



**sartorius stedim**  
biotech

## Sartobind<sup>®</sup> Membrane Adsorbers, 4 and 8 mm Bed Height



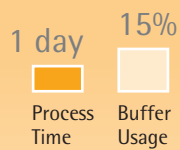
turning science **into solutions**

# 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.

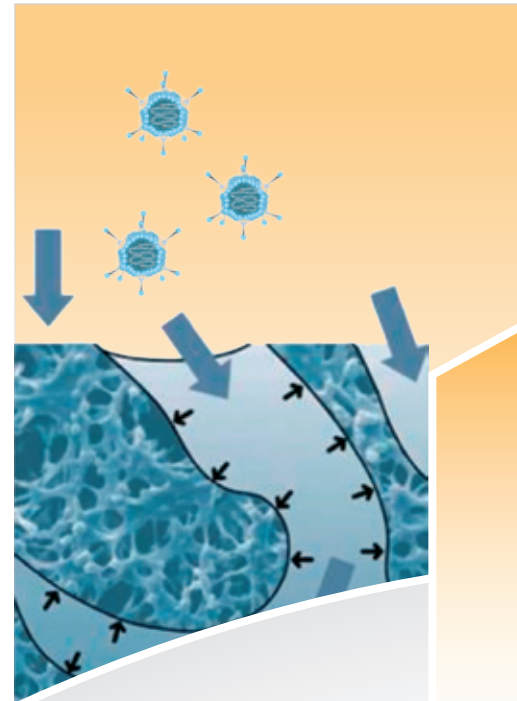
## Valuable Time and Resource Savings

- Sartobind processes recombinant proteins 4 times faster.
- A Sartobind membrane adsorber uses 85% less buffer, saving you time and money.



## Loss of Time and Resources

- Traditional column chromatography systems are slow in producing recombinant proteins.
- They waste considerable buffer resources.



Traditional  
Chro  
Slow, Inflexible

# Discover the Favorable Performance and Economics of Sartobind Membrane Chromatography

## High Binding Capacity

Sartobind membranes have a pore size of  $> 3 \mu\text{m}$ . This allows large proteins, bioparticles and viruses 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.

## Low Binding Capacity

Conventional column beads have a pore size  $< 100 \text{ nm}$ . 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 are membrane adsorbers.

## Compact Capsule Footprint

Compared with a column or an ultracentrifuge, a Sartobind capsule 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.

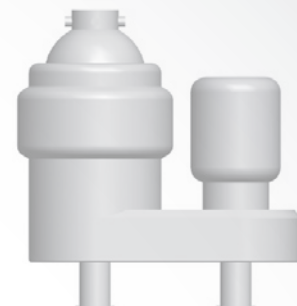
- Disposable or reusable
- No hardware investments



## Large and Expensive Equipment



Pic. 1: Chromatographic columns have a limited loading capacity for polishing and virus capture. Furthermore, they are large and have a high investment cost.



Pic. 2: Likewise, expensive ultracentrifuges are difficult to scale and complex to operate.

Column chromatography: and Costly

# One Device for Capture and Polishing

The 8 mm capsules are void-volume-optimized, giving a sharp peak upon elution with minimal dilution. Compared to non-optimized capsules, this construction increases the dynamic binding capacity by at least one-third, and reduces the need for chromatography buffers by more than two-thirds.

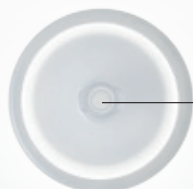
## Optimized Design

With conventional adsorbers, the extensive void volume has to be filled with buffer. Sartobind 8 mm capsules have a void-volume-minimizing core, creating an optimized flow channel, which ensures sharp elution peaks in bind and elute mode and less buffer consumption in the flow-through mode. The direction of flow is from the external upstream channel to the internal downstream channel.



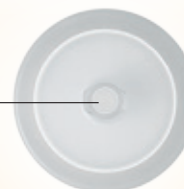
### Top View

of the 1 mL nano version (no optimization)



Upstream

### Optimized

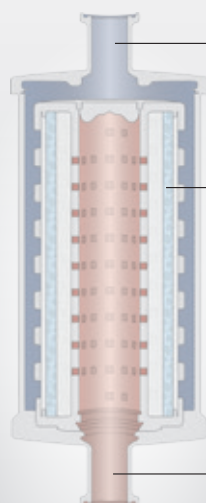


### Top View

of the 3 mL version (with optimization of the flow channels)

### Cutaway of a 5" 70 mL Capsule

Conventional adsorbers intended for polishing have no internal core. During operation, the open space is filled with buffer.

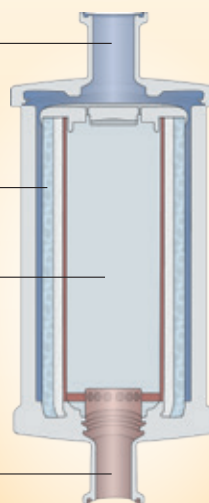


Upstream

Membrane

Core

Downstream



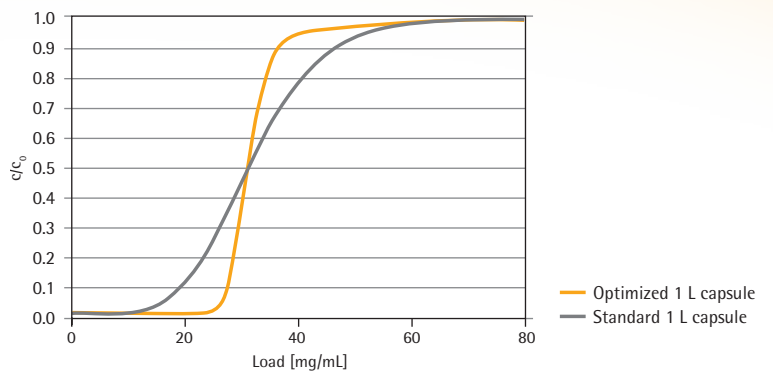
### Cutaway of a 75 mL Capsule

The 8 mm capsule incorporates a core, which forms a small internal channel so that the membrane adsorber capsule can be used in bind and elute applications. As a result, polishing economy is improved and buffer consumption is reduced.



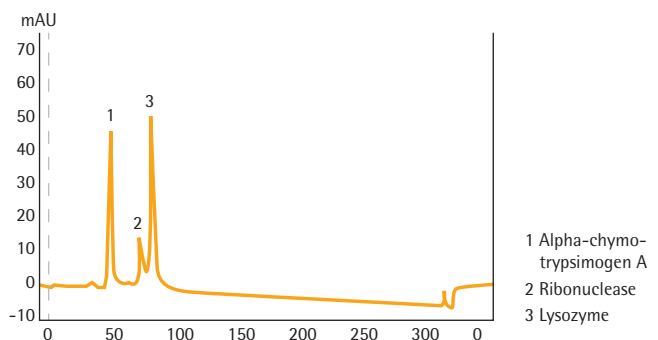
### Comparison of Binding Capacity: Standard vs. Void-Volume-Optimized Capsule

As a result of the minimized void volume, the dynamic binding capacity of the Sartobind 8 mm capsules is increased by nearly 50%.



### Improved Resolution

The efficient design also provides for sharp elution peaks and excellent resolution. The small peak | pool volume makes Sartobind membrane adsorbers applicable for bind and elute processes.





# For Virus | Protein Capture and Contaminant Removal

With macropores larger than 3  $\mu\text{m}$ , Sartobind membrane adsorbers are especially suited for the purification of large molecules, such as blood factors and virus particles.

They are also successfully used in flow-through polishing of recombinant proteins like monoclonal antibodies to remove host cell proteins, DNA, aggregates and other contaminants. These polishing steps are performed at high flow rates of up to 5 bed volumes per minute.



# 3

Determination Capacity

# 2

Optimizing Conditions in 96-Well Plates

# 1

Ligand Selection

Ligands Applications - Available Optimized Format

Membrane Type, Capacity	Single Use	Reuse	For Polishing	For Capture	4 mm	8 mm
Q anion exchanger 29 mg/mL with BSA	✓	✓	DNA, host cell proteins, endotoxins	Viruses, VLP, large proteins (e.g. FVIII)	✓	✓
S cation exchanger 25 mg/mL with lysozyme	✓	✓	Host cell proteins, aggregates	Viruses, VLP, large proteins	✓	✓
Phenyl hydrophobic interaction 15 mg/mL with IgG	✓	✓	Aggregates, detergents, viruses	Viruses, VLP, large proteins	-	✓

# 4

## Accessories

Sartobind Jumbo 5 L  
on a trolley



Adapter for use with a  
150 mL capsule on a liquid  
chromatography system



of Binding  
with Sartobind pico or nano

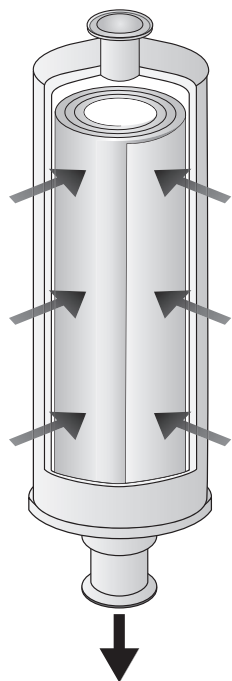
## Scale-Up



# Frequently Asked Questions

## What is the direction of flow?

While the fluid enters at the top of the capsule, it flows from the external upstream to the internal downstream channel.



## How is the membrane stacked?

The membranes are wheeled up, forming the membrane bed.

## Can I reuse Sartobind capsules?

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.

## 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 I run capsules in series or parallel?

The capsules have been run successfully in both ways as well as in the combination of both.

## What type of device should I start with in the lab?

After selecting your ligand, trials can be run with Sartobind pico. At a 0.08 mL bed volume, it requires only a minimum sample quantity for binding studies. For screening binding conditions, 96-well plates can be used.

## How do I choose between using a column or a membrane adsorber?

Columns are recommended for bind and elute applications, where their capability of binding small molecules can be best employed. However, for rapid contaminant removal – especially when the process volume is large – and the capture of viruses or large proteins, Sartobind capsules are an excellent choice.

## Can the capsules be autoclaved?

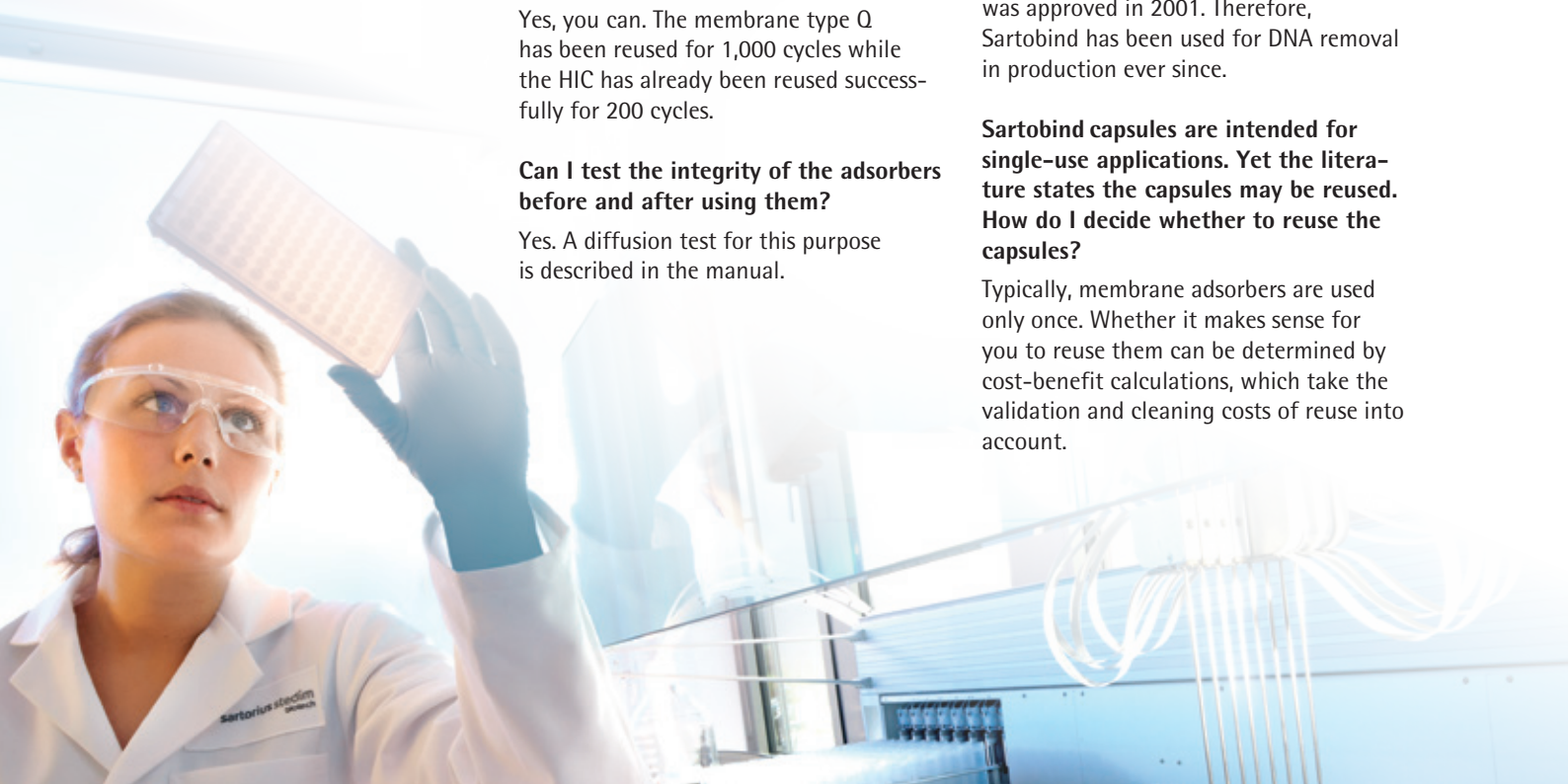
Yes, the ion exchange capsules can be autoclaved once at 121°C for 30 minutes.

## When was the first commercial process approved using Sartobind?

The monoclonal antibody Campath 1-H was approved in 2001. Therefore, Sartobind has been used for DNA removal in production ever since.

## Sartobind capsules are intended for single-use applications. Yet the literature states the capsules may be reused. How do I decide whether to reuse the capsules?

Typically, membrane adsorbers are used only once. 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.





# Technical Data

## Membrane

Base material	Stabilized reinforced cellulose
Membrane thickness	275 µm
Pore size	> 3 µm
Ion exchanger types	- Strong anion Q (quaternary ammonium) R-CH <sub>2</sub> -N <sup>+</sup> (CH <sub>3</sub> ) <sub>3</sub> - Strong cation S (sulfonic acid) R-CH <sub>2</sub> -SO <sub>3</sub> <sup>-</sup>
Hydrophobic interaction type	- Phenyl (-NH-C <sub>6</sub> H <sub>6</sub> )

## Capsule Materials





Outer cage, inner core, end caps, capsule housings, nonwovens	Polypropylene
O-ring in vent valve*	Silicone

\*Only with 150 mL, 1.2 L and 5 L

## Operation

Depyrogenation	1 N NaOH for 30 minutes at 20°C
Autoclaving	121°C for 30 minutes for one cycle only (for Q and S)
Integrity testing	By the diffusion test method

## Dimensions and Connections

Capsule size	nano 3 mL	75 mL   150 mL	1.2 L	5 L Jumbo
				
Bed height	8 mm	4 mm   8 mm	8 mm	8 mm
Membrane (cm <sup>2</sup> )	110	2700   5,500	44,000	182,000
Dimensions (height x diameter) mm	37 x 33	190 x 77	810 x 100	850 x 302
Connectors	Luer female	Sanitary 3/4" 25 mm outer, 14 mm inner diameter	Sanitary 1 1/2" 50.5 mm outer, 36 mm inner diameter	Sanitary 1 1/2" 50.5 mm outer, 36 mm inner diameter
Dimensions hose barb* (height x diameter) mm	-	203 x 77	-	-
Approximate weight	10 g	400 g	1.9 kg	16 kg, 20 kg wet, 23 kg filled

\* For 75 mL capsules only

Related products are Sartobind 96-well plates, MA units for laboratory use and the Sartobind capsules with a 4 mm bed height: Sartobind nano, 1 mL; mini, 7 mL; 5", 70 mL; 10", 180 mL; 20", 360 mL; 30", 540 mL; and mega, 1.62 L.

### For more information:

- Sartobind brochure, Publication No.: SL-1513-e, Order No.: 85030-518-92
- Sartobind brochure for Polishing, Publication No.: SL-1521-e, Order No.: 85030-531-08

# Ordering Information

## Sartobind Q Capsules

Order no.	Chemistry	Description adapter inlet and outlet	Quantity	Bed volume [mL]	Bed height [mm]	Nominal membrane area	Protein binding capacity** [g]	Recommended flow rate [L/min]	Approx. weight
Sartobind nano 96IEXQ42EUC11--A	Q	Female Luer	4	3	8	110 cm <sup>2</sup>	0.088	0.015	10 g
Sartobind 75 mL 96IEXQ42D9MOO--A	Q	Hose barb	4	75	4	2,700 cm <sup>2</sup>	2.16	1.5	400 g
Sartobind 75 mL 96IEXQ42D9MFF--A	Q	Sanitary flange	4	75	4	2,700 cm <sup>2</sup>	2.16	1.5	400 g
Sartobind 150 mL 96IEXQ42E9BFF	Q	Sanitary flange	1	150	8	5,500 cm <sup>2</sup>	4.4	0.75	400 g
Sartobind 1.2 L 96IEXQ42E3FSS	Q	Sanitary flange	1	1,200	8	4.4 m <sup>2</sup>	35	6	1.9 kg
Sartobind Jumbo 5 L 96IEXQ42E3ESS	Q	Sanitary flange	1	5,000	8	18.2 m <sup>2</sup>	45	25	16 kg

## Sartobind S Capsules

Order no.	Chemistry	Description adapter inlet and outlet	Quantity	Bed volume [mL]	Bed height [mm]	Nominal membrane area	Protein binding capacity** [g]	Recommended flow rate [L/min]	Approx. weight
Sartobind nano 96IEXS42EUC11--A	S	Female Luer	4	3	8	110 cm <sup>2</sup>	0.077	0.015	10 g
Sartobind 75 mL 96IEXS42D9MOO--A	S	Hose barb	4	75	4	2,700 cm <sup>2</sup>	1.89	1.5	400 g
Sartobind 75 mL 96IEXS42D9MFF--A	S	Sanitary flange	4	75	4	2,700 cm <sup>2</sup>	1.89	1.5	400 g
Sartobind 150 mL 96IEXS42E9BFF	S	Sanitary flange	1	150	8	5,500 cm <sup>2</sup>	3.9	0.75	400 g
Sartobind 1.2 L 96IEXS42E3FSS	S	Sanitary flange	1	1,200	8	4.4 m <sup>2</sup>	31	6	1.9 kg
Sartobind Jumbo 5 L 96IEXS42E3ESS	S	Sanitary flange	1	5,000	8	18.2 m <sup>2</sup>	127	25	16 kg

## Sartobind Phenyl Capsules

Order no.	Chemistry	Description adapter inlet and outlet	Quantity	Bed volume [mL]	Bed height [mm]	Nominal membrane area	Protein binding capacity** [g]	Recommended flow rate [L/min]	Approx. weight
Sartobind nano 96HICP42EUC11--A	Phenyl	Female Luer	4	3	8	110 cm <sup>2</sup>	0.044	0.015	10 g
Sartobind 150 mL 96HICP42E9BFF	Phenyl	Sanitary flange	1	150	8	5,500 cm <sup>2</sup>	2.2	0.75	400 g
Sartobind 1.2 L 96HICP42E3FSS	Phenyl	Sanitary flange	1	1,200	8	4.4 m <sup>2</sup>	18	6	1.9 kg
Sartobind Jumbo 5 L 96HICP42E3ESS	Phenyl	Sanitary flange	1	5,000	8	18.2 m <sup>2</sup>	73	25	16 kg

\* Frontal surface area = average cylinder surface

\*\* Typical dynamic binding capacity at 10% breakthrough was measured with BSA for Q | lysozyme for S chemistry and IgG for HIC.  
1 mL is the equivalent to 36 cm<sup>2</sup> membrane

## Accessories

Order No.	Description	Quantity
1ZA0GV0003	Adapter, Sanitary 25 mm, 1/2" - 3/4" to UNF 10-32	2
1ZA---0004	Adapter, male Luer to UNF 10-32 female, PEEK	1
9ZGL--0102	Trolley for Jumbo, 5 L, stainless steel	1
7ZAL-V0013	Reducing adapter 1 1/2" - 3/4" / 1/4"; 50.5 mm to 25 mm, sanitary	2
7ZAL-V0010	Reducing adapter 2" - 1 1/2"; 64/50.5 mm to 25 mm, sanitary	2

## 96-Well Plates and Accessories

Order No.	Description	Quantity
99IEXQ42GC-----V	Sartobind Q 96-well plate, 2 units	2 (24 × 8-well strips)
99IEXQ42GC-----D	Sartobind Q 96-well plate, 10 units	10 (120 × 8-well strips)
99STPA42GC-----V	Sartobind STIC PA 96-well plate, 2 units	2 (24 × 8-well strips)
99STPA42GC-----D	Sartobind STIC PA 96-well plate, 10 units	10 (120 × 8-well strips)
99IEXS42GC-----V	Sartobind S 96-well plate, 2 units	2 (24 × 8-well strips)
99IEXS42GC-----D	Sartobind S 96-well plate, 10 units	10 (120 × 8-well strips)
99HICP42GC-----V	Sartobind Phenyl 96-well plate, 2 units	2 (24 × 8-well strips)
99HICP42GC-----D	Sartobind Phenyl 96-well plate, 10 units	10 (120 × 8-well 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	25
VW08VAC01	Vac8 vacuum manifold	1
VW08VAA02	Vac8 liquid trap and reservoir	1
VW08VAA03	8-well collection strips, 1.2 mL (round wells)	125
VW08VAA04	Replacement seal for Vac8 vacuum manifold	1
BBI-8582572	Swing-out rotor for deep-well plates (max. 80 mm high), incl. 2 buckets	1
16694-2-50-06	Microsart® mini.vac vacuum pump, 230 V   50 Hz	1
16694-1-60-06	Microsart mini.vac vacuum pump, 115 V   60 Hz	1

## Sartobind pico Capsules

Order No.	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

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Chromatography as easy as filtration



▶ Sartobind App  
[www.sartorius-stedim.com/apps](http://www.sartorius-stedim.com/apps)