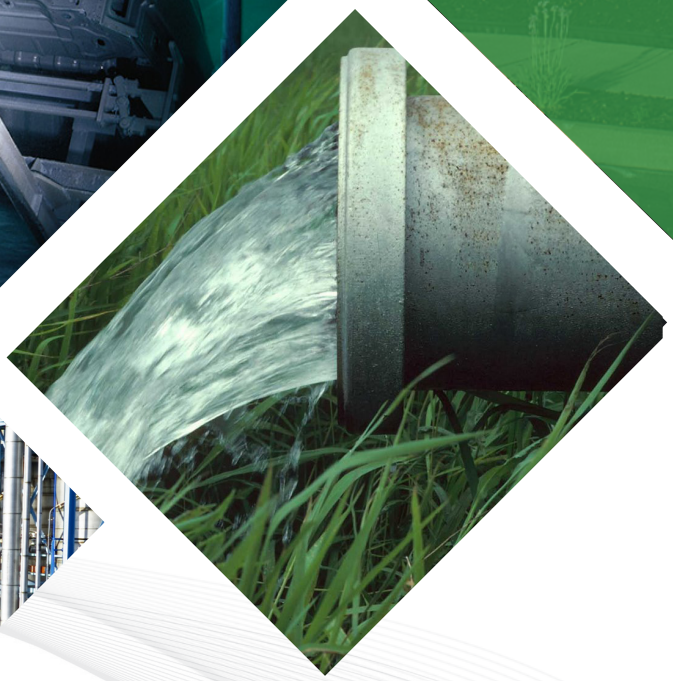
INDUSTRIAL MEMBRANE CATALOG



Synder® Filtration

Membranes that Perform.
People who Deliver.™

Company Profile

OUR COMPANY

Synder Filtration manufactures spiral wound microfiltration, ultrafiltration, and nanofiltration membrane elements and systems. But we were not always a supplier - Synder began as a buyer of spiral membranes in 1989, pioneering their use in industrial enzyme technology. Because we know firsthand what being a buyer in this industry is like, we have unique insight into what users need from their membrane supplier: quality, economy, and support.

We are privately-held and financially independent. This gives us the freedom to make a product that genuinely contributes to our customer's success, rather than maximizing profits at their expense. To achieve these goals, we maintain an international team of representatives and distributors with years of membrane expertise who are dedicated to our serving our customers.

We serve a variety of industries including dairy, biotech, automotive, and food & beverage. All sanitary products meet USDA, FDA, and 3-A sanitary standards. Synder manufacturing is certified ISO 9001:2015, ISO 14001:2015, Halal, and Kosher.

We look forward to serving you.

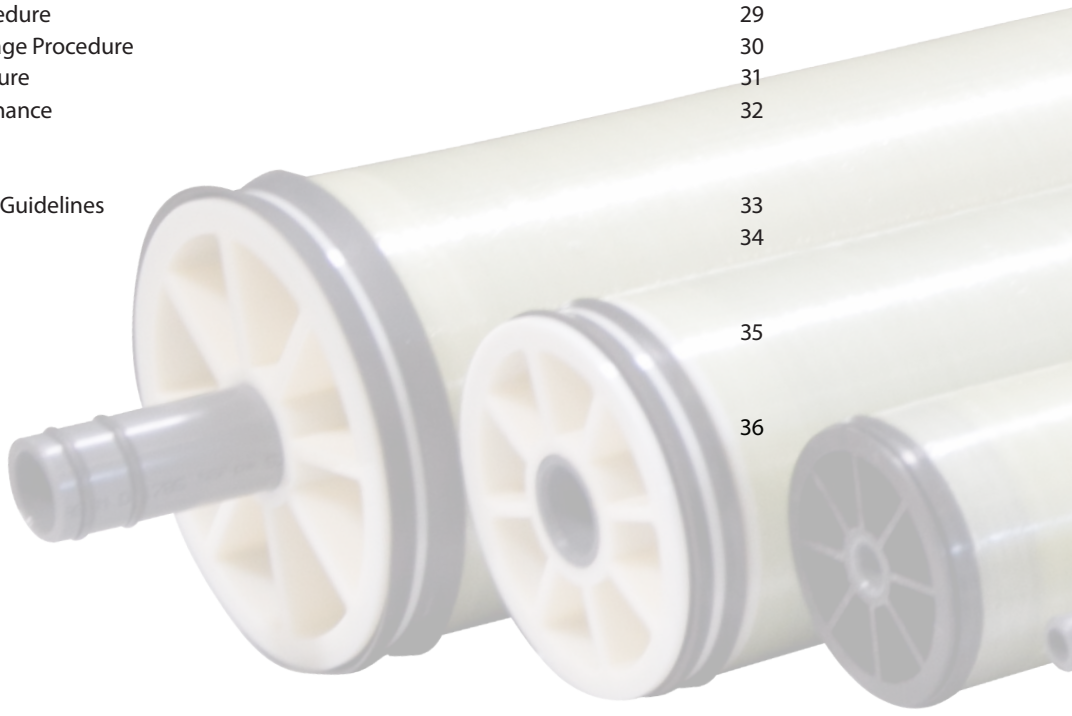
OUR MISSION

Solve the separation challenges of today. Innovate the membrane technologies of tomorrow.

As a company, we strive to be:

RELIABLE - We will be there when you need us.
CREATIVE - High performance begins with innovative ideas.
SUPPORTIVE - Technical or logistical questions? We have a team for that.
AUTHENTIC - Your success is our success.

Contents

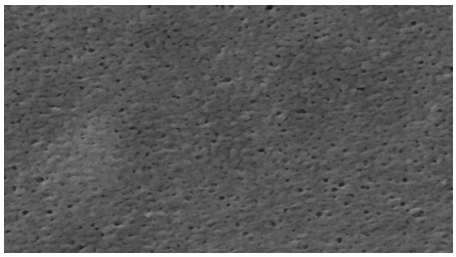


Membrane Technology

SELECTIVE TRANSPORT

Synder Filtration's polymeric membranes are used to separate, concentrate, and/or fractionate a wide variety of liquids. Membranes serve as a thin barrier between miscible fluids that allow for preferential transport of one or more feed components when a driving force is applied, such as a pressure differential.

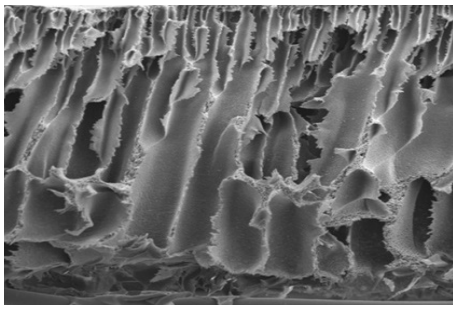
Electron Microscope Images



- Smooth surface reduces fouling tendency.
- Advancements in porosity and more uniform pore size distribution

ASYMMETRIC PORE STRUCTURE

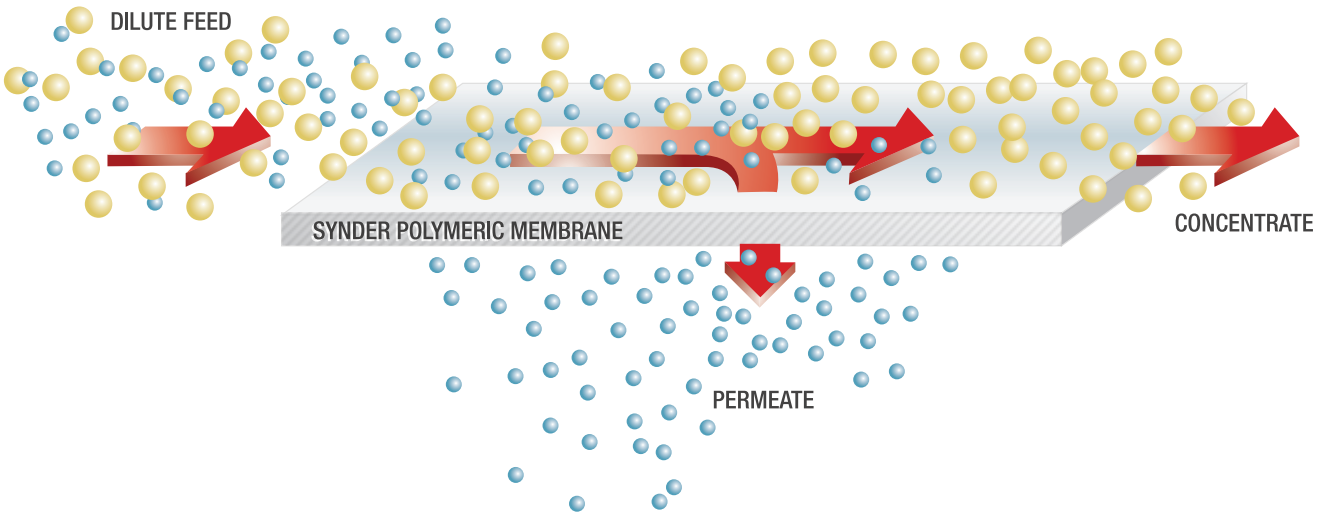
Synder membranes feature an asymmetric pore structure. Small surface pores control rejection of target molecules while large finger-like pores beneath the membrane surface allow permeate to move quickly through to a more open permeate carrier. This combination, along with membrane thickness, offers an optimal combination of selectivity and throughput.



- Tiny pores on membrane surface are not visible.
- Finger-like pores beneath membrane surface.
- Larger finger-like pores allowing maximum permeate flow.
- Polyester backing material. (Also available in Polypropylene).

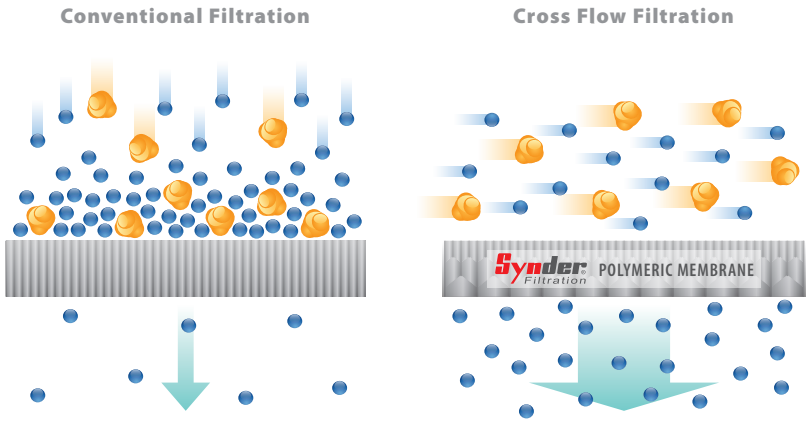
CROSSFLOW PROCESS

Spiral wound membrane elements are fed tangentially. When sufficient pressure or concentration differentials exist on the surface of the membrane, molecules smaller than the surface pores will be driven through it. This solution that passes through the membrane is called the permeate, while the solution rejected by the membrane is called the concentrate (or retentate).

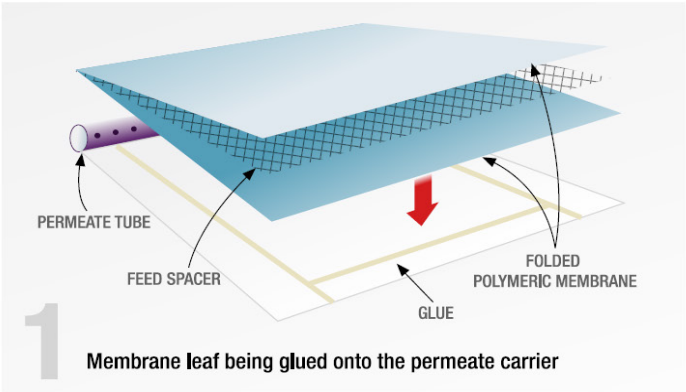


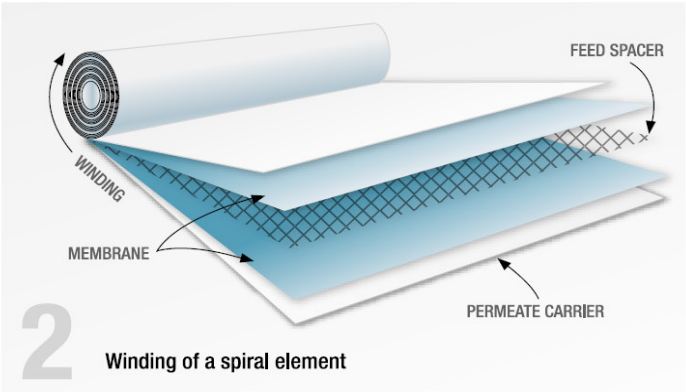
CONVENTIONAL VS. CROSS-FLOW

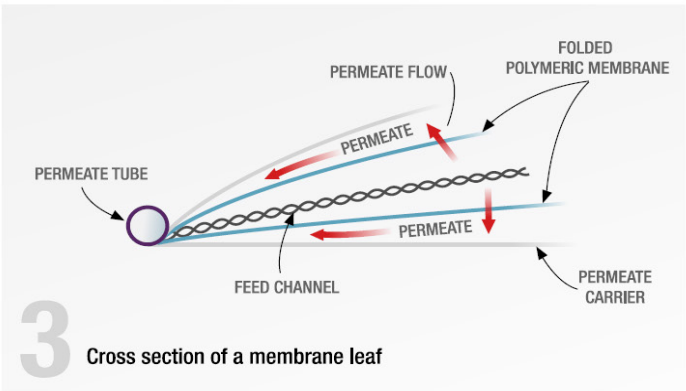
Synder's spiral wound membranes are designed for tangential flow (or cross-flow) filtration, where the feed stream runs parallel to the membrane surface. Unlike conventional filtration where solids and solutes immediately accumulate on the membrane surface, cross-flow creates a shearing force along the surface of the membrane to provide for longer filter life and less frequent cleaning cycles under normal operating conditions.

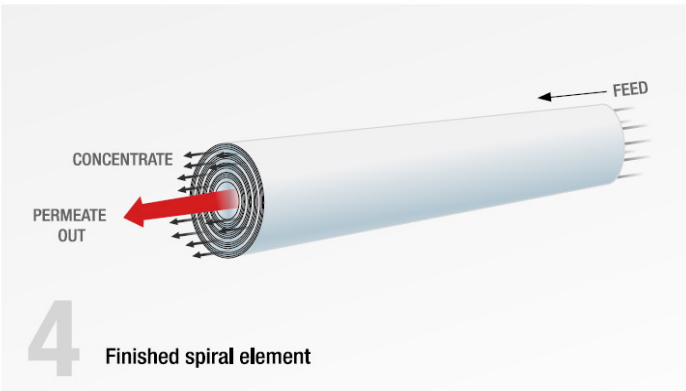


SPIRAL WOUND ELEMENT: A DISSECTION









Polymeric Membranes

Synder Filtration offers a complete line of nanofiltration (NF), ultrafiltration (UF), and microfiltration (MF) membranes in a variety of different flat sheet and membrane roll options. With sizes ranging from one square foot to thousands of linear feet, Synder can supply membrane for all scales of testing, research, and production with exceptionally fast lead times.

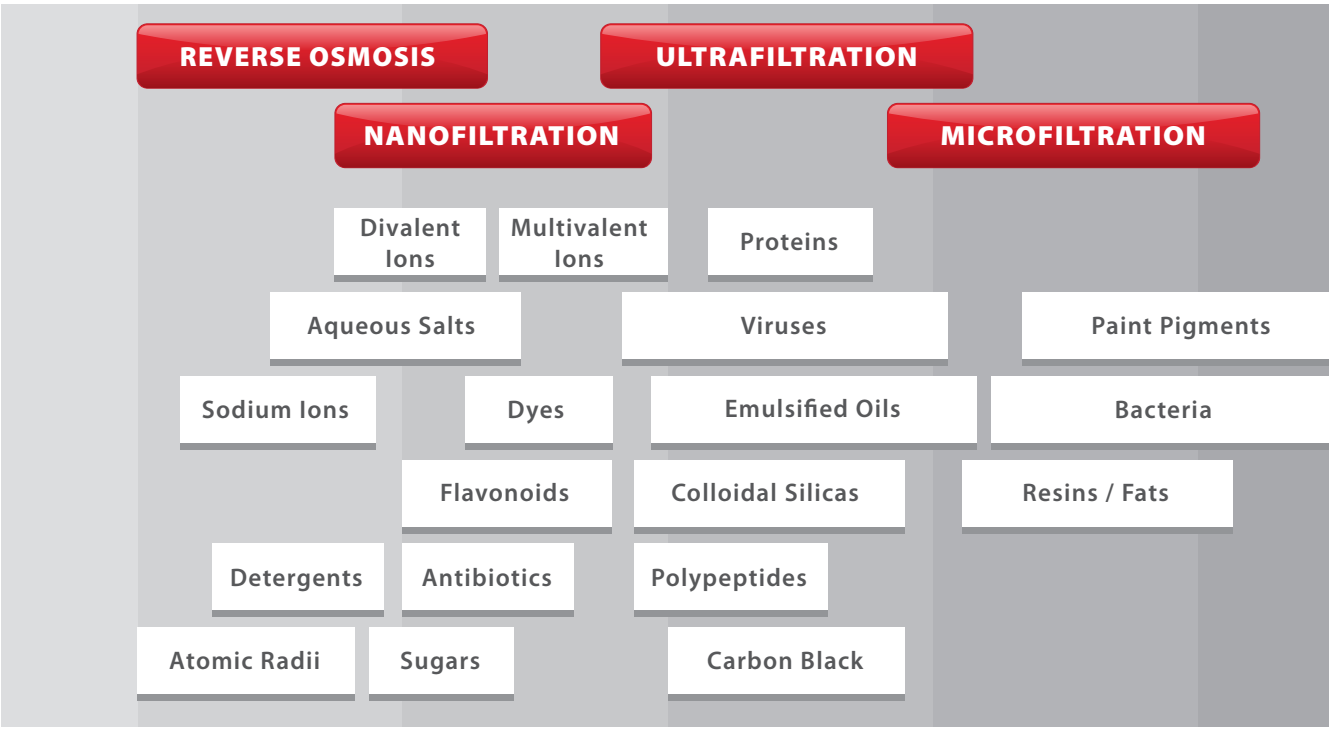
Membrane	Type	Polymer	Molecular Weight Cut-Off
NFX	NF	TFC	150-300
NFS	NF	TFC	200-300
NFW	NF	TFC	300-500
NDX	NF	TFC	500-600
NDF	NF	TFC	500-700
NFG	NF	TFC	600-800
XT	UF*	PES	1,000
VT	UF*	PES	3,000
MT	UF*	PES	5,000
ST	UF*	PES	10,000
SM	UF*	PES	20,000
MK	UF*	PES	30,000
MQ	UF*	PES	50,000
LY	UF*	PES	100,000
LV	UF*	PES	200,000
LX	UF*	PES	300,000
PZ	UF	PAN	30,000
PY	UF	PAN	100,000
PX	UF	PAN	400,000
V3	UF*[1]	PVDF	30,000
V4	UF*[1]	PVDF	70,000
V5	UF*[1]	PVDF	200,000
V6	UF*[1]	PVDF	500,000
V7	UF*[1]	PVDF	800,000
BN	UF*	PVDF	50,000
BY	UF*	PVDF	100,000
BX	UF*	PVDF	250,000
A6	UF*	PVDF	500,000
FR	MF*	PVDF	800,000
V0.1	MF*	PVDF	0.1µm
V0.2	MF*	PVDF	0.2µm

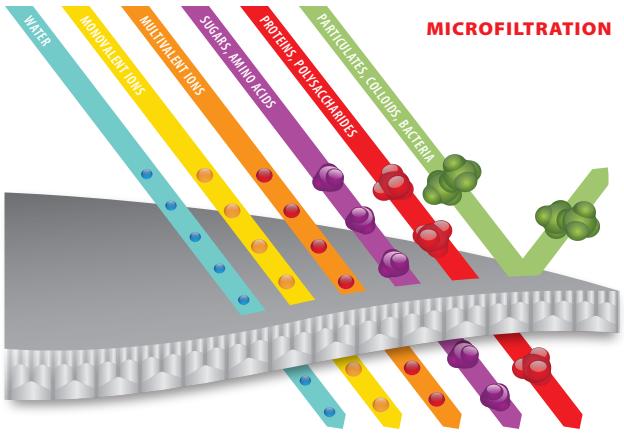
*MAX (High Temperature/High pH) Models Also Available
[1]Not Approved for Use in Food Contact Applications

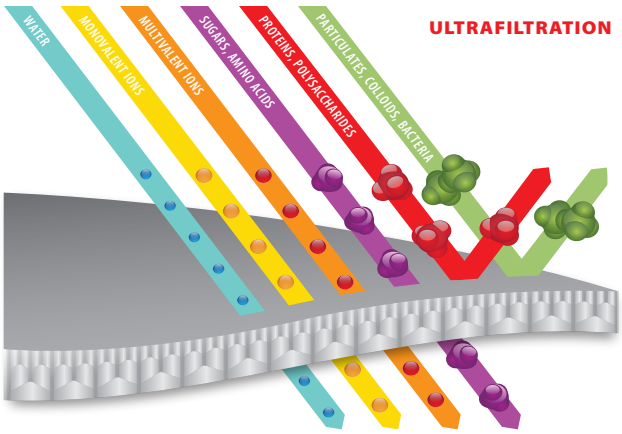
MODEL INFORMATION

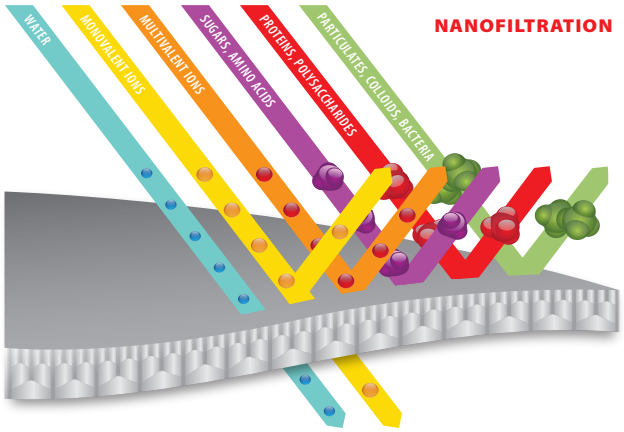
Size	Wet/Dry	Notes
12" x 12"	Both Available	Custom Sizes / Shapes Available
1m x 1m		
Flat Sheet Roll		

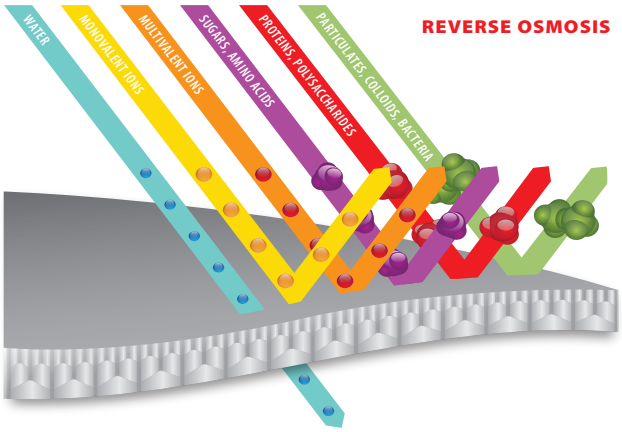
Degrees of Separation











Solutions with Membrane Technology

With over 25 years of application knowledge and experience, Synder Filtration is committed to creating value with membrane technology. In addition to our most common applications listed below, Synder's process engineers have a deep understanding of how to evaluate new applications efficiently and effectively. Stocking a fleet of pilot systems for all types and sizes of pilot studies, Synder Filtration is ready to help you develop your unique process.

INDUSTRIAL APPLICATIONS

Electrocoat Paint
Synder's ultrafiltration membranes have become a world standard across the electrocoat paint industry.

Recommended Membranes: V3 (30kDa), V4 (70kDa), V5 (200kDa), V6 (500kDa), V7 (800kDa), A6 (500kDa)

Landfill Leachate Treatment
Nanofiltration membranes in landfill leachate operations can be integrated as a post treatment to MBR processes to help meet discharge regulations.

Recommended Membranes: NFW (300-500Da)

Demineralization of Sea Water
Synder's nanofiltration membranes offer and excellent combination of divalent rejection and monovalent selectivity for seawater demineralization.

Recommended Membranes: NFX (150-300Da), NFW (300-500Da)

Seawater Sulfate Removal
Synder's NFS membrane displays superior sulfate rejection and flux performance ideal for use in seawater sulfate removal applications within the oil & gas industry.

Recommended Membranes: NFS (200-300Da)

Chlor-Alkali Process
Synder's NFS membrane demonstrates excellent sulfate rejection and permeate flux, even in high salinity brine solutions, making it well-suited for use in chlor-alkali processes.

Recommended Membranes: NFS (200-300Da)

Flat Sheet for MBR Plate & Frame Systems
In waste water treatment, microfiltration flat sheet membranes can be integrated with MBR to provide a true physical barrier for the elimination of bacteria and other unwanted microbes.

Recommended Membranes: FR (800kDa), V0.1 (0.1µm), V0.2 (0.2µm)

Oil Removal in Wastewater Treatment
Synder's PX membrane is effective for the separation and removal of oils present in many industrial wastewater streams, in order to accomodate stringent discharge regulations and growing manufacturing costs.

Recommended Membranes: PX (400kDa)

FR Membrane & Parallel-Stranded Feed Spacers
Synder's FR and V0.1 membranes are ideal for applications involving the separation of fats, bacteria and large particulates. For applications with higher solids levels, we also offer parallel-stranded spacers available in 46 and 80mil options.

Recommended Membranes: FR (800kDa), V0.1 (0.1µm)

Concentration of Latex Wastewater
Nanofiltration systems concentrate waste water containing latex suspension and reduce the volume of water being shipped off-site for disposal or treated chemically by 90-95%.

Recommended Membranes: NFX (150-300Da), NFW (300-500Da)

The Synder Difference

INDUSTRY LEADING SHIPPING TIMES

Synder prides itself of having the best lead time in the industry. Lead time is measured in days or weeks, not months. In addition, we maintain a large stock of our popular models, ready to go at a moment's notice.

PERSONAL RESPONSE POLICY

You will hear from us within 24 hours. Usually less. It's that simple. Contact us today.

QUALITY & ENVIORNMENTAL POLICY

Synder Filtration strives to achieve the best lead times, deliver high-quality products and services to our clients and emphasizes a focus on satisfying our customers' requirements, along with all other applicable standards and legal compliance requirements, while continually improving all our processes. We accomplish this by:

- Monitoring our performance against our established quality and environmental objectives, which measure the effectiveness of our processes and associated optimization efforts
- Protecting our environment and preventing pollution
- Identifying areas where we can improve our processes
- Facilitating a company culture defined by fairness and accountability
- Management commitment and employee training
- Ensuring the sustainability of our processes to promote growth within our organization as well as into new products and applications

CUSTOM ELEMENTS & PRODUCT DEVELOPMENT

We have the widest range of membrane pore sizes in the industry. However, sometimes customers have needs not met by the standard membrane models. Our team of experts can work with you to help deliver a membrane solution to better suit your application.

Nanofiltration Membrane Elements

Synder's wide range of nanofiltration membranes are engineered to provide optimal performance in both flux and rejection in a variety of process applications.

MEMBRANE TYPES

Model	Polymer	Approx. Molecular Weight Cutoff	Typical Operating Flux	Average Lactose Rejection[1]	Average $MgSO_4$ Rejection[2]	Average NaCl Rejection[3]
NFX	Proprietary PA TFC	150-300Da	20-25 GFD	99.5%	99.5%	50.0%
NFS	Proprietary PA TFC	200-300Da	25-35 GFD	99.5%	99.3%	40.0%
NFD	Proprietary PA TFC	250-350Da	10-20 GFD	99.5%	99.0%	40.0%
NFDE	Proprietary PA TFC	250-400Da	30-40 GFD	99.0%	98.0%	30.0%
NFW	Proprietary PA TFC	300-500Da	45-50 GFD	98.5%	97.0%	30.0%
NFDC	Proprietary PA TFC	350-550Da	25-30 GFD	98.6%	96.5%	20.0%
NDX	Proprietary PA TFC	500-600Da	30-40 GFD	95.0%	92.0%	40.0%
NDF	Proprietary PA TFC	500-700Da	40-50 GFD	90.0%	80.0%	10.0%
NFG	Proprietary PA TFC	600-800Da	55-60 GFD	60.0%	50.0%	10.0%

[1]Test Conditions 2% Lactose Solution at 110PSI (760 kPa) operating pressure, 77° F (25° C)
[2]Test Conditions 2,000ppm $MgSO_4$ Solution at 110PSI (760 kPa) operating pressure, 77° F (25° C)
[3]Test Conditions 2,000ppm NaCl Solution at 110PSI (760 kPa) operating pressure, 77° F (25° C)

NF ELEMENT SPECIFICATIONS

Maximum Operating Pressure	600psi (41.4 bar)
Maximum Temperature	Continuous Operation: 122˚F (50˚C) Clean-In-Place (CIP): 131˚F (55˚C)
pH Range	Continuous Operation: pH 2.0-10.5 Clean-In-Place (CIP): 1.8-11.0
Maximum Pressure Drop	Per Element: PSI (1 Bar)
Chlorine Tolerance	Dechlorination Recommended

WHY SYNDER NF MEMBRANES?

- Optimized flux and rejection
- Operate at lower pressures than reverse osmosis membranes and still achieve excellent rejection of polyvalent ions
- Greatly reduce levels of hardness, nitrates, sulfates, tannins, turbidity, color, TDS, and moderate levels of salt from feed streams

CUSTOMIZATION WITH EXCEPTIONAL SPEED

Synder typically stocks the most common models for each membrane, however, elements can be customized and delivered with unparalleled lead times. For element sizes not listed, please call or e-mail Synder today with the following information to have an element made to your exact specifications:

- Element OD or Housing ID
- Permeate Tube Diameter
- Element Length
- Specified MWCO, if applicable.

Note: Trials should be conducted to determine optimal application conditions.

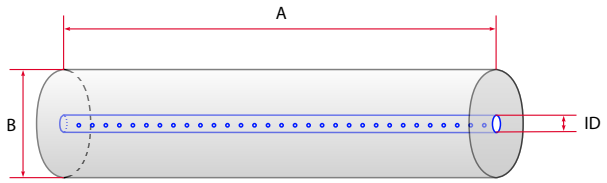
DIMENSIONS & WEIGHT

Element	Model Number	Diameter (B) in (cm)	Length (A) in (cm)	PWT ID/OD in (cm)	Tube Extension (C) in (cm)	Weight lb (kg)
1.8″	1812TM	1.8 (4.6)	11.75 (29.8)	0.68 (1.7)	0.75 (perm) 1.0 (plug)	2 (0.9)
2.5″	2519TF/HF	2.4 (6.1)	19.0 (48.3)	0.63 (1.6)	-	4 (1.8)
	2540TM/HM	2.4 (6.1)	40.0 (101.6)	0.75 (1.9)	1.0 (2.5)	5 (2.3)
	2540TF/HF	2.4 (6.1)	40.0 (101.6)	0.63 (1.6)	-	5 (2.3)
4.0″	4040TM/HM	3.9 (9.9)	40.0 (101.6)	0.75 (1.9)	1.0 (2.5)	9 (4.1)
	4040TF/HF	3.9 (9.9)	40.0 (101.6)	0.63 (1.6)	-	9 (4.1)
8.0"	8040TF/HF	7.9 (20.1)	40.0 (101.6)	1.125 (2.9)	-	30 (13.6)

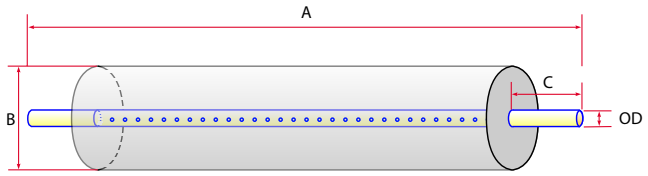
Membrane Model → NFX - 2 - 4040HM

Spacer Size	Model No.
24 mil	1
31 mil	2
46 mil	3
65 mil	4
80 mil	5
80 mil (corrugated)	5C

Industrial Designations	
T = Tape Wrapped	M = Male
H = Fiberglass Hardshell Wrap	F = Female



Female Element (Fig.1)



Male Element (Fig.2)

RECOMMENDED ELEMENT CROSS-FLOW RATE

Feed Spacer (in mils)

Element		24	31	46	65	80
1.8″	m^3/hr	0.4	0.5	0.6	0.6	0.6
	gpm	1.8	2.0	2.4	2.5	2.6
2.5″	m^3/hr	1.2	1.4	1.6	1.8	2.1
	gpm	5	6	7	8	9
4.0″	m^3/hr	2	4	5	5	6
	gpm	10	18	21	23	24
8.0″	m^3/hr	10	11	13	14	15
	gpm	43	48	55	61	64

The recommended cross-flow rate will be subject to differential pressure limitations and specific applications.

MEMBRANE AREA (SQ. FT.)

Feed Spacer (in mils)

Element	24	31	46	65	80
1812TM	4.0	3.4	2.6	2.0	1.6
2519HF	13	12	9	7	6
2540TM/HM	33	28	21	16	14
2540TF/HF	35	30	23	17	15
4040TM/HM	99	87	68	51	43
4040TF/HF	96	82	64	50	42
8040TF/HF	440	380	293	227	193

Ultrafiltration & Microfiltration Elements

Synder Filtration's ultrafiltration and microfiltration elements are available in a highly comprehensive range of MWCO's. Contact us today to learn more about our complete line of membrane products and services.

MEMBRANE MODELS

MODEL	MWCO	MATERIAL
XT	1,000	PES
VT	3,000	PES
MT	5,000	PES
ST	10,000	PES
SM	20,000	PES
MK	30,000	PES
MQ	50,000	PES
LY	100,000	PES
LV	200,000	PES
LX	300,000	PES
PZ	30,000	PAN
PY	100,000	PAN
PX	400,000	PAN
V3	30,000	PVDF
V4	70,000	PVDF
V5	200,000	PVDF
V6	500,000	PVDF
V7	800,000	PVDF
BN	50,000	PVDF
BY	100,000	PVDF
BX	250,000	PVDF
A6	500,000	PVDF
FR	800,000	PVDF
V0.1	0.1 µm	PVDF
V0.2	0.2 µm	PVDF

INDUSTRIAL ELEMENT SPECIFICATIONS

Membrane Type	Membrane Construction
Proprietary PES, PVDF or PAN	Spiral-Wound with tape outerwrap or fiber glass hardshell (FRP)

Pressure	PSI	Bar
Max. Inlet Pressure	140	9.7
Min. Outlet Pressure	10	0.7
Differential Pressure per Element		
24 & 31 mil	12-18	0.8-1.0
46 mil	15-20	1.0-1.4
65 & 80mil	15-25	1.0-1.7
Max. Permeate Backpressure	5	0.3

NOTE: Soft start on boost pumps required to minimize pressure/flow shocks to elements.

Temperature	Fahrenheit	Celsius
Max. Operating	122°	50°
Max. CIP Temperature	131°	55°

pH Parameters	pH
Operating Parameters	3.0-10.0
Cleaning Parameters	1.8-11.0 at 50°C

Peroxide	Max. ppm
Free Peroxide in Product during Operation	< 3 ppm
Peroxide as a Sanitizer at 25°C Max, pH 6-7 10 minutes recirculation	0.1%

Chlorine	Norm. ppm	Max. ppm
Free Chlorine in DF Water or Product	0	< 0.1
Chlorine during CIP at: pH 10.8-11.0 and 50°C (PES/PVDF) pH 10.5 and 50°C (PAN)	150	180

NOTE: Maximum chlorine exposure for all elements is 30 minutes per day at pH and temperature conditions listed above.

UF/MF Spiral-Wound Industrial Elements

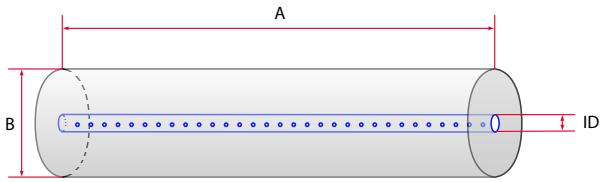
DIMENSIONS & WEIGHT

Element	Model Number	Diameter (B) in (cm)	Length (A) in (cm)	PWT ID/OD in (cm)	Tube Extension (C) in (cm)	Weight lb (kg)
1.8″	1812TM	1.8 (4.6)	11.75 (29.8)	0.68 (1.7)	0.75 (perm) 1.0 (plug)	2 (0.9)
2.5″	2519TF/HF	2.4 (6.1)	19.0 (48.3)	0.63 (1.6)	-	4 (1.8)
	2540TM/HM	2.4 (6.1)	40.0 (101.6)	0.75 (1.9)	1.0 (2.5)	5 (2.3)
	2540TF/HF	2.4 (6.1)	40.0 (101.6)	0.63 (1.6)	-	5 (2.3)
4.0″	4040TM/HM	3.9 (9.9)	40.0 (101.6)	0.75 (1.9)	1.0 (2.5)	9 (4.1)
	4040TF/HF	3.9 (9.9)	40.0 (101.6)	0.63 (1.6)	-	9 (4.1)
8.0"	7940TF/HF	7.9 (20.1)	40.0 (101.6)	1.138 (2.9)	-	30 (13.6)
	8040TF/HF	7.9 (20.1)	40.0 (101.6)	1.125 (2.9)	-	30 (13.6)

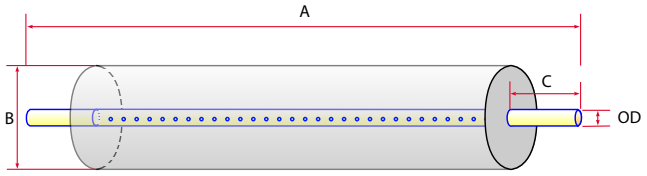
Membrane Model → FR - 2 - 8040HF

Spacer Size	Model No.
24 mil	1
31 mil	2
46 mil	3
65 mil	4
80 mil	5
80 mil (corrugated)	5C

Industrial Designations	
T = Tape Wrapped	M = Male
H = Fiberglass Hardshell Wrap	F = Female



Female Element (Fig.1)



Male Element (Fig.2)

RECOMMENDED ELEMENT CROSS-FLOW RATE

Feed Spacer (in mils)

Element		24	31	46	65	80
1.8″	m³/hr	0.7	0.8	0.9	1.0	1.1
	gpm	3	3	4	4	5
2.5″	m³/hr	1.3	1.5	1.8	2.0	2.1
	gpm	6	7	8	9	9
4.0″	m³/hr	3	4	5	5	5
	gpm	15	17	20	23	24
8.0″	m³/hr	15	17	20	23	24
	gpm	66	75	89	99	105

The recommended cross-flow rate will be subject to differential pressure limitations and specific applications.

STANDARD SERIES BENEFITS

- Wide range of UF MWCO's available
- Good pH and temperature resistance
- High resistance to fouling
- Customizable dimensions for unique housings
- Easy to clean with membrane cleaning chemicals

MEMBRANE AREA (SQ. FT.)

Feed Spacer (in mils)

Element	24	31	46	65	80
1812TM	3.1	2.7	2.1	1.6	1.3
2519TF/HF	13	12	10	8	6
2540TM/HM	28	24	20	16	13
2540TF/HF	30	26	22	17	14
4040TM/HM	81	72	58	46	39
4040TF/HF	86	75	61	49	41
7940TF/HF	379	335	268	210	178
8040TF/HF	379	335	268	210	178

TECHNICAL NOTES

For element sizes not listed, please call or e-mail Synder Filtration for details. We can design an element to meet your needs.

Ultrafiltration & Microfiltration MAX Elements

Synder Filtration's ultrafiltration and microfiltration MAX (high pH/temp) elements are available in a highly comprehensive range of MWCO's. Contact us today to learn more about our complete line of membrane products and services.

MEMBRANE TYPES

MODEL	MWCO	MATERIAL
XT	1,000	PES
VT	3,000	PES
MT	5,000	PES
ST	10,000	PES
SM	20,000	PES
MK	30,000	PES
MQ	50,000	PES
LY	100,000	PES
LV	200,000	PES
LX	300,000	PES
V3	30,000	PVDF
V4	70,000	PVDF
V5	200,000	PVDF
V6	500,000	PVDF
V7	800,000	PVDF
BN	50,000	PVDF
BY	100,000	PVDF
BX	250,000	PVDF
A6	500,000	PVDF
FR	800,000	PVDF
V0.1	0.1 µm	PVDF
V0.2	0.2 µm	PVDF

MAX INDUSTRIAL ELEMENT SPECIFICATIONS

Membrane Type	Membrane Construction
Proprietary PES, PVDF or PAN	Spiral-wound with tape outerwrap or fiber glass hardshell (FRP)

Pressure	PSI	Bar
Max. Inlet Pressure	140	9.7
Min. Outlet Pressure	10	0.7
Differential Pressure per Element		
24 & 31 mil	12-18	0.8-1.0
46 mil	15-20	1.0-1.4
65 & 80mil	15-25	1.0-1.7
Max. Permeate Backpressure	5	0.3

NOTE: Soft start on boost pumps required to minimize pressure/flow shocks to elements.

Temperature	Fahrenheit	Celsius
Max. Operating	140°	60°
Max. CIP Temperature	158°	70°

pH Parameters	pH
Operating Parameters	2.0-10.0
Cleaning Parameters	1.8-11 (PES) / 2.0-11.0 (PVDF)

Peroxide	Max. ppm
Free Peroxide in Product during Operation	< 3 ppm
Peroxide as a Sanitizer at 25°C Max, pH 6-7 10 minutes recirculation	0.1%

Chlorine	Norm. ppm	Max. ppm
Free Chlorine in DF Water or Product	0	< 0.1
Chlorine during CIP at: pH 10.8-11.0 and 50°C (PES/PVDF) pH 10.5 and 50°C (PAN)	150	180

NOTE: Maximum chlorine exposure for all elements is 30 minutes per day at pH and temperature conditions listed above.

UF/MF MAX Spiral-Wound Industrial Elements

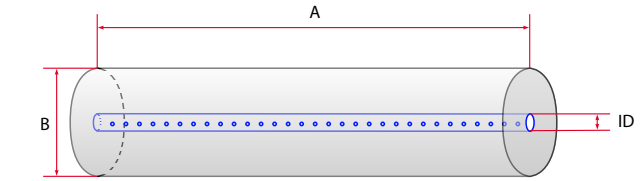
DIMENSIONS & WEIGHT

Element	Model Number	Diameter (B) in (cm)	Length (A) in (cm)	PWT ID/OD in (cm)	Tube Extension (C) in (cm)	Weight lb (kg)
1.8″	1812TM	1.8 (4.6)	11.75 (29.8)	0.68 (1.7)	0.75 (perm) 1.0 (plug)	2 (0.9)
2.5″	2519TF/HF	2.4 (6.1)	19.0 (48.3)	0.63 (1.6)	-	4 (1.8)
	2540TM/HM	2.4 (6.1)	40.0 (101.6)	0.75 (1.9)	1.0 (2.5)	5 (2.3)
	2540TF/HF	2.4 (6.1)	40.0 (101.6)	0.63 (1.6)	-	5 (2.3)
4.0″	4040TM/HM	3.9 (9.9)	40.0 (101.6)	0.75 (1.9)	1.0 (2.5)	9 (4.1)
	4040TF/HF	3.9 (9.9)	40.0 (101.6)	0.63 (1.6)	-	9 (4.1)
8.0"	7940TF/HF	7.9 (20.1)	40.0 (101.6)	1.138 (2.9)	-	30 (13.6)
	8040TF/HF	7.9 (20.1)	40.0 (101.6)	1.125 (2.9)	-	30 (13.6)

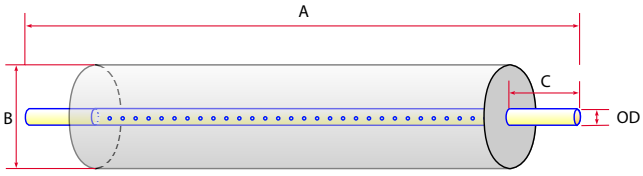
Membrane Model → FR - 2 - 8040HF-MAX

Spacer Size	Model No.
24 mil	1
31 mil	2
46 mil	3
65 mil	4
80 mil	5
80 mil (corrugated)	5C

Industrial Designations	
T = Tape Wrapped	M = Male
H = Fiberglass Hardshell Wrap	F = Female



Female Element (Fig.1)



Male Element (Fig.2)

RECOMMENDED ELEMENT CROSS-FLOW RATE

Feed Spacer (in mils)

Element		24	31	46	65	80
1.8″	m³/hr	0.7	0.8	0.9	1.0	1.1
	gpm	3	3	4	4	5
2.5″	m³/hr	1.3	1.5	1.8	2.0	2.1
	gpm	6	7	8	9	9
4.0″	m³/hr	3	4	5	5	5
	gpm	15	17	20	23	24
8.0″	m³/hr	15	17	20	23	24
	gpm	66	75	89	99	105

The recommended cross-flow rate will be subject to differential pressure limitations and specific applications.

MAX SERIES BENEFITS

- Wide range of UF MWCO's available
- High pH and temperature resistance
- High resistance to fouling
- Customizable dimensions for unique housings
- Easy to clean with membrane cleaning chemicals

MEMBRANE AREA (SQ. FT.)

Feed Spacer (in mils)

Element	24	31	46	65	80
1812TM	3.1	2.7	2.1	1.6	1.3
2519TF/HF	13	12	10	8	6
2540TM/HM	28	24	20	16	13
2540TF/HF	30	26	22	17	14
4040TM/HM	81	72	58	46	39
4040TF/HF	86	75	61	49	41
7940TF/HF	379	335	268	210	178
8040TF/HF	379	335	268	210	178

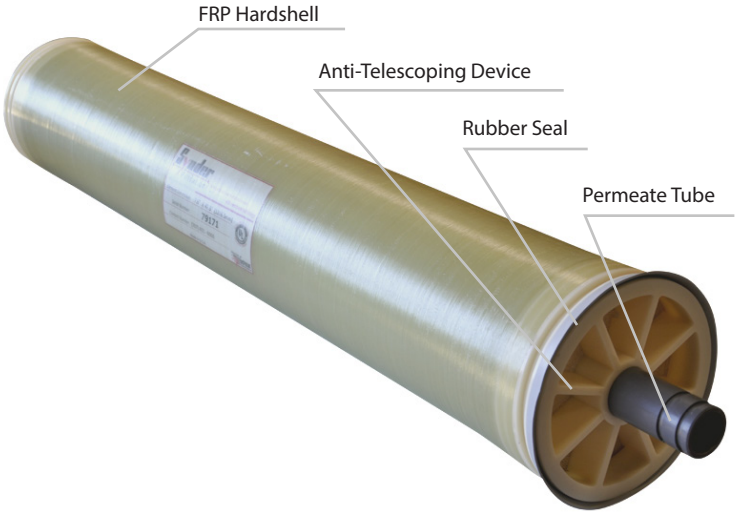
TECHNICAL NOTES

For element sizes not listed, please call or e-mail Synder Filtration for details. We can design an element to eet your needs.

Ultrafiltration E-Coat Membranes

THE INDUSTRY STANDARD

Synder Filtration is a leading supplier of ultrafiltration (UF) membranes and filtration systems to the E-Coat industry worldwide. With a full range of molecular weight cut-offs and element sizes for both cathodic and anodic paint baths, Synder can outfit E-Coat paint lines with reliable ultrafiltration membrane elements.



FEATURES & BENEFITS

- The V-Series has a proprietary hydrophilic charge to repel paint particles and promote maximum flux rates.
- Additional charging not required.
- Membrane only requires one cleaning chemical plus acid. No other additives required.
- Models with integrated end plugs allow for easy installation and removal.
- Synder offers a devoted team comprised of E-Coat sales, engineering, and support staff to assist with any technical inquiries or questions.

MEMBRANE TYPES

MODEL	MWCO	MATERIAL
V3	30,000	PVDF*
V4	70,000	PVDF*
V5	200,000	PVDF*
V6	500,000	PVDF*
V7	800,000	PVDF*
A6	500,000	PVDF

*The V-Series is designed for processing cathodic paint, while the A6 is intended for processing anodic paint. V6 (treated PVDF 500kDa) is the most popular Synder membrane for processing cathodic paint.

COMPREHENSIVE TECHNICAL SUPPORT

- UF system optimization
- Anolyte system optimization
- Personalized technical support

E-COAT ELEMENT SPECIFICATIONS

Membrane Type	Synder Proprietary PVDF
Membrane Construction	Spiral-wound with tape, net or fiberglass outerwrap
Maximum Temperature	Continuous Operation: 122˚F (50˚C) Clean-In-Place (CIP): 110˚F (43.3˚C)
pH Range	Continuous Operation: 1-11 Clean-In-Place (CIP): 2-10.5
Maximum Pressure Drop	FRP Element: 35psi (2.4 bar) Net Wrap Element: 17psi (1.2 bar)
Chlorine Tolerance	180ppm maximum per cleaning cycle

UF E-Coat Spiral-Wound Industrial Elements

DIMENSIONS & FEED RATE

Model #	(A) Length in (mm)	(B) Element OD in (mm)	Perm Tube ID (Female) in (mm)	Perm Tube OD (Male) in (mm)	(C) Tube Ext Length (Male)	Feed Rate GPM (LPM)	Standard Housing
1812TM	10.00 (254)	1.8 (45.7)	-	0.675 (17.1)	0.75 (perm) 1.0 (plug)	2.5 (9.5)	IH-1812M
2514HM	14.00 (356)	2.5 (63.5)	-	0.75 (19.1)	1.00 (both ends)	6.0 (23)	-
2519H	19.25 (489)	2.5 (63.5)	0.62 (15.8)	-	-	6.0 (23)	IH2519
2521HM	19.00 (483)	2.5 (63.5)	-	0.75 (19.1)	1.00 (both ends)	6.0 (23)	
2540H	38.00 (965)	2.5 (63.5)	-	0.75 (19.1)	1.00 (both ends)	6.0 (23)	IH2540
3940AH	38.80 (986)	3.93 (99.8)	-	0.827 (21)	0.60 (both ends)	25 (95)	-
3945H	45.00 (1143)	3.93 (99.8)	0.62 (15.8)	-	-	25 (95)	-
4028HA	28.10 (714)	3.93 (99.8)	0.62 (15.8)	-	-	25 (95)	-
4030H	27.00 (659)	3.93 (99.8)	-	0.84 (21.3)	3.00 (perm) 3.63 (plug)	25 (95)	IH4030
4032H	29.50 (749)	3.93 (99.8)	-	0.75 (19.1)	1.06 (both ends)	25 (95)	-
4033H	33.00 (838)	3.93 (99.8)	0.62 (15.8)	-	-	25 (95)	-
4037H	27.00 (686)	3.93 (99.8)	-	0.84 (21.3)	3.00 (perm) 8.625 (plug)	25 (95)	IHKR4
4040AH/HA	40.00 (1016)	3.93 (99.8)	0.62 (15.8)	-	-	25 (95)	-
4040BH	40.00 (1016)	3.93 (99.8)	0.77 (19.6)	-	-	25 (95)	-
4045BH	40.00 (1016)	3.93 (99.8)	-	0.84 (21.3)	3.00 (perm) 1.875 (plug)	25 (95)	IH4042
4045CH	45.00 (1143)	3.93 (99.8)	0.62 (15.8)	-	-	25 (95)	-
4051.5H	40.00 (1016)	3.93 (99.8)	-	0.84 (21.3)	3.00 (perm) 8.50 (plug)	25 (95)	IH40RF
5640H	40.00 (1016)	5.60 (142.2)	1.29 (32.8)	-	-	40 (151)	-
M5640H	40.00 (1016)	5.60 (142.2)	1.29 (32.8)	-	4.375 (plug)	40 (151)	-
5640HS	40.00 (1016)	5.60 (142.2)	1.29 (32.8)	-	-	70 (247)	-
M5640HS	40.00 (1016)	5.60 (142.2)	1.29 (32.8)	-	4.375 (plug)	70 (247)	-
5647.5HS	40.00 (1016)	5.60 (142.2)	-	1.66 (42.2)	3.00 (perm) 4.375 (plug)	70 (247)	-
5651.5H	40.00 (1016)	5.60 (142.2)	-	1.66 (42.2)	3.00 (perm) 8.375 (plug)	40 (151)	IH60RF
7637HB	33.00 (838)	7.45 (189.2)	-	1.66 (42.2)	2.00 (both ends)	70 (265)	-
7637HC	33.00 (838)	7.28 (184.9)	-	1.66 (42.2)	2.00 (both ends)	70 (265)	-
7640HB	40.00 (1016)	7.45 (189.2)	1.29 (32.7)	-	-	70 (265)	-
M7640HB	40.00 (1016)	7.45 (189.2)	1.29 (32.7)	-	4.375 (plug)	70 (265)	-
7640HC	40.00 (1016)	7.28 (184.9)	1.29 (32.7)	-	-	70 (265)	-
M7640HC	40.00 (1016)	7.28 (184.9)	1.29 (32.7)	-	4.375 (plug)	70 (265)	-
7640HS	40.00 (1016)	7.56 (192.0)	1.29 (32.7)	-	-	120 (454)	-
M7640HS	40.00 (1016)	7.56 (192.0)	1.29 (32.7)	-	4.375 (plug)	120 (454)	-
7647.5HB	40.00 (1016)	7.45 (189.2)	-	1.66 (42.2)	3.00 (perm) 4.375 (plug)	70 (265)	-
7647.5HC	40.00 (1016)	7.28 (184.9)	-	1.66 (42.2)	3.00 (perm) 4.375 (plug)	70 (265)	IH80C/D/E
7647.5HS	40.00 (1016)	7.56 (192.0)	-	1.66 (42.2)	3.00 (perm) 4.375 (plug)	120 (454)	-
7940HA	38.25 (972)	7.90 (200.7)	-	1.50 (38.1)	0.875 (both ends)	80 (303)	-
F7940HA	40.00 (1016)	7.90 (200.7)	1.139 (28.9)	-	-	80 (303)	IH79SB
MF7940HA	40.00 (1016)	7.90 (200.7)	1.139 (28.9)	-	plugged end	80 (303)	-
F7940HB	40.00 (1016)	7.90 (200.7)	1.29 (32.8)	-	-	80 (303)	-
M7940HB	38.25 (972)	7.90 (200.7)	-	1.50 (38.1)	0.875 (both ends)	80 (303)	-
MF7940HB	40.00 (1016)	7.90 (200.7)	1.29 (32.8)	-	plugged end	80 (303)	-
8040HA	40.00 (1016)	7.90 (200.7)	1.125 (28.6)	-	-	80 (303)	-

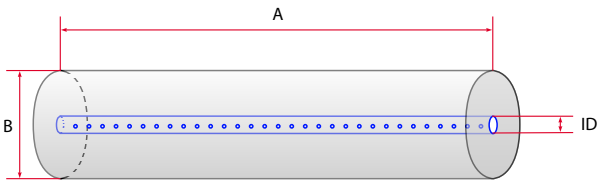
Note: Common models in green.

Membrane Model → V62-7647.5HB

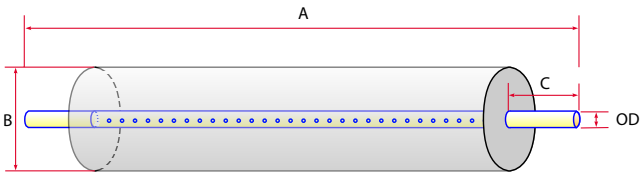
Spacer Size	Model No.
24 mil	1
31 mil	2
46 mil	3
65 mil	4
80 mil	5
80 mil (corrugated)	5C

Industrial Designations
T = Tape Wrapped
H = Fiberglass Shell
M/BH = Male
F/CH = Female
HB = For Stainless Steel Housing
HC = For PVC Housing
HS = Fiberglass Shell w/ Net

NOTE: Designations may vary. For questions or element sizes not listed above, please call or e-mail Synder Filtration for more information.



Female Element (Fig.1)



Male Element (Fig.2)

HK Ultrafiltration E-Coat Membranes

THE INDUSTRY STANDARD

As a leading supplier of E-Coat products to plants worldwide, Synder's ultrafiltration elements are also available in the HK configuration. This element comes with an integrated PVC shell and Victaulic connections, allowing for ease in element installation and removal.

FEATURES & BENEFITS

- The V-Series has a proprietary hydrophilic charge to repel paint particles and promote maximum flux rates.
- Additional charging not required.
- Membrane only requires one cleaning chemical plus acid. No other additives required.
- Integrated PVC shell for easy installation and removal.

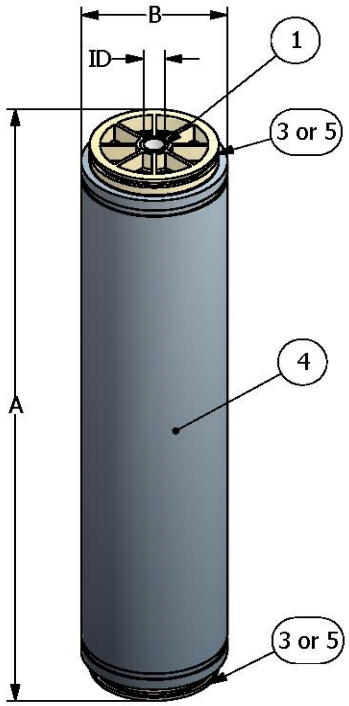
HK E-COAT ELEMENT SPECIFICATIONS

Membrane Type	Synder Proprietary PVDF
Membrane Construction	Spiral-wound with Integrated PVC Shell
Maximum Temperature	Continuous Operation: 122˚F (50˚C) Clean-In-Place (CIP): 110˚F (43.3˚C)
pH Range	Continuous Operation: 1-11 Clean-In-Place (CIP): 2-10.5
Maximum Pressure Drop	FRP Element: 35psi (2.4 bar) Net Wrap Element: 17psi (1.2 bar)
Chlorine Tolerance	180ppm maximum per cleaning cycle

MEMBRANE TYPES

MODEL	MWCO	MATERIAL
V3	30,000	PVDF*
V4	70,000	PVDF*
V5	200,000	PVDF*
V6	500,000	PVDF*
V7	800,000	PVDF*
A6	500,000	PVDF

*The V-Series was specifically designed for processing cathodic paint, while the A6 is intended for processing anodic paint. V6 (treated PVDF 500kDa) is the most popular Synder membrane for processing cathodic paint.



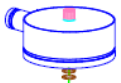
DIMENSIONS & FEED RATE

Model #	(A) Length in (mm)	(B) Element OD in (mm)	Perm Tube ID (Female) in (mm)	Feed Rate GPM (LPM)
7538.13HK	39.13 (994)*	8.63 (219)	1.30 (33.0)	70 (284)
7538.25HK	39.25 (997)*	8.63 (219)	1.30 (33.0)	70 (284)
7538.5HK	39.50 (1003)*	8.63 (219)	1.30 (33.0)	70 (284)
10738.10HK	38.78 (985) / PSL 37.10 (942)*	10.75 (273)	1.30 (33.0)	120 (454)
10738.35HK	38.78 (985) / PSL 37.35 (949)*	10.75 (273)	1.30 (33.0)	120 (454)

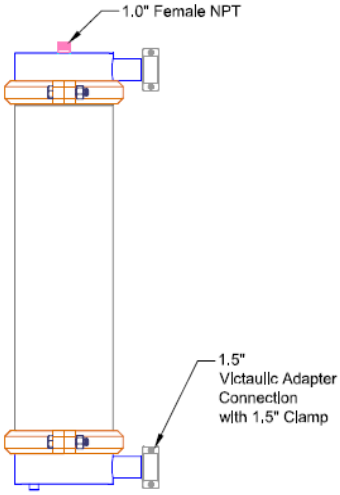
NOTE: *PVC shell length (PSL) needs to be confirmed when ordering as this value can vary.

HK SPARE PARTS

1.5" Victaulic Coupling
1200-07-0242
1.5" Clamp complete w/ Gasket & Bolts

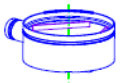


Top Cap
1400-07-0071
HK Top Cap w/ 1.5" Port and 1" Permeate
Includes "O" Rings - 1400-07-0038



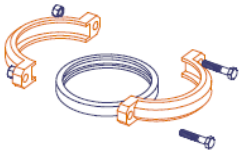
HK ATD
1400-07-0037
2 Included w/ element order

HK End Plug
1400-07-0034
Includes "O" Rings - 1400-07-0038

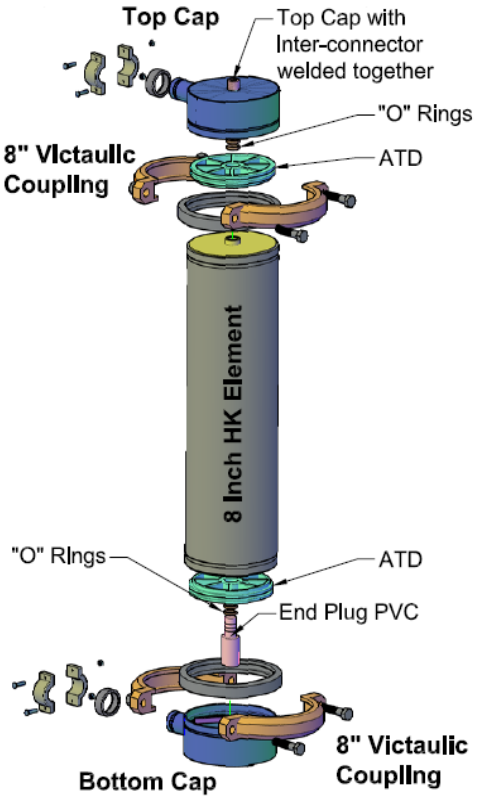


Bottom Cap
1400-07-0115
HK Bottom Cap w/ 1.5" Port

HK Parts Kit
1400-07-0043
Includes:
1 - Top Cap w/ Permeate Adapter
1 - Bottom Cap
4 - "O" Rings - PN: 1400-07-0038
2 - ATD's
1 - Bottom Plug
2 - Complete 8" Victaulic Clamps
2 - Complete 1.5" Victaulic Clamps



8" Victaulic Coupling
1200-07-0247
8" Clamp complete w/ Gasket & Bolts



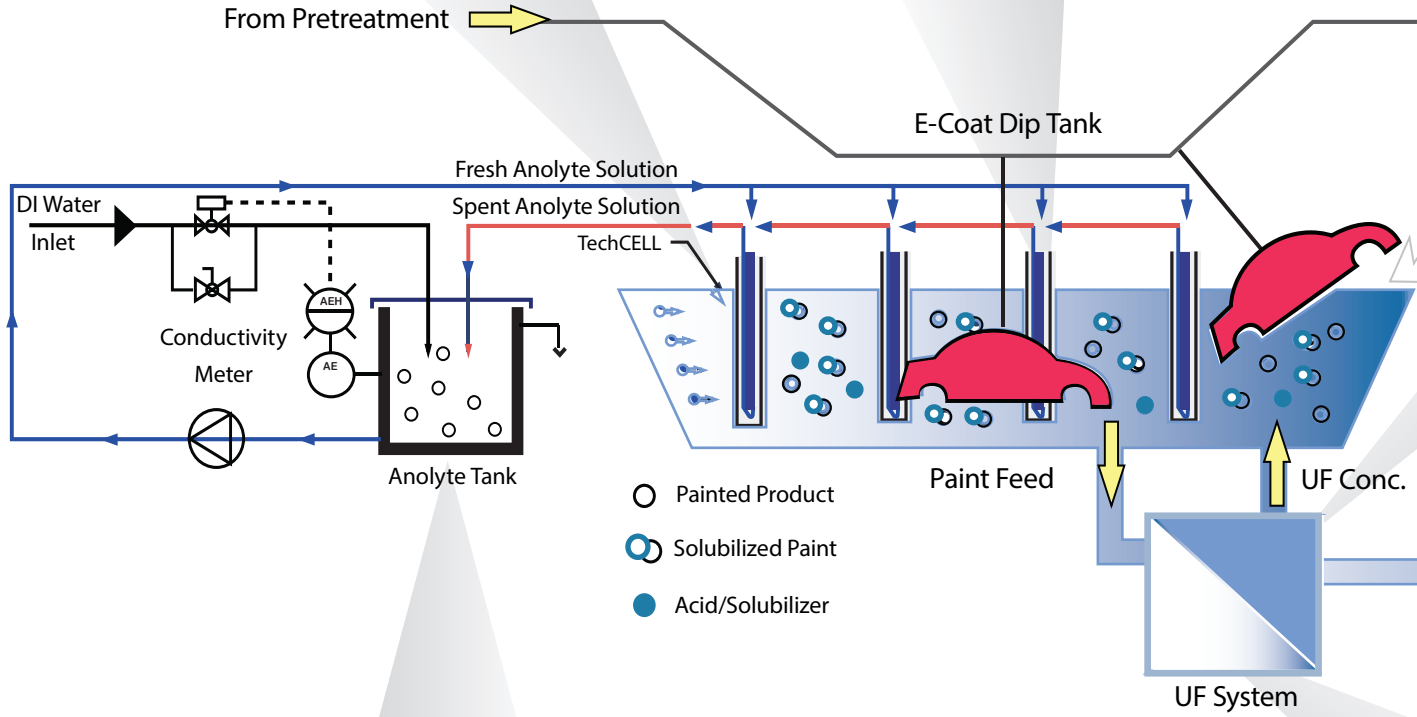
Electrocoat Process

TechCELL (Pg. 15)

Synder's TechCELL anode cell was specifically designed to optimize the electrocoating process. The tubular anode cell design is the preferred style for smaller industrial E-Coat lines.

SuperCELL (Pg. 16)

The SuperCELL is a heavy duty, light weight, one piece C-Cell anode cell designed for optimum paint coverage in large electrocoat paint tanks. It offers incredible efficiency and performance with 100% of the cell facing the job.

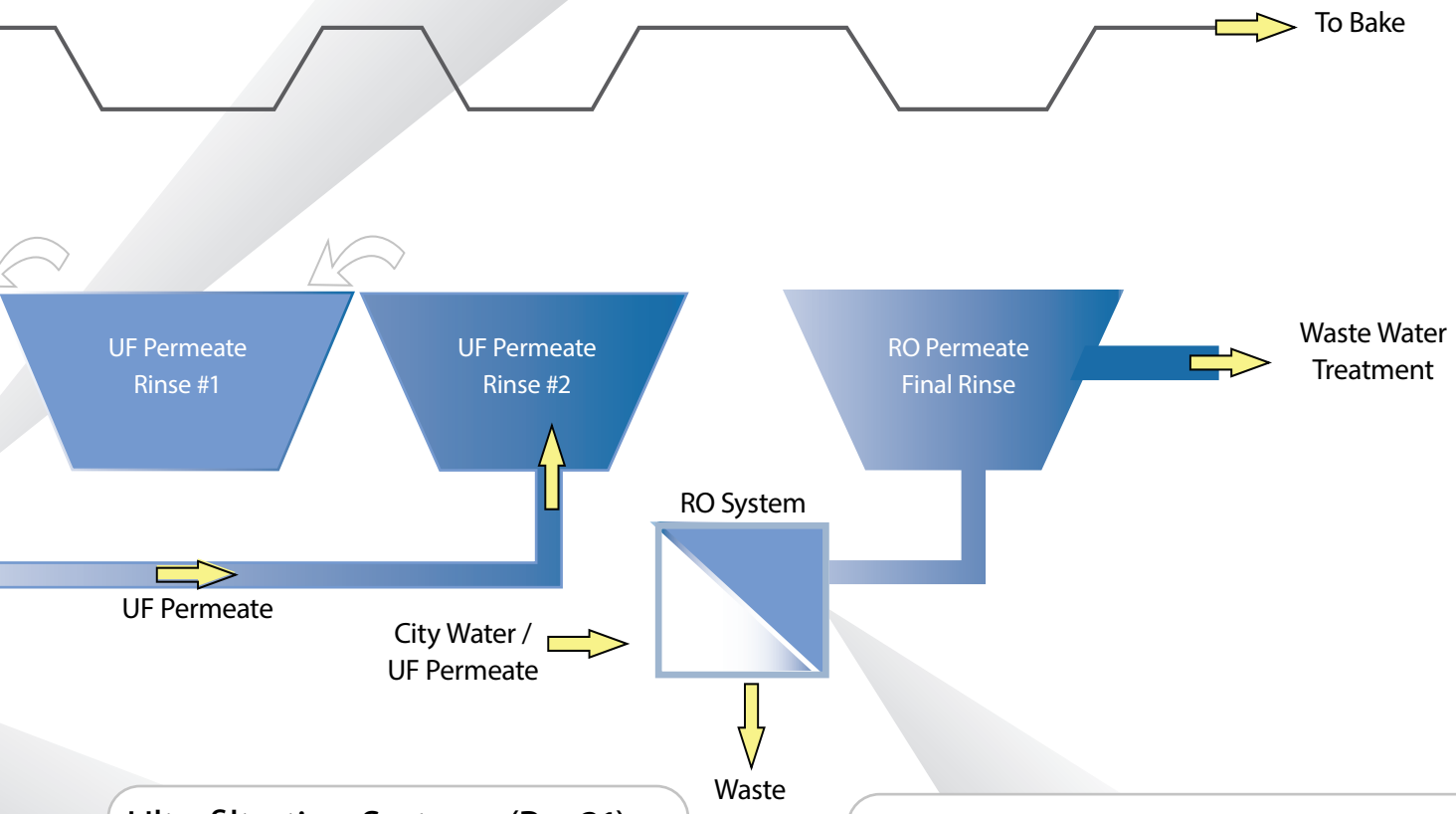


Anolyte Recirculation System (Pg. 22)

Synder Filtration's anolyte recirculation system offers advanced conductivity controllers, ultrasonic level sensors, and UV systems to meet the needs of both automotive and industrial E-Coat applications. Customization is readily available.

Ultrafiltration E-Coat Membrane Elements (Pgs. 13-14)

Synder Filtration is a leading supplier of ultrafiltration (UF) membranes and complete systems to the E-Coat industry worldwide. With a full range of molecular weight cut-offs and element sizes for both cathodic and anodic paint baths, Synder can outfit most E-Coat paint lines with reliable ultrafiltration membrane elements.



Ultrafiltration Systems (Pg. 21)

Synder Filtration offers a complete suite of membrane products for the E-Coat industry. Aside from our specially designed V-Series elements which are well suited for any cathodic paint bath, we offer custom built electrodeposition ultrafiltration systems (EDUF) which guarantee optimal performance for your paint process.

Reverse Osmosis Systems (Pg. 18)

Synder Filtration's reverse osmosis systems provide consistent water quality for industrial processes, creating pure water by rejecting more than 99% of all dissolved solids in most cases.

TechCELL

Synder's TechCELL anode cell was specifically designed to optimize the electrocoating process. This tubular anode cell design is the preferred style for industrial E-Coat lines, due to a wider range of throw angles and part coverage.

TUBULAR CELL FEATURES AND BENEFITS

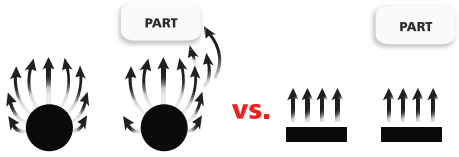
- More throw angles create better part coverage
- Larger membrane area, longer life leading to lower capital & operating costs
- Easy to use & maintain
- Flexibility for your tank
- Custom designs for different tanks and configurations
- Roof cells & floor cells available

HOW IT WORKS

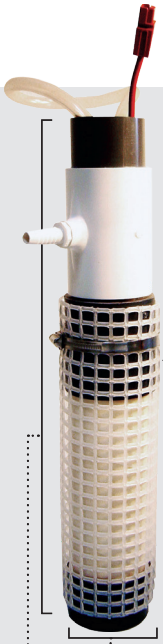
Anolyte cells serve as an opposing electrode for the part being painted and also remove excess acid generated during electrodeposition.

Equipped with a robust anionic membrane, the electrical charge on these cells attract the excess acid in the paint bath and effectively remove them out of solution through membrane filtration.

BETTER THROW ANGLES



Tubular (Round) Anodes offer a greater range of electrical throw angles vs. flat cells. A greater variety of throw angles can significantly improve the coating quality and coverage in hard to reach areas of the part, or more complex geometries. More throw angles also allow the anode to start painting sooner in monorail systems.



Anode Model: T200 G - 1500 - 1800 - S40 WD

Polypropylene Outer Guard

Model / Size
T150 = 1.5" Open Top
TCX150 = 1.5" Closed Top
FBA150 = 1.5" Bare Floor Anode
T150GFL = 1.5" Flanged Floor Cell
T150GRF = 1.5" Flanged Roof Cell
T200 = 2" Open Top
TCX200 = 2" Closed Top
FBA200 = 2" Bare Floor Anode
T200GFL = 2" Flanged Floor Cell
T200GRF = 2" Flanged Roof Cell

Effective Membrane Length
(mm or in)

Total Length
(mm or in)

Anode Thicknes
S10
S40
S80

Anode Construction
WD = Welded
SMLS = Seamless
Ti/IrO = Titanium w/ Iridium Oxide Coating
Ti/RuO = Titanium w/ Ruthenium Oxide Coating

STANDARD PARTS INCLUDED WITH SHELL ONLY
- Polypropylene Outerguard
- (2) Unistrut Mounting Clamps

STANDARD PARTS INCLUDED WITH EACH COMPLETE ANODE CELL
- 5' Anolyte Supply Tube (Clear PVC 3/8")
- 5' Anolyte Return Tube (Clear PVC 1/2")
- 6" Electrical Lead Wire with Anderson Power Pole Quick Disconnect (With Mating QD)
- Polypropylene Outerguard
- (2) Unistrut Mounting Clamps

TechCELL NAMING CONVENTION

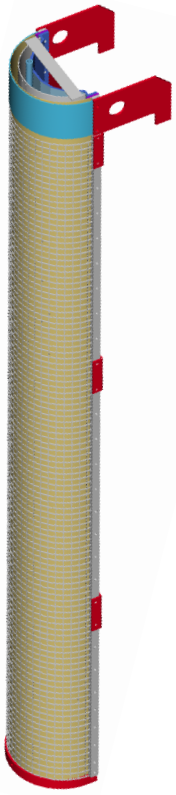
TechCELL Model & Size (add G for Guard)	Dash	Effective Length Inches or millimeters	Dash	Overall Length Inches or millimeters	Dash	Material 316 Stainless Steel S80 - S40 - S10 Ti/IrO - Ti/RuO	Material Type Welded or Seamless	Dash	EXTRA Designation Floor & Roof ONLY Verticle Rise
TCX150G	-	101	-	111	-	S40	WD	-	-
T150GFL	-	73	-	98	-	S40	SMLS	-	UP24
T200G	-	1650	-	2100	-	S40	WD	-	-

TechCELL MODELS & SIZE

T = Open Top Style
TCX = Closed Top Cell - Union style
150 = 1.5" Anode Nominal (1.9" OD)
200 = 2.0" Anode Nominal (2.4" OD)
G after 150/200 = Optional Guard
GFL = Flanged Floor Designation
GRF = Flanged Roof Designation
FBA = Bare Floor Designation

SuperCELL

The SuperCELL is a heavy duty, light weight, one piece C-Cell anode cell designed for optimum paint coverage in large electrocoat paint tanks. SuperCELL offers incredible efficiency and performance with 100% of the cell facing the job and is thus the most economic option for large volume paint tanks.



SUPER CELL DESIGN

- A one piece anode cell
- Designed for ease in lifting and connecting to the power cable
- Weighs less than 1/3 of a standard flat cell
- No welds below the anolyte fluid to prevent failure due to submerged mechanical or welded connections
- Made from 10 gauge or 3/16" thick 316L stainless

FEATURES AND BENEFITS

Lower Operating Costs-

- Increased amps per square foot and subsequent 50% savings in electrical power usage provide for dramatic reductions in operating costs

Better Coverage-

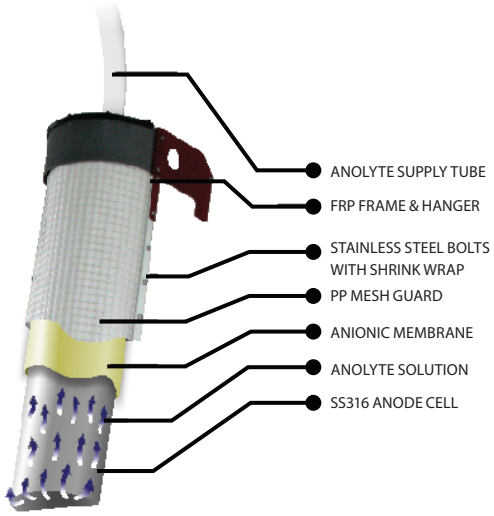
- More throw angles mean greater coverage and longer paint times in monorail systems.

Easy To Use & Maintain-

- Heavy duty, light weight, and in one piece to ensure easy lifting and simple power cable connections.

Flexibility For Your Tank-

- Available in four different sizes, including a low profile option for tanks with limited clearance between the part and tank wall.



MATERIALS OF CONSTRUCTION

Heavy Duty molded FRP back and PVC body
FRP, PVC, and SS hardware
PVC back on Membrane Module
Polypropylene mesh membrane protector

ELECTRODE

316L Stainless Steel
Available in 3 sizes:
Effective area 1.3 sq. ft/ft, Standard Size
Effective area 1.0 sq. ft/ft, Low Profile Size
Effective area 1.5 sq. ft/ft, High Surface Area Size

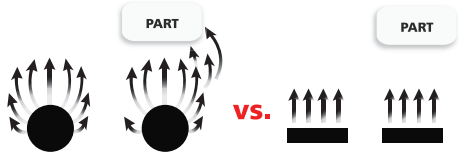
STANDARD ACCESSORIES

Flow meters
Supply and return tubing
Stainless Steel mounting clamps

BETTER THROW ANGLES

The SuperCELL offers a greater range of electrical throw angles vs. flat cells. A greater variety of throw angles can significantly improve the coating quality and coverage in hard to reach areas of the part.

More throw angles also allow the anode to start painting sooner in monorail systems.



EDUF Systems

Synder Filtration offers a complete suite of membrane products for the E-Coat industry. Aside from our specially designed V-Series elements which are well suited for any cathodic paint bath, we offer custom built Electrodeposition Ultrafiltration systems (EDUF) which guarantee optimal performance for your paint process. This premium quality product is achieved through a collaborative effort between our engineers and customers. Synder is proud to have a majority of automotive system installations in North America.

UF SYSTEM OPERATING SPECIFICATIONS

Operational Parameters and Limitations for Electrodeposition Systems	
Maximum operating pressure at element inlet	60 PSIG
Maximum operating pressure at element outlet	40 PSIG
Minimum operating pressure at element outlet	5 PSIG
Minimum pressure drop per element at 70 GPM/element	20 PSIG
Design pressure drop per element at 70 GPM/element	25 PSIG
Maximum pressure drop per element at 70 GPM/element	35 PSIG
Minimum feed rate per 8" UF element	65 GPM
Design feed rate per 8" UF element	70 GPM
Maximum Operating/Cleaning Temperature	
(Schedule 80 PVC piped EDUF System)	120° F @ 50 PSI
(Stainless Steel / CPVC piped EDUF System)	140° F @ 110 PSI
Additional Specifications	
Maximum operating temperature/paint - per paint manufacturer's specifications	
Maximum pressure at permeate outlet	5 PSIG
Recommended cleaning pressure profiles	25 - 30 PSI inlet pressure
(Note: all valves 100% open)	0 - 5 PSI outlet pressure
pH range/cleaning	2.0 - 12.0 @ 110° F
	4.5 - 11.0 @ 120° F

STANDARD MODULE SYSTEM PARTS

- Housing Vessels (PVC or SS)
- Permeate Flow Meters
- Ball Valves (PVC or SS)
- Pressure Gauges
- Elements (Included with order)

STANDARD CIP SYSTEM PARTS

- CIP Pump
- Low-Level/Temperature Switch
- Cooling Coil
- CIP Tank Heater
- CIP Flow Meter

UF SYSTEMS FEATURES AND OPTIONS

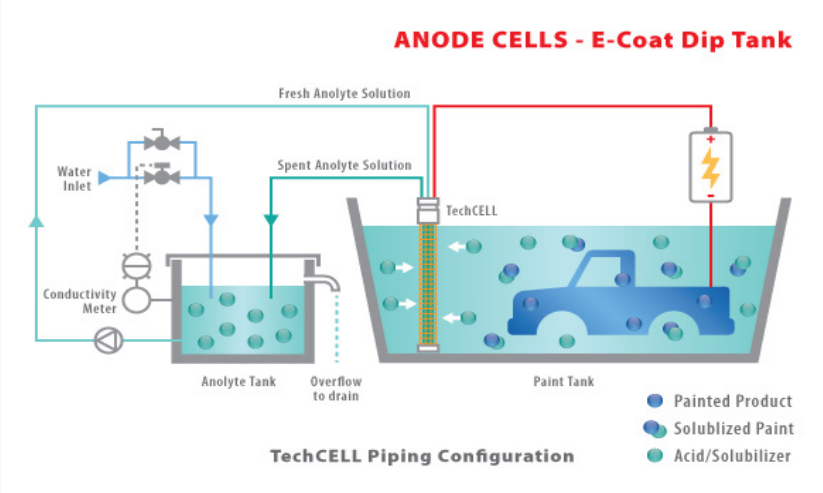
- Compact, user-friendly design
- Optional integrated bag filters reduce costs and save
  floor space
- Optional CIP system can clean a single element while rest of system remains online
- Stainless Steel top & bottom caps are standard.

EDUF NAMING CONVENTION

E-Coat Ultrafilter ED = ED paint UF = Ultrafilter	Skid TYpe S - SS304 housing / U - SS316 housing / P - PVC housing / HK - HK element		Installed # of housings	Optional - Expansion (e)	Optinoal - Expandable # of housings		Element & Housing Size 8 = 8" 10 = 10"		CIP Options BM - Basic module CP - Integrated CIP CM - Connections for individual	Optional - B - SS bag vessel on CIP return line H -heater C - cooling coil		Optional - B = SS bag vessel before housings 4 = # of SS bag vessels		Manifold Material & Size P - PVC Sch 80 run / S - SS304 Sch 10 run / U - SS316 Sch 10 run (## - Size of run in tenths of an inch. For example, 40 = 4" manifold)
EDUF	P	-	5	e	6	x	8	-	CP	BHC	-	B5	-	P40
EDUF	S	-	8			x	8	-	BM		-		-	S50
EDUF	U	-	4			x	10	-	CM		-		-	U30

Anolyte Recirculation System

Synder Filtration's Anolyte Recirculation System offers advanced conductivity controllers, and ultrasonic level sensors to meet the needs of both automotive and industrial E-Coat applications.



STANDARD PARTS INCLUDED IN EACH ANOLYTE SYSTEM

- Anolyte storage tank
- Circulation pump
- Primary anolyte flow meter
- Conductivity controller and sensor

ANOLYTE SYSTEMS			
Anolyte System Model	Tank Size & Material P = Polyethylene S = Stainless Steel	Dash	Pump Flow # = GPM (gallons per minute)
AS	15P	-	25

FEATURES AND BENEFITS

- Monitoring systems are capable of collecting data for showing trends and other important information
- Increases anolyte cell life by controlling and maintaining both acid level and acid proportions in your tank
- System design and parts are customizable to fit your specific criteria and configurations.

UF, MF, NF & RO Filtration Systems

Synder Filtration offers a complete suite of membrane products for your industrial processes. Aside from our high performance nanofiltration, ultrafiltration and microfiltration spiral elements, we offer custom built industrial filtration systems which provide optimal performance for your application. This premium quality product is achieved through a collaborative effort between our engineers and customers. During the design phase of industrial systems, Synder's engineers and R&D staff will work with the customers to perform pilot tests and ensure optimal design, sizing, and configuration. Together, we can build a fully customized system that is truly appropriate for your application, no matter how unique it may be.

STANDARD SYSTEM PARTS

- Housing Vessels
- Housing Flow Meters
- SS/PVC Ball Valves
- Pressure Gauges
- Elements (Included with order)

STANDARD CIP SYSTEM PARTS

- CIP Pump
- Temperature/Low-Level Switch
- Cooling Coil
- CIP Tank Heater
- CIP Flow Meter

Highly customizable, wide range of materials, components, and controls sophistication

OPTIONAL FEATURES

- Various pretreatment options available
- CIP systems can have the capability to clean a single element while rest of system remains online, or clean entire system all at once
- Add-on features such as data logging and remote monitoring capabilities

NOTE: Optimum design is based on representative feed-water analyses, and Synder Filtration offers no performance guarantees, either expressed or implied, without complete knowledge of the chemical constituents in the feed stream.

The right balance of cost, lead time, and quality

Anode Cell Current Monitoring System

The Anode Cell Current Monitoring System (CMS) is designed to measure the amp draw for an individual anode cell and monitor the overall performance and efficiency of the cell over time.

HOW IT WORKS

Power from the rectifier passes through the shunt prior to entering the TechCELL and the resulting voltage drop across the shunt can then be measured and used to calculate amperage.

The signal from the shunt is then processed, and converted to amperage readings on the analog gauges.

CMS FEATURES AND BENEFITS

The CMS allows users to monitor the amp draw of individual TechCELLs, an indicator of TechCELL performance and condition. Monitoring TechCELL performance will assist in determining ideal configuration, and prevent product defects occurring in the paint bath. The analog model displays all amperage readings on individual analog meters on the panel.

ANALOG CMS

The analog model allows the user to monitor individual TechCELL amp draw simultaneously through analog meters mounted on the enclosure.

EASY INSTALLATION

No modification required for existing systems. The shunt sensors can be installed directly between the TechCELL and rectifier using existing quick connects.

Feasibility Testing

In addition to performing case studies, Synder Filtration offers a wide array of feasibility testing options for our customers. With our newly designed research & development laboratory and fleet of pilot systems, we are able to conduct feasibility tests both in-house and on-site. We strive to gain a better understanding of your process goals in order to develop a comprehensive testing plan to suit your separation needs. The ultimate goal is to provide meaningful trial data toward the design, fabrication, and successful implementation of a commercial scale system.

1. CUSTOMER SUBMITS PILOT STUDY RFQ FORM. This helps us to gather important information about the feed stream, operating parameters, and the customer's application goals.

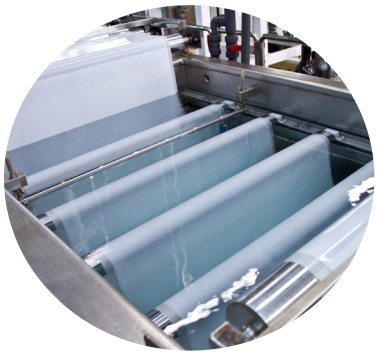
2. RFQ REVIEW. Synder account manager schedules review meeting with the customer and the engineering staff to discuss the project and clarify any remaining questions.

3. FEASIBILITY TESTING. A feasibility test is proposed to the customer, and conducted if approval is received. A feasibility report is prepared with 24-48 hours after test completion.

- Flat sheet feasibility tests: Synder's complete line of NF, UF, and MF and MAX membranes are available in a variety of different flat sheet options for feasibility testing.

- Spiral element feasibility tests: In some cases such as feed streams requiring high operating pressure to obtain additional concentration and flux data, spiral elements may be recommended for use on feasibility tests.

- Analytical capabilities include TOC levels, COD levels, hardness, chloride, sulfate, and iron concentrations, liquid viscosity, turbidity, pH, and conductivity measurements. Synder is also able to outsource other analytical instruments such as SEM, FTIR, BOD, TSS, and other ion measurements if the customer accepts 3rd party involvement in the testing.



4. PILOT STUDY TESTING. If feasibility results are positive, a pilot study is proposed. Pilot studies can last anywhere from one week to several months or longer, depending on the nature of the application and possible variability in the feed stream.See pilot system specs.

5. FULL SCALE SYSTEM DESIGN & FABRICATION. If the pilot study results are positive, a full scale system is proposed and revised as needed until the customer is satisfied with the design specs, lead time, and projected ROI. Synder then fabricates the system.

6. SYSTEM INSTALLATION & COMMISSIONING. The final step is installation, commissioning, and training on site. Start up and commissioning service can be done worldwide.

E-Coat Housings & Spare Parts

Synder Filtration stocks large inventories of spare parts and accessories for E-Coat and general industrial applications. With a wide range of spare parts and accessories for anolyte and membrane filtration systems, Synder can supply these accessories and can also provide industrial grade housing units for our elements. Contact us to find the most appropriate housing unit and parts for your E-Coat line.

Size	Housing Unit	Element Model	Material	Port-to-Port Length	Total Length	Max. Pressure Rating
2″	IH1812M	1812TM	SS316	12.88" (327mm)	18.22″ (463mm)	650 PSI
	IH2540	2540HF/HM	SS316	42.60" (1082mm)	48.88 (1242mm)	650 PSI
4″	IH4030	4030H	PVC	31.63″ (804mm)	37.88″ (962mm)	100 PSI
	IH4042	4045BH	PVC	42.00″ (1067mm)	48.25″ (1226mm)	100 PSI
	IH40RF	4051.5H	PVC	49.63″ (1260mm)	55.75″ (1416mm)	100 PSI
	IHKR4	4037H	PVC	37.00″ (940mm)	43.25″ (1099mm)	100 PSI
6″	IH60A	5647.5H	PVC	43.00″ (1092mm)	50.80″ (1290mm)	100 PSI
	IH60RF	5651.5H	PVC	49.63″ (1261mm)	55.75″ (1416mm)	100 PSI
	IH60RF-M3	5651.5H	PVC	49.63″ (1261mm)	57.13″ (1451mm)	100 PSI
8″	IH80C	7647.5HC	PVC	43.00″ (1092mm)	51.75″ (1314mm)	100 PSI
	IH80D	7647.5HC	PVC	51.03″ (1296mm)	56.75″ (1441mm)	100 PSI
	IH80E	7647.5HC	PVC	43.00″ (1092mm)	51.75″ (1314mm)	100 PSI
	IH79SB	F7940HA	SS304	43.00″ (1092mm)	50.63″ (1286mm)	100 PSI

ANODE CELL SPARE PARTS

- 1.5" & 2.0" Boot Kits (with or without tubing)
- 1.5" & 2.0" Splash Caps
- 1/2" Anolyte Return Fitting Kit
- 3/8" Anolyte Supply Fitting Kit
- Anderson Power Pole 75amp QD w/ Lead Wire
- Anode Membrane Repair Kit
- Anolyte Flow Meters (0-1 GPM / 0-2 GPM)
- Tab Bolt Kit
- TCX150/200 Top Cap Replacements
- Unistrut Clamps

MISCELLANEOUS SPARE PARTS

- Bag Filters / Bag Filter Vessels
- Cartridge Filters
- Flow Meters
- Pressure Gauges
- Storage Bags

ELEMENT/HOUSING SPARE PARTS

- Top/Bottom Caps
- Victaulic Clamps / Tri-Clamp Fittings
- Victaulic Gaskets
- O-Rings
- Brine Seals

Industrial Element Installation Procedure

PRE-INSTALLATION NOTES

Spiral elements must fit snugly in their vessels in order for them to function properly. If a loose-fitting element is put into operation, unnecessary bypass flow and lower flux may be observed.

A preservative solution is used to prevent microbial growth and membrane dry-out during shipping and storage. While this solution is not classified as hazardous, extra care should be take to limit exposure.

Recommended Equipment:

- Sharp knife or scissors
- Gloves
- Safety glasses
- Dust mask

INSTALLATION PROCEDURES

1. Remove the element from the plastic bag and take this opportunity to do a thorough visual examination of the element. There should be no mold, dust, or dirt anywhere on the element.

2. Prepare an element loading diagram to document the serial number(s), date, element model number, location within the system, and any other required information for future reference.

3. Install the new O-ring supplied with your element onto the top cap and lubricate them with glycerine. A vial of glycerine is included with the shipment.

4. Insert the element into the pressure vessel. It should fit snugly.

5. O-rings should be well lubricated prior to installation with a non-petroleum based lubricant such as glycerine or any mild household liquid detergent.

6. A sufficient flush should be performed on all elements prior to start-up. Clean water at 131°F (55°C) should be used in a non-recirculating mode for at least 10 minutes after installation. This should remove residual preservative solutions, and glycerine.

7. The element is now ready for start-up. Feed and/or recirculation pumps should "ramp-up" RPMs slowly to prevent the element from being shocked. Varial Frequency Drives (VFDs) are recommended for all feed and recirculation pumps to safely control pump RPMs.

8. Synder Filtration recommends the collection of daily performance data of the system and element performance. The following data should be collected at least daily and is required in the event of a warranty claims:

    1) Flows (feed, permeate, concentrate)
    2) Pressures (feed, permeate, concentrate)
    3) Operating temperatures (production and CIP)
    4) Hours of operation (production and CIP)
    5) Other cleaning parameters (pH, time, chlorine PPM exposure)
    6) Unexpected events (system upsets, unscheduled shutdowns, etc)

E-Coat Element Installation Procedure

1. Ensure the housing is depressurized before installation. Remove the top cap assembly and store in a safe place to prevent damage.
2. Lift the top cap off the housing. In the event that this is a replacement element, in most cases the element will lift up with the top cap. If it does not, you may pull the spent element out by the permeate tube extension or by removing the housing and bottom cap to push the element out.
3. Remove the new element from its storage bag and save the bag for element installation. Ensure the rubber seals are installed in the correct position (See Double or Single Seal Detail on the drawing attached, depending on your system capabilities). Install the O-rings onto the permeate tube extension or top cap, if applicable and apply a suitable amount of glycerin to lubricate the O-rings and rubber seal(s). A vial of glycerin is included with the element.
4. Eliminate the residual paint from the housing and fill the housing approximately 1/3 full with DI/RO water.
5. Insert the bottom plug into the end of the element without the rubber seal(s), if applicable. For elements with no rubber seal, insert the bottom plug into any end. Male models "M" are already plugged.

For HS models: Remove the four pieces of 1" tape that holds the netting in place. Insert the element into the housing, bottom plug end first, with a circular motion. Do not force the element, this will cause the netting to roll and will result in improper installation. If the element does not fit into the housing, trim off the tail from the element at approximately 1/4 of the outer diameter (OD) at a time. Test the element's fit after each trimming. Ideally, the element should fit snugly into the vessel. See attached drawing with cutting detail for more information.

6. Make a sleeve of plastic from the element storage bag to wrap around the seals (See drawing with element storage bag details). Use tape if necessary and insert the element with the plugged end first into the housing. Slide the sleeve and element into the housing. Once the seal(s) are about 2" into the housing, remove the sleeve.
7. Gently push the element to make sure the element is seated on the bottom of the housing. Make sure the permeate tube is completely submerged in DI/RO water.
8. Carefully insert the top cap connector into the permeate tube. Replace the Victaulic coupling and tighten the bolts. Return the top cap assembly and tighten the union connections.
9. Circulate DI/RO water through the element for 15 minutes in the CIP loop. Purge to drain, and then refill with fresh DI/RO water. If this is not possible, soak the element in DI/RO water for at least one hour, purge to drain, and refill the housing with fresh DI/RO water.
10. Open both the paint permeate to rinse valve and the paint return valve.
11. Start paint feed pump and SLOWLY open the paint feed valve (to fully open in 3 to 5 minutes). Adjust inlet pressure to a minimum of 50 psi. If your system is running, open your housing outlet and permeate valve. Then, very SLOWLY open the housing inlet valve to fully open in 3 to 5 minutes to bring your element back online.
12. After the system runs for a few minutes, it may be necessary to re-adjust the pressures until the system balances out.
13. If you are running permeate to drain and are ready to change to permeate to rinse, open the permeate to rinse valve before closing the permeate to clean valve.
14. Start-up is now complete. Record the Serial No., Date, Permeate Output and Installer's Initials on the housing label provided with your new element.

WARNING: All rubber seals must be lubricated with glycerin, which is provided in a vial with your shipment. Never use excessive force during installation. Excessive force may damage seal(s). When operating on paint, the "Permeate to Rinse" valve must be 100% open and when cleaning, the "Permeate to CIP tank" valve must be 100% open. Throttling or closing any permeate valve while the element is in operation can result in "leakers" and "smokers" and will void the element warranty.

NOTE: For older systems without Reverse Flow Cleaning capabilities, use (1) paint seal in the ATD groove. For systems with Reverse Flow Cleaning capabilities, install two (2) paint seals in the upper ATD groove. See attached drawing for the correct position or single and double seals.

Disclaimer: Procedures may not apply to all E-Coat processes. Please contact Synder for more information on proper handling and storage guidelines.

HK Element Installation Procedure

INSTALLATION

1. Record the serial number of the new HK element.
2. Install new EPDM O-Rings on the bottom plug and lubricate with glycerin.
3. Lubricate the coupling gaskets with glycerin and push the large ones just onto each end of the PVC shell on the membrane.
4. Install the ATD, narrow end first and the new EPDM O-Rings on the permeate tube outlet end cap and lubricate with glycerin.
5. Loose fit the outlet end cap onto the top of the new membrane and measure the distance between the lower edge of the coupler clamp groove on the outlet end cap and the upper edge of the matching groove on the membrane. It should match the distance between the upper and lower lips on the inside of the coupler clamp.
6. Pull the coupler clamp gasket up equidistant between the outlet end cap and membrane, followed by the clamp halves and nuts and bolts.
7. Tighten the nuts and bolts to the clamp half clearance while removing them, while maintaining the lips into their respective grooves.
8. On the other end of the element, install the ATD, narrow end first. Insert the bottom plug into the membrane until it seats, and then loose fit the inlet end cap and adjust the clamp groove dimensions as shown in step 5 & tighten and secure the inlet end cap as shown in steps 6 and 7.
9. Install and hand tighten only the brackets to secure the completed membrane to the system frame and reconnect the flowmeter and inlet and outlet ports.
10. Circulate DI/RO water through the element for 15 minutes in the CIP loop. Purge to drain, and then refill with fresh DI/RO water. If this is not possible, soak the element in DI/RO water for at least one hour, purge to drain, and refill the housing with fresh DI/RO water.Install and hand tighten only the brackets to secure the completed membrane to the system frame and reconnect the flowmeter and inlet and outlet ports.
11. Open both the paint permeate to rinse valve and the paint return valve.
12. Start paint feed pump and slowly open the paint feed valve (to fully open in 3 to 5 minutes). Adjust inlet pressure to a minimum of 50 psi. If your system is running, open your housing outlet and permeate valve. Then, very slowly open the housing inlet valve to fully open in 3 to 5 minutes to bring your element back online.
13. After the system runs for a few minutes, it may be necessary to re-adjust the pressures until the system balances out.
14. If you are running permeate to drain and are ready to change to permeate to rinse, open the permeate to rinse valve before closing the permeate to clean valve.
15. Start-up is now complete. Record the Serial No., Date, Permeate Output and Installer's Initials on the housing label provided with your new element.

WARNING: When operating on paint, the "Permeate to Rinse" valve must be 100% open and when cleaning, the "Permeate to CIP tank" valve must be 100% open. Throttling or closing any permeate valve while the element is in operation can result in "leakers" and "smokers" and will void the element warranty.

Flat Sheet Installation & Storage Procedure

This guideline is intended for use with flat sheet membranes, and does not offer any guarantees of performance whether directly stated or implied.

INSTALLATION

1. Remove the new flat sheet from its storage bag and ensure that the flat sheet has not been damaged or tampered with. Look for any scratches, wrinkles, and/or deformities that could hinder performance.
2. Carefully rinse the flat sheet with RO or DI water before usage. This will flush out any preservatives and other unwanted materials attached to the flat sheet.
3. Make sure your hands are clean before handling the flat sheet. Hold onto the ends of the flat sheet when transferring it around. Do not contaminate the membrane as much as possible as this may hinder performance.
4. Place the flat sheet onto the filtration cell body and secure tightly.
5. Increase the pressure in the system slowly until you reach your desired pressure level. It is important not to rapidly increase pressure as this may cause over compaction in the membrane.
6. Properly store the flat sheet when it is not in use. It is important that you do not allow the membrane to dry out at any point in time. See proper storage methods below.

STORAGE

Synder Filtration's dry flat sheet membranes come packaged with a coated layer of glycerine; wet flat sheet membranes are in solution with 2% sodium metabisulfite (MBS).

Note: After removing the flat sheet from the storage bag, you must always first rinse the flat sheet with either RO or DI water to remove preservatives. Only use or store the flat sheet once this cleaning process is complete.

1. Unopened flat sheets may be stored in a refrigerator for up to 2 months. Flat sheets that are not properly refrigerated risk drying out due to evaporation.
2. Opened flat sheets that are not in use should be kept in a solution of either 1% sodium metabisulfite (0.1% MBS for NF) or 50% glycerine to prevent microbial growth, and the preservative solution must be maintained regularly.

Contact Synder Filtration's Technical Services Department if you have any questions about installation and/or storage with your Flat Sheet Membranes at +1-707-451-6060.

TechCELL Installation Procedure

GATHER THE FOLLOWING TOOLS PRIOR TO STARTING:

- DI Water source, the cells will need to be filled as they are placed into the paint bath
- Utility Knife
- Qty 2 1/2" wrenches
- Qty 2 9/16" wrenches

INSTALLATION WITH PAINT IN THE TANK

1. Carefully remove the TechCELL shell from its packing, leaving on the plastic bag containing the TechCELL.
2. Wipe off the surface of the anode for the TechCELL and remove tape from the anolyte supply tube. DO NOT USE SUPPLY TUBE TO HOLD ANODE.
3. Install the short Power Cable to the anode tap with the supplied hardware.
4. Carefully insert the anode into the TechCELL shell. Lay shell on a flat, clean area. Start by sliding the anode in the open top of the shell. Once the anode is completely inserted, lift top of the shell no higher than a 45-degree angle and rotate the shell to allow the anode to slide into the remainder of the way in the shell.
5. Carry the TechCELL to the paint tank. Remove the protective plastic bag from the TechCELL.
6. Gather the 2 sets of Unistrut cell clamps for one TechCELL.
7. Lower the TechCELL into the paint bath close to the designated position.
8. Place the clamps around the neck of the TechCELL. The TechCELL should be vertically positioned so that the membrane is completely submerged just below the paint level.
9. Once the TechCELL is secured immediately fill the TechCELL with DI water to a level a few inches below the return nozzle.
10. Attach the 3/8" supply line to the flow indicator after the proper length of the tubing has been determined and trimmed.
11. Determine the proper return tubing length. Attach the 1/2" return line to the TechCELL and then insert the other end into the return manifold.
12. Attach the long power cable to the short power cable. Connect the power supply cable from rectifier to the anode cell power cable (with quick connect).

INSTALLATION WITHOUT PAINT IN THE TANK

1. Follow the above steps, but do not remove the protective plastic bag from the membrane area. Typically the bag is lowered to a point on the cells neck where interference with the clamps is eliminated.
2. Once the cell is in place; fill the TechCELL with DI water until the paint is being introduced into the tank. Do not let the anolyte (DI) solution in the cells remain dormant for more than 24 hours. Verify that the anolyte circulation system is operational prior to installing the TechCELL units.

FLOW INDICATOR INSTALLATION

Install by tapping a 1/4" NPT in supply manifold. Install indicator using Teflon tape around threads. Flow indicators should be vertical on the manifold.

POWER CABLE INSTALLATION

1. Attach the lug connector to the buss bar in a location that allows multiple TechCELL long Power Cable connections. Typically one every 5 feet on the buss bar is adequate.
2. Install the long Power Cables to the lug. Typically five Power Cables per 125 Amp lug.

TechCELL Removal and Maintenance

To remove the cell for maintenance, inspection, replacement or long term storage, please do the following:

1. Make sure all power from rectifier is turned off and rectifier locked out. Never work on an energized system.
2. Shut off and disconnect the anolyte supply tubing from the secondary flow indicator.
3. Unplug the quick disconnect power lead and disconnect the short cable from the anode.
4. Remove the anode from the cell.
5. Remove the anolyte return tubing from the nozzle on the cells neck.
6. Loosen and remove the cell clamps from the strut channel, while holding the shell from falling into the tank.
7. Carefully lift the shell out of the tank. When about 1/3 to 1/2 of the shell is out of the tank, start rotating the shell to allow the anolyte solution to drain into the paint bath.
8. Once the shell is out of the tank, immediately rinse off the shell with DI water to remove any paint. Resins and solids may be removed with solubilizer and or diluted solvents.
9. Do not allow membrane to dry out. If it is necessary to store the shell for an extended period of time, place unit in a plastic bag and seal it from the environment. A small amount of biocide placed in the bag will aid in unwanted growth. Store unit vertically when possible.

CELL REPLACEMENT

1. Carefully insert anode assembly into the shell, be sure the anode is fully sealed.
2. Work backwards through steps 1-6, making sure all power from rectifier is turned off and rectifier locked out.

Standard Cleaning Guidelines

The following procedure is a general guideline for the cleaning/sanitization of spiral elements. Depending on individual process streams, equipment and process time some variations in cleaning procedures may be required for optimal cleaning results. Please consult a qualified chemical supplier for application specific cleaning regimes.

Improper cleaning sequence, chemical concentration or abnormal temperatures/pH/pressure profiles can significantly reduce membrane life and possibly void any warranties offered on the element(s). If you have any questions or concerns about your cleaning regime, please contact Synder Filtration immediately.

CONCENTRATE DISPLACEMENT AND INITIAL FLUSH

1. Flush the remaining concentrate in the system back to the concentrate tank or to drain.
2. Using clean water heated to 131°F/55°C, adequately flush the system in non-recirculation mode to remove any remaining build-up. The retentate and permeate should appear to be clean after this step.
3. Perform a complete Clean-In-Place (CIP) immediately after the initial flush per the following.

CAUSTIC WASH

1. Circulate warm clean water (131°F/55°C) through the system under standard pressure and flow parameters.
2. Add caustic SLOWLY to achieve a pH of 10.8-11.0. DO NOT EXCEED pH 11.0.
3. Circulate caustic solution for 30 minutes.
4. Flush the system to drain with clean, warm water (same temperature as before).

ACID WASH

1. Circulate warm clean water through the system under standard pressure and flow parameters.
2. Add a sufficient amount of acid SLOWLY to achieve a pH of 2.0-2.2. DO NOT EXCEED pH 2.0 (pH 3.0 for NFW/NFG/PZ/PY/PX).
3. Circulate acid solution for 30 minutes.
4. Flush the system to drain with clean, warm water (same temperature as before).

SANITATION (CAUSTIC/CHLORINE SOLUTION) - FOR UF/MF

1. Circulate warm clean water through the system under standard pressure and flow parameters.
2. Add caustic SLOWLY to achieve a pH of 10.8-11.0. DO NOT EXCEED pH 11.0.
3. Add chlorine SLOWLY to achieve constant level of 150 ppm. DO NOT EXCEED 180 ppm.
4. Circulate the caustic/chlorine solution for 30 minutes.
5. Periodically check and maintain a chlorine concentration of 150 ppm.
6. Flush the system to drain with clean, warm water (same temperature as before).
   Note: For NF, dechlorination is recommended.

Synder Filtration believes the above information and data herein to be accurate. However, said information is offered in good faith, but without guarantee of results since the conditions and methods used are beyond Synder Filtration's control. Synder Filtration assumes no liability as to the application of the previously mentioned data.

E-Coat Cleaning Guidelines

Spiral Elements should be cleaned when the permeate rate has declined between 20-30% from the steady state permeate rate that was recorded when either the element was installed initially or last cleaned. Steady state permeate rate is the rate that you record about 15-20 minutes after the element is initially put on the paint, or after the element has been thoroughly cleaned.

Note: The permeate rate should never drop more than 30% before an element is cleaned.

CLEANING PROCEDURES

1. When initially cleaning an element, flush the paint from the element (preferably back to the paint tank) with UF permeate. If your system is large enough, and time permits, do this 2 more times. This helps with the cleaning process and helps recover as much paint as possible.

2. If UF permeate is unavailable, make up a solution of artificial permeate using DI/RO water and acetic acid. Adjust the heat and pH of the solution to that of the paint. Flushing the paint from the element with cold DI/RO water, you can "set" the paint on the element surface, making it difficult to clean. Confirm that this is acceptable with the paint manufacturer before proceeding.

3. After flushing the paint from the element, flush the element to drain. Start with a full heated cleaning tank of DI/RO water, pH adjusted to pH of the paint. Once you have started flushing the element to drain, open the DI/RO water fill valve to the cleaning tank to maintain the level in the cleaning tank. This will allow you to thoroughly flush the element to drain, while gradually lowering the temperature of the water.

4. When the flush water is reasonably clean from the element , slowly close the cleaning pump discharge valve and stop the pump.

SPECIAL RECOMMENDATIONS

There are many cleaning formulas available for cleaning spiral elements. Many of them were developed in the early days of cathodic paints when the paints were formulated with lead, solvents, and higher solids. These formulas were very effective for those paints, but are not as effective with today's low solvent and no solvent, low lead and no lead paints.

Synder Filtration has formulated a concentrated cleaning product for use with our membranes and other spiral elements. The concentrate ratio is 1:99 and does not require the use of any solvents; it uses muriatic acid (acetic and formic acid may be substituted for muriatic) and is usually effective in 60 minutes or less. The key to its success is cleaning at a pH of 2.0 to 2.2, maintaining a temperature between 100°F and 110°F, and cleaning before the permeate rate has decline too far.

For more information regarding cleaning procedures for E-Coat elements, please contact Synder.

Element Storage Procedure

6 MONTHS OR LESS (SHORT TERM)

Immediately following the final CIP flush, the system should be filled with 1% Sodium Metabisulfite (MBS) solution with a pH of 4.0-5.0. Every 7-10 days the following procedure should be performed:

1. Drain MBS solution from the system and flush to drain with clean water.
2. Run a caustic wash (pH 10.8-11.0; 120 - 122°F; 15-20 minutes)
3. Flush to drain with clean water.
4. Recharge the system with a fresh bath of MBS.

LONGER THAN 6 MONTHS (LONG TERM)

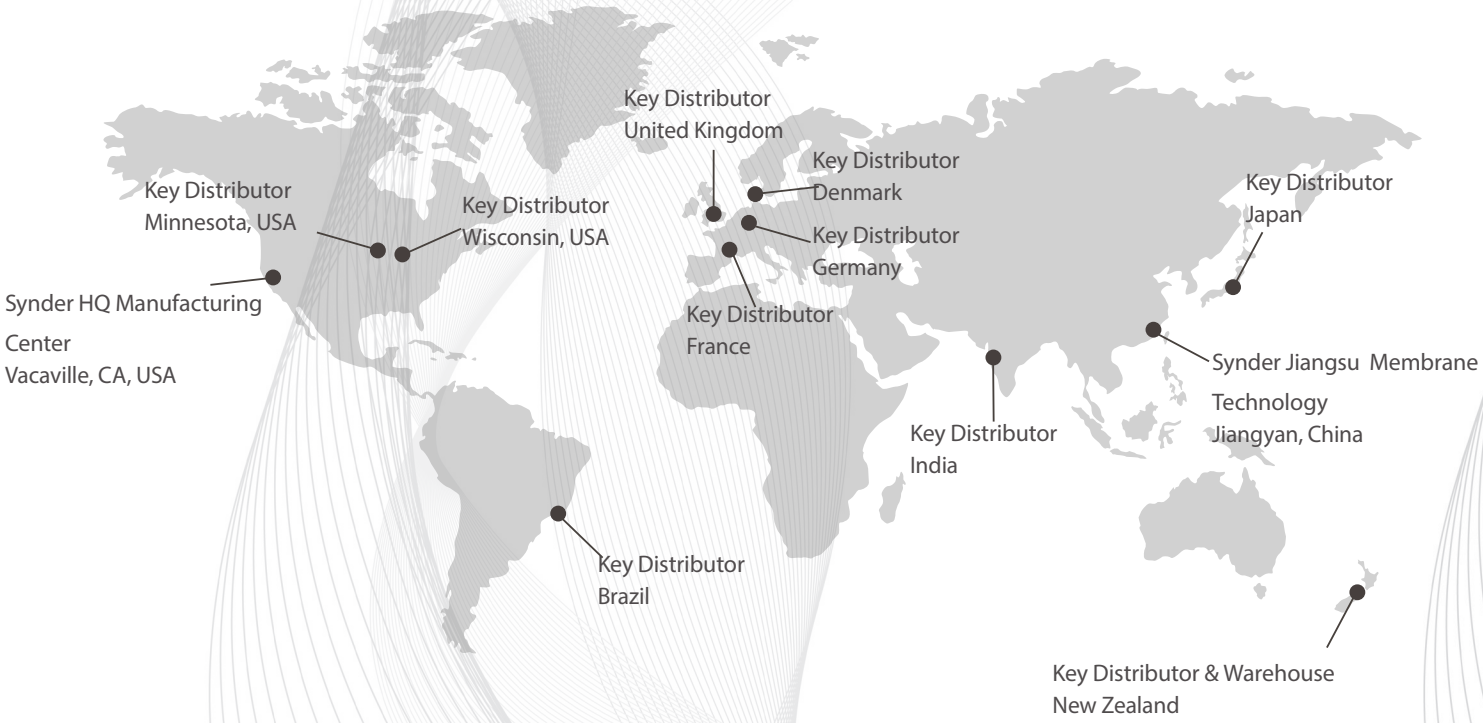
A long term shutdown (over 6 months) can be handled easily and efficiently. This involves the removal of elements from the system, soaking them in preservative solution (vertically if possible), and sealing in a plastic bag for future use.

1. The preservative solution should include:
   - 20% Glycerine
   - 2% Sodium Metabisulfite
   - pH 4.0-5.0
2. Remove the element from the vessel, drain the elements in a vertical position to avoid extensive dilution of the preservative solution.
3. Place the element in a preservative for a minimum of 15 minutes.
4. Depending on the number of elements, the preservative solution may become diluted. In that event, add more preservative to maintain pH 4.0-5.0.
5. Remove the element from the preservative and allow to drain for approximately 10 seconds, then place the element back in the bag.
6. Seal the bag either via heat seal or waterproof tape. This should be done well to prevent any leakage during storage/transport.
7. Element storage in 50°F - 59°F (10°C - 15°C) will increase storage life of the elements. Refrigeration is highly recommended.
8. Contact Synder Filtration prior to storing any elements to discuss element warranty concerns.

Daily Log Sheet

Date	Pre-filter In/Out (PSI)	Element Stage 1 (PSI)	Element Stage 2 (PSI)	Element Final (PSI)	Permeate (PSI)	Permeate Rate (GPM)	Concentrate Rate (GPM)	Recycle Rate (GPM)	Temp (°F)	Conductivity (µ)	Date Cleaned

Comments:



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