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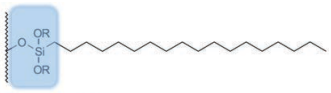
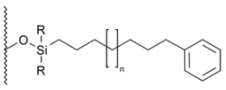
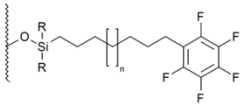
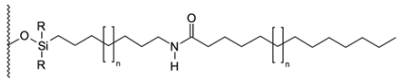
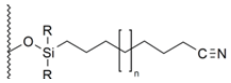
avantor™

Avantor® ACE®
Stationary phase guide

Avantor® ACE®

AVANTOR® ACE® NOVEL CHEMISTRIES

- Unique chemistries in our range. Excellent choices for method development and validation labs.
- Please ensure familiarity and use with the Avantor® ACE® **Specification Guide** and >500 application notes database (**https://uk.vwr.com/cms/chromatography_chrom_library**).
- Phase alternatives are based on selectivity behaviour and the hydrophobic subtraction model comparison of >750 columns from different manufacturers **(https://www.hplccolumns.org)**. It does not take into account differences/changes associated to pH, temperature, separation conditions, particle size, pore size, nor any column dimensions during comparisons.
- For further technical assistance/detail please contact **chromsupport@avantorsciences.com**. The technical team can also provide information on validation kits/multiple column batches.

Stationary Phase All chemistries are bonded onto ultra-inert porous spherical silica particles.	Name	Design: USP Type and pH range	Applications and Alternatives
 Proprietary Encapsulated Bonding Technology	SuperC18	C18 describes the 18-carbon unit alkyl chain bonded onto the silica surface, also known as octadecyl-silica (ODS). 'SuperC18' represents a proprietary design to withstand an extended pH range with high stability. USP Classification: L1 pH range 1.5–11.5	Applications: unique C18 phase to include during method development and column selectivity experiments, separations with pH switching or changes, or basic molecules that tail/poorly retained at low pH. A very versatile phase. For example, but not limited to: compounds that differ in hydrophobicity; basic compounds; nicotine and related substances; non-steroidal anti-inflammatory drugs; artificial sweeteners; food additives; hydroxychloroquine in whole (EDTA) blood; acrylamide; methacrylamide and methacrylic acid; permethrin cis- and trans-Isomers. Alternatives that are stable outside silica-based particles recommended pH range of 2-8: Acquity UPLC BEH C18, Aeris PEPTIDE XB-C18, Betasil C18, Fortis UniverSil HS C18, Gemini C18 110A, Luna Omega C18, Ultra C18, XBridge C18, XTerra MS C18, Zorbax Eclipse Plus C18, Zorbax Eclipse XDB-C18, Zorbax Extend C18.
	C18-AR	Specially designed ligand combining a C18 chain with an integral aromatic 'AR' functionality. Suitable for use in 100% aqueous mobile phases. USP Classification: L1 pH range 2–8	Applications: unique selectivity that combines C18 and phenyl selectivity characteristics. For example, but not limited to: substituted aromatics, isoflavanones; parabens; Favipiravir and Impurities; NDMA Impurity in Ranitidine; phytoestrogens; quinidine; quinine and their hydro-derivatives; thyroid hormones; mycotoxins; analgesics; itraconazole and hydroxyitraconazole in human whole blood; cotinine in fetal plasma. USP assay and impurities of mercury-based vaccines, hydrocortisone (cream, gels, ointments, suspensions, and tablets), glycine, barbiturates, aspirin, and caffeine capsules. Alternatives: Atlantis dC18, Atlantis T3, Betasil C18, Bondclone C18, COSMOSIL C18-AR-II, Hypersil Beta Basic-18, Genesis AQ 120A, Nucleosil 100 5 C18 HD, SepaxHP-C18.
	C18-PFP	Uniquely designed C18 ligand with an integrated pentafluoro phenyl (PFP) moiety for π-π bonding or electron or proton donor groups. Suitable for use in 100% aqueous mobile phases. USP Classification: L1 pH range 2–8	Applications: unique selectivity that combines C18 and PFP moiety's selectivity characteristics. For example, but not limited to: Remdesivir and impurity; catecholamines and metanephrines in urine; nitrosamines; corticosteroids; ethyl glucuronide; sennosides in traditional Chinese medicines; aminoglycosides; phenols and phenoxy acid herbicides; 25-hydroxy vitamin D in serum; metabolomics; and biochemical genetics assays e.g., acylglycines, vitamin B7 (Biotin), short-chain organic acids. USP assay for antifungal creams. Alternatives: Nucleodur PFP, Luna PFP(2), Pursuit PFP. Luna Omega C18, Nucleodur Isis, Sunshell C18, YMC-Triart C18.
	C18-Amide	C18 phase with an embedded amide group (please see ligand structure), suitable for use in 100% aqueous mobile phases. USP Classification: L60 pH range 2–8	Applications: specialty C18 phase for sample separations of molecules with a degree of hydrophobicity and varying polar embedded groups in their structure(s). For example, but not limited to: 4-tert-octylphenol monoethoxylate and 4-tert-octylphenol; caffeine; sweeteners and preservatives; acelofenac and paracetamol; antiseptics; phenolics; vitamin D2/D3; chocolate and wine analysis. Alternatives: Acquity UPLC CSH C18, Discovery Amide C16.
	CN-ES	A cyano-bonded phase with an extended alkyl chain spacer between the silica surface and the cyano group 'CN' for extra stability 'ES' and improved column lifetime. Suitable for use in 100% aqueous mobile phases. USP Classification: L10 pH range 2–8	Applications: suitable for both reversed phase and normal phase separations for molecules with dipole-dipole characteristics. For example, but not limited to: polar analytes; explosive analytes; steroids; aspirin and related substances; vitamin K. Alternatives: BetaBasic CN, Fortis Cyano, Hypurity Cyano, ProntoSIL 120 CN EC, Sepax HP-Cyano, Venusil XBP CN.

AVANTOR® ACE® TRADITIONAL CHEMISTRIES

- Robust, established column chemistries. Excellent choice as 'equivalent' columns for validated methods. Columns suitable for various USP designations. Opportunities to improve methods on older Type A silica columns by replacing with an Avantor® ACE® modern Type B silica.
- Please ensure familiarity and use with the Avantor® ACE® **Specification Guide** and >500 application notes database (**https://uk.vwr.com/cms/chromatography_chrom_library**).
- Phase alternatives are based on selectivity behaviour and the hydrophobic subtraction model comparison of >750 columns from different manufacturers (**https://www.hplccolumns.org**). It does not take into account differences/changes associated to pH, temperature, separation conditions, particle size, pore size, nor any column dimensions during comparisons.
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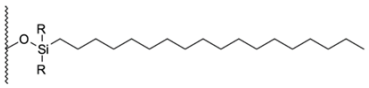
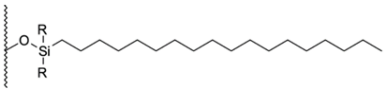
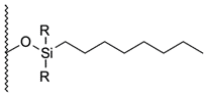
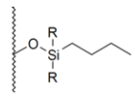
	C18	C18 describes the alkyl chain of 18 carbon units bonded onto the silica surface, also known as Octadecyl-silica (ODS). This classical C18 reversed-phase selectivity is manufactured using. High purity type B silica for excellent peak shape. USP Classification: L1 pH range 2 – 8	Applications: the most utilised phase for the majority of reversed phase (RP) separations, e.g., legacy methods, routine assays, method development. For samples that range from simple to complex matrices. For example, but not limited to vitamins – fat soluble, capsaicinoids, USP method – povidone impurity B, USP method povidone impurity A, USP method – minoxidil in topical solution, endogenous steroids, extractables and leachables, antioxidants, sunscreen agents, amoxicillin, antihistamines and expectorants, tricyclic antidepressants, pesticides, herbicides, water soluble vitamins. USP assays associated with dissolution, organic impurities, and uniformity of dosage units for medications in the form of tablets, capsules and injectables - please contact our Technical support team for full listing. Alternatives: Discovery C18, HyperClone BDS C18 130A, Hypersil ODS-2, Nucleosil C18, Onyx Monolithic C18, Zorbax StableBond 80A C18.
 Same C18 chemistry with a higher carbon load (HL)/ ligand density	C18-HL	A C18 phase with a higher ligand density 'HL' / higher carbon load relative to our traditional C18 phase. USP Classification: L1 pH range 2 – 8	Applications: C18 type phase that facilitates increased sample loading. For example, but not limited to process development workflows that require larger capacity separations, from analytical up to preparative scale separations, didanosine, biogenic amines and amino acids. Alternatives: DeltaPak C18 100A, HSS C18, Prodigy ODS(2)Pursuit XRs C-18, Shim-pack XR-ODS, Shim-pack XR-ODS II, Synergi Max-RP, Syncronis C18, Titan C18. Additional alternatives may include Luna C18(2) and Symmetry C18 – further discussion with our Technical support team is required.
	C8	Increased bonding density and relatively shorter alkyl chain length compared to our traditional C18 phase. USP Classification: L7 pH range 2 – 8	Applications: suitable for separations where analytes are too retentive on C18. For example, but not limited to USP monographs doxepin, metronidazole, benzothiazole and derivatives, fatty acids, amitriptyline hydrochloride tablets – organic impurities, benzothiazole and derivatives. USP dissolution test and organic impurity testing for pharmaceuticals/medicines in tablet, injectable and eye drop formulations. Alternatives: Acclaim 120 C8, Betasil C8, Accucore C8, Ascentis Express C8, Chromolith Performance RP-8e, Cortecs C8, Discovery C8, Genesis C8 120A, Genesis EC C8 120A, Halo C8, HyperClone BDS C8 130A, Hypersil GOLD C8, Hypurity C8, InertSustain, Swift C8, Kromasil 100 5 C8, Nucelosil 100-5-C8 HD, Poroshell 120 EC-C8, Partisil C8, Prevail C8, Primesil C8, ProntoSIL 120 C8 SH, Sunniest C8, TSKgel Octyl-80Ts, TSKgel Super-Octyl, Ultimate XB-C8, Ultra C8, Ultrasphere Octyl, Xbridge C8, Zorbax Eclipse XDB-C8, Zorbax StableBond 80A C8.
	C4	Relatively lower hydrophobicity and relatively shorter alkyl chain length compared to longer C18 and C8 alkyl chain phases. USP Classification: L26 pH range 2 – 8	Applications: hydrophobic interactions to a lesser degree compared to C8 phase. For example, but not limited to analysis of relatively smaller biomolecules such as peptides and proteins <5,000 Da in molecular weight, and phosphatidylethanol biomarker analysis. Alternatives: Hypersil GOLD C4, Accucore 150-C4Hypersil GOLD C4, HyPurity C4, ProntoSIL C4,Genesis C4 EC 120A, Kromasil 100 5 C4, Sepax-C4, Ultra C4.

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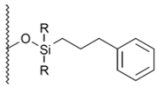
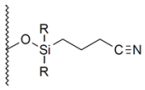
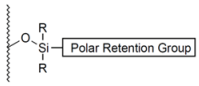
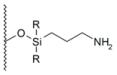
	Phenyl	Phenyl group with a short propyl alkyl chain spacer bonded onto the silica surface. Designed to offer a degree of hydrophobicity, aromatic selectivity and pi-pi interactions. USP Classification: L11 pH range 2 – 8	Applications: separations with substituted aromatics, phenyl and pi-pi groups that can exploit the aromaticity and pi-pi mechanisms of the phenyl phase e.g., stereoisomers, steroids and taxanes. For example, but not limited to paraben preservatives and flavonoids. USP assay and organic impurities of an antiplatelet medicine. Alternatives: Ascentis Phenyl, BetaBasic Phenyl, Fortis Phenyl, Genesis Phenyl, Hypersil GOLD Phenyl, Inertsil Ph-3, Luna Phenyl-Hexyl, ProntoSIL 120 Phenyl, TSKgel Super-Phenyl, Ultimate XB-Phenyl, Ultisil XB-Phenyl, Ultra Phenyl, Xbridge Phenyl, Xterra Phenyl, Zorbax XDB-Phenyl.
	CN	Cyano group (CN) bonded group with a short alkyl chain spacer, this phase offers dipole-dipole interactions. USP Classification: L10 pH range 2 – 7	Applications: recommended for the separation of polar molecules with dipole-dipole characteristics. Separation of compounds with double or triple bonds. For example, but not limited to nitroanilines, brompheniramine maleate, epanolol, beta blockers, paroxetine and desfluoro analogue, carglumic acid and methotrexate. USP dissolution testing of hypertension high blood pressure medicines. Alternatives: Discovery CN, Genesis CN 120A, Hypersil GOLD CN, Hypurity Cyano, Hypersil GOLD CN, Hypurity Cyano, InertSustain Cyano, LaChrom CN, Precision CN, SepaxHP-Cyano, Thermo CN, Ultra Cyano, Venusil XBP CN.
	AQ	Specially designed C18 type phase which is named 'AQ' to represent its 100% aqueous mobile phase compatibility. USP Classification: L1 pH range 2 – 8	Applications: separations that require separation/resolving power at the start of the chromatogram under reversed phase conditions (stability under 95-100% aqueous conditions). Unique C18-type phase that may offer resolution for the analysis of polar molecules, polar acids, bases, and neutrals. For example, but not limited to amino acids, maleic and fumaric acid, acetaminophen, l-cysteine and l-cystine, impurities in oxaliplatin related substances, and amoxicillin. Alternatives: Acclaim 120 C18, Aqua C18, Cogent HPS C18, HSS T3, Promosil C18, Purospher STAR RP18e, Ultimate AQ-C18, YMC Hydrosphere C18, YMC-Pack ODS-AQ.
	SIL	Silica phase compatible with normal phase conditions. USP Classification: L3 pH range 2 – 7	Applications: polar analyte separations that require normal phase chromatography conditions. For example, but not limited to lipids, fat-soluble vitamins, and tocopherols. Alternatives: comparable to other manufacturers silica phases. For further support please contact chromsupport@avantorsciences.com.
	NH_2	An amine-bonded phase (NH2) that can be operated under different mobile phase conditions: normal phase, HILIC and highly aqueous reversed phase separation conditions. USP Classification: L8 pH range 2 – 7	Applications: ideal for the analysis of sugars, or analytes requiring a versatile phase that can be used under different separation conditions. For example, but not limited to BP Monograph - lactulose solution and related substances, USP method for analysis of acarbose, alcohol biomarkers, monosaccharides, and disaccharides. Alternatives: comparable to other manufacturers amine-bonded phases. For further support please contact chromsupport@avantorsciences.com.

AVANTOR® ACE® ULTRACORE SMALL MOLECULE

- Columns offering higher throughput capabilities, faster assays without compromising performance or backpressure. Please note the solid core/superficially porous particle (SPP) architecture results in a decrease in hydrophobicity and sample loading characteristics relative to the fully porous particle of the same particle size.
- Please ensure familiarity and use with the Avantor® ACE® **Specification Guide** and >500 application notes database (**https://uk.vwr.com/cms/chromatography_chrom_library**).
- Phase alternatives are based on selectivity behaviour and the hydrophobic subtraction model comparison of >750 columns from different manufacturers **(https://www.hplccolumns.org)**. It does not take into account differences/changes associated to pH, temperature, separation conditions, particle size, pore size, nor any column dimensions during comparisons.
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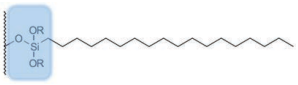
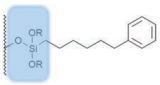
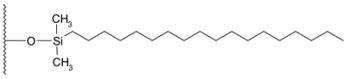
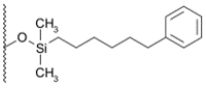
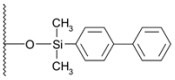
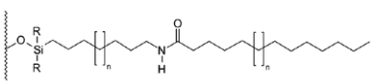
Solid Core Technology Avantor® ACE® Phases	**UltraCore**	**UltraCore is used to represent our solid core/SPP technology which contributes to a reduced porosity, retention, and loading capacity compared to fully porous particles (FPP) of the same particle size.**	SPP contributes towards lower backpressure and higher efficiency advantages at higher velocities compared to FPP of the same particle size often allowing analysts to speed up methods even on HPLC instrumentation with 400 bar pressure limits.
 Proprietary Encapsulated Bonding Technology	UltraCore SuperC18	C18 describes the 18 carbon unit alkyl chain bonded onto the silica surface, also known as Octadecyl-silica (ODS). 'SuperC18' represents a proprietary design to withstand an extended pH range with high stability - bonded on solid core technology. USP Classification: L1 pH range 1.5 – 11.0	Applications: Applications that can benefit from the SuperC18's extended pH stability and SPP advantages. For example, but not limited to: formaldehyde-DNPH; cytotoxic agents; pesticides; herbicides; biomarker profiling; 1;25-dihydroxyvitamins D2 and D3; neonicotinoids; USP Monographs: hydrocortisone; 17a-ethinylestradiol; estradiol; guaifenesin; naproxen; paracetamol/aspirin/caffeine. Alternatives that are stable outside silica-based particles recommended 2-8: Kinetex C18 100A, Kinetex EVO C18, Kinetex XB-C18, Poroshell 120 HPH C18. Additional Alternatives: Accucore XL C18, Shim-pack Velox C18.
 Proprietary Encapsulated Bonding Technology	UltraCore SuperPhenylHexyl	A phenyl hexyl (benzene ring and a hexyl alkyl chain spacer) proprietary design to withstand an extended pH range with high stability. Bonded on solid core technology. USP Classification: L11 pH range 1.5–11.0	Applications: extended pH stability for separations requiring a degree of hydrophobicity, aromatic, pi-pi interactions and the benefits of SPP. For example, but not limited to, catecholamines and their metabolites, pharmaceutically relevant mixtures separated at different pHs, water soluble vitamins, natural and artificial vanilla flavourings. Alternatives that are stable outside silica-based particles recommended 2-8: Kinetex Phenyl-Hexyl, Sunshell Phenyl.
	UltraCore C18	C18 describes the alkyl chain of 18 carbon units bonded onto the silica surface, also known as Octadecyl-silica (ODS). The C18 bonded on solid core technology. USP Classification: L1 pH range 2–8*	Applications: C18 separations with the additional advantages offered by SPP technology. For example, but not limited to, phthalates, nitrosamine contaminants in pharmaceutical and active pharmaceutical ingredients. Alternatives: Accucore C18, Accucore XL C18, Ascentis Express C18, Chromolith RP18e, Cortecs C18, Halo C18, Onyx Monolithic C18.
	UltraCore Phenylhexyl	An alternative phenyl phase bonded on SPP with an alkyl spacer chain for a combination of phenyl and short alkyl chain retention mechanisms. Please note limited pH range compared to our SuperC18 phase. USP Classification: L11 pH range 2–8*	Applications: separations that require an alternative phenyl selectivity, pi-pi interactions, a degree of alkyl selectivity (C6 spacer chain), with the additional advantages offered by SPP technology. For example, but not limited to, substituted aromatic compounds, water-soluble vitamins, metabolite profiling. Alternatives: Accucore Phenyl-Hexyl, Ascentis Express Phenyl-Hexyl, Halo Phenyl-Hexyl.
	UltraCore Biphenyl	Unique phenyl type phase with two phenyl groups phase bonded on SPP with no alkyl spacer chain. Best suited for mass spectrometry assays (EIC or selected ion monitoring to minimise background interferences). USP Classification: L11 pH range 2–8*	Applications: recommended for assays that require differing selectivity not offered by the other phases within our range and can benefit from the advantages of SPP technology. For example, but not limited to, benzimidazoles, pesticides, and nitrosamines. Alternatives: Accucore Biphenyl, Ascentis Express Biphenyl, Cortecs Phenyl, Halo Biphenyl, Kinetex Biphenyl 100A, Shim-pack Velox Biphenyl, SunShell Biphenyl.
	UltraCore C18-Amide	C18-amide phase (see description provided in the Novel Chemistries section) bonded on solid core technology. USP Classification: L60 pH range 2–8*	Applications: separations that require a C18-type phase and the ability to operate in highly aqueous conditions. Moreover, the additional benefits of SPP technology separations. For example, but not limited to, polar substituted aromatic compounds, phenolics, antioxidants, polar pesticides, and contaminants. Alternatives: Ascentis Express RP-Amide, Halo RP-Amide.

*Upper pH limit of 9 at 40°C.

AVANTOR® ACE® SEPARATION/APPLICATION SPECIFIC

- Avantor® ACE® HILIC phases are a great alternative for polar analytes that are difficult to resolve under typical reversed phase conditions.
- HTP-MS is an alternative facilitating increased productivity for higher throughput mass spectrometry assays.
- Our Method Development Kits (MDK) are cost effective alternatives for method development.
- Please ensure familiarity and use with the Avantor® ACE® **Specification Guide** and >500 application notes database **(https://uk.vwr.com/cms/chromatography_chrom_library)**.
- Phase alternatives are based on selectivity behaviour and the hydrophobic subtraction model comparison of >750 columns from different manufacturers **(https://www.hplccolumns.org)**. It does not take into account differences/changes associated to pH, temperature, separation conditions, particle size, pore size, nor any column dimensions during comparisons.
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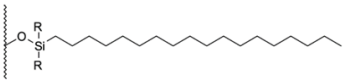
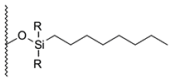
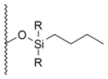
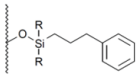
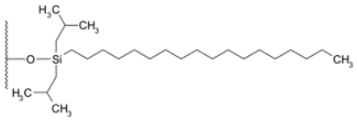
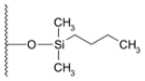
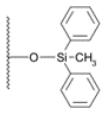
Avantor® ACE® HILIC Phases			
Proprietary SIL	HILIC-A	USP Classification: L3 pH range 2-7	Applications: HILIC separations that require cation exchange interactions with a silica phase. For example, but not limited to β-blockers, creatine and metabolite creatinine, neomycin, fluorodeoxyglucose and fluorodeoxysorbitol, linagliptin and metformin. Alternatives: silica phases for HILIC assays with a similar USP type.
Proprietary aminopropyl	HILIC-B	USP Classification: L8 pH range 2–7	Applications: HILIC separations that require anion exchange interactions with an aminopropyl-based phase. For example, but not limited to penicillins, fendizoic acid and related Compounds, and sugars. Alternatives: aminopropyl phases for HILIC assays with a similar USP type.
Proprietary polyhydroxy	HILIC-N	USP Classification: Pending pH range 2–7	Applications: HILIC separations that require low specific interactions with a polyhydroxy phase. For example, but not limited to caffeine and related compounds, adenine and nucleosides, nitrogenous bases, melamine, and related analytes. Alternatives: polyhydroxy type phases for HILIC assays.
Avantor® ACE® HTP-MS			
Proprietary	HTP-MS	Specifically designed for highly efficient ultra-fast LC-MS workflows. USP Classification: L1 pH range 2–8	Applications: High sample throughput (HTP) LC-MS assays. For example, but not limited to immunosuppressants, perfluorinated alkyl substances (PFAS), illicit drugs and non-steroidal anti-inflammatory drugs (NSAIDs). Alternatives: direct injection, guard cartridges or short length U/HPLC column.
Avantor® ACE® Method Development Kits (MDKs)			
Advanced MDK	3 column kit: C18, C18-AR, and C18-PFP.	Data for these columns are the same as the the individual column chemistries.	Applications: Column screening/method development with our unique C18-based phases. Please see analyte examples listed for the individual column chemistries. Cost-effective alternative to purchasing individual columns.
Extended MDK	3 column kit: SuperC18, C18-Amide, and CN-ES.	Data for these columns are the same as the the individual column chemistries.	Applications: Column screening/method development with our extended stability phases. Please see analyte examples listed for the individual column chemistries. Cost-effective alternative to purchasing individual columns
UltraCore MDK	2 column kit: SuperC18, and SuperPhenylHexyl.	Data for these columns are the same as the the individual column chemistries.	Applications: Column screening/method development with our extended pH solid core phases. Please see analyte examples listed for the individual column chemistries. Cost-effective alternative to purchasing individual columns.
HILIC MDK	3 column kit: HILIC-A, HILIC-B, and HILIC-N.	Data for these columns are the same as the the individual column chemistries.	Applications: Column screening/HILIC method development. Please see analyte examples listed for the individual column chemistries. Cost-effective alternative compared to purchasing individual columns.

AVANTOR® ACE® LARGE MOLECULE WIDE PORE & BIOMOLECULE SEPARATIONS

- Larger pore sizes for better access to the stationary phase for bulkier/larger biomolecules. Recommended for analytes over 5 kDa molecular weight.
- Dedicated application specific columns for oligonucleotide and glycan separations.
- Please note when considering Avantor® ACE® UltraCore the solid core/superficially porous particle architecture results in a decrease in hydrophobicity and sample loading characteristics relative to the fully porous particle of the same particle size.
- Please ensure familiarity and use with the Avantor® ACE® **Specification Guide** and >500 application notes database (**https://uk.vwr.com/cms/chromatography_chrom_library**).
- Phase alternatives are based on selectivity behaviour and the hydrophobic subtraction model (**https://www.hplccolumns.org**). The weighting factor for steric hindrance was adjusted from 83 to 300 for the comparison of >750 columns from different manufacturers. It does not take into account differences/changes associated to pH, temperature, separation conditions, particle size, pore size, nor any column dimensions during comparisons.
- For further technical assistance/detail please contact **chromsupport@avantorsciences.com**. The technical team can also provide information on validation kits/multiple column batches.

Stationary Phase All chemistries are bonded onto ultra-inert porous silica particles	Name	Design: USP Type and pH range	Applications and Alternatives
 Same bonded chemistry for our Avantor® ACE® Traditional phases on wide pore particles	C18-300	C18 bonded phase with an increased pore size compared to our traditional phase. USP Classification: L1 pH range 2–8	Applications: Wide 300 Å pores for improved access for larger or bulkier molecules to interact with the C18 ligands bonded in the porous structure of the stationary phase. For example, but not limited to: proteins; peptides; angiotensin peptides; olanzapine; insulin analogues; Trastuzumab and large molecular mass fractions. Alternatives: Acclaim300 C18, DeltaPak C18 300A, Hypersil Bio Basic-18, Jupiter 300 C18, ProntoSIL 300-5-C18 H, Proto 300 C18, Sepax Bio-C18, Symmetry 300 C18.
 Same bonded chemistry for our Avantor® ACE® Phases traditional phases on wide pore particles.	C8-300	C8 bonded phase with an increased pore size compared to our traditional phase. USP Classification: L7 pH range 2–8	Applications: Wide 300 Å pores for improved access for larger or bulkier molecules to interact with the C8 ligands bonded in the porous structure of the stationary phase. For example, but not limited to, snake venom and proteins and peptides requiring less hydrophobicity compared to the C18-300 phase. Alternatives: Biobond C8, Discovery BIO Wide pore C8, Hypersil Bio Basic-8, Inertsil WP300 C8, ProntoSIL 300 C8 SH, Sepax Bio-C8.
 Same bonded chemistry for our Avantor® ACE® Phases traditional phases on wide pore particles.	C4-300	C4 bonded phase with an increased pore size compared to our traditional phase. USP Classification: L26 pH range 2–8	Applications: Wide 300 Å pores for improved access for larger or bulkier molecules to interact with the C4 ligands bonded onto the fully porous particles. For example, but not limited to, preparative scale fractionation of α-lactalbumin and peptides and proteins requiring less hydrophobicity compared to the C8-300 phase. Alternatives: Aeris WIDEPORE XB-C4, BioBasic 4, Biobond C4, Jupiter 300 C4, Microsorb 300-5 C4, ProntoSIL 300 C4, SepaxBio-C4, Symmetry 300 C4, Triart Bio C4, Viva C4.
 Same bonded chemistry for our Avantor® ACE® Phases traditional phases on wide pore particles.	Phenyl-300	Phenyl bonded phase with an increased pore size compared to our traditional phase. USP Classification: L11 pH range 2–8	Applications: Wide 300 Å pores for improved access for larger or bulkier molecules to interact with the phenyl ligands bonded onto the fully porous particle. For example, but not limited to, peptides and proteins that can exploit the differing aromatic, pi-pi selectivity interactions of the phenyl moiety. Alternatives: comparable to competitors columns with a phenyl bonded ligand used specifically for biomolecule assays requiring better access with a relatively larger pore size.

Stationary Phase All chemistries are bonded onto ultra-inert silica particles	Name	Design: USP Type and pH range	Applications and Alternatives
Large Molecule Wide Pore Avantor® ACE® UltraCore Phases			
	UltraCore BIO C18	Superficially porous increased pore size particle with a C18 bonded moiety. USP Classification: L1 pH range 1 – 8	Applications: C18 type stationary phase for biomolecule separations that can exploit the backpressure and efficiency advantages offered by the solid-core wide pore-size. Available in pore-size 300 or 500 Å. For example, but not limited to higher throughput separations of proteins, peptides, tryptic digests of IgG and lysozyme. Alternatives: Halo ES-C18 400 Å.
	UltraCore BIO C4	Superficially porous increased pore size particle with a C4 bonded moiety. USP Classification: L26 pH range 2 – 9	Applications: Biomolecule separations with reduced hydrophobicity compared to the BIO C18 phase. Available in pore-size 300 or 500 Å. For example, but not limited to, higher throughput separations of proteins, peptides, tryptic digests of IgG and lysozyme. Alternatives: Halo C4 400 Å.
	UltraCore BIO Phenyl2	Superficially porous increased pore size particle with a phenyl bonded moiety. USP Classification: L11 pH range 2 – 9	Applications: Biomolecule separations that can exploit aromatic pi-pi interactions. Available in pore-size 300 or 500 Å. For example, but not limited to, higher throughput separations of proteins, peptides, tryptic digests of IgG and lysozyme. Alternatives: Halo Diphenyl 400 Å.
Avantor® ACE® Excel Oligo and Glycan Phases			
Proprietary	Oligo	Proprietary USP Classification: L1 pH range 1.5-11.5	Applications: Oligonucleotide separations. Alternatives: comparable to competitors columns used specifically for oligonucleotide related separations using reversed phase, ion pair, methodology.
Proprietary	Glycan	Proprietary USP Classification: Pending pH range 2-7	Applications: Cleaved Glycan separations. Alternatives: to competitors columns used specifically for glycan-related separations in HILIC mode.
Avantor® ACE® Method Development Kits (MDKs)			
ACE Biomolecule MDK	3 column kit: C18-300, C4-300, and Ph-300.	Data for these columns are the same as the the individual column chemistries.	Applications: Column screening/method development for biomolecule separations with fully porous wider pore-size particles. Please see analyte examples listed for the individual column chemistries. Cost-effective alternative to purchasing individual columns.