

# WATERS COLUMNS AND ANALYTICAL STANDARDS AND REAGENTS SELECTION GUIDE

Waters' comprehensive family of columns offer scientists a diverse range of selectivity and particle size choices that provide exceptional scalability within UPLC, UHPLC, HPLC, and preparative LC applications. In addition, Waters' growing family of QC Reference Materials and application-specific standards help users to effortlessly confirm column and system performance.

CORTECS UPLC, UHPLC, and HPLC Columns	Particle/Ligand	Ligand Density	Carbon Load	Endcapped	USP Class No.	pH Range	Temperature Limits	Surface Area	Performance Standards	Application Standards
<b>C18+</b> UPLC: 1.6 µm UHPLC: 2.7 µm HPLC: 2.7 µm		2.4 µmol/m <sup>2</sup>	5.7%	Yes	L1	2-8	Low pH = 45 °C High pH = 45 °C	100 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360	Reversed-Phase QC Reference Material P/N: 186006363
<b>C18</b> UPLC: 1.6 µm UHPLC: 2.7 µm HPLC: 2.7 µm		2.7 µmol/m <sup>2</sup>	6.6%	Yes	L1	2-8	Low pH = 45 °C High pH = 45 °C	100 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360	Reversed-Phase QC Reference Material P/N: 186006363
<b>T3</b> UPLC: 1.6 µm UHPLC: 2.7 µm HPLC: 2.7 µm		1.6 µmol/m <sup>2</sup>	4.7%	Yes	L1	2-8	Low pH = 45 °C High pH = 45 °C	100 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360	Reversed-Phase QC Reference Material P/N: 186006363
<b>C8</b> UPLC: 1.6 µm UHPLC: 2.7 µm HPLC: 2.7 µm		3.4 µmol/m <sup>2</sup>	4.5%	Yes	L7	2-8	Low pH = 45 °C High pH = 45 °C	100 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360	Reversed-Phase QC Reference Material P/N: 186006363
<b>Shield RP18</b> UPLC: 1.6 µm UHPLC: 2.7 µm HPLC: 2.7 µm		3.2 µmol/m <sup>2</sup>	6.4%	Yes	L1	2-8	Low pH = 45 °C High pH = 45 °C	100 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360	Reversed-Phase QC Reference Material P/N: 186006363
<b>Phenyl</b> UPLC: 1.6 µm UHPLC: 2.7 µm HPLC: 2.7 µm		3.2 µmol/m <sup>2</sup>	5.9%	Yes	L11	2-8	Low pH = 45 °C High pH = 45 °C	100 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360	Reversed-Phase QC Reference Material P/N: 186006363
<b>HILIC</b> UPLC: 1.6 µm UHPLC: 2.7 µm HPLC: 2.7 µm		N/A	Unbonded	No	L3	1-5	Low pH = 45 °C High pH = 45 °C	100 m <sup>2</sup> /g	HILIC QC Reference Material P/N: 186007226	HILIC QC Reference Material P/N: 186007226

ACQUITY UPLC and XBridge HPLC/UHPLC Columns	Particle/Ligand	Ligand Density	Carbon Load	Endcapped	USP Class No.	pH Range	Temperature Limits	Surface Area	Performance Standards	Application Standards
<b>BEH C18</b> UPLC: 1.7 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5, 10 µm		3.1 µmol/m <sup>2</sup>	18%	Yes	L1	1-12	Low pH = 80 °C High pH = 60 °C	185 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360 Preparative Chromatography Mix P/N: 186006703	Reversed-Phase QC Reference Material P/N: 186006363
<b>BEH C8</b> UPLC: 1.7 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5, 10 µm		3.2 µmol/m <sup>2</sup>	13%	Yes	L7	1-12	Low pH = 60 °C High pH = 60 °C	185 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360 Preparative Chromatography Mix P/N: 186006703	Reversed-Phase QC Reference Material P/N: 186006363
<b>BEH Shield RP18</b> UPLC: 1.7 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5, 10 µm		3.3 µmol/m <sup>2</sup>	17%	Yes	L1	2-11	Low pH = 50 °C High pH = 45 °C	185 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360 Preparative Chromatography Mix P/N: 186006703	Reversed-Phase QC Reference Material P/N: 186006363
<b>BEH Phenyl</b> UPLC: 1.7 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		3.0 µmol/m <sup>2</sup>	15%	Yes	L11	1-12	Low pH = 80 °C High pH = 60 °C	185 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360	Reversed-Phase QC Reference Material P/N: 186006363
<b>BEH HILIC</b> UPLC: 1.7 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		N/A	Unbonded	No	L3	1-9	Low pH = 45 °C High pH = 45 °C	185 m <sup>2</sup> /g	HILIC QC Reference Material P/N: 186007226	HILIC QC Reference Material P/N: 186007226
<b>BEH Amide</b> UPLC: 1.7 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		7.5 µmol/m <sup>2</sup>	12%	No	L68	2-11	Low pH = 90 °C High pH = 90 °C	185 m <sup>2</sup> /g	HILIC QC Reference Material P/N: 186007226	HILIC QC Reference Material P/N: 186007226
<b>Peptide BEH C18, 130Å</b> UPLC: 1.7 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5, 10 µm		3.1 µmol/m <sup>2</sup>	18%	Yes	L1	1-12	Low pH = 80 °C High pH = 60 °C	185 m <sup>2</sup> /g	Cytochrome c Digestion Standard P/N: 186006371 Preparative Chromatography Mix P/N: 186006703	Peptide Retention Standard P/N: 186006555
<b>Peptide BEH C18, 300Å</b> UPLC: 1.7 µm HPLC: 3.5, 5, 10 µm		3.1 µmol/m <sup>2</sup>	12%	Yes	L1	1-12	Low pH = 80 °C High pH = 60 °C	90 m <sup>2</sup> /g	Cytochrome c Digestion Standard P/N: 186006371 Preparative Chromatography Mix P/N: 186006703	Peptide Retention Standard P/N: 186006555
<b>Protein BEH C4, 300Å</b> UPLC: 1.7 µm HPLC: 3.5, 5, 10 µm		2.4 µmol/m <sup>2</sup>	8%	No	L26	1-10	Low pH = 80 °C High pH = 50 °C	90 m <sup>2</sup> /g	MassPREP Protein Standard Mix P/N: 186004900	MassPREP Protein Standard Mix P/N: 186004900
<b>Protein BEH SEC, 125Å</b> UPLC: 1.7 µm HPLC: 3.5 µm		4.9 µmol/m <sup>2</sup>	15%	No	L33	1-8	Low pH = 60 °C High pH = 60 °C	395 m <sup>2</sup> /g	BEH125 Protein Standard Mix P/N: 186006519	BEH125 Protein Standard Mix P/N: 186006519
<b>Protein BEH SEC, 200Å</b> UPLC: 1.7 µm HPLC: 3.5 µm		5.5 µmol/m <sup>2</sup>	12%	No	L33	1-8	Low pH = 60 °C High pH = 60 °C	220 m <sup>2</sup> /g	BEH200 SEC Protein Standard Mix P/N: 186006518	BEH200 SEC Protein Standard Mix P/N: 186006518
<b>Protein BEH SEC, 450Å</b> UPLC: 2.5 µm HPLC: 3.5 µm		4.8 µmol/m <sup>2</sup>	9%	No	L33	1-8	Low pH = 60 °C High pH = 60 °C	80 m <sup>2</sup> /g	BEH450 SEC Protein Standard Mix P/N: 186006842	BEH450 SEC Protein Standard Mix P/N: 186006842
<b>Oligonucleotide BEH C18, 130Å</b> UPLC: 1.7 µm HPLC: 2.5 µm		3.1 µmol/m <sup>2</sup>	18%	Yes	L1	1-12	Low pH = 80 °C High pH = 60 °C	185 m <sup>2</sup> /g	MassPREP OST Standard P/N: 186004135	MassPREP OST Standard P/N: 186004135
<b>Glycan BEH Amide, 130Å</b> UPLC: 1.7 µm UHPLC: 2.5 µm XP HPLC: 3.5 µm		7.15 µmol/m <sup>2</sup>	N/A	No	L68	2-11	Low pH = 90 °C High pH = 90 °C	194 m <sup>2</sup> /g	Glycan Performance Test Standard P/N: 186006349	Glycan Performance Test Standard P/N: 186006349 Dextran Calibration Standard P/N: 186006841
<b>Glycoprotein BEH Amide, 300Å</b> UPLC: 1.7 µm		7.15 µmol/m <sup>2</sup>	N/A	No	L68	2-11	Low pH = 90 °C High pH = 90 °C	93 m <sup>2</sup> /g	Glycoprotein Performance Test Standard P/N: 186008010	Glycoprotein Performance Test Standard P/N: 186008010

## Primary Manufacturer of Chromatographic Media

- Waters maintains a Quality Management System in compliance with ISO 9001:2008.
- Waters owns and controls every step of the process, from raw materials to final product (few suppliers are capable of doing this). Understanding and controlling our processes makes the difference in product performance in your laboratory.

ACQUITY UPLC and XSelect HPLC/UHPLC Columns	Particle/Ligand	Ligand Density	Carbon Load	Endcapped	USP Class No.	pH Range	Temperature Limits	Surface Area	Performance Standards	Application Standards
<b>CSH C18</b> UPLC: 1.7 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5, 10 µm		2.3 µmol/m <sup>2</sup>	15%	Yes	L1	1-11	Low pH = 80 °C High pH = 45 °C	185 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360 Preparative Chromatography Mix P/N: 186006703	Reversed-Phase QC Reference Material P/N: 186006363
<b>CSH Phenyl-Hexyl</b> UPLC: 1.7 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		2.3 µmol/m <sup>2</sup>	14%	Yes	L11	1-11	Low pH = 80 °C High pH = 45 °C	185 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360	Reversed-Phase QC Reference Material P/N: 186006363
<b>CSH Fluoro-Phenyl</b> UPLC: 1.7 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		2.3 µmol/m <sup>2</sup>	10%	No	L43	1-8	Low pH = 60 °C High pH = 45 °C	185 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360	Reversed-Phase QC Reference Material P/N: 186006363
<b>Peptide CSH C18, 130Å</b> UPLC: 1.7 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		2.3 µmol/m <sup>2</sup>	15%	Yes	L1	1-11	Low pH = 80 °C High pH = 45 °C	185 m <sup>2</sup> /g	Cytochrome c Digestion Standard P/N: 186006371	Peptide Retention Standard P/N: 186006555
<b>HSS C18</b> UPLC: 1.8 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		3.2 µmol/m <sup>2</sup>	15%	Yes	L1	1-8	Low pH = 45 °C High pH = 45 °C	230 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360	Reversed-Phase QC Reference Material P/N: 186006363
<b>HSS C18 SB</b> UPLC: 1.8 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		1.6 µmol/m <sup>2</sup>	8%	No	L1	2-8	Low pH = 45 °C High pH = 45 °C	230 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360	Reversed-Phase QC Reference Material P/N: 186006363
<b>HSS T3</b> UPLC: 1.8 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		1.6 µmol/m <sup>2</sup>	11%	Yes	L1	2-8	Low pH = 45 °C High pH = 45 °C	230 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360	Reversed-Phase QC Reference Material P/N: 186006363
<b>Peptide HSS T3, 100Å</b> UPLC: 1.8 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		1.6 µmol/m <sup>2</sup>	11%	Yes	L1	2-8	Low pH = 45 °C High pH = 45 °C	230 m <sup>2</sup> /g	Cytochrome c Digestion Standard P/N: 186006371	Peptide Retention Standard P/N: 186006555
<b>HSS PFP</b> UPLC: 1.8 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		3.2 µmol/m <sup>2</sup>	7%	No	L43	2-8	Low pH = 45 °C High pH = 45 °C	230 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360	Reversed-Phase QC Reference Material P/N: 186006363
<b>HSS CN</b> UPLC: 1.8 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		2.0 µmol/m <sup>2</sup>	5%	No	L10	2-8	Low pH = 45 °C High pH = 45 °C	230 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360	-

Atlantis UPLC, UHPLC, and HPLC Columns	Particle/Ligand	Ligand Density	Carbon Load	Endcapped	USP Class No.	pH Range	Temperature Limits	Surface Area	Performance Standards	Application Standards
<b>BEH C18 AX</b> UPLC: 1.7 µm UHPLC: 2.5 µm HPLC: 5 µm		1.6 µmol/m <sup>2</sup>	17%	Yes	L78	2-10	Low pH = 60 °C High pH = 60 °C	270 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360	Reversed-Phase QC Reference Material P/N: 186006363
<b>Silica T3</b> HPLC: 3, 5, 10 µm		1.6 µmol/m <sup>2</sup>	14%	Yes	L1	2-8	Low pH = 45 °C High pH = 45 °C	330 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360 Preparative Chromatography Mix P/N: 186006703	Reversed-Phase QC Reference Material P/N: 186006363
<b>Silica HILIC</b> HPLC: 3, 5 µm		No	Unbonded	No	L3	1-5	Low pH = 45 °C High pH = 45 °C	330 m <sup>2</sup> /g	HILIC QC Reference Material P/N: 186007226	HILIC QC Reference Material P/N: 186007226
<b>Silica dC18</b> HPLC: 3, 5, 10 µm		1.6 µmol/m <sup>2</sup>	12%	Yes	L1	3-7	Low pH = 45 °C High pH = 45 °C	330 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360 Preparative Chromatography Mix P/N: 186006703	Reversed-Phase QC Reference Material P/N: 186006363

SunFire HPLC Columns	Particle/Ligand	Ligand Density	Carbon Load	Endcapped	USP Class No.	pH Range	Temperature Limits	Surface Area	Performance Standards	Application Standards
<b>Silica C18</b> HPLC: 3.5, 5, 10 µm		3.5 µmol/m <sup>2</sup>	16%	Yes	L1	2-8	Low pH = 50 °C High pH = 40 °C	340 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360 Preparative Chromatography Mix P/N: 186006703	Reversed-Phase QC Reference Material P/N: 186006363
<b>Silica C8</b> HPLC: 3.5, 5, 10 µm		3.5 µmol/m <sup>2</sup>	12%	Yes	L7	2-8	Low pH = 40 °C High pH = 40 °C	340 m <sup>2</sup> /g	Neutrals QC Reference Material P/N: 186006360 Preparative Chromatography Mix P/N: 186006703	Reversed-Phase QC Reference Material P/N: 186006363

BioResolve UPLC, UHPLC and HPLC Columns	Particle/Ligand	Ligand Density	Carbon Load	Endcapped	USP Class No.	pH Range	Temperature Limits	Surface Area	Performance Standards	Application Standards
<b>RP mAb Polyphenyl</b> UPLC: 2.7 µm UHPLC: 2.7 µm HPLC: 2.7 µm		5.5 µmol/m <sup>2</sup>	0.95%	Yes	L11	2-7	Low pH = 90 °C High pH = 50 °C	22.2 m <sup>2</sup> /g	mAb Subunit Standard P/N: 186008927	mAb Subunit Standard P/N: 186008927
<b>SCX mAb</b> UPLC: 3 µm UHPLC: 3 µm HPLC: 3 µm		N/A	N/A	N/A	N/A	2-12	Recommended to maintain at 30 °C	Non porous	mAb Charge Variant Standard P/N: 186009057	mAb Charge Variant Standard P/N: 186009057

Specialty HPLC and UPLC Columns	Performance Benefits and Bonding	Performance Standards	Application Standards
BioSuite DEAE, SP, and CM (HPLC)	Protein-Pak Hi Res CM and SP (UPLC)	These series of cation- and anion-exchange columns include strong (SP) and weak (CM) cation - as well as strong (SP) and weak anion (DEAE) exchangers bonded to a pH stable (i.e., pH 2-12), methacrylic ester-based polymeric resin. They were developed and tested to maximize component resolution and recovery of various biomolecules that include proteins and peptides.	IEX Cation Test Standard P/N: 186006870 IEX Anion Test Standard P/N: 186006869