

*Industry's Most Advanced Technologies.  
Experience, Not Experiments.*



# TITANIUM MEMBRANE FILTRATION



*A Filtration Solution That Delivers Cost Savings And Unmatched  
Performance In Demanding Process Conditions.*

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## A REVOLUTION IN FILTRATION: *THE TITANIUM MEMBRANE*

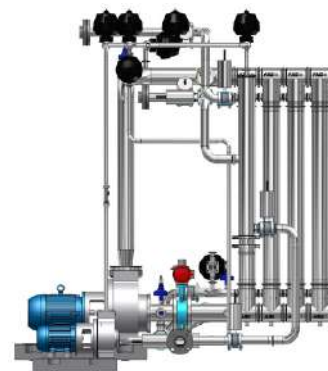
Membrane filtration technologies are well established in industrial filtration processes. However, traditional membrane systems with polymeric hollow fiber or ceramic membranes come with draw-backs that present challenges to many operators: rapid fouling, declining flux rates, limited operating ranges (due to the impact of temperature, pH, corrosion or pressure), poor selectivity and high costs.

Trident Titanium Membrane Systems address all these concerns. The superior performance properties of titanium paired with the proven tubular cross flow design, ensure consistently high separation results. **Regardless of how demanding the operating conditions might be; the Trident Titanium Membrane System continues to deliver.** ►

Titanium has long been a desired material in high-performance applications. Thanks to an innovative manufacturing technique, we are now able to utilize Ti as an economically competitive filter media for UF applications.

### **Tubular Cross Flow Ti Membrane For Demanding Conditions**

The Trident Titanium Membrane System features a cross-flow filtration design with tubular high-porosity membranes. The system is well suited for a variety of applications, in particular for high solids recovery and separation of high viscosity streams and oily materials, which commonly cause fouling and require extensive cleaning cycles with traditional membranes. The Trident system on the other hand, delivers unmatched runtime and exceptional performance in the widest range of operating conditions including extreme temperatures, pressure or pH. The system is fully scalable and its modular design allows for future expansion. ▼



#### **WHY CHOOSE TITANIUM?**

- Exceptional strength and structural properties
- pH resistant: allowable pH Range 0.0 - 14.0
- High-temperature resistant: over 1,000°F (550°C)
- High-pressure resistant: high fracture toughness
- Fouling resistant: CIP back to 'Day 1' condition
- Chemical resistant: allow chemical sanitization
- Corrosion resistance in oxidizing acid environment
- High residual value of Titanium

**Trident Ti Membranes are 100% pure Titanium, not Ti-coated, ensuring maximum structural strength.**

### **Trident Titanium Membrane Systems Deliver Exceptional Performance**

**HIGH SOLID LOADINGS:** Tubular membranes build up suspended solid loadings to 99%. The RDV delivers a 'spadable' dry retentate.

**HIGH FLUX RATES:** System design, membrane hydrophilicity and strength deliver and maintain highest flux rates and longest runtime.

**REMOVE FATS, OILS AND GREASE:** Superior filtration performance in FOG applications, with up to 99.87% removal in a single pass.

**CLEANING:** CIP with your preferred cleaning agents, steam or pressure, without degrading the membrane's performance.

**STARTUP & SHUTDOWN:** No extensive startup and shutdown procedures required, improving runtime efficiency, especially when batch processing or mobile applications are required.

**SELECTIVITY:** Superior strength and structural properties of membrane ensures true pore sizes and uniform rejection rates.

**LOW OPEX:** Low energy requirements (operate at low pressure), only require chemicals for cleaning, and fully automated operation.

**TEMPERATURE:** Membranes withstand high temperatures and can process feed streams with over 1,000°F (550°C). Membranes can also be cleaned with nitric acids at high temperature.

**FLEXIBILITY:** The modular design allows scalability and expansion. The system suits a variety of applications and plant processes due to the available pore sizes and modules with different treatment capacities.

**PIECE OF MIND:** Membranes have a 10-year warranty.



### Applications: Liquid Purification And High-Solids Recovery

Trident offers its Titanium Membrane Systems as Ultrafiltration and Microfiltration systems with high-porosity membranes that are available with pore sizes from 0.05 to 5 micron allowing the removal of microbial particles, bacteria, viruses, pathogens, yeast, colloids, silt, protein, gelatin etc.

Common applications include liquid purification and high-solids recovery and concentration in both manufacturing and waste related processes. Food & beverage processing, manufacturing or oil & gas are only some of the industries we serve. The high removal rates achieved by the Trident Titanium Membrane System also help protect your plant's downstream treatment (e.g. RO).

- Juicing**
- Dairy Processing**
- CIP Recovery**
- Brewing**
- Gelatin Recovery**
- MEG Recovery**
- Winery**
- Meat Processing**
- Potato Starch Recovery**

### Flexible Process Integration

The skid-mounted Trident Titanium Membrane System can easily be integrated in existing manufacturing or waste treatment processes. Depending on the project requirements, the filtration system can be controlled by a dedicated PLC and automation package or fully integrated in the plant's PLC system.

### Economic Case: Low OPEX And Valuable By-Products

The Trident Titanium Membrane System delivers an exceptional ROI. Low OPEX due to low electrical and no or little chemical requirements, and competitive CAPEX build the foundation for a sustainable investment. The system's ability to increase a plant's process efficiency and to recover valuable (by-)products, contribute to the ROI and build a strong economic case. A great example is the recovery of expensive chemical cleaning agents during CIP processes, or the reclamation of monoethylene glycol (MEG) in the oil & gas industry.

### Convincing Results

Don't just take our word for it. Testing data from various food & beverage processing applications prove the system's outstanding performance. These 2 samples were processed in a single pass, through a 0.2 micron filtration system):

	DESCRIPTION	BOD mg/L	SS mg/L	Grease mg/L	COD mg/L
Sample 1	Feed	28,900	19,800		61,900
	Filtrate	1,520	15		4,390
	Reduction	1,820	2,585		8,110
	% Reduction	54.49%	99.42%		64.88%
Sample 2	Feed	1,650		370	2,890
	Filtrate	608		13	791
	Reduction	1,042		357	2,099
	% Reduction	63.15%		96.49%	72.63%

*DISCOVER A NEW FILTRATION STANDARD: TRIDENT TITANIUM MEMBRANE FILTRATION SYSTEMS CONVINCE WITH HIGHEST CHEMICAL AND TEMPERATURE TOLERANCE AND EXCEPTIONAL REMOVAL RATES OF SUSPENDED SOLIDS, FATS, OILS AND GREASE, WHILE MAINTAINING FULL FLUX RATES OVER ITS LIFETIME.*

**ELIMINATE NEED TO BALANCE FEED STREAMS**

**REMOVE UP TO 99% SUSPENDED SOLIDS**

**REMOVE UP TO 99% FATS, OILS AND GREASE**

**REDUCE BOD BY UP TO 99% AND COD BY UP TO 92%**

**SEPARATION WITHOUT CHEMICALS**

**LOW ENERGY REQUIREMENTS**

**PROTECTS DOWNSTREAM TREATMENT**

**REDUCE WASTEWATER DISCHARGE COSTS**

## TECHNICAL DETAILS

The Trident Titanium Membrane System is specifically designed based on your processing method (batch vs continuous), treatment capacity requirements, quality of feed stream, and output objectives.

<b>Membrane</b>	
Membrane Structure:	Tubular
Membrane Substrate Layer:	Titanium, 40 – 60% porosity
Active Surface Layer:	Titanium
Internal Diameter (ID):	5/64 – 43/64" (2-17 mm)
Nominal Pore Diameter:	0.05 – 5 micron (Ultrafiltration, Microfiltration)
<b>Operating and Design Information</b>	
Membrane Module Sizes (Diameter):	3-15/16", 7-7/8", 11-13/16" (100, 200, 300 mm)
Flux Rate	176 Gallons/ft2/day (300 Liter/m2/hour)
Maximum Operating Temperature:	1,000°F (550°C)
Allowable pH Continuous Operation:	0.0 – 14.0
Cleaning:	Clean-in-Place (CIP)
Allowable pH – CIP:	0.0 – 14.0



## ARE YOU INTERESTED IN IMPROVING YOUR PLANT'S PROCESS?

Would you like to eliminate downstream fouling?  
 Do you use harsh chemicals or heat?  
 Are your discharge costs too high?

We do offer to pilot the Trident Titanium Membrane System at your plant and provide a comprehensive report including sample analysis results.

**CALL 1.800.799.3740 FOR DETAILS.**