



How FILMTEC Membrane Elements are Made

FILMTEC® reverse osmosis and nanofiltration elements have been installed in more water treatment systems, in more applications, than any other elements. Their consistency and reliability in actual field service have been documented for more than a decade.

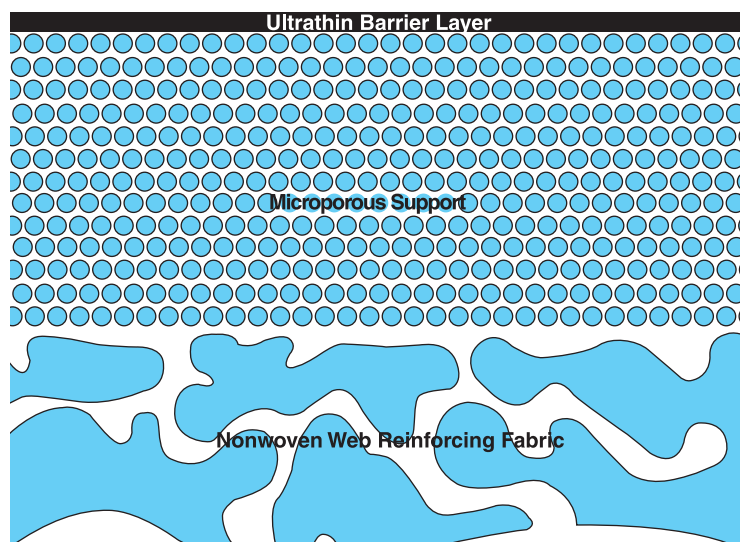
FILMTEC elements are based on proven spiral-wound, thin-film composite, polyamide membrane technology. They offer exceptional rejection of dissolved solids and organics. They can operate efficiently at lower pressures, offer greater structural stability, greater pH stability, and more favorable system operating economy than many conventional RO elements.

FILMTEC thin-film composite membranes consist of three layers: an ultra-thin polyamide barrier layer, a microporous polysulfone interlayer, and a high-strength polyester support web. The underlying structural support is provided by the non-woven web. The polyamide barrier layer provides high water flux, unsurpassed salt and silica rejection, and excellent chemical resistance. The thick, microporous polysulfone support layer provides the necessary porosity and strength characteristics, and resists compaction under the pressure of RO operation.

FILMTEC elements fabricated in FilmTec Corporation's ISO 9002 certified facility take advantage of the industry's most advanced precision manufacturing technology to ensure consistently high product quality and performance. Membrane sheet is cut using an automated process that controls quality. Each lot of the resulting proprietary FT30 membrane is closely inspected and its quality documented before it can be approved for use in the element fabrication process.

FILMTEC elements are fabricated to optimum physical tolerances using a computer-controlled manufacturing process. Highly automated fabrication equipment ensures that membrane winding tension is uniform, that spacing between membrane layers is maintained, and that all glue lines are straight and narrow to preserve active membrane area. Sonic welding of all critical fastening points assures maximum strength and durability.

Following fabrication, FILMTEC elements are subjected to extensive quality and performance testing to ensure that the high manufacturing standards are met, and that these elements will provide consistent, predictable and trouble-free operation. The quality control process includes visual and vacuum testing of glue lines, and wet testing of elements to



confirm rejection and flow performance. To further ensure the quality of FILMTEC elements, each is packaged in an oxygen barrier bag before shipment to minimize any opportunity for biological contamination.

The precision fabrication process employed to manufacture FILMTEC elements has resulted in significant product design innovations. FilmTec Corporation's ability to manufacture elements to extremely close tolerances has enabled the company's design engineers to introduce a unique "short leaf" configuration. By packing a greater number of shorter membrane leaves into eight-inch elements, FilmTec can produce highly efficient and productive elements that more fully utilize the membrane's available surface area, that operate at lower pressure, are less prone to fouling, and have more uniform flux over the surface of each leaf.

FILMTEC elements are available shipped either wet or dry. Dry elements can be installed faster and more easily because there is no preservative solution to rinse out prior to membrane installation. Dry elements also weigh less, reducing shipping costs. In addition, dry elements are easier to inventory and store because they are not sensitive to freezing temperatures and have a longer shelf life than wet elements. FILMTEC elements are available shipped either wet or dry. Dry elements can be installed faster and more easily because there is no preservative solution to rinse out prior to membrane installation. Dry elements also weight less, reducing shipping costs. In addition, dry elements are easier to inventory and store because they are not sensitive to freezing temperatures and have a longer shelf life than wet elements.

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