FILMTEC Membranes

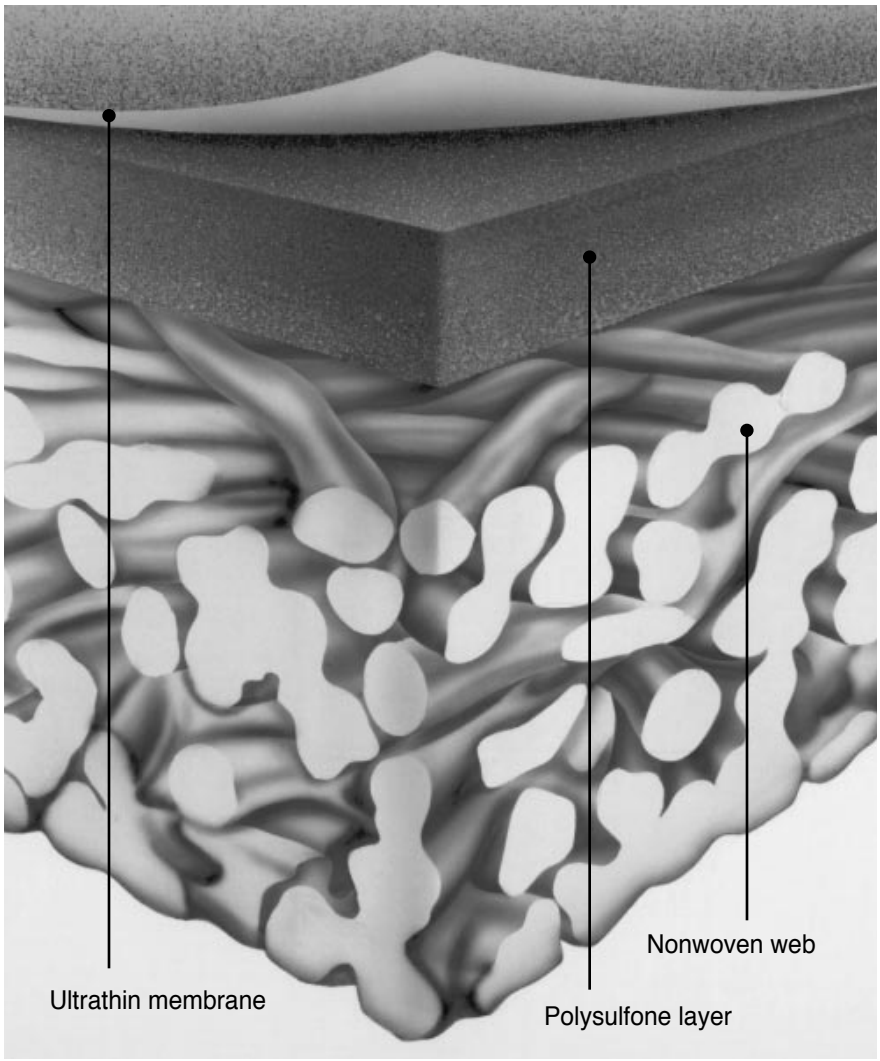
FT30 Membrane Description

FILMTEC® FT30 thin-film composite reverse osmosis (RO) membrane gives excellent performance for a wide variety of applications, including low-pressure tapwater use, single-pass seawater and brackish water desalination, chemical processing, and waste treatment. This membrane exhibits excellent performance in terms of flux, salt rejection, and microbiological resistance. FT30 elements can operate over a pH range of 2 to 11, are resistant to compaction, and are suitable for temperatures up to 45°C.

FILMTEC spiral-wound elements of FT30 membrane have been extensively used since 1980 both in the United States and abroad. In numerous installations under actual seawater conditions, FT30 elements have provided salt rejections of better than 99.5 percent and fluxes of 10 gfd (24 l/h m^2). On a 0.2 percent salt solution at 225 psi (1.6 MPa), rejections above 99 percent and fluxes of 26 gfd (51 l/h m^2) are routinely obtained.

Several long-term tests have been completed. A continuous three-year test operating at about 25°C and 350 psi on 3000 ppm feed did not show any membrane compaction or deterioration in salt rejection. Elements have also operated in shipboard seawater systems with normal intermittent use for over three years with no significant loss in performance.

FILMTEC FT30 thin-film composite RO membrane complies with Food Additive Regulation 21 CFR 177.2550 for use in processing foods and purifying water for food applications.



FT30 Membrane Composite

Thin-Film Composite Configuration

The membrane composite consists of three layers: a polyester support web, a microporous polysulfone interlayer, and an ultrathin barrier coating on the top surface.

A schematic diagram of the membrane is shown above.

Description of the FT30 Membrane

The major structural support is provided by the nonwoven web, which has been calendered to produce a hard, smooth surface free of loose fibers. Since the polyester web is too irregular and porous to provide a proper substrate for the salt barrier layer, a microporous layer of engineering plastic (polysulfone) is cast onto the surface of the web. The polysulfone coating is remarkable in that it has surface pores controlled to a diameter of approximately 150 angstroms. The FT30 barrier layer,

*Trademark of The Dow Chemical Company

FILMTEC Membranes

For more information about FILMTEC membranes, call Dow Liquid Separations:

North America 1-800-447-4369
Latin America . . . . . .(+55) 11-5188-9345
Europe . . . . . .(+31) 20-691-6268
Japan . . . . . .(+81) 3-5460-2100
Australia . . . . . .(+61) 2-9776-3226
http://www.dow.com/liquidseps

about 2000 angstroms thick, can withstand high pressures because of the support provided by the polysulfone layer. Because of its barrier layer thickness, FT30 is very resistant to mechanical stresses and chemical degradation.

Biological Protection and Disinfection

Various storage tests have been conducted on FT30 elements to determine biological protection procedures. The best procedure recommended for storage is to immerse the element in a protective solution which contains 1.5 percent (by weight) sodium metabisulfite (food grade). This treatment maintains initial membrane flux and performance.

Disinfection with chlorinating agents can be practiced within limits but is not recommended. The FT30 membrane is resistant to chloramine, chloramine-T, N-chloroisocyanurates to the extent that these mild agents can be used, but their disinfectant properties are not very great. Pure chlorine dioxide can be used successfully at 500 ppm concentration if the storage period is less than one week, but it is not an effective biocide for longer periods. Chlorine dioxide that is generated on site from chlorine and sodium chlorate is always contaminated with free chlorine, which attacks the membrane. The FT30 membrane is permeable to chloramine and to chlorine dioxide. Either of these will pass through the membrane resulting in a small residual disinfectant in the permeate.

The membrane has only limited resistance to free chlorine. Chlorine attack is slowest at neutral and acidic pH levels and fastest at alkaline pH levels. It is noteworthy, however, that short-term exposure of the membrane to chlorine does not destroy the membrane. Thus, it can be used effectively in installations where system upsets may result in temporary exposure of the membrane to free chlorine.

Alternative disinfectants that may be used are hydrogen peroxide and peracetic acid. Hydrogen peroxide or peracetic acid can be used at concentrations up to 0.2 percent at 25°C as specified in the warranty on FILMTEC membranes but not at higher temperatures. Continuous exposure to hydrogen peroxide at this concentration will eventually damage the membrane.

Copper sulfate can be used to control algae growth. Iodine, quaternary germicides, and phenolic compounds should not be used as tests show that all of these agents cause flux losses.

Cleaning

Because of the FT30 membrane's combination of pH stability and temperature resistance, cleaning can be done very effectively. Both acidic and alkaline cleaners can be used at temperatures to 50°C. Acid cleaning to remove mineral scale is best done at pH 2 or lower with phosphoric, hydrochloric, sulfamic or nitric acid. Citric acid can also be used. Alkaline cleaning to remove organic fouling is generally done with sodium hydroxide and sodium lauryl sulfate. Various combinations of agents such as sodium EDTA, sodium tripolyphosphate, and trisodium phosphate can also be used.

Generally, anionic surfactants can be used for alkaline cleaning. Cationic surfactants cause an irreversible flux loss and must be avoided. Nonionic surfactants can sometimes be used, but they must be used sparingly and thoroughly rinsed out before the membrane is pressurized.

See bulletins Cleaning Procedures (Form No. 609-23010/CH 172-086-E) and Biological Protection and Disinfection (Form No. 609-24010/CH172-120-E) for further information.

Published April 1998.

Form No. 609-01010-498QRP
CH 172-041-E-498