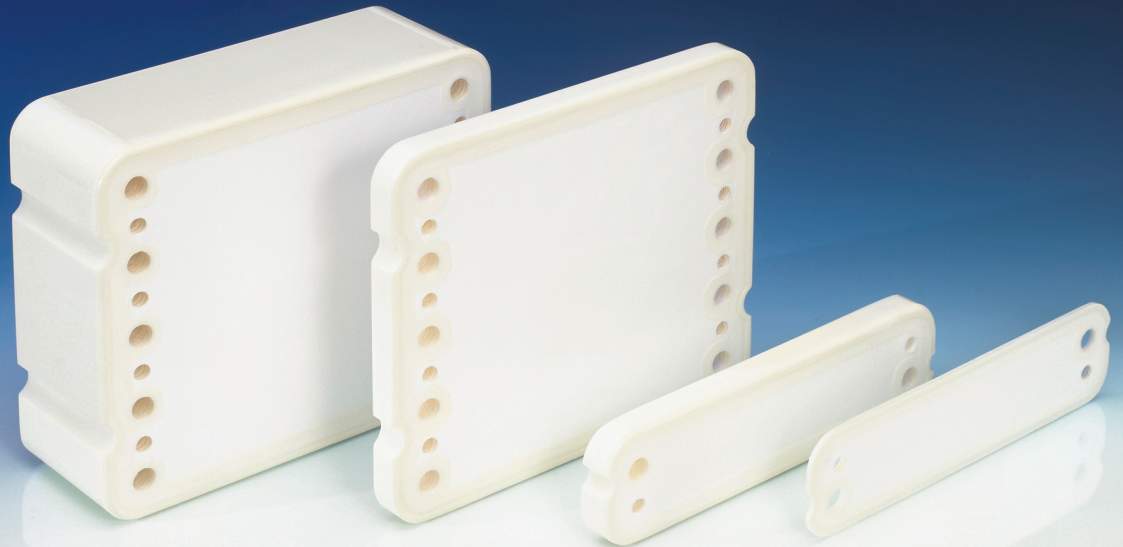




## T-Series TFF Cassettes with Omega™ Membrane



*High performance Omega PES membrane combined with significant material and design improvements deliver highly reliable fluid dynamics and better process economics*

- ▶ **Easy implementation into your process.** The new T-series cassettes offer significant improvements in construction and design while utilizing the same proven Omega polyethersulfone (PES) membrane to reduce revalidation requirements.
- ▶ **Increased safety, reliability, and reproducibility.** Superior new materials of construction are durable and stable, exhibit very low extractables, and offer broad chemical compatibility.
- ▶ **High flux, high selectivity, and low protein binding** are achieved through the use of Omega PES membrane.
- ▶ **Improved process performance.** Cassettes are designed to provide optimal mass transfer to improve your process economics.
- ▶ **Easy scale up for robust purification processes.** Available in scalable formats with the same materials of construction from development to production-scale processes.
- ▶ **Enhanced validation.** T-series cassettes surpass the latest biopharmaceutical and regulatory standards such as biological reactivity, extractables, and total organic carbon (TOC). Product claims are backed by extensive validation documentation to support the use of T-Series cassettes in your process.

## Applications

T-Series cassettes with Omega membrane are designed for development, pilot, and production-scale TFF applications in diverse biological and biopharmaceutical processes.

They are especially useful in:

- ▶ Vaccine and conjugate concentration and diafiltration
- ▶ Purification and recovery of monoclonal antibodies (mAbs) or recombinant proteins
- ▶ Blood plasma fractionation and purification

## Product Platforms

T-Series cassettes complement Pall's highly successful Centramate™ and Centrasette™ products, and have been developed following years of experience designing and optimizing our customers' biotech and biopharmaceutical processes.

T-Series cassettes for Centramate holders are offered in scalable membrane formats with effective filtration areas (EFA) from as low as 200 cm<sup>2</sup> (0.215 ft<sup>2</sup>) to 0.5 m<sup>2</sup> (5.4 ft<sup>2</sup>), making them ideal for process development and small-scale production of 0.1 L to 125 L.

Centrasette T-Series cassettes, in combination with Centrasette holders, can process thousands of liters with installations incorporating hundreds of square meters of EFA.

## Proven Omega Membrane

Pall's Omega polyethersulfone (PES) membranes offer high flux and selectivities. They have been specifically modified to minimize protein binding to the surface and interstitial structure of the membrane. This polymeric membrane is stable against biological and physical degradation due to the unique chemical properties of PES.

Omega membranes are cast on a highly porous, non-woven polyolefin support. They have an anisotropic structure, a thin skin-like top layer with a highly porous underlying support. The structure of the skin determines the porosity and permeability characteristics of the membrane and can typically be cleaned quicker and easier than membranes with a uniform, sub-micron depth structure. This membrane is compatible with acids, bases and a variety of other cleaning agents. Omega membranes are available in a wide range of nominal molecular weight cut-offs (NMWC).

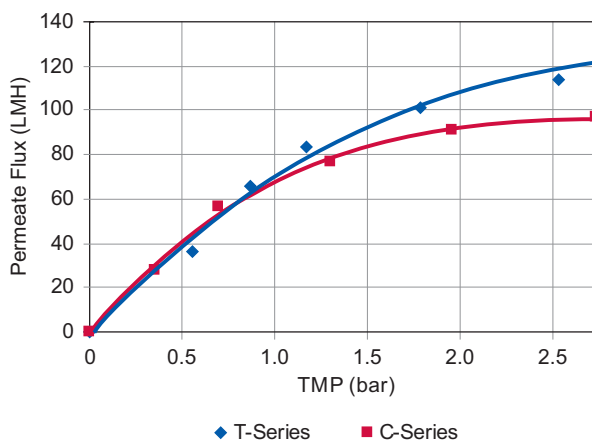
## The T-Series Advantage

Superior new materials of construction and improved cassette design increase process safety, reliability, reproducibility, and productivity:

- ▶ The feed and permeate screen material for T-Series cassettes is made from polypropylene which is highly resistant to sodium hydroxide.
- ▶ Larger feed and permeate ports provide lower pressure drops.
- ▶ T-Series cassettes have been designed to provide maximum mass transfer through the membrane, resulting in faster processing times or reduced area installations compared to existing similar cassette formats.

**Figure 1**

*Omega 10 kDa membrane, Centramate C vs. T-Series membrane cassettes at a 5 L/min/m<sup>2</sup> cross flow rate*



## Technical Specifications

### Materials of Construction

Membrane	Omega polyethersulfone
Support	Polyolefin
Screens	Polypropylene
Encapsulant	Polyurethane with white pigment (TiO <sub>2</sub> )
Permeate seals	Platinum cured silicone
Gaskets	Medical grade, platinum cured silicone

### Operating Limits

Maximum pressure <sup>1</sup>	6 barg (90 psig) at 23 °C; 4 barg (60 psig) at 55 °C
Maximum transmembrane pressure (TMP)	4 barg (60 psig) at 55 °C
Temperature range <sup>2</sup>	-5 to 55 °C
pH range	2 – 14

<sup>1</sup> Pressure rating will be dependant on rating of the lowest system component

<sup>2</sup> Cassettes must not be allowed to freeze

### Typical Operating Parameters

Cross flow rate for processing	5 – 7 L/min/m <sup>2</sup> (0.5 – 0.7 L/min/ft <sup>2</sup> )
Cross flow rate for cleaning	8 – 10 L/min/m <sup>2</sup> (0.8 – 1.0 L/min/ft <sup>2</sup> )

### Integrity Test

Test pressure	2 barg (30 psig)
Maximum air forward flow	< 1600 sccm/m <sup>2</sup> (< 150 sccm/ft <sup>2</sup> )

### Shelf Life

The shelf life of cassettes packaged in 0.3 N sodium hydroxide is expected to be 4 (four) years from the date of manufacture when the cassettes are stored unopened in the original packaging at 4–25 °C and protected from direct light. Extended shelf life studies are ongoing.

### Biological Safety

All of the materials of construction in the T-Series cassettes have been tested and meet requirements for United States Pharmacopeia (USP) Biological Reactivity Test, *In Vivo* <88> at 70 °C.

### Documentation

Each T-Series membrane cassette has a unique serial number for full traceability. Each cassette is supplied with:

- ▶ Certificate of quality
- ▶ Membrane Cassette Care and Use Procedures
- ▶ Material safety data sheet (MSDS) for cassette preservative
- ▶ Two platinum cured silicone gaskets

The full validation guide is available on request from your local Pall contact. Pall also offers a comprehensive validation service for specific tests (such as compatibility) in your process fluid. As always, Pall's downstream processing specialists are available to train and support you in the optimization of your TFF processes.

To test T-Series cassettes in your process, contact Pall today.

## Ordering Information

This is a guide to the part number structure and availability of T-Series cassettes. For example, the part number **OS 010 T12** is an Omega membrane, 10 kDa NMWC, 0.1 m<sup>2</sup> (1.1 ft<sup>2</sup>) Centramate screen channel cassette.

**OS**

Code	Membrane	Description
OS	Omega	Low protein binding, modified polyethersulfone

**xxx**

Code	NMWC
001	1 kDa
003	3 kDa
005	5 kDa
010	10 kDa
030	30 kDa
050	50 kDa
070	70 kDa
100	100 kDa
300	300 kDa

**Txx**

Code	Type and Area Screen Channel
T01	Centramate 0.01 m <sup>2</sup> (0.1 ft <sup>2</sup> )
T02	Centramate 0.02 m <sup>2</sup> (0.2 ft <sup>2</sup> )
T12	Centramate 0.1 m <sup>2</sup> (1.1 ft <sup>2</sup> )
T06	Centrasette 0.5 m <sup>2</sup> (5.4 ft <sup>2</sup> )
T26	Centrasette 2.5 m <sup>2</sup> (27 ft <sup>2</sup> )



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