samples

The goals for a separation can range between maximum speed, for screening purposes, to maximum resolution, for quality control purposes. Each analysis type presents unique challenges. Waters' comprehensive line of GPC columns ensures that the column or column bank you select for an analysis will accommodate a particular temperature, solvent, and polymer type.

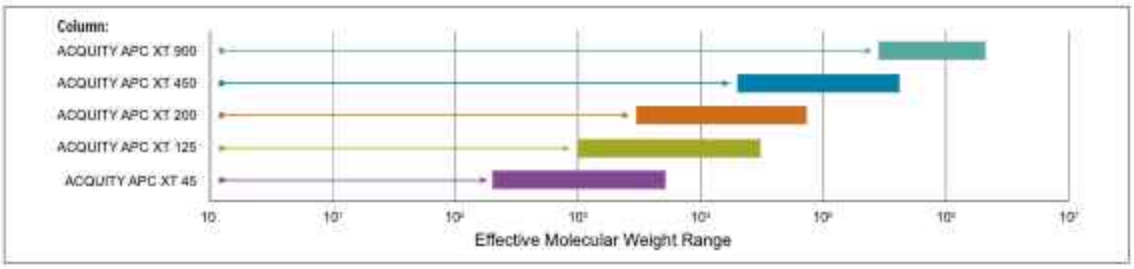
ACQUITY APC XT COLUMNS

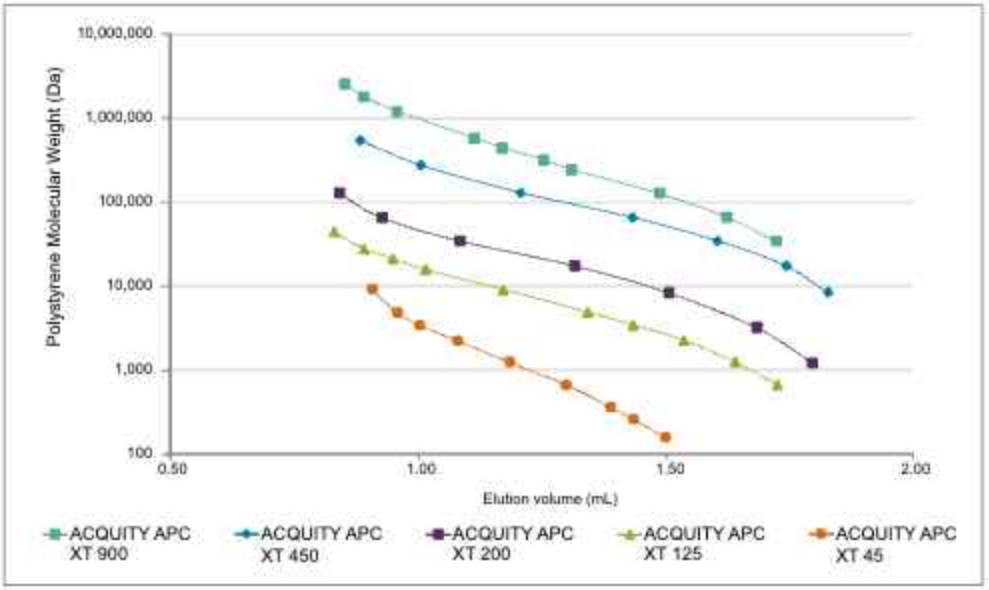
Using ACQUITY APC XT Columns, you can quantify and characterize polymer samples with accuracy and confidence while maximizing productivity. The high-performance chemistries contained in ACQUITY Advanced Polymer Chromatography® (APC™) Columns enable rapid and accurate chromatographic characterization of synthetic polymer and macromolecular species.
The rigid hybrid particles used for ACQUITY APC XT Columns provide an unprecedented capability for rapid solvent switching, allowing the scientist to use multiple conditions for the same column bank. This gives the chromatographer the ability to quantify and characterize polymer samples with confidence and accuracy while maximizing productivity.



Compared with conventional columns, ACQUITY APC Columns provide faster analysis time and increase chromatographic resolution. Improving data quality enhances your ability to accurately characterize polymers and to do it with confidence. The conventional GPC separation was performed using three Styragel® HR Columns (HR 0.5, HR 2, and HR 4E), all 7.8 × 300 mm. The same polystyrene sample was analyzed using a 3-column bank of 4.6 × 150 mm ACQUITY APC Columns (XT 45, XT 45, and XT 200). The separation used THF; the flow rate was 1 mL/min.

ACQUITY APC XT Column Selection Guide





Polystyrene calibration curves for ACQUITY APC XT Columns.

Ordering Information

ACQUITY APC XT Columns

Pore Size	Effective MW Range*	Particle Size	P/N	P/N	P/N
			Column Length		
			30 mm	75 mm	150 mm
45Å	200–5000	1.7 µm	186006992	186006993	186006995
125Å	1000–30,000	2.5 µm	186006997	186006998	186007000
200Å	3000–70,000	2.5 µm	186007002	186007003	186007005
450Å	20,000–400,000	2.5 µm	186007007	186007008	186007010
900Å	300,000–2,000,000	2.5 µm	186007252	186007253	186007254

*The calibration range is based on well-characterized polystyrene standards.
All columns are 4.6 mm I.D., maximum temperature limit 80 °C and are shipped dry.

ACQUITY APC XT Columns are shipped dry, with acetal compression plugs at the assembly's ends. If you are storing the columns wet using a strong solvating solvent, consider fitting compression plugs made of stainless steel.

ACQUITY APC XT Fitting Compression Plug

Description	P/N
Stainless Steel Pin Plug, 1/16 in., High Pressure, 5/pk	700002747

Waters ACQUITY APC Column Selector

Easily find column and calibration kit recommendations that fit your polymer analysis requirements.

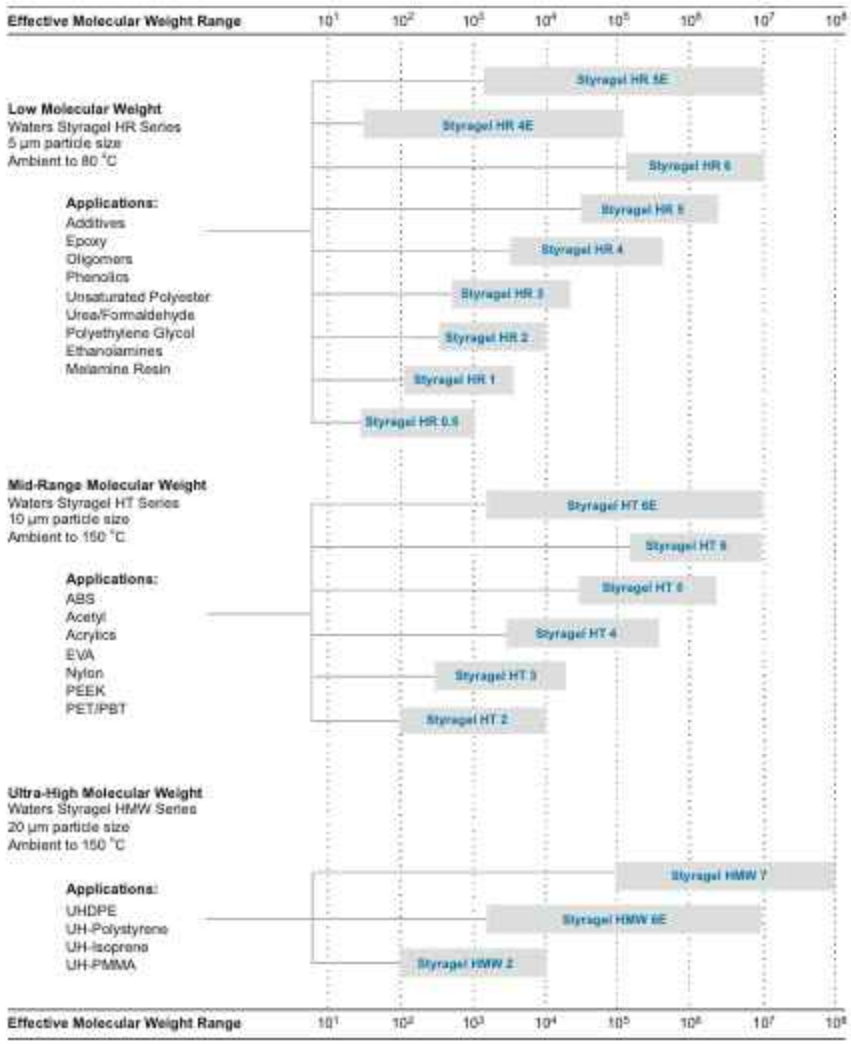
To try this tool, go to www.waters.com/APCselector



STYRAGEL COLUMNS SELECTION GUIDE

Waters offers a comprehensive selection of polymeric GPC Columns. Select a column or column bank that is compatible with the temperature, solvent, and polymer type analyzed. Refer to the following charts to quickly compare the molecular weight ranges for the specified columns. By connecting two or more columns in series, you extend the effective molecular-weight range, which is necessary preparation for performing increasingly complex sample analyses.

Selection Guide

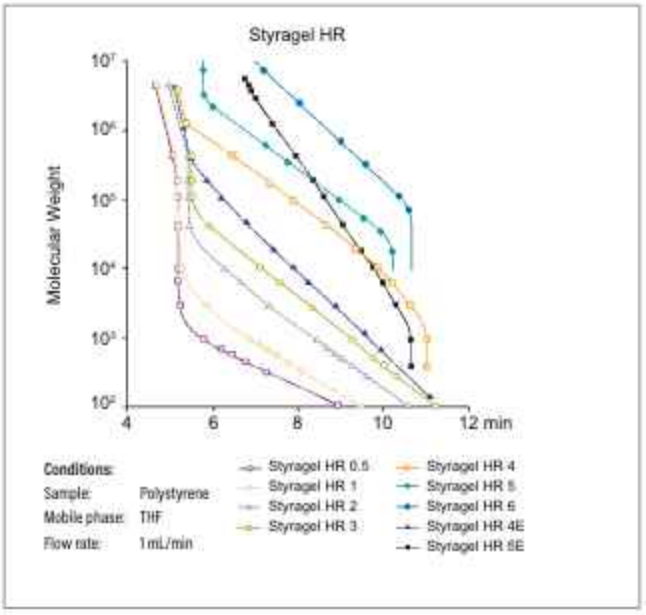


HMW—High Molecular Weight HT—High Temperature HR—High Resolution

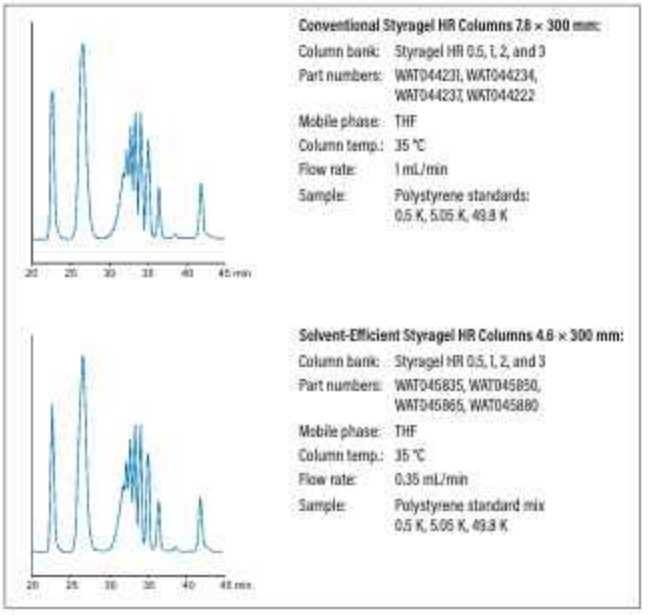
Styragel HR (High-Resolution) Columns

Designed especially for low-molecular-weight samples, Waters Styragel HR Columns are ideal for analyzing oligomers, epoxies, and polymer additives, where high resolution is critical. Packed with rigid 5 µm particles, these columns deliver unrivaled resolution and efficiency in the low-to-mid molecular-weight region.

Calibration Curves for the Waters Styragel HR Series of High-Resolution Columns



Styragel HR Columns for Unrivaled Resolution of Low Molecular Weight Samples



Ordering Information

Styragel HR Columns (7.8 × 300 mm)

		P/N	P/N	P/N
Description	**Effective MW Range**	**THF**	**DMF**	**Toluene**
Styragel HR 0.5	0–1000	WAT044231	WAT044232	WAT044230
Styragel HR 1	100–5000	WAT044234	WAT044235	WAT044233
Styragel HR 2	500–20,000	WAT044237	WAT044238	WAT044236
Styragel HR 3	500–30,000	WAT044222	WAT044223	WAT044221
Styragel HR 4	5000–600,000	WAT044225	WAT044226	WAT044224
Styragel HR 4E	50–100,000	WAT044240	WAT044241	WAT044239
Styragel HR 5	50,000–4,000,000	WAT054460	WAT054466	WAT054464
Styragel HR 5E	2000–4,000,000	WAT044228	WAT044229	WAT044227
Styragel HR 6	200,000–10,000,000	WAT054468	WAT054474	WAT054470
Styragel Guard Column 4.6 × 30 mm	—	WAT054405	WAT054415	WAT054410

Styragel HR Columns (4.6 × 300 mm)*

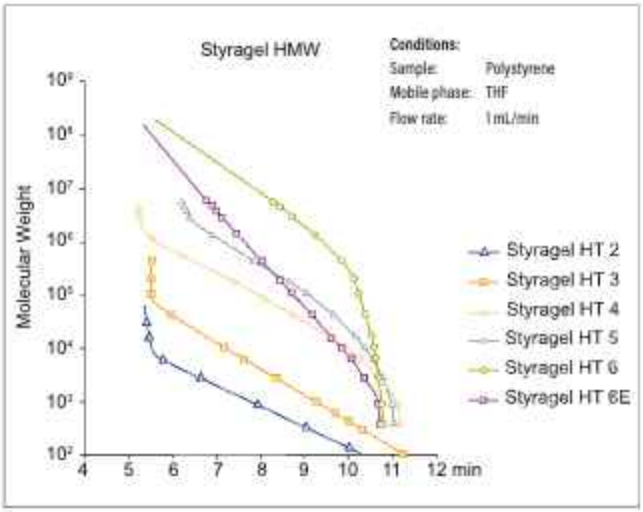
Description	Effective MW Range	P/N THF	P/N DMF	P/N Toluene
Styragel HR 0.5	0–1000	WAT045835	WAT045840	WAT045830
Styragel HR 1	100–5000	WAT045850	WAT045855	WAT045845
Styragel HR 2	500–20,000	WAT045865	WAT045870	WAT045860
Styragel HR 3	500–30,000	WAT045880	WAT045885	WAT045875
Styragel HR 4	5000–600,000	WAT045895	WAT045900	WAT045890
Styragel HR 4E	50–100,000	WAT045805	WAT045810	WAT045800
Styragel HR 5E	2000–4,000,000	WAT045820	WAT045825	WAT045815

*The same high performance as our conventional Styragel HMW Columns with the added advantage of reducing your solvent consumption by two-thirds.

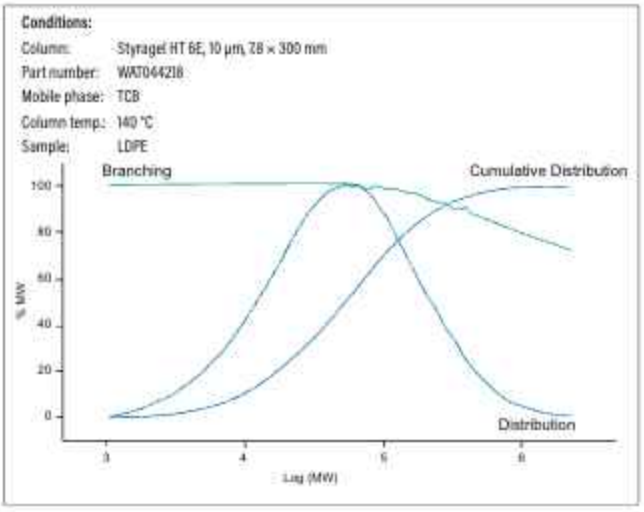
Styragel HT (High-Temperature) Columns

You can use Styragel HT Columns with aggressive solvents at high temperatures without sacrificing resolution or column lifetime. Packed with rigid 10 µm particles, a typical plate count exceeds 10,000 plates per column. These columns are extremely durable because of a narrow particle-size distribution that results in a stable column bed. Suitable for both ambient and high-temperature analysis, the Styragel HT Columns offer excellent resolution of polymers in the mid-to-high molecular-weight range.

Calibration Curves for the Waters Styragel HT Series of High-Temperature Columns



Styragel HT Columns Deliver Superior Performance— Even at High Temperatures



Ordering Information

Styragel HT Columns (7.8 × 300 mm)

Description	Effective MW Range	P/N THF	P/N DMF	P/N Toluene
Styragel HT 2	100–10,000	WAT054475	WAT054480	WAT054476
Styragel HT 3	500–30,000	WAT044207	WAT044208	WAT044206
Styragel HT 4	5000–600,000	WAT044210	WAT044211	WAT044209
Styragel HT 5	50,000–4,000,000	WAT044213	WAT044214	WAT044212
Styragel HT 6	200,000–10,000,000	WAT044216	WAT044217	WAT044215
Styragel HT 6E	5000–10,000,000	WAT044219	WAT044220	WAT044218
Styragel Guard Column 4.6 × 30 mm	—	WAT054405	WAT054415	WAT054410

Styragel HT Columns (4.6 × 300 mm)*

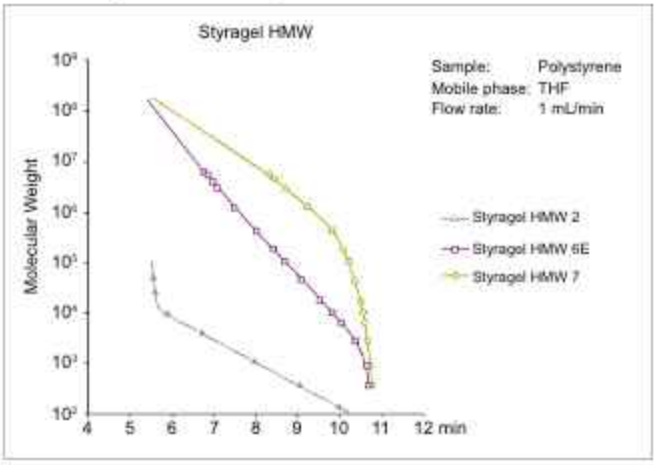
Description	Effective MW Range	P/N THF	P/N DMF	P/N Toluene
Styragel HT 3	500–30,000	WAT045920	WAT045925	WAT045915
Styragel HT 4	5000–600,000	WAT045935	WAT045940	WAT045930
Styragel HT 5	50,000–4,000,000	WAT045950	WAT045955	WAT045945
Styragel HT 6	200,000–10,000,000	WAT045965	WAT045970	WAT045960
Styragel HT 6E	5000–10,000,000	WAT045980	WAT045985	WAT045975

*The same high performance as our conventional Styragel HT Columns with the added advantage of reducing your solvent consumption by two-thirds.

Styragel HMW (High-Molecular Weight) Columns

The Styragel HMW Columns are designed specifically to analyze polymers of ultra-high molecular-weight, which are susceptible to shearing. Combining high-porosity, 10 µm frits and 20 µm particles, the Styragel HMW Columns minimize polymer shear effects. Usable at ambient or elevated temperatures, these state-of-the-art columns exhibit excellent lifetimes.

Calibration Curves for Waters Styragel HMW Series of High-Molecular Weight Columns



Ordering Information

Styragel HMW Columns (7.8 × 300 mm)

Description	Effective MW Range	P/N THF	P/N DMF	P/N Toluene
Styragel HMW 2	100–10,000	WAT054488	WAT054494	WAT054490
Styragel HMW 7	500,000–1 × 108	WAT044201	WAT044202	WAT044200
Styragel HMW 6E	5000–1 × 107	WAT044204	WAT044205	WAT044203
Styragel Guard Column 4.6 × 30 mm	—	WAT054405	WAT054415	WAT054410

Styragel HMW Columns (4.6 × 300 mm)*

Description	Effective MW Range	P/N THF	P/N DMF	P/N Toluene
Styragel HMW 7	500,000–1 × 108	WAT046805	WAT046810	WAT046800
Styragel HMW 6E	5000–1 × 107	WAT046820	WAT046825	WAT046815

*The same high performance as our conventional Styragel HMW Columns with the added advantage of reducing your solvent consumption by two-thirds. System dead volume must be minimized for maximum column performance.

ULTRASTYRAGEL COLUMNS

Ultrastyragel™ Preparative Columns provide high-efficiency GPC separations for compound isolation and sample cleanup. Closely related to Styragel GPC Columns, the family of Ultrastyragel Columns provides a two- to three-fold increase in efficiency (plates/meter) that improves separation speed and reduces solvent consumption for preparative isolation. Separations that once required several smaller Styragel Columns can be performed on a single, more efficient, Ultrastyragel Preparative Column.

Ordering Information

Ultrastyragel Columns (19 × 300 mm)

		(mL/min)	P/N	P/N
Pore Size	Effective MW Range	Flow Rate	Toluene	THF
100Å	50–1500	4–10	WAT025866	WAT025859
500Å	100–10,000	4–10	WAT025867	WAT025860
10^3 Å	200–30,000	4–10	WAT025868	WAT025861
10^4 Å	5000–600,000	4–10	WAT025869	WAT025862
10^5 Å	50,000–4 M	4–10	WAT025870	WAT025863
10^6 Å	200,000–10 M	4–10	WAT025871	WAT025864
Linear	2000–4 M	4–10	WAT025872	WAT025865

Ultrastyragel Columns (7.8 × 300 mm)

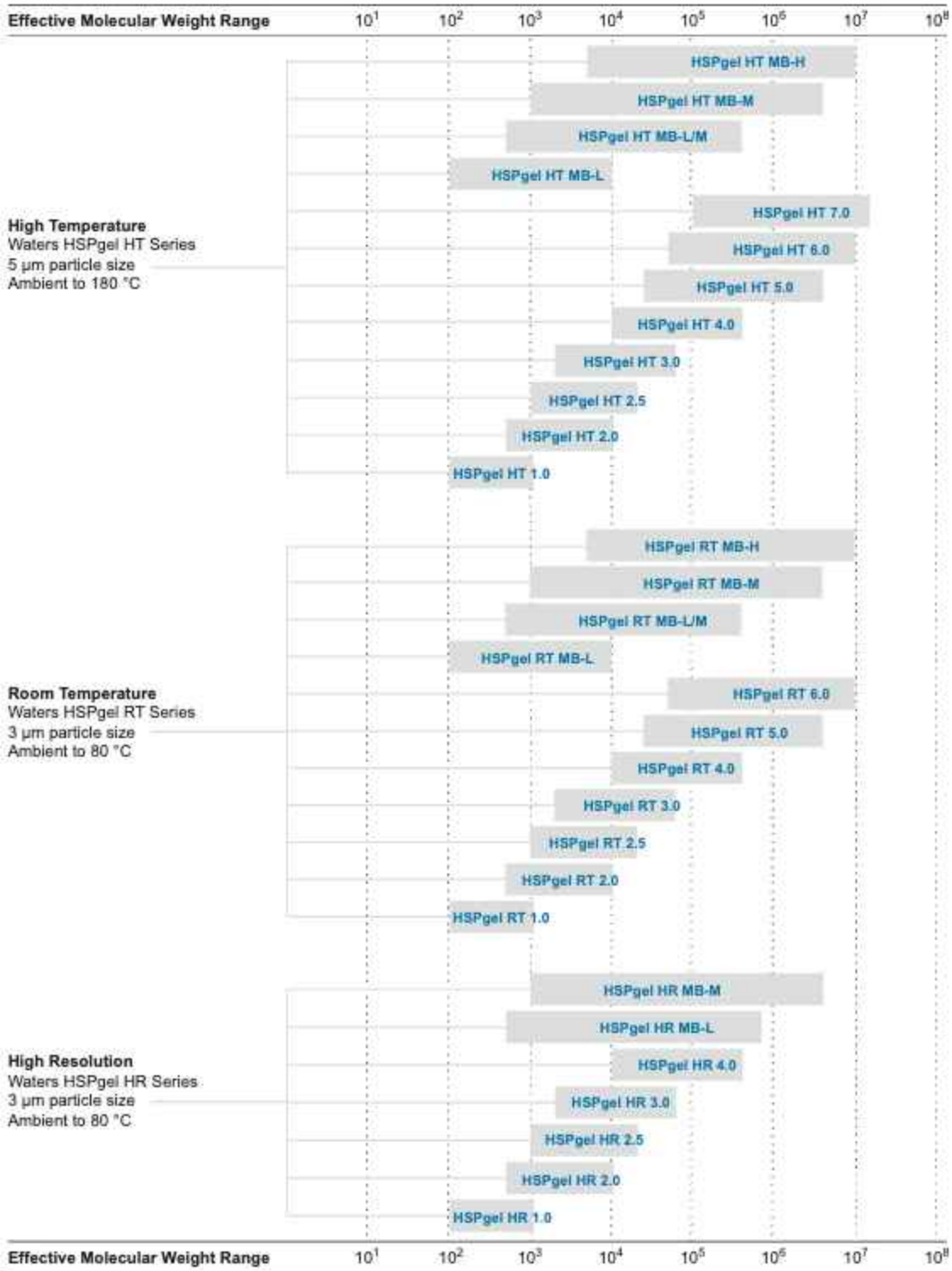
		P/N	P/N
Pore Size	Effective MW Range	Toluene	THF
100Å	50–1500	WAT085500	WAT010570
500Å	100–10,000	WAT085501	WAT010571

HSPgel COLUMNS

Designed for high-speed GPC analysis, the Waters HSPgel™ Column provides an accurate and precise determination of molecular weight, increased sample throughput, and greatly reduced solvent consumption and disposal.

Waters offers these 6.0 × 150 mm columns:

- HSPgel HR series, for high-resolution, room-temperature GPC
- HSPgel RT series, for routine room temperature GPC
- HSPgel HT series for high temperature GPC



*MW ranges for HR and RT are based on polystyrene chain lengths.

HR—High Resolution
RT—Room Temperature
HT—High Temperature
MB—Mixed Bed
L—Low MW Range
M—Medium MW Range
L/M—Low/Medium MW Range
H—High MW Range

HSPgel HR Series

The HSPgel HR series is designed for high-resolution, room-temperature, organic polymer GPC. These columns are packed in THF and can be converted once to toluene, dichloromethane, or chloroform.

Ordering Information

HSPgel HR Columns, in THF, 3 µm, 6.0 × 150 mm

Description	MW Range	P/N
HSPgel HR 1.0	100–1000	186001741
HSPgel HR 2.0	500–10,000	186001742
HSPgel HR 2.5	1000–20,000	186001743
HSPgel HR 3.0	2000–60,000	186001744
HSPgel HR 4.0	10,000–400,000	186001745
HSPgel HR MB-L	500–700,000	186001746
HSPgel HR MB-M	1000–4,000,000	186001747

HR—High Resolution, MB—Mixed Bed, L—Low MW Range, M—Medium MW Range.

HSPgel RT Series

The HSPgel RT series is designed for the routine, room-temperature work of organic-polymer GPC. The columns, which are shipped packed in THF, can be converted multiple times, from THF to toluene, chloroform, dichloromethane, DMF, DMSO, etc.

Ordering Information

HSPgel RT Columns, in THF, 3 µm, 6.0 × 150 mm

Description	MW Range	P/N
HSPgel RT 1.0	100–1000	186001749
HSPgel RT 2.0	500–10,000	186001750
HSPgel RT 2.5	1000–20,000	186001751
HSPgel RT 3.0	2000–60,000	186001752
HSPgel RT 4.0	10,000–400,000	186001753
HSPgel RT 5.0	25,000–4,000,000	186001754
HSPgel RT 6.0	50,000–10,000,000	186001755
HSPgel RT MB-L	100–10,000	186001757
HSPgel RT MB-L/M	500–400,000	186001758
HSPgel RT MB-M	1000–4,000,000	186001759
HSPgel RT MB-H	5000–10,000,000	186001760

RT—Room Temperature, MB—Mixed Bed, L—Low MW Range, M—Medium MW Range, L/M—Low/Medium MW Range, H—High MW Range.

HSPgel HT Series

The HSPgel HT series is designed for organic GPC conducted at between room temperature and high temperature (180 °C). The columns are shipped packed in either THF or ODCB. The ODCB-packed column should be used for direct conversion to TCB. These columns can withstand multiple solvent switches.

Ordering Information

HSPgel HT Columns, in THF, 5 µm, 6.0 × 150 mm

Description	MW Range	P/N
HSPgel HT 1.0	100–1000	186001761
HSPgel HT 2.0	500–10,000	186001762
HSPgel HT 2.5	1000–20,000	186001763
HSPgel HT 3.0	2000–60,000	186001764
HSPgel HT 4.0	10,000–400,000	186001765
HSPgel HT 5.0	25,000–4,000,000	186001766
HSPgel HT 6.0	50,000–10,000,000	186001767
HSPgel HT 7.0	100,000–15,000,000	186001768
HSPgel HT MB-L	100–1000	186001769
HSPgel HT MB-L/M	500–400,000	186001770
HSPgel HT MB-M	1000–4,000,000	186001771
HSPgel HT MB-H	5000–10,000,000	186001772

HSPgel HT Columns, in ODCB, 5 µm, 6.0 × 150 mm

Description	MW Range	P/N
HSPgel HT 1.0	100–1000	186001773
HSPgel HT 2.0	500–10,000	186001774
HSPgel HT 2.5	1000–20,000	186001775
HSPgel HT 3.0	2000–60,000	186001776
HSPgel HT 4.0	10,000–400,000	186001777
HSPgel HT 5.0	25,000–4,000,000	186001778
HSPgel HT 6.0	50,000–10,000,000	186001779
HSPgel HT 7.0	100,000–15,000,000	186001780
HSPgel HT MB-L	100–1000	186001781
HSPgel HT MB-L/M	500–400,000	186001782
HSPgel HT MB-M	1000–4,000,000	186001783
HSPgel HT MB-H	5000–10,000,000	186001784

HT - High Temperature, MB - Mixed Bed, L - Low MW Range, M -Medium MW Range, L/M - Low/Medium MW Range, H - High MW Range.

SHODEX COLUMNS

Waters is proud to distribute Shodex GPC Columns and accessories. For 30 years, Shodex GPC Columns have been used successfully by scientists worldwide. The following selection of highly-reproducible GPC Columns contains styrene divinylbenzene resins.

K-800 Series (8 × 300 mm)

Ultra-high-efficiency columns designed for high-resolution performance, available in THF, DMF, or chloroform.

Ordering Information

Shodex GPC K-800 Columns, in THF, 5 µm, 8 × 300 mm

Description	Polystyrene Exclusion Limit	P/N
Shodex KF-801	1500	WAT030697
Shodex KF-802	5000	WAT030698
Shodex KF-802.5	20,000	WAT030699
Shodex KF-803	70,000	WAT034100
Shodex KF-804	400,000	WAT034101
Shodex KF-805	4,000,000	WAT034102
Shodex KF-807	200,000,000	WAT034104
Shodex KF-806M (linear)	40,000,000	WAT034105
Shodex KF-G Guard (5 µm, 4.6 × 10 mm)		WAT034106

Shodex GPC K-800 Columns, in Chloroform, 5 µm, 8 × 300 mm

Description	Polystyrene Exclusion Limit	P/N
Shodex K-802.5	20,000	WAT034109
Shodex K-803	70,000	WAT034110
Shodex K-804	400,000	WAT034111
Shodex K-805	4,000,000	WAT034112
Shodex K-G Guard (5 µm, 4.6 × 10 mm)		WAT035524

Shodex GPC K-800 Columns, in DMF, 5 µm, 8 × 300 mm

Description	Polystyrene Exclusion Limit	P/N
Shodex KD-801	2500	WAT034116
Shodex KD-802	5000	WAT034117
Shodex KD-802.5	20,000	WAT034118
Shodex KD-803	70,000	WAT034119
Shodex KD-804	400,000	WAT034120
Shodex KD-806	40,000,000	WAT034122
Shodex KD-807	200,000,000	WAT034123
Shodex KD-806 M (linear)	40,000,000	WAT034124
Shodex KD-G Guard (5 µm, 4.6 × 10 mm)		WAT034125

HFIP-800 Series

These columns have the same high efficiency as the K-series columns shipped in HFIP.

Ordering Information

Shodex GPC HFIP-800 Columns, 5 µm, 8 × 300 mm

Description	Polystyrene Exclusion Limit	P/N
Shodex HFIP-803	70,000	WAT035605
Shodex HFIP-806M (linear)	40,000,000	WAT035611
Shodex HFP-LG Guard (8 × 50 mm)	–	WAT035612

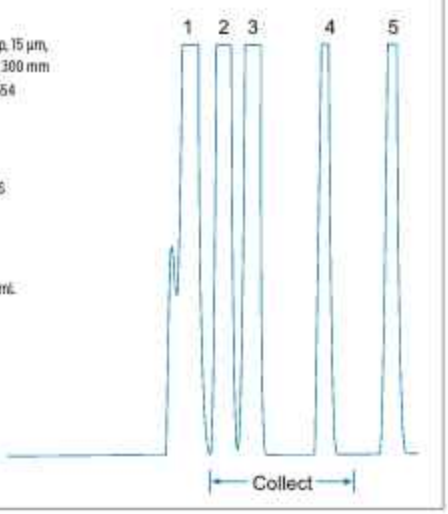
ENVIROGEL HIGH-RESOLUTION GPC CLEANUP COLUMNS

The Envirogel™ High-Efficiency GPC Cleanup Columns remove low volatility, high-molecular-weight interferences, such as lipids and natural resins, from environmental samples, as specified in EPA Method 3640A. In the past, the cleanup procedure for environmental samples was performed on low-efficiency GPC Columns based on packing particle diameters of 37–75 µm (200–400 mesh) Bio-Beads S-X resins. The high efficiency Envirogel GPC Cleanup Columns increase the speed of this process, and simultaneously reduce solvent consumption. For optimum capacity and resolution, a 150 mm column is used in series with the 300 mm column. The use of both the 150 mm and 300 mm column provides maximum loading capacity, while the 300 mm column provides maximum throughput when used alone, plus reduced solvent consumption.

Column Optimization

Conditions:
Column: Envirogel GPC Cleanup, 15 µm, 19 × 150 mm and 19 × 300 mm
Part numbers: WAT036555, WAT036554
Sample: 2000 µL
Solvent: Methylene chloride
Flow rate: 5 mL/min
Detection: UV @ 254 nm, 1.5 AUFS

Compounds:
1. Corn oil, 62.5 mg/mL
2. Bis(2-Ethylhexyl) Phthalate, 2.5 mg/mL
3. Methoxychlor, 0.5 mg/mL
4. Perylene, 0.05 mg/mL
5. Sulfur, 0.2 mg/mL



Ordering Information

Envirogel High-Resolution GPC Cleanup Columns

Description	Solvent	Dimension	P/N
Envirogel GPC Cleanup	Methylene chloride	19 × 150 mm	WAT036555
Envirogel GPC Cleanup	Cyclohexane/ethyl acetate	19 × 150 mm	186001915
Envirogel GPC Cleanup	Methylene chloride	19 × 300 mm	WAT036554
Envirogel GPC Cleanup	Cyclohexane/ethyl acetate	19 × 300 mm	186001916
Envirogel GPC Guard	Methylene chloride	4.6 × 30 mm	186001913
Envirogel GPC Guard	Cyclohexane/ethyl acetate	4.6 × 30 mm	186001914

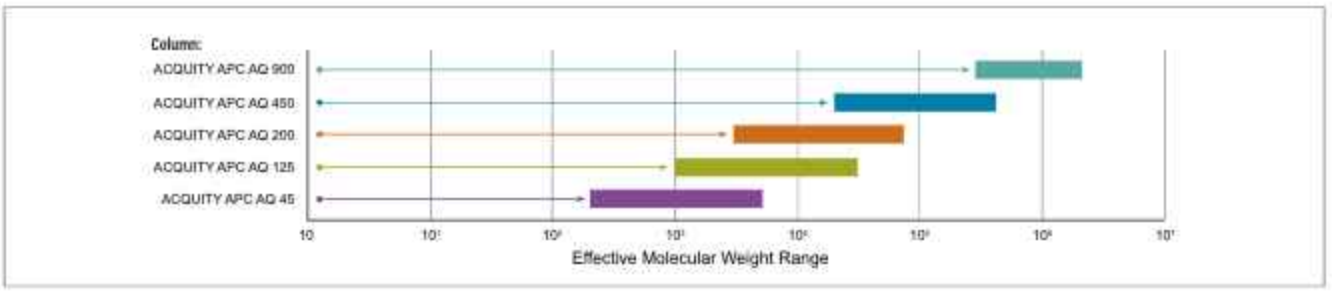
SEC Columns

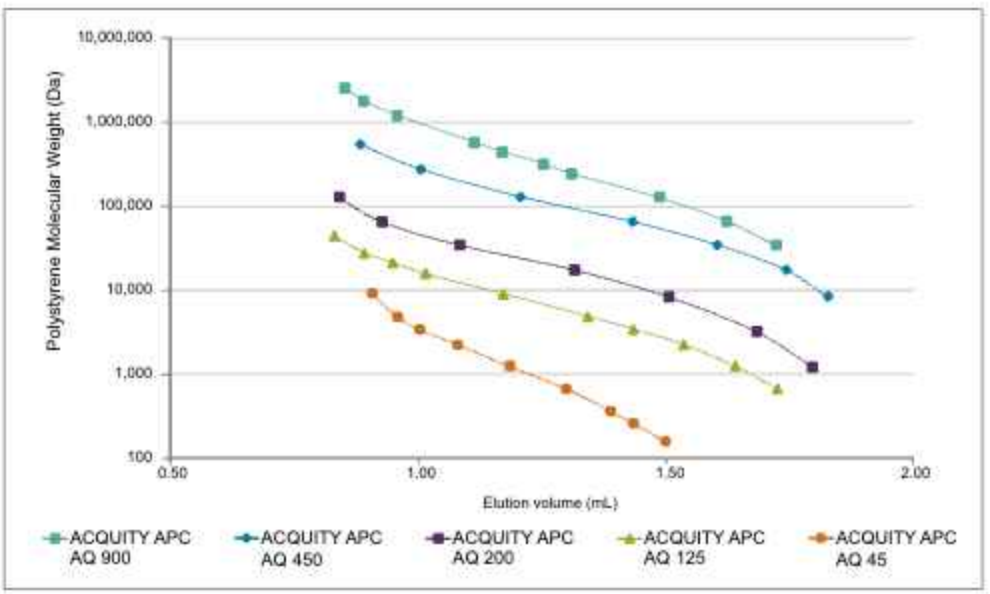
Size-exclusion chromatography (SEC) and gel-filtration chromatography (GFC) are synonymous terms for techniques used to separate macromolecules in aqueous environments according to their hydrodynamic volume. Waters SEC Columns efficiently separate cationic, anionic, and non-ionic macromolecules in many physical, chemical, and biological applications.

ACQUITY APC AQ COLUMNS

Designed for aqueous samples, ACQUITY APC AQ Columns are based on hybrid-polymer sub-3-µm particle technology. The advantages of this technology, detailed in the ACQUITY APC XT section on page 301, apply as well to the AQ columns.

ACQUITY APC AQ Column Selection Guide





Polystyrene calibration curves for ACQUITY APC AQ Columns.

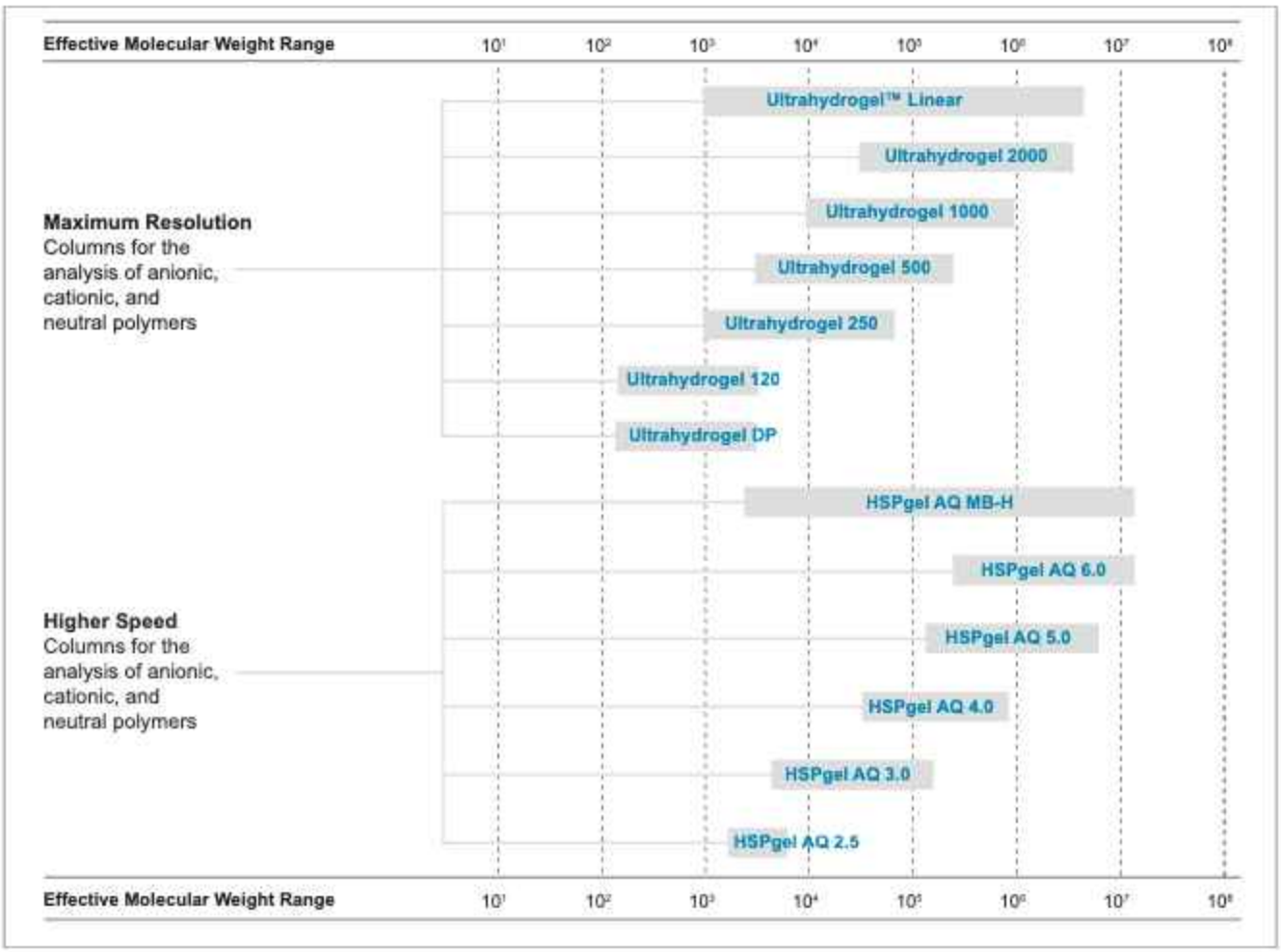
Ordering Information

ACQUITY APC AQ Columns

Pore Size	Effective MW Range*	Particle Size	P/N	P/N	P/N
			Column Length		
			30 mm	75 mm	150 mm
45Å	200–5000	1.7 µm	186006972	186006973	186006975
125Å	1000–30,000	2.5 µm	186006977	186006978	186006980
200Å	3000–70,000	2.5 µm	186006982	186006983	186006985
450Å	20,000–400,000	2.5 µm	186006987	186006988	186006990
900Å	300,000–2,000,000	2.5 µm	186007249	186007250	186007251

*All columns are 4.6 mm I.D., maximum temperature limit is 45 °C, columns are shipped dry.

Aqueous SEC Column Selection Guide



This chart compares the molecular weight ranges for the specified columns. By connecting two or more columns in series, the effective molecular weight range can be extended to provide coverage for more complex sample analysis.

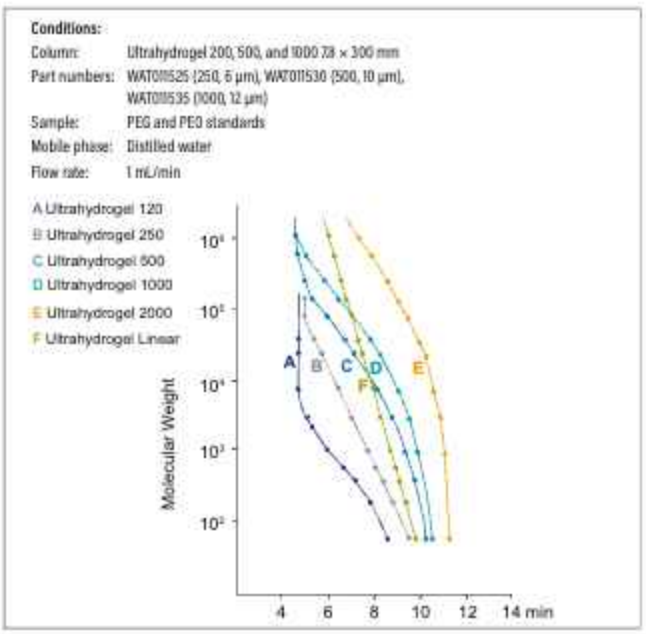
ULTRAHYDROGEL COLUMNS

Packed with hydroxylated, polymethacrylate-based gel, Waters Ultrahydrogel SEC Columns are ideal for analyzing aqueous-soluble samples such as oligomers, oligosaccharides, and polysaccharides. They are likewise well-suited to analyzing cationic, anionic, and amphoteric polymers.

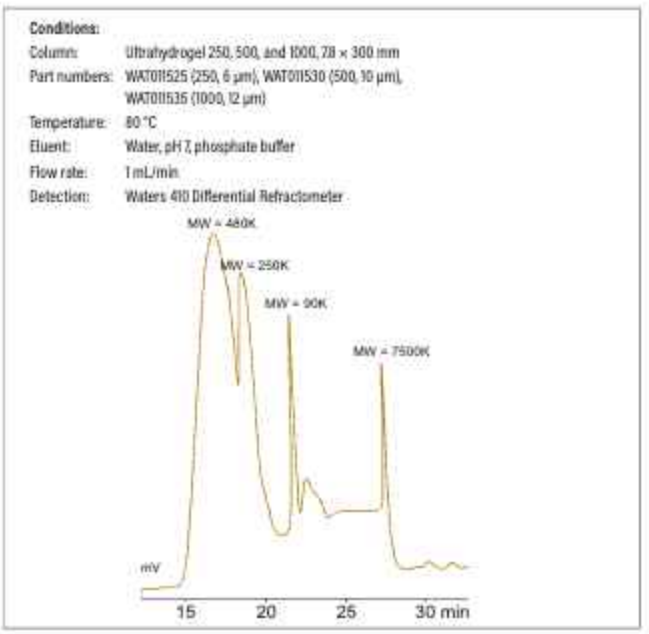
These 7.8 × 300 mm, high-resolution columns offer many advantages over conventional aqueous SEC Columns:

- Wide-pH range (2–12)
- Compatibility with high concentrations of organic solvents, as much as 20% organic and 50% organic for mobile phases introduced by gradient
- Greater flexibility for the mobile phase
- Minimal non-size-exclusion effects

Ultrahydrogel Columns Calibration Curves



Gelatin Sample



Ordering Information

Ultrahydrogel Columns (7.8 × 300 mm)*

Description	Pore Size	Particle Size	Exclusion Limit	P/N
Ultrahydrogel 120	120Å	6 µm	5000	WAT011520
Ultrahydrogel 250	250Å	6 µm	80,000	WAT011525
Ultrahydrogel 500	500Å	10 µm	400,000	WAT011530
Ultrahydrogel 1000	1000Å	12 µm	1,000,000	WAT011535
Ultrahydrogel 2000	2000Å	12 µm	7,000,000	WAT011540
Ultrahydrogel Linear	Blend	10 µm	7,000,000	WAT011545
Ultrahydrogel DP*	120Å	6 µm	5000	WAT011550
Ultrahydrogel DNA	>2000Å	10 µm	10,000,000	WAT011560
Ultrahydrogel Guard Column	N/A	6 µm	N/A	WAT011565
Ultrahydrogel Guard Column DP*	N/A	6 µm	N/A	WAT011570

*DP = Degree of Polymerization, choice of column when working with glucose oligomers.

HSPgel COLUMNS

Waters HSPgel™ SEC Columns are optimized for high-speed polymer analysis in aqueous solution. HSPgel Columns reduce solvent consumption, increase throughput, and provide accurate molecular-weight data for any room-temperature analysis. The column dimensions are 6.0 × 150 mm.

Ordering Information

HSPgel Columns for High-Speed SEC Analysis*

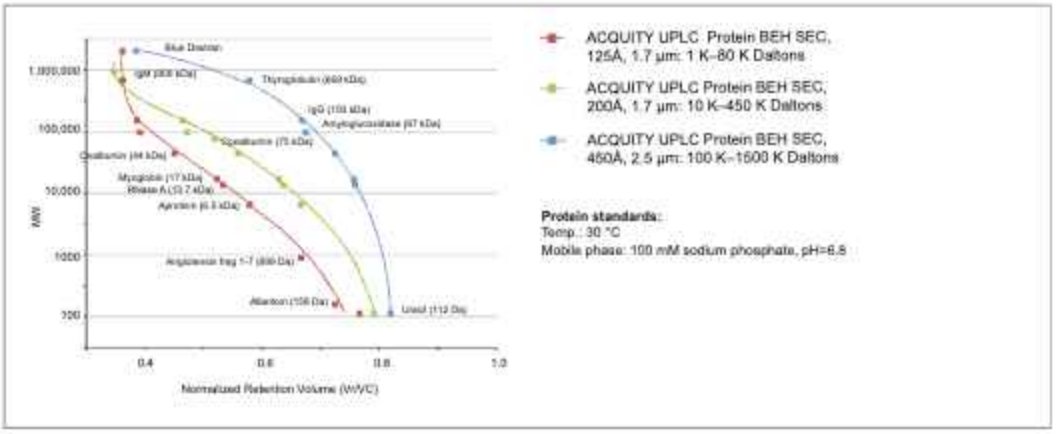
Description	MW Range	Solvent	Particle Size	P/N
HSPgel AQ 2.5	500–2000	Water	4 µm	186001785
HSPgel AQ 3.0	1000–60,000	Water	4 µm	186001786
HSPgel AQ 4.0	10,000–400,000	Water	6 µm	186001787
HSPgel AQ 5.0	50,000–4,000,000	Water	7 µm	186001788
HSPgel AQ 6.0	100,000–10,000,000	Water	9 µm	186001789
HSPgel AQ MB-H	500–10,000,000	Water	9 µm	186001790

*Exclusion limits for AQ series extrapolated from highest MW PEO standard (~900,000).

ACQUITY UPLC PROTEIN SEC COLUMNS

ACQUITY UPLC Protein SEC Columns are packed with ethylene-bridged hybrid (BEH), diol-coated particle technology. Manufacturers of biotherapeutics and biosimilars can choose the most effective pore size for their application: 125, 200, and 450Å.

Calibration Curves on ACQUITY UPLC Protein BEH SEC, 125Å, 200Å, and 450Å Columns



Ordering Information

ACQUITY UPLC Protein BEH SEC 4.6 mm Column

Pore Size	MW Range	Particle Size	P/N	P/N	P/N	P/N	P/N
			Column Length				
			30 mm Guard	150 mm	300 mm	150 mm w/Standard	300 mm w/Standard
125Å	1K - 80K Da	1.7 µm	186006504	186006505	186006506	176003906	176003907
200Å	10K - 450K Da	1.7 µm	186005793	186005225	186005226	176003904	176003905
450Å	100K - 1500k Da	2.5 µm	186006850	186006851	186006852	176002996	176002997
125Å	1K - 80K Da	1.7 µm	–	186008471*	–	–	–
ELSD outlet tubing (0.004" I.D. × 6" length)							430001562
0.005 × 1.75" SEC UPLC connection tubing, 2/pk							186006613

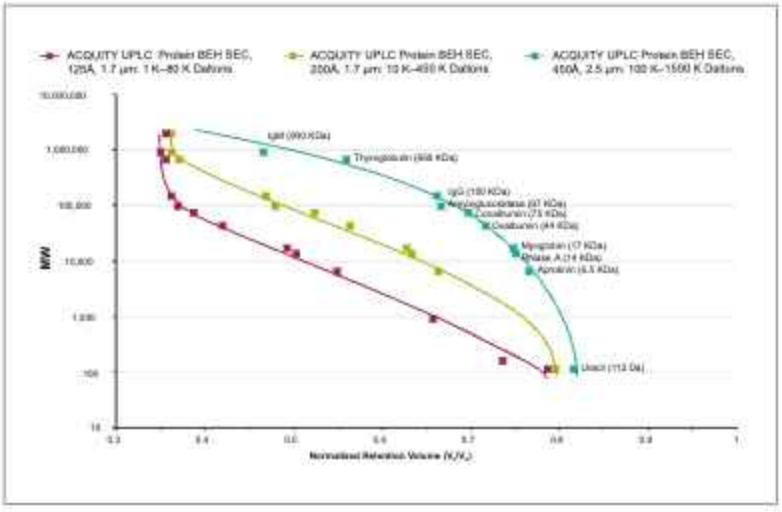
*ACQUITY UPLC Protein BEH SEC 2.1 x 150 mm Column.

For more information on ACQUITY UPLC Protein SEC Columns, refer to page 276.

XBRIDGE PROTEIN BEH SEC COLUMNS

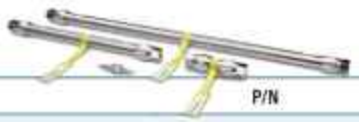
XBridge Protein BEH SEC Columns are designed for use on HPLC and UHPLC instrumentation. The 3.5 µm columns are available in 125, 200, and 450Å pore sizes using the same ethylene-bridged hybrid (BEH) particle technology and diol-bonded coating used in Waters UPLC-based SEC columns. This allows you to transfer methods based on laboratory instrumentation and component resolution or sample throughput needs.

Calibration Curves on XBridge Protein BEH SEC, 125Å, 200Å, and 450Å Columns



Ordering Information

XBridge Protein BEH SEC, 7.8 mm I.D. Columns*



Pore Size	Effective MW Range*	Particle Size	P/N	P/N	P/N
			Column Length		
			30 mm	75 mm	150 mm
125Å	1K - 80K	3.5 µm	176003591	176003592	176003593
200Å	10K - 450K	3.5 µm	176003594	176003595	176003596
450Å	100K - 1500k	3.5 µm	176003597	176003598	176003599

Straight Connection Tubing and End-fittings for XBridge Protein BEH SEC Column	WAT022681
U-Bend Connection Tubing and End-fittings for XBridge Protein BEH SEC Column	WAT084080

*All columns and guards include standards mix.
SEC Protein Standards are matched to the pore size of the column.

PROTEIN-PAK SIZE-EXCLUSION HPLC COLUMNS

Protein-Pak Packings are based on a 10 µm diol-bonded silica and are available in a selection of pore sizes and column configurations.

The Protein-Pak Size-Exclusion Columns can be expected to resolve proteins that differ in molecular weight by a factor of two and to distinguish proteins differing by as little as 15% in molecular weight. The degree of resolution is more dependent on the sample mass and volume than the interaction between the sample and the stationary phase. Ideally, there should be no interaction between the stationary phase and the sample molecules. Secondary interactions are most often ionic and can, therefore, be reduced by increasing the ionic strength of thee mobile phase. Typical, salt concentrations range to 0.2-0.5 M NaCl. It may also be useful in some cases to consider adding 10-20% methanol to eliminate hydrophobic and other hydrogen-bonding interactions.

Ordering Information

Protein-Pak SEC HPLC Columns and Guards

Steel Column	Dimension	MW Range	P/N
Protein-Pak 60	7.8 x 300 mm	1,000-20,000	WAT085250
Protein-Pak 60	19 x 300 µm	1,000-20,000	WAT025830
Protein-Pak 125	7.8 x 300 mm	2,000-80,000	WAT084601
Protein-Pak 125	19 x 300 mm	2,000-80,000	WAT025831
Protein-Pak 300SW	7.5 x 300 mm	10,000-300,000	WAT080013
Protein-Pak 125 Sentry Guard Column, 3.9 x 20 mm, 2/pk (requires holder)			186000926
Sentry Universal Guard Column Holder			WAT046910

PROTEIN STANDARDS

Each standard contains proteins selected for ACQUITY UPLC and XBridge Protein BEH SEC Columns. Use these standards for purposes of quality control, to test an HPLC or UPLC column, and to monitor column performance over time.

Ordering Information

BEH SEC Column Protein Standards

Description	P/N
BEH125 SEC Protein Standard Mix A mix of 4 proteins; Thyroglobulin, ovalbumin, ribonuclease A and uracil	186006519
BEH200 SEC Protein Standard Mix A mix of 5 proteins; Thyroglobulin, IgG, BSA, Myoglobin, Uracil	186006518
BEH450 SEC Protein Standard Mix A mix of 5 proteins; Thyroglobulin, IgG, BSA, Myoglobin, Uracil	186006842

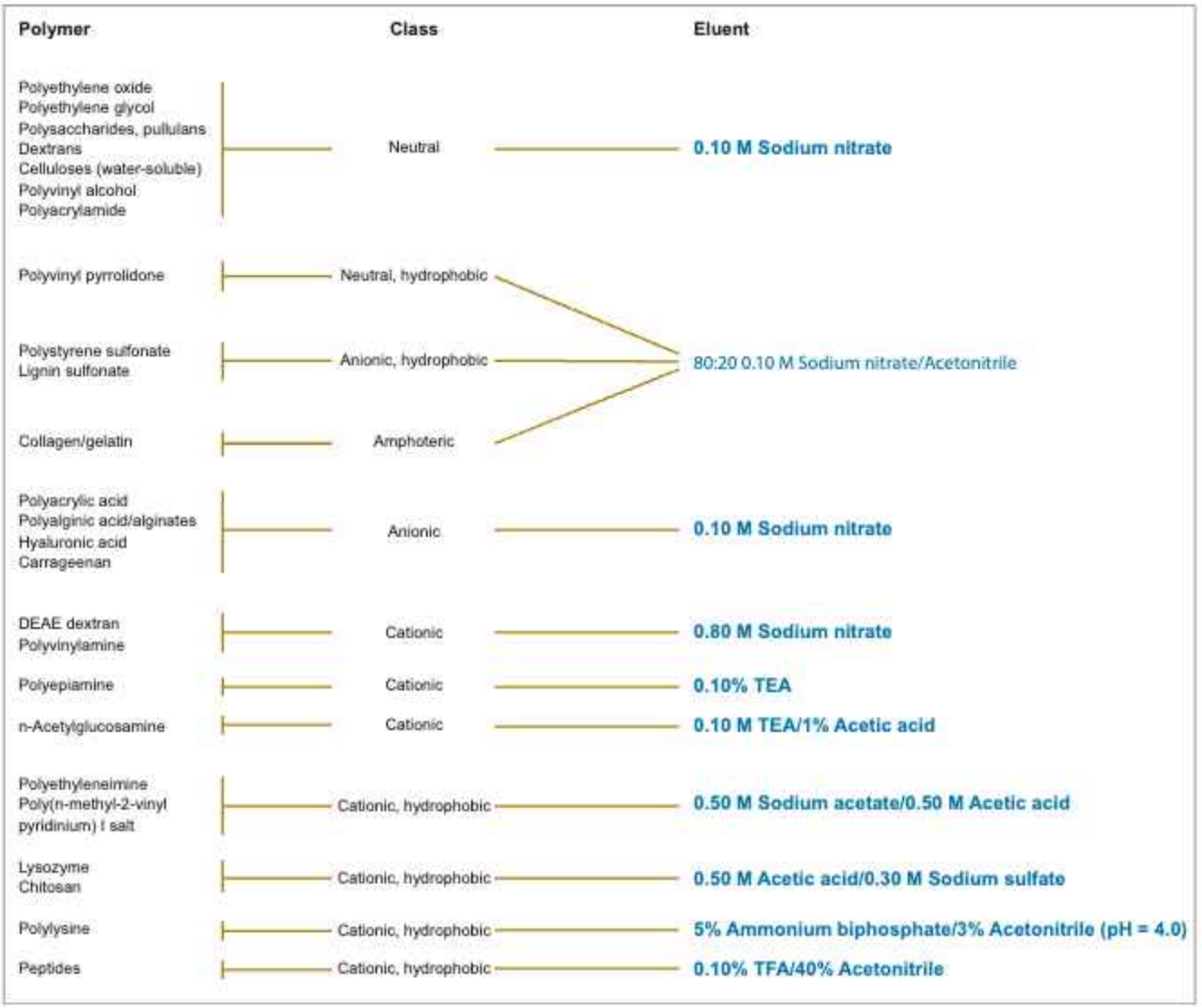


For more information on XBridge Protein BEH SEC Columns, refer to page 280.

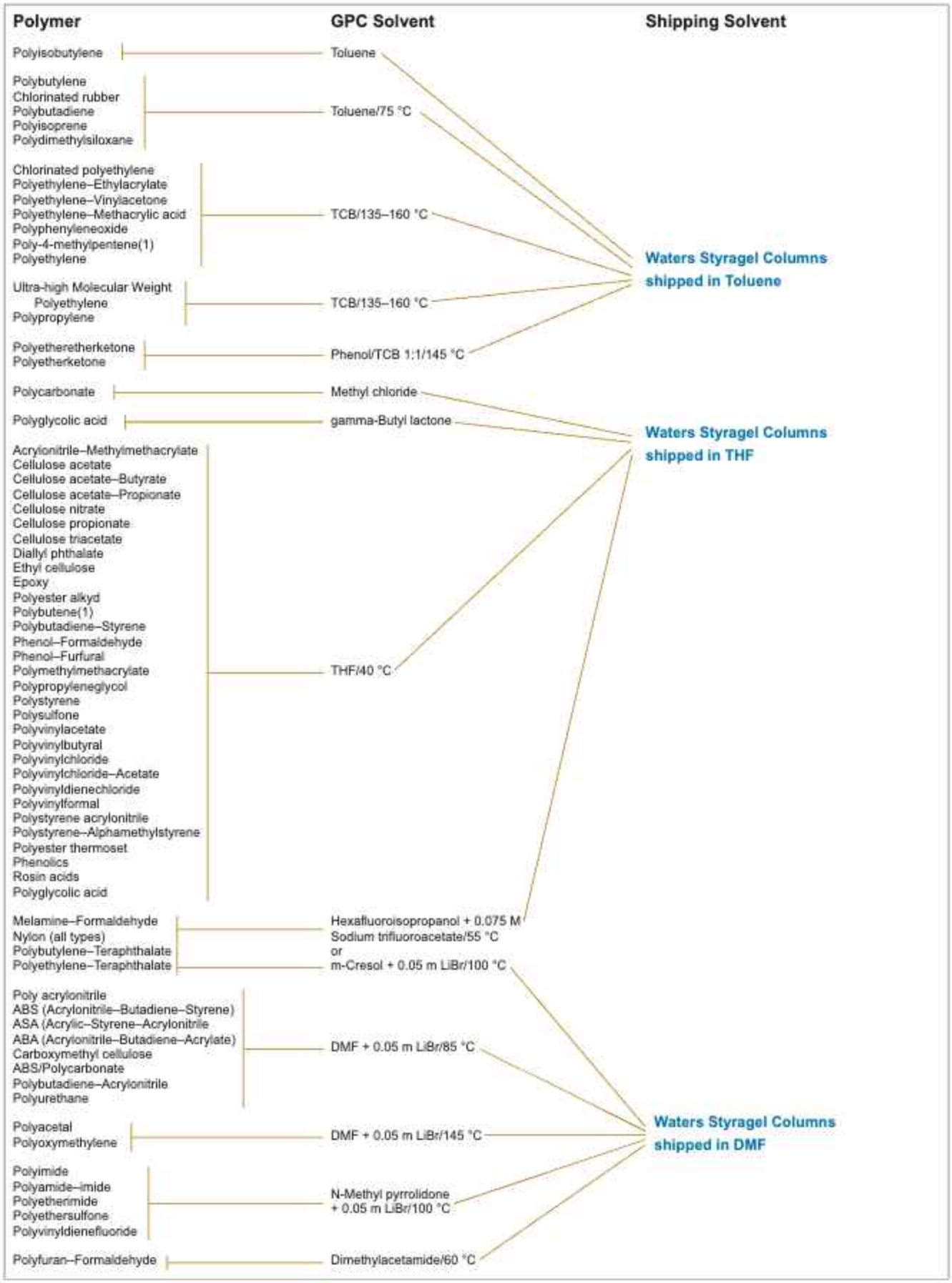
Solvent Guide

The following graphic is a guide for eluents.

Aqueous SEC Solvent Selection Guide



Non-Aqueous GPC Solvent Selection Guide

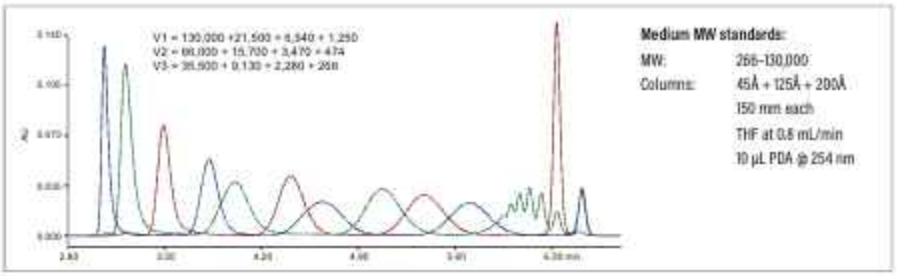


Calibration Standards

Waters offers a selection of well-characterized polymer standards for calibration. The offering includes kits as well as individual standards. The standards are available for aqueous and non-aqueous applications.

ACQUITY APC CALIBRATION STANDARDS

ACQUITY APC Calibration Standards match the molecular-weight range of the ACQUITY APC XT Columns. These kits eliminate the need to manually prepare custom calibration mixes because they provide the correct number of data points for the targeted molecular-weight range. In addition, they reduce, by 3–5 times, the ACQUITY APC System's calibration time. With reduced calibration time, calibrations can be carried out on a more frequent basis, increasing confidence in the accuracy of results.

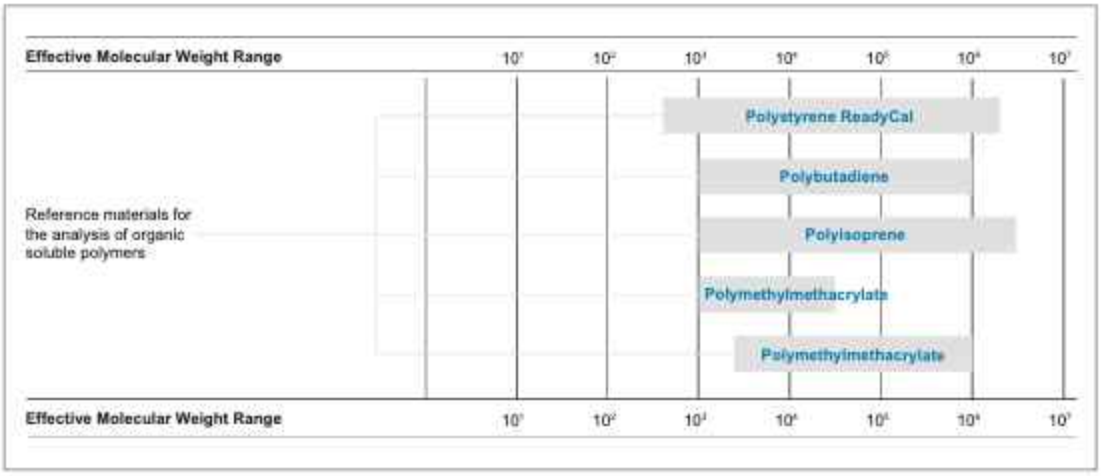


The ACQUITY APC Calibration Standards are available in both polystyrene and polymethyl methacrylate, configured as low, middle, and high-molecular-weight calibration kits. Also available are method development kits, which include the full separation range of the three kits combined.

Ordering Information

ACQUITY APC Calibration Standards

Description	MW Range	P/N
ACQUITY APC Polystyrene Low MW Calibration Kit 3 vials containing different MW ranges, Qty. 10 of each vial	266–15,000	186007539
ACQUITY APC Polystyrene Middle MW Calibration Kit 3 vials containing different MW ranges, Qty. 10 of each vial	266–130,000	186007540
ACQUITY APC Polystyrene High MW Calibration Kit 3 vials containing different MW ranges, Qty. 10 of each vial	266–2,500,000	186007541
ACQUITY APC Polystyrene Method Development MW Calibration Kit 9 vials containing 1 vial each of the low, middle, and high polystyrene kits	266–2,500,000	186007542
ACQUITY APC Polymethyl Methacrylate Low MW Calibration Kit 3 vials containing different MW ranges, Qty. 10 of each vial	202–12,000	186007543
ACQUITY APC Polymethyl Methacrylate Middle MW Calibration Kit 3 vials containing different MW ranges, Qty. 10 of each vial	202–200,000	186007544
ACQUITY APC Polymethyl Methacrylate High MW Calibration Kit 3 vials containing different MW ranges, Qty. 10 of each vial	202–1,600,000	186007545
ACQUITY APC Polymethyl Methacrylate Method Development MW Calibration Kit 9 vials containing 1 vial each of the low, middle, and high polymethyl methacrylate kits	202–1,600,000	186007546



READYCAL STANDARDS

A ReadyCal Kit allows quick and accurate preparation of a multi-point calibration curve without the need to weigh chemicals. Each vial contains a polymer mix that spans a molecular-weight range, to provide baseline resolution of each component. Simply add solvent directly to the vial and mix.

Ordering Information

ReadyCal Standards

Description*	P/N
Polystyrene ReadyCal Standards 4 mL Kit A complete kit of ready-to-use polystyrene calibration standards. Kit contains thirty, 4 mL autosampler vials which contain four polystyrene standards per vial. There are three separate molecular weight ranges in each kit, ten units of each range. Range is from 400 to 2,000,000 Da.	WAT058930
Polystyrene ReadyCal Standards 2 mL Kit A complete kit of ready-to-use polystyrene calibration standards. Kit contains thirty, 2 mL autosampler vials which contain four polystyrene standards per vial. There are three separate molecular weight ranges in each kit, ten units of each range. Range is from 400 to 2,000,000 Da.	WAT058931

*Values listed are approximate molecular weights.

POLYMER SPECIFIC CALIBRATION STANDARDS

Tailored specifically for different types of polymer analysis, these calibration standards provide a quick and reliable reference to known molecular-weight ranges. Polymer type and MW ranges appear in the table.

Ordering Information

Polymer Specific Calibration Standards

Description*	P/N
Polybutadiene Standards Kit 0.5 g/vial polybutadiene at each molecular weight: 1000, 3000, 7000, 10,000, 30,000, 70,000, 100,000, 300,000, 700,000, 1,000,000	WAT035709
Polyisoprene Standards Kit 0.5 g/vial polyisoprene at each molecular weight: 1000, 3000, 10,000, 30,000, 70,000, 100,000, 300,000, 500,000, 1,000,000, 3,000,000	WAT035708
Polymethylmethacrylate Low MW Standards Kit 0.5 g/vial polymethylmethacrylate at each molecular weight: 1000, 1700, 2500, 3500, 5000, 7000, 10,000, 13,000, 20,000, 30,000	WAT035707
Polymethylmethacrylate Mid MW Standards Kit 0.5 g/vial polymethylmethacrylate at each molecular weight: 2400, 9500, 31,000, 52,000, 100,000, 170,000, 270,000, 490,000, 730,000, 1,000,000	WAT035706
Polystyrene Low-Mid MW Standards Kit 10 g/vial polystyrene at each molecular weight: 400, 530, 950 5 g/vial polystyrene at each molecular weight: 2800, 6400, 10,000, 17,000, 43,000, 110,000, 180,000	WAT011588
Polystyrene Mid-High MW Standards Kit 5 g/vial polystyrene at each molecular weight: 430,000, 780,000 1 g/vial polystyrene at each molecular weight: 1,300,000, 2,800,000, 3,600,000, 4,300,000, 5,200,000, 6,200,000, 8,400,000, 20,000,000	WAT011610
Polystyrene Low MW Standards Kit 0.5 g/vial polystyrene at each molecular weight: 580, 950, 1200, 1800, 2470, 3770, 5100, 7600, 12,500, 17,000	WAT034208
Polystyrene Mid MW Standards Kit 0.5 g/vial polystyrene at each molecular weight: 1200, 3250, 10,200, 28,000, 68,000, 195,000, 490,000, 1,080,000, 1,750,000, 2,750,000	WAT034209
Polystyrene High MW Standards Kit 0.5 g/vial polystyrene at each molecular weight: 45,000, 1,270,000, 2,300,000, 3,260,000, 4,340,000, 8,000,000, 15,000,000	WAT034210

*Values listed are approximate molecular weights.

INDIVIDUAL MW STANDARDS

In many cases, a single calibration standard can verify the molecular weight of a sample-mixture component, making its identification simple and straightforward.

Ordering Information

Individual MW Standards

Description*	P/N
Polystyrene Standard 400 10 g/vial polystyrene, 400 MW	WAT011590
Polystyrene Standard 530 10 g/vial polystyrene, 530 MW	WAT011592
Polystyrene Standard 950 10 g/vial polystyrene, 950 MW	WAT011594
Polystyrene Standard 2800 5 g/vial polystyrene, 2800 MW	WAT011596
Polystyrene Standard 6400 5 g/vial polystyrene, 6400 MW	WAT011598
Polystyrene Standard 10,100 5 g/vial polystyrene, 10,100 MW	WAT011600
Polystyrene Standard 17,000 5 g/vial polystyrene, 17,000 MW	WAT011602
Polystyrene Standard 43,000 5 g/vial polystyrene, 43,000 MW	WAT011604
Polystyrene Standard 110,000 5 g/vial polystyrene, 110,000 MW	WAT011606
Polystyrene Standard 180,000 5 g/vial polystyrene, 180,000 MW	WAT011608

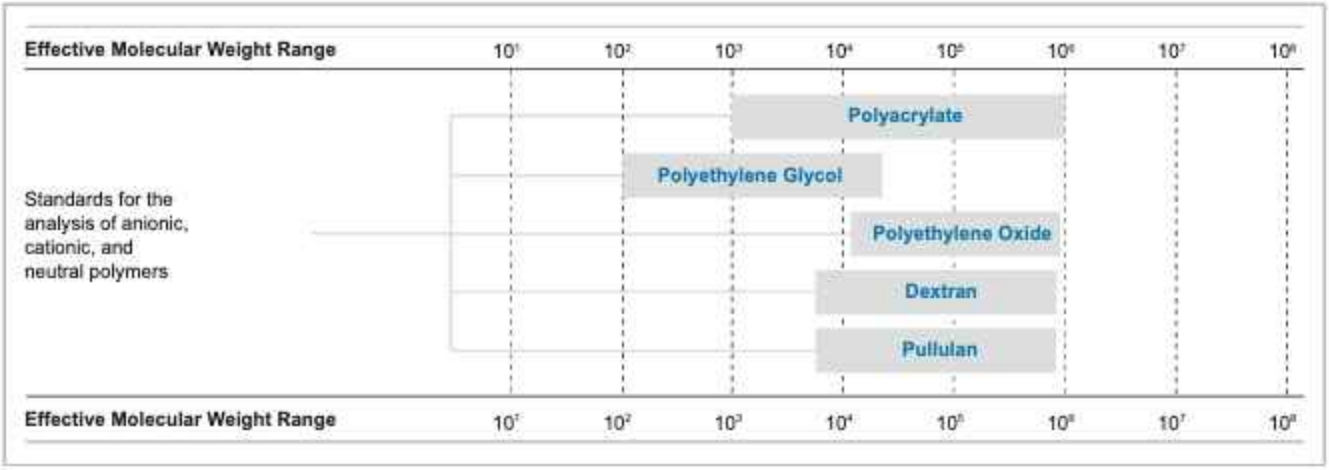
Description*	P/N
Polystyrene Standard 430,000 5 g/vial polystyrene, 430,000 MW	WAT011612
Polystyrene Standard 780,000 5 g/vial polystyrene, 780,000 MW	WAT011614
Polystyrene Standard 1,300,000 1 g/vial polystyrene, 1,300,000 MW	WAT011616
Polystyrene Standard 2,800,000 1 g/vial polystyrene, 2,800,000 MW	WAT011618
Polystyrene Standard 3,600,000 1 g/vial polystyrene, 3,600,000 MW	WAT011620
Polystyrene Standard 4,300,000 1 g/vial polystyrene, 4,300,000 MW	WAT011622
Polystyrene Standard 5,200,000 1 g/vial polystyrene, 5,200,000 MW	WAT011624
Polystyrene Standard 6,200,000 1 g/vial polystyrene, 6,200,000 MW	WAT011626
Polystyrene Standard 8,400,000 1 g/vial polystyrene, 8,400,000 MW	WAT011628
Polystyrene Standard 20,000,000 1 g/vial polystyrene, 20,000,000 MW	WAT011630

*Values listed are approximate molecular weights.

SEC CALIBRATION STANDARDS

Waters SEC Calibration Standards are precisely formulated to determine accurate molecular weight and conveniently packaged to minimize errors in SEC calibration methods. The fully traceable aqueous-based polymer kits simplify routine calibration procedures that improve workflow and increase productivity.

Aqueous SEC Standards Guide



This chart may be used to determine the appropriate component standard and corresponding molecular weight range.

Full-Range Calibration Standards

These standards kits provide an accurate calibration range for determining the molecular weight of common water-soluble polymers. The kits contain a series of well-characterized standards of a specified polymer type and include certificates that list component ranges and concentrations.

Ordering Information

Full-Range Calibration Standards for SEC



Description*	P/N
Polyacrylic Acid Standards Kit 250 mg/vial polyacrylic acid at each molecular weight: 1000, 3000, 7000, 15,000, 30,000, 70,000, 100,000, 300,000, 700,000, and 1,000,000	WAT035714
Polyethylene Glycol Standards Kit 1.0 g/vial polyethylene glycol at each molecular weight: 100, 200, 400, 600, 1000, 1500, 4300, 7000, 13,000, and 22,000	WAT035711
Polyethylene Oxide Kit 500 mg/vial polyethylene oxide at each molecular weight: 24,000, 40,000, 79,000, 160,000, 340,000, 570,000, and 850,000	WAT011572
Dextrans Standard 500 mg/vial dextrans at each molecular weight: 5000, 12,000, 24,000, 48,000, 148,000, 273,000, 410,000, and 750,000	WAT054392
Pullulan Kit 200 mg/vial pullulan at each molecular weight: 5000, 10,000, 20,000, 50,000, 100,000, 200,000, 400,000, and 800,000	WAT034207

*Values listed are approximate molecular weights.

Individual Calibration Standards

In many cases, a single calibration standard can verify the molecular weight of a sample-mixture component, making its identification simple and straightforward.

Ordering Information

Individual Calibration Standards for SEC

Description*	P/N
Polyethylene Oxide Standard 24,000	WAT011574
Polyethylene Oxide Standard 40,000	WAT011576
Polyethylene Oxide Standard 79,000	WAT011578
Polyethylene Oxide Standard 160,000	WAT011580
Polyethylene Oxide Standard 340,000	WAT011582
Polyethylene Oxide Standard 570,000	WAT011584
Polyethylene Oxide Standard 850,000	WAT011586

*Values listed are approximate molecular weights.

Nano-flow and Micro-flow LC Columns

Nano-flow and Micro-flow LC Columns



"The reason we are here is to ensure the quality and reproducibility of the final product."

– Dr. Gu (Weiqiang Gu), Chemistry Technical Support Manager, Taunton, MA , U.S.A

Contents

Nano-Flow and Micro-Flow LC Columns **327**

ionKey/MS **328**

Simplified Micro-flow LC-MS with Enhanced Sensitivity 328

iKey Separation Device **330**

Nano- and Micro-flow Columns and Trapping Columns **332**

Separation Columns 332

Trapping Columns 332

ACQUITY UPLC M-Class with HDX Technology **334**

Enzymate Pepsin Online Digestion Column 334

Nano-Flow and Micro-Flow LC Columns

Our nano-flow and micro-flow LC Columns fully exploit the separation power of small, sub-2-µm particles to deliver superior chromatographic resolution.

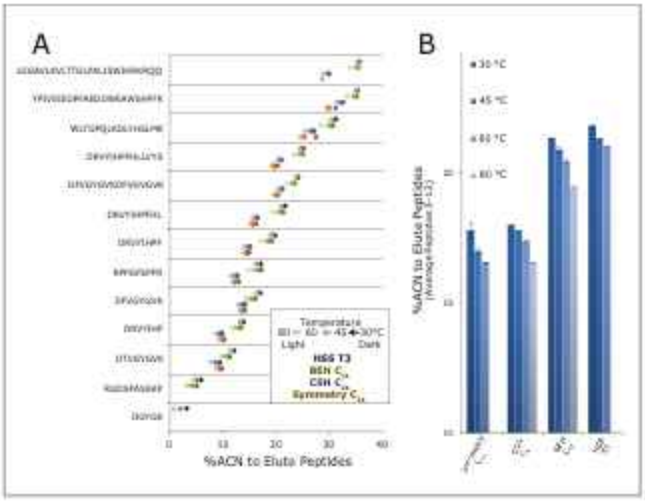
The selected stationary phases for nano-LC columns facilitate the efficiency and selectivity required for separations of complex peptide and protein separations as well as other sample-limited analyses.

Hybrid Particles			Silica-based Particles
			
BEH Technology™		CSH Technology	HSS HIGH STRENGTH SILICA
130Å	300Å	130Å	100Å
1.7 µm	1.7 µm	1.7 µm	1.8 µm
C_{18}	C_{18}, C_4	C_{18}	T3

Peptide Separation Technology stationary phases are specifically QC tested with tryptic digests of Cytochrome *c* to ensure consistent performance for peptide separations.

Protein Separation Technology stationary phases are specifically designed for the high resolution analysis of proteins of various sizes, hydrophobicities, and isoelectric points. Particles are QC tested using a protein standard mix.

Trap Elute Peptide Separation

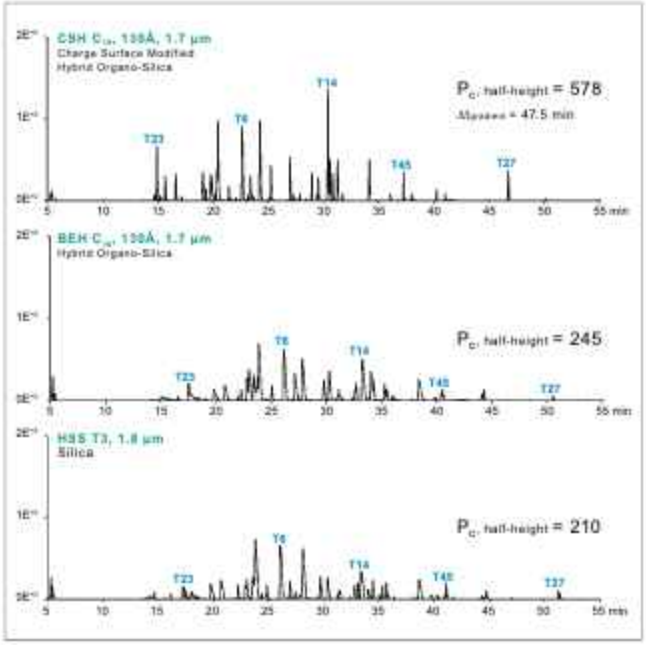


Peptide retentivity comparison of different stationary phases, including Symmetry Silica (the lower retention of Symmetry is used in trap-elute separations).

In nano-flow and micro-flow LC-MS, analyzing large-volume samples using a single column can be impractical. In such cases, you can trap analytes at higher flow rates. It is preferable to perform online trapping of analytes at microscale flow rates and to subsequently elute and separate those analytes across an analytical column, wherein a significantly lower nanoscale flow rate is employed.

To be effective, the trapping column's retentivity must be lower than the analytical column's. This relationship between trapping and analytical columns ensures refocusing of analytes on the analytical column after elution from the trap at the start of the gradient, delivering high peak capacity separations.

Peak Capacity and Retentivity



Comparison of a base peak ion chromatogram of MassPREP Enolase Digestion Standard, 1 µg, direct injection on a 75 µm (I.D.) column.

For more information on Waters Particle Technology, please refer to page 75.

Nano-flow and Micro-flow LC-MS

Nano-flow and micro-flow LC-MS is becoming commonplace in areas of bio-separation such as peptide bioanalysis, intact antibody analysis, proteomics, lipidomics and metabolomics. This technique addresses limited sample availability and the need for high sensitivity and the requirement for low limits of detection or quantification.

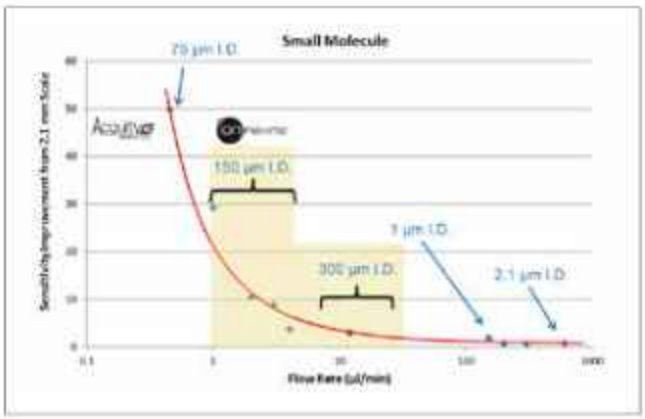
In micro flow LC-MS, the inner diameter of the separation column, and thus the flow rate of the mobile phase can dramatically alter the sensitivity of the mass spectrometry as follows:

- By increasing sampling efficiency
- By increasing ionization efficiency
- By reducing matrix effects

When performed using 75 µm I.D. columns, nano-flow LC-MS provides a higher sensitivity increase, compared with 2.1 mm UPLC Columns. Nevertheless, micro-flow separations, which use larger-diameter columns, increase sample throughput dramatically while continuing to deliver excellent sensitivity for many complex biomolecular analyses.

We offer solutions that satisfy the most demanding requirements for assays that rely on nano-flow and micro-flow LC-MS technology—solutions that ensure the assays' successful performance.

Gaining Sensitivity by Reducing Column Diameter and Flow Rate



Sensitivity enhancement for a series of small molecules relative to a 2.1 mm I.D. separation performed on an ACQUITY UPLC System. The volume and concentration of sample injected on each column format was identical.

Nano-flow and Micro-flow LC-MS Consumables

ionKey/MS



- Includes a 150 µm I.D. separation channel, for highest sensitivity, and a 300 µm I.D. channel, for high throughput analysis
- Greatly simplified micro-flow LC-MS, with fitting-free connections
- The 150 µm I.D. iKey Separation Device demonstrates as much as 40 times the sensitivity of the 2.1 mm I.D. UPLC column
- The 300 µm I.D. iKey, during high-throughput UPLC-cycle times, delivers as much as 6 times the sensitivity of a 2.1 mm I.D. UPLC Column
- Easy post-column addition of MS-modifier solvents

nanoEase™ M/Z Columns

zenFiT



- nanoEase™ M/Z Columns with easy-to-use ZenFit® Connection Technology
- Column inner diameters range from 75 to 300 µm
- Column lengths range from 50 to 250 mm
- Trapping columns range from 180 to 300 µm I.D.

ionKey/MS

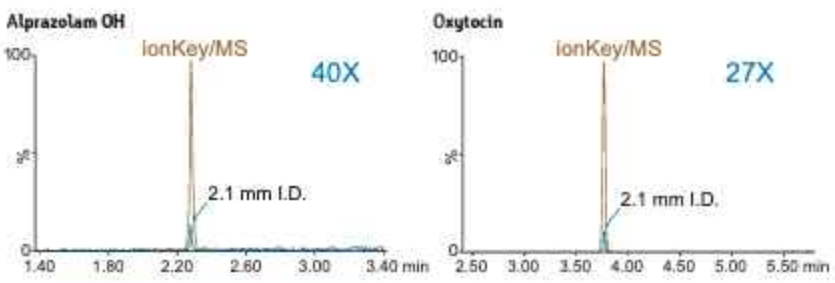
SIMPLIFIED MICRO-FLOW LC-MS WITH ENHANCED SENSITIVITY

The ionKey*/MS System integrates the micro-flow UPLC separation into the source of the mass spectrometer. This delivers LC-MS system performance and sensitivity that cannot be achieved any other way. ionKey/MS Systems are enabled by the iKey* Separation Device, which replaces the need for traditional fittings and columns and simplifies the user experience. The "plug and play" design of the iKey Separation Device eliminates operator variability common in traditional micro-flow LC-MS analyses.



The ionKey MS System with the ACQUITY UPLC M-Class System and Xevo TQ-S Mass Spectrometer.

150 µm I.D. iKey: Up to 40× Increase in Sensitivity Compared to 2.1 mm UPLC LC-MS Applications

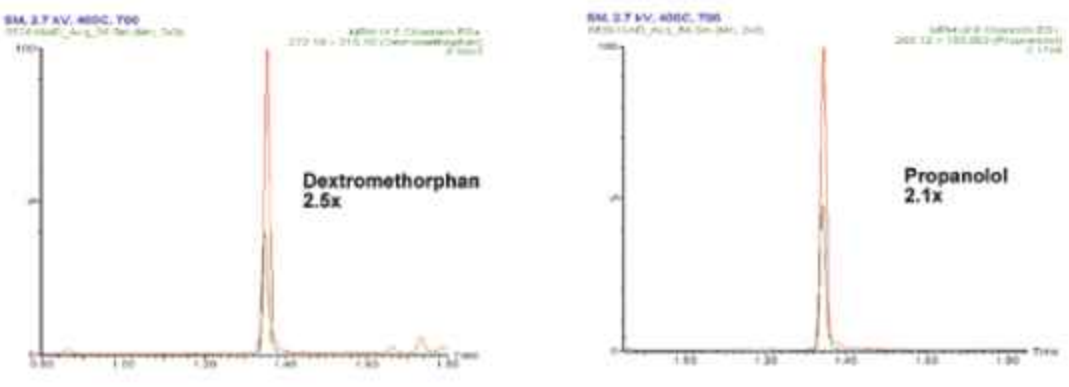


UPLC/MRM comparison of ionKey/MS relative to 2.1 mm I.D. chromatography

Compound name	Relative peak area	Relative S/N
Small Molecule		
Lidocaine	5	3
Fluconazole	15	39
Propranolol	2	2
Alprazolam OH	14	40
Alprazolam	7	12
Nefazodone	3	6
Tolbutamide	5	6
Warfarin	2	4
Clopidogrel	2	2
Mean value	6	13

Sensitivity comparison between ionKey/MS and 2.1 mm I.D. chromatography; 1 µL injection of equal sample load on each.

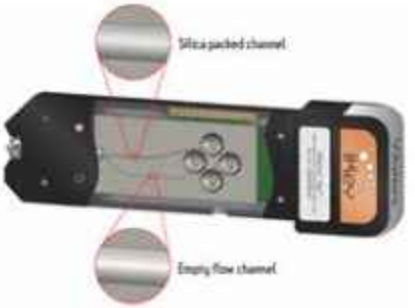
300 µm I.D. iKey HT: Increased LC-MS Sensitivity with UPLC Throughput



Sensitivity gains using (300 µm × 50 mm) iKey HT BEH C_{18} Separation Device (red) compared to (2.1 mm × 50 mm) UPLC BEH C_{18} Column (green) under identical injection volume and gradient conditions.

iKey Separation Device

In an ionKey/MS System, the iKey Separation Device contains the fluid connections, electronics, ESI interface, column heater, eCord, and chemistry needed to perform UPLC separations. As such, it replaces the need for traditional fittings and columns, simplifying the user experience. The "plug and play" design of the iKey eliminates user-dependent variation in results that often occurs in traditional micro-flow LC-MS analyses, regardless of users' skill level.

iKey Separation Device	iKey Separation Device with Post Column Addition (PCA)
	
The major component of the ionKey/MS System, the iKey Separation Device performs sub-2-µm UPLC separations, resulting in highly sensitive, efficient, micro-flow LC-MS analyses. The iKey Separation device is available with two inner diameters: 150 µm I.D. which provides the highest level of sensitivity, and the 300 µm I.D. iKey HT for higher throughput separations.	The PCA iKey incorporates a separation channel as well as a post-column addition (PCA) channel. The design allows for mixing the mobile phase, post-separation with a desired solvent. Both effluents are merged and collected at the inlet of the emitter. Post-column addition of solvents can enhance the electrospray process and increase sensitivity without adversely affecting the separation.

Robust, Reproducible, and Reliable

1 user	Peptide from P00924, yeast enolase		5 users
X	6.84 min	Retention time	6.69 min
1 system	0.01 min	SD of retention time	0.11 min
X	3.01 sec	Average peak width FWHM	2.72 sec
1 iKey			18 iKeys
0.15% retention time RSD			**1.64%** retention time RSD
QC reproducibility for one iKey with over 500 injections of protein precipitated plasma.			*QC reproducibility across multiple users, ionKey/MS Systems, and iKeys.*

The iKey Separation Device is LC-MS tested to ensure consistent performance not only for a particular iKey but from one iKey to another. The device also exhibits robust performance—performance that achieves high-quality results, even after hundreds of injections.

Ordering Information

iKey Separation Device

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH C_{18}, 130Å	150 µm × 50 mm	186007256
	150 µm × 50 mm (PCA)	186007580
	150 µm × 100 mm	186007258
CSH C_{18}, 130Å	150 µm × 50 mm	186007244
	150 µm × 100 mm	186007245
HSS T3, 100Å	150 µm × 50 mm	186007260
	150 µm × 100 mm	186007261
	300 µm × 50 mm	186008727

iKey Peptide Separation Devices, 1/pk

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH C_{18}, 130Å	150 µm × 50 mm	186006764
	150 µm × 50 mm (PCA)	186007557
	150 µm × 100 mm	186006766
CSH C_{18}, 130Å	150 µm × 50 mm	186007257
	150 µm × 100 mm	186007259
BEH C_{18}, 300Å	150 µm × 50 mm	186006969
	150 µm × 100 mm	186006970

iKey Protein Separation Devices, 1/pk

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH C_4, 300Å	150 µm × 50 mm	186006765
	150 µm × 100 mm	186006968

iKey Utility Devices

	Dimension	P/N
iKey Infusion Device	85 µm × 50 mm	186007049
iKey Flow Injection Analysis Device	85 µm × 50 mm	186007051
iKey Diagnostic Device V3	N/A	186008450

For additional information, please go to www.waters.com/iKey

Nano- and Micro-flow Columns and Trapping Columns

Waters columns for nano-to-microscale LC-MS analyses are designed for low-dispersion nano-UPLC Systems. Our rigorous quality-control measures ensure that the columns achieve their full potential for sensitivity, resolution, and reproducibility for biomarker discovery and also for identifying and characterizing peptides and proteins.

SEPARATION COLUMNS

These columns enable nano- and microscale separations with MS detection under UPLC conditions at 15,000 psi. They take full advantage of the separation power of sub-2-µm particle technology. Columns of between 75 and 300 µm I.D. provide chromatographic separations, with flow rates between 200 nL/min and 100 µL/min, covering a 170-fold range of sample amounts. The varying characteristics of available particle technologies provide alternate selectivity, retentivity, and loadability, and thus the flexibility to achieve the most suitable separation for complex LC-MS analyses.

TRAPPING COLUMNS

Trapping columns are used to desalt and enrich the sample before eluting onto the analytical column for the final separation with MS detection. For fast loading of the trap column and to reduce the cycle time, trap columns are packed with larger 5 µm particles.

nanoEase M/Z Columns with ZenFit Connection Technology

Waters ZenFit Connection Technology introduces easy-to-use, re-usable, fingertight, liquid-line connectors to the family of nanoEase M/Z Columns. These columns are capable of withstanding pressures as high as 15,000 psi, eliminate dead volume, a frequent source of variability associated with regular fittings. ZenFit Connection Technology does not require user training or any further special attention.

To use nanoEase M/Z Columns on the ACQUITY M-Class or nanoACQUITY UPLC Systems, equip systems with the appropriate upgrade kit (p/n: 205001681). The 300 µm I.D. ACQUITY M-Class Columns and traps are compatible with ZenFit Connections.



Ordering Information

nanoEase M/Z Peptide Columns

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH C_{18}, 130Å	75 µm × 100 mm	186008792
	75 µm × 150 mm	186008793
	75 µm × 200 mm	186008794
	75 µm × 250 mm	186008795
	100 µm × 100 mm	186008796
	150 µm × 100 mm	186008797
BEH C_{18}, 300Å	75 µm × 100 mm	186008798
	75 µm × 150 mm	186008799
	75 µm × 200 mm	186008800
	75 µm × 250 mm	186008801
	100 µm × 100 mm	186008802
	150 µm × 100 mm	186008803
CSH C_{18}, 130Å	75 µm × 100 mm	186008807
	75 µm × 150 mm	186008808
	75 µm × 200 mm	186008809
	75 µm × 250 mm	186008810
	100 µm × 100 mm	186008811
	150 µm × 50 mm	186008812
	150 µm × 100 mm	186008813
	150 µm × 150 mm	186008814

nanoEase M/Z Protein Columns

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH C_{4}, 300Å	75 µm × 100 mm	186008804
	100 µm × 100 mm	186008805
	150 µm × 100 mm	186008806

nanoEase M/Z HSS Columns

	Dimension	P/N
	Particle Size: 1.8 µm	
HSS T3, 100Å	75 µm × 100 mm	186008815
	75 µm × 150 mm	186008816
	75 µm × 200 mm	186008817
	75 µm × 250 mm	186008818
	100 µm × 100 mm	186008819
	150 µm × 100 mm	186008820

nanoEase M/Z Columns and ACQUITY UPLC M-Class Columns are preferred for use with the ACQUITY UPLC M-Class and nanoACQUITY UPLC Systems.

nanoEase M/Z Trap Columns*

	Dimension	P/N
	Particle Size: 5 µm	
Symmetry C_{18}, 100Å	180 µm × 20 mm	186008821

*For 300 µm I.D. traps please refer to M-Class Trap Columns.

ACQUITY UPLC M-Class Columns

	Dimension	P/N
	Particle Size: 1.8 µm	
HSS T3, 100Å	75 µm × 100 mm	186008006
	75 µm × 150 mm	186007473
	75 µm × 200 mm	186008007
	75 µm × 250 mm	186007474
	100 µm × 100 mm	186008008
	150 µm × 100 mm	186008009
	300 µm × 50 mm	186007559
	300 µm × 100 mm	186007560
	300 µm × 150 mm	186007472

ACQUITY UPLC M-Class Trap Columns

	Dimension	P/N
	Particle Size: 5 µm	
Symmetry C_{18}, 100Å	180 µm × 20 mm	186007496[4]
	180 µm × 20 mm	186007497[5]
	180 µm × 20 mm	186007500[6]
	180 µm × 20 mm	186007592[7]
Symmetry C_{18}, 100Å	300 µm × 25 mm	186007499[3]
	300 µm × 50 mm	186007498
Peptide BEH C_{18}, 130Å	300 µm × 50 mm	186007471
BEH C_4, 300Å	300 µm × 50 mm	186008470
HSS T3, 100Å	300 µm × 50 mm	186008029

[3]Configuration HCP (2D).
[4]Configuration: 2G, V/M.
[5]Configuration: 2D, V/M.
[6]Configuration: 2G, V/V.
[7]Configuration: 2D, V/V.

ACQUITY UPLC M-Class Peptide Columns

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH C_{18}, 130Å	75 µm × 100 mm	186007481
	75 µm × 150 mm	186007482
	75 µm × 200 mm	186007483
	75 µm × 250 mm	186007484
	100 µm × 100 mm	186007485
	150 µm × 100 mm	186007486
	300 µm × 50 mm	186007564
	300 µm × 100 mm	186007565
	300 µm × 150 mm	186007566
BEH C_{18}, 300Å	75 µm × 100 mm	186007487
	75 µm × 150 mm	186007490
	75 µm × 200 mm	186007491
	75 µm × 250 mm	186007492
	100 µm × 100 mm	186007488
	150 µm × 100 mm	186007489
	300 µm × 50 mm	186007570
	300 µm × 100 mm	186007571
	300 µm × 150 mm	186007572
CSH C_{18}, 130Å	75 µm × 100 mm	186007475
	75 µm × 150 mm	186007476
	75 µm × 200 mm	186007477
	75 µm × 250 mm	186007478
	100 µm × 100 mm	186007479
	150 µm × 50 mm	186007513
	150 µm × 100 mm	186007480
	150 µm × 150 mm	186007514
	300 µm × 50 mm	186007561
	300 µm × 100 mm	186007562
	300 µm × 150 mm	186007563

ACQUITY UPLC M-Class Protein Columns

	Dimension	P/N
	Particle Size: 1.7 µm	
BEH C_4, 300Å	75 µm × 100 mm	186007493
	100 µm × 100 mm	186007494
	150 µm × 100 mm	186007495
	300 µm × 50 mm	186007567
	300 µm × 100 mm	186007568
	300 µm × 150 mm	186007569

ACQUITY UPLC M-Class with HDX Technology

Hydrogen-deuterium exchange mass spectrometry (HDS-MS) is used to study a protein's structural dynamics and conformational changes, a component of understanding its higher-order structure. Information about protein conformation from an HDX MS study can serve to compare a control compound with an analyte by measuring the relative amount of deuteration uptake. HDX-MS can monitor domain interaction, localized-protein breathing, and folding or unfolding in the solution phase. The ACQUITY UPLC M-Class System can quantify small changes in protein conformation by extending its pressure range to effect a higher-efficiency separation. An integral part of the ACQUITY UPLC M-Class HDX System is the Waters Enzymate® BEH Pepsin Column, which performs online protein digestion.



ACQUITY UPLC M-Class System.

The technology offers these benefits:

- True UPLC separations for peptide and protein HDX
- Reproducible, robust, and rapid separations (nano-to-micro-scale at 0 °C and pressure to 15,000 psi)

ENZYMATE PEPSIN ONLINE DIGESTION COLUMN

Waters Enzymate Pepsin Online Digestion Column digests intact proteins into peptides. The peptic peptides are then retained on a trapping column. Peptides eluting from the trapping column are refocused onto a sub-2-µm ACQUITY UPLC Column and then eluted into a high-resolution mass spectrometer.

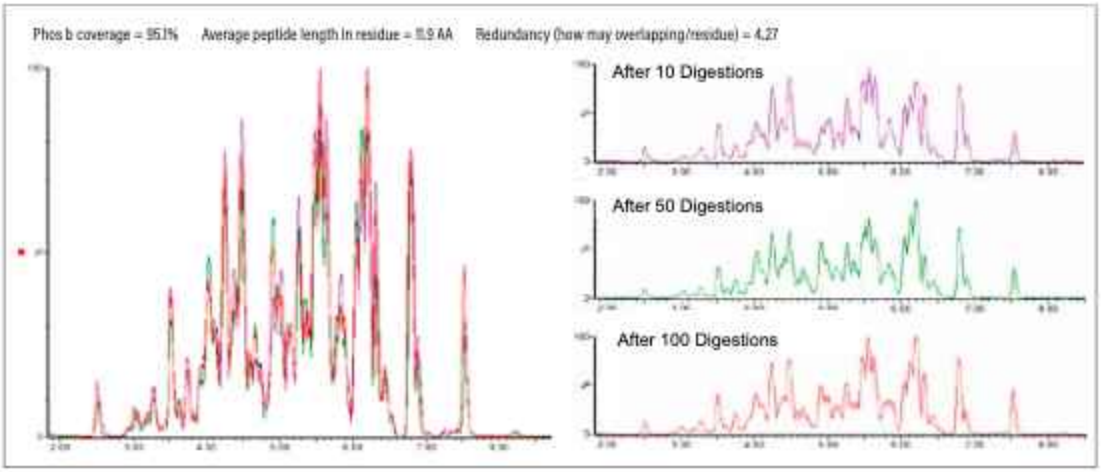
Enzymate Pepsin Online Digestion Columns, an integral part of the ACQUITY UPLC M-Class HDX System, offer these benefits:

- Fast, reproducible, and efficient online protein digestion, typically within 30 seconds
- Shortened preparation time (overall) for protein samples
- Ability to optimize the efficiency of protein digestion by changing temperature, flow rate, or both



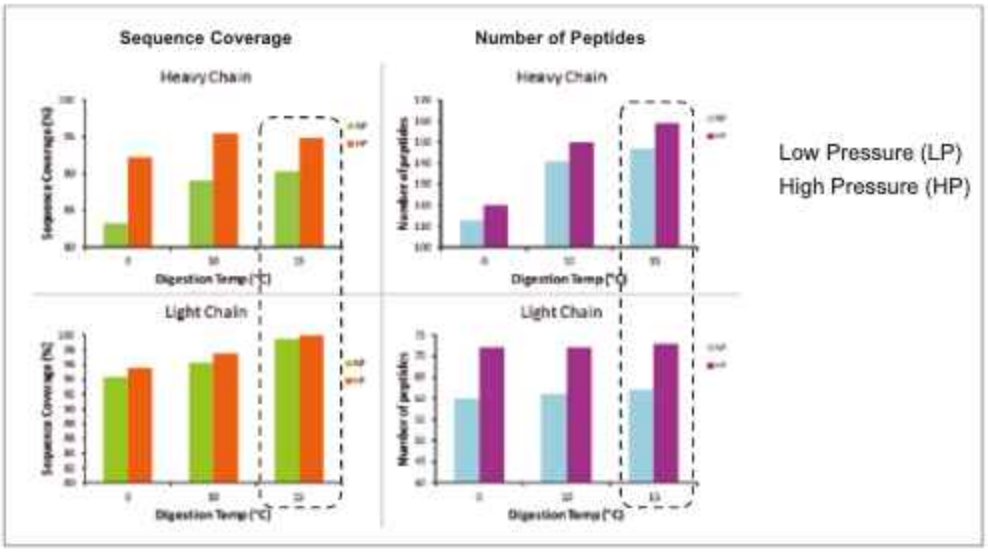
Enzymate Pepsin Online Digestion Column.

Overlay of Three Phos B Digestions within a 130-Injection HDX MS Study



Reproducible online pepsin digestions of phosphorylase b. A total of 130 digestions were performed using an Enzymate Pepsin Column. The 10th, 50th, and 100th digestions are shown. The sequence coverage is shown on the right.

Comparisons of Low- and High-Pressure Digestion Efficiencies



The Waters Enzymate BEH Pepsin Column was used for digestion of IgG2, at 1000 psi (NP), and 13,000 psi (HP). Results show high-pressure digestion increases protein-sequence coverage and spatial resolution of IgG2, compared with low-pressure digestion.

Ordering Information

Enzymate Pepsin Online Digestion Column

Description	Dimension	P/N
	Particle Size: 5 µm	
Enzymate Pepsin Online Digestion Column	2.1 × 30 mm	186007233

ionKey/ms™

NOW YOU CAN START THINKING OF

MICROSCALE SENSITIVITY

IN TERMS OF POSSIBILITIES,

NOT RESTRAINTS.



Introducing Waters ionKey/MS™ System. Open the door to the new world of robust, reliable and reproducible microscale with dramatically enhanced sensitivity and significantly lower solvent consumption compared to 2.1 mm I.D. chromatography. This plug & play MS system gives your whole lab access to UPLC chromatography performance and highly sensitive, reliable data. This is where the industry's going. You can get there today. To learn more about what's possible, visit waters.com/ionkey

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Waters Quality Parts and Supplies

Waters Quality Parts and Supplies



"We build the quality in as the product is being made."

– Chris Benevides, Director of Manufacturing, Taunton/Milford, MA, U.S.A.

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Waters Quality Parts and Supplies

Rely on Genuine Waters Quality Parts

Waters knows how to run chromatography and LC-MS laboratories at peak performance. Our instruments, software, chemistries, and services provide you the tools for success.

Only Waters Quality Parts® are tested and certified for ensuring optimal performance of Waters systems. Fitting our component parts to your instruments instills confidence that they will operate in a dependable, invariable manner over time, that results will be accurate, precise, and reproducible, and that systems will remain compliant.

Performance Maintenance Kits —All the Parts You Need, in One Box

Our Performance Maintenance (PM) kits meet the requirements of our instruments, providing a dependable, economical way to ensure proper maintenance. Each kit contains the parts necessary to keep an instrument operating at peak performance. You'll also find a sticker, for affixing to the instrument. On it you can document the performance of maintenance procedures and thus be reminded when they are once again due.

Performance maintenance protocols for Waters instruments can be obtained from our support library on **www.waters.com**. The protocols include details of maintenance tasks and may also include calibration and diagnostic tests, to ensure the instruments function correctly.

Ordering is Easy, Online or by Phone

Our local Waters sales office can quote prices, in any currency, for PM Kits and Waters Quality Parts. In the United States and Canada, you can obtain pricing by phone at 1-800-252-4752. If you are located elsewhere, you can consult the inside back cover of this catalog, which lists our worldwide sales offices and contact information. Finally, if you're a registered user of the Waters website, you can obtain local-currency prices at **waters.com/order**.

To Find Parts: Use Our Waters Quality Parts Locator

Visit Waters online at **www.waters.com/parts** to use the Waters Quality Parts Locator to browse Waters systems, identify replacement components, and make purchases.

The Quality Parts Locator provides access to far more items than those that appear in this catalog. It also offers troubleshooting information, by our technical experts, to help you determine how best to correct problems.



The online Waters Quality Parts Locator provides a simple way to find the component parts you need. You move the cursor over depictions of instruments, click on assemblies, and then click on component parts.

NEW ACQUITY Arc System

Ordering Information

ACQUITY Arc QSM-R

Description	P/N
Arc QSM Performance Maintenance Kit	201000303
Pump, Solenoid, Wash	700010657
Assy, Barbed Seal Wash Housing, SFC-BSM	700008999
Support Plate, Thickened, VHP Head	700002601
Assy, Plunger, .125 Dia, 2/pk	700010661
Pump Head, 9 K, Shallow Gland	700010662
Wash Seal, Floating, .125 I.D., 2/pk	700009137
HP Seal, Flanged, .125 I.D., Thin Bur, 2/pk	700010663
O-Ring, 2–016, Teflon	WAT076152
Primary Check Valve, 1/pk	700010664
Assy, Check Valve, Double Ball and Seat, 1/pk	700005164
Washer, Check Valve, PEEK	700005221
Assy, Mixer, 4.6 mm × 100 mm, 200 µm Path 1	700010589
Assy, Mixer, 4.6 mm × 30 mm, 200 µm Path 2	700010590
Assy, Cartridge, Dual Mixer Vent Valve	700010669
Assy, Filter, In-Line, SS Frit	700002912
Assy, Cartridge, Inline Filter, SS Frit	700002913
Assy, Solvent Filter, Bottle, 2/pk	700010196
Assy, Tube, GPV to PCV	700010678
Assy, Tube, Head to Transducer	700010679
Assy, Tube, Xducer - VV	700010680
Assy, Tube, Xducer - ACC	700010681
Tube Assy, Solvent Inlet	700010682
Tubing, .040 PEEK, GPV, 4/pk	700010683
Assy, Tube, VV P7 to Waste	700010684
Assy, Tube, VV P4–5 to Mixers	700010685
Assy, Tube, VV P2 to Mixer Path 2	700010686
Assy, Tube, Mixer to VV P1 Path 1	700010687

ACQUITY Arc FTN-R

Description	P/N
ACQUITY Arc SM FTN-R Performance Maintenance Kit	201000302
Assy, Cart, Inject, STR, FTN, 18 K psi	700006057
Seat, Vespel with Anti-rot	405011492
Kit, Assy, Seat Port, SST, .007 I.D.	700010726
Assy, Needle, 30 µL, FTN	700005279
Guide, Sample Needle	405008854
Syringe, 100 µL, HP	700002570
Filter, Solvent Bottle, SS, 1/pk	700003615
Filter, Solvent Bottle, SS, 7/pk	700003616
Air Filter, Side Panel	401000694



ACQUITY Arc System.

ACQUITY 30CM Column Heater and Column Heater/Cooler

Description	P/N
Kit, ACQUITY Arc CM Column H/HC PPH, .005	205001484
Kit, ACQUITY Arc 30CM Column H/HC PPH, .007	205001524
Tube, SST, .062 × .005 × 10 L	700010708
Tube, SST, .062 × .007 × 10 L, High Flow	700010540
Assy, Tube, SST, .005 I.D., Valve Inlet	700010694
Assy, Tube, SST, .005 I.D., Column Inlet	700010695
Assy, Tube, SST, .007 I.D., Valve Inlet	700010696
Assy, Tube, SST, .007 I.D., Column Inlet	700010697
Valve, 3 Column Switch, 8 Port, 9.5 K psi	700010692
Rebuild Kit, Rotor, 3 Col Switch VLV, 9.5 K	700010447
Assy, Restriction Tube	700001598
PEEK Comp. Screw, Ferr, with Lock Ring, 5/pk	700000991
Kit, Screw, Comp., Lock Ring, Knurled, 8/pk	700010011
Kit, Ferrule B/L PEEK, 1/16 Machined, 10/pk	700010009
Screw, Comp., 10–32, SS Gold Plated, Long, 10/pk	700002645
Ferrule, Set, .062, Two-piece, 10/pk	700002635
Union, SST, V-V, .010" Thru	700010702

ACQUITY 30CM Column Heater—Active

Description	P/N
ACQUITY UPLC APH, SS .005 I.D. 23.5 LG	205001452
ACQUITY UPLC APH, SS .007 I.D. 23.5 LG	205001451
Assy, Tube, APH to Column, .005 I.D.	700010700
Assy, Tube, APH to Column, .007 I.D.	700010698
Tube, PEEK, .062 × .005 × 24	700010530
Tube, PEEK, .062 × .007 × 24	700010701
PEEK Comp. Screw, Ferr, with Lock Ring, 5/pk	700000991
Screw, Comp., Lock Ring, Hex, Captured	700010699
Kit, Ferrule B/L PEEK, 1/16 Mach, 10/pk	700010009
Screw, Comp., 10–32, SS Gold Plated, Long, 10/pk	700002645
Ferrule, Set, .062, Two-piece, 10/pk	700002635

ACQUITY DETECTORS FOR ACQUITY ARC SYSTEM

2489 UV/Vis Detector

Description	P/N
ACQUITY PDA/TUV 2489/2998 Performance Maintenance Kit PM Kit consists of: PerformancePLUS Lamp	201000281
Parts and Accessories	
Performance Plus HB Deuterium Lamp Assy	700009330
Low Dispersion Analytical Flow Cell for Arc 2489	205001553
Flow Cell Rebuild Kit	WAS081346

2998 PDA Detector

Description	P/N
Performance Plus HB Deuterium Lamp Assy PM Kit consists of: PerformancePLUS Lamp	700009330
Parts and Accessories	
ACQUITY PDA/TUV 2489/2998 Performance Maintenance Kit	201000281
Low Dispersion Analytical Flow Cell for Arc 2998	205001552

2414 RI Detector

Description	P/N
Valve, 2-way Solenoid	700002360
Assy, Pressure Relief, 1/4-28, 35 psi	700002361
Valve, 3-way Recycle	700002362
Tubing, Union to Relief Valve	700002363
Tubing, Union to Purge Valve	700002364
Tubing, 2-way to 3-way Valve	700002378

Common Tubing for Arc Detectors

Description	P/N
Tubing Convoluted	700010532
Tube Assy, PEEK, .062 × .005 × 17 in.	700010533
Tube Assy, PEEK, .062 × .005 × 24 in.	700010530
Tube Assy, PEEK, .062 × .020 × 60 in., Waste	700010531

2475 FLR Detector

Description	P/N
ACQUITY UPLC FLR Detector Performance Maintenance Kit PM Kit consists of: Lamp Assy	201000193
Parts and Accessories	
Low Dispersion Flow Cell for Arc 2475	205001554

ACQUITY UPC² System

Ordering Information



ACQUITY UPC² System.

ACQUITY UPC² BSM

Description	P/N
UPC² BSM Performance Maintenance Kit PM Kit consists of: Mixer, Plungers, Check Valves, Seals, and Filters	201000270
Parts and Accessories	
Assy, Seal Wash Housing, B-Pump	700008999
Assy Plunger, SFC, 0.125 Diameter, 2/pk	700009000
Head, SFC	700009001
Assy, Tube, Head to Transducer, No Loop	430003165
Transducer Assy, SFC A-Pump, 15 K psi, Parylene Coated	700009006
Assy, Seal Wash, Copper, SFC A-Pump	700009007
Support Plate, SFC Head, A-Pump	700009008
Insulating Sleeve, SFC Head, 2/pk	700009009
Assy, 250 µL Mixer	700008909
Kit, Cover, Head Insulator UPC² BSM	700009012
Bulkhead Actuator Insulation , SFC-BSM	415001943
Insulator, Actuator, Pre-chiller, SFC-BSM	415001945
Assy, Tube, SSV to i2 V, SFC	430003096
Assy, Tube, Degasser to SSV, SFC-BSM	430003104
Assy, Tube, Transducer to C-Valve, SFC-BSM	430003105
Assy Tube, Vent Valve P2 to Tee/Filter, SFC	430003108
Assy, Tube, Vent Valve P5 to Tee/Filter, SFC	430003109
Assy, Tube, Accu, CO_2 Transducer, V-Valve	430003161
Assy Tube, Solvent Inlet, SFC-BSM	430003274
Assy Tube, Vent Valve P4 to Waste	430003277
Assy Tube, Vent Valve P1 to Waste	430003278
Head Seal	700009136
Head Support Plate (Pump B)	700002601
Screw Metric Skt Cap M3 × 16, 4/pk	700004023
Screw M5 × 25, 2/pk	700002478
Screw, Metric, Skt Cap M5 × 40, 138 K , 4/pk	700006049
Transducer Assy, Head Mounted	700002594
Wash Seal, 2/pk	700009137
Solvent Select Valve Cartridge	700005408
Union, 0.020 in. I.D. V-Detail	700002636
Tube, Degasser 2 to SSV 2	700003387
Tube, Degasser 3 to SSV 3	700003388
Tube, Degasser 4 to SSV 4	700003389
Air Filter, Side Panel, Fan Intake	401000813
Air Filter, Vista Pump	700002632
Connector Plug, 12-pin	700001539
ACQUITY UPC² CO_2 Connections Kit	205001006

ACQUITY UPC² SM-FL

Description	P/N
UPC² SM-FL Performance Maintenance Kit PM Kit consists of: Syringes, Needle Assy, Injection Cartridge, 10 µL Loop, Tube Assys, and Filters	201000271
Parts and Accessories	
Injection Valve Cartridge	700009057
In-line Waste Valve	410003180
PEEK Sample Needle Kit, 10 µL	700009095
Needle Assy, 250 µm, PEEKsil	700005179
Syringe, 100 µL	700002570
Volume Detection Device	700009094
Wash Port Fitting, 1/4-28 PEEK	700005297
Sample Loop, 2 µL	430002928
Sample Loop, 5 µL	430002936
Sample Loop, 10 µL	430002938

ACQUITY UPC² Convergence Manager

Description	P/N
Convergence Manager Performance Maintenance Kit PM Kit consists of: Valve Cartridge, Pressure Regulator, and Filters	201000272
Parts and Accessories	
Tee, V-Detail, SFC	405013607
Assy Tube, Tee to Vent Valve, SFC	430003194
Assy, Cartridge, Static Regulator	700009455
Assy Tube, Transducer to ABPR	430003200
Assy, Filter, 20 µm, 19 mm	700009059
Tube, Convoluted, 3/8 in. I.D., Cuffed End	430003142
Tube, Convoluted, 1/4 in. I.D., Cuffed End	430003191
Assy Tube, Vent Valve Tee to ABPR	430003201
Welded Tube, SM P6 to CM P1	430003351
Welded Tube, SS 0.007 in. I.D. × 14.5 in.	430003211
Welded Tube, SM P5 to CM P4	430003350
Welded Tube, SS 0.007 in. I.D. × 26.0 in.	430003339
Welded Tube, SS 0.007 in. I.D. × 20.5 in.	430003341
Injection Cartridge	700009052
Air Filter	401000813

ACQUITY CM-A

Description	P/N
ACQUITY CM-A/CM-A Aux Performance Maintenance Kit PM Kit consists of: Filters	201000207
Parts and Accessories	
Kit, ACQUITY UPC², SST, .007 in. I.D. × 12.5 in.	205001002
Kit, ACQUITY UPC², SST, .007 in. I.D. × 18.5 in.	205001003
Kit, ACQUITY UPC², SST, .007 in. I.D. × 36.5 in.	205001004
Kit, ACQUITY UPC² CM-A 6 Column Tubing	205001001
Kit, ACQUITY UPC² CM-A 4 Column Tubing	205000999
Kit, ACQUITY UPC² CM-A 2 Column Tubing	205000986
Valve Cartridge, Rotary Shear, SS	700005438

ACQUITY UPC² PDA Detector

Description	P/N
PDA/TUV Performance Maintenance Kit PM Kit consists of: PerformancePLUS Lamp	201000273
Parts and Accessories	
PerformancePLUS HB Deuterium Lamp Assembly	700005269
I/O Connector 6-pin	700005237
Ethernet Cable, Shielded CAT 5 Cross-over, 3 ft.	440000145
Ethernet Patch Cord, Shielded, 10 ft.	441000372
Fuse Holder	WAT055426
Back Pressure Regulator, 250 psi	700002676
ACQUITY UPC² Analytical Flow Cell	205015037
Leak Sensor Assy	205000505

DID YOU KNOW...

Waters supplies standards that help you benchmark and trend APC data, enhancing productivity and increasing the accuracy of results.

For more information, see page 320.

ACQUITY APC System

Ordering information

ACQUITY APC CM-S

Description	P/N
CM-S Performance Maintenance Kit PM Kit consists of: Filters	201000282
Parts and Accessories	
Kit, Tubing Configuration, No Vlvs, CM-S	205001166
Kit, 2-column Bank Connection, CM-S	205001169
Kit, 3-column Bank Connection, CM-S	205001171
Kit, 4-column Bank Connection, CM-S	205001172
Tubing, SS Bypass, .004 in. I.D.	430002725
Welded Tube Assy, SST, 44.0 LG, LP	430002772
Welded Tube Assy, SS, 19.0 LG	700005478
Welded Tube Assy, SS, 22.5 LG, LP	700005480
Welded Tube Assy, MP35N, 14.5 LG, LP	700005482
Latch Set, CM-A/CM-Aux Trough Cover, L&R	700005980
Assy, Cartridge, 9-port CM-S	700008871
Tube, .005 I.D., Col Conn, In-line	700009524
Tube, .004 I.D., Col Conn, Offset "U"	700009534
Tube, .004 I.D., Col Conn, "U"	700009535
Cover, Column Manager	700009538
Gasket, Trough Cover	700009539
Retainer Clip, CM-S Trough, APH	700009540
Gasket, Thin, APH, CM-S	700009541
Tube, .004 I.D., Col Conn, Long	700009560

ACQUITY APC SM-FTN

Description	P/N
ACQUITY APC SM-FTN Performance Maintenance Kit PM Kit consists of: Syringe, Std Needle, Injection Cartridge and Filters	201000285
Parts and Accessories	
Assy, Extension Loop, 250 µL	430002007
Assy, Extension Loop, 100 µL	430002011
Assy, Extension Loop, 50 µL	430002012
Cup, Overflow	700009505
Support Sleeve, Fountain Wash PPS	700009506
Guide, Sample Needle, PPS	700009512
Syringe, 100 µL, HP PPS Tip	700009529
Set Screw, M3 × 5, T6, for Needle Guide	700009530
Syringe, 250 µL, HPLC PPS Tip	700009576
Needle, 30 µL, pFTN	700009580
Cartridge, Inject, FTN, 18 K psi, APC	700009919



ACQUITY APC System.

ACQUITY APC PDA TS

Description	P/N
PDA/TUV Performance Maintenance Kit PM Kit consists of: PerformancePLUS Lamp	201000273
Parts and Accessories	
ACQ PDA TS Analytical Flow Cell	205001162
Assy, Tube Inlet .004 I.D. LT PEEK Nut	430001748
Assy, Tube Inlet .0025 I.D. LT PEEK Nut	430001749
Assy, Tube Inlet .0025 I.D. PEEK Nut PDA	430001783
Union, .020 I.D., V-detail	700002636
Performance Plus HB Deuterium Lamp Assy	700005269
Backpressure Restrictor	700009590

ACQUITY APC p-ISM

Description	P/N
p-ISM Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	201000283
Parts and Accessories	
22 µL Filter Assy	205000731
Tube, Transducer to Check Valve, MP35N	430002475
Tubing Kit, SS, Standard Flow TUV/PDA, 6 and 10 in.	700003756
i2V Cartridge, Hexane/THF	700005272
Assy Check Valve, Dual Ball, and Seat	700005273
Transducer Pressure, Flex Cable	700006045
Assy, Cartridge Vent Valve	700006052
Pump Head, 316 SS, DLC, Face Seal	700009190
Tube, Degasser to i2 V	700009478
Tube Assy, Solvent Inlet, ISM	700009483
Tube, VV P4 to Waste, p-ISM	700009484
Tube, SW to Accum, EFTE	700009485
Tube, SW, Accum to Pri, EFTE	700009489
Tube, Seal to Waste, EFTE	700009490
Tube, Vent Valve P2 to Filter, ISM	700009491
Tube, VV to Waste	700009493
Tubing, GP Pump Outlet	700009911

ACQUITY UPLC I-Class System

Ordering Information

ACQUITY I-Class Sample Manager-FTN

Description	P/N
ACQUITY I-Class Sample Manager-FTN Performance Maintenance Kit PM Kit consists of: Syringe, Std Needle, Injection Cartridge, and Filters	201000259

Parts and Accessories	
Air Filter, Side Panel	401000694
Guide, Sample Needle	405008854
Seat, Vespel with Anti-rot	405011492
Assy, Tube, Out, Wash Pump	430002345
Assy, Tube, Feed, Injection Port	430002346
Assy, Tube, Feed, Syringe	430002347
Assy, Tube, Feed, Transducer	430002348
Assy, Tube, Feed, Injection Valve	430002349
Assy, Tube, Waste, EXT., Injection Valve	430002360
Assy, Tube, Waste, Injection Valve	430002362
Tube Assy, Sample Manager Purge	430002462
Syringe, 100 µL, HP	700002570
Filter, Solvent Bottle, SS, 7/pk	700003616
Assy Needle 15 µL with Guide and Seat 18 K psi	700008977
Assy, Seat Port, .003 I.D.	700006056
Assy, Cart, Inject, STR, FTN, 18 K psi	700006057
Tube, ACQUITY UPLC I-Class to MS MP35N 17 in.	700008939
Tube, ACQUITY UPLC I-Class to MS PEEKsil 17 in.	700008940
Tube, ACQUITY UPLC I-Class to MS PEEK 17 in.	700008941
Tube, ACQUITY UPLC I-Class to MS PEEK 21 in.	700008942
Tube, ACQUITY UPLC I-Class to MS PEEKsil 21 in.	700008943
Tube, ACQUITY UPLC I-Class to MS PEEKsil. 003 × 21 in.	700008944
10.5 in. Col to PDA Det Inlet, SST	205000895
8.5 in. Col to TUV Det Inlet, SST	205000896



ACQUITY UPLC I-Class System.

ACQUITY I-Class Sample Manager-FL

Description	P/N
ACQUITY I-Class Sample Manager-FL Performance Maintenance Kit PM Kit consists of: Syringes, Std Needle, Injection Cartridge, 10 µL Loop and Filters	201000258

Parts and Accessories	
Assy, Tube, SSV/P-3 to Transducer	430002558
Assy, Tube, SSV P-2 to VM/SSV	430002560
Assy, Tube, WS1 to VM/S-SY	430002564
Assy, Tube, WS2 to VM/W-SY	430002566
Assy, Tube, WS to VM/W-In.	430002568
Assy, Tube, SS to VM/S-In.	430002571
Assy, Tube, NCS Inlet	430002579
Assy, Tube, VDD	430003103
Tube, NCS, Puncture Needle to Elbow	430003159
Syringe, 100 µL, HP	700002570
Port, Seal, Needle Wash	700002886
Assy, Puncture Needle, .059 O.D.	700006067
Assy, Cart, Inject, STR, FL, 18 K psi	700006069
Syringe, 2.5 mL, Inverted	700006070
Assy, Sample Loop, EXT. Hypo Tip, 5 µL	430002936
Assy, Sample Loop, Hypo Tip, 10 µL	430002938
Assy, Sample Loop, EXTD. Hypo Tip, 1 µL	430003166
Assy, Sample Loop, EXT. Hypo Tip, 2 µL	430002928
Kit, I-Class FEP/Metal Needle, 10 µL	700005925
Kit, I-Class PEEKsil Needle 10 µL	700005926
Kit, I-Class FEP/Metal Needle, 20 µL	700005929
Kit, I-Class ACQUITY UPLC PEEKsil Needle	700005930
Kit, I-Class PEEK Needle, 10 µL	700005923

ACQUITY I-Class BSM

Description	P/N
ACQUITY I-Class BSM Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	201000260

Parts and Accessories	
Filter, Air	405003507
Assy, Tube, Degasser Port B2 to SSV B	430001113
Assy, Tube, Degasser Port B1 to SSV B	430001114
Assy, Tube, Degasser Port A1 to SSV A	430001115
Assy, Tube, Degasser Port A2 to SSV A	430001116
Assy, Tube, Accu. "B" Xducer—Vent Valve	430001199
Assy, Tube, Accu. "A" Xducer—Vent Valve	430001200
Assy, Tube, Vent Valve P5 to Tee/Filter	430001207
Assy, Tube, Vent Valve P2 to Tee/Filter	430001208
Assy, Tube, SSV to i2V	430001443
Assy, Tube, Vent Valve P1 to Waste	430001893
Assy, Tube, Vent Valve P4 to Waste	430001894
Assy, Tube, Head to Xducer, MP35N	430002472
Assy, Tube, Prim-out Xducer to CV, MP35N	430002583
Tube Assy, Solvent Inlet, BSM-CR	430002800
Plunger Assy, 2/pk	700002600
Support Plant, Thickened, VHP, Head	700002601
Filter, Air	700002632
Filter, Air	700002633
Screw, Comp., 10-32, SS Gold Plated, Short, 10/pk	700002634

Parts and Accessories	
Ferrule, Set, .062, Two-piece, 10/pk	700002635
Screw, Comp., 10-32, SS Gold Plated, Long, 10/pk	700002645
Primary Inlet Check Valve Filter Kit, 2/pk	700002912
Assy, Cartridge, Filter, SS Frit	700002913
Marker Set, Tubing, ACQUITY, 2/pk	700003102
Filter, Solvent Bottle, SS, 7/pk	700003616
Kit, Check Valve, Dual Ball and Seat, 2/pk	700003755
Ferrule, Lock Ring and Screws, Flangless, 7/pk	700003797
Assy, Cartridge, i2 V, Hexane/THF, 2/pk	700004139
Fitting and Lock Ring, GPV Filter, 4/pk	700005259
Pump Head, 316 SS, DLC, Face Seal	700009190
Seal, Wash, .0787 I.D., Fixed, 2/pk	700006048
SCR, Metric SKT Cap M5 × 40, 138 K psi, 4/pk	700006049
Assy, Cart, Vent, Dogleg, 18 K psi, Dome	700006052
*HP Seal, Dual Spring, Perform Seal, 2/pk	700009135
Assy, Housing, Seal Wash, .045, SST, 2PT	700009194

*S/N prior to G12BUR641M must use 0.045 Seal Wash Housing and Seals Conversion Kit (p/n:205001097) first.

ACQUITY UPLC System

Ordering Information

ACQUITY UPLC Binary Solvent Manager

Description	P/N
ACQUITY i2 Valve Binary Solvent Manager Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	201000197
ACQUITY Binary Solvent Manager Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	201000173

Parts and Accessories	
100 µL Filter Mixer	205000404
High Sensitivity Filter Mixer, 425 µL	205000403
Tube Assembly, Solvent Inlet SDS	430001020
Degasser Port B2 to SSV B Tube Assembly	430001113
Tube Assembly, Transducer to Check Valve	430001121
Vent Valve P5 to Tee/Filter Tube Assembly	430001207
Tube Assembly, System Outlet SDS	430001486
Transducer Assembly, Head Mounted, 15 K psi	700002594
15 K psi Head	700002595
UPLC Primary Check Valve Assembly, 2/pk	700002596
Seal Wash Housing	700002597
Wash Seal, 2/pk	700002598
Head Plunger Seal	700002599
Plunger, 2/pk	700002600
Support Plate, Thickened, VHP Head	700002601
Solenoid Valve, Solvent Select	700002603
Fuse, 5A, 250 V, 5 × 20 mm, SLO BLO, 5/pk	700002604
Screw, Comp., 10–32, SS Gold Plated, Short 10/pk	700002634
Ferrule Set, 1/16 in. I.D., Two-piece, 10/pk	700002635
Union, .020 I.D.	700002636
Screw, Comp., 10–32, SS Gold Plated, Long, 10/pk	700002645
Vent Valve/Trap Valve Cartridge	700002660
Solvent Bottle Filter, Stainless Steel, 7/pk	700003616
Solvent Bottle Filter, Stainless Steel, 1/pk	700003615
50 µL High Pressure Filter Mixer	700002911
Primary Inlet Check Valve Filter Kit, 2/pk	700002912
ACQUITY Accum. Check Valve, 2/pk	700002968
O-ring, Teflon	WAT076152
Assembly, Actuator	700003557
Assembly, Tube, Transducer to Check Valve	430001773
Assembly, Tube, SSV to Active Check Valve	430001443
Fuse, 0.5 A Slow Blow	WAT042091



ACQUITY UPLC System.

ACQUITY UPLC Sample Manager

Description	P/N
ACQUITY Sample Manager Performance Maintenance Kit PM Kit consists of: Syringe, Needle, and Filters	201000174

Parts and Accessories	
ACQUITY UPLC Column In-line Filter Kit	205000343
Needle Stainless Steel, 30 µL	205000362
Needle, 15 µL Stainless Steel	205000363
Needle, Stainless Steel Tip, 30 µL	205000369
Needle, Stainless Steel Tip, 15 µL	205000370
Tube Holder, 24-well, 1.5 mL Tubes	405003740
Tube Holder, 48-well, 0.65 mL Tubes	405003741
Vial Holder, 24-well, 4 mL Vial	405003742
Vial Holder, 48-well, 2 mL Vial	700011047[1]
250 µL Sample Syringe	410001347
Sample Needle Fitting Kit	410001659
Tube Assembly, Inject Outlet, (UPLC Fittings both ends)	430001084
Needle Guide Tube	430001086
Tube Assembly, Inject Out, (UPLC fitting at injector and HPLC fitting at Col. Inlet)	430001221
Sample Loop, 2 µL	430001264
Sample Loop, 5 µL	430001311
Sample Loop, 20 µL, Std.	430001320
Sample Loop, 50 µL	430001325
Sample Loop, 10 µL	430001326
2.5 mL Wash Syringe	700002569
100 µL Sample Syringe	700002570
Needle Seal O-ring, 002 Kalrez	700002572
Needle Assembly, PEEK	700002644
ACQUITY Injector Pod/Cartridge	700002765
0.2 µm SS Column In-line Replacement Frits, 5/pk	700002775

ACQUITY UPLC Sample Organizer

Description	P/N
ACQUITY Sample Organizer Performance Maintenance Kit PM Kit consists of: Filters	201000208
Parts and Accessories	
Door Window Shade	700003794
Vial Holder, 48-well, 2 mL Vial	700011047
Vial Holder, 24-well, 1.5 mL Tubes	405003740
Vial Holder, 48-well, 0.65 mL Tubes	405003741
Vial Holder, 24-well, 4 mL Vial	405003742



ACQUITY UPLC Bottle Accessory Kit.

ACQUITY UPLC Bottle Accessory Kit

Description	P/N
ACQUITY UPLC Bottle Accessory Kit	205000589

ACQUITY UPLC Column Manager, Column Heater, and Cooler

Description	P/N
Column Stabilizer Kit, 50/100 mm Columns	205000291
Column Stabilizer Kit, 150 mm Columns	205000365
Column Support Clips, 10/pk	205000478
Ferrule, PEEK, 1/16, HPFT, 10/pk	700003114
Fingertight Reusable Fittings Kit	700003139
Door Seal Gasket	700003147
Snap-in. Clip, 1/16 Tubing	700003151
Column Retainer Rod, 2/pk	700003156
Exit Drip Tray	700003164
I-button Cord Clip	700003167
Collet, Reusable, HPFT, 10/pk	700003168
Screw, Comp., Reusable, HPFT, Gold, 10/pk	700003169
1-piece Fitting, 10-32, 10/pk	700004841
Column Support Clips, Column Heater, 10/pk	205000263
Column Heater Thermal Gasket	425000536
Front Cover, Column Heater	700002587
Collet, Reusable, HPFT, 2/pk	700003115
Screw, Comp., Reusable, HPFT, Gold, 2/pk	700003116

ACQUITY UPLC Open Architecture System

Description	P/N
Open Architecture UPLC Performance Maintenance Kit PM Kit consists of: Injection Cartridge, 10 µL Loop Tension Cords, and Lubricant (Relevant Syringe is ordered separately)	201000198
Parts and Accessories	
10 µL Sample Loop	430001326
25 µL Syringe	700002705
5 µL Sample Loop	430001311
Column Manager Tubing Assembly	430002015
Column Stabilizer Tubing Assembly	205000585
Injection Valve Adapter	700004145
Injection Valve Pod	700011083
MS Inlet Tubing Assembly	430001229
O-ring, Injection Valve Drive	700004147
Syringe Kit, 25 µL	205000275
System Outlet Tubing	430001017
Valve Drive	700002455
Waste Check Valve Kit	700004057
Ferrule Set, (062), 2-piece	700002635
Screw, Comp., 10-32, SS Gold Plated, Long 10/pk	700002645
Screw, Comp., 10-32, SS Gold Plated, Short 10/pk	700002634

DID YOU KNOW...

Waters supplies System Performance Standards that can help you benchmark and trend ACQUITY UPLC data, enhancing productivity and increasing the accuracy of results.

For more information, visit asr.waters.com



ACQUITY Isocratic Solvent Manager.

ACQUITY Isocratic Solvent Manager

Description	P/N
ACQUITY ISM Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	201000286

Parts and Accessories	
22 µL Filter Assy	205000731
Assy, Tube, Head to Xducer	430001120
Assy, Tube, Xducer to Check Valve	430002357
Wash Pump Solenoid	WAT270926
Plunger, .0787 Diameter × 1.415, 2/pk	700002600
Support Plant, Thickened, VHP, Head	700002601
Primary Inlet Check Valve Filter Kit	700002912
Transducer, Pressure	700006045
Seal, Wash, .787 I.D., Fixed, 2/pk	700006048
Tube, Vent Valve P2 to Filter, ISM	700009491
Tubing, .156 O.D. × .031 I.D., Pharmed	700009694
Tube, Inlet to Check Valve	700009699
Tube Assy, Solvent Inlet, ISM	700009700
Tee, w/Bracket	700009708
Tube, PEEK, .007 in. I.D. × 16 in. L	700009709
Module, Restrictor, 100 S/R	700009712
Module, Restrictor, 10 S/R	700009713
Module, Restrictor, 250 S/R	700009714
Capillary Tube, ISM Outlet	700009715
Capillary Tube, Optic Det Inlet	700009716
Module, Restrictor, 5 S/R	700009776
Tube, PEEK, .062 × .010 × 60.0 LG	700009778
Tube, PEEK, .062 × .005 × 26.0 LG	700009779
Tube, PEEK, .007 I.D., 28.0 in. LG	700009780
Tube, Connector, UPC²	700009781
Module, Coiled Probe, Dual Det	700009782
Module, Coiled Probe, Triple Det	700009783
Tube, PEEKsil, 75 µm × 31 in. L	700009784
Support Plate for Drip Tab	700009789
Tube, SST w/AU, .007 in. I.D. × 28 in. LG	700009796
Tube, SST, .005 in. I.D. × 20 in. L	700009797
Tube, SST, .01 in. I.D. × 60 in. L	700009798
Tube, SST/w/AU, .007 in. I.D. × 5 in. L	700009799
Solvent Filter, Thru Tube, 316SS	700010196
O-ring, 2-016, Teflon	WAT076152

ACQUITY UPLC DETECTORS

ACQUITY QDa Detector

Description	P/N
ACQUITY QDa® 'KAB' STD Performance Maintenance Kit PM Kit consists of: O-rings, Seals, Filters, Aperture Disk Assy, and Calibration Pin	201000300
ACQUITY QDa 'KAD' STD Performance Maintenance Kit PM Kit consists of: O-rings, Seals, Filters, Aperture Disk Assy, and Calibration Pin	201000308
ACQUITY QDa 'KAB' High Performance Maintenance Kit PM Kit consists of: O-rings, Seals, Filters, Aperture Disk Assy, Calibration Pin, and Rotary Pump Components	201000301
ACQUITY QDa 'KAD' High Performance Maintenance Kit PM Kit consists of: O-rings, Seals, Filters, Aperture Disk Assy, Calibration Pin, and Rotary Pump Components	201000309

Performance Maintenance Kit does not include the probe. We strongly recommend you purchase and replace annually the appropriate probe, selecting it from the list below.

Note: Instruments prior to KAB1052 will also require MKII Ion Block Assy, (p/n: 700010377) fitted to the instrument.

Parts and Accessories	
ESI Probe Assembly 250 mm	700009641
ESI Probe Assembly 500 mm	700009642
SFC Probe Assembly 200 mm	700009771
Probe Assembly 750 L × 50 µm	700009977
O-ring, 2.6 I.D. × 1.9 C/S Viton, 10/pk	700000943
MKII Ion Block Assembly	700010377
Sample Cone	700009597
Gasket, Pumping Block (Front)	700011132
Seal, Custom Shaft	700009601
Gasket, Ion Block	700009603
Source Aperture Carrier	700009608
O-ring, Viton, 28 × 1 mm	700009614
Cone Gas Nozzle	700009625
Cone Clamp	700009626
Source Gas Seal	700009627
Calibration Pin, Assy (for MKII Ion Block)	700011295
Pumping Block Assembly	700009678
Rotary Pump, RE6 B-oil, 1 L	700009679
Diaphragm Pump Service Kit	700009680
ESI Source Attachment Knob, 2/pk	700009690
Aperture Disc Assembly, 0.2 mm, Performance	700009768
Aperture Disc Assembly, 0.09 mm, Standard	700009769
O-ring, Conductive, 7.1 × 1.6 mm	700009810
Septa, Advanced Green, Non Stick, 11 mm	700009976
External Valve Drain Assembly	700010156
Thumbscrew Assembly	700010158
Oil Filter Insert	700010211
Absorbent Felt	700010213
Gasket, Pumping Block (Rear)	700011133



ACQUITY UPLC RI Detector.

ACQUITY UPLC RI Detector

Description	P/N
Kit, ACQUITY RI Compatibility Kit for APC	205001157
Parts and Accessories	
Valve, 2-way Solenoid	700002360
Assy, Pressure Relief, 1/4-28, 35 psi	700002361
Valve, 3-way Recycle	700002362
Tubing, Union to Relief Valve	700002363
Tubing, Union to Purge Valve	700002364
Tubing, 2-way to 3-way Valve	700002378
Welded Tube Assy, SST, 14.5 LG, HP	700005476
Ferrule, Flangeless w/Lock Ring—3/pk	700009440
Tubing, ETFE, .030 I.D. × .062 O.D.	700009554

ACQUITY UPLC TUV Detector

Description	P/N
ACQUITY PDA/TUV 2489/2998 Performance Maintenance Kit PM Kit consists of: PerformancePLUS Lamp	201000281
ACQUITY TUV Performance Maintenance Kit PM Kit consists of: PerformancePLUS Lamp (for ACQUITY TUV through S/N K05UPT699N)	WAS081142
Parts and Accessories	
Flow Cell, Std., ACQUITY TUV (TUV with S/N K05UPT699N or lower)	205015000
Flow Cell, Low Flow, ACQUITY TUV (TUV with S/N K05UPT699N or lower)	205015001
ACQUITY UPLC I.D. Cell TUV, Analytical	205015033
Flow Cell, High Sensitivity, 2.4 µL Vol. (TUV with S/N K05UPT700N or higher)	205015018
Connector Plug, 10-position	323000247
Tube Assembly, Low Flow, TUV Inlet	430001749
Tube Assembly, Std. Flow, TUV Inlet	430001748
Ethernet Patch Cord, 5 ft.	441000456
Fuse, 3.15A (250 V, 5 × 20 mm), 2/pk	700001800
Backpressure Regulator	700002676
Power Cord, 110 V	442000176

ACQUITY UPLC PDA Detector and eLambda Detector

Description	P/N
ACQUITY PDA/TUV 2489/2998 Performance Maintenance Kit PM Kit consists of: PerformancePLUS Lamp	201000281
Parts and Accessories	
ACQUITY PDA, Standard Flow Cell, 10 mm, 500 nL (for earlier models)	205015036
ACQUITY UPLC I.D. Cell PDA, Analytical Flow Cell	205015017
ACQUITY UPLC I.D. Cell PDA, High Sensitivity	205015019
Connector Plug, 10-position	323000247
Ethernet Patch Cord, Shielded, 5 ft.	441000456
Event Cable, 6 ft.	441000373
Backpressure Regulator, 250 psi	700002676
Fuse, 3.15A (250 V, 5 × 20 mm), 2/pk	700001800
Power Cord, 110 V	442000176
Assembly, Tube Inlet .004 I.D. PDA	430001784
Leak Sensor	205000505
Tube Assembly, Low Flow, PDA Inlet	430001783

ACQUITY UPLC FLR Detector

Description	P/N
ACQUITY UPLC FLR Detector Performance Maintenance Kit PM Kit consists of: Lamp Assy	201000193
Parts and Accessories	
ACQUITY FLR Flow Cell Assembly	700003711
Fuse Drawer	WAT055426
Fuse 3.15A, 250 V	700001800
10-position I/O Connector	323000247
Connector Shell Cover	323000446
Union, Internal Reducer	410002096
Backpressure Regulator	700002676
Fluorescence System PQ Solution	700003694
Analog Out Cable Assembly	WAT057235
Power Cord, 110 V	442000176
External Ethernet Cable	441000372

ACQUITY UPLC ELS Detector

Description	P/N
ACQUITY ELSD/ELSD Performance Maintenance Kit PM Kit consists of: Lamp Assy	201000159
Parts and Accessories	
Nebulizer	205000342
Connector Plug, 10-position	323000247
Packing Ring, Nebulizer	425000326
PEEK Tubing, 6 in. × .004 in. I.D.	430001562
PEEK Tubing, 14 in. × .004 in. I.D.	430001565
Ethernet Cross-over Cable, 3 ft.	440000145
Ethernet Patch Cord, 5 ft.	441000456
Bottle/Vapor Trap, 1000 mL	700002682
Siphon Drain Tube	700002801
Event In./Out Cable Assembly	WAT020321
Analog Out Cable Assembly	WAT057235
Fuse 5.0A, 250 V, 5 × 20 mm, Fast-acting	WAT163-18

WATERS HIGH BRIGHTNESS LAMP WITH INTELLIGENT TECHNOLOGY

The Waters High Brightness (HB) Lamp boasts features that outshine its competition's. In a lamp history file in the Empower Software Database, the lamp's "intelligent" technology records its serial number, hours of use, and number of ignitions. Moreover, you can include the lamp history in a comprehensive status report, so if you transfer the lamp between units, its data remain with it. Thus you always know exactly how many hours the lamp has operated.

The High Brightness Lamp with Intelligent Technology is currently available for our latest ACQUITY UPLC PDA and TUV Detectors.



Description	P/N
PerformancePLUS HB Deuterium Lamp Assembly	700005269

NEW Waters Fraction Manager—Analytical

Description	P/N
Analytical Fraction Manager Performance Maintenance Kit	201000291
Parts and Accessories	
Assy, Needle, FC-007 I.D., MP35N	700009406
Assy, Needle, FM-10 I.D., MP35N	700010339
Guide, Needle, FC	700010380
Syringe, 250 µL, HPLC	410001347
Assy, Fraction Valve with Coupling	700009400
Basin, Needle Wash	700010215
Assy, Tube, FM Flush	700010453
Assy, Tube, MSV-FV, Interconnect	700010457
Assy, Tube, FV, Inlet	700010458
Tube, Convoluted, 1/4 I.D. × 72 LG	700009402
Tube, Convoluted, 1/4 I.D. × 1.75 LG	700009408
WFMA Delay Coil 0.1–1 mL Flow Kit #1	205001416
WFMA Delay Coil 0.5–2.2 mL Flow Kit #2	205001417
WFMA Delay Coil 2.2–5 mL Flow Kit #3	205001418
WFMA w/QDa Delay Coil 0.1–1 mL Flow Kit 4	205001419
Low Flow Detector—WFMA Tubing Kit	205001427
Assy, Tube, Det-FM, .007" × 14" L, ETFE	700010334
Assy, Tube, Det-FM, .007" × 32" L, ETFE	700010335
High Flow Detector—WFMA Tubing Kit	205001428
Assy, Tube, Det-FM, .010" × 14" L, ETFE	700010336
Assy, Tube, Det-FM, .010" × 32" L, ETFE	700010337
Assy, Tube, Restrictor/Waste, Frac Valve	700010338
Assy, Tube, Res/Waste, FV, Hi Flow	700010345
Kit, 10 mL Vial Holder	205001042
Vial, 2 2 × 45 mm with 20–400 screw top, 100/pk	186001420
96 Well 350 µL ACQUITY Collection Plate	186002643
Plate, 96-well, 700 µL Round Well, 25/pk	186005837
1 mL Round Collection Plate, 50/pk	186002481
2 mL Square Collection Plate, 50/pk	186002482
Holder, 48-well, 2 mL Vial	700011047
Glass Vial with Screw Neck, 100/pk	186000273
Holder, 24-well, 4 mL Vial	405003742
4 mL Vial, Screw Top, 100/pk	186000840
Holder, 48-well, .65 mL Tubes	405003741
Holder, 24-well, 1.5 mL Tube	405003740

DID YOU KNOW...

Waters offers a range of services to support Agilent LC and GC systems.

Consult your Waters service representative to learn more.

ACQUITY UPLC H-Class System



ACQUITY UPLC H-Class System.

Ordering Information

ACQUITY H-Class Sample Manager-FTN

Description	P/N
ACQUITY H-Class Sample Manager Flow Through Needle Performance Maintenance Kit PM Kit consists of: Mixer, Plungers, Check Valves, Seals, and Filters	201000234
Parts and Accessories	
Sample Needle Kit, 15 µL	700005215
In-line Waste Valve, 1/4–28 Thread	410003180
Seal Extension Tube	700005234
Injector Valve Cartridge, SM-FTN	700005236
Sample Needle Guide	405008854
Needle Seat	405011492
Syringe 100 µL, HP	700002570

ACQUITY H-Class Column Heater Active

Description	P/N
Door Latch with Pins	700005248
Clip Retainer	415001544
Active Preheater Assembly	205000730
Column Support Clips, 10/pk	205000478
Screw, Panel, M4 × 16, Blue	410003295
Extension Arm Kit, Optional	205000726
Drip Tray, CH-A	415001608
Tygon Tubing (0.375 in. O.D. × 0.250 in. I.D.)	700001796
External Cable, Right Angle	441001040
I-button, CH-A	700005251

ACQUITY H-Class Quaternary Solvent Manager

Description	P/N
ACQUITY H-Class Quaternary Solvent Manager Performance Maintenance Kit PM Kit consists of: Mixer, Plungers, Check Valves, Seals, and Filters	201000233
Parts and Accessories	
Bottle Tray	289002414
Seal Wash Waste Fittings	405003015
Plunger Removal Tool	405007627
Inlet Manifold	405010508
Screw, Metric Skt Cap M5 × 40, 2/pk	410001296
Tube Assembly, Degasser to GPV	430002208
Tube Assembly, Transducer to Vent Valve	430002316
Tube Assembly, Vent Valve P4 to Waste	430002317
Tube Assembly, Vent Valve P2 to Outlet Filter	430002319
Tube Assembly, Transducer to Check Valve	430002357
Tube Assembly, GPV-D to Mixer Manifold	430002387
Tube Assembly, GPV-C to Mixer Manifold	430002388
Tube Assembly, GPV-A to Mixer Manifold	430002389
Tube Assembly, GPV-B to Mixer Manifold	430002390
Tube Assembly, Mixer Manifold to i2 V	430002400
Outlet Housing Cartridge, Stainless Steel	700001530
Transducer	700002594
Pump Head	700002595
Seal Wash Housing	700002597
Seal Wash Housing Seal	700002598
Head Plunger Seal	700002599
Plunger	700002600
Head Support Plate	700002601
Ferrule Set (.062, 2-piece), 10/pk	700002635
Vent Valve Cartridge Assembly	700002660
Screw, Metric Skt Cap M3 × 16, 4/pk	700004023
i2 V Valve	700005162
Check Valve, Double Ball and Seat	700005164
i2 V Valve Cartridge, 1/pk	700005165
Filter, Air, Door	700005167
Filter for GPV, 4/pk	700005173
Assy, Mixer, 100 µL, QSM	700005119
O-ring, Teflon, Pump Head	WAT076152
Seal Wash Pump Solenoid	WAT270926

ACQUITY UPLC H-Class Bio System



ACQUITY UPLC H-Class Bio System.

Ordering Information

ACQUITY H-Class Bio Column Management

Description	P/N
CH30-A	
APH Bio MP35N, 12.5 in. LG	205000756
APH Bio MP35N, 23 in. LG	205000777
CH-30A Tubing Kit, Bio	205000792
Tube, Outlet, MP35N, 22.5 in. LG	700006914
Tube, Outlet, MP35N, 36 in. LG	700006915
CM-A	
CM-A and CM-Aux Performance Maintenance Kit PM Kit consists of: Filters	201000207
Parts and Accessories	
Assy, MP35N, 14.5 LG, HP	700005481
Assy, MP35N, 14.5 LG, LP	700005482
Assy, MP35N, 19.0 LG, LP	700005483
Assy, MP35N, 19.0 LG, HP	700005484
Assy, MP35N, 22.5 LG, LP	700005485
By-pass Tubing, MP35N, .005 in. I.D.	430002779
APH Bio MP35N, 12.5 in. LG	205000756
APH Bio MP35N, 18.5 in. LG	205000775
Valve Cartridge Kit, Ti CM-A	205000773

ACQUITY H-Class Bio SM-FTN

Description	P/N
H-Class Bio FTN Performance Maintenance Kit PM Kit consists of: Syringe, Std Needle, Injection Cartridge, and Filters	201000201
Parts and Accessories	
Air Filter, Side Panel	401000694
Seat, Vespel with Anti-rot	405011492
Calibration Pin, RZZ Mechanism	405013532
Union, 1/4-28, THRU	410001281
Ferrule, Set, .062, Two-piece	410001349
Assy, Tube, Out, Wash Pump	430002345
Assy, Tube, Feed, Injection Port	430002346
Assy, Tube, Feed, Syringe	430002347
Assy, Tube, Feed, Transducer	430002348
Assy, Tube, Feed, Injection Valve	430002349
Assy, Tube, Waste, EXT., Injection Valve	430002360
Assy, Tube, Waste, Injection Valve	430002362
Tube Assy, Sample Manager Purge, Bio	430002464
Tube Assy, Sample Manager Wash, Bio	430002487
Syringe, 100 µL, HP	700002570
Screw, Comp., 10-32, SS Gold Plated, Short, 10/pk	700002634
Ferrule, Set, .062, Two-piece, 10/pk	700002635
Ferrule, Flangeless, Tefzel, Lock Ring	700003796
Ferrule, Lock Ring and Screws, Flangeless, 7/pk	700003797
Solvent Filter, Titanium, 7/pk	700005378
Cartridge, Inject Valve, Bio	700005407
Needle, DI-15 µL, MP35N, BioSM-FTN	700005421
Kit, Tube Markers, Purge/Wash	700005429

ACQUITY H-Class Bio QSM

Description	P/N
ACQUITY H-Class Bio QSM Performance Maintenance Kit PM Kit consists of: Mixer, Plungers, Check Valves, Seals, and Filters	201000244
Parts and Accessories	
Tube Assy, Solvent Inlet, BioQSM	430002274
Assy, Tube, Vent Valve P4 to Waste, QSM	430002317
Assy, Tube, Head to Xducer, MP35N	430002472
Assy, Tube, Degasser to GPV, MP35N	430002474
Assy, Tube, Xducer to Check Valve, MP35N	430002475
Assy, Tube, Xducer to Vent Valve, MP35N	430002476
Assy, Tube, Vent VLV P2 to Filter, MP35N	430002477
Assy, Tube, Mixer Manifold to i2 V, MP35N	430002479
Assy, Tube, GPV-A to Mixer, MP35N	430002481
Assy, Tube, GPV-B to Mixer, MP35N	430002482
Assy, Tube, GPV-C to Mixer, MP35N	430002483
Assy, Tube, GPV-D to Mixer, MP35N	430002484
Transducer Assy, Head Mounted, 15 K psi	700002594
Plunger, .0787 Diameter × 1.415, 2/pk	700002600
Support Plant, Thickened, VHP, Head	700002601
Screw, Comp., 10–32, SS Gold Plated, Short, 10/pk	700002634
Ferrule, Set, .062, Two-piece, 10/pk	700002635
Screw, Comp., 10–32, SS Gold Plated, Long, 10/pk	700002645
Pin Plug, 1/16 in., High Pressure, 5/pk	700002747
Ferrule, Flangeless, Tefzel, Lock Ring	700003796
Ferrule, Lock Ring and Screws, Flangeless, 7/pk	700003797
Filter, Air, Door	700005167
Assy, Mixer, 100 µL, BioQSM	700005258
Fitting and Lock Ring, GPV Filter, 4/pk	700005259
Solvent Filter, Titanium, 7/pk	700005378
Barbed Seal Wash Housing, Titanium	700005410
Pump Head, ACQUITY, Titanium	700005411
Cartridge, Vent Valve, BioQSM	700005413
Cartridge, i2V, BioACQUITY	700005414
Check Valve, Accumulator, Ti	700005415
HP Seal, .0787 I.D., Flanged, Bio	700005418
Holder, 20 Micron Frit, Titanium, 4/pk	700005419
Wash Seal, .0787 I.D., Flanged, Bio	700005422

ACQUITY UPLC M-Class System

Ordering Information

ACQUITY M-Class µBSM/ASM

Description	P/N
µBSM/ASM Performance Maintenance Kit PM Kit consists of: Mixer, Plungers, Check Valves, Seals, and Filters	201000289

Parts and Accessories	
Certified Container Low Volume Kit	186007278
Assy, Tube, Vent Valve P1 to Waste	430001209
Assy, Tube, Vent Valve P4 to Waste	430001210
Assy, Tube, Head to Xducer, MP35N	430002472
Assy, Tube, Prim-out Xducer to CV, MP35N	430002583
Plunger, .0787 Diameter × 1.415, 2/pk	700002600
Support Plant, Thickened, VHP, Head	700002601
Valve, Solenoid, Solvent Select	700002603
Tubing, 3/16 in. O.D. × 1/16 in. I.D., TYGON, 25 in.	700003751
Filter, In-line, Titanium Kit, 2/pk	700003784
Cartridge, Filtered Ferrule, Titanium, 2/pk	700003785
i2V PEEK High Pressure Gasket	700005218
PEEK Check Valve Washer	700005221
Reduced Height i2V, Bio	700005412
Cartridge, Valve, Vent	700005413
Cartridge, i2V, BioACQUITY	700005414
Check Valve, Accumulator, Ti	700005415
Transducer, Pressure	700006045
Filter, 1/2 micron, HP, Titanium	700009010
Tee, nano, M-detail, Ti	700009830
Seal, Wash HSG, Dual Sprg, 2P, Ti	700009836
Pump Head, Ti, DLC, Face Seal, Straight	700009837
HP Seal, Dual Spring, .045, 2/pk	700009838
Seal, Wash .0787 I.D., Fixed, Bio, 2/pk	700009839
Tube, Degass Port B2-SSV B, MP35N	700009843
Tube, Degass Port A2-SSV A, MP35N	700009844
Tube, SSV to i2V, MP35N	700009845
Tube, Vent Valve P2-filter, MP35N	700009846
Tube, Vent Valve P5-filter, MP35N	700009847
Tube, Accu "A" XDucer-V V P3	700009848
Tube, Accu "B" XDucer-VV P6, MP35N	700009849
Tube, Filter Inlet A, FCM, MP35N	700009850
Tube, Filter Inlet B, FCM, MP35N	700009851
Tube Assembly, Inlet ASM	700009858
O-ring, 2-016, Teflon	WAT076152



ACQUITY UPLC M-Class System.

ACQUITY M-Class µSM-FL

Description	P/N
µSM-FL Performance Maintenance Kit PM Kit consists of: Syringes, Std Needle, and Filter	201000290

Parts and Accessories	
Plug, One-piece, 10–32, Coned	410001400
Tube Assy, Strong Needle Wash-in.	430002491
Tube Assy, Weak Needle Wash-in.	430002680
Sample Loop, Ext. Hypo Tip, 2 µL	430002928
Sample Loop, Ext. Hypo Tip, 5 µL	430002936
Sample Loop, Ext. Hypo Tip, 10 µL	430002938
Sample Loop, Ext. Hypo Tip, 1 µL	430003166
Syringe, 100 µL, HP	700002570
Kit, I-Class PEEKsil Needle 10 µL	700005926
Puncture Needle, .059 O.D.	700006067
Tube, Vent/Drain	700009863
Cart, Injection, 18 K psi, µSM-FL	700009864

ACQUITY M-Class TVM

Description	P/N
Tee, MMV Nano	289004442
Tube, Cap, 40 µm × 10 in., V-V, HP	700009875
Tube, Cap, 25 µm × 30 in., M-M, HP	700009876
Tube, Cap, 40 µm × 6 in., V-V, HP	700009878
Tube, Cap, 40 µm × 6 in., M-V, HP	700009880
Tube, Cap, 40 µm × 26 in., V-V, HP	700009881
Cap Tube, 40 µm × 30 in., V-PT, HP	700009889
Capillary Tubing, 40 µm × 40 in., Inlet	700010399
Waste Tube, TVM, 31 in.	700009892
Cap Tube, 40 µm × 20 in. L, M-V	700009894
Cap Tube, 25 µm × 20 in. L, M-V	700009895
Assy, Waste Tube	700010401
Nano Tee, #6–40 Ports	700009920
Tube, PEEKsil, 25 µm × 30 in. L, M-V	700010040
Tube, PEEKsil, 25 µm × 50 cm. LG, V-V	700010042
Tube, Cap w/Frit, 40 µm × 26 in. L	700010059

nanoACQUITY UPLC System

Ordering Information

nanoACQUITY High Pressure BSM/ASM

Description	P/N
nanoACQUITY Solvent Manager Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	201000181

Parts and Accessories	
Assembly, Bottle Tray	289002414
1/2 µm Filter Assembly	289002111
Solvent Filter Assembly, 5 µm	289002172
Degasser Port B2 to SSV B Tube Assembly	430001113
Degasser Port B1 to SSV B Tube Assembly	430001114
Degasser Port A1 to SSV A Tube Assembly	430001115
Degasser Port A2 to SSV A Tube Assembly	430001116
Tube Assembly, Pump Head to Transducer	430001120
Tube Assembly, Transducer to Check Valve	430001121
Tube, Vent Valve Port 1 to Waste	430001209
Tube, Vent Valve Port 4 to Waste	430001210
Tube, Vent Valve Port 5 to Filter	430001346
Solvent Inlet Tube (Aux. Pump Only)	430001389
Tube Set, A2 and B2 Inlet Lines	430001436
Tube, Vent Valve Port 2 to Filter	430001511
Tube, Vent Valve Port 5 to Filter	430001512
Tube, ACC. A Transducer to Vent Valve P3	430001534
Tube, ACC. B Transducer to Vent Valve P6	430001535
Tube, Filter to Flow Sensor Inlet A	430001568
Tube, Filter to Flow Sensor Inlet B	430001569
Tube, ASM to MS, 25 µm × 60 in.	430001572
Fuse Drawer	700001502
Transducer Assembly, Head Mounted, 15 K psi	700002594
15 K Pump Head	700002595
UPLC Primary Check Valve Assembly, 2/pk	700002596
Wash Seal, 2/pk	700002598
Head Plunger Seal	700002599
I/O Connector Plug, 12 pin	WAT270868
Plunger, 2/pk	700002600
Support Plate, Thickened	700002601
Solenoid Valve, Solvent Select	700002603
Fuse, 5A, 250 V, 5 × 20 mm, SLO BLO, 5/pk	700002604
Ferrule Set, 1/16 I.D., Two-piece, 10/pk	700002635
Screw, Comp., 10–32, SS Gold Plated, Long, 10/pk	700002645
Vent Valve/Trap Valve Cartridge	700002660
1/2 µm Filter Insert Assembly	700002696
Tube, Vent Valve Port 2 to Filter	700002702
Tube, ASM to MS, 25 µm × 60 in.	700002712
Solvent Inlet System Tube Set	700002713
Check Valve, Double Ball and Seat, 2/pk	700002968
O-ring, Teflon	WAT076152



nanoACQUITY UPLC System.

nanoACQUITY High Pressure Sample Manager

Description	P/N
nanoACQUITY Sample Manager Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	201000182

Parts and Accessories	
Shuttle Tray Kit	205000542
Kit, Tubing 2D/2 Pmp. Trap, nanoACQUITY	205000398
Union, Zero Dead Volume	289000439
nano-Tee without Gauge Pin	289002576
nano Trap Column Holder	289002802
Tube Holder, 24-well, 1.5 mL Tubes	405003740
Tube Holder, 48-well, 0.65 mL Tubes	405003741
Vial Holder, 24-well, 4 mL Vial	405003742
Vial Holder, 48-well, 2 mL Vial	700011047
Fitting, Plug, PEEK, Knurled	405005067
Fitting, PEEK, Knurled One-piece	405005068
50 µL Sample Syringe	410001348
2 µL Sample Loop	430001264
5 µL Sample Loop	430001311
20 µL Sample Loop	430001320
50 µL Sample Loop	430001325
10 µL Sample Loop	430001326
Assembly, Cap. Tube with Frit 25 µm × 18 in.	430002242
Capillary Tubing with Frit, 25 µm × 10 in.	430001570
Capillary Tubing with Frit, 40 µm × 16 in.	430001571
25 µm Capillary, BSM to Trap Valve	430001575
40 µm Capillary, ASM to Inject Valve	430001576
Capillary Tubing Assembly, Injection Valve to Column	430001577
Capillary Tubing Assembly, Injection Valve to Trap Valve	430001629
2.5 mL Wash Syringe	700002569
100 µL Sample Syringe	700002570
Needle Seal O-ring, 002 Kalrez	700002572
Fuse, 0.25A, 250 V	700002576
Fuse, 10A, 5 mm × 20 mm, Slo Blo	700002577
Screw, Comp., 10–32, SS Gold Plated, Short, 10/pk	700002634
Sample Needle, PEEK, 15 µL	700002708
Capillary Tube, 300 µm Column Inlet	700002754
Capillary Tube, 300 µm Column Outlet	700002755
300 µm Column Inlet/Outlet Tubing Kit	700002757
Injector Valve Pod/Cartridge	700002907
Column Heater	700002908

nanoACQUITY TUV Detector

Description	P/N
ACQUITY PDA/TUV 2489/2998 Performance Maintenance Kit PM Kit consists of: PerformancePLUS Deuterium Lamps	201000281
UPLC TUV Detector Performance Maintenance Kit (TUV with S/N through K05UPT699N) PM Kit consists of: PerformancePLUS Deuterium Lamps	WAS081142
Parts and Accessories	
TUV Flow Cell, 10 nL (TUV with S/N through K05UPT699N)	205000159
TUV Flow Cell, 10 nL (TUV with S/N K05UPT700N and above)	205015013
Connector Plug, 10-position	323000247
Fuse, 3.15A (250 V, 5 × 20 mm), 2/pk	700001800
Backpressure Regulator	700002676
Fuse Holder	WAT055426

nanoACQUITY UPLC System with 2D Technology

Description	P/N
Assembly, Waste Tube, HTM, PEEK	430001456
Union, Nano, 6–40	289004407
Tee, Nano M-M-V-Detail	289004442
Capillary Tubing, BSM-MMV Tee, M-M 25 µm × 24 in.	430002140
Capillary Tubing, Injection Valve to Trap Valve, V-V 40 µm × 13 in.	430001629
Holder, MVM nano-Tee	700004599
Assembly, Capillary Tubing, 1st D Col. In./Out 10 in.	430002183
Assembly, Capillary Tubing, Trap Valve to MMV Tee 12 in.	430002153
Assembly, Capillary Tubing, BSM2-Injection Valve, 22 in.	430002155
Assembly, Capillary Tubing, BSM-Trap Valve, 30 in.	430001575
Assembly, Pod, Trap Valve, 3 trace	700004601
Assembly, Capillary Tube with Frit 25 µm × 18 in.	430002242
nano-Tee, M-M-M Detail	289002576
Pin Plug, 1/16 in., High Press.	700002747
Capillary Tubing Assembly Injection Valve to Trap Valve	430001577
Capillary Tubing with Frit, 40 µm × 16 in.	430001571
Tubing Assembly, Solvent Select Valve to In-line Filter	430001470
Mixer Assembly, 1.0 × 50 mm, Zirc. Bead	289003345
Tubing, Capillary, 300 µm Col. Outlet	430001848
Tubing, Capillary with Frit, 75 µm × 10 in.	430001837
Tubing, Capillary with Frit, 75 µm × 8 in.	430001835
Thumb Screw, Stainless Steel, M5 × 11 mm Large	410001697
Ethernet Switch Box, 8-port	725000455
Mixer Kit for 1 mm Column	205000540

nanoACQUITY HDX Manager

Description	P/N
Parts and Accessories	
Assy, Tube, Post Column, .005 I.D.	430001919
Assy, Tube, Column HTR/CLR, HPLC	430001923
Column Clip, 4/pk	700002143
Ferrule Set, 1/16 I.D., Two-piece, 10/pk	700002635
Screw, Comp., 10-32, SS Gold Plated, Long, 10/pk	700002645
One-piece Fitting, 10-32, 10/pk	700004841
Clip, Snap-in., 1/16 in. Tubing, 5/pk	700003792
Union	WAT097332

ACQUITY UPLC FlexCarts

Make Your System Mobile

A complete-system platform, the ACQUITY UPLC FlexCart wheeled cart provides the means to position an ACQUITY UPLC System close to a mass spectrometer's ionization source, facilitating its installation and operation. Fitted with electrical outlets, a computer monitor and keypad, and a container for fluid waste, the FlexCart is compatible for use with ACQUITY UPLC and nanoACQUITY Systems.



Description	P/N
ACQUITY UPLC FlexCart	205015015
nanoACQUITY UPLC FlexCart	205016040

DID YOU KNOW...

To ensure the maximum performance and longevity of your ACQUITY UPLC System, it is critical that you use Waters Quality Parts for maintenance.

Visit www.waters.com/parts for more information about parts and accessories for your ACQUITY UPLC and nanoACQUITY UPLC Systems.

Our Professional Services team is comprised of dedicated, certified, experienced, scientists, and informatics engineers. We offer a comprehensive suite of professional services to help you accelerate product production, improve laboratory effectiveness, and manage your resources.



Alliance Separations Modules

Ordering Information

2695 SEPARATIONS MODULE



2690/2695 Performance Maintenance Kit



Replacement Plunger



Description	P/N
2690/2695 Separations Module Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, Filters, Needle, Syringe (250 µL), and Injector Rebuild Kit	WAT270944

2695D SEPARATIONS MODULE



2690D/2695D Separations Module 8 Needle Performance Maintenance Kit



Description	P/N
2695D Separations Module 8 Needle Performance Maintenance Kit* PM Kit consists of: Dispenser Syringes, Needles, and Filters	700000201

*Note: For proper maintenance of the 2695D, please make sure to order, PM Kit: 700000201 and PM Kit: WAT270944.

2795 SEPARATIONS MODULE



2795 Performance Maintenance Kit



Syringe



Description	P/N
2795 Separations Module Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, Filters, Needle, Syringe (500 µL), and Injector Rebuild Kit	201000107

2796 SEPARATIONS MODULE

Description	P/N
2796 Separations Module Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, Filters, Needle, Syringe (500 µL), and Injector Rebuild Kit	201000169

IMPORTANT INFORMATION ABOUT SELECTING COMPONENTS FOR WATERS SEPARATIONS

Modules and Pumps

Waters separations modules and pumps are constructed using the highest-quality components available. The component parts recommended in Waters' Performance Maintenance protocols are intended to optimize a system's performance for the widest range of applications possible. Yet, to meet certain performance expectations, some applications may require an alternative technology. For such applications, several options are available that may in some cases affect superior performance in a particular operating environment.

The information that follows serves as a guide to selecting alternative components. It is not intended as a hard-and-fast set of rules. Rather, it is a set of recommendations that, if adopted, may prove more effective, depending on specific application requirements. To determine the best configuration for an application, you may need to experiment.

Sapphire Plungers

Sustained and proper operation of any pump depends on the cleanliness and smoothness of its plungers. Our Performance Maintenance strategy recommends you change sapphire plungers once a year.

The condition of an LC system's sapphire plungers is critically important to its reliable operation. We offer two types of plungers: the standard sapphire plunger and the Performance PLUS Sapphire Plunger. We make the standard plunger according to traditional processes and methods—the same processes and methods adopted by other manufacturers. Our PerformancePLUS Sapphire Plunger, however, is unique. Its crystalline structure is oriented lengthwise, rather than randomly. The effect is a harder, better-sealing surface at the circumference of the plunger and durability that extends the plunger's usable life considerably beyond that of the standard plunger.

Plunger Seals

The material out of which plunger seals are made is critical. You can obtain seals made of various materials that serve as alternatives to the recommended ones. Some of these seals improve performance in specific applications. The usable life of plunger seals is typically six months to one year. If you find that the life of your seals is shorter than six months, you might try alternative seals.

Plunger-Seal Wash

Seal-wash solvent lubricates the plungers and flushes away any solvent or dried salts forced past the plunger seal from the high-pressure side of the piston chamber. This wash cycle extends the life of the seals. Position the plunger seal-wash reservoir in a visible location above the solvent management system, and refill the reservoir, as necessary, with a solvent suited to your application.

For reversed-phase HPLC applications, use an aqueous seal-wash solution, adding enough organic content to inhibit bacterial growth. For example, depending on your application, you might use an 80:20 water/methanol or water/acetonitrile mixture. For all GPC (normal-phase) separations, use a 50:50 methanol/water mixture as the seal-wash solution.

Note: Ensure that you use separate solutions and containers for the plunger-seal wash and the needle wash for the sample-management system or autosampler. Because the functions of these solutions differ, the use of one solution for both functions may compromise the effectiveness of either needle washing or plunger-seal washing. Change plunger seal wash seals whenever you change the main plunger seals.

Check Valves

Check-valve failures can be a common cause of reproducibility problems. Check-valve failure modes, such as sticking (failure to open or close) and intermittent leaks, can cause variable retention times and pressure fluctuations. Intermittent leaks are often caused by particulate matter that sticks to the ball of the check valve. These particulates can come from the mobile phase, shredded seal material, dirty glassware, or an unclean laboratory environment.

We offer the choice of various types of check-valve cartridges. The standard cartridge incorporates a valve fitted with a ball made of synthetic ruby and a seat made of sapphire. A second option is the PerformancePLUS™ Check-valve Cartridge,* standard on 500- and 600-series pumps. Like the standard cartridge, the PerformancePLUS Cartridge incorporates a ruby ball and sapphire seat, though both are larger than those in the standard cartridge, as is the internal volume. The PerformancePLUS Cartridge also provides excellent sealing characteristics and, at higher flow rates, its larger orifices can provide a performance advantage. Finally, the PerformancePLUS Cartridge is more effective than the standard cartridge in its resistance to sticking. Nevertheless, where sticking problems associated with ruby/sapphire ball-and-seat check-valves persist, we offer a valve fitted with ceramic ball and seat.

For most applications, expect check valves to perform to specifications for a year or more. Note, however, that laboratory practices, such as solvent preparation, choice of plunger-seal material, and the mobile phase required for certain applications can significantly shorten the usable life of these valves. You can reduce or eliminate a tendency toward sticking. To do so, experiment with different ball-and-seat sizes and materials of construction. Then determine which provide optimal performance for a particular application and operating environment.

*Requires PerformancePLUS Separations Module Check Valve Housing, p/n: 700002332, 2/pk.

Common Parts for Alliance Systems

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Ordering Information

Common Parts for Alliance Systems

Description	2690/D 2695/D	2790 2795	2796	P/N
Plunger Oriented (Optional)	•	•	•	WAT271067
Assembly, Plunger (Standard)	•	•	•	WAT270959
Head, Plunger Seal Kit (Clear)	•	•	•	700001326
Head, Plunger Seals Repl. Kit (Std—Yellow)	•	•	•	WAT270938
Head, GFP Plunger Seal Kit (Optional Black)	•	•	•	WAT271066
Head, Face Seals Replacement Kit, 4/pk	•	•	•	WAT270939
Wash Tubes Seals Replacement Kit, S/W	•	•	•	WAT270940
Seal Wash Face Seal Replacement Kit	•	•	•	WAT271017
Seal Wash Plunger Seal Replacement Kit	•	•	•	WAT271018
Check Valve Cartridge Replacement Kit (2 cart.)	•	•	•	WAT270941
PerformancePLUS Check Valve Cartridge	•	•		700002399
Check Valve Cartridge	•	•		700002761
Ceramic Check Valve	•	•	•	700002333
PerformancePLUS Check Valve Housing	•	•	•	700002332
In-line Filter	•	•	•	WAT035190
Filter Insert	•	•	•	WAT088084
Assembly, GPV	•	•	•	WAT270927
Nut, Head	•	•	•	WAT270964
Degasser Chamber	•	•	•	700001218
25 µL Syringe	•	•	•	WAT077343
250 µL Syringe	•			WAT073109
500 µL Syringe		•	•	700000565

Description	2690/D 2695/D	2790 2795	2796	P/N
1000 µL Syringe		•	•	700000611
2500 µL Syringe	•	•	•	WAT077342
PerformancePLUS Needle	•			700001247
HPMV Rebuild Kit	•			WAT045424
HPMV and Seal Tool Kit	•			WAT045427
Assembly, Seal Pack Replacement Kit with Needle	•			700002791
Seal Pack Rebuild Kit with Needle	•			WAT271019
Kit, Carousel Set, 5/pk	•			WAT270328
Inject Port		•	•	700000383
Seat, Inject Port		•	•	700000384
Seal, Inject Port Washer		•	•	700000385
2790 Needle		•	•	700000389
Syringe, 100 µL		•	•	700000564
Solvent Bottle Caps, 4 L, 4/pk	•	•	•	WAT062341
Bottle Caps, 1 L, 4/pk	•	•	•	WAT062479
Sample Loop, 5 µL, PEEK			•	430000781
Sample Loop, 50 µL, PEEK			•	430000762
Sample Loop, 20 µL, PEEK			•	430000782
Sample Loop, 100 µL, PEEK			•	430000783
Sample Loop, 500 µL, PEEK			•	430000784
Sample Loop, 2 mL, PEEK			•	430000785

HPLC Pumps

Ordering Information

515 HPLC PUMP



515 Performance Maintenance Kit



Clear-100™ Plunger Seals, 4/pk



Description	P/N
515 HPLC Pump Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	WAT052587

1515 SERIES HPLC PUMP



1515 Performance Maintenance Kit



Solvent Filter



Clear-100 Plunger Seals, 4/pk



Description	P/N
1515 Series HPLC Pump Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	201000113

1525 SERIES HPLC PUMP



1525 Performance Maintenance Kit



Solvent Filter



Clear-100™ Plunger Seals, 4/pk



Description	P/N
1525 Series HPLC Pumps Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	201000114

Parts and Accessories	
1525 to 1525 Extended Flow Conversion Kit	205000324
1525 EF Performance Maintenance Kit	201000160

1525 MICRO HPLC PUMP



1525 micro Performance Maintenance Kit

Description	P/N
1525 micro HPLC Pump Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	201000161

Common Parts for HPLC Pumps

Description	515	1515 1525	1525 Micro	Extended Flow	P/N
1525 micro Seal Kit			•		205000202
Active Seal Wash Kit 1525		•			205000251
Active Seal Wash Kit 1525 EF				•	205000252
Active Seal Wash Kit 1525 micro			•		205000250
AQ Seal Repl., 2/pk	•	•			WAT025296
AQ Seal Repl., 4/pk	•	•			WAT025297
Plunger Seal UP30, 1/pk				•	700002282
Plunger Seal, TAN (Rulon)	•	•			WAT025384
Seal, Clear-100	•	•			WAT022934
Seal, Clear-100, 4/pk	•	•			WAT022946
Seal, Kit Black, Replace	•	•			WAT026613
Seals, Aqueous, Buffer, 2/pk	•	•			WAT025296
Seals, Aqueous, Buffer, 4/pk	•	•			WAT025297
1525, Check Valve, 2/pk			•		700002275
B and S Check Valve Kit				•	WAT088223
Extended Flow Update Kit	•			•	WAT207119
Inlet Check Valve				•	WAT032646
Inlet Check Valve Housing				•	WAT060308
Outlet Check Valve				•	WAT025028

Description	515	1515 1525	1525 Micro	Extended Flow	P/N
Outlet Check Valve				•	WAT025216
Outlet Check Valve Housing				•	WAT025207
Outlet Check Valve Rebuild Kit				•	WAT026014
PerformancePLUS Cartridge with Housing, 2/pk	•	•	•		700000253
PerformancePLUS Ceramic Check Valve Cartridge	•	•	•		700002399
PerformancePLUS Check Valve Cartridge	•	•	•		700000254
Plunger Wash Kit (225 µL)				•	WAT030852
Assembly, Plunger	•	•			WAS207069
Oriented Plunger, 510	•	•			WAT069511
Plunger				•	WAT060304
Retaining Ring	•	•	•	•	WAT025360
Assembly, Solvent Filter	•	•	•	•	WAT025531
Reference Valve 600/510	•	•		•	WAT026592
Reference Valve Rebuild Pump Kit	•	•	•	•	WAT025746
Safety Syringe, 10 mL	•	•	•	•	WAT027629
Priming Syringe Needle	•	•	•	•	WAT025559
Head Support Bushing	•	•	•	•	WAT060305
Ind. Rod Kit	•	•	•	•	WAT069583

Gradient Modules

Ordering Information

2545/2525 BINARY GRADIENT MODULE



2545/2525 Performance Maintenance Kit



Description	P/N
2545/2525 Binary Gradient Module Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	201000130

2545 QUATERNARY GRADIENT MODULE



2545Q Performance Maintenance Kit



Description	P/N
2545Q Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	201000199

2535 QUATERNARY GRADIENT MODULE



2535 Performance Maintenance Kit



Description	P/N
2535 QGM Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	201000209

2555 QUATERNARY GRADIENT MODULE



2555 Performance Maintenance Kit



Description	P/N
2555 QGM Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	201000210

Common Parts for Gradient Modules

	Binary	Quaternary			
Description	2545/ 2525	2535	2555	2545	P/N
Assembly, Leak Sensor		•	•	•	205000505
Plate, Head Support			•		405006414
Pump Head .395			•		405008440
Plunger C-Clip		•		•	410000570
Tubing, Mixer to Vent Valve		•	•	•	430002032
Assembly Tube, Right Transducer Outlet		•	•	•	430002121
Check Valve Cartridge Kit, 4/pk	•				700001493
Plunger Seal Kit, 4/pk	•				700001494
Assembly, Cartridge Housing Outlet		•	•	•	700001530
Assembly Housing, Inlet Check Valve		•	•	•	700001529
Outlet Pump Filter Assembly			•		700001836
Block, Stop Valve Positioning		•	•	•	700004425
Drip Tray, Leak Sensor, 2545Q, LS Ready		•	•	•	700004430

	Binary	Quaternary			
Description	2545/2525	2535	2555	2545	P/N
Inlet Manifold Block		•	•	•	700004431
Bracket Mixer Inlet, Manifold Z		•	•		700004439
Assembly, Mixer				•	700004436
Manifold Outlet Check Valve		•	•	•	700004445
Pump Head Assembly		•		•	700004454
Assembly, Tube 1/4 Solvent Inlet (from Solvent Bottle)			•	•	700004607
Assembly Pump Head Support Plate		•		•	700004613
Solvent Filters, 4/pk		•			700005083
Assembly Mixer			•		700005084
Helium Connection Kit		•	•	•	WAT023486
Assembly, Solvent Filters (Sparge)		•	•	•	WAT025531
Manifold Tee 2555Q			•		WAT070122

Fluid Handling Units

Ordering Information

600E FLUID HANDLING UNIT



600E Performance Maintenance Kit



Clear-100 Plunger Seals, 4/pk



Description	P/N
600E Fluid Handling Unit Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	WAT052675

626 LC FLUID HANDLING UNIT



626 LC Performance Maintenance Kit



Description	P/N
626 LC Fluid Handling Unit Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	WAT052673

Common Parts for HPLC Pumps

Description	Extended Flow	600	626	P/N
AQ Seal Repl., 2/pk		•		WAT025296
AQ Seal Repl., 4/pk		•		WAT025297
Plunger	•			WAT060304
Plunger Seal	•			700002282
Plunger and Wash Seal Kit (2) 626			•	WAT031790
Plunger Seal, Tan (Rulon)		•		WAT025384
Seal, Clear-100		•		WAT022934
Seal, Clear-100, 4/pk		•		WAT022946
Seal, Kit Black, Replace		•		WAT026613
Seals Aqueous, Buffer, 2/pk		•		WAT025296
Seals, Aqueous, Buffer, 4/pk		•		WAT025297
B and S Check Valve Kit		•		WAT088223
Check Valve Cartridge			•	WAT024120
Extended Flow Update Kit	•	•		WAT094003
Inlet Check Valve Assembly		•		WAT033679
Inlet Check Valve Assembly	•			WAT060307
Inlet Check Valve Housing			•	WAT030541
Inlet Housing		•		WAT025203
Inlet Rebuild Kit		•		WAT060495
Outlet Check Valve		•		WAT025028
Outlet Check Valve Assembly	•	•		WAT025216
Outlet Check Valve Housing		•		WAT025207
Outlet Check Valve Housing			•	WAT030543
Outlet Check Valve Rebuild Kit		•		WAT026014

Description	Extended Flow	600	626	P/N
PerformancePLUS Cartridge with Housing, 2/pk		•		700000253
PerformancePLUS Ceramic Check Valve Cartridge		•		700002399
PerformancePLUS Check Valve Cartridge		•		700000254
Assembly, Plunger Sapphire 1/8		•		WAT025656
Oriented Plunger, 510		•		WAT069511
Plunger with Indicator Rod			•	WAT031788
Retaining Ring		•		WAT025360
Assembly, Solvent Filter		•		WAT025531
Assembly Diffuser		•		WAT007272
Reference Valve 600/510		•		WAT026592
Kit Ref. Valve Rebuild Pump		•		WAT025746
Syringe, 10 mL Safety		•		WAT027629
Priming Syringe Needle		•		WAT025559
Head Support Bushing	•	•		WAT060305
Ind. Rod Kit	•	•		WAT069583
Fuse, 4A, 125 V, 5/pk		•		WAT055631
Fuse, 5A			•	WAT163-18
Fuse, 0.5A, 5/pk		•	•	WAT022628
Fuse, 1.5A, 250 V, 5/pk		•	•	WAT055632
Fuse, 1.25A, 250 V, 5/pk		•	•	WAT055633
Fuse, 0.8A Slo-Blo, 5/pk		•	•	WAT055629
Fuse, 0.25A Slo-Blo for Wash Pump, 5/pk		•	•	WAT042200

REAGENT MANAGER



Description	P/N
Reagent Manager Performance Maintenance Kit PM Kit consists of: Plungers, Check Valves, Seals, and Filters	201000102
Parts and Accessories	
EZ Grip Nut, 3/pk	700000146
EZ Grip Ferrule, 3/pk	700000145

Tools

Description	P/N
Capillary Tubing Cutter	605000101
PEEK Tubing Cutter	700001012
Collet and Compression Screw Multi-tool	700003170
3/16 in. Open End Wrench	700000610
Plunger Insertion Tool	WAT011042
Snap Ring Pliers	WAT025263
Tubing Cutter for 1/16 in. Stainless Steel Tubing	WAT022384
Tubing Cutter, Spare Blades, 3/pk	WAT022385
Hex Key for 2465 Flow Cell Assembly	700001985

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Injectors/Fraction Collectors

717plus AutoSampler



Description	P/N
717plus AutoSampler Performance Maintenance Kit PM Kit consists of: Syringe (250 µL), Needle, and Filter	WAT052669
Parts and Accessories	
HP Valve Rebuild Kit	WAT045424
Syringe, 25 µL	WAT077343
Syringe, 250 µL	WAT073109
Syringe, 2500 µL	WAT077342
48-vial Carousel	WAT078723
96-vial Carousel	WAT078727

2777/2777C Sample Manager

2777C Sample Manager





2777 Sample Manager

Description	P/N
2777/2777C Sample Manager Performance Maintenance Kit PM Kit consists of: Tension Cord and Lubrication Kit	201000162
Rotors List Associated with the Valco Valves	
Rotor 10 Port 2 Pos 0.4 mm Cheminert Valve	700001230
Rotor 6 Port 2 Pos 0.4 mm LC Injection Valve	700002210
Rotor 6 Port 2 Pos 0.4 mm Cheminert	700002292
Rotor 6 Port 2 Pos 0.25 mm Cheminert	700002293
Rotor 10 Port 2 Pos 0.4 mm LC Injection Valve	700002297
Rotor 4 Port 2 Pos 0.5 µL Internal Loop LC Injection Valve	700002298
Rotor 6 Port 2 Pos 0.75 mm Cheminert	700002439

Note: These rotors are not included in the PM Kit; must be ordered separately based on the type of valve.

2707 AutoSampler



2707 Performance Maintenance Kit



Description	P/N
2707 Performance Maintenance Kit PM Kit consists of: Syringe (500 µL), Needle, and Rotor Seal	201000196
2707 Prep Performance Maintenance Kit PM kit consists of: Syringe (2500 µL), Prep Needle, and Rotor Seal	201000306
Parts and Accessories	
Stainless Steel Sample Loop, 20 µL	700000680
Stainless Steel Sample Loop, 5 µL	700000683
Bio-compatible Sample Loop, 100 µL	700000684
Stainless Steel Sample Loop, 100 µL	700000685
Wash Bottle, Glass, 250 mL	700004063
Stainless Steel Sample Loop, 10 µL	700003872
Air Needles, 50 mm, Yellow	700003921
Air Needles, 56 mm, Red	700003922
Air Needles, 68 mm, Blue	700003923
Air Needles, 74 mm, Green	700003924
Air Needles, 80 mm, Black	700003925
Stainless Steel Sample Loop, 50 µL	700003928
Preparative Sample Loop	700004086
Bio-compatible Sample Loop, 10 µL	700004088
Bio-compatible Sample Loop, 20 µL	700004089
Bio-compatible Sample Loop, 50 µL	700004090
Syringe, 500 µL	700000862
Needle Assy, Std	700003842
Needle Assy, Bio	700003843
Rotor Seal	700003851
Stator	700003852
Bottle, Wash Solvent, 250 mL, Glass	700004063
Vial Holder Tray, 12 pos., 10 mL	700004082
Needle Assy, 60 µL, Prep	700004085

2747 AutoSampler



2747 Performance Maintenance Kit



Description	P/N
2747 AutoSampler Performance Maintenance Kit PM Kit consists of: Syringe 1 mL, Probe, and Lubrication Kit	201000132

2767 AutoSampler



2767 Performance Maintenance Kit



Description	P/N
2767 AutoSampler Performance Maintenance Kit PM Kit consists of: Probe, Injector Port, and Rotors	201000195

Syringes to complement the 2767 AutoSampler Performance Maintenance Kit:	
10 mL Reagent Syringe	700000471
500 µL Reagent Syringe	WAT272080
1.0 mL Reagent Syringe	WAT272617
2.5 mL Reagent Syringe	WAT272620
5.0 mL Reagent Syringe	WAT272623

2757 Sample Manager/Fraction Collector



Description	P/N
96-well Microtiter Plate Holder Kit	205000105
4 mL Vial Holder Plate Kit	205000106
2 mL Vial Holder Plate Kit	205000107
13 mm Tube Holder Kit	205000108
Open Access 2 mL Vial Holder Kit	205000109
Open Access 4 mL Vial Holder Kit	205000112
Fraction Collector 18 mm Rack Kit	205000115
Fraction Collector 13 mm Rack Kit	205000116
Fraction Collector 16 mm Rack Kit	205000117
Fraction Collector 25 mm Rack Kit	205000118
Fraction Collector 28 mm Rack Kit	205000119
Deepwell Plate Fraction Collector Rack Kit	205000134

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Waters Fraction Collector III



Description	P/N
Tabletop Rack (for use with prep funnel rack)	289000440
Prep Funnel (32 position, 2 each set)	725000106
Prep Funnel Rack (holds up to 4 prep funnels)	725000107
4-Microtiter Plate Rack	725000110
Multi-purpose Rack	725000113
Carousel Rack (2 × 2690 Carousels)	725000144
Eppendorf Tube Collection Rack	725000145
17 mm O.D. Vial Collection Rack	725000146
28 mm O.D. Vial Collection Rack	725000147
Standard Test Tube Rack, 120 positions	725000152
Tygon Tubing, 6.35 mm I.D. × 9.52 mm O.D. × 5 m, 2/pk (use with prep funnel rack)	WAT037047
Teflon Tubing 8 mm I.D. × 50 ft. (for use with prep funnel rack)	WAT037090

Manual Injectors

7725 Analytical Injector Performance Maintenance Kit



Description	P/N
3725 High Pressure Manual Valve Performance Maintenance Kit	201000116
7010 Analytical Injector Performance Maintenance Kit	201000117
7125 Sample Injector Performance Maintenance Kit	201000118
7725 Analytical Injector Performance Maintenance Kit	201000119
8125 Micro-scale Injector Performance Maintenance Kit	201000120
9125 PEEK Valve Performance Maintenance Kit	201000121
7750E Stainless Steel Switching Platform Performance Maintenance Kit	201000122
7750E-075 Motorized Sample Injector Performance Maintenance Kit	201000125

Waters Quality Parts and Performance Maintenance Kits

We design and manufacture Waters Quality Parts and Performance Maintenance Kits according to demanding Waters Critical Clean™ processes. The same strict regulatory standards (ISO-9001 and cGMP) that we apply when manufacturing your high-performance systems apply to Waters Critical Clean processes. This unrelenting focus on quality confers these benefits:

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2487 Dual-Wavelength Absorbance Detector



2487 Performance Maintenance Kit



Description	P/N
2487 Absorbance Detector Performance Maintenance Kit PM Kit consists of: PerformancePLUS Deuterium Lamp	WAS081142
Parts and Accessories	
Fuse, Lamp Power Supply, 2A micro (F1 and F2 on CPU)	WAS290423
Flow Cell Rebuild Kit, 10 mm	WAS081346
2487 Microbore Taper Slit Flow Cell	WAT081159
2487 High Pressure Taper Slit Flow Cell	WAT081321
2487 Semi-prep Taper Slit Flow Cell	WAT081158
2487 Inert Taper Slit Flow Cell	WAT081157
2487 AutoPurification Flow Cell	289000614
2487 Variable Path Length Flow Cell	700000923

2489 UV/Visible Dual-Wavelength Absorbance Detector

2489 Performance Maintenance Kit



Description	P/N
ACQUITY PDA/TUV 2489/2998 Performance Maintenance Kit PM Kit consists of: PerformancePLUS Deuterium Lamp	201000281
Parts and Accessories	
Autopure Flow Cell	289000614
Analytical Flow Cell	WAS081140
Inert Taper Slit Flow Cell	WAT081157
Semi-prep Flow Cell	WAT081158
Microbore Flow Cell	WAT081159
High Pressure Flow Cell	WAT081321
MS Flow Cell Rebuild Kit	700000168
10 mm Flow Cell Rebuild Kit	WAS081346
3 mm Flow Cell Rebuild Kit	WAS081347
I/O Connector, 10 Pin	323000247
Assembly, Cable, Ethernet, 10 ft. Straight Through	441000372
Ethernet 10 ft. Crossover Cable	700003423
Cuvette Holder Assembly	WAS081333
Gasket Kit, 10/pk	WAS081348
10 mm Cell, Linearity Solutions	WAT042881
Wavelength Accuracy Solutions	WAT042885
PQ Test Mix for Absorbance Detector	WAT042887
Two Cuvette Kit (empty)	700004155
Fuse, 3.25A, 250 V 5 × 20 mm, Fast-acting, 5/pk	700001800
Analog Out Cable Assembly	WAT057235
Power Cord, 110 V	442000176

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2996 Photodiode Array Detector (PDA)



2996 Performance Maintenance Kit



Description	P/N
2996 Photodiode Array Detector Performance Maintenance Kit PM Kit consists of: PerformancePLUS Deuterium Lamp	WAT052586

Parts and Accessories	
Fuse, 4A	WAT057337
Analytical High Pressure Flow Cell Assembly, 10 mm	WAT057460
Analytical Flow Cell Assembly, 10 mm	WAT057919
Inert Titanium Flow Cell Assembly, 10 mm	WAT057461
Microbore Flow Cell Assembly, 3 mm	WAT057462
Semi-prep Flow Cell Assembly, 3 mm	WAT057463
100 µm Aperture (Slit) Assembly	WAT057921
50 µm Aperture (Slit) Assembly	WAT057920

2414 Refractive Index Detector

Description	P/N
2414 Valve Upgrade Kit	700002670
Sample Inlet Tubing Assembly	700001710
Compression Screws and Ferrules Kit, 5/pk	WAT025604
Stainless Steel Tubing, 0.062 in. × .040 in. I.D. × 10 ft.	WAT026805
Stainless Steel Tubing, 0.062 in. × .009 in. I.D. × 10 ft.	WAT026973
Analog Signal Cable	WAT057235
IEEE-488 Cable 6 ft. (2 meter)	WAT087141
Power Cord, 110 V	442000176
I/O Connector Plug, 12 Pin	WAT270868

2998 Photodiode Array Detector (PDA)

2998 Performance Maintenance Kit



Description	P/N
ACQUITY PDA/TUV 2489/2998 Performance Maintenance Kit	201000281

Parts and Accessories	
2998 Analytical Flow Cell Kit	205000399
2998 Microbore Flow Cell Kit	205000400
2998 Semi-prep Flow Cell Kit	205000401
2998 AutoPurification Flow Cell Kit	205000402
Fuse, 3.15A, 250 V, 5 × 20 mm Fast Acting, 2/pk	700001800
Connector Plug, 10-Position	323000247
Connector Shell Cover	323000446
Ethernet Patch Cord, Shielded, 10 ft.	441000372
Event Cable, 6 ft.	441000373
Crossover Cable, 5E, 10 ft., Ethernet	700003423
Tubing, 3/8 in. O.D. × 1/4 in. I.D., Tygon	700001796
Cable, Assembly, Shield, Analog Output Signal Cable	WAT057235
PEEK Compression Fitting	WAT021815
Knob, Compression Fitting	WAT021816
Convoluted Tubing	430001556

2424/2420 Evaporative Light Scattering (ELS) Detector

2424/2420 Performance Maintenance Kit



Description	P/N
2424/2420 ELS Detector Performance Maintenance Kit PM Kit consists of: PerformancePLUS Lamp Cartridge Assembly	201000159

Parts and Accessories	
Drip Tray	415000415
Vapor Trap (10 mm O.D. Bottle Trap)	700000574

2465 Electrochemical Detector



Description	P/N
Flow Cell Kit: 0.7 mm GC Working Electrode, Salt Bridge Reference Electrode	205004100
Flow Cell Kit: 2 mm GC Working Electrode, Salt Bridge Reference Electrode	205004115
Flow Cell Kit: 2 mm GC Working Electrode, ISAAC Reference Electrode	205004215
Flow Cell Kit: 3 mm Pt Working Electrode, ISAAC Reference Electrode	205004220
Flow Cell Kit: 3 mm AU Working Electrode, "HyREF" Reference Electrode	205004325
Flow Cell Kit: 3 mm Ag Working Electrode, "HyREF" Reference Electrode	205004330
Fuse, 5 × 20, 2.5A, T 250 V	700001004
RS-232 Cable	700001942
Dummy Flow Cell	700001943
External I/O Cable	700001948
ISAAC Solution, 10 mL	700001949
Fingertight Flow Cell Fitting	700001950
Spacer, 120 µm	700001951
Spacer, 25 µm	700001952
Spacer, 50 µm	700001953
Polishing Disk, Work Electrode	700001954
Diamond Slurry, 1 µm, 10 mL	700001955
Swivel, 2465 Salt Bridge Reference Electrode	700001956
Body, 2465 Salt Bridge Reference Electrode	700001957
Salt Bridge Ag/AgCl Reference Electrode	700001958
KCl Solution for Salt Bridge Ref (50 mL)	700001959
Working Electrode Block, 2 mm GC	700001960
Working Electrode Block, 3 mm, Platinum	700001961
Working Electrode Block, 3 mm, Gold	700001962
Working Electrode Block, 2 mm, Silver	700001963
Salt Bridge Inlet Block	700001964
HyREF Inlet Block	700001965
Cell Cable	700001968
2465 Integrator Cable	700001994
2465 ISAAC Inlet Block	700002003
Polishing Disk, Reference Electrode	700002069
Capillary Connection Kit for Micro Cell	700002103

2475 Multi-Wavelength Fluorescence Detector

2475 Performance Maintenance Kit



Description	P/N
2475 Multi-wavelength Fluorescence Detector PM Kit consists of: Xenon Lamp Assembly	201000131
Parts and Accessories	
Fuse, 4A SMD with Holder, 2/pk	700001840
Flow Cell	700001618

NEW 2432 Conductivity Detector

Description	P/N
Assembly, Cell 2432	700011185
Inlet tube, 2432	700011137
Outlet Tube, 2432	700011186

432 Conductivity Detector



Description	P/N
Compression Screws and Ferrules, 5/pk	WAT025604
432 Flow Cell	WAT043069
Power Cord	442000176
Union	WAT097332

Quadrupole Time-of-Flight Mass Spectrometers



NEW Vion IMS Q-Tof

Description	P/N
Vion™ IMS QTof™ Performance Maintenance Kit PM Kit consists of: Source Components, ESI and Reference Probe Components	201000307

Parts and Accessories	
IonSABRE II Service Kit	700005744
APGC Service Kit	700004842



SYNAPT G2-S and SYNAPT G2-S*i*

Description		P/N
SYNAPT G2-S/G2-S*i* LockSpray (Rotary) Performance Maintenance Kit	PM Kits consist of: Source Components, ESI and Reference Probe Components, and Vacuum Pump Components	201000254
SYNAPT G2-S/G2-S*i* LockSpray (Scroll) Performance Maintenance Kit		201000255
SYNAPT G2-S/G2-S*i* NanoLockSpray (Rotary) Performance Maintenance Kit		201000256
SYNAPT G2-S/G2-S*i* NanoLockSpray (Scroll) Performance Maintenance Kit		201000257

Parts and Accessories	
Outer APPI Source Service Kit	700004730
IonSABRE II Service Kit	700005744
APGC Service Kit	700004842
ETD Service Kit	700005276
MALDI Service Kit	700005275



SYNAPT G2

Description		P/N
SYNAPT G2 LockSpray Performance Maintenance Kit	PM Kits consist of: Source Components, ESI and Reference Probe Components, and Vacuum Pump Components	201000229
SYNAPT G2 NanoLockSpray Performance Maintenance Kit		201000230

Parts and Accessories	
Outer APPI Source Service Kit	700004730
APCI Probe Service Kit	700004673
APGC Service Kit	700004842
ETD Service Kit	700005276
MALDI Service Kit	700005275



SYNAPT MS/HDMS

Description	P/N
SYNAPT MS/HDMS Performance Maintenance Kit PM Kit consists of: Source Components, ESI and Reference Probe Components, and Vacuum Pump Components	201000187



Xevo G2-XS QTof and Xevo G2-S QTof

Description		P/N
Xevo G2-S LS (Rotary) Performance Maintenance Kit	PM Kit consists of: Source Components, ESI and Reference Probe Components, and Vacuum Pump Components	201000276
Xevo G2-S LS (Scroll) Performance Maintenance Kit		201000277
Xevo G2-S NLS (Rotary) Performance Maintenance Kit		201000278
Xevo G2-S NLS (Scroll) Performance Maintenance Kit		201000279
Parts and Accessories		
Xevo G2-S ASAP Accessory		176002472
Outer APPI Source Service Kit		700004730
APCI Probe Service Kit		700004673
APGC Service Kit		700004842



Xevo G2 QTof

Description		P/N
Xevo G2 QTof LS (Rotary) Performance Maintenance Kit	PM Kits consist of: Source Components, ESI and Reference Probe Components, and Vacuum Pump Components	201000238
Xevo G2 QTof LS (Scroll) Performance Maintenance Kit		201000239
Xevo G2 QTof NLS (Rotary) Performance Maintenance Kit		201000240
Xevo G2 QTof NLS (Scroll) Performance Maintenance Kit		201000241
Parts and Accessories		
Xevo G2 QTof ASAP Accessory		176002472
Outer APPI Source Service Kit		700004730
APCI Probe Service Kit		700004673
APGC Service Kit		700004842



Xevo QTof

Description		P/N
Xevo QTof LS (Rotary) Performance Maintenance Kit	PM Kits consist of: Source Components, ESI and Reference Probe Components, and Vacuum Pump Components	201000203
Xevo QTof LS (Scroll) Performance Maintenance Kit		201000204
Xevo QTof NLS (Rotary) Performance Maintenance Kit		201000205
Xevo QTof NLS (Scroll) Performance Maintenance Kit		201000206
Parts and Accessories		
Outer APPI Source Service Kit		700004730
APCI Probe Service Kit		700004673
APGC Service Kit		700004842



Q-Tof Premier

Description		P/N
Q-Tof Premier™ Performance Maintenance Kit	PM Kits consist of: Source Components, ESI and Reference Probe Components, and Vacuum Pump Components	201000187
Q-Tof Premier MALDI Performance Maintenance Kit		201000187

Tandem Quadrupole Mass Spectrometers



Xevo TQ-XS

Description		P/N
Xevo TQ-XS Performance Maintenance Kit with Chemical Kit	PM Kit consists of: Source Components	176004023

Parts and Accessories	
ESI Probe Assembly, 500 LG × 125 µm	700011241
ESI Probe Assembly, 750 LG × 125 µm	700011242
APCI Probe Assembly, 500 LG × 125 µm	700011244
APCI Probe Assembly, 750 LG × 125 µm	700011245



Xevo TQ-S

Description		P/N
Xevo TQ-S (Rotary) Performance Maintenance Kit with Chemical Kit	PM Kits consist of: Source Components, ESI Probe Components, and Vacuum Pump Components	176002745
Xevo TQ-S (Scroll) Performance Maintenance Kit with Chemical Kit		176002744

Parts and Accessories	
Xevo TQ-S ASAP Accessory	176002472
Outer APPI Source Service Kit	700004730
IonSABRE II Service Kit	700005744
APGC Service Kit	700004842



Xevo TQ-S Micro

Description		P/N
Xevo TQ-S Micro (Rotary) Performance Maintenance Kit with Chemical Kit	PM Kits consist of: Source Components, ESI Probe Components, and Vacuum Pump Components	176003850
Xevo TQ-S Micro (Scroll) Performance Maintenance Kit with Chemical Kit		176003851

Parts and Accessories	
Xevo TQ-S Micro ASAP Accessory	176002472
IonSABRE II Service Kit	700005744
Outer APPI Source Service Kit	700004730
APGC Service Kit	700004842



Xevo TQD

Description		P/N
Xevo TQD (Rotary) Performance Maintenance Kit with Chemical Kit	PM Kits consist of: Source Components, ESI Probe Components, and Vacuum Pump Components	176002780
Xevo TQD (Scroll) Performance Maintenance Kit with Chemical Kit		176002781

Parts and Accessories	
Xevo TQD ASAP Accessory	176002472
IonSABRE II Service Kit	700005744
Outer APPI Source Service Kit	700004730
APGC Service Kit	700004842



Xevo TQ

Description		P/N
Xevo TQ (Rotary) Performance Maintenance Kit with Chemical Kit	PM Kits consist of: Source Components, ESI Probe Components, and Vacuum Pump Components	176002058
Xevo TQ (Scroll) Performance Maintenance Kit with Chemical Kit		176002059

Parts and Accessories	
APCI Probe Service Kit	700004673
Outer APPI Source Service Kit	700004730
APGC Service Kit	700004842



TQ Detector (TQD)

Description		P/N
TQD (Rotary)Performance Maintenance Kit with Chemical Kit	PM Kits consist of: Source Components, ESI Probe Components, and Vacuum Pump Components	176002064
TQD (Oil Free)Performance Maintenance Kit with Chemical Kit		176002135

Parts and Accessories	
SQD/TQD ASAP Accessory	176002049



Quattro Premier/Premier XE

Description		P/N
Quattro Premier™ (Rotary) Mass Spectrometer Performance Maintenance Kit with Chemical Kit	PM Kits consist of: Source Components, ESI Probe Components, and Vacuum Pump Components	176002053
Quattro Premier (Scroll) Mass Spectrometer Performance Maintenance Kit with Chemical Kit		176002054

Parts and Accessories	
IonSABRE APci Probe	M956335DC1
IonSABRE Spare Parts Kit	M956335DC2
MUX 4/5 Parts Kit	201000149
APCI Probe Parts Kit	700000338

Quattro micro GC



Description	P/N
Quattro micro GC Mass Spectrometer Performance Maintenance Kit PM Kit consists of: Source Components, and Vacuum Pump Components	201000170

Quattro micro



Description	P/N
Quattro micro™ Mass Spectrometer Performance Maintenance Kit with Chemical Kit PM Kit consists of: Source Components, and Vacuum Pump Components	176002050

Parts and Accessories	
MUX 4/5 Parts Kit	201000149

Atmospheric Solids Analysis Probe (ASAP)

INCREASE WATERS LC AND MS SYSTEM PERFORMANCE WITH COST-EFFECTIVE UPGRADES

You can extend you laboratory's sample-analysis capabilities and flexibility by fitting certain Waters SYNAPT, Xevo, SQD, and TQD Mass Spectrometers with the Atmospheric Solids Analysis Probe. When installed in the following instruments, the probe enables rapid, direct analyses of volatile and semi-volatile solid and liquid samples:

- Xevo TQ-S
- Xevo TQ-S micro
- SYNAPT G2-Si
- Xevo G2 Tof/QTof
- Xevo G2-S Tof/QTof
- Xevo G2-XS Tof/QTof
- Xevo TQD/SQ Detector 2
- SQD/TQD Instruments



Owing to the game-changing nature of ASAP, these instruments can now perform analyses that they previously could not. For a relatively low cost, ASAP increases asset utilization and provides optimum productivity.

The ASAP technique proves a good alternative to analyses that rely on an EI/CI solids probe, doing so without the need of a vacuum lock. The technique offers these additional benefits:

- High-sensitivity analysis of low-polarity or nonpolar compounds unable to be ionized by ESI, APCI, or APPI
- Direct analysis of complex mixtures—no need for sample preparation or chromatographic separation

Description	P/N
SQD/TQD/3100 ASAP Accessory	176002049
SYNAPT G2-Si, Xevo G2 Tof/QTof, Xevo G2-S Tof/QTof, Xevo G2-XS Tof/QTof, and ASAP Accessory	176002472
Xevo TQD, Xevo TQ-S, Xevo TQ-S micro, SQD Detector 2 ASAP Accessory	176003243

Single Quadrupole Mass Spectrometers



SQ Detector2

Description		P/N
SQ Detector 2 (Rotary) Performance Maintenance Kit with Chemical Kit	PM Kits consist of: Source Components, ESI Probe Components, and Vacuum Pump Components	176002780
SQ Detector 2 (Scroll) Performance Maintenance Kit with Chemical Kit		176002781

Parts and Accessories	
Xevo TQD ASAP Accessory	176002472
IonSABRE II Service Kit	700005744
Outer APPI Source Service Kit	700004730
APGC Service Kit	700004842



SQ Mass Detector

Description		P/N
SQD (Rotary) Performance Maintenance Kit with Chemical Kit	PM Kits consist of: Source Components, ESI Probe Components, and Vacuum Pump Components	176002064
SQD (Oil-free) Performance Maintenance Kit with Chemical Kit		176002135

Parts and Accessories	
SQD/TQD/3100 ASAP Accessory	176002049



3100 Mass Detector

Description		P/N
3100 (Rotary) Performance Maintenance Kit with Chemical Kit	PM Kits consist of: Source Components, ESI Probe Components, and Vacuum Pump Components	176002064
3100 (Oil-free) Performance Maintenance Kit with Chemical Kit		176002135



ZQ Mass Spectrometer

Description	P/N
ZQ Mass Spectrometer Performance Maintenance Kit with Chemical Kit PM Kit consists of: Source Components, ESI Probe Components, and Vacuum Pump Components	176002050

Parts and Accessories	
APCI Probe Spare Parts Kit	700000338

Time-of-Flight (Tof) Mass Spectrometers



Xevo G2-XS Tof and Xevo G2-S Tof

Description		P/N
Xevo G2-S LS (Rotary) Performance Maintenance Kit	PM Kits consist of: Source Components, ESI and Reference Probe Components, and Vacuum Pump Components	201000276
Xevo G2-S LS (Scroll) Performance Maintenance Kit		201000277
Xevo G2-S NLS (Rotary) Performance Maintenance Kit		201000278
Xevo G2-S NLS (Scroll) Performance Maintenance Kit		201000279
Parts and Accessories		
Xevo G2-S ASAP Accessory		176002472
Outer APPI Source Service Kit		700004730
APCI Probe Service Kit		700004673
APGC Service Kit		700004842



Xevo G2 Tof

Description		P/N
Xevo G2 Tof LS (Rotary) Performance Maintenance Kit	PM Kits consist of: Source Components, ESI and Reference Probe Components, and Vacuum Pump Components	201000238
Xevo G2 Tof LS (Scroll) Performance Maintenance Kit		201000239
Xevo G2 Tof NLS (Rotary) Performance Maintenance Kit		201000240
Xevo G2 Tof NLS (Scroll) Performance Maintenance Kit		201000241
Parts and Accessories		
Xevo G2 Tof ASAP Accessory		176002472
Outer APPI Source Service Kit		700004730
APCI Probe Service Kit		700004673
APGC Service Kit		700004842



LCT Premier/LCT Premier XE

Description		P/N
LCT P/XE (Rotary) Performance Maintenance Kit with Chemical Kit	PM Kits consist of: Source Components, ESI and Reference Probe Components, and Vacuum Pump Components	176002060
LCT P/XE (Scroll) Performance Maintenance Kit with Chemical Kit		176002061
Parts and Accessories		
IonSABRE APCI Probe		M956513DC1-S
IonSABRE Spare Parts Kit		700003731
MUX 4/5 Parts Kit		201000149



GCT Premier

Description	P/N
GCT Premier™ Mass Spectrometer Performance Maintenance Kit PM Kit consists of: Source Components and Vacuum Pump Components	201000188
Parts and Accessories	
Field Ionization/Field Desorption Source Performance Maintenance Kit for GCT Premier	201000189

Magnetic Sector Mass Spectrometer



AutoSpec/Auto Spec Premier

Description		P/N
AutoSpec Premier Mass Spectrometer Base Performance Maintenance Kit (Rotary)	PM Kits consist of: Vacuum Pump Maintenance Components	201000245
AutoSpec Premier Mass Spectrometer Base Performance Maintenance Kit (Scroll)		201000246
Parts and Accessories		
Electron Impact (EI) Source PM Kit for AutoSpec		201000152
Chemical Ionization (CI) Source PM Kit for AutoSpec		201000151
Alternate CI/EI (ACE) Source PM Kit for AutoSpec		201000153
Field Desorption (FD) Source PM Kit for AutoSpec		201000155
LSIMS/CS Gun Source PM Kit for AutoSpec		201000150
Outer Source Service Kit		700005589
Lock, Probe, and Valves Service Kit		700005590
GC Interface Service Kit		700005591

Column and Cartridge Fittings and Accessories

ACQUITY UPLC Column In-Line Filter Unit



Description	P/N
In-line Filter Holder and six 0.2 µm Stainless Steel Replacement Filters	205000343
Five 0.2 µm Stainless Steel Replacement Filters and End Nuts for 205000343	700002775

ACQUITY UPLC Column Replacement Parts



Description	P/N
Three 0.2 µm Inlet/Outlet Frits for 2.1 mm I.D. UPLC Columns	700003776
Three 0.2 µm Inlet/Outlet Frits for 1.0 mm I.D. UPLC Columns	700003775
One Inlet End Nut for 2.1 mm I.D. UPLC Column	700003779
One Outlet End Nut for 2.1 mm I.D. UPLC Column	700003780

End Connector Kit (End-Fittings for Cartridge Columns)



Description	P/N
End Connector Kit (contains 1 Pair of End-fittings, C-clips and Coupling)	WAT037525
Replacement O-ring, 2/pk	WAT023401
Replacement C-clip, 1/pk	WAT037560

Replacement Filter Assemblies for Columns



Description	Porosity	P/N
2.1 mm	2 µm	600000177
2.1 mm	0.5 µm	600000178
3.0, 3.9, 4.6 mm	2 µm	600000179
3.0, 3.9, 4.6 mm	0.5 µm	600000180
7.8 mm	2 µm	600000181
7.8 mm	5 µm	600000182
19 mm	2 µm	600000183
30 mm	2 µm	600000184

Parker-Style Cartridge Fittings and Accessories

You can use the end-fittings and accessories shown in the following table with these cartridge sizes:

- 46 mm (I.D.)
- 40 mm (I.D.)
- 30 mm (I.D.)

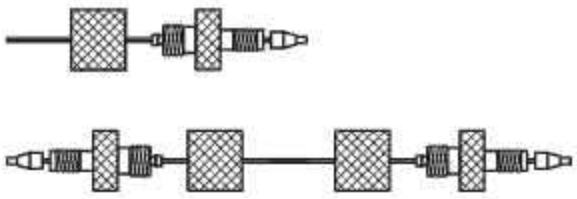


Description	P/N
Removable Column End-fitting, 2/pk	PSS614100
Frit Assembly (2 µm), 5/pk	PSS614103
Frit Assembly (0.5 µm), 5/pk	PSS614104
Column Coupler, 2/pk	PSS614102
Extended End-fitting for use with 10 mm Integral Guard, 1/pk	PSS614108
Nylon Column Plugs for Storage of Complete Column, 1/pk	WAT015674
Nylon Column Caps for Storage of Replacement Cartridge Column, 10/pk	PSS614113
In-line 10 mm Guard Cartridge Holder Kit for use with above items	PSS830008

[1] 30 mm Stand Alone Guard/Column (end-fittings not included).
[2] Extended end-fitting for use with 10 mm Integral Guard, p/n: PSS614108.
[3] 10 mm Integral Guard Column.
[4] Column Coupler, p/n: PSS614102.

SLIPFREE Connectors

Generation HPLC Column Connector



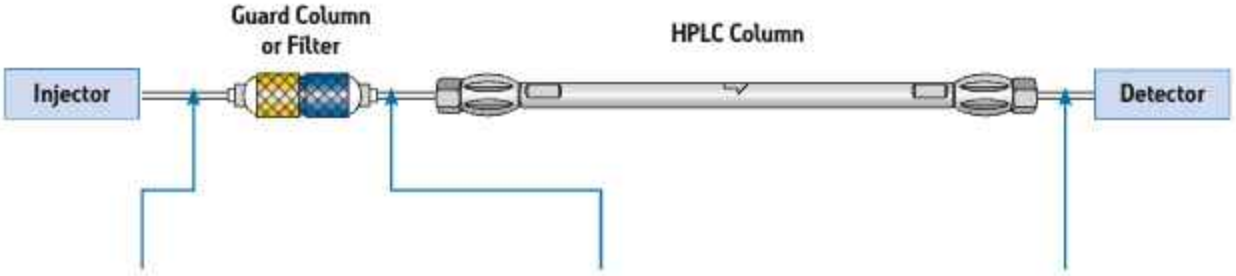
- Guarantees a void-free connection because it pushes tubing into the end-fitting (the connector is installed on the tubing at the factory)
- Fingertight to 10,000 psi—never need wrenches
- Readjusts to all column end-fittings; compatible with all tested commercially available end-fittings
- Stainless steel tread, for good stability and no particle generation
- Unique design separates tube-holding function from sealing function

SLIPFREE Fittings	P/N
Single SLIPFREE, 6 cm Long, 0.005 in. I.D.	PSL618000
Single SLIPFREE, 20 cm Long, 0.005 in. I.D.	PSL618004
Single SLIPFREE, 6 cm Long, 0.010 in. I.D.	PSL618006
Single SLIPFREE, 10 cm Long, 0.010 in. I.D.	PSL618008
Single SLIPFREE, 20 cm Long, 0.010 in. I.D.	PSL618010
Double SLIPFREE, 6 cm Long, 0.005 in. I.D.	PSL618001
Double SLIPFREE, 10 cm Long, 0.005 in. I.D.	PSL618003
Double SLIPFREE, 20 cm Long, 0.005 in. I.D.	PSL618005
Double SLIPFREE, 6 cm Long, 0.010 in. I.D.	PSL618007
Double SLIPFREE, 10 cm Long, 0.010 in. I.D.	PSL618009
Double SLIPFREE, 20 cm Long, 0.010 in. I.D.	PSL618011

0.010 in. I.D. is recommended for routine work.
0.005 in. I.D. is recommended for column connection to short 4.6 mm I.D. and for small-bore or microbore connections.
0.020 in. I.D. is recommended for prep or semi-prep connections, or for connections ahead of the injector.

How to Use a SLIPFREE Connector

Place a SLIPFREE Connector at any location in an HPLC system where connections must be made or broken frequently Install a single SLIPFREE Connector at the injector or at any other fitting with conventional nuts and ferrules that would require infrequent removal. Install a double SLIPFREE Connector for column coupling or places where both ends of the connector must be loosened frequently.



Single SLIPFREE (length as needed)

The connecting end of a single SLIPFREE Connector should be placed where connections and disconnections will be made frequently, for example, the end-fitting of a column or detector. In the image, the other end-fitting is seated within the injector, held in place by a stainless steel nut and ferrule compatible with the injector brand.

Double SLIPFREE (60 mm length)

Place a double SLIPFREE Connector where you will make frequent connections and disconnections at both ends of the connector, for example, between an analytical column and guard column. Very short (6 cm) connectors of small inner diameter are available, to minimize resultant dead-volume. SLIPFREE Connectors fit the end-fitting of any column, regardless of its manufacturer.

Single SLIPFREE (length as needed)

Place the connecting end of a single SLIPFREE Connector where you will frequently make connections and disconnections, for example, the end-fitting of a column or detector. In the image, the other end of the tubing is seated within the detector, held in place by a stainless steel nut and ferrule compatible with the detector brand. If there is not a convenient way to connect to the detector, you can attach a union.

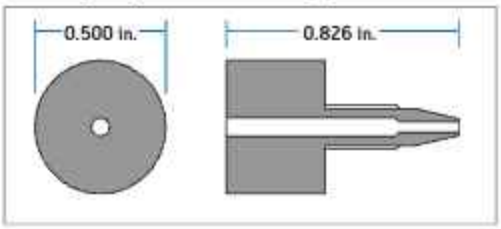
PEEK Tubing and Fittings

PEEK One-Piece Fingertight Fitting, 1/16-inch, 10–32 Thread

For the most demanding applications, we recommend the high-performance fingertight HPLC fitting. Nut and ferrule are made from a single piece of PEEK, which helps the fitting remain leak-tight at pressures as high as 6000 psi (420 bar). With the knurled head of the nut increased in diameter, to facilitate tightening without tools, it's nonetheless a genuine fingertight.

Description	P/N
PEEK Fingertight One-piece Fitting	186008714

PEEK Fingertight One-Piece Fitting

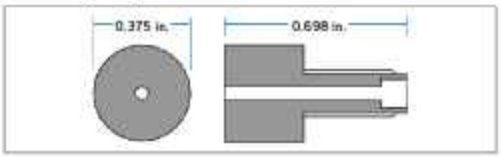


PEEK Two-Piece Fingertight Fittings, 1/16-inch, 10–32 Thread

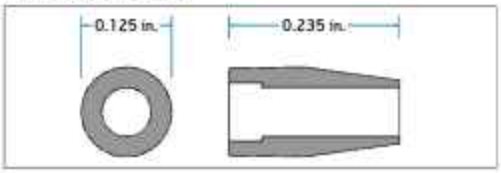
Two-piece fingertight fittings, with a pressure rating of 4000 psi (280 bar), allow connections by hand. The inexpensive PEEK ferrules resist wear and deformation, lasting for at least 50 connections and disconnections before they require replacement. The nuts can be reused repeatedly. Chemically inert to a high degree, the PEEK ferrule can be used with any mobile phase. This fitting provides an inexpensive alternative to traditional HPLC fittings. It fits almost all HPLC fittings, including Swagelok, Parker, Rheodyne, Beckman, Valco, Waters, etc.—all with 10–32 female threads.

Description	P/N
PEEK Single Ferrule	PSL613316

PEEK Fingertight Two-Piece Nut



PEEK Single Ferrule



PEEK Fittings with Double Ferrules, 1/16-inch, 10–32 Thread

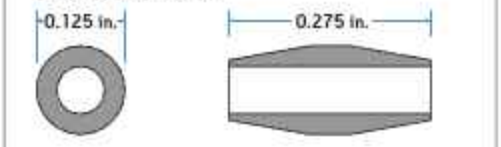
Double-ferrule fittings made of PEEK grip tubing in two places. The ferrules provide twice the holding power of single-ferrule fittings. They are ideal for use with PEEK and Tefzel tubing, which often slip when used with single-ferrule fittings. When used with stainless steel or titanium tubing, double-ferrule fittings grip tighter, creating a highly reliable connection that performs flawlessly at high pressures.

We offer both fingertight and hex-head nuts for use with double-ferrules. The fingertight version can be hand-tightened for operating pressures as high as 6000 psi. Use the hex-head version for connections that are difficult to reach or closely spaced.

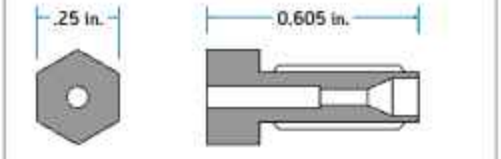
These fittings fit virtually any female 1/16-inch fitting, including Parker, Swagelok, Waters, Valco, Rheodyne, UPChurch, etc.—all with 10–32 threads.

Description	P/N
PEEK Double-ferrule	PSL613302
PEEK Hex-head Nut	PSL613324
PEEK Fingertight Nut	PSL613301
Stainless Steel Fingertight Nut	PSL613325

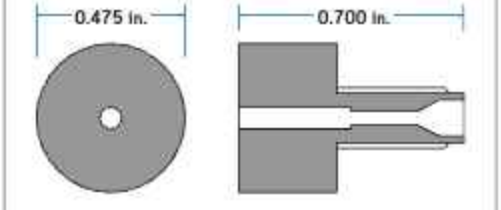
PEEK Double-Ferrule



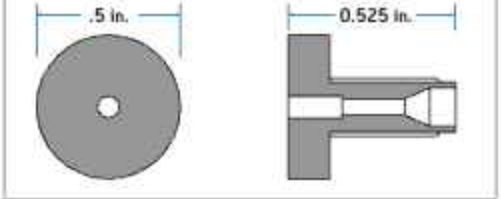
PEEK Hex-Head Nut



PEEK Fingertight Nut



Stainless Steel Fingertight Nut



PTFE/ETFE Tubing and Fittings

O.D. Inches (mm)	I.D. Inches (mm)	Length/Material	P/N
0.125 (3.2)	0.062 (1.57)	25 ft. (7.6 m), PTFE	WAT026808
0.149 (3.8)	0.119 (30.0)	25 ft. (7.6 m), PTFE	WAT026809
0.250 (6.3)	0.190 (4.8)	10 ft. (3 m), PTFE	WAT026810
0.080 (2.0)	0.058 (1.5)	25 ft. (7.6 m), PTFE	WAT026974
0.178 (4.52)	0.148 (3.76)	25 ft. (7.6 m), PTFE	WAT051041
0.149 (3.8)	0.119 (30.0)	20 ft. (6 m), PTFE	WAT051052
0.125 (3.2)	0.020 (0.508)	10 ft. (3 m), PTFE	WAT088430
0.125 (3.2)	0.009 (0.228)	10 ft. (3 m), PTFE	WAT088431
0.125 (3.2)	0.040 (1.0)	10 ft. (3 m) , PTFE	WAT088432
0.062 (1.57)	0.009 (0.228)	36 in. (1 m), ETFE	WAT088561
0.062 (1.57)	0.040 (1.0)	36 in. (1 m), PTFE	WAT088563
PTFE Adapter, 0.125 (3.2) to 0.065 (1.6), 5/pk			WAT005137

Stainless Steel Tubing and Fittings

O.D. Inches (mm)	I.D. Inches (mm)	Length/Material	P/N
0.0625 (1.6)	0.005 (0.127)	10 ft. (3 m), SS	WAT241039
0.0625 (1.6)	0.020 (0.508)	10 ft. (3 m), SS	WAT026804
0.0625 (1.6)	0.030 (0.762)	10 ft. (3 m), SS	430000366
0.0625 (1.6)	0.040 (1.020)	10 ft. (3 m), SS	WAT026805
0.125 (3.2)	0.062 (1.57)	10 ft. (3 m), SS	WAT026806
0.125 (3.2)	0.093 (2.36)	10 ft. (3 m), SS	WAT026807
0.0625 (1.6)	0.009 (0.228)	10 ft. (3 m), SS	WAT026973
0.0625 in. O.D. Stainless Steel Tubing Cutter with 3 Blades			WAT022384
Replacement Blades for WAT022384, 3/pk			WAT022385

PEEK Tubing and Fittings

O.D. Inches (mm)	I.D. Inches (mm)	Length/Material	P/N
0.0625 (1.6)	0.005 (0.127)	5 ft. (1.5 m), PEEK	WAT022995
0.0625 (1.6)	0.010 (0.254)	5 ft. (1.5 m), PEEK	WAT022996
0.0625 (1.6)	0.015 (0.381)	5 ft. (1.5 m), PEEK	WAT022997
0.0625 (1.6)	0.020 (0.508)	5 ft. (1.5 m), PEEK	WAT022998
PEEK Tubing Cutter			WAT031795
PEEK Tubing and Fitting Kit			WAT022999
PEEK Union, 0.0625 in.			WAT026-04

Compression Screws and Ferrules

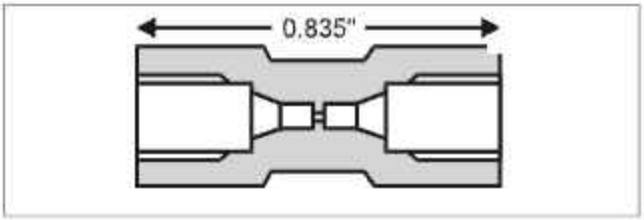
Description	P/N
Ferrule, 01, Stainless Steel, 10/pk	WAT005063
Compression Screw, 0.0625 in., 10/pk	WAT005070
Compression Fitting Plug, Stainless Steel, 5/pk	WAT005079
Rheodyne Ferrule, 10/pk	WAT007020
Ferrule, Stainless Steel	WAT022330
Ferrule, 1/16 in. O.D., PEEK	WAT021817
Compression Screw, Stainless Steel	WAT025313
Compression Fitting Plug, Stainless Steel	WAT025566
Compression Screws and Ferrules, 0.166 in., 5/pk	WAT025604
Compression Screws, 0.125 in., PEEK, 2/pk	WAT046-12
Compression Screw, Long, 1/16 in.	WAT021812
Compression Screw, Short, PEEK 1/16 in.	WAT021815
Extra Long Compression Screw, Stainless Steel, 10/pk	WAT060051
Finger Tight Poly Knob Used with Compression Screws Plus PEEK Ferrules	WAT021816
Tee, 0.0625 in. Compression Screw, Stainless Steel	WAT075215
Tubing Cap, Hex Stainless Steel	WAT084078
Union, 0.0625 in. Stainless Steel	WAT097332

PEEK Unions, Tees, and Crosses

Inert and biocompatible PEEK unions can withstand operating pressures as high as 6000 psi (420 bar). PEEK tees and crosses can withstand pressures as high as 10,000 psi (690 bar).

PEEK unions, tees, and crosses share these features:

- Connect any 1/16-inch tubing (PEEK, stainless steel, titanium, or Tefzel)
- Low dead volume
- 10–32 thread

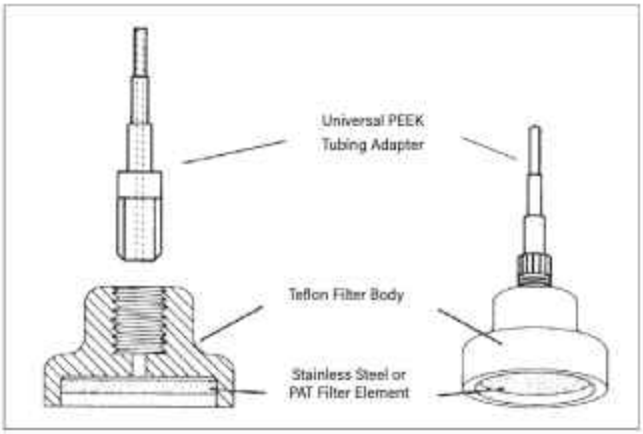


Description	P/N
PEEK Union with 2 PEEK Fingertight Nuts and Double Ferrules 1/16 in.	PSL613312
PEEK Union without Nuts and Ferrules 1/16 in.	PSL613313
PEEK TEE with One-piece Fingertight Fitting	PSL613317
PEEK CROSS with One-piece Fingertight Fitting	PSL613319
PEEK TEE without Fittings	PSL613318
PEEK CROSS without Fittings	PSL613320
PEEK One-piece Fingertight Fitting	186008714

Filters

Last Drop Mobile Phase Filters

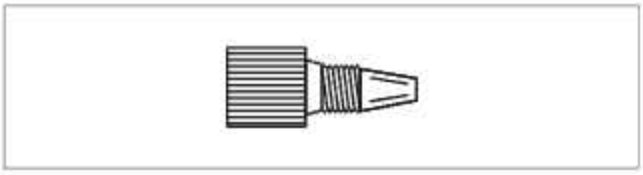
The Last Drop mobile-phase filter incorporates a flat filter element set parallel to the bottom of a reservoir. This design allows the filter to draw all but the last 2% of mobile phase from the reservoir without drawing air into the system. Last Drop filters are available with 316 L stainless steel or PAT (PEEK alloyed with Teflon) filter elements in inert Teflon housings. The top of the housing incorporates a PEEK tripod that fits into pump inlet lines with inner diameters of 1.5, 2.2, or 3.5 mm.



Description	P/N
Filter with 2 µm Stainless Steel Filter	PSL901290

Handilok CTFE Fittings

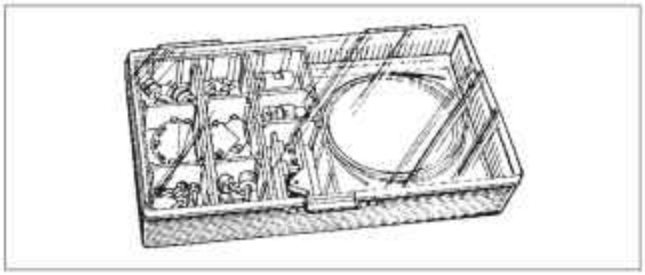
Handilok fittings can replace, without the need for tools, conventional compression fittings used with 1/16-inch tubing. Compatible with all internal fittings with a 10–32 thread, these fittings meet rigid high-pressure requirements, withstanding pressures greater than 4000 psi (280 bar).



Handilok Fittings	P/N
1/16 in. Fitting, 1/pk	PSL618021
1/16 in. Fitting, 10/pk	PSL618022

PEEK Starter Kit

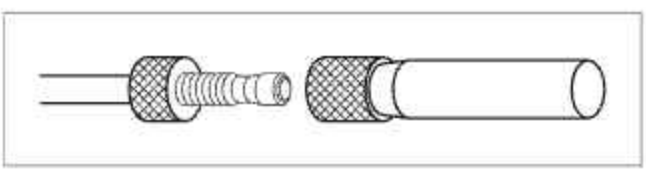
By replacing stainless steel parts, such as tubing, fittings, ferrules, mobile-phase filters, in-line filters, etc., you create a biocompatible, metal-free environment for samples and mobile phases. In a sturdy plastic case, the PEEK Starter Kit contains items that all biochromatographers will find helpful. Purchasing this kit earns you savings of 25% of the cost of purchasing its components individually.



Description	P/N
PEEK Starter Kit	PSL613321
Contains the following:	
PEEK Fingertight One-piece, 6/pk	
PEEK Handtight Nut, 4/pk	
PEEK Hex-head Nut, 4/pk	
PEEK Double Ferrules, 20/pk	
PEEK Tubing 1/16 in. × 0.25 mm (1 × 3 m)	
PEEK Tubing 1/16 in. × 0.50 mm (1 × 3 m)	
PEEK Union, 1/pk	
Elbow 90 Degrees, 2/pk	
Elbow 180 Degrees, 2/pk	
Guillotine Cutter, 1/pk	
PAT Mobile Phase Filter—"Last Drop", 1/pk	

PEEK Biocompatible Mobile Phase Filter

The PEEK Biocompatible Mobile Phase Filter protects an HPLC pumping system against particulate matter in a mobile phase. Many macromolecules are fairly labile and require not only biocompatible chromatographs but also mobile-phase filters that are absolutely inert. These filters are designed from inert polymeric components, which effectively eliminate metal from the fluid path. With a porosity of 5 µm, all fittings (including the inlet tube) are composed of perfectly inert PEEK.



Description	P/N
Biocompatible Mobile Phase Filter	PSL901282

Solvent Inlet Filters

It's good practice to always filter solvents, to avoid damaging the pump. Solvent inlet filters, with a porosity of 10 µm, provide the necessary pump protection, and their large surface area ensures long life without pump cavitation.

Filters should be changed periodically, depending on usage and mobile phase. Replacing the filter is easy; no tools are needed. The unique Plastictight male nut is screwed into the filter and tightened by hand. Finger tightening is sufficient; the Plastictight fitting holds without flanging.



Solvent Inlet Filter 10 µm with Flangeless Fittings for 1/8 in. O.D. Tubing

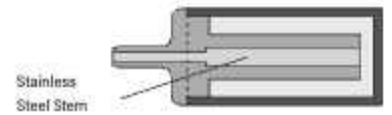


Solvent Inlet Filter 10 µm with 1/8 in. O.D. Stem for 3/16 in. O.D. Tubing

Description	P/N
Solvent Inlet Filter Kits	
Assy, Solvent Filter	WAT025531
Plastictight Fitting with Teflon Tubing 1/16 in. I.D. × 1/8 in. O.D. × 3 ft.	PSL613602
Replacement Filter 10 µm, 5/pk	PSL613604
Solvent Inlet Filters for General Use	
Solvent Inlet Filter 10 µm with 1/16 in. O.D. Stem for 1/8 in. O.D. Tubing	PSL613570
Solvent Inlet Filter 10 µm with Flangeless Fittings for 1/8 in. O.D. Tubing	PSL613578
Solvent Inlet Filters for Preparative HPLC	
Solvent Inlet Filter 10 µm with 1/16 in. O.D. Stem for 1/8 in. O.D. Tubing	PSL613607
Solvent Inlet Filter 10 µm with Flangeless Fittings for 1/8 in. O.D. Tubing	PSL613608
Solvent Inlet Filters for Waters HPLC Systems	
Solvent Inlet Filter 10 µm with 1/8 in. O.D. Stem for 3/16 in. O.D. Tubing	PSL613609

Bottom-of-the-Bottle Solvent Filters

Our Bottom-of-the Bottle Solvent Filter is designed after the original Bottom-of-the-Bottle replaceable filters. This unique filter is fitted with a stainless steel stem on top, to accommodate 1/16-inch (I.D.) tubing. A lower stem, which goes directly into the filter, reaches to within 0.06 inches of the Bottom-of-the-Bottle filters. The 10 µm filter can easily accommodate flow rates as high as 10 mL/min.



Bottom-of-the-Bottle Solvent Filter	P/N
Stainless Steel Filter Assembly	PSL613457

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Indices



"The quality of our products differentiates us from the competition. We take quality personally."

– Chris Ryan, Director of Chemistry Operations, Wexford, Ireland

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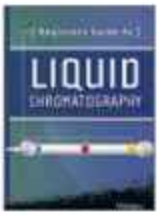


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