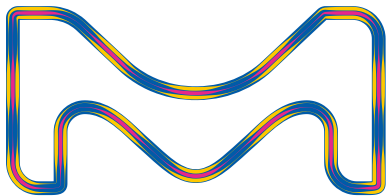


Biochromatography Portfolio Guide

Bulk Resin, Membranes and Prepacked Columns



The Life Science business of Merck
operates as MilliporeSigma in the U.S.
and Canada.

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Media Type	Product Description	Ligand	Application/Benefits	Product Characteristics	Prepacked columns/Devices	Catalog No.	Bulk Media	Catalog No.
Protein A affinity chromatography	Eshmuno® A resin Base matrix: Hydrophilic Polyvinyl Ether	Merck proprietary ligand recombinantly expressed in <i>E. coli</i>	<ul style="list-style-type: none"> Primary capture of Fc-containing antibodies High capacity and good caustic stability 	<ul style="list-style-type: none"> Mean particle size d_{50}: 50 μm Protein binding capacity: 40–55 mg/mL at 3–6 min RT and 5% breakthrough for mAbs pH stability range: 1.5–13.5 Pressure limit: 8 bar Linear flow rate: >500 cm/hr 	MiniChrom Columns: 1 mL (8 × 20 mm) 5 mL (8 × 100 mm) RoboColumns®: 0.2 mL (5 × 10 mm) 0.6 mL (5 × 30 mm)	1251600001 1251610001 1251620001 1251630001	10 mL 100 mL 500 mL 5 L	1200890010 1200890100 1200890500 1200895000
	Eshmuno® P anti-A and Eshmuno® P anti-B resin Base matrix: Hydrophilic Polyvinyl Ether	Trisaccharide blood group antigens (A or B)	<ul style="list-style-type: none"> Plasma derived immunoglobulin production Effective removal of anti A/B antibodies 	<ul style="list-style-type: none"> Particle size d_{50}: 50 μm pH stability range: 1.5–13.5 Pressure limit: 8 bar Linear flow rate: >500 cm/hr >75% removal of anti-A and anti-B 			Anti-A 10 mL 100 mL 500 mL 5 L Anti-B 10 mL 100 mL 500 mL 5 L	1200940010 1200940100 1200940500 1200945000 1200950010 1200950100 1200950500 1200955000
Affinity chromatography	Eshmuno® Fit Base matrix: Hydrophilic Polyvinyl Ether	Custom ligand based on Nanofitin® technology	<ul style="list-style-type: none"> Custom affinity resins for vaccines or other difficult-to-purify molecules 	<ul style="list-style-type: none"> Particle size d_{50}: 50 or 90 μm Product characteristics designed during the custom affinity resin development stage	Designed during the custom affinity resin development stage		Custom	Custom

* Nanofitin® is a registered trademark of Affilogic.

Media Type	Product Description	Ligand	Application/Benefits	Product Characteristics	Prepacked columns/Devices	Catalog No.	Bulk Media	Catalog No.
Strong anion exchangers (AEX)	Eshmuno® Q resin Base matrix: Hydrophilic Polyvinyl Ether	TMAE Trimethylammoniumethyl	<ul style="list-style-type: none"> Flow through polishing of mAbs Purification of viral vectors Nucleic acid, endotoxin and virus removal Good separation at high flow rates Plasmid DNA capture 	<ul style="list-style-type: none"> Mean particle size: d₅₀ 85 µm Protein binding capacity: ~150 mg BSA/ml of gel pH stability range (working): 2–12 pH stability range (CIP): 0–14 Pressure limit: 8 bar Linear flow rate: up to ~1000 cm/h <2.5 bar net pressure 	MiniChrom Columns: 1 mL (8 × 20 mm) 5 mL (8 × 100 mm)	1250650001 1250740001	10 mL 100 mL 500 mL 5 L	1200790010 1200790100 1200790500 1200795000
	Fractogel® EMD TMAE (M) resin Base matrix: Methacrylate		<ul style="list-style-type: none"> Protein purification DNA, virus and endotoxin removal Plasmid and vaccine production Efficient separation of closely related species 	<ul style="list-style-type: none"> Particle size: 40–90 µm Protein binding capacity: ~100 mg BSA/mL of gel pH stability range (working): 2–12 pH stability range (CIP): 0–14 Pressure limit: 8 bar Linear flow rate: up to ~240 cm/h 	MiniChrom Columns: 1 mL (8 × 20 mm) 5 mL (8 × 100 mm)	1250540001 1250690001	10 mL 100 mL 500 mL 5 L	1168810010 1168810100 1168810500 1168815000
	Fractogel® EMD TMAE (S) resin Base matrix: Methacrylate		<ul style="list-style-type: none"> Particle size: 20–40 µm Protein binding capacity: ~100 mg BSA/mL of gel pH stability range (working): 2–12 pH stability range (CIP): 0–14 Pressure limit: 8 bar Linear flow rate: up to ~80 cm/h 	MiniChrom Columns: 1 mL (8 × 20 mm) 5 mL (8 × 100 mm)	1250570001 1250710001	10 mL 100 mL 500 mL 5 L	1168870010 1168870100 1168870500 1168875000	
	Fractogel® EMD TMAE Hicap (M) resin Base matrix: Methacrylate		<ul style="list-style-type: none"> Particle size: 40–90 µm Protein binding capacity: ~180 mg BSA/mL of gel pH stability range (working): 2–12 pH stability range (CIP): 0–14 Pressure limit: 8 bar Linear flow rate: up to ~180 cm/h 	MiniChrom Columns: 1 mL (8 × 20 mm) 5 mL (8 × 100 mm)	1250550001 1250700001	10 mL 100 mL 500 mL 5 L	1103160010 1103160100 1103160500 1103165000	
	Fractogel® EMD TMAE Medcap (M) resin Base matrix: Methacrylate		<ul style="list-style-type: none"> Particle size: 40–90 µm Protein binding capacity: ~150 mg BSA/mL of gel pH stability range (working): 2–12 pH stability range (CIP): 0–14 Pressure limit: 8 bar Linear flow rate: up to ~180 cm/h 	MiniChrom Columns: 1 mL (8 × 20 mm) 5 mL (8 × 100 mm)	1250560001 1250780001	10 mL 100 mL 500 mL 5 L	1168850010 1168850100 1168850500 1168855000	
Natrix® Q membrane adsorber Base matrix: Porous polyacrylamide	Quaternary amine	<ul style="list-style-type: none"> Flow through polishing of mAb feeds Removal of endotoxins, viruses, HCP and nucleic acids Very rapid and high loading capacities compared to resins Plasmid DNA capture 	<ul style="list-style-type: none"> Nominal pore size: 0.4 µm Protein binding capacity: >200 mg BSA/mL of membrane Flow rate: 5–25 membrane volume per minute (2.4–12 seconds residence time) Pressure limit: 5 bar 	Natrix® Q Micro (0.2 mL) Natrix® Q Pilot (15 mL) Natrix® Q Process 150 (115 mL) Natrix® Q Process 600 (460 mL)	NXF-00 NXF-10 NXF-20 NXF-50			

Media Type	Product Description	Ligand	Application/Benefits	Product Characteristics	Prepacked columns/Devices	Catalog No.	Bulk Media	Catalog No.
Weak anion exchangers (AEX)	Fractogel® EMD DEAE (M) resin Base matrix: Methacrylate	DEAE Diethylaminoethyl	<ul style="list-style-type: none"> Protein purification Plasma and vaccine production Plasmid DNA intermediate purification or polishing Fine separations of closely related species 	<ul style="list-style-type: none"> Particle size: 40–90 µm Protein binding capacity: ~100 mg BSA/mL of gel pH stability range (working): 2–13 pH stability range (CIP): 0–14 Pressure limit: 8 bar Linear flow rate: up to ~170 cm/h 	MiniChrom Columns: 1 mL (8 × 20 mm) 5 mL (8 × 100 mm)	1250580001 1250790001	10 mL 100 mL 500 mL 5 L	1168830010 1168830100 1168830500 1168835000
	Fractogel® EMD DMAE (M) resin Base matrix: Methacrylate	DMAE Dimethylaminoethyl	<ul style="list-style-type: none"> Protein purification Plasma and vaccine production Plasmid DNA intermediate purification or polishing Fine separations of closely related species 	<ul style="list-style-type: none"> Particle size: 40–90 µm Protein binding capacity: ~100 mg BSA/mL of gel pH stability range (working): 2–13 pH stability range (CIP): 0–14 Pressure limit: 8 bar Linear flow rate: up to ~170 cm/h 	MiniChrom Columns: 1 mL (8 × 20 mm) 5 mL (8 × 100 mm)	1250590001 1250800001	10 mL 100 mL 500 mL 5 L	1168840010 1168840100 1168840500 1168845000
Strong cation exchangers (CEX)	Eshmuno® CPX resin Base matrix: Hydrophilic Polyvinyl Ether	SO ₃ Sulfoisobutyl	<ul style="list-style-type: none"> Intermediate or polishing purification of mAbs or other recombinant proteins High mAb aggregate removal efficiency and high dynamic binding capacity Separation of monoclonal antibodies variants (e.g. charge and glycovariants) Wide pH and conductivity operating window 	<ul style="list-style-type: none"> Mean particle size d₅₀: 50 µm Protein binding capacity: ~120 mg lysozyme/mL of gel pH stability (working): 2–12 pH stability range (CIP): 0–14 Pressure limit: 8 bar Linear flow rate: up to ~500 cm/h (<3.0 bar net pressure) 	MiniChrom Columns: 1 mL (8 × 20 mm) 5 mL (8 × 100 mm)	1251560001 1251570001	10 mL 100 mL 500 mL 5 L	1200830010 1200830100 1200830500 1200835000
	Eshmuno® CP-FT resin Base matrix: Hydrophilic Polyvinyl Ether		<ul style="list-style-type: none"> Frontal mode purification of mAbs Removal of aggregates Frontal mode operation enables very high loading capacities 	<ul style="list-style-type: none"> Mean particle size d₅₀: 50 µm Protein binding capacity: ~80 mg lysozyme/mL of gel pH stability (working): 2–12 pH stability range (CIP): 0–14 Pressure limit: 8 bar Linear flow rate: up to ~400 cm/h (<3.0 bar net pressure) 	MiniChrom Columns: 0.2 mL (5 × 10 mm) 1 mL (8 × 20 mm) 5 mL (8 × 100 mm)	1251700001 1251680001 1251690001	10 mL 100 mL 500 mL 5 L	1200930010 1200930100 1200930500 1200935000

Media Type	Product Description	Ligand	Application/Benefits	Product Characteristics	Prepacked columns/Devices	Catalog No.	Bulk Media	Catalog No.
Strong cation exchangers (CEX)	Eshmuno® CPS resin Base Matrix: Hydrophilic Polyvinyl Ether	SO ₃ ⁻ Sulfisobutyl	<ul style="list-style-type: none"> Intermediate or polishing purification of recombinant proteins Salt tolerant 	<ul style="list-style-type: none"> Mean Particle Size d₅₀: 50 µm Protein binding capacity: ~160 mg lysozyme/mL of gel pH stability (working): 2–12 pH stability range (CIP): 0–14 Pressure limit: 8 bar Linear flow rate: up to ~500 cm/h (<3.0 bar net pressure) 	MiniChrom Columns: 1 mL (8 × 20 mm) 5 mL (8 × 100 mm)	1251640001 1251650001	10 mL 100 mL 500 mL 5 L	1200840010 1200840100 1200840500 1200845000
	Fractogel® EMD SO₃⁻ (M) resin Base matrix: Methacrylate		<ul style="list-style-type: none"> Capture, intermediate purification or polishing of recombinant proteins Separation of mAb aggregates, HCP and virus removal 	<ul style="list-style-type: none"> Particle size: 40–90 µm Protein binding capacity: ~130 mg lysozyme/mL of gel pH stability range (working): 1–13 pH stability range (CIP): 0–14 Pressure limit: 8 bar Linear flow rate: up to ~200 cm/h 	MiniChrom Columns: 1 mL (8 × 20 mm) 5 mL (8 × 100 mm)	1250610001 1250720001	10 mL 100 mL 500 mL 5 L	1168820010 1168820100 1168820500 1168825000
	Fractogel® EMD SO₃⁻ (S) resin Base matrix: Methacrylate		<ul style="list-style-type: none"> Protein purification where high levels of selectivity and separation are required 	<ul style="list-style-type: none"> Particle size: 20–40 µm Protein binding capacity: ~150 mg lysozyme/mL of gel pH stability range (working): 1–13 pH stability range (CIP): 0–14 Pressure limit: 8 bar Linear flow rate: up to ~80 cm/h 	MiniChrom Columns: 1 mL (8 × 20 mm) 5 mL (8 × 100 mm)	1251810001 1251820001	10 mL 100 mL 500 mL 5 L	1168900010 1168900100 1168900500 1168905000
	Fractogel® EMD SE Hicap (M) resin Base matrix: Methacrylate	SO ₃ ⁻ Sulfoethyl	<ul style="list-style-type: none"> Capture, intermediate purification or polishing of recombinant proteins High dynamic binding capacity 	<ul style="list-style-type: none"> Particle size: 40–90 µm Protein binding capacity: ~160 mg lysozyme/mL of gel pH stability range (working): 1–13 pH stability range (CIP): 0–14 Pressure limit: 8 bar Linear flow rate: up to ~220 cm/h 	MiniChrom Columns: 1 mL (8 × 20 mm) 5 mL (8 × 100 mm)	1250600001 1250810001	10 mL 100 mL 500 mL 5 L	1148940010 1148940100 1148940500 1148945000

Media Type	Product Description	Ligand	Application/Benefits	Product Characteristics	Prepacked columns/Devices	Catalog No.	Bulk Media	Catalog No.
Weak cation exchangers (CEX)	Fractogel® EMD COO- (M) resin Base matrix: Methacrylate	COO- Carboxyethyl	<ul style="list-style-type: none"> Capture, intermediate purification or polishing of recombinant proteins Fine separations of closely related species, including difficult to remove mAb aggregates and variants 	<ul style="list-style-type: none"> Particle size: 40–90 µm Protein binding capacity: ~100 mg lysozyme/mL of gel pH stability range (working): 1–12 pH stability range (CIP): 0–14 Pressure limit: 8 bar Linear flow rate: up to ~300 cm/h 	MiniChrom Columns: 1 mL (8 × 20 mm) 5 mL (8 × 100 mm) RoboColumns®: 0.2 mL (5 × 10 mm) 0.6 mL (5 × 30 mm)	1250620001 1250820001 1251480001 1251540001	10 mL 100 mL 500 mL 5 L	1168860010 1168860100 1168860500 1168865000
Mixed-mode cation exchange media (CEX)	Eshmuno® CMX Base matrix: Hydrophilic Polyvinyl Ether	COO-(weak cation exchange) and alkyl-functional groups	<ul style="list-style-type: none"> ADC DAR variant separation Bispecific mAb purification and polishing High selectivity for difficult to separate species 	<ul style="list-style-type: none"> Mean particle size d_{50}: 50 µm Protein binding capacity: 60 mg pIgG/mL packed resin pH stability range (working): 2–12 pH stability range (CIP): 0–14 Pressure limit: 8 bar Linear flow rate: up to 300 cm/h 	MiniChrom Columns: 1 mL (8 × 20 mm) 5 mL (8 × 100 mm) RoboColumns®: 0.2 mL (5 × 10 mm) 0.6 mL (5 × 30 mm)	1251850001 1251860001 1251870001 1251880001	10 mL 100 mL 500 mL 5 L	1206500010 1206500100 1206500500 1206505000
CEX High salt-tolerant (mixed mode chromatography)	Eshmuno® HCX resin Base matrix: Hydrophilic Polyvinyl Ether	Sulfo + carboxy + phenyl	<ul style="list-style-type: none"> Removal of challenging contaminants in bind-and-elute or flow through mode 	<ul style="list-style-type: none"> Mean particle size d_{50}: 85 µm Protein binding capacity: ~50 mg pIgG/mL of gel pH stability range (working): 2–12 pH stability range (CIP): 2–14 Pressure limit: 8 bar Linear flow rate: up to ~1000 cm/h (<2.5 bar net pressure) 	MiniChrom Columns: 1 mL (8 × 20 mm) 5 mL (8 × 100 mm) RoboColumns®: 0.2 mL (5 × 10 mm) 0.6 mL (5 × 30 mm)	1250660001 1250750001 1251340001 1251420001	10 mL 100 mL 500 mL 5 L	1200870010 1200870100 1200870500 1200875000
Immobilized metal affinity chromatography (IMAC)	Fractogel® EMD Chelate (M) resin Base matrix: Methacrylate	Iminodiacetic acid	<ul style="list-style-type: none"> Capture of his-tagged proteins 	<ul style="list-style-type: none"> Particle size: 40–90 µm Protein binding capacity: ~60 mg lysozyme/mL of gel Metal ion binding capacity: ~75 µmol copper/mL of gel pH stability range (working): 1–12 pH stability range (CIP): 0–14 Pressure limit: 8 bar Linear flow rate: up to ~240 cm/h 	MiniChrom Columns: 1 mL (8 × 20 mm) 5 mL (8 × 100 mm) RoboColumns®: 0.2 mL (5 × 10 mm) 0.6 mL (5 × 30 mm)	1250630001 1250830001 1251490001 1251550001	10 mL 100 mL 250 mL 500 mL 5 L	1103380010 1103380100 1103380250 1103380500 1103385000
Mixed-mode cation exchange	Natrix® CH membrane adsorber Base matrix: Macroporous Polymer	Sulfonic acid and t-butyl	<ul style="list-style-type: none"> Purification of mAbs Capable of operating in frontal mode Very rapid and high loading capacity compared to resins 	<ul style="list-style-type: none"> Nominal pore size: 1 µm Protein binding capacity: >90 mg Lysozyme/mL of membrane Flow rate: ≤10 MV/min 	Natrix® CH Micro (1 mL) (2/pack) Natrix® CH Micro (1 mL) (10/pack) Natrix® CH Bench (8.8 mL)	NXCH002MCR NXCH010MCR NXCH001BEN		
Size exclusion chromatography (SEC)	Fractogel® EMD BioSEC (S) resin Base matrix: Methacrylate	Modified pore structure	<ul style="list-style-type: none"> Separation of proteins in the range between 5 kDa and 1000 kDa 	<ul style="list-style-type: none"> Particle size: 20–40 µm pH stability range (working): 1–12 pH stability range (CIP): 0–14 Pressure limit: 8 bar Linear flow rate: up to 100 cm/h 			150 mL 250 mL 5 L	1103170150 1103170250 1103175000

Media Type	Product Description	Ligand	Application/Benefits	Product Characteristics	Prepacked columns/Devices	Catalog No.	Bulk Media	Catalog No.
Normal-phase and reversed-phase chromatography	PharmPrep™ P100 sorbent Base matrix: Spherical silica gel particles	Si 100, 10 µm, 20 µm RP-18e, 10 µm, 20 µm RP-8e, 10 µm	<ul style="list-style-type: none"> Peptides (insulin), APIs, antibiotics, intermediates 	<ul style="list-style-type: none"> Spherical high-performance sorbent Mean pore size: 10 nm Pressure PharmPrep™ P Si 100 ≤25 bar (10 µm), ≤10 bar (20 µm) Pressure PharmPrep™ P100 RP-18e ≤40 bar (10 µm), ≤25 bar (20 µm) Pressure PharmPrep™ P100 RP-8e ≤40 bar (10 µm) 	Hibar® RT 250 x 4.6 mm Scout columns PharmPrep™ P100 RP-18e, 10 µm PharmPrep™ P100 RP-18e, 20 µm PharmPrep™ P100 RP-8e, 10 µm PharmPrep™ P100 RP-8e, 10 µm, 3 pieces HIBAR® columns 250 x 25 mm* PharmPrep™ P100 RP-18e, 10 µm PharmPrep™ P100 RP-18e, 20 µm PharmPrep™ P100 RP-8e, 10 µm	1205710001 1205720001 1205940001 1205940003 1205730001 1205740001 1205880001	PharmPrep™ P Si 100, 10 µm PharmPrep™ P Si 100, 20 µm PharmPrep™ P100 RP-18e, 10 µm PharmPrep™ P100 RP-18e, 20 µm PharmPrep™ P100 RP-8e, 10 µm Validation kit (3 x 100 g) PharmPrep™ P100 RP-8e, 10 µm Validation kit PharmPrep™ P100 RP-18e, 10 µm Validation kit PharmPrep™ P100 RP-18e, 20 µm	119681 119682 119995 119996 119132 1191320003 1199950003 1199960003
	LiChroprep® sorbent Base matrix: Irregular-shaped silica gel particles	Si 60, RP-8, RP-18	<ul style="list-style-type: none"> APIs, antibiotics, steroids, intermediates, natural products 	<ul style="list-style-type: none"> Irregular-shaped silica gel particles 15–25 µm, 25–40 µm, 40–63 µm Mean pore size of RP-18, RP-8: 10 nm Mean pore size of Si 60: 6 nm 	Ready to use columns for preparative chromatography HIBAR® prepacked columns 250 x 25 mm, 250 x 50 mm	On demand	LiChroprep® sorbent Si 60, 15–25 µm LiChroprep® sorbent Si 60, 25–40 µm LiChroprep® sorbent Si 60, 40–63 µm LiChroprep® sorbent RP-8, 40–63 µm LiChroprep® sorbent RP-18, 15–25 µm LiChroprep® sorbent RP-18, 25–40 µm LiChroprep® sorbent RP-18, 40–63 µm	109336 109390 113905 109362 113901 109303 113900

Notes: Normal/reversed phase chromatography resins and silica gel cat. no. needs to be complemented by the 4-digit volume indication: 10 g: 0010; 100 g: 0100; 1000 g: 1000; 5000 g: 5000. Aluminium oxide: cat. no. needs to be complemented by the 4-digit volume indication. 1 kg: 1000; 2 kg: 2000; 5 kg: 5000; 20 kg: 9020; 50 kg: 9050.

Media Type	Product Description	Ligand	Application/Benefits	Product Characteristics	Prepacked columns/Devices	Catalog No.	Bulk Media	Catalog No.
Normal phase/reversed phase chromatography and silica gel	Silica gel Base matrix: Irregular-shaped silica gel particles	Si 60, Silanized	<ul style="list-style-type: none"> Natural ingredients, vitamins, fine chemicals 	<ul style="list-style-type: none"> For normal-phase chromatography, filtration, flash chromatography Particle size: 15–40 µm 35–70 µm 40–63 µm 63–200 µm 200–500 µm Mean pore size: 6 nm 	Ready to use columns for preparative chromatography HIBAR® prepacked columns 250 × 25 mm, 250 × 50 mm	On demand	Silica gel Si 60, 15–40 µm Silica gel Si 60, 40–63 µm Silica gel Si 60, 63–100 µm Silica gel Si 60, 63–200 µm Silica gel Si 60 silanized, 63–200 µm Silica gel Si 60 extra pure, 63–200 µm Silica gel Si 60, 200–500 µm	115111 109385 115101 107734 107719 107754 107733
	Aluminium oxide Base matrix: Irregular-shaped aluminium oxide particles	≥60 active basic, ≥90 active acidic, 90 active neutral, 90 active basic, 90 standardized, 150 basic	<ul style="list-style-type: none"> Intermediates, antibiotics, removal of polar organic compounds, fine chemicals 	<ul style="list-style-type: none"> For normal-phase chromatography High pH stability in the alkaline range. Anion and cation properties Mean pore size: 6 nm/9 nm/15 nm Activity grades according to Brockmann <ul style="list-style-type: none"> Activity grade I: Aluminium oxide 60, active basic Aluminium oxide 90, active basic Aluminium oxide 90 active neutral Aluminium oxide 90, active acidic Activity grade I–II: Aluminium oxide 150, basic Activity grade II–III: Aluminium oxide 90, standardized 				Aluminium Oxide 60, active basic, 63–200 µm Aluminium Oxide 90, active acidic, 63–200 µm Aluminium Oxide 90, active neutral, 63–200 µm Aluminium Oxide 90, active basic, 63–200 µm Aluminium Oxide 90, standardized, 63–200 µm Aluminium Oxide 150, basic, 63–200 µm

Notes: Normal/reversed phase chromatography resins and silica gel cat. no. needs to be complemented by the 4-digit volume indication: 10 g: 0010; 100 g: 0100; 1000 g: 1000; 5000 g: 5000. Aluminium oxide: cat. no. needs to be complemented by the 4-digit volume indication. 1 kg: 1000; 2 kg: 2000; 5 kg: 5000; 20 kg: 9020; 50 kg: 9050.

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