



# Dairy NF FilmTec™ Hypershell™ Elements

## Nanofiltration Elements for Dairy Processing Applications

### Key Features

- Cost-effective lactose and whey protein separation and demineralization
- Robust nanofiltration FilmTec™ membrane designed to reject organics with approximate molecular weight cut-off above 250-300 amu, while allowing transport of monovalent salts.
- Full-fit element configuration that minimizes stagnant areas for a sanitary design.
- A machined polypropylene rigid outer-shell, FilmTec™ Hypershell™ elements:
  - Do not deform and minimize channeling, which can lead to a reduction in premature element failure.
  - Have reduced bypass compared to conventional full-fit, mesh wrapped elements, which may result in energy savings (see figure 1), improved product processing and efficient Clean In Place (CIP).
  - Enable safer and faster loading and removal from a system as the outer shell does not expand and preserves its shape during use.
  - Are identified with permanent laser etched model names and serial number.
- All components comply with FDA and \*EU food contact regulations, as well as halal and kosher certifications.

\*Contact your DuPont representative for more information.

### FilmTec™ Hypershell™ NF245XD

FilmTec™ Hypershell™ NF245XD elements are engineered with an improved membrane chemistry that enables:

- Up to 20% longer service life compared to competitive NF elements.
- Improved permeability enables up to 10% more productivity vs competition.
- Enhanced chemical resistance.

### Key Applications

- Separation of lactose and whey protein from dairy streams
- Partial demineralization of lactose and whey protein

### Feed Flow vs Pressure Drop

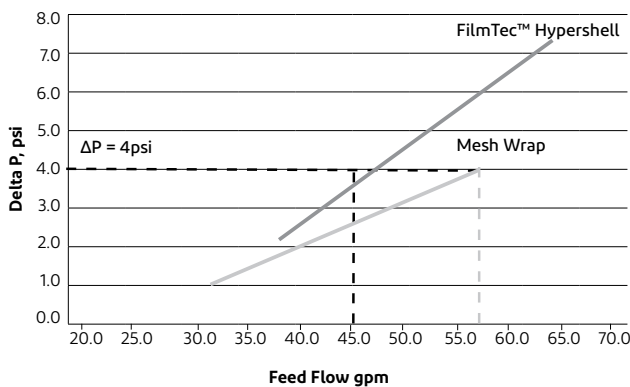


Figure 1: Feed Flow vs Pressure Drop for Mesh Wrap and FilmTec™ Hypershell™ Elements.

FilmTec™ Hypershell™ elements have less exterior fluid bypass and require approximately 30% less flow than conventional full-fit, mesh wrapped elements for an equivalent pressure drop. This means more feed flows through the element for processing instead of around the element and through the mesh. This can result in up to 30% energy savings and up to 10% greater productivity, with higher crossflow velocity at the membrane surface.

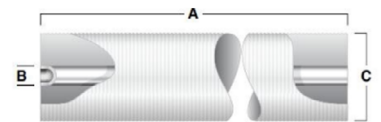
The graph indicates the flow comparison at 4psi  $\Delta P$ . Energy savings can be achieved by flow reduction.

## Typical Properties

Element Name	Part Number	Active Area		Feed Spacer (mil)	Design Features
		(ft <sup>2</sup> )	(m <sup>2</sup> )		
FilmTec™ Hypershell™ NF245XD-8038-FF	12100388	370	34.4	33	Outer shell Full Fit
FilmTec™ Hypershell™ NF245XD-8038/48-FF	12100552	270	25.0	48	Outer shell Full Fit
FilmTec™ NF245XD-3838/30-FF	12100410	79	7.3	30	Mesh Wrap Full Fit
FilmTec™ Hypershell™ NF245XD-3838/48-FF	12100496	50	4.7	48	Outer shell Full Fit
FilmTec™ NF245XD-3840/30-FF	12100389	81	7.5	30	Mesh Wrap Full Fit
FilmTec™ Hypershell™ NF-8038-FF	365935	370	34.4	33	Outer shell Full Fit
FilmTec™ NF-3838/30-FF	146071	79	7.3	30	Mesh Wrap Full Fit
FilmTec™ NF-3840/30-FF	146073	81	7.5	30	Mesh Wrap Full Fit

## Element Dimensions

Element Name	A		B		C	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)
FilmTec™ Hypershell™ NF245XD-8038-FF	38.00	965	1.125	28.58	7.9	200
FilmTec™ Hypershell™ NF245XD-8038/48-FF	38.00	965	1.125	28.58	7.9	200
FilmTec™ NF245XD-3838/30-FF	38.00	965	0.831	21.10	3.8	96
FilmTec™ Hypershell™ NF245XD-3838/48-FF	38.00	965	0.831	21.10	3.8	96
FilmTec™ NF245XD-3840/30-FF	38.75	984	0.831	21.10	3.8	96
FilmTec™ Hypershell™ NF-8038-FF	38.00	965	1.125	28.58	7.9	200
FilmTec™ NF-3838/30-FF	38.00	965	0.831	21.10	3.8	96
FilmTec™ NF-3840/30-FF	38.75	984	0.831	21.10	3.8	96



For these models end caps, coupler, and O-rings are not included.

FilmTec™ Hypershell™ Elements are designed to fit schedule 40, 8-inch stainless pipe (nominal 7.98-inch ID)

## Suggested Operating Conditions

Maximum Operating Pressure	800 psig (54.8 bar)
Maximum Operating Temperature <sup>a</sup>	
pH 3 – 10	122°F (50°C)
Above pH 10	95°F (35°C)
pH Range	3 – 11
Free Chlorine Tolerance <sup>b</sup>	Non-detectable
Hydrogen peroxide usage limit <sup>b</sup>	
Continuous operation	20 ppm

## Suggested Clean in Place (CIP) Limits

Maximum CIP Pressure	15 – 75 psig (1 - 5 bar)
Maximum CIP pH and Temperature <sup>a</sup>	
pH range 1.8 – 11 (reference temperature 25°C) <sup>c</sup>	122°F (50°C)
pH range 1.8 – 11.2 (reference temperature 25°C) <sup>c</sup>	113°F (45°C)
Hydrogen peroxide usage limit <sup>b</sup>	
Short-term cleaning (@77°F/25°C maximum) <sup>d</sup>	1,000 ppm

- Please consult DuPont's representative for operating and cleaning at different pH and temperature conditions. NF245XD elements could offer an eXtra Durability for extreme pH cleaning (case by case review).
- Under certain conditions, the presence of free chlorine and other oxidizers agents will cause premature membrane failure. DuPont recommends removing residual free chlorine using pretreatment, prior to membrane exposure.
- Refer to [Food Processing and Sanitary Elements Cleaning Guide](#) (Form No. 45 D01686 en).  
And to [Temperature and pH best practices in preparation of Cleaning Solutions](#) (Form No. 45-D04358-en).
- Refer to [Sanitizing Membrane System](#) (Form No. 45-D01630-en)

## Design Guidelines

Element Name	Max.recirculation cross-flow gpm (m <sup>3</sup> /h)	Max. element ΔP* Psi (bar)
FilmTec™ Hypershell™ NF245XD-8038-FF	80 (18.2)	13 (0.9)
FilmTec™ Hypershell™ NF245XD-8038/48-FF	80 (18.2)	13 (0.9)
FilmTec™ NF245XD-3838/30-FF	30 (6.8)	15 (1.0)
FilmTec™ Hypershell™ NF245XD-3838/48-FF	30 (6.8)	15 (1.0)
FilmTec™ NF245XD-3840/30-FF	30 (6.8)	15 (1.0)
FilmTec™ Hypershell™ NF-8038-FF	80 (18.2)	13 (0.9)
FilmTec™ NF-3838/30-FF	30 (6.8)	15 (1.0)
FilmTec™ NF-3840/30-FF	30 (6.8)	15 (1.0)

\*Maximum pressure drop across entire vessel is 60 psi (4.1 bar).

## General Information

- Keep elements moist at all times after initial wetting.
- If operating limits and guidelines given in this bulletin are not strictly followed, the limited warranty will be null and void.
- 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-backpressure at all times.
- Any concentrate or 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.

## Additional Important Information

Before use or storage, review these additional resources for important information:

- [Usage Guidelines for FilmTec™ 8" Elements](#) (Form No. 45-D01706-en)
- [Start-Up Sequence](#) (Form No. 45-D01609-en)
- [Storage and Shipping of New FilmTec™ Elements](#) (Form No. 45-D01633-en)

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