Product Safety Assessment

FILMTEC™ Membrane Elements


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Names
- FILMTEC™ membranes
- FILMTEC™ elements
- Nanofiltration element
- Reverse osmosis element

Product Overview
- FILMTEC™ reverse osmosis (RO) and nanofiltration (NF) elements are water and other liquids purification products manufactured by FilmTec Corporation, a subsidiary of The Dow Chemical Company (“Dow”). These elements are designed for reverse osmosis, a separation process that uses pressure to force pure water through a membrane, leaving dissolved salts and other contaminants in a concentrated waste stream.¹,²,³ For further details, see Product Description.
- FILMTEC elements are composed of thin membranes rolled into a spiral. Each element contains from one to forty membranes depending on the intended use. Within the RO system, elements are housed in cylindrical canisters called pressure vessels, which withstand the pressure exerted by flowing water. The elements range in size from 1.8 inches (4.6 cm) in diameter by 12 inches (30.5 cm) long for home drinking-water elements, to 8 inches (20 cm) in diameter by 40 inches (100 cm) long for industrial and commercial elements.⁴ For further details, see Manufacture of Product and Product Description.
- FILMTEC membrane elements are used as part of a system to purify water in hospitals, research laboratories, car washes, restaurants, water-bottling plants, water-vending machines, food-processing facilities, residences, power-generation and semiconductor plants, municipal water-treatment facilities, and other applications in which water with low mineral-content is desired. These elements can also be used in residential RO systems.⁵ For further details, see Product Uses.
- FILMTEC membrane elements used for drinking-water purification and food-processing applications have been evaluated for consumer safety by NSF International (The Public Health and Safety Company). Drinking water elements meet the requirements of NSF/ANSI Standard 58 and NSF/ANSI 61. FilmTec membranes are compliant to FDA cfr 21 177-2550 (FDA indirect food contact code).⁵,⁶ For further details, see Health Information.
- FILMTEC elements have specific handling guidelines.⁷ Although consumers do not come into direct contact with these membranes, consumers use and may be exposed to purified water from RO systems. The membranes are essentially inert plastic films. For further details, see Exposure Potential.
- FILMTEC elements are stable under normal storage and use conditions. For further details, see Physical Hazard Information.

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Manufacture of Product

• **Location** – FILMTEC™ elements are manufactured at FilmTec Corporation’s Edina, Minnesota, facility.
• **Process** – FILMTEC elements are fabricated in automated closed systems with strict quality and safety standards. The Quality System for FILMTEC elements is approved to ISO 9001-2008 by Lloyd’s Register Quality Assurance.

Product Description

FILMTEC™ reverse osmosis (RO) and nanofiltration (NF) elements are liquid purification products manufactured by FilmTec Corporation, a subsidiary of Dow. RO is a separation process that uses pressure to force pure water through a membrane barrier, leaving dissolved salts and other contaminants in a concentrated waste stream. An entire RO treatment system consists of a water pretreatment section, a membrane element RO section, and a water post-treatment section. The elements vary in size and membrane composition depending on the intended application and the composition of the feed water.

• **FILMTEC membranes** – Each FILMTEC membrane is composed of three layers: an ultrathin polyamide barrier layer (~0.2 µm), a polysulfone support layer, and a polyester support web. The entire membrane is about 160 µm thick. (By comparison, a standard piece of copy paper is about 100 µm.) The polyamide barrier layer allows water molecules to pass through readily, but not dissolved solids or other contaminants. The polysulfone and polyester layers provide structural support to the barrier layer. The technical name for membranes of this type is thin-film composite or TFC. FILMTEC membranes are rolled onto a plastic tube into a spiral bundle. This membrane bundle with a tube in the center is called an element.

• **FILMTEC elements** – FILMTEC elements are composed of spiral-wound membranes surrounding a clean water collection tube. Each element contains from one to more than 30 membrane leaves, depending on the intended use. The element outer wrapping can be tape, fiberglass, or polypropylene mesh, depending on the application. In RO systems, elements are housed in cylindrical canisters called pressure vessels, which withstand the pressure exerted by flowing water. FILMTEC elements range from 1.8 inches (4.6 cm) in diameter by 12 inches (30.5 cm) long for home drinking-water elements, to 8 inches (20 cm) in diameter by 40 inches (100 cm) long for industrial and commercial elements. In commercial applications, multiple elements are often arranged in series to handle large water volumes.

Product Uses

FILMTEC™ membrane elements are used in RO water purification and treatment systems. The main commercial uses for these elements are:

• Municipal water treatment facilities
• Power Industry
• Chemical industry
• Semiconductor industry
• Hospitals and medical supply companies (Example: water for dialysis)
• Research laboratories
• Pharmaceutical industry
• Beverage industry
• Food processing industry
• Restaurants
• Car washes

FILMTEC™ elements can also be used in residential RO systems.

Exposure Potential

FILMTEC™ membrane elements are used in commercial, industrial, and residential RO water purification systems. Although consumers do not come into direct contact with the membranes, they use and are exposed to purified water from these systems. The membranes are essentially inert plastic films.

• **Workplace exposure** – Workers using these elements in commercial and industrial water purification systems should follow product-handling guidelines. Wearing protective gloves and sleeves and avoiding prolonged contact with skin and clothing helps prevent contamination.

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- **Consumer exposure** – Consumers using these elements for home RO systems should carefully follow installation instructions to ensure that the element is handled properly. Following installation of new elements, the permeate water obtained from the first hour of use should be discarded.

For more information, see the Safety Data Sheet and the RO system manual. For wet FILMTEC™ RO elements, see Safety Data Sheet.

**Health Information**

Following Information for Wet RO elements with storage solution (15% of FILMTEC™ RO elements are sold wet). Wet RO elements contain a 1% sodium metabisulfite, 2% citric acid solution.

**Eye contact** – May cause severe eye irritation. May cause severe corneal injury.

**Skin contact** – Brief contact may cause slight skin irritation with local redness. May cause more severe response if skin is abraded (scratched or cut). Prolonged contact may cause moderate skin irritation with local redness. Repeated contact may cause severe skin irritation with local redness and discomfort.

**Skin absorption** – Prolonged skin contact is unlikely to result in absorption of harmful amounts.

**Skin Sensitization** – For the minor component(s): Skin contact may cause an allergic skin reaction in a small proportion of individuals.

**Inhalation** – Mist may cause irritation of upper respiratory tract (nose and throat).

**Sensitization** – For the minor component(s) – May cause allergic respiratory response in a small proportion of individuals.

**Ingestion** – Low toxicity if swallowed. Swallowing may result in irritation or burns of the mouth, throat, and gastrointestinal tract. May rarely cause allergic reactions in small proportion of individuals. Symptoms may include skin reactions, stomach cramps and diarrhea, asthma-like symptoms, and, in severe cases, shock and unconsciousness. May cause abdominal discomfort or diarrhea.

**Aspiration Hazard** – Based on physical properties, not likely to be an aspiration hazard.

**Effects of Repeated Exposure** – For the minor component(s): In animals, effects have been reported on the following organs: Blood. Spleen. Gastrointestinal tract.

For more information, see the Safety Data Sheet.

**Environmental Information**

Used FILMTEC™ elements can be disposed of as municipal waste provided no preservation solution or other hazardous liquids or solids are contained within the element.

For more information, see the Safety Data Sheet.

**Physical Hazard Information**

FILMTEC™ elements are stable under normal storage and use conditions. Although not a hazard, FILMTEC membranes will degrade in the presence of chlorine. Feed water for RO systems must be dechlorinated prior to undergoing RO treatment to minimize degradation.

For more information, see the Safety Data Sheet.
Regulatory Information
Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of these products. These regulations may vary by city, state, country, or geographic region. For more information, visit the Dow Water Solutions web site, review the Safety Data Sheet, or Contact Us.

Additional Information
- Contact Us (http://www.dow.com/liquidseps/contact/contact.htm)

For more business information about these products, visit the web site of Dow Water Solutions http://www.dowwaterandprocess.com/en/

References

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