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Products & CTDMO Services

Data Sheet

Pellicon® 2 Cassettes

High-Performance TFF Devices for legacy molecules, vaccines, and a wide array of bioprocessing applications

Pellicon® 2 cassettes are well established devices for ultrafiltration (UF) and diafiltration (DF) applications in bioprocessing. These versatile devices efficiently separate oligonucleotides, peptides, proteins, blood and plasma, recombinant proteins, monoclonal antibodies (mAbs) and vaccines. Available with various membranes, pore sizes and filtration areas, Pellicon® cassettes ensure optimal product recovery and high yields. They are particularly suited for higher titer therapeutics, more viscous formulations and demanding filtration processes that require elevated operating conditions.

Designed to support a wide range of TFF applications, Pellicon® 2 cassettes offer effective separation for small- to full-scale manufacturing.

Benefits

- Two membrane types, composite regenerated cellulose (CRC) and modified polyethersulfone (PES), support a wide range of applications
- Three distinct feed screens provide options for maximum flux (A), viscous (C) and very viscous solutions (V)
- Broad NMWL from 1 kD to 1000 kD
- Distinct NMWL 100–1000 kD for vaccines
- Linear scalability for fast scale-up/down from lab to production scale

Typical Applications

- Vaccines
- Blood and plasma
- Recombinant proteins
- Oligonucleotides
- Peptides, proteins
- Antibodies

Portfolio

Membrane	Ultracel® (composite regenerated cellulose), Biomax® (modified polyethersulfone)
Feed screen	A (max flux), C (viscous), V (very viscous)
NMWL (kD)	1, 5, 8, 10, 30, 50, 100, 300, 500, 1000
Area (m^2)	0.1, 0.5, 2.0, 2.5

* NMWL = Nominal Molecular Weight Limit

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Consistent High Flux and High Product Recovery

Our Biomax® modified PES and Ultracel® CRC membranes have void-free structures that guard against leakage of solutes through microdefects normally associated with voids beneath the thin skins of conventional UF membranes (**Figures 1 and 2**).

These void-free membranes are more permeable, resulting in high-flux with equivalent or superior product retention (**Figure 3**). These void-free membranes provide the advantages of fast, high yield processing and smaller systems.

Fast, Reliable Linear Scale Up

All Pellicon® 2 cassettes are constructed of identical materials and have the same flow channel length, height, turbulence promoter and flow direction. This ensures a consistent performance profile at every scale, from 250 mL to thousands of liters. Whether you operate 0.1 m² or 100 m² of installed area, every device operates with the same pressure drop, flow velocity and concentration profile for true, rapid and simple linear scale-up.

Pellicon® 2 cassettes (0.1 m^2) are designed for laboratory ultrafiltration of 100 mL to 1.0 L volumes. These smaller scale cassettes linearly scale up to Pellicon® 2 cassettes (0.5 m^2 and 2.5/2.0 m^2) used in pilot and production plants to process volumes from one liter to thousands of liters.

Greater Process Reliability

We ensure the quality of our ultrafiltration membranes through our innovative multiple solute mixed-dextran retention profile test. This test ensures reproducible retention performance across the entire range of molecular weights retained by the membrane, rather than at just one or two points.

With our defect-free membranes and highly controlled manufacturing processes, you can expect greater consistency for any TFF application in your process.

Low Product Loss

Pellicon® 2 cassettes have a low minimum working volume—as low as 175 mL of retentate volume per square meter of membrane area. This low retentate volume permits high concentration factors to be reached with low starting volumes and maximizes the recovery of small sample volumes.

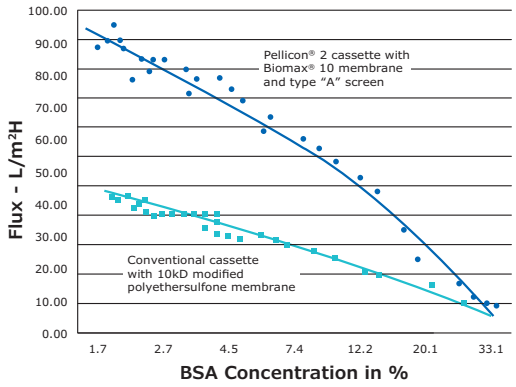
To prevent product loss, Pellicon® 2 cassettes are 100% tested in manufacturing to ensure every filter is integral.

In addition, Biomax® and Ultracel® membranes are exposed to a highly sensitive, high-pressure integrity test. The integrity test procedure and specifications are supplied so you can confirm integrity at high pressure when the cassette is installed (**Figure 6**).

Figure 1. Void-free Biomax® 10 modified PES membrane

Figure 2. Conventional 10 kD PES membrane with sub-surface voids

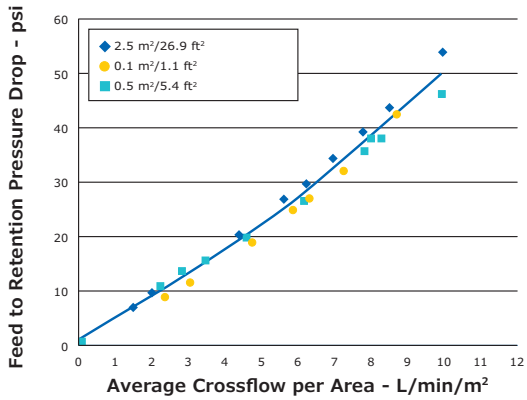
Pellicon® 2 Cassettes Proof of Performance



Pellicon® 2 cassettes with Biomax® membranes provide up to two times the process flux of conventional cassettes resulting in faster processing and smaller systems.

Feed pressure: 5.6 bar/80 psi
Retentate pressure: 2.1 bar/30 psi
Temperature: 10–13.5 °C
Initial volume 28 L
Final volume: 2 L

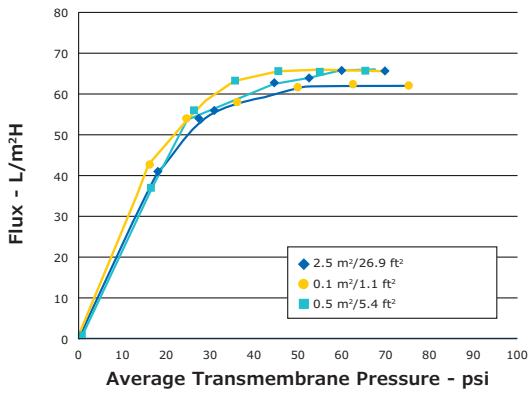
Figure 3. Flux versus BSA concentration



Pellicon® 2 family of cassettes scale linearly from 0.1 to 0.5 to 2.5 m^2 (1.1 to 5.4 to 26.9 ft^2) for rapid, accurate and safe process scale up and transfer.

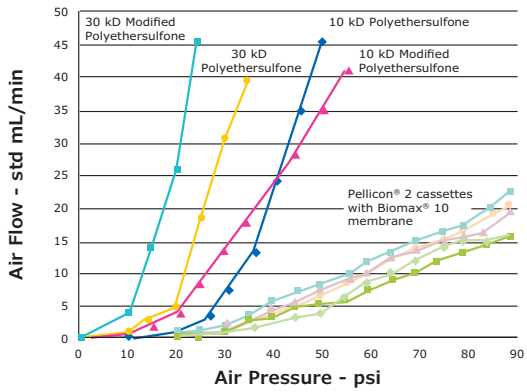
Temperature: 8 °C

Figure 4. Feed to retentate pressure drop versus average crossflow on a 10% BSA solution



Temperature: 8 °C
Feed to retentate pressure drop:
2.8 bar/40 psi

Figure 5. Flux versus average transmembrane pressure on a 10% BSA solution



The void-free structure of Biomax® membranes is demonstrated by low, linear air diffusion values. This performance ensures better process reliability and safety and better product retention for higher yields.

Figure 6. Integrity test comparison-air flow through wetted cassettes

Quality Assurance

All Pellicon® 2 cassettes are manufactured using the same equipment, process and quality assurance. Each device manufacturing lot is 100% integrity tested during manufacturing to ensure every filter is integral, robust and within specification.

Services and Support

Our technical experts offer best-in-class field support from process development to implementation, helping you overcome barriers and achieve your goals faster. To accelerate and simplify your path to market, our Validation Services team can help you select, test and validate the cassettes, assemblies and systems you need and assist with meeting your process and regulatory requirements.

A Choice of Feed Screens

Pellicon® 2 cassettes incorporate three types of feed screens to optimize performance based on the nature and viscosity of products being filtered.

Solution Type	Screen	Feed Flow
Dilute protein solution or low viscosity solutions (mAbs, interferons)	A	4.0–6.0 Lpm/m²
Concentrated protein solutions or high viscosity solutions (IgG, biopolymers)	C	4.0–7.0 Lpm/m²
High viscosity solutions (polysaccharides)	V	4.0–8.0 Lpm/m²

A Choice of Membrane

Two membrane types support a wide range of applications.

Membrane Type	Material	Benefits
Biomax®	Modified Polyethersulfone	• Highest flux • Excellent chemical resistance
Ultracel®	Composite Regenerated Cellulose	• Extremely low protein binding • Highest product recovery with difficult-to-process feed streams (antifoams, lipids, protein transmission applications)

Specifications

Materials of Construction

Membrane	Composite regenerated cellulose or modified polyethersulfone
Screen	Polypropylene
Jacket	Polyurethane
Endcap	Polysulfone
Storage Solution	1.1% acetic acid, 1.6% sodium phosphate monobasic and 24.8% glycerin (w/w)

Temperature Range

Device Size (m²)	Biomax®	Ultracel®
0.1	4 to 50 °C	4 to 30 °C
0.5	4 to 50 °C	4 to 30 °C
2.0/2.5	4 to 50 °C	4 to 30 °C

Maximum Forward Transmembrane Pressure

Device Size (m²)	Biomax®	Ultracel®
0.1	6.8 bar (100 psig) Max	6.8 bar (100 psig) Max
0.5	6.8 bar (100 psig) at 30 °C	3.4 bar (50 psig) at 30 °C
2.0/2.5	6.8 bar (100 psig) at 30 °C	3.4 bar (50 psig) at 30 °C

Maximum Reverse Transmembrane Pressure

Device Size (m²)	Biomax®	Ultracel®
0.1	0.3 bar (5 psig)	0.3 bar (5 psig)
0.5	0.3 bar (5 psig)	0.3 bar (5 psig)
2.0/2.5	0.3 bar (5 psig)	0.3 bar (5 psig)

Dimensions

Device Size (m²)	Width	Length	Thickness
0.1	5.6 cm	21 cm	1.5 cm (V screen-2.2 cm)
0.5	17.8 cm	21 cm	1.5 cm (V screen-2.2 cm)
2.0/2.5	17.8 cm	21 cm	7.6 cm (V screen-9.0 cm)

Normalized Recirculation Rates

Feed Screen	Feed Flow
A	4.0–6.0 Lpm/m²
C	4.0–7.0 Lpm/m²
V	4.0–8.0 Lpm/m²

Pellicon® 2 Membrane Selection Chart

Approximate Molecular Weight (range of solutes retained >99%, kD)		Membrane	NMWL (kD) or Microns	Membrane Material	pH Range
Biomax® Membranes—for Higher Yield and Reliability					
12–25	(growth factors, hormones)	PBCC	5	modified polyethersulfone	1–14
25–50	(growth factors, hormones)	PBFC	8	modified polyethersulfone	1–14
50–100	(albumin, hemoglobin)	PBGC	10	modified polyethersulfone	1–14
100–140	(enzymes)	PBTK	30	modified polyethersulfone	1–14
140–300	(IgG's)	PBQK	50	modified polyethersulfone	1–14
300–500	(small viruses and antigens)	PBHK	100	modified polyethersulfone	1–14
>500	(IgM's, large viruses)	PBMK	300	modified polyethersulfone	1–14
>0.03 µm	(large viruses, colloids, particulates)	PBVK	500	modified polyethersulfone	1–14
>0.03 µm	(large viruses, cells, colloids, particulates)	PBXK	1000	modified polyethersulfone	1–14
Ultracel® Membranes—for High Recoveries					
8–18	(proinsulin, hematopoetic factors)	PLCCC	5	regenerated cellulose	2–13
18–60	(hemoglobin, enzymes)	PLCGC	10	regenerated cellulose	2–13
60–200	(monoclonal IgG's)	PLCTK	30	regenerated cellulose	2–13
200–500	(small viruses, viral antigens)	PLCHK	100	regenerated cellulose	2–13
>500	(large viruses, IgM's)	PLCMK	300	regenerated cellulose	2–13
>0.03 µm	(large viruses, cells, colloids, particulates)	PLCXK	1000	regenerated cellulose	2–13
Supported Regenerated Cellulose Membranes					
2–5	(heparin, allergens, peptides)	PLAC	1	regenerated cellulose	2–13

Ordering Information

Pellicon® 2 Cassettes

	Cassettes with A Screens			Cassettes with Type C Screens		
Membrane	**0.1 m²/1.1 ft²**	**0.5 m²/5.4 ft²**	**2.5 m²/26.9 ft²**	**0.1 m²/1.1 ft²**	**0.5 m²/5.4 ft²**	**2.5 m²/26.9 ft²**
Supported Regenerated Cellulose Membranes						
1 kD	NA	NA	NA	P2PLACC01	P2PLACC05	P2PLACC25
Biomax® Membranes—Modified Polyethersulfone						
5 kD	P2B005A01	P2B005A05	P2B005A25	SK1M009W01	SK1M014W01	SK1M016W01
8 kD	P2B008A01	P2B008A05	P2B008A25	NA	NA	SK1M017W01
10 kD	NA	NA	NA	SK1M011W01	SK1M015W01	SK1M018W01
30 kD	NA	NA	NA	SK1M012W01	SK1P006W6	SK1M019W01
50 kD	NA	NA	NA	P2B050C01	P2B050C05	P2B050C25
100 kD	P2B100A01	P2B100A05	P2B100A25	P2B100C01	P2B100C05	P2B100C25
300 kD	NA	NA	NA	P2B300C01	P2B300C05	P2B300C25
500 kD	NA	NA	NA	P2B500C01	P2B500C05	P2B500C25
1000 kD	NA	NA	NA	P2B01MC01	P2B01MC05	P2B01MC25
Ultracel® Membranes—Composite Regenerated Cellulose						
100 kD	NA	NA	NA	P2C100C01	P2C100C05	P2C100C25
300 kD	NA	NA	NA	P2C300C01	P2C300C05	P2C300C25
1000 kD	NA	NA	NA	P2C01MC01	P2C01MC05	P2C01MC25

Ordering Information (Continued)

	Cassettes with Type V Screens		
Membrane	**0.1 m²/1.1 ft²**	**0.5 m²/5.4 ft²**	**2.0 m²/21.5 ft²**
Supported Regenerated Cellulose Membranes			
1 kD	P2PLACV01	P2PLACV05	P2PLACV20
Biomax® Membranes—Modified Polyethersulfone			
5 kD	P2B005V01	P2B005V05	P2B005V20
8 kD	P2B008V01	P2B008V05	P2B008V20
10 kD	P2B010V01	P2B010V05	P2B010V20
30 kD	P2B030V01	P2B030V05	P2B030V20
50 kD	P2B050V01	P2B050V05	P2B050V20
100 kD	P2B100V01	P2B100V05	P2B100V20
300 kD	P2B300V01	P2B300V05	P2B300V20
500 kD	P2B500V01	P2B500V05	P2B500V20
1000 kD	P2B01MV01	P2B01MV05	P2B01MV20
Ultracel® Membranes—Composite Regenerated Cellulose			
5 kD	P2C005V01	P2C005V05	P2C005V20
10 kD	P2C010V01	P2C010V05	P2C010V20
30 kD	P2C030V01	P2C030V05	P2C030V20
100 kD	P2C100V01	P2C100V05	P2C100V20
300 kD	P2C300V01	P2C300V05	P2C300V20
1000 kD	P2C01MV01	P2C01MV05	P2C01MV20

Silicone intercassette gaskets are required for use with Pellicon® 2 cassettes. Two gaskets are packed in each box of Pellicon® 2 cassettes.
NA = not available

The part numbers listed above represent a selection of available configurations. Additional part numbers may be available. Contact your local account manager for complete ordering information.

Related Products

Pellicon® XL Devices for Process Development

For process development of volumes from 50 mL to 1 liter, we offer Pellicon® XL devices. This small volume TFF filter is designed for true scalability by providing the same flow path, channel length and channel height as Pellicon® 2 cassettes. Based on proven TFF membrane technology, Pellicon® XL devices ensure reliable, consistent and predictable performance.

Pellicon® 3 Cassettes

Advanced, high-performance cassettes that are ideal for today's higher titer therapeutics as well as for the more demanding filtration processes that require higher operating pressures, temperatures, concentrations and caustic cleaning regimes. The Pellicon® 3 cassette design and automated manufacturing process provide unbeatable performance consistency and enhanced linear scalability within the Pellicon® family of cassettes and capsules.

Pellicon® Capsules with Ultracel® Membrane

Ideal for single-use TFF, providing high flux and linear scalability in a sterilized plug 'n play format for optimum process flexibility and productivity. Pellicon® Capsules were engineered for performance consistency and linear scalability within the Pellicon® family of cassettes and capsules for reliable process development and predictable scaleup at any stage of your biologics.

TFF Holders

Holder	Description	Cat. No.
Pellicon® Micro Holder	For area from 0.1 to 0.3 m², Luer fittings	**XX42PMICRO**
Pellicon® Mini Holder + Minix Tie Rods	For area from 0.1 to 0.5 m², Mini Tri Clamp (TC) fittings	**XX42PMINI-X**
Pellicon® Cassette Standard Acrylic Holder	For area from 0.5 to 5 m²	**XX42P0060**
Pellicon® Stainless Steel Holder	For area from 0.5 to 5 m², 100% Stainless tell, TC connections for TMP measurement	**XX42P0080**
Pellicon® Process Scale Holders	Pellicon® Process Scale holders	**Refer to DS15260EN literature**

TFF Systems

Cogent® Lab Systems

When developing a TFF step at small scale, using a model that is representative of large scale, performance is essential. It not only allows for the successful transfer from laboratory scale to larger volumes but also maintains consistent process parameters. Our family of Cogent® Lab systems uses a similar design, sensing technologies and accessories as our process-scale equipment. With a homogeneous design and flow range from 20 to 6000 mL/min, our Cogent® Lab systems have been specifically created to simplify process development. These systems offer linear performance and a uniform and intuitive software experience, reducing training requirements and ensuring smooth scale up and scale down.

Cogent® Process-Scale TFF System

The fully automated Cogent® TFF system is designed to separate and purify monoclonal antibodies, vaccines, plasma and therapeutic proteins. It is ideally suited for both pilot and production scale applications, thereby supporting rapid scale up from small to large scale operations. This system has a very low hold-up volume for maximum volume concentration and optimal product recovery, thus enhancing process performance.

TFF Systems (Continued)

Process Scale Single-Use TFF Systems

Our Mobius® TFF 20 and Mobius® TFF 80 systems provide a combination of single-use Flexware® assemblies and hardware specifically designed for efficient concentration and diafiltration of proteins. With an installable filter area ranging from 0.5 to 20 m^2, flow range from 2 to 80 L/min and tank size from 50 to 500 L, these systems can adapt to your process needs. The closed flow path minimizes the risk of contamination while protecting operators and increasing process flexibility and efficiency.

To place an order or receive technical assistance:
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For local contact information:
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