



FILMTEC Membranes

Membrane System Design Guidelines for 8-inch FILMTEC™ Elements

The following tables show the recommended guidelines for designing RO systems with 8-inch FILMTEC elements, arranged according to feed water type.

Design Guidelines for 8-inch FILMTEC Elements in Water Treatment Applications

Feed Source	RO	Well	Surface Supply		Wastewater (Filtered Municipal Effluent)		Seawater	
	Permeate	Water	MF ¹	Conventional	MF ¹	Conventional	Well or MF ¹	Open Intake
Feed Silt Density Index	SDI<1	SDI<3	SDI<3	SDI<5	SDI<3	SDI<5	SDI<3	SDI<5
Max. Element Recovery %	30	19	17	15	14	12	13	10
Typical Target Flux, gfd (l/m ² h)	23 (39)	19 (32)	16 (27)	15 (25)	12 (20)	10 (17)	8.8 (15)	7.3 (12)
Max. Permeate Flow Rate, gpd (m³/d)								
320 ft ² Elements	10000 (38)	7500 (28)	6500 (25)	5900 (22)	5300 (20)	4700 (18)	7500 (28)	6400 (24)
365 ft ² Elements	10000 (38)	8300 (31)	7200 (27)	6500 (25)	5900 (22)	5200 (20)		
380 ft ² Elements	12000 (45)	8600 (33)	7500 (28)	6800 (26)	5900 (22)	5200 (20)	8800 (33)	7600 (29)
390 ft ² Elements	10600 (40)	8900 (34)	7700 (29)	7000 (26)	6300 (24)	5500 (21)		
400 ft ² Elements	11000 (42)	9100 (34)	7900 (30)	7200 (27)	6400 (24)	5700 (22)		
440 ft ² Elements	12000 (45)	10000 (38)	8700 (33)	7900 (30)	7100 (27)	6300 (24)		
Element Type								
	Min. Concentrate Flow Rate, gpm (m³/d)							
BW Elements (365 ft ²)	16 (3.6)	16 (3.6)	16 (3.6)	18 (4.1)	16 (3.6)	18 (4.1)		
BW or NF Elements (400 ft ² and 440 ft ²)		16 (3.6)	16 (3.6)	18 (4.1)	18 (4.1)	20 (4.6)		
NF Elements	16 (3.6)	16 (3.6)	16 (3.6)	18 (4.1)	18 (4.1)	18 (4.1)		
Full-Fit Elements	25 (5.7)	25 (5.7)	25 (5.7)	25 (5.7)	25 (5.7)	25 (5.7)		
SW Elements	16 (3.6)	16 (3.6)	16 (3.6)	18 (4.1)	16 (3.6)	18 (4.1)	16 (3.6)	18 (4.1)

Element Type	Active Area, ft ² (m ²)	Max. Feed Flow Rate, gpm (m ³ /h) ²							
		RO	Well	Surface Supply MF ¹	Surface Supply Conventional	Wastewater MF ¹	Wastewater Conventional	Seawater Well or MF ¹	Seawater Open Intake
BW Elements	365 (33.9)	73 (17)	65 (15)	63 (14)	58 (13)	52 (12)	52 (12)		
BW or NF Elements	400 (37.2)	85 (19)	75 (17)	73 (17)	67 (15)	61 (14)	61 (14)		
BW Elements	440 (40.9)	85 (19)	75 (17)	73 (17)	67 (15)	61 (14)	61 (14)		
Full-Fit Elements	390 (36.2)	85 (19)	75 (17)	73 (17)	67 (15)	61 (14)	61 (14)		
SW Elements	320 (29.7)	73 (17)	65 (15)	63 (14)	58 (13)	52 (12)	52 (12)	63 (14)	56 (13)
SW Elements	380 (35.3)	81 (18)	72 (16)	70 (16)	64 (15)	58 (13)	58 (13)	70 (16)	62 (14)

¹ MF: Microfiltration - continuous filtration process using a membrane with pore size of <0.5 micron.

² The maximum recommended pressure drop across a single element is 15 psid (1 bar) or 50 psid (3.5 bar) across multiple elements in a pressure vessel, whichever value is more limiting. We recommend designing at maximum of 80% (12 psid) or for any element in a system.

Note: The limiting values listed above have been incorporated into the ROSA (Reverse Osmosis System Analysis) software. Design of systems in excess of the guidelines results in a warning message on the ROSA printout.

FILMTEC Membranes

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The factor which has the greatest influence on the membrane system design is the fouling tendency of the feed water. Membrane fouling is caused by particles and colloidal material which are present in the feed water and are concentrated at the membrane surface. The concentration of the fouling materials at the membrane surface increases with increasing permeate flux (the permeate flow rate per unit membrane

area) and increasing FILMTEC element recovery (the ratio of permeate flow rate to feed flow rate for a single element). A system with high permeate flux rates is, therefore, likely to experience higher fouling rates and more frequent chemical cleaning. The Silt Density Index (SDI) value of the pretreated feed water correlates fairly well with the amount of fouling material present.

The proposed limits are recommended guidelines based on many years of experience with FILMTEC membranes. If the fouling tendency of the feed water has been underestimated in the system design, the membranes will require more frequent cleaning, or the capacity of the system will decrease due to fouling. On the other hand, a conservative approach is to anticipate a higher fouling tendency and enjoy a troublefree system operation and an increased membrane lifetime.

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Published January 2002.



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Form No. 609-21010-102XQRP
CH 172-078-E-102R