



FILMTEC Membranes
Basics of RO and NF: Element Characteristics

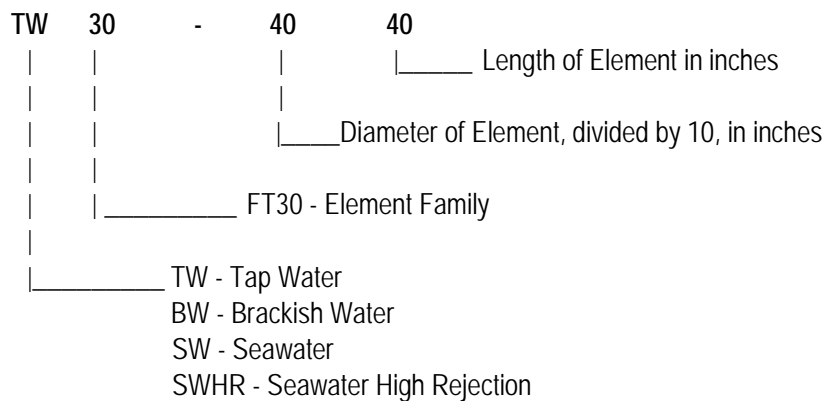
FILMTEC™ elements cover a wide range of applications. They can be characterized by membrane type, outer wrap, size and performance. The nomenclature of FILMTEC elements provides some of this information.

Nomenclature

Elements less than 8 inches in diameter are named according to Table 1.3. The first part of the name indicates the membrane and it's typical use; for example, BW30 is a **Brackish Water FT30** membrane used for brackish water. The second part of the name indicates the element size; for example 2540 is an element with a diameter of 2.5 inches and a length of 40 inches.

Table 1.3 Nomenclature of elements <8 inches

The element nomenclature for FILMTEC elements is for example as follows:



Eight-inch elements are always 8 inches in diameter and 40 inches in length. They are named according to the actual active membrane area in square feet, for example the BW30-400 element has an active membrane area of 400 square feet.

Some element types have an extension to their name, e.g. FF or FR. These stand for special element or membrane features:

- FR: Fouling Resistant
- FF: Fullfit

Membrane

The following membrane types are used with FILMTEC elements:

- NF270 – high productivity nanofiltration membrane for removal of organics with medium salt and hardness passage
- NF200 – nanofiltration membrane for high atrazine and TOC rejection, medium calcium passage
- NF90 – nanofiltration membrane for 90% salt removal, high removal of iron, pesticides, herbicides, TOC
- NF – nanofiltration membrane used in non-water applications
- TW30 – High rejection brackish water FT30 membrane, typically used for Tap Water RO
- TW30LP – ‘Low Pressure’ version of the TW30 membrane
- BW30 – High rejection Brackish Water FT30 membrane for brackish water RO
- RO – Reverse Osmosis membrane used in fullfit elements for sanitary applications
- HSRO – Heat Sanitizable version of the RO membrane used in fullfit elements
- BW30LE – ‘Low Energy’ version of the BW30 membrane
- SG30 – Semiconductor Grade FT30 membrane for ultrapure water RO
- SG30LE – Low Energy version of the SG30 membrane
- XLE – EXTremely Low Energy RO membrane for lowest pressure brackish water RO
- SW30 – SeaWater RO membrane, typically used for low salinity or cold seawater RO and high salinity brackish water RO
- SW30HR – SeaWater RO membrane with High salt Rejection, typically used for single pass seawater desalination
- SW30HRLE - SeaWater RO membrane with High salt Rejection, typically used for Low Energy seawater desalination
- SW30XLE – membrane for SeaWater desalination with eXTremely Low Energy consumption

Element Size

The standard length of a membrane element is 40 inches (1,016 mm). For small and compact systems shorter elements are available, such as 14 inches (356 mm) and 21 inches (533 mm).

Home Drinking Water RO elements are 12 inches long and 1.8 inches in diameter to fit into nominal 2-inch I.D. housings.

The standard diameter of FILMTEC elements is 2.5, 4 and 8 inches (61 – 99 – 201 mm). They are sized to fit into 2.5, 4 and 8 inch pressure vessels respectively.

Element Outer Wrap

The outer wrap of FILMTEC elements is either tape, fiberglass or a polypropylene mesh. Tap water and home drinking water RO elements are tape wrapped, all other elements except fullfit elements are fiberglass wrapped. Fiberglass adds more physical strength to the element for operation under harsh conditions. Fullfit elements have a designed bypass during operation to minimize stagnant areas; such elements are optimal for applications requiring a sanitary design.

Element Performance

The performance of all FILMTEC elements is stated on their respective product information data sheets. An overview about the available sizes and their flow performance range is shown in Table 1.4.

Table 1.4 FILMTEC element types

Element type	Diameter (inch)	Permeate flow ¹ at standard test conditions		Maximum operating pressure	
		(GPD)	(l/h)	(bar)	(PSI)
NF270	2.5, 4, 8	850 - 14,700	134 - 2,300	41	600
NF200	2.5, 4, 8	460 - 8,000	73 - 1,260	41	600
NF90	2.5, 4, 8	525 - 10,300	83 - 1,620	41	600
TW30	1.8	24 - 100	3.8 - 16	21	300
TW30, TW30HP	2, 2.5, 4	100 - 3,200	16 - 500	41	600
BW30	2.5, 4, 8	750 - 10,500	120 - 1,660	41	600
BW30LE	4, 8	2,000 - 11,500	320 - 1,830	41	600
XLE	2.5, 4, 8	330 - 13,000	52 - 2,040	41	600
SW30	2.5, 4	150 - 1,950	24 - 300	69	1,000
SW30HR	8	6,000	950	84	1,200
SW30HRLE	8	7,500	1,200	84	1,200
SW30XLE	8	9,000	1,400	69	1,200

¹ Varying with different element dimensions and test conditions.

The standard element test conditions vary depending on the membrane type. Table 1.5 summarizes the test conditions used to specify the performance of FILMTEC elements.

Table 1.5 Standard test conditions for FILMTEC elements

Element type	Feedwater	Temperature	Pressure		pH	Recovery	Test time
			psi	bar			
NF200 NF270 NF90	MgSO ₄ , 2,000 ppm	77°F (25°C)	70	4.8	8	15%	20 min.
NF200 NF270	CaCl ₂ , 500 ppm	77°F (25°C)	70	4.8	8	15%	20 min.
NF90	NaCl, 2,000 ppm	77°F (25°C)	70	4.8	8	15%	20 min.
LPTW	Tapwater, 250 ppm	77°F (25°C)	50	3.45	8	15%	20 min.
BW30LE	NaCl, 2,000 ppm	77°F (25°C)	150	10.3	8	15%	20 min.
XLE	NaCl, 500 ppm	77°F (25°C)	100	6.9	8	15%	20 min.
TW30 BW30	NaCl, 2,000 ppm	77°F (25°C)	225	15.5	8	15%	20 min.
SW30	NaCl, 32,000 ppm	77°F (25°C)	800	55	8	10% [†]	20 min.
SW30HR	NaCl, 32,000 ppm	77°F (25°C)	800	55	8	8%	20 min.

[†] 8% for 2.5 inch and 4 inch diameter elements.

FILMTEC Membranes

For more information about FILMTEC membranes, call the Dow Liquid

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