Sartobind® Membrane Chromatography

Simplifying Progress

SARTORIUS

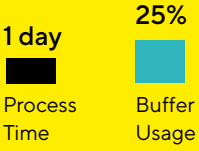
A Rising Star in Bioprocessing

The macroporous membrane structure and optimized design of the Sartobind® membrane adsorbers enable efficient and ultra-rapid chromatographic purification. As a result, Sartobind® is an economical solution for bioprocessing challenges and an asset for your purification platform.

Membrane Adsorber

Valuable Time and Resource Savings

- Processes for recombinant proteins are 4 times faster with Sartobind®
- A Sartobind® membrane adsorber uses 75% less buffer, saving you time and money.



High Binding Capacity

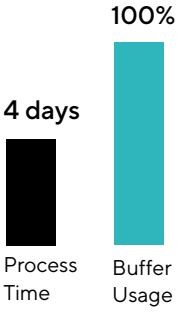
Sartobind® membranes have a pore size of > 3 µm. This allows large proteins, bioparticles and viruses or virus like particles to enter the macro-porous membrane structure.

Consequently, Sartobind® membrane adsorbers have a 10-times higher binding capacity for viruses, and about 200 times more polishing capacity than traditional chromatography columns.

Traditional Chromatography

Loss of Time and Resources

- Traditional column chromatography is slow in purifying recombinant proteins.
- They waste considerable buffer resources.



Low Binding Capacity

Conventional column beads have a pore size < 100 nm. Small pores limit the access of large molecules to internal binding sites, resulting in a low binding capacity for large biomolecules, blood factors and viruses or virus-like particles. In addition, columns are operated at 10 to 30 times lower flow rates than membrane adsorbers.

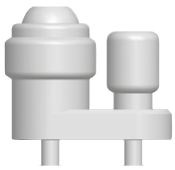
Discover the Favorable Performance and Economics of Sartobind® Membrane Chromatography

Compact Footprint
Compared with a column or an ultra-centrifuge, a Sartobind® capsule or cassette system is much more compact and easier to set up and use. As a result, it requires less lab space and can be conveniently and accurately scaled up.

- Disposable or reusable
- No hardware investments

Large and Expensive Equipment
Chromatographic columns have a limited loading capacity for polishing and virus capture. Furthermore, they are large and have a high investment cost.

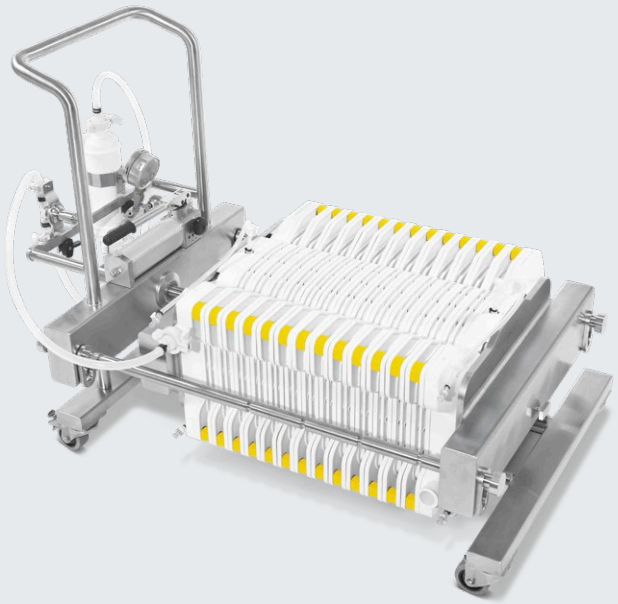
Likewise, expensive ultracentrifuges are difficult to scale and complex to operate.



Size Limit Exceeded with Sartobind® Cassettes
New design eliminates the 5 L size limitation for membrane adsorbers and offers simple scale up to 100 L membrane volume due to its modular nature.

γ-irradiated

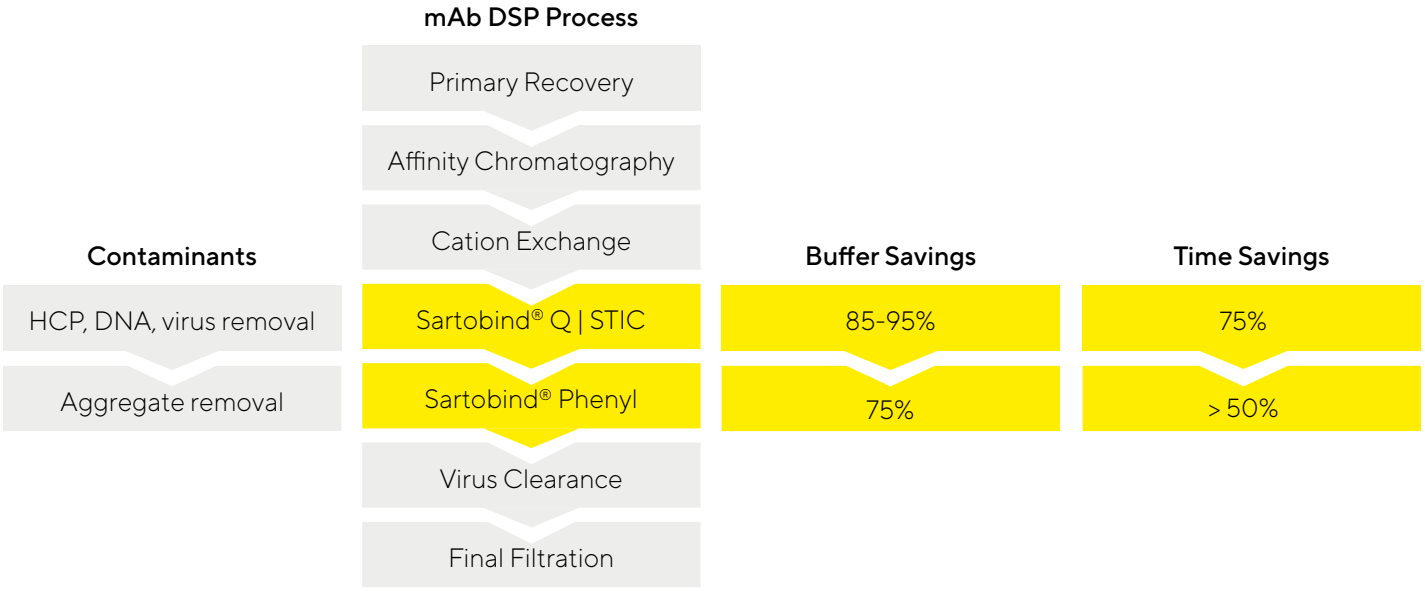
Sterile Validated Q Anion Exchangers
Virus purification processes that cannot utilize sterile filtration prior to filling due to virus size and continuous manufacturing especially benefit.



Contaminant Removal

Buffer and Time Savings

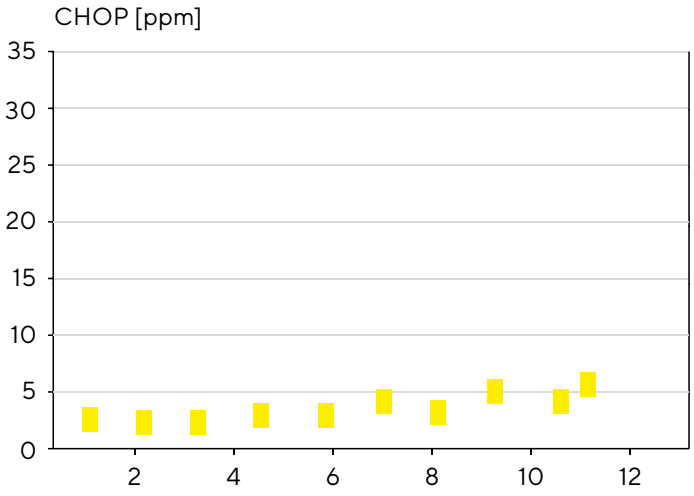
In a downstream process for the production of monoclonal antibodies, the flow-through polishing steps by membrane chromatography have a huge impact on process time and buffer consumption[1,2] compared to oversized columns[3]. Savings of > 60% in cost of goods can be realized when utilizing membrane adsorbers in polishing processes[4].



[1] Zhou, J.X., Tressel, T., Membrane Chromatography as a Robust Purification System for Large-Scale Antibody Production, BioProcess Int. 09, 2005, 32–37
[2] Smith, M., A CMO's View on Platform Technologies, Presentation, 9th European Downstream Technology Forum 10-11 Sept. 2013, Sartorius College, Goettingen, Germany
[3] Knudsen, H., et al. Membrane Ion Exchange Chromatography for Process-Scale Antibody Purification, J. Chromatography A 907, 2001, 145–154
[4] Lim, J.A.C. et al. Economic Benefits of Single-Use Membrane Chromatography in Polishing, A Cost of Goods Model, BioProcess Int., 5(2), 2007, 48-58

Less Process Steps (No Dilution)

Sartobind STIC® was developed for removing HCP at high salt conditions (up to 15 mS/cm). A dilution step after the cation exchange step like in a typical mAb process is not necessary and can be skipped. No investment in holding tanks is needed.



Host cell protein removal from a mAb process: pH 7, 300 ppm HCP load, Sartobind STIC® PA pico 0.08 mL, loading up to 10 kg mAb/L[1,2]

Application Notes:

[1] Host cell protein removal with Sartobind STIC® PA pico, order no. 85032-541-30

[2] Host cell protein removal, A comparison between Sartobind STIC® PA and Sartobind® Q, order no. 85032-540-18

High Flow Rates Combined With High Loading Capacity

The use of conventional chromatography columns for flow-through (FT) anion exchange chromatography requires high flow rates. Optimized production columns need a certain diameter and bed height to achieve high throughput and therefore have a large bed volume. That is the reason why columns are typically oversized.

The high flow rate of the membrane is combined with a large frontal surface and small bed height resulting in very high throughput while keeping the bed volume small. Typical process data show that in flow-through mode protein loading can be two orders of magnitutde higher with membrane adsorbers than with columns.

	Q Resin	Q Membrane Adsorber
Flow rate	100 - 150 cm/h	450 - 600 cm/h
Protein loading (flow-through)	50 - 100 g/L	> 3,000 g/m^2 or > 10.9 kg/L
Buffer used	100%	5%
Cleaning validation	Yes	No

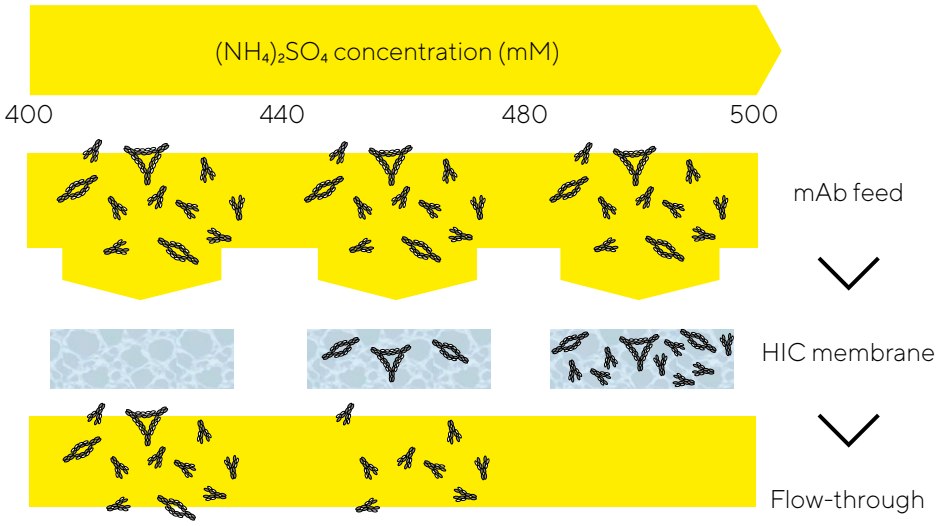
Zhou, J.X., Tressel, T., Membrane Chromatography as a Robust Purification System for Large-Scale Antibody Production, BioProcess Int. 09, 2005, 32–37.

Boost Your mAb Process by Flow-Through Aggregate Removal

The large pores of Sartobind® Phenyl allow better accessibility for large molecules to the phenyl groups Smaller membrane volume and 75% less buffer consumption results in considerable cost savings.

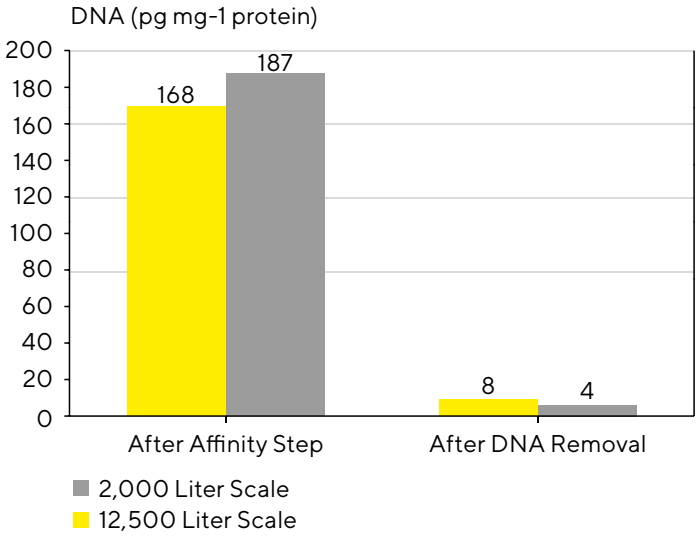
Hydrophobic interaction chromatography enable sufficient aggregate removal using an ammonium sulphate concentration of 480 mM.

The process stream contained 11.6% aggregates and 0.3% fragments before the Sartobind® Phenyl step, which resulted in 100% monomeric mAb in flow-through mode. Retained aggregates began to elute at 230 mM ammonium sulphate concentration.



Ebert, S., Fischer-Frühholz, S., Efficient Aggregate Removal from Impure Pharmaceutical Active Antibodies, BioProcess Int., Vol. 9,(2), 2011, 36-42

DNA Below Detection Limit



Sartobind® Q was successfully implemented in process scale manufacturing of 2,000 liter and 12,500 liter batches to clear DNA below detection limit.

Walter, J.K., Strategies and Considerations
for Advanced Economy in Downstream Processing of Biopharmaceutical Proteins, in: Bioseparation and Bioprocessing; G. Subramanian, (Ed.), Processing, Quality and Characterization,
Economics, Safety and Hygiene, Wiley VCH, vol. II,1998, 447-460

DNA removal is the perfect application of membrane chromatography in flow-through mode. The dynamic binding capacity of Sartobind® Q is ten times higher than conventional AEX resins.

Application Note:
DNA Removal using Sartobind® Q in mAb Purification, Order no. 85030-511-29

... and endotoxins

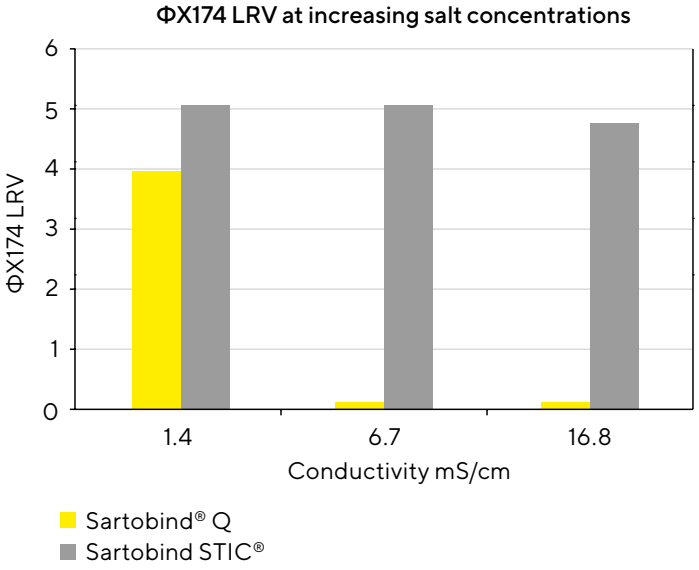
Application Note:
Endotoxin Removal, Order no. 85030-531-53

The salt tolerant anion exchanger Sartobind STIC® works at higher conductivity as effective as Sartobind® Q[1]. When choosing polyanionic buffers such as phosphate, the DNA removal works even independent of pH without binding the target protein[2].

Application Notes:
[1] DNA Binding on Sartobind STIC® compared to Sartobind® Q, Order no. 85032-538-43
[2] Effect of Phosphate on Binding to Sartobind STIC® PA, Order no. 85032-536-63

More Product Safety With Q and STIC AEX Membranes

Virus	LRV of virus spiked sample 500 mL	50 mL
MVM	4.41 ± 0.37	≥ 6.77 ± 0.24
Reo-3	≥ 7.53 ± 0.29	≥ 7.28 ± 0.30
MuLV	6.29 ± 0.32	≥ 5.57 ± 0.25
PrV	≥ 5.76 ± 0.23	≥ 5.67 ± 0.17



Anion exchange chromatography removes HCP and DNA and is also an effective virus removal step as part of an orthogonal viral clearance technology platform. Under process conditons, 5–7 LRV can be achieved (example shown with Sartobind® Q).

Application Note:
Virus Purification and Removal, Order no. 85030-522-22

Publication:
Dolan, S., Nolan, P., Carey S., Quinney C., Littlejohn, L.,
Using Anion Exchange Membrane Adsorbers to Ensure Effective Virus Clearance of Challenging Parvoviruses
Biopharm International, vol 34, issue 4, pages 32-37

Salt tolerant Sartobind STIC® membrane, also removes viruses but can do so at higher conductivities than Sartobind® Q. As shown here with phage PhiX174, a LRV of 5 can be achieved at higher conductivity compared to a standard anion exchanger such as Sartobind® Q.

Device used:

MA15 (total surface area: 15 cm^2, frontal surface area 5 cm^2, Total column volume 0.41 mL, 3 membrane layers),

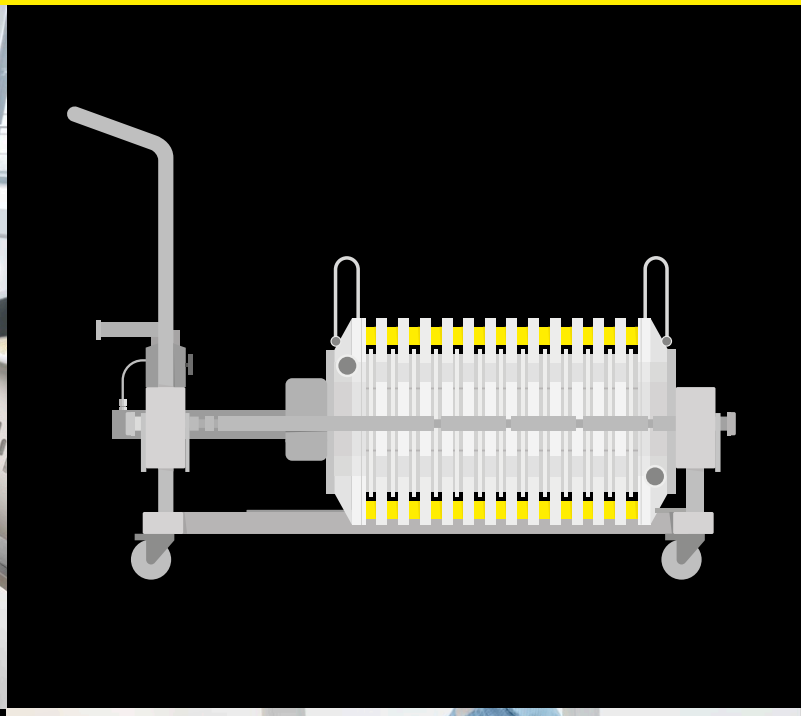
Loading buffer:

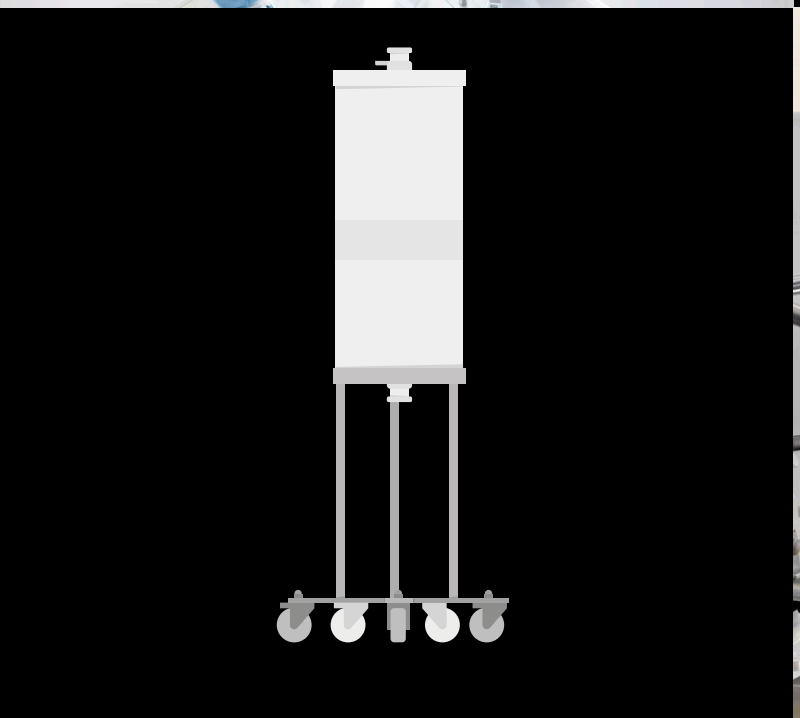
20 mM Tris pH 7.5, Flow rate: 10 mL/min (~24 BV/min), Bacteriophage concentration: $2+10^7$ pfu/mL PhiX 174, LRV determined by infectivity assay

Sartobind Commercial Manufacturing Scale

Sartobind® Jumbo
- Largest capsule with 2.5 L (4 mm bed height) or 5 L (8 mm bed height) membrane
- Scalable to smallest capsule (nano) and cassette format
- Optimal for closed processing
- Autoclavable

Sartobind® cassette
- Modular format up to 100 L of membrane
- Scalable to capsule portfolio
- Sartobind® Q cassettes are gamma irradiable



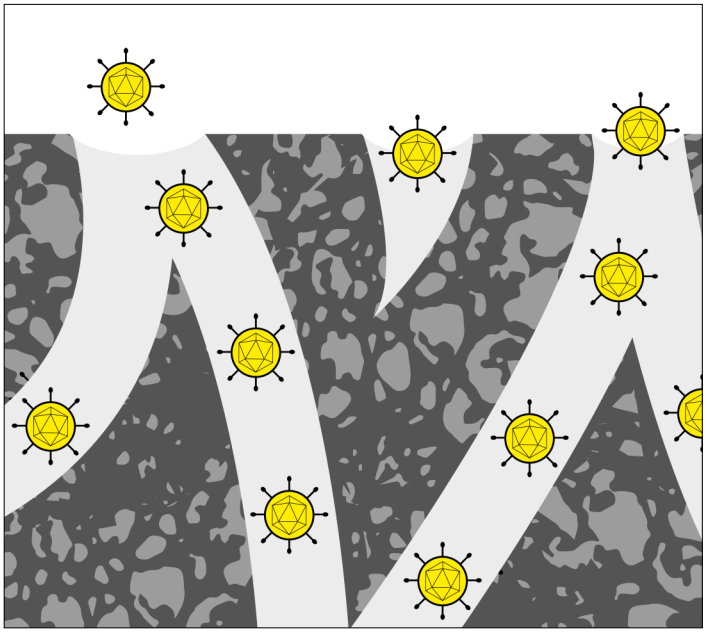


Capture

VLP | Virus Purification for Pandemic Vaccines: Get 10 to 100 Times More Binding Capacity

The large pores of Sartobind® allow convective flow and eliminate size exclusion effects. To achieve similar throughput, a traditional column and media combination require > 10 times more bed volume compared to a membrane adsorber. The binding capacity for adenovirus type 5 for example is up to 1×10^{13} VP/mL on Sartobind® Q[1]. Sartobind® SC (Sulfated Cellulose) displays ~10 times higher capacity for influenza than conventional resins[2]. Other virus types exhibit even a larger binding capacity potential* – depending on the size of the virus | VLP.

An optimized membrane adsorber step can also improve process economy through shorter processing times, less buffer, and smaller footprint. Virus purification processes that cannot be sterile filtered prior to final filling due to the virus size could especially benefit from using sterile validated Sartobind® Q cassettes. This applies also to continuous manufacturing operations that run over a prolonged period of time.



[1] Brochure: Adeno and Lentivirus Purification and Concentration Kits, order no. 85030-530-78

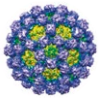
[2] Article: Fortuna, R, Taft, F., Villain, L., Wolff, M.W., Reichl, U., Optimization of cell culture-derived influenza A virus particles purification using sulfated cellulose membrane adsorbers, Eng. Life Sci. 18, 2018, 29-39

Also read:
Publication: Abrecht, H., Pressac, G., Boulais, A., Permanne, P., Adenovirus Downstream Process Intensification: Implementation of a Membrane Adsorber
BioProcess Intl, 17(19), Oct 2019

Adenovirus type 5

Lentivirus

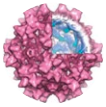
Norovirus



Influenza

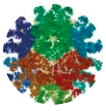
Vaccinia | VLP

Adenoassociated virus (AAV)

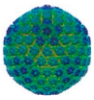


Baculovirus

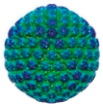
Foot-and-mouth disease virus



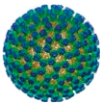
Pseudorabies virus



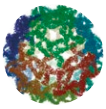
Bovine herpesvirus



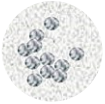
Rotavirus like particles



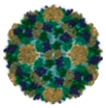
Yellow fever virus



Parvovirus

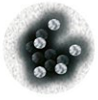


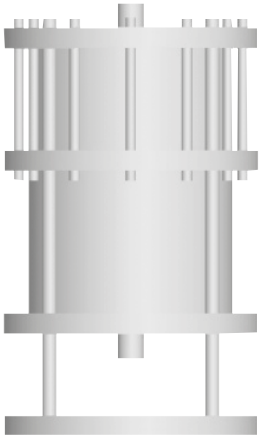
Bacteriophages



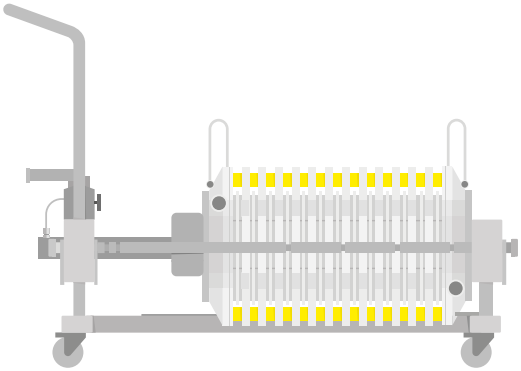
Plasmid DNA

Hepatitis A virus





200 L Column



20 L Adsorber

Source for thumbnails: Protein Data Bank Japan (PDBj)

Size Limit Exceeded With Sartobind® Cassettes

Full Flexibility in Pilot and Process Scale

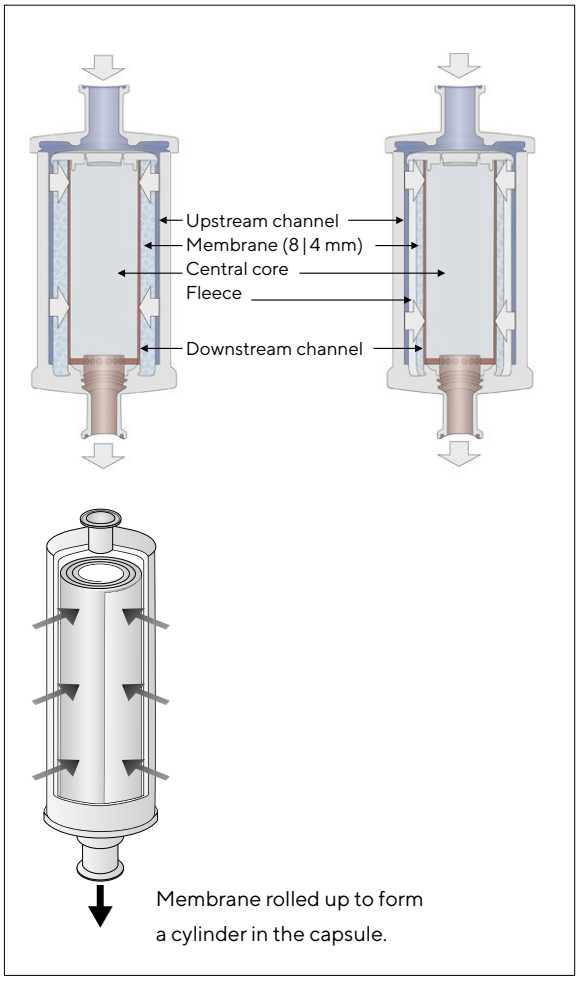
The new cassette format overcomes the 5 L size limitation for membrane adsorbers and offers simple modular scale up to 100 L membrane volume.

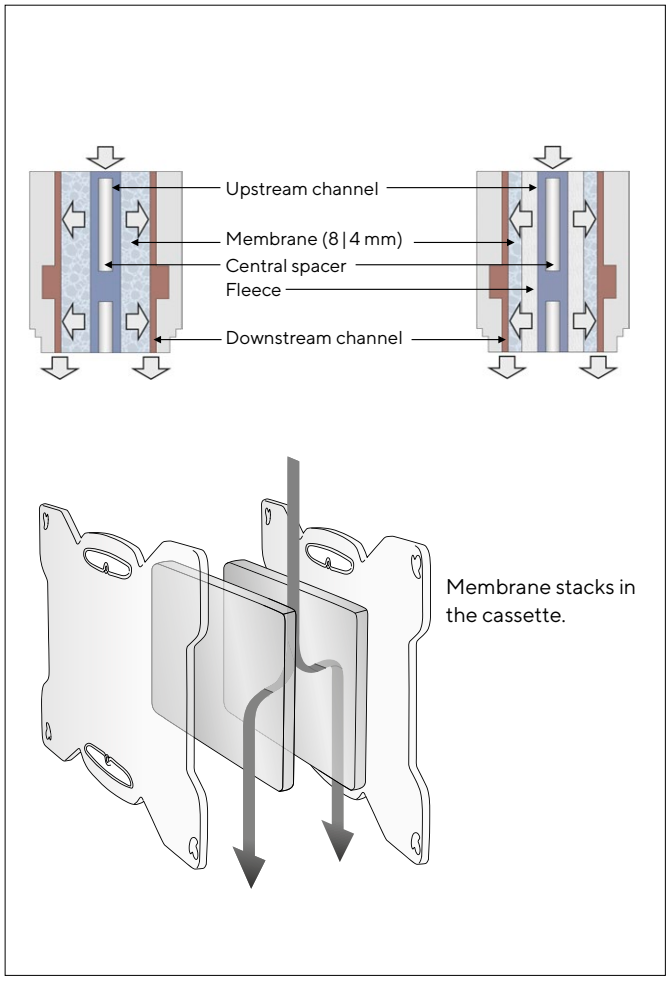
Membrane adsorbers have been limited by size to 5 L membrane volume for almost a decade ignoring the needs for bind and elute chromatography.
As capture of large proteins such as blood factors, conjugated proteins or viruses and virus like particles play an increasing role, a new modular size was needed.

The new cassette size is adapted to the Sartobind® void volume optimized capsules and with this directly scalable to the known capsule formats.

Comparison of Capsule and Cassette Design

The direct comparison of capsule (left cutaway) and cassette (right) shows same construction principles, bed height and flow scheme.





Rapid Chromatography – Ready to Use

The Membrane adsorbers are ready to use, thus eliminating the need for packing, cleaning or revalidation.

After process development with plates, picos and nanos you go straight to pilot and production scale by increasing process volume and capsule size.

1. Ligand Selection

Single-use	Re-use	High salt condition	Ligand and binding capacity	For Polishing	For Capture
Anion exchange					
■	■	–	Q, quaternary ammonium 29 mg/mL (BSA)	DNA, host cell proteins, viruses, endotoxins	Large proteins (e.g. FVIII), viruses, VLP
Anion exchange					
■	–	■	STIC PA, Primary Amine 50 mg/mL (BSA at 17 mS/cm)	DNA, host cell proteins, viruses, endotoxins	–
Cation exchange					
■	■	–	S, sulfonic acid 26 mg/mL (lysozyme)	Host cell proteins, aggregates	Large proteins, viruses, VLP
Hydrophobic interaction					
■	■	■	Phenyl, hydrophobic interaction 15 mg/mL (IgG)	Aggregates, detergents	Large proteins , conjugated proteins, viruses, VLP

■ Applicable – Not applicable

2. Screening of Conditions With Sartobind® 96-Well Plates or pico

96-well plates

Sartobind® pico

3. Sartobind® nano for Process Development

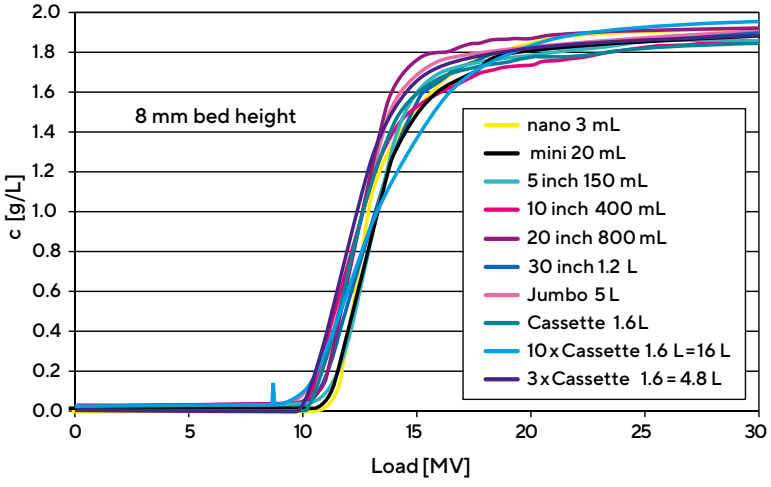
Sartobind® nano

4. Scalability of the Sartobind Portfolio

Each capsule size is available in 4 or 8 mm bed height. The scale-up is most simple if you stay within one bed height. Just increase load with membrane volume. The performance stays the same (example: Q 8 mm capsules and cassettes).

Cassettes can be scaled up to 20.8 L (13 × 1.6 L cassettes) in a Pilot Filter Holder or up to ~100 L in Double Process Filter Holders (see accessories). Pressure flow relation and shape of breakthrough curves are identical from nano to the cassette format.

In addition, scalability is given for the elution peak and flow rates.



Frequently Asked Questions

What type of device should I start with in the lab?
The nano is the most recommended device to start with. If you have very limited sample quantity you can also use Sartobind® pico. With 0.08 mL bed volume, it requires only a minimum sample quantity for binding studies. For screening of binding conditions, 96-well plates can be used.

How do I choose between a 4 mm and a 8 mm bed height?
8 mm bed height is recommended for bind and elute applications, in which the high dynamic binding capacity for large molecules can be best employed. However, for rapid contaminant removal – especially when the process volume is large – and the binding capacity is less a concern as for flow-through polishing, Sartobind® 4 mm is an excellent choice.

How is the membrane stacked?
For the capsules the membranes are rolled up, forming the membrane bed. The plates, the pico and the cassettes have flat stacked membranes.

What is the direction of flow?
While the fluid enters at the top, it flows from the upstream to the downstream through the membrane channel.

Can I test the integrity of the adsorbers before and after using them?
Yes. A diffusion test for this purpose is described in the manual.

Can the devices be autoclaved?
Yes, the ion exchange capsules can be autoclaved once at 121 °C for 30 minutes. The cassettes cannot be autoclaved, but Q cassettes can be delivered also gamma-irradiated with validated sterility.

Can I reuse Sartobind® devices?
Yes, you can. The membrane type Q has been reused for 1,000 cycles while the HIC has already been reused successfully for 200 cycles.

How do I decide whether I shall reuse the membrane?
Whether it makes sense for you to reuse them can be determined by cost-benefit calculations, which take the validation and cleaning costs of reuse into account.

Are the cassettes also void volume optimized?
Yes cassettes were developed to directly scale to the capsule formats and with this have a comparable void volume to membrane ratio as the capsules have.

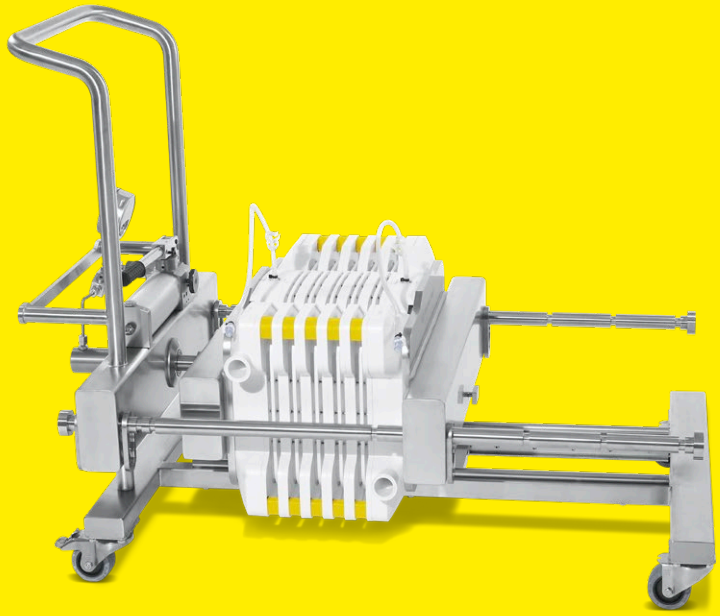
Is there a small scale down cassette?
This is not necessary as the cassettes do scale to the smaller capsule size. Also the comparability can be checked with three cassettes to the Jumbo size directly.
Furthermore they fulfill the USP extractables requirements after cleaning in place.

How many cassettes can be run in a holder?
In the Pilot Filter Holder 13 cassettes can be run, which is 20.8 L membrane volume. Optionally in the Processes Filter holder 50 L and in the Double Process Filter Holder 100 L.

I have a filter holder from a different brand. Can I use the Sartobind® Cassettes with it?
Please get in touch with your local Sartorius Service to check if your holder fits.

When was the first approval of a biologic produced using Sartobind®?
It was in 2001 for the monoclonal antibody Campath 1-H for DNA removal.

I need to run a sterile process. How to set this up?
To maintain sterility you have to use the gamma irradiated manifold with the sterile cassettes. For pre-assembled sterile packs get in touch with us.



Cassettes are assembled between two manifolds in the Pilot Filter Holder

Technical Data

Membrane		
Matrix	Stabilized reinforced cellulose	
Membrane thickness | membrane volume = membrane area	275 µm | 1 mL = 36.4 cm^2	
Nominal pore size	> 3 µm	
Ion exchanger ligand Q	Strong anion Q: quaternary ammonium ($R\text{-}CH_2\text{-}N^+(CH_3)_3$)	
Ion exchanger ligand STIC PA	Weak anion STIC PA: primary amine ($R\text{-}NH_2$)	
Ion exchanger ligand S	Strong cation S: sulfonic acid ($R\text{-}CH_2\text{-}SO_3^-$)	
Hydrophobic interaction ligand	HIC: Phenyl ($R\text{-}NH\text{-}C_6H_5$)	
Capsule Materials		
Outer cage, inner core, end caps, capsule housing, nonwoven, fleece	Polypropylene	
O-ring in vent valve (except nano)	EPDM (ethylene propylene diene monomer)	
Cassette Materials		
Outer cage, seal, nonwoven, fleece	ABS, silicone, polyethylene, stable to gamma irradiation	
Operation		
Depyrogenation	1 N NaOH for 30 minutes at 20 °C	
Autoclaving	121 °C for 30 minutes for one cycle | capsules only	
Integrity testing	By the diffusion test method with Sartocheck® 4 Plus	
Typical Dynamic Binding Capacity at 10% Breakthrough		
Q (bovine serum albumin, 20 mM Tris | HCl, pH 7.5)	29 mg/mL (0.8 mg/cm^2)	
STIC PA (BSA, 20 mM Tris HC, 150 mM NaCl, pH 7.5)	50 mg/mL (1.4 mg/cm^2)	
STIC PA (salmon sperm DNA, 20 mM Tris | HCl, 150 mM NaCl pH 7.2)	10.9 mg/mL (0.3 mg/cm^2)	
S (lysozyme, 10 mM potassium phosphate, pH 7.0)	25 mg/mL (0.7 mg/cm^2)	
Phenyl (polyclonal bovine IgG, 50 mM potassium phosphat, 0.9 M $(NH_4)_2SO_4$, pH 7.5)	14.6 mg/mL (0.4 mg/cm^2)	
Ligand Density		
Q	2 – 5 µeq/cm^2	
STIC PA	18 – 22 µeq/cm^2	
S	2 – 5 µeq/cm^2	
Phenyl	3 µeq/cm^2	
pH stabilities		
	Short term	Long term
Q	pH 1 – 14	pH 2 – 12
STIC PA	pH 2 – 14	not defined
S	pH 3 – 14	pH 4 – 13
Phenyl	pH 2 – 14	pH 3 – 13

Gamma irradiated products	Gamma dose	Sterile validated
Sterile Sartobind® Q cassettes 4 mm and 8 mm	≥ 25 kiloGrays (kGy) maximum dose: 50 kGy	Yes, minimum dose for sterility is 7 – 8 kGy
Gamma irraditated manifold	See above	No

Dimensions and Connections

Membrane volume | 4 mm	**1 mL**	**10 mL**	**75 mL**	**200 mL**	**400 mL**	**600 mL**	**2,500 mL**	**800 mL**
Membrane volume | 8 mm	**3 mL**	**20 mL**	**150 mL**	**400 mL**	**800 mL**	**1,200 mL**	**5,000 mL**	**1,600 mL**
Size	**nano**	**mini**	**5"**	**10"**	**20"**	**30"**	**Jumbo**	**Cassette**
Membrane area cm^2 | 4 mm	36.4	364	2,700	7,300	14,600	22,000	91,000	29,000*
Membrane area cm^2 | 8 mm	110	728	5,500	14,600	29,000	44,000	182,000	58,000*
Void volume | 4 mm MV** | mL	3.5 | 3.5	3.2 | 32	2.7 | 200	2.7 | 540	2.7 | 1,080	2.7 | 1,600	2.8 | 7,000	3.1 | 2500*
Void volume | 8 mm MV** | mL	1.3 | 4	1.6 | 32	1.3 | 200	1.4 | 540	1.4 | 1,080	1.3 | 1,600	1.4 | 7,000	1.8 | 2900*
Dimensions one device	37 × 31 h × d	70 - 110 × 54.5 h × d	190 - 203 × 77 h × d	350 × 100 h × d	570 × 100 h × d	810 × 100 h × d	850 × 302 h × d	634 × 387 × 49 w × h × d
Connectors	Luer female	Luer female Sanitary ¾" 25 mm outer, 14 mm inner diameter Hose barb ½"	Sanitary ¾" 25 mm outer, 14 mm inner diameter Hose barb ½" (Q/S 75 mL)	Sanitary 1½" 50.5 mm outer, 36 mm inner diameter	Sanitary 1½" 50.5 mm outer, 36 mm inner diameter	Sanitary 1½" 50.5 mm outer, 36 mm inner diameter	Sanitary 1½" 50.5 mm outer, 36 mm inner diameter	Sanitary 1½" 50.5 mm outer, 36 mm inner diameter via manifolds (accessory)
Approximate weight	10 g	65 g	400 g	760 g	1.3 kg	1.9 kg	16 kg 20 kg wet 23 kg filled	4.9 kg* 6.0 kg* wet

*Multiply with the number of used cassettes
**MV = membrane volume (including the porosity of the membrane which is 80%)

Ordering Information

96-Well Plates and Accessories

Order number	Description	Quantity
99IEXQ42GC–-V	Sartobind® Q 96-well plate, 2 units	2 (24 + 8-strips)
99IEXQ42GC–-D	Sartobind® Q 96-well plate, 10 units	10 (120 + 8-strips)
99STPA42GC–-V	Sartobind STIC® PA 96-well plate, 2 units	2 (24 + 8-strips)
99STPA42GC–-D	Sartobind STIC® PA 96-well plate, 10 units	10 (120 + 8-strips)
99IEXS42GC–-V	Sartobind® S 96-well plate, 2 units	2 (24 + 8-strips)
99IEXS42GC–-D	Sartobind® S 96-well plate, 10 units	10 (120 + 8-strips)
99HICP42GC–-V	Sartobind® Phenyl 96-well plate, 2 units	2 (24 + 8-strips)
99HICP42GC–-D	Sartobind® Phenyl 96-well plate, 10 units	10 (120 + 8-strips)
VW96VAC01	Vac96 vacuum manifold	1
VW96VAA02	Vac96 liquid trap and reservoir	1
VW96VAA04	96 deep well collection plate 2 ml (square wells)	25
VW96VAA05	Replacement seal for Vac96 vacuum manifold	1
16612	Vacuum pump, 98%, 220 V, 50 Hz	1
16615	Vacuum pump, 98%, 110 V, 60 Hz	1

Sartobind® pico 4 mm Bed Height

Order number	Description	Quantity
92IEXQ42DD-11-D	Sartobind® Q pico 0.08 mL	10
92STPA42DD-11-D	Sartobind STIC® PA pico 0.08 mL	10
92IEXS42DD-11-D	Sartobind® S pico 0.08 mL	10
92HICP42DD-11-D	Sartobind® Phenyl pico 0.08 mL	10
92MU0142DD-11	Sartobind® Selection Kit pico 0.08 mL, Q, S and STIC PA	one each of Q, S and STIC PA

Sartobind® Q

Order number	Description	Quantity	Bed height [mm]	Description adapter inlet and outlet	Protein binding capacity [g]	Recom-mended flow rate [L/min]	Maximum pressure [MPa] (bar/psig)
96IEXQ42DN-11	Sartobind® Q nano 1 mL	1	4	Female Luer	0.029	0.02	0.4 (4/58)
96IEXQ42DN-11--A	Sartobind® Q nano 1 mL	4	4	Female Luer	0.029	0.02	0.4 (4/58)
96IEXQ42D4R11--A	Sartobind® Q mini 10 mL	4	4	Female Luer	0.29	0.2	0.4 (4/58)
96IEXQ42D4RFF--A	Sartobind® Q mini 10 mL	4	4	Sanitary ¾", 25 mm	0.29	0.2	0.4 (4/58)
96IEXQ42D4ROO--A	Sartobind® Q mini 10 mL	4	4	Hose barb ½"	0.29	0.2	0.4 (4/58)
96IEXQ42D9MOO--A	Sartobind® Q 75 mL	4	4	Hose barb ½"	2.16	1.5	0.4 (4/58)
96IEXQ42D9MFF--A	Sartobind® Q 75 mL	4	4	Sanitary ¾", 25 mm	2.16	1.5	0.4 (4/58)
96IEXQ42D1GSS	Sartobind® Q 200 mL	1	4	Sanitary 1½", 50.5 mm	5.8	4	0.4 (4/58)
96IEXQ42D2HSS	Sartobind® Q 400 mL	1	4	Sanitary 1½", 50.5 mm	11.7	8	0.4 (4/58)
96IEXQ42D3KSS	Sartobind® Q 600 mL	1	4	Sanitary 1½", 50.5 mm	17.6	12	0.4 (4/58)
96IEXQ42D3NSS	Sartobind® Q Jumbo 2.5	1	4	Sanitary 1½", 50.5 mm	73	50	0.3 (3/43.5)
96IEXQ42EUC11--A	Sartobind® Q nano 3 mL	4	8	Female Luer	0.088	0.015	0.4 (4/58)
96IEXQ42E4J11--A	Sartobind® Q mini 20 mL	4	8	Female Luer	0.58	0.1	0.4 (4/58)
96IEXQ42E4JFF--A	Sartobind® Q mini 20 mL	4	8	Sanitary ¾", 25 mm	0.58	0.1	0.4 (4/58)
96IEXQ42E4JOO--A	Sartobind® Q mini 20 mL	4	8	Hose barb ½"	0.58	0.1	0.4 (4/58)
96IEXQ42E9BFF	Sartobind® Q 150 mL	1	8	¾" Sanitary clamp, manual, certificate 25 mm	4.35	0.75	0.4 (4/58)
96IEXQ42E1HSS	Sartobind® Q 400 mL	1	8	1½" Sanitary clamp, manual, certificate 50.5 mm	11.6	2	0.4 (4/58)
96IEXQ42E2LSS	Sartobind® Q 800 mL	1	8	Sanitary 1½", 50.5 mm	23.3	4	0.4 (4/58)
96IEXQ42E3FSS	Sartobind® Q 1.2 L	1	8	Sanitary 1½", 50.5 mm	35	6	0.4 (4/58)
96IEXQ42E3ESS	Sartobind® Q Jumbo 5 L	1	8	Sanitary 1½", 50.5 mm	145	25	0.3 (3/43.5)
98IEXQ42D-L	Sartobind® Q Cassette 0.8 L	1	4	Via manifold accessory: Sanitary 1½", 50.5 mm	23.2	16	0.2 (2/29)
98IEXQ42DGL	Sartobind® Q Cassette 0.8 L, sterile	1	4	Via gamma manifold accessory: Sanitary 1½", 50.5 mm	23.2	16	0.2 (2/29)
98IEXQ42E-P	Sartobind® Q Cassette 1.6 L	1	8	Via manifold accessory: Sanitary 1½", 50.5 mm	46.4	8	0.2 (2/29)
98IEXQ42EGP	Sartobind® Q Cassette 1.6 L, sterile	1	8	Via gamma manifold accessory: Sanitary 1½", 50.5 mm	46.4	8	0.2 (2/29)

Sartobind® S

Order number	Description	Quantity	Bed height [mm]	Description adapter inlet and outlet	Protein binding capacity [g]	Recom-mended flow rate [L/min]	Maximum pressure [MPa] (bar/psig)
96IEXS42DN-11	Sartobind® S nano 1 mL	1	4	Female Luer	0.025	0.02	0.4 (4/58)
96IEXS42DN-11--A	Sartobind® S nano 1 mL	4	4	Female Luer	0.025	0.02	0.4 (4/58)
96IEXS42D4R11--A	Sartobind® S mini 10 mL	4	4	Female Luer	0.25	0.2	0.4 (4/58)
96IEXS42D4RFF--A	Sartobind® S mini 10 mL	4	4	Sanitary ¾", 25 mm	0.25	0.2	0.4 (4/58)
96IEXS42D4ROO--A	Sartobind® S mini 10 mL	4	4	Hose barb ½"	0.25	0.2	0.4 (4/58)
96IEXS42D9MOO--A	Sartobind® S 75 mL	4	4	Hose barb ½"	1.89	1.5	0.4 (4/58)
96IEXS42D9MFF--A	Sartobind® S 75 mL	4	4	Sanitary ¾", 25 mm	1.89	1.5	0.4 (4/58)
96IEXS42D1GSS	Sartobind® S 200 mL	1	4	Sanitary 1½", 50.5 mm	5.1	4	0.4 (4/58)
96IEXS42D2HSS	Sartobind® S 400 mL	1	4	Sanitary 1½", 50.5 mm	10.2	8	0.4 (4/58)
96IEXS42D3KSS	Sartobind® S 600 mL	1	4	Sanitary 1½", 50.5 mm	15.4	12	0.4 (4/58)
96IEXS42EUC11--A	Sartobind® S nano 3 mL	4	8	Female Luer	0.077	0.015	0.4 (4/58)
96IEXS42E4J11--A	Sartobind® S mini 20 mL	4	8	Female Luer	0.5	0.1	0.4 (4/58)
96IEXS42E4JFF--A	Sartobind® S mini 20 mL	4	8	Sanitary ¾", 25 mm	0.5	0.1	0.4 (4/58)
96IEXS42E4JOO--A	Sartobind® S mini 20 mL	4	8	Hose barb ½"	0.5	0.1	0.4 (4/58)
96IEXS42E9BFF	Sartobind® S 150 mL	1	8	Sanitary ¾", 25 mm	3.9	0.75	0.4 (4/58)
96IEXS42E1HSS	Sartobind® S 400 mL	1	8	Sanitary 1½", 50.5 mm	10.2	2	0.4 (4/58)
96IEXS42E2LSS	Sartobind® S 800 mL	1	8	Sanitary 1½", 50.5 mm	20	4	0.4 (4/58)
96IEXS42E3FSS	Sartobind® S 1.2 L	1	8	Sanitary 1½", 50.5 mm	31	6	0.4 (4/58)
96IEXS42E3ESS	Sartobind® S Jumbo 5 L	1	8	Sanitary 1½", 50.5 mm	127	25	0.3 (3/43.5)
98IEXS42D-L	Sartobind® S Cassette 0.8 L	1	4	Via manifold accessory: Sanitary 1½", 50.5 mm	20.3	16	0.2 (2/29)
98IEXS42E-P	Sartobind® S Cassette 1.6 L	1	8	Via manifold accessory: Sanitary 1½", 50.5 mm	40.6	8	0.2 (2/29)

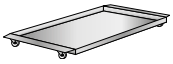
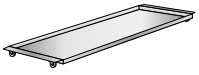
Sartobind STIC® PA

Order number	Description	Quantity	Bed height [mm]	Description adapter inlet and outlet	Protein binding capacity [g]	Recom-mended flow rate [L/min]	Maximum pressure [MPa] (bar/psig)
96STPA42DN-11--A	Sartobind STIC® PA nano 1 mL	4	4	Female Luer	0.05	0.02	0.4 (4/58)
96STPA42D4R11--A	Sartobind STIC® PA mini 10 mL	4	4	Female Luer	0.5	0.2	0.4 (4/58)
96STPA42D4RFF--A	Sartobind STIC® PA mini 10 mL	4	4	Sanitary ¾", 25 mm	0.5	0.2	0.4 (4/58)
96STPA42D4ROO--A	Sartobind STIC® PA mini 10 mL	4	4	Hose barb ½"	0.5	0.2	0.4 (4/58)
96STPA42D9MFF--A	Sartobind STIC® PA 75 mL	4	4	Sanitary ¾", 25 mm	3.8	1.5	0.4 (4/58)
96STPA42D1GSS	Sartobind STIC® PA 200 mL	1	4	Sanitary 1½", 50.5 mm	10.2	4	0.4 (4/58)
96STPA42D2HSS	Sartobind STIC® PA 400 mL	1	4	Sanitary 1½", 50.5 mm	20.4	8	0.4 (4/58)
96STPA42D3KSS	Sartobind STIC® PA 600 mL	1	4	Sanitary 1½", 50.5 mm	30	12	0.4 (4/58)
96STPA42D3NSS	Sartobind STIC® PA Jumbo 2.5 L	1	4	Sanitary 1½", 50.5 mm	127	50	0.3 (3/43.5)
98STPA42D-L	Sartobind STIC® PA Cassette 0.8 L	1	4	Via manifold accessory: Sanitary 1½", 50.5 mm	40.6	16	0.2 (2/29)

Sartobind® Phenyl

Order number	Description	Quantity	Bed height [mm]	Description adapter inlet and outlet	Bed volume [mL]	Protein binding capacity [g]	Recom-mended flow rate [L/min]	Maximum pressure [MPa] (bar/psig)
96HICP42EUC11--A	Sartobind® Phenyl 3 mL	4	8	Female Luer	3	0.044	0.015	0.4 (4/58)
96HICP42E4J11--A	Sartobind® Phenyl mini 20 mL	4	8	Female Luer	20	0.293	0.1	0.4 (4/58)
96HICP42E4JFF--A	Sartobind® Phenyl mini 20 mL	4	8	Sanitary ¾", 25 mm	20	0.293	0.1	0.4 (4/58)
96HICP42E4JOO--A	Sartobind® Phenyl mini 20 mL	4	8	Hose barb ½"	20	0.293	0.1	0.4 (4/58)
96HICP42E9BFF	Sartobind® Phenyl 150 mL	1	8	Sanitary ¾", 25 mm	150	2.2	0.75	0.4 (4/58)
96HICP42E1HSS	Sartobind® Phenyl 400 mL	1	8	Sanitary 1½", 50.5 mm	400	5.8	2	0.4 (4/58)
96HICP42E2LSS	Sartobind® Phenyl 800 mL	1	8	Sanitary 1½", 50.5 mm	800	11.6	4	0.4 (4/58)
96HICP42E3FSS	Sartobind® Phenyl 1.2 L	1	8	Sanitary 1½", 50.5 mm	1,200	17.6	6	0.4 (4/58)
96HICP42E3ESS	Sartobind® Phenyl 5 L	1	8	Sanitary 1½", 50.5 mm	5,000	72.8	25	0.3 (3/43.5)
98HICP42E-P	Sartobind® Phenyl Cassette 1.6 L	1	8	Via manifold accessory: Sanitary 1½", 50.5 mm	1,600	23.2	8	0.2 (2/29) 4.9 kg

Accessories

Order number		Description	Quantity
1ZA---0004		Adapter Luer male to UNF 10-32 female, PEEK	1
1ZAOGV0003		Adapter UNF 10-32 female to sanitary ¾", 25 mm, polyoxymethylene	2
5ZGI-0001		Holder for 1 × 200 to 1,200 mL (10 – 30") capsule, stainless steel, 3 legs	1
5ZALB-0002		Distribution adapter for 3 × 200 to 1,200 mL capsules (10 – 30"), 1 × 2", 3 × 1½", sanitary, stainless steel	1
7ZAL-V0013		Reducing adapter 1½" (50.5 mm) to ¾" (25 mm), sanitary	1
7ZAL-V0010		Reducing adapter 2" (64 mm) to 1½" (50.5 mm), sanitary	1
9ZGL-0102		Trolley for Jumbo 2.5 or 5 L, stainless steel	1
26787---FT---P		Sartocheck® 5 Plus Filter Tester	1
29Z-S00001		Manifold set, 1½" sanitary clamp, inlet and outlet adapter plate	2
29Z-S00003		Gamma irradiated manifold set, 1½" sanitary clamp, inlet and outlet adapter plate, ≥ 25 kGy, max. 50 kGy	2
2ZGL-0005		Pilot Filter Holder for Sartoclear® | Sartobind®	1
2ZGL-0006		Process Filter Holder for Sartoclear® | Sartobind®	1
2ZGL-0007		Double Process Filter Holder for Sartoclear® | Sartobind®	1
2ZGL-0008		Drip pan for Pilot Filter Holder	1
2ZGL-0015		Drip pan for Process and double Process Filter Holder	1

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Publication No.: SL-1533-e | Order No.: 85037-544-14 | Status: 09 | 21 | 2021