

Vinopro* Series

Wine Processing -- Volatile Acidity & Alcohol Adjustment

The Vinopro* family of proprietary thin-film nanofiltration membrane elements are characterized by an approximate molecular weight cut-off of 150-300 Dalton for uncharged organic molecules. Divalent and multivalent ions are preferentially rejected by the membrane while monovalent ions rejection is dependent upon feed concentration and composition. Since monovalent ions pass through the membrane, they do not contribute to the osmotic pressure, thus enabling Vinopro membrane systems to operate at feed pressures below those of RO systems. The D-Series membrane has a minimum rejection of 98% on 2,000 ppm MgSO₄ at 25 °C and 110 psi operating pressure.

The Vinopro Elements are typically used for grape sugars concentration, oak extract fractionation, alcohol and acidity reduction and wine adjustment.

The Vinopro Elements feature a Durasan* Cage patented outer wrap, a selection of feed spacers and polysulfone parts.

Table 1: Element Specification

Membrane	D-Series, Thin Film Membrane (TFM*)
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Model	Spacer mil (mm)	Active area ft ² (m ²)	Part number
Vinopro 4040C-30D	30 (0.76)	80 (7.4)	1231691
Vinopro 4040C-50D	50 (1.27)	63 (5.9)	1232742
Vinopro 8040C-30D	30 (0.76)	346 (32.1)	1240357
Vinopro 8040C-50D	50 (1.27)	252 (23.4)	1238231

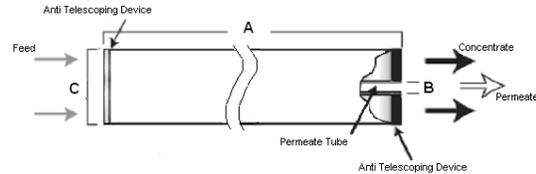


Figure 1: Element Dimensions Diagram - Female

Table 2: Dimensions and Weight

Model ¹	Dimensions, inches (cm)			Boxed Weight lbs (kg)
	A	B ²	C ³	
Vinopro 4040C-30D	40.00 (101.6)	0.625 (1.59)	3.98 (10.1)	7 (3.2)
Vinopro 4040C-50D	40.00 (101.6)	0.625 (1.59)	3.98 (10.1)	7 (3.2)
Vinopro 8040C-30D	40.00 (101.6)	1.125 (2.86)	7.91 (20.1)	29 (13.2)
Vinopro 8040C-50D	40.00 (101.6)	1.125 (2.86)	7.91 (20.1)	29 (13.2)

¹These elements are dried and bagged before shipping.

²Internal diameter.

³The element diameter (dimension C) is designed for optimum performance in GE Water & Process Technologies pressure vessels. Others pressure vessel dimension and tolerance may result in excessive bypass and loss of capacity.

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- www.koch-membranes.com
- www.codelinehousings.com
- www.bigmembrane.com
- www.toraymembranes.com
- www.dairymembranes.com
- www.amtrol-tanks.com

- www.easternro.com
- www.dairymembranes.com
- www.gemembranes.com
- www.hydranauticsmembrane.com
- www.rosave.com

Table 3: Operating parameters

Typical Operating Pressure	140-800 psi (966-5,516 kPa)
Typical Operating Flux	5-20 GFD (8 - 34 LMH)
Clean Water Flux (CWF) ¹	14 GFD (24 LMH) @ 110 psi
Maximum Operating Pressure ²	1,200psi (8,273kPa)
Maximum Temperature	122°F (50°C)
Sanitization Temperature	194°F (90°C)
pH Range	3.0-9.0
Maximum Pressure Drop	Over an element: 15 psi (103 kPa) Per housing: 60 psi (414 kPa)
Chlorine Tolerance	500 ppm-hours dechlorination recommended

¹Clean water flux (CWF) is the rate of water permeability through the membrane after cleaning (CIP) at reproducible temperature and pressure. It is important to monitor CWF after each cleaning cycle to determine if the system is being cleaned effectively. CWF can vary $\pm 25\%$.

² Operating pressure in bar multiplied by operating temperature in degree Celsius should not exceed 2000.

Table 4: CIP limits for NF elements

Temperature	pH minimum	pH maximum
50°C (122°F)	3.0	10.0
45°C (113°F)	2.0	10.5
35°C (95°F)	1.5	11.5
25°C (77°F)	1.0	11.5

Hot Water Sanitization Recommendations

For optimal performance, Vinopro elements should always be cleaned using approved CIP procedures and flushed with fouling free water before the sanitization process. Feed pressure during sanitization should not exceed 40psi (275kPa) and the crossflow should not incur a pressure drop greater than 2psi (14kPa) per element. Heating rate to sanitizing temperature and cool down should not be faster than 5°C/minute. Maximum sanitization temperature is 90°C.

Loss Of Permeate Flow After Repeated 90°C Sanitization Cycles

It is almost impossible to exactly predict the percentage of permeate flow rate lost from the high temperature sanitations, which among other factors depends on:

- 1) Rate of temperature increase and decrease.
- 2) Presence of other species like organics, ionic and metallic compounds that could locally decrease or increase the temperature at the surface of the membrane.
- 3) Feed flow rate and specifically the heat transfer rate to the membrane surface.
- 4) The thickness and geometry of the feed spacer used.

At optimum conditions measured in controlled environment with deionized water, between 30% and 50% of the original permeate flow rate was lost before the element performance had stabilized after repeated heat treatments (over 90% of this flow reduction occurred during the first heat treatment). With the loss of permeate flow rate, the salt rejection increases. The rate of cooling and heating was not more than 5qC per minute, and the differential pressure drop per element did not exceed 2 psi.

Pilot testing based on the criteria noted above will give the best operating parameters for any specific application.