KOCH MEMBRANE SYSTEMS

FLUID SYSTEMS® TFC®- ULP® 4" ELEMENT

Ultra Low Pressure RO Element

PRODUCT DESCRIPTION

Membrane Chemistry:	Proprietary TFC® polyamide
Membrane Type:	TFC®-ULP® membrane
Construction:	Spiral wound element
Applications:	Ultra low pressure application for light industrial and potable water production
Options:	Fiberglass overwrap or tape overwrap (-T)

SPECIFICATIONS

Part Number	Model	Permeate Flow gpd	(m^3/d)	Chloride Rejection percent	Active Membrane Area ft^2	(m^2)	Feed Spacer mil	(mm)
8482002	4040-ULP	1,800	(6.8)	98.65	85	(7.9)	28	(0.7)
8404008	4040-ULP-T	1,800	(6.8)	98.65	85	(7.9)	28	(0.7)

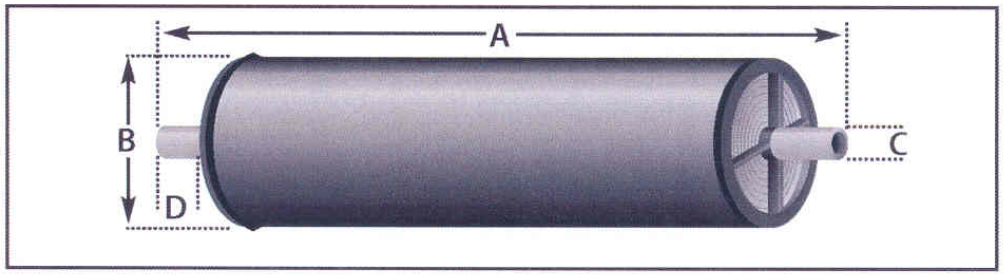
Test Conditions: 2,000 mg/l NaCl solution at 125 psi (860 kPa) applied pressure, 15% recovery, 77°F (25°C) and pH 7.5

OPERATING AND DESIGN INFORMATION*

Typical Operating Pressure:	100 - 175 psi (690 - 1,208 kPa)
Maximum Operating Pressure:	350 psi (2,400 kPa)
Maximum Operating Temperature:	113°F (45°C)
Maximum Cleaning Temperature:	113°F (45°C)
Maximum Continuous Free Chlorine:	<0.1 mg/l
Allowable pH – Continuous Operation:	4 - 11
Allowable pH – Short Term Cleaning:	2.5 - 11
Maximum differential pressure per element:	10 psi (69 kPa)
Maximum Differential Pressure Per Vessel:	60 psi (414 kPa)
Maximum Feed Turbidity:	1 NTU
Maximum Feed SDI (15 minute test):	5
Maximum Number Of Tape Wrap Elements Per Vessel:	3

* Consult Process Technology Group for specific information.

NOMINAL DIMENSIONS AND WEIGHT*



Model	A inches (mm)	B inches (mm)	C inches (mm)	D inches (mm)	Weight lbs (kg)	Part Numbers Interconnector	O-ring	Brine Seal
4040-ULP	40 (1,016)	4 (101.6)	0.75 (19.0)	1.0 (25.4)	10 (4.5)	0035267	0035458	0035702
4040-ULP-T	40 (1,016)	4 (101.6)	0.75 (19.0)	1.0 (25.4)	10 (4.5)	0035267	0035458	0035702

* Dimensions are provided for reference only and should not be interpreted as accurate specifications.

Performance:

Performance specifications shown on the front side of this document are nominal values. Individual element permeate flows may vary +20/-15% from the values shown. Minimum chloride ion rejection is 97.5% at the conditions shown.

System performance should be predicted using KMS ROPRO® software. Element performance is based on the nominal values shown.

System operating data should be normalized and key performance parameters tracked using KMS NORMPRO® software.

Operating Limits:

- Operating Pressure: Maximum operating pressure is 350 psi (2,400 kPa). Typical operating pressure for TFC®-ULP® systems is in the range of 100 psi (690 kPa) to 175 psi (1,208 kPa). Actual operating pressure is dependent upon system flux rate (appropriate for feed source) as well as feed salinity, recovery and temperature conditions.
- Permeate Pressure: Permeate pressure should not exceed feed-concentrate pressure by more than 5 psi (34 kPa) at any time (on-line, off-line and during transition).
- Differential Pressure: Maximum differential pressure limits are 10 psi (69 kPa) per element. Maximum differential pressure for pressure vessel is 60 psi (414 kPa) for FRP overwrap and 30 psi (207 kPa) for tapewrap elements.
- Temperature: Maximum operating temperature is 113°F (45°C). Maximum cleaning temperature is 113°F (45°C).
- pH: Allowable range for continuous operation is pH 4-11. Allowable range for short term cleaning is pH 2.5-11. It is recommended to limit the exposure of the TFC-ULP membrane to the extended pH range to 4 hours, once per month.
- Turbidity and SDI: Maximum feed turbidity is 1 NTU. Maximum feed Silt Density Index (SDI) is 5.0 (15 minute test). Experience has shown that feedwater with turbidity greater than 0.2 NTU generally results in frequent cleanings.
- Recovery: Maximum recovery is site and application specific. In general, single element recovery is approximately 15% per element. Recovery limits should be determined using KMS ROPRO program.

Chemical Tolerance:

- Chlorine: Exposure of TFC-ULP membrane to free chlorine or other oxidizing agents such as permanganate, ozone, bromine and iodine is not recommended. TFC-ULP membrane has a free chlorine tolerance of approximately 1,000 ppm-hours based on testing at 77°F (25°C), pH 8. This tolerance may be significantly reduced if catalyzing metals such as iron are present or if the pH and/or temperature are different. Sodium metabisulfite (without catalysts such as cobalt) is the preferred reducing agent. TFC-ULP membrane has a chloramine tolerance of approximately 60,000 ppm-hours in the absence of free chlorine based on testing at 77°F (25°C), pH 8.
- Cationic Polymers and Surfactants: TFC-ULP membrane may be irreversibly fouled if exposed to cationic (positively charged) polymers or surfactants. Exposure to these chemicals during operation or cleaning is not recommended.

Lubricants:

For element loading, use only approved silicone lubricant, water, or glycerin to lubricate O-rings and brine seals. The use of petroleum based lubricants or vegetable based oils may damage the element and void the warranty.

Service and Ongoing Technical Support:

KMS has an experienced staff of professionals available to assist endusers, and OEM's for optimization of existing systems and support with the development of new applications. Along with the availability of supplemental technical bulletins, KMS also offers a complete line of KOCHTREAT® and KOCHKLEEN® RO pretreatment and maintenance chemicals.

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