



PRODUCT SPECIFICATION

8" AUM Ultrafiltration Turboclean Element Series

Model	Permeate flow GPD (m3/day)*	M.W.C.O.
8040-N6E6Q2	14,000 (52.0)	10,000

Performance is based on the following test conditions: 500.00 ppm 10K PEG, 30.00 psi, 25°C, 15% recovery, pH 8.00, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	AUM Advanced Ultrafiltration Membrane
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	355 ft ² (33.0 m ²)
Recommended Applied Pressure.....	5 - 200 psi (0.3 - 14 bar)
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 113°F (2 - 45°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	10.0 ppm
Maximum Feed Flow.....	80 GPM (18 m3/hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Beverage Water Make Up (UF)



Element Weight : 50 (23)
 Length (A) : 40.00 (1,016) Diameter (B) : 7.9 (200) Permeate Tube (C) : 1.12 (28.6)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres.
 Mechanical Configuration: Filmtec Style Core Tube
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



Engineered Membrane
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PRODUCT SPECIFICATION

8" AUM Ultrafiltration Turboclean Element

Model	Permeate flow GPD (m3/day)*	M.W.C.O.
8040-N7E6X8	14,000 (52.0)	100,000

Performance is based on the following test conditions: 500.00 ppm Dextran, 30.00 psi, 25°C, 15% recovery, pH 8.00, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	AUM Advanced Ultrafiltration Membrane
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	260 ft ² (23.9 m ²)
Recommended Applied Pressure.....	20 - 200 psi (1.4 - 14 bar)
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 113°F (2 - 45°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	10.0 ppm
Maximum Feed Flow.....	95 GPM (22 m ³ /hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Beverage Water Make Up



Element Weight : 40 (18)
 Length (A) : 40.00 (1,016) Diameter (B) : 7.90 (200) Permeate Tube (C) : 1.12 (28.6)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres.
 Mechanical Configuration: Filmtec Style Core Tube
 Feed Spacer: 0.047" thick parallel spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



Engineered Membrane
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TurboClean™ Sanitary Elements for Dialysis Applications

TurboClean elements have been used extensively in the dialysis make-up water market. Although not required by law by the FDA, contamination of dialysis make-up water can result in adverse patient reactions.

The sanitary nature of the TurboClean element provides a continuous by-pass flow around the outside of the element. This eliminates the stagnant area normally present on standard brine seal elements, which can result in bio-growth that can contaminate the beverage product. This stagnant area is difficult to clean or sanitize in place, as there is no flow of cleaning or sanitizing chemicals into this area. If cleaning or sanitizing chemicals do get into this area, it is difficult to predict the rinse out time for these chemicals.

Standard net wrap sanitary elements have traditionally been used in food and dairy applications. Due to the high by-pass flow inherent with these designs, food and dairy systems incorporate large recirculation pumps to insure a certain minimum flow through the elements. These net wrap elements cannot be used in standard 2-1 arrays normally used in water applications.

The TurboClean element minimized by-pass flow to 15-20% of the feed flow. This allows the TurboClean element to be used in standard water type applications like dialysis water make-up. Following are some TriSep TurboClean elements specifically engineered for the dialysis make-up water market.



PRODUCT SPECIFICATION

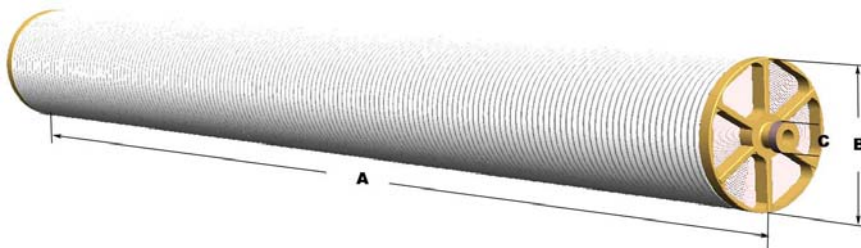
3.8" X-20 RO High Temperature Turboclean Element

Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
3840-N1P3U8	1,750 (6.0)	99.50	98.50

Performance is based on the following test conditions: 2,000.0 ppm NaCl, 225.0 psi, 25°C, 15% recovery, pH 8.0, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	X20 Fully Aromatic Polyamide-Urea Advanced Composite Membrane
Configuration.....	Spiral Wound, Turboclean Shell with FoulGuard Technology
Active Membrane Area.....	70 ft ² (6.4 m ²)
Recommended Applied Pressure.....	100 - 300 psi (7 - 21 bar)
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 140°F (2 - 60°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	<0.1 ppm
Maximum Feed Flow.....	20 GPM (4.5 m3/hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Hemodialysis



Element Weight : 12 (5.4)
 Length (A) : 38.8 (984) Diameter (B) : 3.8 (96) Permeate Tube (C) : 0.83 (21.2)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres.
 Mechanical Configuration: Sanitary Style Core Tube
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



Engineered Membrane
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PRODUCT SPECIFICATION

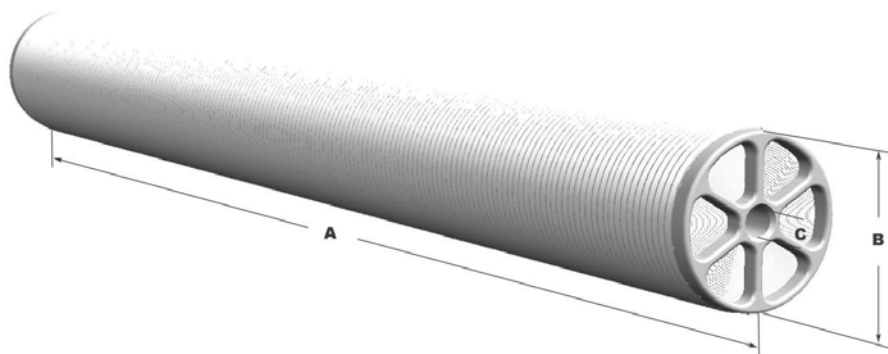
4" ACM High Temperature Turboclean Element

Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
4040-M4P3U8	3,200 (12.0)	99.00	98.00

Performance is based on the following test conditions: 2,000.00 ppm NaCl, 225.00 psi, 25°C, 15% recovery, pH 8.00, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	ACM-LP Fully Aromatic Polyamide Low Pressure Advanced Composite
Configuration.....	Spiral Wound, High Temperature Turboclean Shell
Active Membrane Area.....	80 ft ² (7.4 m ²)
Recommended Applied Pressure.....	100 - 300 psi (7 - 21 bar)
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 140°F (2 - 60°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	<0.1 ppm
Maximum Feed Flow.....	20 GPM (4.5 m3/hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Dialysis Make up Water



Element Weight : 15 (7)
 Length (A) : 40.00 (1,016) Diameter (B) : 4.0 (101) Permeate Tube (C) : 0.62 (15.9)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres.
 Mechanical Configuration: Desal/DuPont Style Core Tube
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



Engineered Membrane
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PRODUCT SPECIFICATION

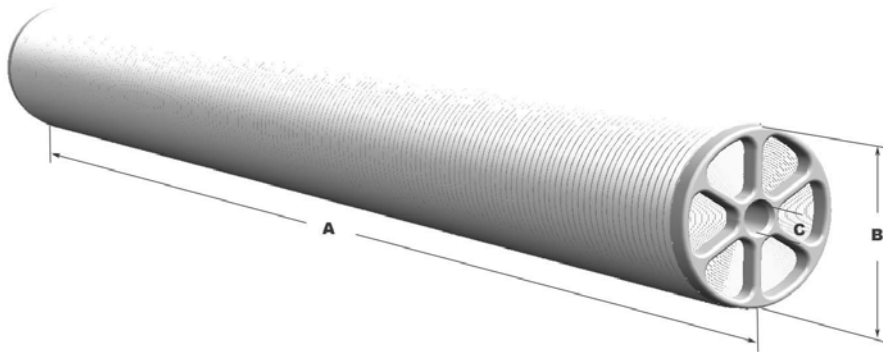
4" ACM-LP Low Pressure RO Turboclean Element

Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
4040-M5P3U5	2,400 (9.0)	98.50	97.50

Performance is based on the following test conditions: 2,000.00 ppm NaCl, 150.00 psi, 25°C, 15% recovery, pH 8.00, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	ACM-LP Fully Aromatic Polyamide Low Pressure Advanced Composite
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	85 ft ² (7.9 m ²)
Recommended Applied Pressure.....	100 - 300 psi (7 - 21 bar)
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 113°F (2 - 45°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	<0.1 ppm
Maximum Feed Flow.....	20 GPM (4.5 m3/hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Dialysis Make up Water



Element Weight : 15 (7)
 Length (A) : 40.00 (1,016) Diameter (B) : 4.0 (101) Permeate Tube (C) : 0.62 (15.9)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres.
 Mechanical Configuration: Desal/DuPont Style Core Tube
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



Engineered Membrane
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PRODUCT SPECIFICATION

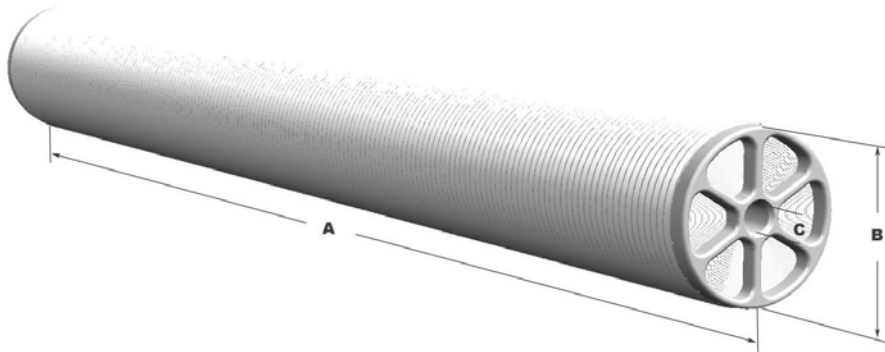
4" AUM Ultrafiltration Turboclean Element Series

Model	Permeate flow GPD (m3/day)*	M.W.C.O.
4040-N6P3X4	3,100 (11.0)	10,000

Performance is based on the following test conditions: 500.00 ppm PEG, 30.00 psi, 25°C, 15% recovery, pH 8.00, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	AUM Advanced Ultrafiltration Membrane
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	78 ft ² (7.2 m ²)
Recommended Applied Pressure.....	5 - 200 psi (0.3 - 14 bar)
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 113°F (2 - 45°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	10.0 ppm
Maximum Feed Flow.....	20 GPM (4.5 m ³ /hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Dialysis Make Up Water



Element Weight : 12 (5.4)
 Length (A) : 40.00 (1,016) Diameter (B) : 4.00 (101) Permeate Tube (C) : 0.62 (15.9)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres.
 Mechanical Configuration: Desal/DuPont Style Core Tube
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



Engineered Membrane
SOLUTIONS



PRODUCT SPECIFICATION

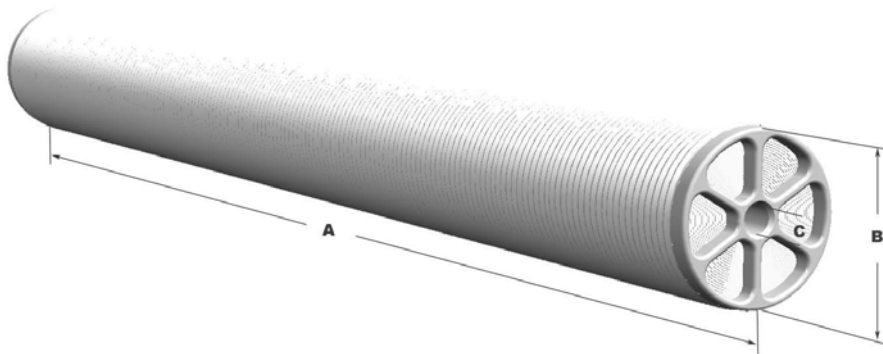
4" CA NF Turboclean Element Series

Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
4040-O3P3U5	1,900 (7.0)	85.00	80.00

Performance is based on the following test conditions: 2,000.00 ppm NaCl, 225.00 psi, 25°C, 15% recovery, pH 5.50, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	Cellulose Acetate Nanofiltration Membrane
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	80 ft ² (7.4 m ²)
Recommended Applied Pressure.....	200 - 500 psi (14 - 34 bar)
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	50 - 90°F (10 - 32°C)
Feedwater pH Range.....	5.5 nominal, 4 - 7
Chlorine Tolerance.....	0.5 ppm nominal, 1.0 ppm max
Maximum Feed Flow.....	20 GPM (4.5m3/hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Dialysis Make up Water



Element Weight : 15 (7)
 Length (A) : 40.00 (1,016) Diameter (B) : 4.00 (101) Permeate Tube (C) : 0.62 (15.9)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres.
 Mechanical Configuration: Desal/DuPont Style Core Tube
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



Engineered Membrane
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PRODUCT SPECIFICATION

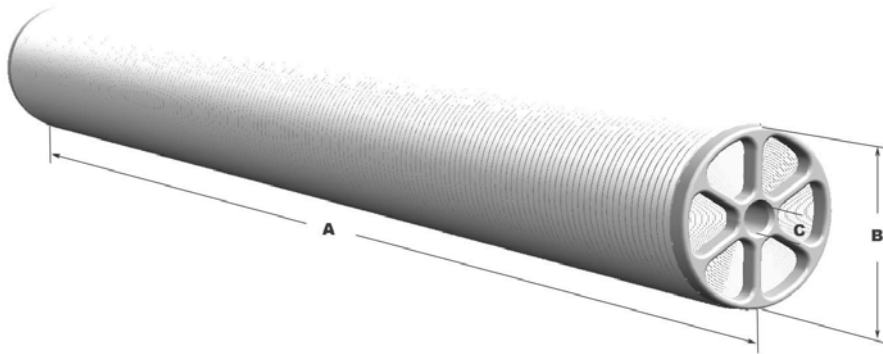
4" ACM RO Turboclean Element

Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
4040-O6G1Y2	1350 (5.0)	99.00	98.00

Performance is based on the following test conditions: 2000 ppm NaCl, 225 psi, 25°C, 15% recovery, pH 8, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	ACM Fully Aromatic Polyamide Advanced Composite Membrane
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	88 ft ² (8.1 m ²)
Recommended Applied Pressure.....	100 - 300 psi (7 - 21 bar)
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 113°F (2 - 45°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	<0.1 ppm
Maximum Feed Flow.....	20 GPM (4.5 m ³ /hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Dialysis Make up Water



Element Weight : 15 (7)
 Length (A) : 40 (1016) Diameter (B) : 4.0 (101) Permeate Tube (C) : 0.78 (19.8)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres.
 Mechanical Configuration: Osmo Style Core Tube
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



Engineered Membrane
SOLUTIONS



PRODUCT SPECIFICATION

8" ACM RO Turboclean Element Series

Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
8040-M2P3T6	9,400 (35.0)	99.50	98.50

Performance is based on the following test conditions: 2,000.0 ppm NaCl, 225.0 psi, 25°C, 15% recovery, pH 8.0, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	ACM Fully Aromatic Polyamide Advanced Composite Membrane
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	355 ft ² (32.6 m ²)
Recommended Applied Pressure.....	100 - 300 psi (7 - 21 bar)
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 113°F (2 - 45°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	<0.1 ppm
Maximum Feed Flow.....	80 GPM (18 m3/hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Dialysis Make up Water



Element Weight : 45 (20)
 Length (A) : 40.0 (1,016) Diameter (B) : 7.9 (200) Permeate Tube (C) : 1.12 (28.6)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres.
 Mechanical Configuration: Filmtec Style Core Tube
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



Engineered Membrane
SOLUTIONS



PRODUCT SPECIFICATION

8" ACM RO High Temperature Turboclean Element

Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
8040-M2P3W7	9,200 (34.0)	99.50	98.50

Performance is based on the following test conditions: 2,000.00 ppm NaCl, 225.00 psi, 25°C, 15% recovery, pH 8.00, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	ACM Fully Aromatic Polyamide Advanced Composite Membrane
Configuration.....	Spiral Wound, High Temperature Turboclean Shell
Active Membrane Area.....	385 ft ² (35.4 m ²)
Recommended Applied Pressure.....	100 - 300 psi (7 - 21 bar)
Maximum Applied Pressure.....	1000 psi (69 bar)
Recommended Operating Temperature.....	35 - 140°F (2 - 60°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	<0.1 ppm
Maximum Feed Flow.....	80 GPM (18 m3/hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	4.0
Maximum Turbidity.....	1 NTU
Application.....	Dialysis Make up Water



Element Weight : 50 (23)
 Length (A) : 40.00 (1,016) Diameter (B) : 7.9 (200) Permeate Tube (C) : 1.12 (28.6)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres.
 Mechanical Configuration: Filmtec Style Core Tube
 Feed Spacer: 0.028" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



Engineered Membrane
SOLUTIONS



PRODUCT SPECIFICATION

8" ACM RO Turboclean Element Series

Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
8040-M3P3T6	11,000 (41.0)	99.50	98.50

Performance is based on the following test conditions: 2,000.00 ppm NaCl, 225.00 psi, 25°C, 15% recovery, pH 8.00, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	ACM Fully Aromatic Polyamide Advanced Composite Membrane
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	355 ft ² (32.6 m ²)
Recommended Applied Pressure.....	100 - 300 psi (7 - 21 bar)
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 113°F (2 - 45°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	<0.1 ppm
Maximum Feed Flow.....	80 GPM (18 m3/hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Dialysis Make Up Water



Element Weight : 45 (20)
 Length (A) : 40.00 (1,016) Diameter (B) : 7.90 (200) Permeate Tube (C) : 1.12 (28.6)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres.
 Mechanical Configuration: Filmtec Style Core Tube
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



Engineered Membrane
SOLUTIONS



PRODUCT SPECIFICATION

8" ACM-LP Low Pressure RO Turboclean Element

Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
8040-M5P3T6	11,500 (43.0)	98.50	97.50

Performance is based on the following test conditions: 2,000.00 ppm NaCl, 150.00 psi, 25°C, 15% recovery, pH 8.00, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	ACM-LP Fully Aromatic Polyamide Low Pressure Advanced Composite
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	355 ft ² (32.6 m ²)
Recommended Applied Pressure.....	40 - 300 psi (3 - 21 bar)
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 113°F (2 - 45°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	<0.1 ppm
Maximum Feed Flow.....	80 GPM (18 m3/hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Dialysis Make up Water



Element Weight : 45 (20)
 Length (A) : 40.00 (1,016) Diameter (B) : 7.9 (200) Permeate Tube (C) : 1.12 (28.6)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres.
 Mechanical Configuration: Filmtec Style Core Tube
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



Engineered Membrane
SOLUTIONS



PRODUCT SPECIFICATION

8" X-20 Low Fouling RO Turboclean Element

Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
8040-N1P3T6	9,200 (34.0)	99.50	98.50

Performance is based on the following test conditions: 2,000.0 ppm NaCl, 225.0 psi, 25°C, 15% recovery, pH 8.0, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	X20 Fully Aromatic Polyamide-Urea Advanced Composite Membrane
Configuration.....	Spiral Wound, Turboclean Shell with FoulGuard Technology
Active Membrane Area.....	355 ft ² (32.6 m ²)
Recommended Applied Pressure.....	100 - 300 psi (7 - 21 bar)
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 113°F (2 - 45°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	<0.1 ppm
Maximum Feed Flow.....	80 GPM (18 m3/hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	2 NTU
Application.....	Dialysis Make up Water



Element Weight : 45 (20)
 Length (A) : 40.0 (1,016) Diameter (B) : 7.9 (200) Permeate Tube (C) : 1.12 (28.6)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres.
 Mechanical Configuration: Filmtec Style Core Tube
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



Engineered Membrane
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TurboClean™ Sanitary Elements for Dairy Applications

The TurboClean® element can reduce by-pass flow by 35% - 44% when compared to commercially available sanitary membrane elements. This improves overall hydraulic control in the pressure vessels, resulting in energy savings, improved membrane life, and significant improvements in processing and cleaning efficiency. The TurboClean® element was developed by TriSep Corporation as a sanitary membrane that uses a hard outer shell.

A basic design requirement of a sanitary element is that it has no 'dead zones', or non-flow areas. Conventional spiral wound elements use a 'brine,' or peripheral seal, to prevent feed water from bypassing through the annular area formed between the pressure vessel inner diameter and the element outer diameter. This results in a dead zone or stagnant area between the outside of the element and the inside of the pressure vessel.

For food and dairy applications, it is a requirement that some of the process fluid must by-pass, or flow around the outside of the element, to insure that this annular area is continuously flushed and that there are no areas in which product can become stagnant or which are not fully exposed to cleaning agents. Different manufacturers employ different means of enclosure in an attempt to provide mechanical stability for the element while assuring this by-pass flow.

These methods include a 'cage' wrap, or alternatively, a "net" wrap around the outer diameter of the element. Either is considered 'soft wrapped' and allows a significant amount of the feed flow to by-pass around the outside of the element.

A third method, the hard shell TurboClean® design by TriSep Corporation, incorporates an impermeable hard plastic shell with a machined groove that spirals around the shell from end to end to allow bypass flow.

In the food and dairy industry, membranes are installed in multi-stage, continuous recirculation systems. The variation in the specific permeate flux at different concentration levels, changing viscosities, and different fouling characteristics of the process streams, requires high recirculation flows to insure adequate feed flow through the membrane element.

A constant velocity over the membrane surface of the process liquid is maintained by a recirculation pump in each stage. Stages contain a number of pressure vessels, all connected in parallel to a main feed manifold. Conventional sanitary elements have significant clearances between the "soft wrap" and the inside of the pressure vessel, resulting in by-pass of feed flow around the element of 40% - 60%. This adds to the required recirculation flow.

Comparative tests at a major California Cheese producer were performed to compare the by-pass flow of the TurboClean® element to a standard "net" wrap element, by isolating one pressure vessel in a continuous recirculation stage. The vessel was equipped with flow control valves on the feed and concentrate side, pressure gauges on feed and concentrate, and flow meters to measure the concentrate and permeate flow. The tests showed a reduction in feed flow rate of 44 % when comparing the TurboClean® elements versus conventional "soft-wrapped" elements. What effect will this new element design have on the food and dairy industry? The hard shell TurboClean® energy savings can be as high as 44% of the required recirculation flow, and in certain application, a corresponding decrease in required cooling energy.

Improved hydraulic flow control may also lead to increased membrane life and improved membrane cleaning efficiencies. Although initial tests tend to support this hypothesis, conclusive data is still pending.

Effects of improved hydraulic flow control may result in improved separation efficiencies, since the effect of high by-pass flow is to reduce membrane cross flow and increase concentration polarization (a higher solute concentration at the membrane surface than in the bulk stream) on the membrane surface. Reduction of concentration polarization is directly related to cross flow rates in the membrane element.

Following, are a list of TriSep TurboClean products specifically designed for the dairy industry.



PRODUCT SPECIFICATION

3.8" ACM High Temperature Turboclean RO Element

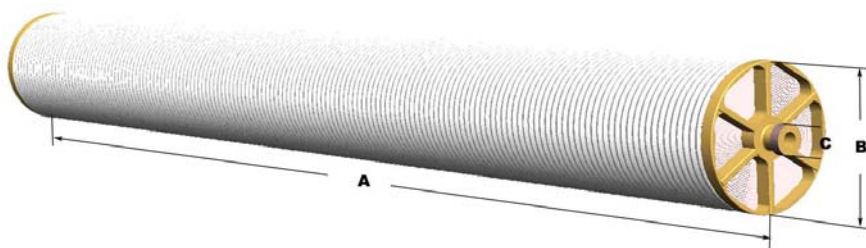
Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
3838-M2D7U8	1700 (6.0)	99.50	98.50

Performance is based on the following test conditions: 2000 ppm NaCl, 225 psi, 25°C, 15% recovery, pH 8, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	ACM Fully Aromatic Polyamide Advanced Composite Membrane
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	68 ft ² (6.2 m ²)
Recommended Applied Pressure.....	Not applicable
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 140°F (2 - 60°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	<0.1 ppm
Maximum Feed Flow.....	20 GPM (4.5 m3/hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Whey Concentration

U.S.D.A.
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Element Weight : 12 (5.4)
 Length (A) : 38 (965) Diameter (B) : 3.8 (96) Permeate Tube (C) : 0.83 (21.2)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres. Dim "A" does not include ATD.
 Mechanical Configuration: Sanitary Style Core Tube ATD not included with element
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



Engineered Membrane
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PRODUCT SPECIFICATION

3.8" ACM High Temperature Turboclean Element

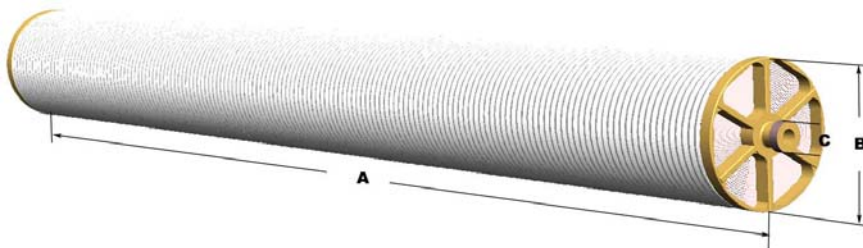
Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
3838-M2D7V6	1,300 (4.0)	99.50	98.50

Performance is based on the following test conditions: 2,000.00 ppm NaCl, 225.00 psi, 25°C, 15% recovery, pH 8.00, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	ACM Fully Aromatic Polyamide Advanced Composite Membrane
Configuration.....	Spiral Wound, High Temperature Turboclean Shell
Active Membrane Area.....	53 ft ² (4.9 m ²)
Recommended Applied Pressure.....	Not applicable
Maximum Applied Pressure.....	1000 psi (69 bar)
Recommended Operating Temperature.....	35 - 140°F (2 - 60°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	<0.1 ppm
Maximum Feed Flow.....	25 GPM (5.6 m3/hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Whey Concentration

U.S.D.A.
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Element Weight : 12 (5.4)
 Length (A) : 38.00 (965) Diameter (B) : 3.8 (96) Permeate Tube (C) : 0.83 (21.2)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres. Dim "A" does not include ATD.
 Mechanical Configuration: Sanitary Style Core Tube ATD not included with element
 Feed Spacer: 0.045" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



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PRODUCT SPECIFICATION

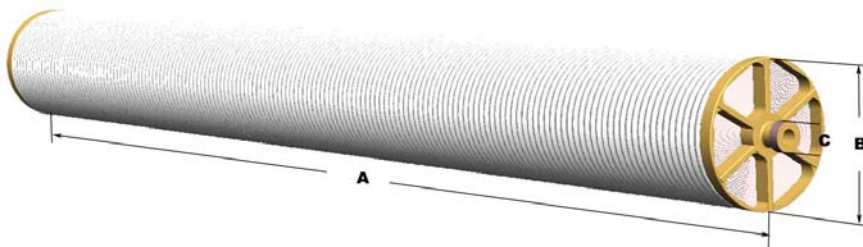
3.8" X-20 High Temperature Turboclean Element

Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
3838-N1D7U8	1700 (6.0)	99.50	98.50

Performance is based on the following test conditions: 2000 ppm NaCl, 225 psi, 25°C, 15% recovery, pH 8, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	X20 Fully Aromatic Polyamide-Urea Advanced Composite Membrane
Configuration.....	Spiral Wound, Turboclean Shell with FoulGuard Technology
Active Membrane Area.....	68 ft ² (6.2 m ²)
Recommended Applied Pressure.....	Not applicable
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 140°F (2 - 60°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	<0.1 ppm
Maximum Feed Flow.....	20 GPM (4.5 m3/hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Whey Concentration



Element Weight : 12 (5.4)
 Length (A) : 38 (965) Diameter (B) : 3.8 (96) Permeate Tube (C) : 0.83 (21.2)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres. Dim "A" does not include ATD.
 Mechanical Configuration: Sanitary Style Core Tube ATD not included with element
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



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PRODUCT SPECIFICATION

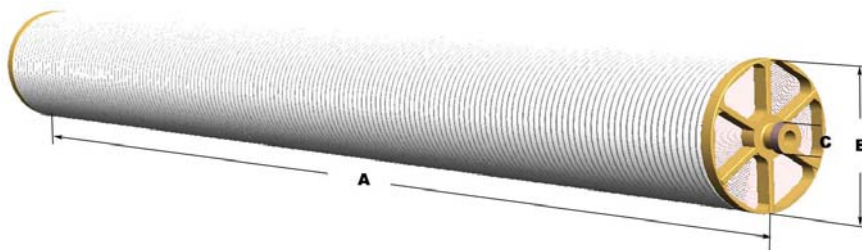
3.8" XN45 High Temperature Turboclean Element

Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
3838-N2D1U8	1700 (6.0)	95.00	92.00

Performance is based on the following test conditions: 2000 ppm MgSO4, 110 psi, 25°C, 15% recovery, pH 8, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	XN45 Polyamide Advanced Nanofiltration Membrane
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	68 ft ² (6.2 m ²)
Recommended Applied Pressure.....	Not applicable
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 140°F (2 - 60°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	0.5 ppm nominal, 1.0 ppm max
Maximum Feed Flow.....	20 GPM (4.5 m ³ /hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Lactose Demineralization



Element Weight : 15 (7)
 Length (A) : 38 (965) Diameter (B) : 3.8 (96) Permeate Tube (C) : 0.83 (21.2)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres. Dim "A" does not include ATD.
 Mechanical Configuration: Sanitary Style Core Tube ATD not included with element
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



Engineered Membrane
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PRODUCT SPECIFICATION

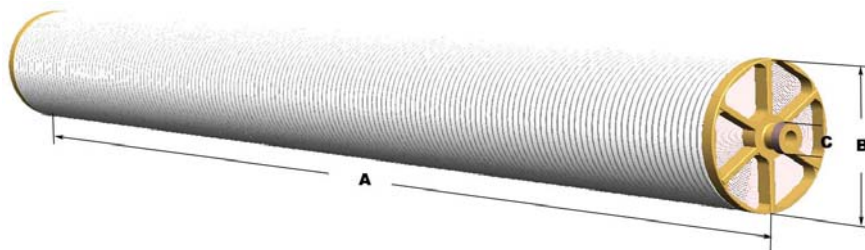
3.8" XN45 High Temperature Turboclean Element

Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
3838-N2D3U8	1700 (6.0)	95.00	92.00

Performance is based on the following test conditions: 2000 ppm MgSO₄, 110 psi, 25°C, 15% recovery, pH 8, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	XN45 Polyamide Advanced Nanofiltration Membrane
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	68 ft ² (6.2 m ²)
Recommended Applied Pressure.....	Not applicable
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 140°F (2 - 60°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	0.5 ppm nominal, 1.0 ppm max
Maximum Feed Flow.....	20 GPM (4.5 m ³ /hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Milk Demineralization



Element Weight : 15 (7)
 Length (A) : 38 (965) Diameter (B) : 3.8 (96) Permeate Tube (C) : 0.83 (21.2)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres. Dim "A" does not include ATD.
 Mechanical Configuration: Sanitary Style Core Tube ATD not included with element
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



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PRODUCT SPECIFICATION

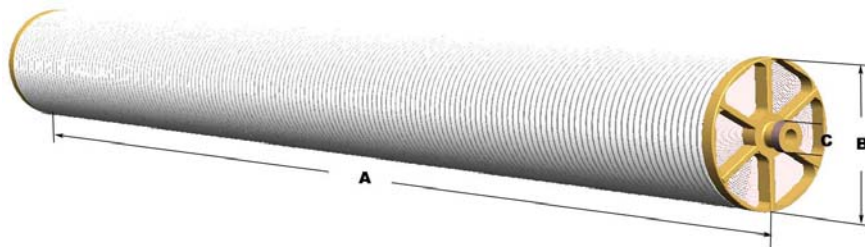
3.8" AUM High Temperature UF Turboclean Element

Model	M.W.C.O.
3838-N6D4V9	10,000

OPERATIONAL AND DESIGN DATA

Membrane Type.....	AUM Advanced Ultrafiltration Membrane
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	53 ft ² (4.9 m ²)
Recommended Applied Pressure.....	Not applicable
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 140°F (2 - 60°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	10.0 ppm
Maximum Feed Flow.....	20 GPM (4.5 m ³ /hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Milk Fractionation

U.S.D.A.
APPROVED



Element Weight : 12 (5.4)
 Length (A) : 38 (965) Diameter (B) : 3.8 (96) Permeate Tube (C) : 0.83 (21.2)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres. Dim "A" does not include ATD.
 Mechanical Configuration: Sanitary Style Core Tube ATD not included with element
 Feed Spacer: 0.045" thick diamond spacer



Engineered Membrane
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PRODUCT SPECIFICATION

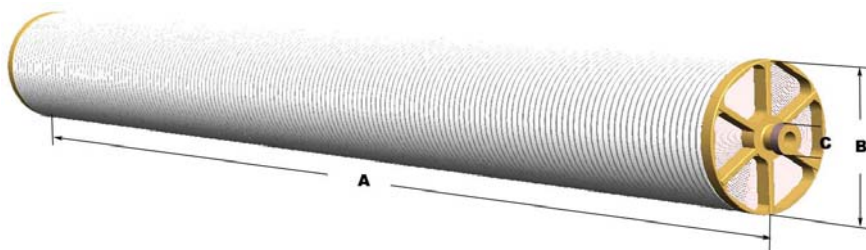
3.8" AUM High Temperature UF Turboclean Element

Model	M.W.C.O.
3838-N6D9V7	10,000

OPERATIONAL AND DESIGN DATA

Membrane Type.....	AUM Advanced Ultrafiltration Membrane
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	41 ft ² (3.8 m ²)
Typical Element Feed Pressure.....	100 - 140 psi (7 - 10 bar)
Maximum Applied Pressure.....	150 psi (10.3 bar)
Maximum Operating Temperature.....	122°F (50°C)
Feedwater pH Range.....	2 - 11 continuous
Max. Chlorine Concentration.....	180.0 ppm @ pH 9 - 11
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Whey Fractionation

**U.S.D.A.
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Element Weight : 12 (5.4)
 Length (A) : 38 (965) Diameter (B) : 3.8 (96) Permeate Tube (C) : 0.83 (21.2)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres. Dim "A" does not include ATD.
 Mechanical Configuration: Sanitary Style Core Tube ATD not included with element
 Feed Spacer: 0.065" thick diamond spacer



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PRODUCT SPECIFICATION

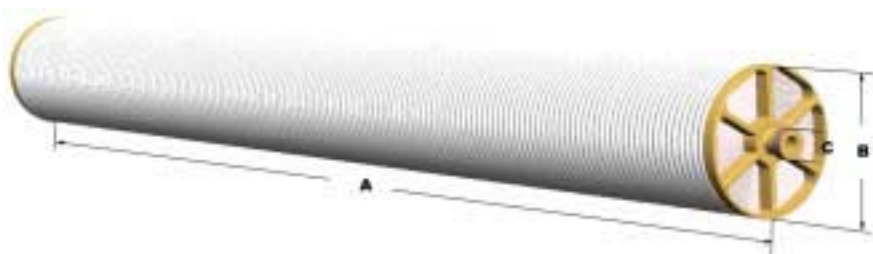
3.8" TS50 High Temperature Turboclean Element

Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
3838-O8D1U8	1,600 (6.0)	99.00	98.00

Performance is based on the following test conditions: 2,000.00 ppm MgSO₄, 110.00 psi, 25°C, 15% recovery, pH 8.00, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	TS50 Polyamide Advanced Nanofiltration Membrane
Configuration.....	Spiral Wound, High Temperature Turboclean Shell
Active Membrane Area.....	70 ft ² (6.4 m ²)
Recommended Applied Pressure.....	Not applicable
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 140°F (2 - 60°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	<0.1 ppm
Maximum Feed Flow.....	20 GPM (4.5 m ³ /hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Lactose Demineralization



Element Weight : 15 (7)
 Length (A) : 38.00 (965) Diameter (B) : 3.8 (96) Permeate Tube (C) : 0.83 (21.2)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres. Dim "A" does not include ATD.
 Mechanical Configuration: Sanitary Style Core Tube ATD not included with element
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.





PRODUCT SPECIFICATION

3.8" ACM High Temperature Turboclean Element

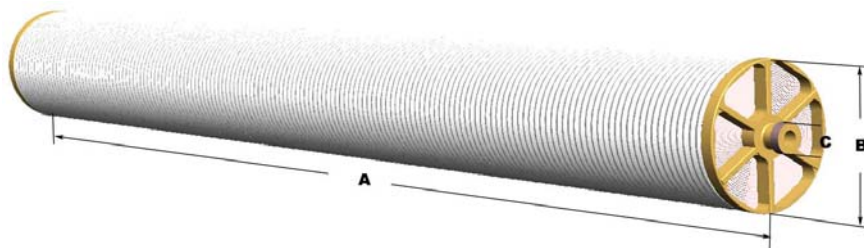
Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
3840-M2D2V6	1300 (4.0)	99.50	98.50

Performance is based on the following test conditions: 2000 ppm NaCl, 225 psi, 25°C, 15% recovery, pH 8, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	ACM Fully Aromatic Polyamide Advanced Composite Membrane
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	53 ft ² (4.9 m ²)
Recommended Applied Pressure.....	Not applicable
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 140°F (2 - 60°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	<0.1 ppm
Maximum Feed Flow.....	25 GPM (5.6 m3/hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Milk Concentration

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Element Weight : 12 (5.4)
 Length (A) : 39 (984) Diameter (B) : 3.8 (96) Permeate Tube (C) : 0.83 (21.2)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres. Dim "A" does not include ATD.
 Mechanical Configuration: Sanitary Style Core Tube ATD not included with element
 Feed Spacer: 0.045" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



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PRODUCT SPECIFICATION

3.8" ACM High Temperature Turboclean Element

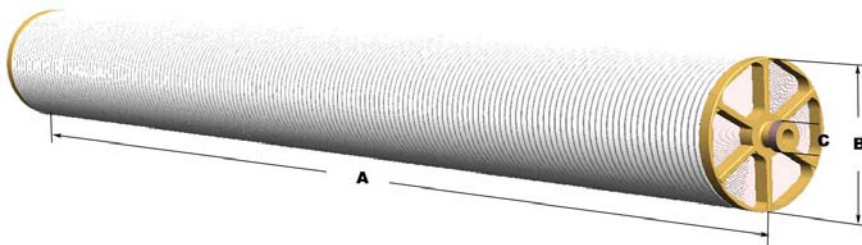
Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
3840-M2D2X3	1000 (3.0)	99.50	98.50

Performance is based on the following test conditions: 2000 ppm NaCl, 225 psi, 25°C, 15% recovery, pH 8, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	ACM Fully Aromatic Polyamide Advanced Composite Membrane
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	40 ft ² (3.7 m ²)
Recommended Applied Pressure.....	Not applicable
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 140°F (2 - 60°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	<0.1 ppm
Maximum Feed Flow.....	25 GPM (5.6 m3/hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Milk Concentration

U.S.D.A.
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Element Weight : 12 (5.4)
 Length (A) : 39 (984) Diameter (B) : 3.8 (96) Permeate Tube (C) : 0.83 (21.2)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres. Dim "A" does not include ATD.
 Mechanical Configuration: Sanitary Style Core Tube ATD not included with element
 Feed Spacer: 0.065" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



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PRODUCT SPECIFICATION

3.8" ACM High Temperature Turboclean Element

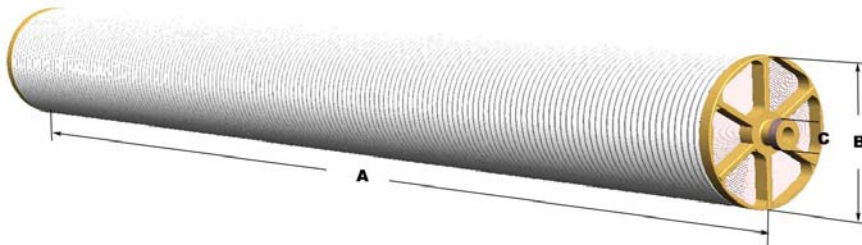
Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
3840-M2D7X3	1,000 (3.0)	99.50	98.50

Performance is based on the following test conditions: 2,000.00 ppm NaCl, 225.00 psi, 25°C, 15% recovery, pH 8.00, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	ACM Fully Aromatic Polyamide Advanced Composite Membrane
Configuration.....	Spiral Wound, High Temperature Turboclean Shell
Active Membrane Area.....	40 ft ² (3.7 m ²)
Recommended Applied Pressure.....	Not applicable
Maximum Applied Pressure.....	1000 psi (69 bar)
Recommended Operating Temperature.....	35 - 140°F (2 - 60°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	<0.1 ppm
Maximum Feed Flow.....	25 GPM (5.6 m3/hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Whey Concentration

U.S.D.A.
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Element Weight : 12 (5.4)
 Length (A) : 38.75 (984) Diameter (B) : 3.8 (96) Permeate Tube (C) : 0.83 (21.2)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres. Dim "A" does not include ATD.
 Mechanical Configuration: Sanitary Style Core Tube ATD not included with element
 Feed Spacer: 0.065" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



Engineered Membrane
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PRODUCT SPECIFICATION

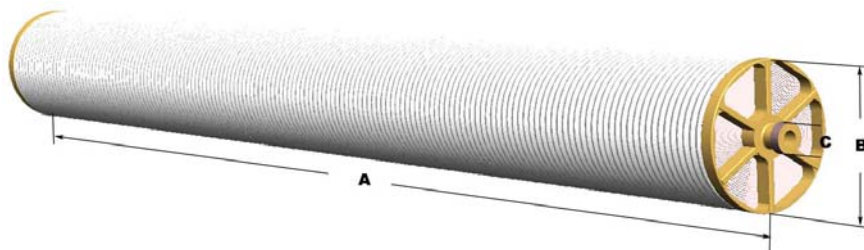
3.8" X-20 High Temperature Turboclean Element

Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
3840-N1C9U8	1750 (6.0)	99.50	98.50

Performance is based on the following test conditions: 2000 ppm NaCl, 225 psi, 25°C, 15% recovery, pH 8, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	X20 Fully Aromatic Polyamide-Urea Advanced Composite Membrane
Configuration.....	Spiral Wound, Turboclean Shell with FoulGuard Technology
Active Membrane Area.....	70 ft ² (6.4 m ²)
Recommended Applied Pressure.....	Not applicable
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 140°F (2 - 60°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	<0.1 ppm
Maximum Feed Flow.....	20 GPM (4.5 m3/hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Lactose Concentration



Element Weight : 12 (5.4)
 Length (A) : 39 (984) Diameter (B) : 3.8 (96) Permeate Tube (C) : 0.83 (21.2)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres. Dim "A" does not include ATD.
 Mechanical Configuration: Sanitary Style Core Tube ATD not included with element
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



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PRODUCT SPECIFICATION

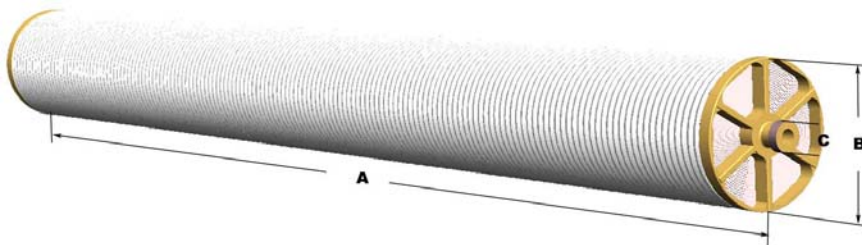
3.8" XN45 High Temperature Turboclean Element

Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
3840-N2D3U8	1750 (6.0)	95.00	92.00

Performance is based on the following test conditions: 2000 ppm MgSO4, 110 psi, 25°C, 15% recovery, pH 8, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	XN45 Polyamide Advanced Nanofiltration Membrane
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	70 ft ² (6.4 m ²)
Recommended Applied Pressure.....	Not applicable
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 140°F (2 - 60°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	0.5 ppm nominal, 1.0 ppm max
Maximum Feed Flow.....	20 GPM (4.5 m3/hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Milk Demineralization



Element Weight : 15 (7)
 Length (A) : 39 (984) Diameter (B) : 3.8 (96) Permeate Tube (C) : 0.83 (21.2)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres. Dim "A" does not include ATD.
 Mechanical Configuration: Sanitary Style Core Tube ATD not included with element
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



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PRODUCT SPECIFICATION

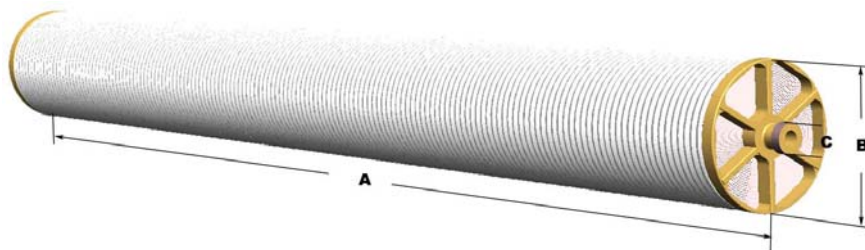
3.8" XN45 High Temperature Turboclean Element

Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
3840-N2D8U8	1750 (6.0)	95.00	92.00

Performance is based on the following test conditions: 2000 ppm MgSO₄, 110 psi, 25°C, 15% recovery, pH 8, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	XN45 Polyamide Advanced Nanofiltration Membrane
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	70 ft ² (6.4 m ²)
Recommended Applied Pressure.....	Not applicable
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 140°F (2 - 60°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	0.5 ppm nominal, 1.0 ppm max
Maximum Feed Flow.....	20 GPM (4.5 m ³ /hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Whey Demineralization



Element Weight : 15 (7)
 Length (A) : 39 (984) Diameter (B) : 3.8 (96) Permeate Tube (C) : 0.83 (21.2)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres. Dim "A" does not include ATD.
 Mechanical Configuration: Sanitary Style Core Tube ATD not included with element
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



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PRODUCT SPECIFICATION

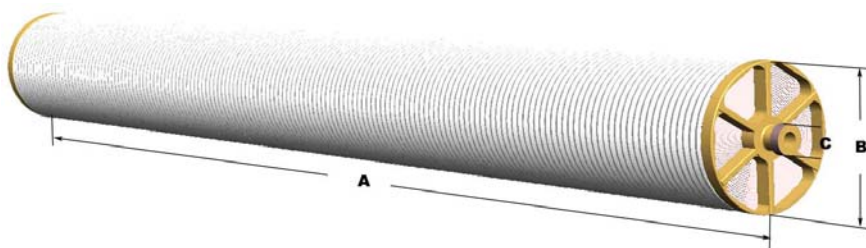
3.8" XN45 High Temperature Turboclean Element

Model	Permeate flow GPD (m3/day)*	Average Salt Rejection (%)	Minimum Salt Rejection (%)
3840-N2D9U8	1750 (6.0)	95.00	92.00

Performance is based on the following test conditions: 2000 ppm MgSO₄, 110 psi, 25°C, 15% recovery, pH 8, 30 minutes operation.

OPERATIONAL AND DESIGN DATA

Membrane Type.....	XN45 Polyamide Advanced Nanofiltration Membrane
Configuration.....	Spiral Wound, Turboclean Shell
Active Membrane Area.....	70 ft ² (6.4 m ²)
Recommended Applied Pressure.....	Not applicable
Maximum Applied Pressure.....	600 psi (41 bar)
Recommended Operating Temperature.....	35 - 140°F (2 - 60°C)
Feedwater pH Range.....	2 - 11 continuous
Chlorine Tolerance.....	0.5 ppm nominal, 1.0 ppm max
Maximum Feed Flow.....	20 GPM (4.5 m ³ /hr)
Minimum Brine Flow/Permeate Flow Ratio....	5:1
Maximum SDI (15 minutes)	5.0
Maximum Turbidity.....	1 NTU
Application.....	Whey Fractionation



Element Weight : 15 (7)
 Length (A) : 39 (984) Diameter (B) : 3.8 (96) Permeate Tube (C) : 0.83 (21.2)
 Units in pounds and inches, units in paranthesis in kilograms and millimetres. Dim "A" does not include ATD.
 Mechanical Configuration: Sanitary Style Core Tube ATD not included with element
 Feed Spacer: 0.031" thick diamond spacer

* Permeate flow is clean water flux at standard conditions above. Not applicable for all feedwater conditions. Individual element's permeate flow may vary +/- 15%.



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