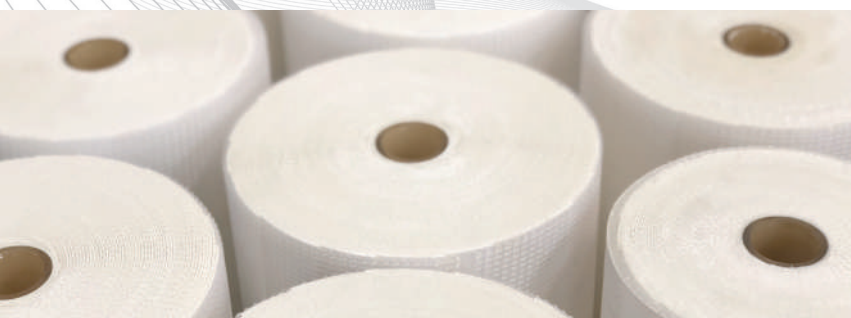




Membranes that Perform. People who Deliver.™



SANITARY MEMBRANE CATALOG



Company Profile

OUR MISSION

Make the world's best membrane filters to solve the separation challenges of today, and innovate the membrane technology of the future.

We are guided by these simple rules:

- WORK HARD and ENJOY the process
- INNOVATE to meet our customers' needs
- TREAT OTHERS as you expect to be treated.
- Be RESPONSIVE
- Be HUMBLE

OUR COMPANY

Synder Filtration specializes in manufacturing Nanofiltration, Ultrafiltration, and Microfiltration membranes and systems for specialty process applications. Synder Filtration has a unique understanding of the membrane industry from its history as both a buyer and a supplier of membrane technology. Established in 1989, Synder Inc. originally focused on industrial enzyme technology, and was a pioneer in the application of spiral membranes.

Today, the company serves a variety of industries including dairy, biotech, pharmaceutical, automotive, and oil & gas. All sanitary products meet USDA, FDA and 3-A sanitary standards and Synder is a certified Halal, Kosher, and ISO-9001:2015 manufacturing company.

Synder Filtration is a proud recipient of the President's "E" Award in recognition of manufacturing export growth. Synder has developed an extensive team of international representatives and distributors with a similar dedication to customer service and deep technical knowledge.

OUR COMMITMENT

With our deep understanding of membrane technology, industry-leading delivery times, and a highly responsive staff, we are dedicated to meeting and exceeding your expectations by doing business "the right way", every single day.

We sincerely look forward to working with you.

Best Regards,

A handwritten signature in black ink that reads "Joseph Wang".

Dr. Joseph Wang, Ph.D.
Co-Founder, Synder Filtration

A handwritten signature in black ink that reads "Jeffrey H. Yeh".

Jeffrey H. Yeh
President, Synder Filtration

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Membrane Technology

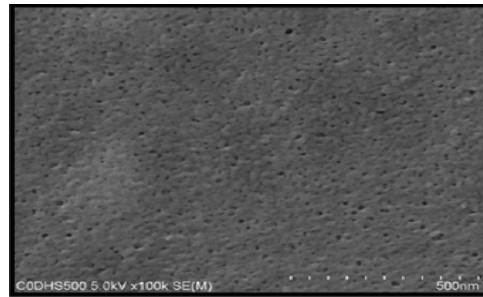
SELECTIVE TRANSPORT

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.

ASYMMETRIC PORE STRUCTURE

Synder membranes feature an asymmetric pore structure. Small surface pores control rejection of target molecules while large "finger 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 permeate flux.

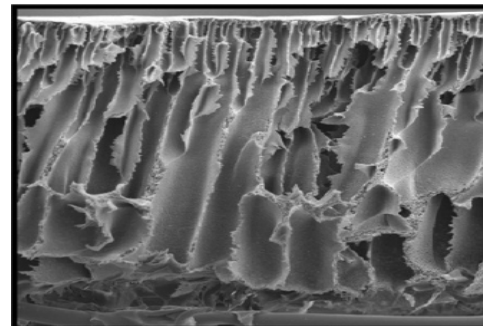
Electron Microscope Images



(LX) PES 300 Membrane Top View

Smooth surface reduces fouling tendency.

Advancements in porosity and more uniform pore size distribution



(LX) PES 300 Membrane Cross Section

Tiny pores on membrane surface are not visible.

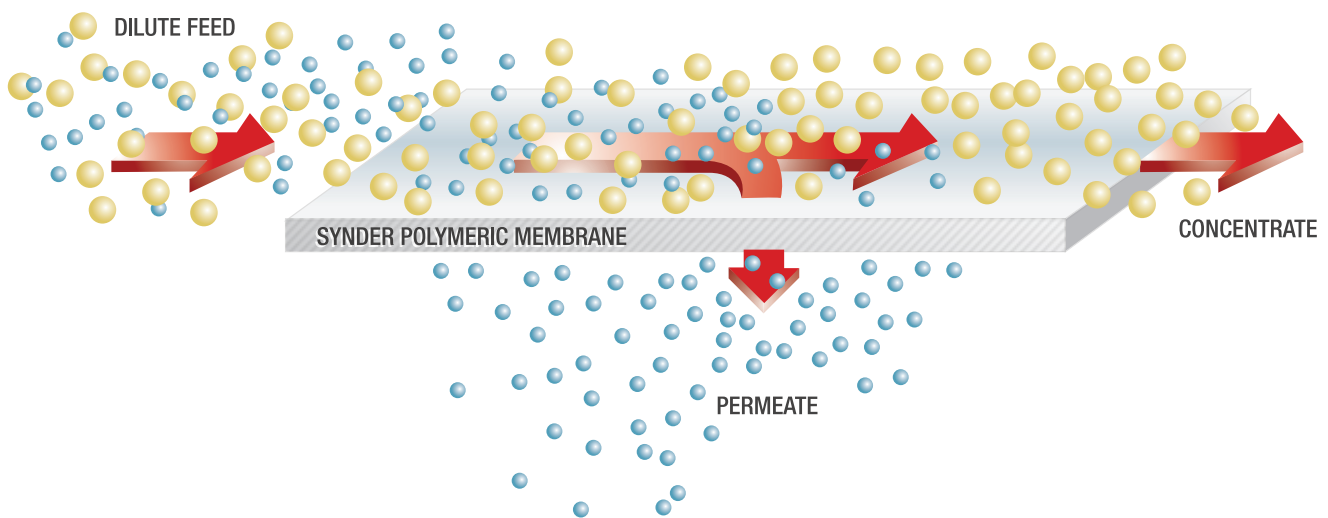
"Finger" pores beneath membrane surface.

Larger "finger" pores allowing maximum permeate flow.

Polyester backing material. (Also available in Polypropylene).

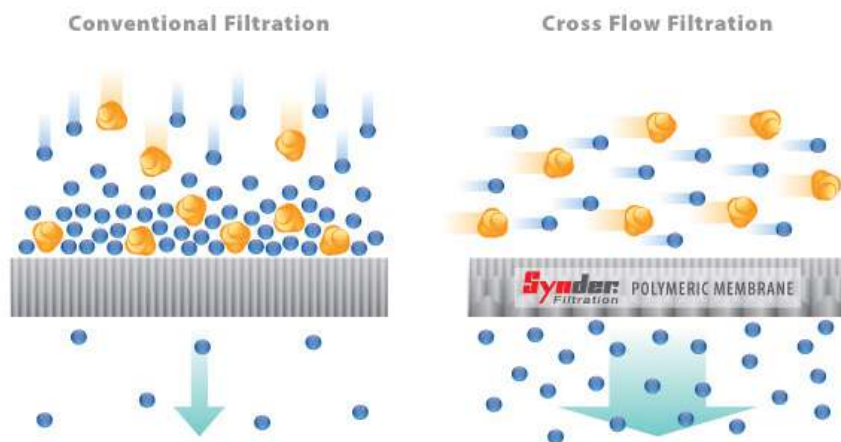
CROSS FLOW PROCESS

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).

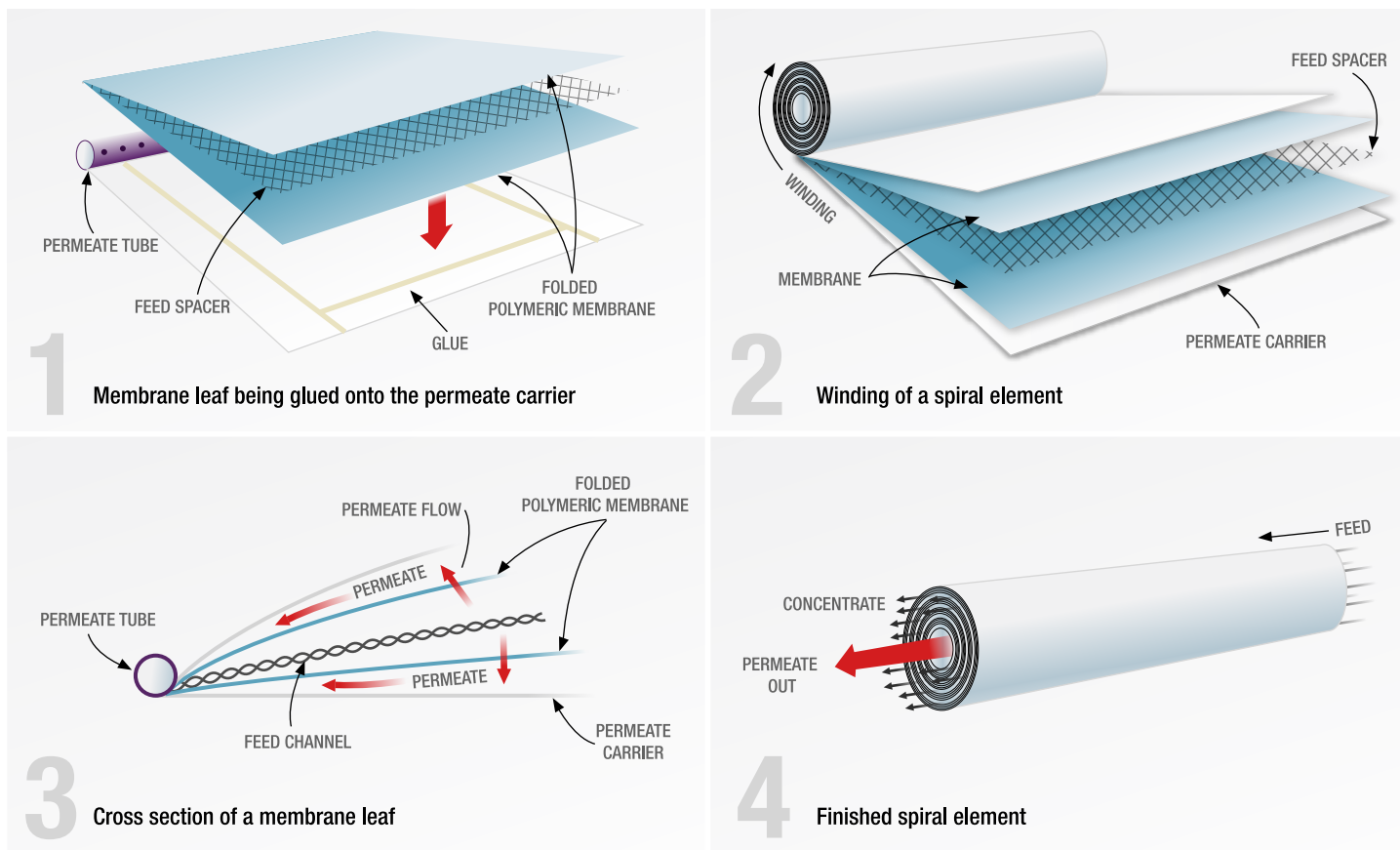


CONVENTIONAL V. CROSS FLOW

Synder's spiral wound membranes are designed for cross flow (or tangential 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 sweeping (or sheering) 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





UF-201



NF-UF-202



NF-UF-402



Flat Sheet Test Loop



Forging New Applications & Optimizing Existing Ones

Finding Solutions With Membrane Technology

With over 20 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 process.

DAIRY INDUSTRY

Whey Protein Concentrate/Isolate Production

Synder has been serving the dairy industry since 1994 and has become a leading supplier worldwide for this application.

RECOMMENDED MEMBRANES VT (3kD), MT (5kD), ST (10kD), NFG (600-800)

Lactose Concentration & Demineralization

Synder's membranes offer an optimal combination of lactose yield, flux, and demineralization of UF permeate or whey.

RECOMMENDED MEMBRANES NFS (100-250Da), NFX (150-300Da)

Milk Protein Concentrate/Isolate

Synder originally developed this membrane specifically for milk protein concentration in 1999. Today, it's used in dairies worldwide.

RECOMMENDED MEMBRANES SM (20kD), MK (30kD), MQ (50kD)

Casein/Whey Fractionation

Synder's membranes can separate these high value proteins with incredible efficiency.

RECOMMENDED MEMBRANES FR (800kD), V0.1 (0.1µm)

Fat/Microbial Removal

Microfiltration membranes are used for fat and microbial removal in the production of high purity WPC & WPIs. Users typically experience significant cost savings in both CAPEX and OPEX vs. ceramic membranes.

RECOMMENDED MEMBRANES FR (800kD)

Brine Clarification

Ultrafiltration membranes are proven to economically clarify and recover the brine used in the curing of cheese.

RECOMMENDED MEMBRANES BN (50kD)

High pH & Temperature Feed Solutions

Membrane sanitization without the use of chlorine is now a reality.

RECOMMENDED MEMBRANES UF/MF MAX

BIOTECH & PHARMACEUTICAL

Enzyme Concentration

UF and MF membranes are the standard for enzyme concentration and clarification/removal of cell bodies, respectively.

RECOMMENDED MEMBRANES MT (5kD), ST (10kD), FR (800kD), V0.1 (0.1µm)

Antibiotics Production

NF membranes can be used to process a wide range of antibiotics with consistent product purity and performance.

RECOMMENDED MEMBRANES NFX (150-300Da)

Blood Serum

Synder's Nanofiltration membranes are capable of capturing fibrinogen and other clotting compounds with excellent efficiency.

RECOMMENDED MEMBRANES NFX (150-300Da)

Endotoxin & Pyrogen Removal

Synder UF and MF membranes can efficiently remove endotoxins, pyrogens, microbes, and bacteria.

RECOMMENDED MEMBRANES MT (5kD), ST (10kD), V0.1 (0.1µm)

Polypeptide Concentration

NF membranes can concentrate and purify polypeptides while providing outstanding quality and consistency in operation.

RECOMMENDED MEMBRANES NFW (300-500Da), NFG (600-800Da), XT (1kD)

Common Applications

FOOD & BEVERAGE

Corn Wet Milling

Membranes ranging from MF to NF are commonly used in the wet milling of corn. Numerous applications range from the removal of microorganisms to the concentration and clarification of corn syrup, just to name a few.

RECOMMENDED MEMBRANES NFX (150-300Da), NFW (300-500Da), LX (300kD), FR (800kD), V0.1 (0.1µm)

Gelatin Concentration

Synder's Ultra & Microfiltration membranes provide optimal retention rates for concentrating gelatin while removing unwanted microorganisms.

RECOMMENDED MEMBRANES MT (5kD), ST (10kD)

Juice Processing

Synder's Ultra and Nanofiltration membranes consistently display excellent removal of starch, pectin, proteins, and polyphenolic compounds. Microfiltration can also be utilized for the removal of microorganisms.

RECOMMENDED MEMBRANES NFX (150-300Da), MT (5kD), ST (10kD), FR (800kD), V0.1 (0.1µm)

Natural Polymers & Xanthan Gum

Synder's MF and NF membranes provide an optimal combination of retention rates and throughput required for commercial production while removing harmful microorganisms.

RECOMMENDED MEMBRANES V0.1 (0.1µm), NFX (150-300Da)

Dealcoholization

NF membranes can remove alcohol efficiently with minimal effect to flavor profile.

RECOMMENDED MEMBRANES NFX (150-300Da), NFW (300-500Da)

Maple Syrup

Concentrating maple sap with spiral wound membranes can reduce overall processing time and operating costs.

RECOMMENDED MEMBRANES NFX (150-300Da)



The Synder Difference

INDUSTRY LEADING SHIPPING TIMES

As a family-owned and financially independent company, we can afford to hold higher inventory levels and ship orders as quickly as possible. Synder Filtration constantly invests in large and diverse inventories of the most common membrane element models and sizes. This inventory matched with a global distribution network allows Synder to get you what you need, when you need it.

PERSONAL RESPONSE POLICY

Synder Filtration has a company-wide policy of personally responding to every customer inquiry within 24 hours. Whether your company employs 10 people or 10,000 people, we offer the same responsiveness and expertise that you've come to expect from your most preferred vendors.



CUSTOM ELEMENTS & PRODUCT DEVELOPMENT

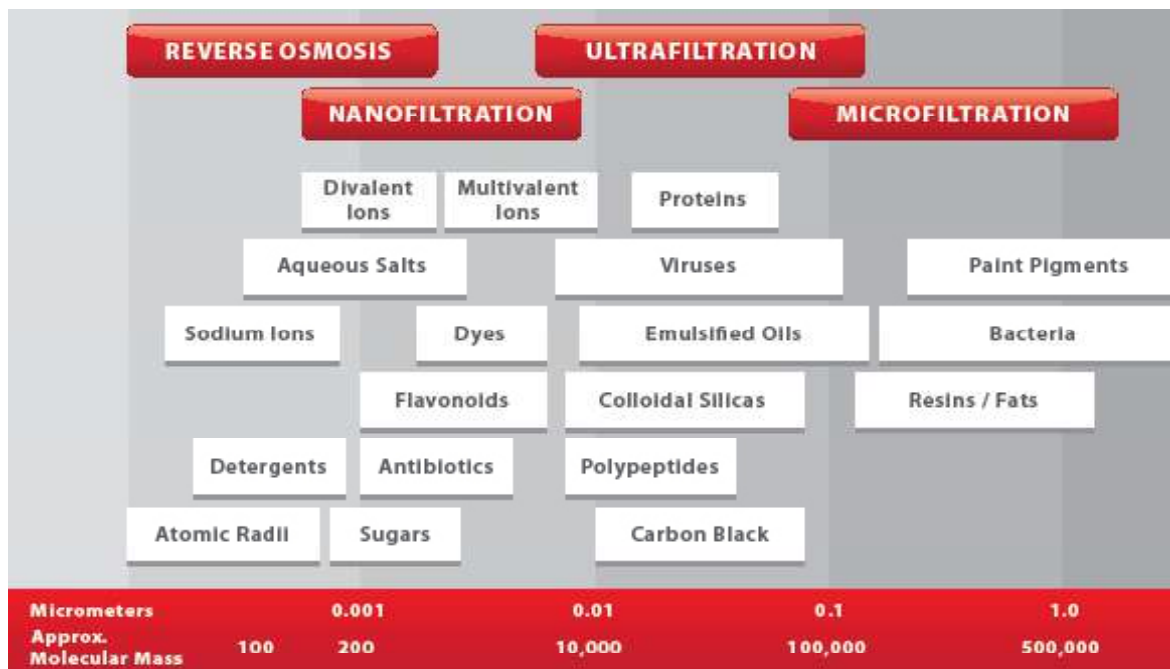
We have developed one of the widest ranges of Ultrafiltration membrane molecular weight cutoffs of any manufacturer in the world. Our product line continues to evolve with the needs of our customers. With a highly flexible production strategy, we can alter our manufacturing schedule to incorporate rush orders of the most uncommon models and sizes.

QUALITY POLICY

At Synder, we believe quality is rooted in the overall customer experience, from the initial inquiry all the way through final technical support and maintenance. Synder is proud to be ISO-9001:2015 certified. We pride ourselves in delivering a premium product and meeting the specific application needs of our customers.



Degrees of Separation



NOTE: 1 MICROMETER (MICRON) = 4×10^{-5} INCHES = 1×10^4 ANGSTROM UNITS

Nanofiltration Membrane Elements

Synder Filtration's Nanofiltration membranes are engineered and designed to provide superior separation performance for various application needs. Delivering stable flux and wide range of rejection to monovalent and divalent ions, Synder's NF membranes have been developed specifically for specialty 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
NFS	Proprietary PA TFC	100-250Da	30-40 GFD	99.5%	99.5%	50.0%
NFX	Proprietary PA TFC	150-300Da	20-25 GFD	99.0%	99.0%	40.0%
NFW	Proprietary PA TFC	300-500Da	45-50 GFD	98.5%	97.0%	20.0%
NFG	Proprietary PA TFC	600-800Da	55-60 GFD	60.0%	50.0%	10.0%

¹Test Conditions 2% Lactose Solution at 110PSI (7.6 Bar) operating pressure, 77° F (25°C)

²Test Conditions 2,000ppm MgSO₄ Solution at 110PSI (7.6 Bar) operating pressure, 77° F (25°C)

³Test Conditions 2,000ppm NaCl Solution at 110PSI (7.6 Bar) operating pressure, 77° F (25°C)

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.

Call or Email Synder today with the following information to have an element made to your exact specifications:

- Element Outer Diameter/Housing Inner Diameter
- Permeate Tube Diameter
- Element Length

DAIRY PRODUCTS TOTAL SOLIDS LIMITS

Dairy Product Total Solids Limits	Spacer			
	31	46	65	80
Sweet Whey Max. T.S.	15	25	28	30
Acid Whey Max. T.S.	15	24	26	28
Skim Milk Max. T.S.	14	24	26	28
Whole Milk Max. T.S.	15	30	33	35

SANITARY ELEMENT OPERATING SPECIFICATIONS

Pressure	PSI	Bar
Max. Operating Pressure if T<95°F (35°C)	600	41.4
Max. Operating Pressure if T>95°F (35°C)	435	30.0
Max. Pressure Drop per Element	15	1.0
Max. Pressure Drop per Housing	60	4.1

Temperature	Fahrenheit	Celsius
Max. Continuous Operation	122°	50°
Max. CIP Temperature	104°	40°

pH Parameters	pH
Operating Parameters	At Max Temp. - NFS/NFX: 3-9.5
	NFW/NFG: 4-9
	At Ambient Temp. - NFS/NFX: 3-10.5
Cleaning Parameters	NFW/NFG: 4-10
	At Max Temp. - NFS/NFX: 2-11
	NFW/NFG: 3-10
Chlorine	At Ambient Temp. - NFS/NFX: 2-11
	NFW/NFG: 3-10.5

Chlorine
Dechlorination recommended

NOTE: Trials should be made to determine temperature and viscosity effects. Ribbed spacers are also available for high solids applications.

NF Spiral-Wound Sanitary Elements

DIMENSIONS & WEIGHT

Element	Model Number	Diameter (B) in (cm)	Length (A) in (cm)	PWT ID/OD in (cm)	Tube Extension (C) in (cm)	Dry Weight lb (kg)
1.8"	1812F	1.8 (4.6)	12 (30.5)	0.625 (1.6)	-	1.0 (0.5)
2.5"	2540F	2.4 (6.1)	40.0 (101.6)	0.625 (1.6)	-	4.0 (1.8)
	2540M	2.4 (6.1)	40.0 (101.6)	-	1 (2.5) (Both Ends)	4.0 (1.8)
3.8"	3838	3.8 (9.7)	38.0 (96.5)	0.831 (2.1)	-	9.0 (4.1)
	3838.75	3.8 (9.7)	38.75 (98.4)	0.831 (2.1)	-	9.0 (4.1)
8"	8038	7.9 (20.1)	38.0 (96.5)	1.125 (2.9)	-	29 (13.2)
	8040	7.9 (20.1)	40.0 (101.6)	1.125 (2.9)	-	29 (13.2)

Membrane Model

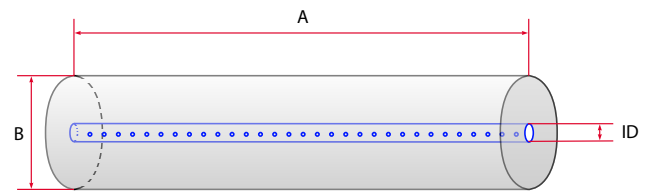
NFX - 2B - 3838

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

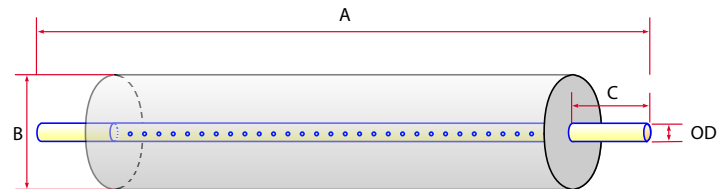
Outerwrap

A = Control Bypass with Tail

B = Control Bypass without Tail



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	0.7	0.7	0.7	0.9	0.9
	gpm	3	3	3	4	4
2.5"	m ³ /hr	1.4	1.4	1.6	1.6	1.8
	gpm	6	6	7	7	8
3.8"	m ³ /hr	6	7	8	8	9
	gpm	26	29	33	36	38
8"	m ³ /hr	16	18	21	23	24
	gpm	68	76	89	98	103

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

NF MEMBRANE AREAS (SQ FT)

		Feed Spacer (in mils)				
Element		24	31	46	65	80
1812F		4.8	5.0	3.0	2.3	1.9
2540F		38	30	22	19	15
2540M		36	28	20	18	14
3838		100	87	68	52	43
3838.75		104	89	69	53	44
8038		450	400	300	240	200
8040		450	400	300	240	200

TECHNICAL NOTES

For element sizes not listed, please call or email Synder Filtration for details. We can design an element to fit your exact needs - just specify the element outer diameter (OD) or vessel/housing inner diameter (ID), element inner diameter (ID), and length. Elements are available with or without a controlled bypass tail. Additional feed spacers are also available.

Trials should be conducted to determine optimal application conditions.

Ultrafiltration & Microfiltration Elements

Synder Filtration's Ultrafiltration and Microfiltration elements offer an optimal combination of both flux and rejection in a comprehensive range of MWCOs.

STANDARD SERIES BENEFITS

- Conforms to 3-A, FDA, and USDA sanitary standards
- Wide range of UF MWCO's available
- Good resistance to pH and temperature
- High resistance to fouling
- Customizable dimensions for unique housings

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
BN	50,000	PVDF
BY	100,000	PVDF
BX	250,000	PVDF
A6	500,000	PVDF
FR	800,000	PVDF
V0.1	0.1 μ m	PVDF
V0.2	0.2 μ m	PVDF



SANITARY ELEMENT OPERATING SPECIFICATIONS

Pressure	PSI	Bar
Max. Inlet Pressure	120	8.3
Min. Outlet Pressure	10	0.7
Max. Differential Pressure per Element	18	1.2
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	131°	55°
Max. CIP Temperature	122°	50°

pH Parameters	pH
Operating Parameters	At Max Temp. - PES/PVDF: 3-9 PAN: 3-10.5 At Ambient Temp. - PES/PVDF: 2-10 PAN: 3-10
Cleaning Parameters	At Max Temp. - PES/PVDF: 2-11 PAN: 3-10.5 At Ambient Temp. - PES/PVDF: 1.8-11 PAN: 3-10

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.

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%

Dairy Product Total Solids Limits	Spacer (in mils)			
Products	31	46	65	80
Sweet Whey Max. T.S.	15	25	28	30
Acid Whey Max. T.S.	15	24	26	28
Skim Milk Max. T.S.	14	24	26	28
Whole Milk Max. T.S.	15	30	33	35

NOTE: Trials should be made to determine temperature and viscosity effects. Ribbed spacers are also available for high solids applications.

UF/MF Spiral-Wound Sanitary Elements

ELEMENT DIMENSIONS

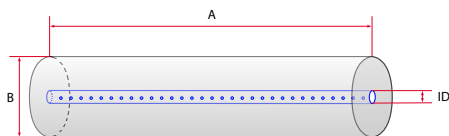
Element	Model No.	Diameter (B) in	Length (A) in	P.W.T. ID
1.8"	1812F	1.8	12	0.63
2.5"	2519	2.5	19.25	0.63
	2540F	2.5	40	0.63
	2540M*	2.5	38	0.75*
3.8"	3838	3.8	38	0.83
	3838.75	3.8	38.75	0.83
	3850	3.8	50	0.83
	3938.75	4.0	38.75	0.63
4.3"	4333	4.3	33	0.83
	4335	4.3	35	0.83
	4335.5	4.3	35.5	0.83
	4336	4.3	36	0.83
	4338	4.3	38	0.83
5.8"	5838	5.8	38	1.14
6.3"	6338	6.3	38	1.14
	6324	6.3	24	1.14
6.4"	6438	6.4	38	1.14
	6424	6.4	24	1.14
7.8"	7838	7.8	38	1.14
	7824	7.8	24	1.14
8"	8038	8.0	38	1.14
	8040	8.0	40	1.14
	8238	8.2	38	1.14
	8240	8.2	40	1.14
	8338	8.3	38	1.14
9"	9838	9.8	38	1.14
10"	10338	10.3	38	1.14

*1" permeate tube extensions (0.75" OD)

RECOMMENDED ELEMENT CROSS FLOW RATE

		Feed Spacer (in mils)				
Element		24	31	46	65	80
1.8"	m ³ /hr	1	1	1	2	2
	gpm	4	5	6	7	7
2.5"	m ³ /hr	2	2	3	3	3
	gpm	9	10	11	12	13
3.8"	m ³ /hr	5	6	7	8	8
	gpm	22	25	29	33	35
4.3"	m ³ /hr	6	7	9	10	10
	gpm	29	32	38	44	46
5.8"	m ³ /hr	12	13	16	18	19
	gpm	51	59	69	78	83
6.3"	m ³ /hr	15	17	20	22	24
	gpm	65	74	88	99	105
8"	m ³ /hr	21	24	29	33	35
	gpm	94	107	128	143	154
10"	m ³ /hr	42	48	57	64	68
	gpm	184	213	250	283	299

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



Membrane Model **ST - 2B - 6338**

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

Outerwrap
A = Control Bypass with Tail
B = Control Bypass without Tail

MEMBRANE AREA (SQ FT)

		Feed Spacer (in mils)				
Element	Model No.	24	31	46	65	80
1.8"	1812F	4.3	3.6	2.9	2.1	1.8
	2519	15	13	10	8	7
2.5"	2540M	34	29	22	17	15
	2540F	35	30	23	18	16
	3838	85	72	58	46	38
3.8"	3838.75	86	74	59	47	39
	3850	100	84	70	52	46
	3938.75	102	89	69	53	47
	4333	99	86	66	53	44
4.3"	4335	105	91	71	56	47
	4335.5	107	93	72	57	48
	4336	108	94	73	58	49
	4338	115	100	77	62	52
5.8"	5838	210	184	147	114	96
6.3"	6324	150	134	107	83	70
	6338	246	220	176	136	115
6.4"	6424	157	140	112	83	74
	6438	258	230	184	136	122
7.8"	7824	242	210	166	132	110
	7838	396	344	273	216	180
8"	8038	414	368	287	225	189
	8040	414	368	287	225	189
	8238	441	384	302	238	201
	8240	441	384	302	238	201
	8338	450	400	311	245	207
9"	9838	N/A	564	440	351	296
10"	10338	N/A	620	492	386	326

TECHNICAL NOTES

For element sizes not listed, please call or email Synder Filtration for details. We can design an element to fit your exact needs - just specify the element outer diameter (OD) or vessel/housing inner diameter (ID), element inner diameter (ID), and length. Elements are available with or without a controlled bypass tail. Trials should be conducted to determine optimal application conditions.

Element Descriptions					
Model No.	OD (in.)	L (in.)	ID* (in.)	Weight (lb)	Weight (kg)
1812F	1.8	12	0.63	1	0.5
2519	2.5	19.25	0.63	2	0.9
2540F	2.5	40	0.63	4	1.8
2540M	2.5	38	0.75*	4	1.8
3838	3.8	38	0.83	10	4.5
3838.75	3.8	38.75	0.83	10	4.5
3850	3.8	50	0.83	13	5.9
3938.75	4.0	38.75	0.63	10	4.5
4333	4.3	33	0.83	11	5.0
4335	4.3	35	0.83	11	5.2
4335.5	4.3	35.5	0.83	11	5.2
4336	4.3	36	0.83	11	5.2
4338	4.3	38	0.83	12	5.4
5838	5.8	38	1.14	15	7
6338	6.3	38	1.14	16	7
6324	6.3	24	1.14	17	7.7
6438	6.4	38	1.14	29	13.2
6424	6.4	38	1.14	18	8.2
7838	7.8	38	1.14	40	18.2
7824	7.8	24	1.14	26	11.8
8038	8.0	38	1.14	38	17.2
8040	8.0	40	1.14	39	17.7
8238	8.2	38	1.14	38	17.2
8240	8.2	40	1.14	40	18
8338	8.3	38	1.14	40	18
8340	8.3	40	1.14	40	18
9838	9.8	38	1.14	42	19.1
10338	10.3	38	1.14	50	22.7

*1" permeate tube extensions (0.75" OD). Specifications are subject to change without notice.

High Temperature / pH (MAX Series)

Synder Filtration's MAX Series Elements offer exceptional physical and chemical durability, in the same wide range of MWCO's as our standard UF elements.

MAX SERIES BENEFITS

- Conforms to 3-A, FDA, and USDA sanitary standards
- Hot sanitization eliminates chlorine during CIP
- High resistance to pH and temperature
- High resistance to fouling
- Customizable dimensions for unique housings

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
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

NOTE: Trials should be made to determine temperature and viscosity effects. Ribbed spacers are also available for high solids applications.



MAX SANITARY ELEMENT OPERATING SPECS

Pressure	PSI	Bar
Max. Inlet Pressure	120	8.3
Min. Outlet Pressure	10	0.7
Max. Differential Pressure per Element	18	1.2
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	185°	85°

pH Parameters	pH
Operating Parameters	At Max Temp. - PES: 2-10 PVDF: 3-10 At Ambient Temp. - PES: 2-10.5 PVDF: 2-10.5
Cleaning Parameters	At Max Temp. - PES: 2-11 PVDF: 2-11 At Ambient Temp. - PES: 2-12.5 PVDF: 2-12

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)	150	180

Dairy Product Total Solids Limits	Spacer (in mils)			
Products	31	46	65	80
Sweet Whey Max. T.S. %	15	25	28	30
Acid Whey Max. T.S. %	15	24	26	28
Skim Milk Max. T.S. %	14	24	26	28
Whole Milk Max. T.S. %	15	30	33	35

MAX Spiral-Wound Sanitary Elements

ELEMENT DIMENSIONS

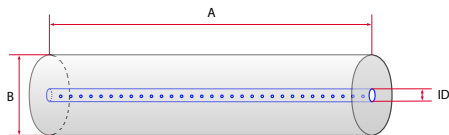
Element	Model No.	Diameter (B) in	Length (A) in	P.W.T. ID
1.8"	1812F	1.8	12	0.63
2.5"	2519	2.5	19.25	0.63
	2540F	2.5	40	0.63
	2540M*	2.5	38	0.75*
3.8"	3838	3.8	38	0.83
	3838.75	3.8	38.75	0.83
	3850	3.8	50	0.83
	3938.75	4.0	38.75	0.63
4.3"	4333	4.3	33	0.83
	4335	4.3	35	0.83
	4335.5	4.3	35.5	0.83
	4336	4.3	36	0.83
	4338	4.3	38	0.83
5.8"	5838	5.8	38	1.14
6.3"	6338	6.3	38	1.14
	6324	6.3	24	1.14
6.4"	6438	6.4	38	1.14
	6424	6.4	24	1.14
7.8"	7838	7.8	38	1.14
	7824	7.8	24	1.14
8"	8038	8.0	38	1.14
	8040	8.0	40	1.14
	8238	8.2	38	1.14
	8240	8.2	40	1.14
	8338	8.3	38	1.14
	8340	8.3	40	1.14
9"	9838	9.8	38	1.14
10"	10338	10.3	38	1.14

*1" permeate tube extensions (0.75" OD)

RECOMMENDED ELEMENT CROSS FLOW RATE

		Feed Spacer (in mils)				
Element		24	31	46	65	80
1.8"	m ³ /hr	1	1	1	2	2
	gpm	4	5	6	7	7
2.5"	m ³ /hr	2	2	3	3	3
	gpm	9	10	11	12	13
3.8"	m ³ /hr	5	6	7	8	8
	gpm	22	25	29	33	35
4.3"	m ³ /hr	6	7	9	10	10
	gpm	29	32	38	44	46
5.8"	m ³ /hr	12	13	16	18	19
	gpm	51	59	69	78	83
6.3"	m ³ /hr	15	17	20	22	24
	gpm	65	74	88	99	105
8"	m ³ /hr	21	24	29	33	35
	gpm	94	107	128	143	154
10"	m ³ /hr	42	48	57	64	68
	gpm	184	213	250	283	299

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



Membrane Model **ST - 2B - 6338-MAX**

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

Outerwrap
 A = Control Bypass with Tail
 B = Control Bypass without Tail

MEMBRANE AREA (SQ FT)

		Feed Spacer (in mils)				
Element	Model No.	24	31	46	65	80
1.8"	1812F	4.3	3.6	2.9	2.1	1.8
2.5"	2519	15	13	10	8	7
	2540M	34	29	22	17	15
	2540F	35	30	23	18	16
3.8"	3838	85	72	58	46	38
	3838.75	86	74	59	47	39
	3850	100	84	70	52	46
	3938.75	102	89	69	53	47
4.3"	4333	99	86	66	53	44
	4335	105	91	71	56	47
	4335.5	107	93	72	57	48
	4336	108	94	73	58	49
	4338	115	100	77	62	52
5.8"	5838	210	184	147	114	96
6.3"	6324	150	134	107	83	70
	6338	246	220	176	136	115
6.4"	6424	157	140	112	83	74
	6438	258	230	184	136	122
7.8"	7824	242	210	166	132	110
	7838	396	344	273	216	180
8"	8038	414	368	287	225	189
	8040	414	368	287	225	189
	8238	441	384	302	238	201
	8240	441	384	302	238	201
	8338	450	400	311	245	207
	8340	450	400	311	245	207
9"	9838	N/A	564	440	351	296
10"	10338	N/A	620	492	386	326

TECHNICAL NOTES

For element sizes not listed, please call or email Synder Filtration for details. We can design an element to fit your exact needs - just specify the element outer diameter (OD) or vessel/housing inner diameter (ID), element inner diameter (ID), and length. Elements are available with or without a controlled bypass tail. Additional feed spacers are also available. Trials should be conducted to determine optimal application conditions.

Element Descriptions					
Model No.	OD (in.)	L (in.)	ID* (in.)	Weight (lb)	Weight (kg)
1812F	1.8	12	0.63	1	0.5
2519	2.5	19.25	0.63	2	0.9
2540F	2.5	40	0.63	4	1.8
2540M	2.5	38	0.75*	4	1.8
3838	3.8	38	0.83	10	4.5
3838.75	3.8	38.75	0.83	10	4.5
3850	3.8	50	0.83	13	5.9
3938.75	4.0	38.75	0.63	10	4.5
4333	4.3	33	0.83	11	5.0
4335	4.3	35	0.83	11	5.2
4335.5	4.3	35.5	0.83	11	5.2
4336	4.3	36	0.83	11	5.2
4338	4.3	38	0.83	12	5.4
5838	5.8	38	1.14	15	7
6338	6.3	38	1.14	16	7
6324	6.3	24	1.14	17	7.7
6438	6.4	38	1.14	29	13.2
6424	6.4	38	1.14	18	8.2
7838	7.8	38	1.14	40	18.2
7824	7.8	24	1.14	26	11.8
8038	8.0	38	1.14	38	17.2
8040	8.0	40	1.14	39	17.7
8238	8.2	38	1.14	38	17.2
8240	8.2	40	1.14	40	18
8338	8.3	38	1.14	40	18
8340	8.3	40	1.14	40	18
9838	9.8	38	1.14	42	19.1
10338	10.3	38	1.14	50	22.7

*1" permeate tube extensions (0.75" OD). Specifications are subject to change without notice.

Flat Sheet Membranes

Synder Filtration offers its 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
NFS	NF	TFC	100-250
NFX	NF	TFC	150-300
NFW	NF	TFC	300-500
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

¹Not Approved for Use in Food Contact Applications

MODEL INFORMATION

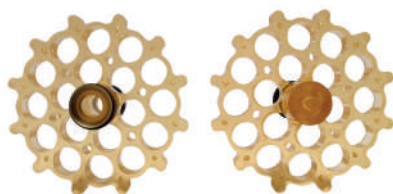
Size	Wet/Dry	Notes
12" x 12"	Both Available	Custom Sizes / Shapes Available
1m x 1m	Both Available	Custom Sizes / Shapes Available
Dry Roll	Dry Only	800 Linear Foot Minimum

Membrane Accessories & Spare Parts

Synder Filtration stocks large inventories of the accessories and spare parts required for membrane installation and operation. With a wide range of Anti-Telescoping Devices (ATDs) and lip seals to fit all of our sanitary membranes, Synder can supply or replace these accessories with exceptional speed to help prevent delays in production or pilot testing. We can also provide full sanitary grade housings for our elements, which can be customized to fit any system. Contact us to find the most appropriate ATD, lip seal, or housings for your process.



6" & 8" POLYSULFONE ATDS



3.8" POLYSULFONE ATD INTERCONNECTOR & END PLUG

ANTI-TELESCOPING DEVICES (ATDs)

Size	Configuration	Materials	Features
3.8"	ATD Interconnector	Polysulfone	Industry Standard, Chemically Robust
3.8"	ATD End Plug		
6.3"	ATD Interconnector	Stainless Steel 304	Designed For High Temp / High Pressure Feed Solutions
6.3/8.0"	ABS End Plug		
8.0"	ATD Interconnector		
8.0"	8040 Interconnector		

*Contact Synder for custom sizes.



EPDM LIP SEALS



VITON LIP SEALS

LIP SEALS

Size	Corresponding Element OD	Available Materials
0.831"	3.8", 4.3"	EPDM, Viton
1.138"	6.3", 8.0"	EPDM, Viton

Materials	Features
EPDM	Industry Standard
Viton	Greater Chemical, Temperature, Solvent Resistivity



2519



2540



3838

SANITARY GRADE HOUSINGS

Model	Corresponding Element	Available Materials
2519	UF/MF/NF 2519	Stainless Steel 304 & Tri-Clamp Fittings
2540	UF/MF/NF 2540	Stainless Steel 304 & Tri-Clamp Fittings
3838	UF/MF/NF 3838	Stainless Steel 304 & Tri-Clamp Fittings

*Contact Synder for additional sizes.

Element Installation Procedures

Outerwrap “Without Tail”

Spiral elements must fit snugly in their vessels in order for them to function properly. If a loose-fitting element is put into operation, one of two unfavorable consequences may result:

- a) Too much liquid will by-pass the element, going around rather than through it. This can result in lower fluxes, more rapid membrane fouling, lower permeate flow, longer cleaning times, and increased costs of cleaning chemicals.
- b) A loose-fitting spiral element may lose some physical integrity by expanding to fit the housing. This can result in buckling, wrinkling, and/or “channeling” which may cause a premature leakage of the membrane.

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 taken to limit exposure. The elements should undergo a standard cleaning (CIP) procedure prior to start up to ensure that preservative has been fully rinsed, and that final rinse water is at a neutral pH.

Recommended Equipment: Sharp knife or scissors, gloves, safety glasses, and 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. If preservative fumes are uncomfortable for some, allow bags to air out for 30-60 minutes after opening.
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. Attempt to install the element into the pressure vessel. It should fit snugly. Be sure to examine Anti-Telescoping Devices (ATD's) and lip seals and replace if needed.
4. Lip seals should be well lubricated prior to installation with a non-petroleum based lubricant such as glycerine or any mild household liquid detergent. Inserting the ATD with lip seals should be done with a slow twisting motion to ensure a good seat and to prevent leakage.
5. A sufficient flush should be performed on all elements prior to start-up. Clean water at 122°F (50°C) should be used in a non-recirculating mode for at least 10 minutes after installation. This should remove all preservative solutions, glycerine, etc. and will help ensure successful membrane performance. The element should be at a neutral pH and thoroughly flushed prior to start-up. Additionally, a caustic wash is recommended as well prior to start-up. For UF/MF a 30min rinse and 120-125°F (49-52°C) is sufficient, while NF is recommended to have two caustic washes (15min each) at 115-118°F (46-48°C) with clean water rinses in between. The element should be at a neutral pH and thoroughly flushed prior to start-up. See specsheets for pH range limitations.
6. The element is now ready for start-up. Feed and/or recirculation pumps should “ramp-up” RPM's slowly to prevent the element from being shocked. Variable Frequency Drives (VFD's) are recommended for all feed and recirculation pumps to safely control pump RPM's.
7. Synder Filtration requires 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 claim:
 - a) Flows (feed, permeate, concentrate)
 - b) Pressures (feed, permeate, concentrate)
 - c) Operating temperatures (production and CIP)
 - d) Hours of operation (production and CIP)
 - e) Other cleaning parameters (pH, time, chlorine exposure)
 - f) Unexpected events (system upsets, unscheduled shutdowns, etc.)

Outerwrap “With Tail”

To further improve the fit of the element in the vessel, Synder Filtration offers a “trim-to-fit” outerwrap. The inner diameter can sometimes vary between vessels and this allows for a customized fit for each vessel.

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 taken to limit exposure.

Recommended Equipment: Sharp knife or scissors, gloves, safety glasses, and 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. If preservative fumes are uncomfortable for some, allow bags to air out for 30-60 minutes after opening. Remove the tape strips from 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. Attempt to install the element into the pressure vessel.
4. If the element does not fit snugly, 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.
5. Examine Anti-Telescoping Devices (ATD’s) and lip seals and replace if needed.
6. Lip seals should be well lubricated prior to installation with a non-petroleum based lubricant such as glycerine or any mild household liquid detergent. Inserting the ATD with lip seals should be done with a slow twisting motion to ensure a good seat and to prevent leakage.
7. A sufficient flush should be performed on all elements prior to start-up. Clean water at 122°F (50°C) should be used in a non-recirculating mode for at least 10 minutes after installation. This should remove all preservative solutions, glycerine, etc. and will help ensure successful membrane performance. The element should be at a neutral pH and thoroughly flushed prior to start-up. Additionally, a caustic wash is recommended as well prior to start-up. For UF/MF a 30min rinse and 120-125°F (49-52°C) is sufficient, while NF is recommended to have two caustic washes (15min each) at 115-118°F (46-48°C) with clean water rinses in between. The element should be at a neutral pH and thoroughly flushed prior to start-up. See specsheets for pH range limitations.
8. 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. Variable Frequency Drives (VFD’s) are recommended for all feed and recirculation pumps to safely control pump RPMs.
9. Synder Filtration requires 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 claim:
 - a) Flows (feed, permeate, concentrate)
 - b) Pressures (feed, permeate, concentrate)
 - c) Operating temperatures (production and CIP)
 - d) Hours of operation (production and CIP)
 - e) Other cleaning parameters (pH, time, chlorine exposure)
 - f) Unexpected events (system upsets, unscheduled shutdowns, etc.)

Standard Cleaning Guidelines

The following procedure is a general guideline for the cleaning/sanitization of spiral elements for most food and dairy applications. 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 122°F/50°C (or 104°F/40°C for NF), 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 (122°F/50°C, or 104°F/40°C for NF) 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 (pH 10.5 for NFW/NFG/PZ/PY/PX).**
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 (pH 10.5 for PZ/PY/PX).**
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.

Note: See water quality standards for "clean water" on pg. 20.

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.

Cleaning Guidelines for High pH/Temperature

The following procedure is a general guideline for the cleaning/sanitization of MAX spiral elements for most food and dairy applications. MAX elements have the advantage of hot sanitization while eliminating the use of chlorine. In addition, the cleaning time for MAX elements is typically 2-4 times faster than traditional cleaning procedures.

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 122°F/50°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 hot clean water (122°F/50°C) through the system under standard pressure and flow parameters.
2. Add caustic SLOWLY to achieve a pH of 12.5. **DO NOT EXCEED pH 11 at 50°C. (pH12.5 for PES and pH 11 for PVDF at ambient temperatures)**
3. Circulate caustic solution for 10 minutes.
4. Flush the system to drain with clean, warm water (same temperature as before).

Acid Wash

1. Circulate warm clean water 122°F/50°C 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.
3. Circulate acid solution for 20 minutes.

High Temperature/pH Sanitation

1. Circulate warm clean water 185°F (85°C) through the system under standard pressure and flow parameters.
2. Add caustic SLOWLY to achieve a pH of 11. **DO NOT EXCEED pH 11.**
3. Circulate the caustic solution for 10 minutes.
4. Flush the system to drain with clean, warm water 122°F/50°C.

Note: See water quality standards for "clean water" on pg 20.

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.

Element Storage Procedures

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. (See caustic wash directions on p. 17 and 18)
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. Remove the element from the preservative and allow it to drain for approximately 10 seconds, then place the element back in the bag.
5. Seal the bag either via heat seal or waterproof tape. This should be done well to prevent any leakage during storage/transport.
6. 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.
7. Element storage in 50°F - 59°F (10°C - 15°C) will increase storage life of the elements. If refrigeration is possible, it is highly recommended by Synder Filtration.
8. Contact Synder Filtration prior to storing any elements to discuss any remaining element warranty.

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 our control. Synder Filtration assumes no liability as to the application of the previously mentioned guidelines.

Water Quality Guidelines For CIP

The quality of water used for flushing and cleaning Synder Filtration membranes is of utmost importance in order to avoid unwanted deposits on the membrane originating from the water. In most cases, municipal water does not qualify as “clean water”.

Special attention should be paid to possible foulants such as iron, manganese, and silicates. Clean water must meet the following specifications at all times:

FOULANT	REQUIREMENT
Iron (Fe)	<0.05ppm
Manganese (Mn)	<0.02ppm
Silicate (SiO ₂)	<5ppm
Aluminum (Al)	<0.05ppm
Hardness	<85ppm as CaCO ₃
Particle Size	<10 micron
Turbidity	<1 NTU

Membrane Customization

At Synder Filtration, we aim to provide quality products, technical expertise, and quick responsiveness. We take pride in collaborating closely with our customers to ensure consistent membrane performance and complete satisfaction with each product. Contact us today for more information about our membrane development program.



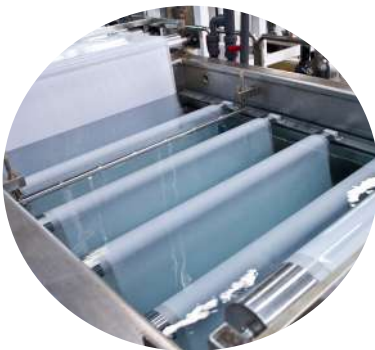
1. Customer submits membrane development inquiry to Synder Sales Dept. This helps us to gather vital information about potential usage for the membrane and establish project goals.

2. Inquiry review by R&D and Engineering Team. Synder's R&D and engineering staff will review the inquiry to assess the overall process goals and feasibility of the project. If approved, they will then put together a proposal for the customer highlighting the development plan, project timeline, and costs.



3. Customer approval. Once the proposal from R&D is sent to the customer, the account manager will schedule a review meeting or conference call to discuss the project and clarify any remaining questions. After everything is reviewed, the customer will then decide the next action steps for the project.

4. Research & development testing. If the proposal is approved by the customer and the plan is finalized, Synder's R&D team will work together to start developing potential membranes. For testing, multiple types of analysis can be provided including SEM imaging, FTIR analysis, contact angle measurements, TOC readings, molecular weight cut-off, and pore distribution.



5. Samples sent to customer. Once the analysis is completed, a summary report will be sent to the customer for examination. Lab samples may also be sent for further validation in their process and modifications to the membrane formulations can be made based on feedback from the customer.

Pilot Study Program

Many new membrane applications require pilot testing during their development phase. Synder offers an extensive pilot study program to help our customers develop innovative applications. As an industry leader in supporting research and development activities, we know the importance of having low cost, flexibility, and quick responsiveness.

Contact us today to learn more about our Pilot Study program. We look forward to serving you.

Pilot Studies at Synder's Laboratories

For the companies that prefer to let Synder's professionals gauge the feasibility or performance of their application, we run a full range of pilot and feasibility testing at Synder headquarters in Vacaville, CA, USA.

- Flat sheet feasibility tests and performance estimations with both single and eight bank cells which require 5 or 10 liter samples, respectively.
- Complete spiral wound Microfiltration, Ultrafiltration, and Nanofiltration pilot studies, done in-house for extended performance testing.



UF-201



NF-UF-202

Systems & Application Development

Membrane filtration systems are the heart of many separation processes. Application research, equipment design, and fabrication quality are all critical factors in the ultimate success of a project. To start, the proper membrane configuration must be selected. Although there are many formats to choose from such as plate & frame, hollow fiber, and tubular, spiral-wound membranes are often preferred due to their well-rounded balance of characteristics. Spiral elements feature excellent membrane packing density (unit area per unit volume), physical and chemical resistance, and unit cost. One important requirement of spiral membranes is that the vast majority of suspended solids and particulates must be removed via pre-filtration.

Synder Filtration is an ISO-9001:2015 certified manufacturer of spiral-wound membranes and membrane systems, capable of engineering and fabricating reverse osmosis, nanofiltration, ultrafiltration, and microfiltration membrane systems. Controls design and panel assembly are done in-house, giving us the ability to customize and modify process designs quickly and competently.

In addition, Synder offers a full service application development program, aimed at helping our customers research and prove out their separation performance with as much support as required from our experienced technical team. With our newly designed research & development laboratory and fleet of pilot systems, we are able to conduct a wide range of feasibility tests both in-house and on-site. Our unique and collaborative application development program offers great flexibility for further development in specialty process applications.



Feasibility Testing

At Synder Filtration, we take pride in providing technical expertise and personal collaboration with our customers. We strive to gain a better understanding of your process goals in order to develop a comprehensive testing plan designed to suit your separation needs. Our unique and collaborative application development program offers great flexibility for further development in specialty process applications.

1. Pilot Study RFQ Form Submission. 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 capabilities such as SEM, FTIR, BOD, TSS, and ICP, 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.



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Winner of the President's "E" Award for Exports

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