



# FilmTec™ Hypershell™ HSRO-390-FF

## Heat Sanitizable Reverse Osmosis Membrane Element

### Key Features

- Delivers outstanding quality water with the added capability to withstand sanitization with hot water to eliminate the need for chemical sanitizers.
- High active membrane area that allows system design with either lower operating flux or cost savings from fewer membrane elements.
- Rugged elements that do not deform, are easier and safer loading and removing from a system, reduce bypass, and prevent premature element failures.
- Full-fit configuration design that minimizes stagnant areas for sanitary designs.
- All components comply with FDA standards.

### Key Applications

- Purified water in the pharmaceutical, medical, and biotechnology applications
- Permeate polishing in food and dairy processes.

### Typical Properties

FilmTec™ Hypershell™	Part Number	Active Area		Stabilized Permeate Flow Rate		Minimum Salt Rejection (%)
		(ft <sup>2</sup> )	(m <sup>2</sup> )	(gpd)	(m <sup>3</sup> /d)	
HSRO-390-FF	346586	390	36	14,500	5	97

1. Permeate flow and salt rejection based on the following test conditions: 2,000 ppm NaCl, 150 psi (10.3 bar), 77°F (25°C), pH 8 and 15% recovery **before any heat treatment**.
2. Permeate flow for individual elements may vary +/-20%.
3. Sales specifications may vary as design revisions take place.

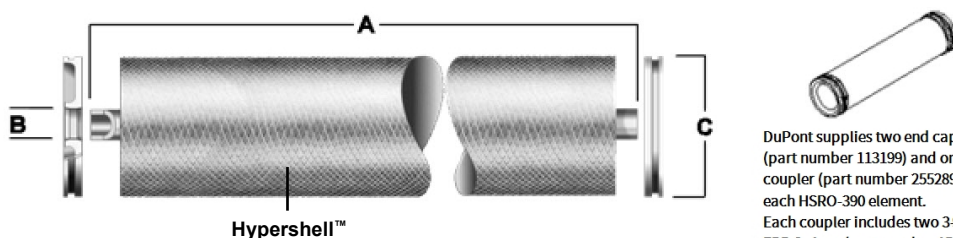
### Exemplary Projections

For optimal performance, elements must be pre-conditioned by exposure to hot water prior to initial use. An initial flux loss and rejection increase will occur after pre-conditioning. An exact percentage of these performance change is difficult to predict since it depends on many factors and can differ from system to system. For more information about projected performance and DuPont's recommended protocol for element pre-conditioning refer to [Heat Sanitization](#) (Form No. 45-D01632-en).

FilmTec™	Feed Pressure	Average Flux	Calculated Permeate Flow	Recovery	Feed TDS	Calculated Permeate TDS	Calculated Rejection
	psi (bar)	gfd (lmh)	gph (m <sup>3</sup> /h)	(%)	(NaCl ppm)	(ppm)	(%)
HSRO-390-FF	130.5 (9)	15 (26)	4,490 (17)	75	500	11.98	97.6

1. Results are based on WAVE modeling **after heat treatment** of a 2-stages (2:1) system with 6-element pressure vessel, operated at 77°F (25°C), pH 7, feed flow 6,000 gph (22.7 m<sup>3</sup>/h) and a Flow Factor 0.85
2. WAVE version: contact your DuPont representative for more help with projections.
3. No warranty is provided for the application of this information since use conditions and applicable laws may differ from one location to another and may change with time
4. Piloting will give the best performance approach for any specific application.

### Element Dimensions



DuPont supplies two end caps (part number 113199) and one coupler (part number 255289) with each HSRO-390 element. Each coupler includes two 3-912 EPRO-rings (part number 151705).

FilmTec™ Element HSRO-390-FF Dimensions - inches (mm)	
A	40.0 (1,016)
B	1.13 ID (28.6)
C	7.9 (200)

ID - Inner Diameter

1. Refer to [FilmTec™ Design Guidelines for multiple-element systems of 8-inch elements](#) (Form No. 45-D01695-en).
2. Fits nominal 8 inch I.D. pressure vessels.

## Suggested Operating Conditions

Membrane Type	Polyamide Thin-Film Composite
Maximum Operating Temperature <sup>a</sup>	113°F (45°C)
Maximum Sanitization Temperature (@ 25 psig)	185°F (85°C)
Maximum Operating Pressure	600 psig (41 bar)
Maximum Pressure Drop	
Per Element	15 psig (1.0 bar)
Per Vessel (Housing)	60 psig (4.1 bar)
pH Range	
Continuous Operation <sup>a</sup>	2 - 11
Short-Term Cleaning <sup>b</sup>	1 - 12
Maximum Feed Silt Density Index	SDI 5
Free Chlorine Tolerance <sup>c</sup>	< 0.1 ppm

a. Maximum temperature for continuous operation above pH 10 is 95°F (35°C).

b. Refer to [FilmTec™ Cleaning Guidelines](#) (Form No. 45-D01696-en).

c. Under certain conditions, the presence of free chlorine and other oxidizing agents will cause premature membrane failure. Since oxidation damage is not covered under warranty, FilmTec™ recommends removing residual free chlorine by pretreatment prior to membrane exposure. Please refer to [Dechlorinating Feedwater](#) (Form No. 45-D01569-en) for more information.

## General Information

- Keep elements moist at all times after initial wetting.
- For successful operation of Reverse Osmosis (RO) and Nanofiltration (NF) membrane systems, the operation must follow the guidelines provided in the [FilmTec™ Reverse Osmosis / Nanofiltration Elements Operation Excellence and Limiting Conditions Tech Fact](#) (Form No. 45-D04388-en).
- To prevent biological growth during prolonged system shutdowns, it is recommended that membrane elements be immersed in a preservative solution.
- The customer is fully responsible for the effects of incompatible chemicals and lubricants on elements.
- Avoid static permeate-side backpressure at all times.
- Permeate obtained from the first hour of operation should be discarded.
- The use of this product in and of itself does not necessarily guarantee the removal of cysts and pathogens from water. Effective cyst and pathogen reduction is dependent on the complete system design and on the operation and maintenance of the system.
- Avoid any abrupt pressure or cross-flow variations on the spiral elements during start-up, shutdown, cleaning or other sequences to prevent possible membrane damage.
- During start-up, a gradual change from a standstill to operating state is recommended as follows:
  - Feed pressure should be increased gradually over a 30-60 second time frame.
  - Cross-flow velocity at set operating points should be achieved gradually over 15-20 seconds.
- Suitable quality water must be used during all pre-conditioning steps. This water is chlorine-free, non-scaling/fouling water. RO permeate is preferred, but prefiltered municipal water may be used.

## Important Information

Please consider good operating practices for the optimal performance of the Reverse Osmosis membrane elements to assure damage free operation:

1. [Loading of Pressure Vessels - Preparation & Element Loading](#) (Form No. 45-D01602-en)
2. System Operation, including plant [Start-Up Sequence](#) (Form No. 45-D01609-en) and [RO & NF Systems Shutdown](#) (Form No. 45-D01613-en)
3. [Handling, Preservation, and Storage](#) (Form No. 45-D03716-en)

Full information of plant design, system operation, and troubleshooting is given in the [FilmTec™ Reverse Osmosis Membranes Technical Manual](#) (Form No. 45-D01504-en).

## Regulatory Note

These products are listed to NSF/ANSI 61. For more information visit:

<http://www.nsf.org/Certified/PwsComponents/Listings.asp?Company=0N280&Standard=061>



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