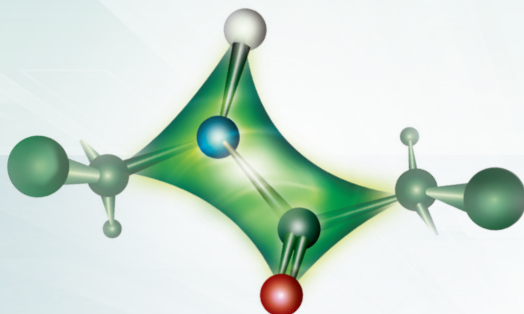
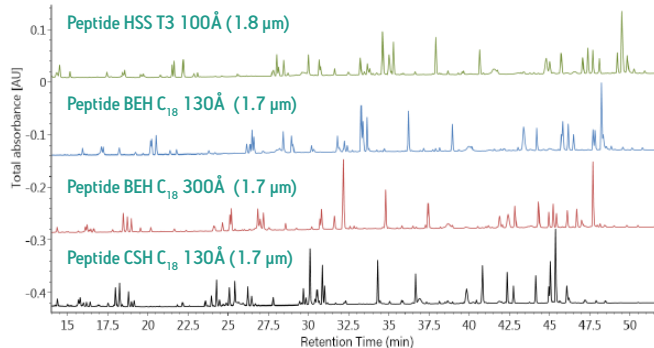


Peptide BEH C₁₈, CSH C₁₈, and HSS T3 Columns

Reversed-phase (RP) chromatography has become the separation mode of choice for many challenging LC and LC-MS peptide separations. Waters Ethylene-Bridged Hybrid (BEH), Charged Surface Hybrid (CSH™), and High Strength Silica (HSS) column technologies, that are specifically QC tested with complex peptide samples, can be effectively used to generate high quality UPLC®, UHPLC, or HPLC-based peptide separations.



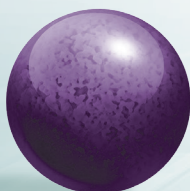
Tryptic Peptide Map of mAb on Waters Peptide Separation Columns



LC system:	ACQUITY UPLC® H-Class Bio	Eluent A:	Water with 0.1% TFA
Sample:	Tryptic Digest of NIST mAb reference material	Eluent B:	Acetonitrile with 0.1% TFA
Columns:	2.1 x 150 mm	Gradient:	0.5% - 50% B in 60 min, linear
		Flow rate:	0.20 mL/min
		Column temp.:	60 °C

Waters UPLC (shown) and HPLC-based, Peptide Separation Columns deliver different peptide selectivities and high peak capacities for the separation of complex peptide mixtures. In addition, each batch of material is specifically QC tested and qualified with a tryptic digest of cytochrome c to help ensure column to column consistency when used in validated methods.

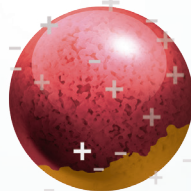
Hybrid Particles



BEH (Ethylene-Bridged Hybrid)

Trifunctional C₁₈ ligand, fully end-capped and bonded to the Ethylene-Bridged Hybrid (BEH) particles.

- Outstanding peak shape and capacity in trifluoroacetic acid (TFA) or formic acid (FA) containing eluents when compared to use of 100% silica-based C₁₈ columns
- BEH particles stable from pH 1 through 11 and up to 80 °C for expanded method development capabilities directed at changing peptide separation selectivities
- Two pore sizes (130Å and 300Å) provide different separation selectivities for a wide range of peptides and small proteins

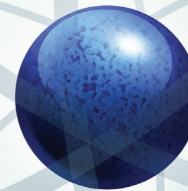


CSH (Charged Surface Hybrid)

Trifunctional C₁₈ ligand, fully end-capped, bonded to Charged Surface Hybrid (CSH) particles.

- Best peak shape and capacity using TFA containing eluents for optical-based detection and with FA for LC-MS peptide analysis
- Accepts greater peptide mass loads than many competitive reversed-phase columns for detection of low-level impurities in complex mixtures
- The 130Å pore size is best suited for compounds less than 10,000 Dalton

Silica Particles



HSS (High Strength Silica)

Trifunctional C₁₈ ligand, fully end-capped, bonded to High Strength Silica (HSS) particles.

- Viable option when either the hybrid-based, Peptide BEH C₁₈ or Peptide CSH C₁₈ 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

Waters

THE SCIENCE OF WHAT'S POSSIBLE.®

Peptide Columns, Guard Columns , Pre-columns, and Kits						
Dimension	Format	Particle Size	BEH C ₁₈ 130Å	BEH C ₁₈ 300Å	CSH C ₁₈ 130Å	HSS 100Å
1.0 x 100 mm	Column	1.7 - 1.8 µm		186005593	186006934	186008752
1.0 x 150 mm	Column	1.7 - 1.8 µm		186005594	186006935	186008753
2.1 x 5 mm	VanGuard Pre-column*	1.7 - 1.8 µm	186003975	186004629	186006939	186008757
2.1 x 100 mm	Column	1.7 - 1.8 µm	186003555	186003686	186006937	186008755
2.1 x 150 mm	Column	1.7 - 1.8 µm	186003556	186003687	186006938	186008756
1.0 x 100 mm	Kit**	1.7 - 1.8 µm			176003062	176003993
1.0 x 150 mm	Kit**	1.7 - 1.8 µm			176003063	176003994
2.1 x 100 mm	Kit**	1.7 - 1.8 µm			176003065	176003996
2.1 x 150 mm	Kit**	1.7 - 1.8 µm			176003066	176003997
2.1 x 5 mm	VanGuard Pre-column*	2.5 µm XP				186008761
2.1 x 10 mm	VanGuard Pre-column*	2.5 µm XP			186006944	
2.1 x 100 mm	Column	2.5 µm XP			186006942	186008759
2.1 x 150 mm	Column	2.5 µm XP			186006943	186008760
4.6 x 100 mm	Column	2.5 µm XP			186006947	186008763
4.6 x 150 mm	Column	2.5 µm XP			186007038	186008764
2.1 x 100 mm	Kit**	2.5 µm XP			176003070	176003999
2.1 x 150 mm	Kit**	2.5 µm XP			176003071	176004006
4.6 x 100 mm	Kit**	2.5 µm XP			176003075	176004008
4.6 x 150 mm	Kit**	2.5 µm XP			176003093	176004009
1.0 x 100 mm	Column	3.5 µm	186003561	186003605		
1.0 x 150 mm	Column	3.5 µm	186003562	186003606		
2.1 x 10 mm	Sentry™ Guard Cartridge	3.5 µm			186006954 ^{2,4}	
2.1 x 100 mm	Column	3.5 µm	186003564	186003608	186006951	
2.1 x 150 mm	Column	3.5 µm	186003565	186003609	186006952	
2.1 x 250 mm	Column	3.5 µm	186003566	186003610		
4.6 x 20 mm	Sentry Guard Cartridge	3.5 µm			186006958 ^{3,4}	
4.6 x 100 mm	Column	3.5 µm	186003568	186003612	186006956	
4.6 x 150 mm	Column	3.5 µm	186003569	186003613	186006957	
4.6 x 250 mm	Column	3.5 µm	186003570	186003614		
2.1 x 100 mm	Kit**	3.5 µm			176003078	
2.1 x 150 mm	Kit**	3.5 µm			176003079	
4.6 x 100 mm	Kit**	3.5 µm			176003083	
4.6 x 150 mm	Kit**	3.5 µm			176003084	
1.0 x 100 mm	Column	5 µm	186003572	186003616		
1.0 x 150 mm	Column	5 µm	186003573	186003617		
2.1 x 100 mm	Column	5 µm	186003575	186003619		186008775
2.1 x 150 mm	Column	5 µm	186003576	186003620		186008776
2.1 x 250 mm	Column	5 µm	186003577	186003621		
3.9 x 5 mm	VanGuard Pre-column*	5 µm				186008765
4.6 x 100 mm	Column	5 µm	186003579	186003623	186007077	186008779
4.6 x 150 mm	Column	5 µm	186003580	186003624	186007078	186008780
4.6 x 250 mm	Column	5 µm	186003581	186003625		
10 x 10 mm	Prep Guard Cartridge	5 µm	186004469 ⁵	186004471 ⁵	186007015 ⁵	
10 x 100 mm	Column	5 µm	186008187	186008191	186008265	
10 x 150 mm	Column	5 µm	186008188	186008192	186008266	
10 x 250 mm	Column	5 µm	186008189	186008193	186008267	
19 x 10 mm	Prep Guard Cartridge	5 µm	186004468 ¹	186004470 ¹	186007019 ¹	
19 x 100 mm	Column	5 µm	186003587		186007020	
19 x 150 mm	Column	5 µm	186003945		186007021	
19 x 250 mm	Column	5 µm			186007031	
30 x 100 mm	Column	5 µm		186003631	186007025	
30 x 150 mm	Column	5 µm		186003946	186007023	
30 x 250 mm	Column	5 µm			186007024	
50 x 100 mm	Column	5 µm			186007027	
50 x 150 mm	Column	5 µm			186007028	
50 x 250 mm	Column	5 µm			186007029	

Dimension	Format	Particle Size	BEH C ₁₈ 130Å	BEH C ₁₈ 300Å
4.6 x 100 mm	Column	10 µm	186003649	186003664
4.6 x 150 mm	Column	10 µm	186003650	186003665
4.6 x 250 mm	Column	10 µm	186003651	186003666
10 x 10 mm	Prep Guard Cartridge	10 µm	186004465 ⁵	186004467 ⁵
10 x 100 mm	Column	10 µm	186008195	186008199
10 x 150 mm	Column	10 µm	186008196	186008200
10 x 250 mm	Column	10 µm	186008197	186008201
19 x 10 mm	Prep Guard Cartridge	10 µm	186004464 ¹	186004466 ¹
19 x 150 mm	Column	10 µm	186003657	186003672
19 x 250 mm	Column	10 µm	186003658	186003673
30 x 10 mm	Prep Guard Cartridge	10 µm	186006880 ⁶	186006882 ⁶
30 x 150 mm	Column	10 µm	186003661	186003676
30 x 250 mm	Column	10 µm	186003662	186003677

Part numbers for additional Nano, Capillary, Analytical, and Preparative Peptide Separation Columns as well as Method Validation Kits and Standards are available at www.waters.com

Peptide HSS T3 Columns available early 2017.

*VanGuard Pre-column, 3/pk.

**Kit includes a Peptide CSH C₁₈ 130Å Column plus one vial of Cytochrome C Digestion Standard, p/n: 186006371.

¹Requires 19 x 10 mm Cartridge Holder, p/n: 186000709.

²Requires 2.1 x 10 mm Universal Sentry Guard Holder, p/n: WAT097958.

³Requires 4.6 x 20 mm Universal Sentry Guard Holder, p/n: WAT046910.

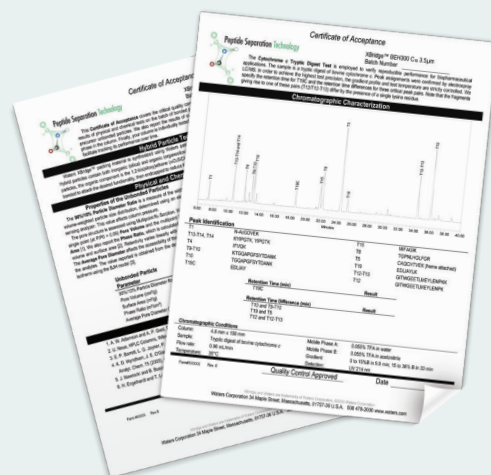
⁴2/pk.

⁵Requires 10 x 10 mm Prep Guard Holder, p/n: 289000779.

⁶Requires 30 x 10 mm Prep Guard Holder, p/n: 186006912.

Increased Assurance with Waters Peptide Columns

Waters rigorously tests each batch of our synthesized Peptide BEH C₁₈ 130Å; Peptide BEH C₁₈ 300Å; Peptide CSH C₁₈ 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: 186006371) 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 C₁₈ 130Å Column.

RapiGest SF Protein Digestion Surfactant

RapiGest™ SF (surfactant) radically enhances protein enzymatic digestions in terms of speed and percent recovery. RapiGest SF is a patented anionic surfactant that accelerates the production of peptides generated by proteases, such as trypsin, Asp-N, Glu-C, and Lys-C. Many hydrophobic proteins are resistant to proteolysis because their cleavage sites are inaccessible to endoproteases. RapiGest SF, a mild denaturant, helps solubilize and unfold proteins making them more amenable to cleavage without denaturing or inhibiting common proteolytic enzymes.



RapiGest SF Surfactant

Description	Part No.
RapiGest SF 1 mg vial	186001860
RapiGest SF 1 mg vial (5/pk)	186001861
RapiGest SF 3 mg vial	186008090
RapiGest SF 10 mg vial	186002123
RapiGest SF 50 mg vial	186002122
RapiGest SF Custom	186002118

MassPREP Protein Digestion Standards

The MassPREP™ Protein Digestion Standards are prepared under strict quality control procedures and contain no undigested standard proteins, trypsin, or other hydrophilic components. Test results from each batch of digestion standards are provided on an available Certificate of Analysis report.



MassPREP Digestion Standards

Description	Volume	Part No.
MassPREP Digestion Standards		
Yeast enolase	Solid	186002325
Phosphorylase b	Solid	186002326
Bovine hemoglobin	Solid	186002327
Yeast alcohol dehydrogenase (ADH)	Solid	186002328
Bovine serum albumin (BSA)	Solid	186002329
Cytochrome c	Solid	186006371
MassPREP Digestion Standard Kit		186002330
Kit contains (1) of 186002325, 186002326, 186002327, 186002328, 186002329		

MassPREP Peptide Standards

Description	Volume	Part No.
MassPREP Peptide Mixture	Solid	186002337
One vial with approximately 1 nmole of each: Allantoin (Vo Marker); RASG-1, angiotensin frag. 1-7, bradykinin; angiotensin II; angiotensin I, renin substrate, enolase T35, enolase T37, melittin. The peptide standard is useful to test LC columns and systems dedicated to peptide separations.		
MassPREP Peptide Mixture, 5/pk	Solid	186002338
This is a (5) pack of 186002337. Each vial contains approximately 1 nmole of each: Allantoin (Vo Marker); RASG-1, angiotensin frag. 1-7, bradykinin, angiotensin II, angiotensin I, renin substrate, enolase T35, enolase T37, melittin. The peptide standard is useful to test LC columns and systems dedicated to peptide separations.		



The ability to effectively separate, identify, and quantitate peptides at substantially different concentrations is important in applications ranging from the analyses of biotherapeutic peptides and proteins to proteomics and biomarker investigations. This document is a compilation of numerous published LC & LC-MS applications for the analyses of peptides. They have been carefully selected and categorized into chapters to help simplify a search for relevant information based on defined application areas.

To download: go to <http://www.waters.com/webassets/cms/library/docs/720005801en.pdf>