



“PERMA” NANO FILTRATION **Spiral-Wound Element Range**

Permionics began its quest for harnessing the water resources way back in 1976. A visionary, Mr. Satyapal Mayor, took the bold step to indigenously develop membrane based water desalination technology. In 1980 Permionics installed its first Reverse Osmosis system using its own Cellulose Acetate membrane elements.

With over 11 different types of membranes in its manufacturing range, Permionics stands out as membrane specialists in the country. We have installed systems for Dairy, dyes, Pharma, bulk drug, fermentation and biotech applications apart from water desalination. Membranes have been used in almost all areas of aqueous separation. This diversity has been possible, because of the range of membranes manufactured and offered by us.

The Nano-filtration membrane elements that we are offering have been developed over the past five years. Extended life and application testing has enabled us to perfect the Nano-filtration range of membranes to precisely suit the applications mentioned against each membrane type. There are at least a dozen if not more systems operating in the field for over two years, incorporating the NF membranes. By far they have proven to be far superior than the currently available membranes of equivalent ratings.

Unique Nano-filtration membrane with high flux and improved hydrophilicity coupled with a higher level of chlorine tolerance.

Properties

- **pH tolerance : 1- 13 during operation and cleaning**
- **Low fouling due to high Hydrophilicity .**
- **Low salt rejection at low molecular wt cut offs, allow operating on high salt concentrations at low pressures.**
- Available in MWCO ranging from 50 to 500 Daltons
- High operating flux rates due to hydrophilicity
- Available in tape wrap, FRP wrap and net outer wrap constructions
- Chlorine tolerance up to 0.5 ppm continuous exposure
- 2.5”,4”and 8” dia spiral wound elements retrofittable with Filmtec, Koch, etc elements.
- Membranes can operate on high BOD and COD feed streams



“PERMA” NANO FILTRATION

Spiral-Wound Element Range

Operating Test Data

Municipal water (TDS: 1000 ppm; Cl : 150 mg/lit; SO4: 140 mg/lit; TH : 400 ppm)

Product	Operating pressure	Individual ion rejection %				Flux
		Hardness	Chloride	Sulphate	TDS	
	Psi					LMH
HPA - 50	100	99	96	98.57	97.77	35
HPA – 100	100	97	90	98.33	91.64	45
HPA – 150	100	90	80	93.3	81.09	53
HPA – 250	100	60	45	91.42	50.58	60
HPA – 400	100	45	26	88.57	36.46	80

➤ **2000 ppm solute concentration**

Product	Operating pressure	Pure Solute rejection %			
		MgSO ₄	Na ₂ SO ₄	NaCl	Sucrose *
	Psi				
HPA - 50	100	99	99	93	99.99
HPA – 100	100	99	99	90	99.99
HPA – 150	100	98	97	75	99.99
HPA – 250	50	90	85	40	99.9
HPA – 400	50	85	80	25	99.9

- *Sucrose feed concentration: 5%

➤ **10000 ppm solute concentration**

Product	Operating pressure	Pure solute rejection %		
		MgSO ₄	Na ₂ SO ₄	NaCl
	Psi			
HPA - 50	200	99	99	90
HPA – 100	200	99	99	80
HPA – 150	200	98	97	60
HPA – 250	100	90	85	25
HPA – 400	100	85	80	15

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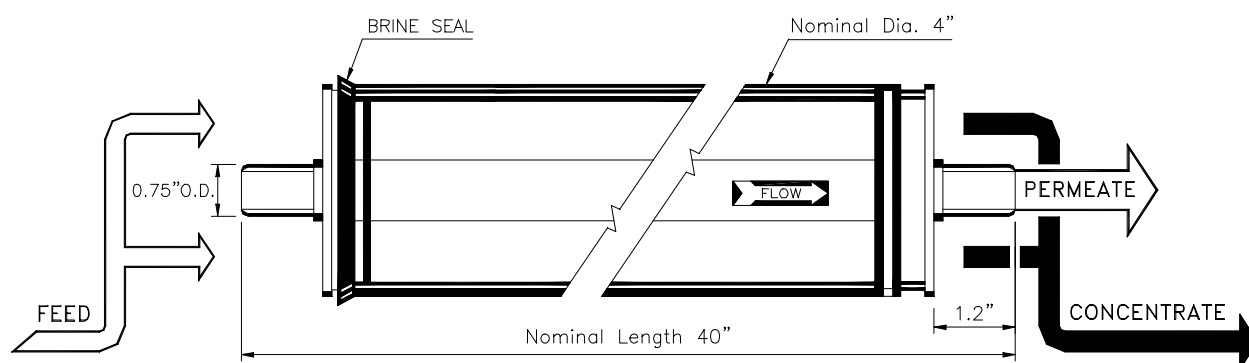
Spiral-Wound Element Range

HPA 400-4040

Product specifications

Product	Size	Product water m ³ /day	Flow rate GPD	Minimum rejection at 2000 ppm			
				MgSo ₄	Na ₂ So ₄	Nacl	Sucrose
HPA 400 4040	4"Ø x 40"L	16.00	4200	85%	80%	25%	99%

1. Permeate flow and salt rejection based on the following test conditions: 2000 ppm solute 100 psi (0.7 Mpa), 77° F (25° C), 15% recovery, sucrose rejection at 5% feed concentration.
2. Flow rates for individual elements may vary ±20%



Operating Limits

Membrane type	Hydrophilized Polyamide
Maximum operating pressure	600 psi (4.08 Mpa)
Feed spacer thickness	28 mils- standard
Membrane filtration area	7.9 sq.mtrs
Molecular weight cut-off	400 daltons
Operating Temperature	Max. 70°C
Operating pH range	2 – 11pH
Cleaning pH range	1.5 - 12 pH
Free Chlorine tolerance	<0.5 ppm continuos
Maximum feed silt density index	5 NTU
Outer wrap	FRP/Tape wrap/sanitary
Maximum feed flow rate	4.2 cumtrs/hr
Minimum concentrate flow rate	1.0 cumtr/hr*
Maximum Pressure drop per element	15 psi

- see design guidelines

Manufactured by...



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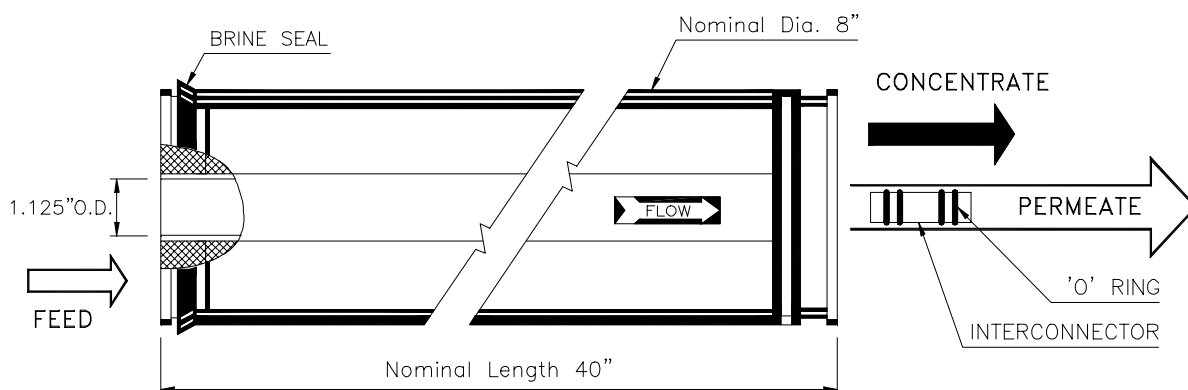
Spiral-Wound Element

HPA 400- 8040

Product specifications

Product	Size	Product water flow rate		Minimum rejection at 2000 ppm			
		m ³ /day	GPD	MgSO ₄	Na ₂ SO ₄	NaCl	Sucrose
HPA 400 8040	8"Ø x 40"L	75.20	20000	85%	80%	25%	99%

1. Permeate flow and salt rejection based on the following test conditions: 2000 ppm solute 100 psi (0.7 Mpa), 77° F (25° C), 15% recovery, sucrose rejection at 5% feed concentration.
2. Flow rates for individual elements may vary ±20%



Operating Limits

Membrane type	Hydrophilized Polyamide
Maximum operating pressure	600 psi (4.08 Mpa)
Feed spacer thickness	28 mils- standard,
Membrane filtration area	37 sq.mtrs
Molecular weight cut-off	400 daltons
Operating Temperature	Max. 70°C
Operating pH range	2 – 11pH
Cleaning pH range	1.5 - 12 pH
Free Chlorine tolerance	<0.5 ppm continuos
Maximum feed silt density index	5 NTU
Outer wrap	FRP/Tape wrap/sanitary
Maximum feed flow rate	16.0 cumtrs/hr
Minimum concentrate flow rate	3.6 cumtr/hr*
Maximum Pressure drop per element	15 psi

* see design guidelines

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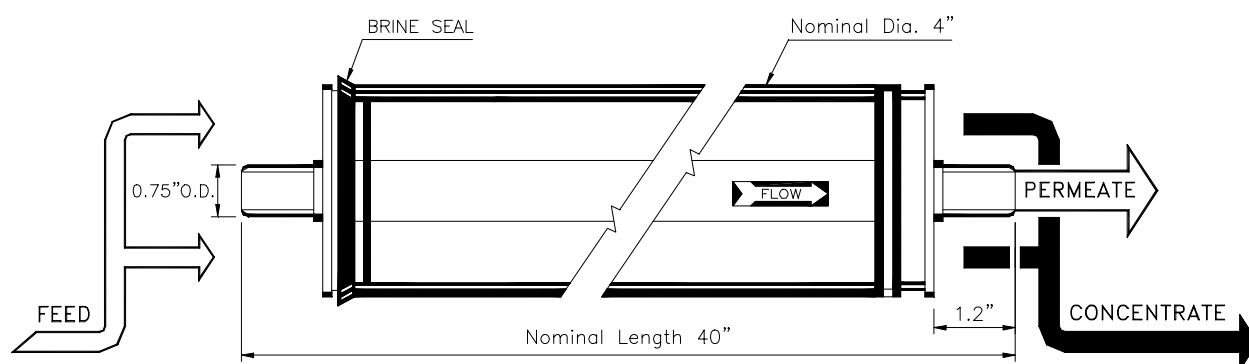
Spiral-Wound Element

HPA 250- 4040

Product specifications

Product	Size	Product water flow rate		Minimum rejection at 2000 ppm			
		m ³ /day	GPD	MgSO ₄	Na ₂ SO ₄	NaCl	Sucrose
HPA 250 4040	4"Ø x 40"L	11.50	3000	90%	85%	40%	99.9%

1. Permeate flow and salt rejection based on the following test conditions: 2000 ppm solute 100 psi (0.7 Mpa), 77° F (25° C), 15% recovery, sucrose rejection at 5% feed concentration.
2. Flow rates for individual elements may vary ±20%



Operating Limits

Membrane type	Hydrophilized Polyamide
Maximum operating pressure	600 psi (4.08 Mpa)
Feed spacer thickness	28 mils- standard
Membrane filtration area	7.9 sq.mtrs
Molecular weight cut-off	250 daltons
Operating Temperature	Max. 70°C
Operating pH range	2 – 11pH
Cleaning pH range	1.5 - 12 pH
Free Chlorine tolerance	<0.5 ppm continuos
Maximum feed silt density index	5 NTU
Outer wrap	FRP/Tape wrap/sanitary
Maximum feed flow rate	4.2 cumtrs/hr
Minimum concentrate flow rate	1.0 cumtr/hr*
Maximum Pressure drop per element	15 psi

* see design guidelines

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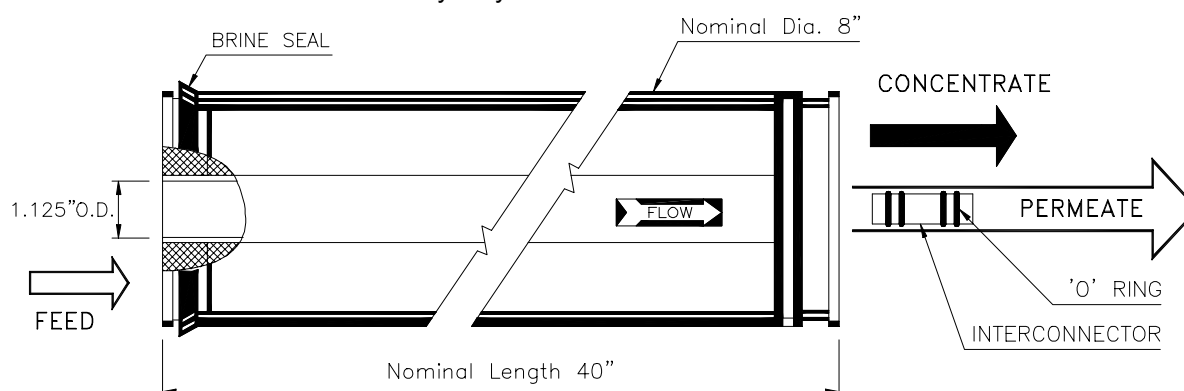
Spiral-Wound Element

HPA 250- 8040

Product specifications

Product	Size	Product water flow rat		Minimum rejection at 2000 ppm			
		m ³ /day	GPD	MgSo ₄	Na ₂ So ₄	Nacl	Sucrose
HPA 250 8040	8"Ø x 40"L	54.00	14000	90%	85%	40%	99.9%

1. Permeate flow and salt rejection based on the following test conditions: 2000 ppm solute 100 psi (0.7 Mpa), 77° F (25° C), 15% recovery, sucrose rejection at 5% feed concentration.
2. Flow rates for individual elements may vary ±20%



Operating Limits

Membrane type	Hydrophilized Polyamide
Maximum operating pressure	600 psi (4.08 Mpa)
Feed spacer thickness	28 mils- standard
Membrane filtration area	37 sq.mtrs
Molecular weight cut-off	250 daltons
Operating Temperature	Max. 70°C
Operating pH range	2 – 11pH
Cleaning pH range	1.5 - 12 pH
Free Chlorine tolerance	<0.5 ppm continuos
Maximum feed silt density index	5 NTU
Outer wrap	FRP/Tape wrap/sanitary
Maximum feed flow rate	16.0 cumtrs/hr
Minimum concentrate flow rate	3.6 cumtr/hr*
Maximum Pressure drop per element	15 psi

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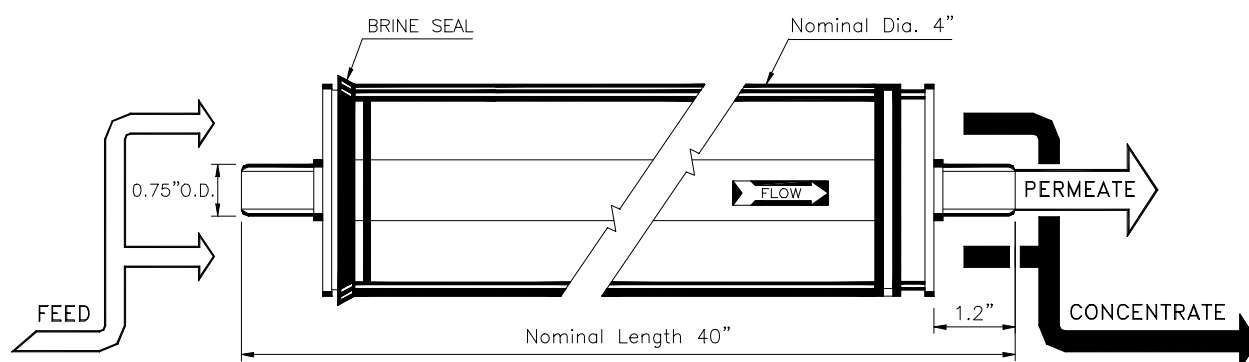
Spiral-Wound Element

HPA 150- 4040

Product specifications

Product	Size	Product water flow rate		Minimum rejection at 2000 ppm			
		m ³ /day	GPD	MgSO ₄	Na ₂ SO ₄	NaCl	Sucrose
HPA 150 4040	4"Ø x 40"L	7.60	2000	98%	97%	75%	99.9%

1. Permeate flow and salt rejection based on the following test conditions: 2000 ppm solute 100 psi (0.7 Mpa), 77° F (25° C), 15% recovery, sucrose rejection at 5% feed concentration.
2. Flow rates for individual elements may vary ±20%



Operating Limits

Membrane type	Hydrophilized Polyamide
Maximum operating pressure	600 psi (4.08 Mpa)
Feed spacer thickness	28 mils- standard
Membrane filtration area	7.9 sq.mtrs
Molecular weight cut-off	150 daltons
Operating Temperature	Max. 70°C
Operating pH range	2 – 11pH
Cleaning pH range	1.5 - 12 pH
Free Chlorine tolerance	<0.5 ppm continuos
Maximum feed silt density index	5 NTU
Outer wrap	FRP/Tape wrap/sanitary
Maximum feed flow rate	4.2 cumtrs/hr
Minimum concentrate flow rate	1.0 cumtr/hr*
Maximum Pressure drop per element	15 psi

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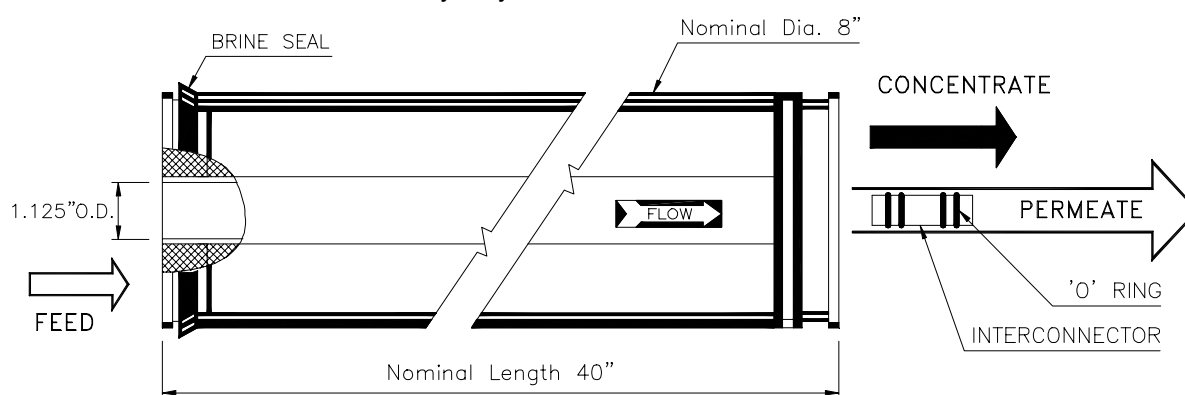
Spiral-Wound Element

HPA 150- 8040

Product specifications

Product	Size	Product water flow rate		Minimum rejection at 2000 ppm			
		m ³ /day	GPD	MgSO ₄	Na ₂ SO ₄	NaCl	Sucrose
HPA 150 8040	8"Ø x 40"L	36.00	9500	98%	97%	75%	99.9%

1. Permeate flow and salt rejection based on the following test conditions: 2000 ppm solute 100 psi (0.7 Mpa), 77° F (25° C), 15% recovery, sucrose rejection at 5% feed concentration.
2. Flow rates for individual elements may vary ±20%



Operating Limits

Membrane type	Hydrophilized Polyamide
Maximum operating pressure	600 psi (4.08 Mpa)
Feed spacer thickness	28 mils- standard
Membrane filtration area	37 sq.mtrs
Molecular weight cut-off	150 daltons
Operating Temperature	Max. 70°C
Operating pH range	2 – 11pH
Cleaning pH range	1.5 - 12 pH
Free Chlorine tolerance	<0.5 ppm continuos
Maximum feed silt density index	5 NTU
Outer wrap	FRP/Tape wrap/sanitary
Maximum feed flow rate	16.0 cumtrs/hr
Minimum concentrate flow rate	3.6 cumtr/hr*
Maximum Pressure drop per element	15 psi

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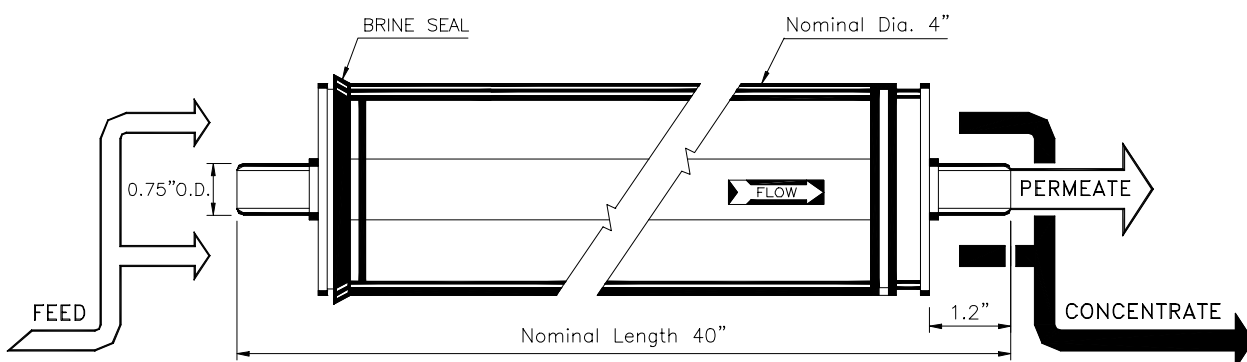
Spiral-Wound Element

HPA 100- 4040

Product specifications

Product	Size	Product water flow rate		Minimum rejection at 2000 ppm			
		m ³ /day	GPD	MgSo ₄	Na ₂ So ₄	Nacl	Sucrose
HPA 100 4040	4"Ø x 40"L	6.40	1700	99%	99%	90%	99.9%

1. Permeate flow and salt rejection based on the following test conditions: 2000 ppm solute 100 psi (0.7 Mpa), 77° F (25° C), 15% recovery, sucrose rejection at 5% feed concentration.
2. Flow rates for individual elements may vary ±20%



Operating Limits

Membrane type	Hydrophilized Polyamide
Maximum operating pressure	600 psi (4.08 Mpa)
Feed spacer thickness	28 mils- standard
Membrane filtration area	7.9 sq.mtrs
Molecular weight cut-off	100 daltons
Operating Temperature	Max. 70°C
Operating pH range	2 – 11pH
Cleaning pH range	1.5 - 12 pH
Free Chlorine tolerance	<0.5 ppm continuos
Maximum feed silt density index	5 NTU
Outer wrap	FRP/Tape wrap/sanitary
Maximum feed flow rate	4.2 cumtrs/hr
Minimum concentrate flow rate	1.0 cumtr/hr*
Maximum Pressure drop per element	15 psi

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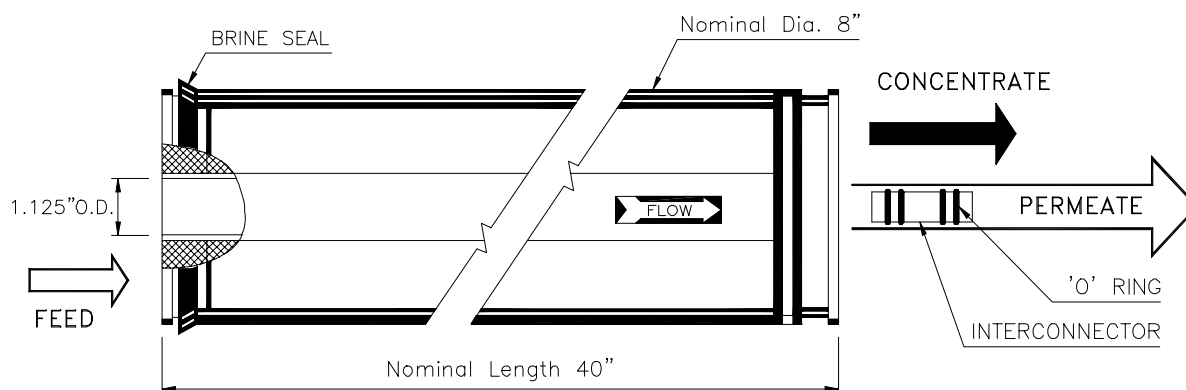
Spiral-Wound Element

HPA 100- 8040

Product specifications

Product	Size	Product water flow rate		Minimum rejection at 2000 ppm			
		m ³ /day	GPD	MgSO ₄	Na ₂ SO ₄	NaCl	Sucrose
HPA 100 8040	8"Ø x 40"L	30.00	8000	99%	99%	90%	99.9%

1. Permeate flow and salt rejection based on the following test conditions: 2000 ppm solute 100 psi (0.7 Mpa), 77° F (25° C), 15% recovery, sucrose rejection at 5% feed concentration.
2. Flow rates for individual elements may vary ±20%



Operating Limits

Membrane type	Hydrophilized Polyamide
Maximum operating pressure	600 psi (4.08 Mpa)
Feed spacer thickness	28 mils- standard
Membrane filtration area	37 sq.mtrs
Molecular weight cut-off	100 daltons
Operating Temperature	Max. 70°C
Operating pH range	2 – 11pH
Cleaning pH range	1.5 - 12 pH
Free Chlorine tolerance	<0.5 ppm continuos
Maximum feed silt density index	5 NTU
Outer wrap	FRP/Tape wrap/sanitary
Maximum feed flow rate	16.0 cumtrs/hr
Minimum concentrate flow rate	3.6 cumtr/hr*
Maximum Pressure drop per element	15 psi

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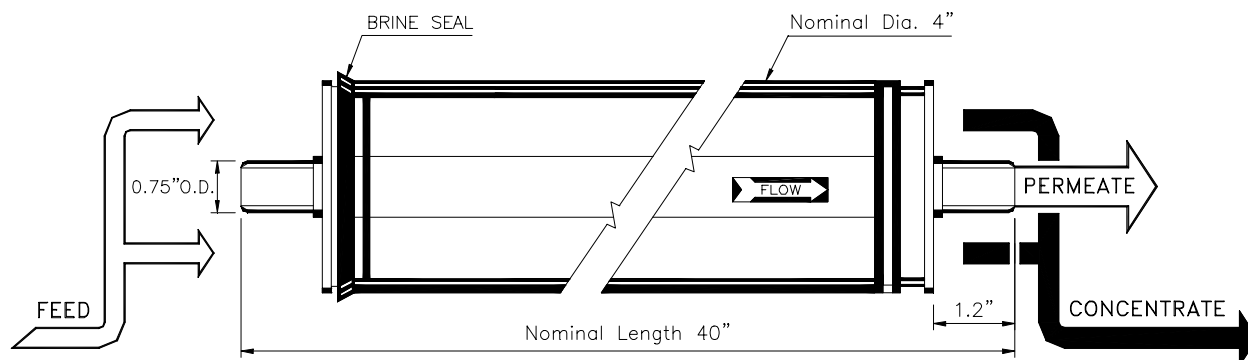
Spiral-Wound Element

HPA 50-4040

Product specifications

Product	Size	Product water flow rate		Minimum rejection at 2000 ppm			
		m ³ /day	GPD	MgSO ₄	Na ₂ SO ₄	NaCl	Sucrose
HPA 50 4040	4"Ø x 40"L	4.80	1270	99%	99%	93%	99.9%

1. Permeate flow and salt rejection based on the following test conditions: 2000 ppm solute 100 psi (0.7 Mpa), 77° F (25° C), 15% recovery, sucrose rejection at 5% feed concentration.
2. Flow rates for individual elements may vary ±20%



Operating Limits

Membrane type	Hydrophilized Polyamide
Maximum operating pressure	600 psi (4.08 Mpa)
Feed spacer thickness	28 mils- standard
Membrane filtration area	7.9 sq.mtrs
Molecular weight cut-off	50 daltons
Operating Temperature	Max. 70°C
Operating pH range	2 – 11pH
Cleaning pH range	1.5 - 12 pH
Free Chlorine tolerance	<0.5 ppm continuos
Maximum feed silt density index	5 NTU
Outer wrap	FRP/Tape wrap/sanitary
Maximum feed flow rate	4.2 cumtrs/hr
Minimum concentrate flow rate	1.0 cumtr/hr*
Maximum Pressure drop per element	15 psi

* see design guidelines

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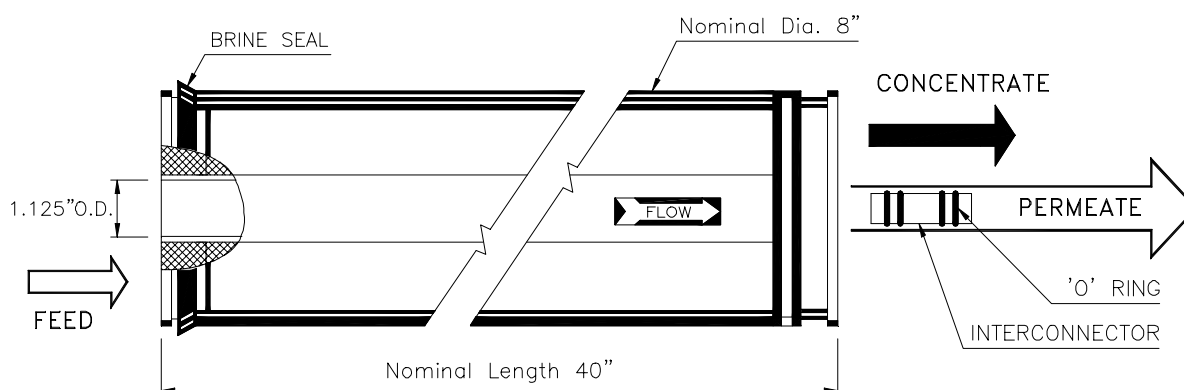
Spiral-Wound Element

HPA 50 - 8040

Product specifications

Product	Size	Product water flow rate		Minimum rejection at 2000 ppm			
		m ³ /day	GPD	MgSO ₄	Na ₂ SO ₄	NaCl	Sucrose
HPA 50 8040	8"Ø x 40"L	22.60	6000	99%	99%	93%	99.9%

1. Permeate flow and salt rejection based on the following test conditions: 2000 ppm solute 100 psi (0.7 Mpa), 77° F (25° C), 15% recovery, sucrose rejection at 5% feed concentration.
2. Flow rates for individual elements may vary ±20%



Operating Limits

Membrane type	Hydrophilized Polyamide
Maximum operating pressure	600 psi (4.08 Mpa)
Feed spacer thickness	28 mils- standard
Membrane filtration area	37 sq.mtrs
Molecular weight cut-off	50 daltons
Operating Temperature	Max. 70°C
Operating pH range	2 – 11pH
Cleaning pH range	1.5 - 12 pH
Free Chlorine tolerance	<0.5 ppm continuos
Maximum feed silt density index	5 NTU
Outer wrap	FRP/Tape wrap/sanitary
Maximum feed flow rate	16.0 cumtrs/hr
Minimum concentrate flow rate	3.6 cumtr/hr*
Maximum Pressure drop per element	15 psi

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Element Application summary

Product	Flow rate m3/day	% solute rejection				Applications
		MgSO ₄	Na ₂ SO ₄	NaCl	Sucrose [*]	
4040 HPA – 400	16.00	85	80	25	99.9	<ul style="list-style-type: none"> ➤ Desalination of brackish water ➤ Drinking water production ➤ Cooling tower blow down recycle
8040	75.00					
4040 HPA – 250	11.50	90	85	40	99.9	<ul style="list-style-type: none"> ➤ Partial TDS reduction & Softening ➤ Drinking water production ➤ COD and BOD reduction
8040	54.00					
4040 HPA – 150	7.60	98	97	75	99.99	<ul style="list-style-type: none"> ➤ Softening of water ➤ Drinking water production from low TDS surface water ➤ Separation of dyes intermediates ➤ Waste water treatment ➤ Concentration of antibiotics intermediates
8040	36.00					
4040 HPA –100	6.40	99	99	90	99.99	<ul style="list-style-type: none"> ➤ Partial softening of water ➤ Whey deashing ➤ THM removal ➤ Color removal from dyes and dyeing industry ➤ Antibiotics concentration and purification ➤ Pretreatment to sea and brackish water units
8040	30.00					
4040 HPA –50	4.80	99	99	93	99.99	<ul style="list-style-type: none"> ➤ Dyes deashing and concentration ➤ THM removal ➤ Polysaccharide concentration ➤ Antibiotics concentration and purification ➤ Color removal from textile dyes and dyeing industry ➤ Sodium chloride removal
8040	22.60					

1. Permeate flow and salt rejection based on the following test conditions: 2000 ppm solute 100 psi (0.7 Mpa), 77° F (25° C), 15% recovery, sucrose rejection at 5% feed concentration.
2. Flow rates for individual elements may vary ±20%

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GENERAL GUIDELINES FOR HPA ELEMENTS.

1. Elements are shipped moist and should be kept moist .
2. Elements must never be kept vertically during storage.
3. Elements are preserved in a 2% solution of Sodium Metabisulphite when shipped.
4. After start up, flush the element under low pressure to remove residual chemicals. Then pressurize the membrane to 100 psi and discard initial permeate for 30 minutes.
5. The elements are stored in a 18% Propylene glycol solution , if specified , where freezing conditions may be prevailing.
6. Formaldehyde should not be used as a disinfecting agent at all.
7. A maximum of 50 ppm free chlorine can be used at a pH of 11.00 and temperature < 30 deg C. for shock cleaning and short durations (< 2 minutes) . Care should be taken that after chlorine use, flush the system thoroughly with water followed by a 0.5% solution SMBS.
8. See the Technical manual for more information on design and applications.
9. Use of cationic surfactants and flocculating agents may foul the membrane.

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