

AMS Membrane Series

CATALOGUE

Specialty Spiral Wound Elements

UNISOL MEMBRANE TECHNOLOGY

www.unisol-global.com



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Product Introduction

UNISOL MEMBRANE TECHNOLOGY is a membrane & membrane module supplier, providing a wide portfolio of products and seriousness in business proceedings according to customer needs.

AMS membrane series represent our chemically and thermally stable ultrafiltration (UF) and nanofiltration (NF) membranes and modules.

Today these membranes have become state of the art with significant improvement in the economics of organic and inorganic compounds recovery.

We offer a complete product line of extreme acid, alkaline, solvent, thermal- and pressure-stable membranes. Our core technology adds significant value in various applications and industries; by way of cost savings, improved recovery rates, greater supply reliability and clear environmental benefits.

AMS membrane series primarily are focused on the mineral extraction sector (mining) and industries with harsh operating environments such as: pharma, pulp, rayon, beverages and chemicals.

Product History

2000. Bio Pure Technology Ltd (BPT) is founded to develop novel NF membranes for industrial and agricultural applications.

2012. Former BPT is renamed into AMS Technologies (AMS) and belongs now to a group of investors from the mining industry.

2022. Integration of the AMS Technologies (AMS) products into the UNISOL Membrane Technology products portfolio. Today, UNISOL Membrane Technology markets products and continuously develops novel membranes to address complex tasks in various industries worldwide.

Project Approach

Initial assessment. Knowing the composition of the solution it is possible to carry out a simulation, which gives an approximate result of the separation. Clients are asked to provide details on solution's composition. This information enables UNISOL experts to provide an initial analysis.

Lab testing. After the initial analysis, it is recommended to follow up with laboratory testing. For the purpose of lab testing, UNISOL can provide the adequate testing modules or flat sheet membrane to determine feasibility

Proof of concept. Client together with UNISOL evaluates the preliminary business case of the application by analyzing potential benefits to expected costs.

Pilot plant. In collaboration with an EPC, UNISOL designs and builds a testing system at the client's site.

Full-scale plant. Lastly, an EPC will be engaged to fabricate the full-scale operating plant.



AMS Membrane Products Overview

Product Line	Stability	Membrane	Cut-off [Da]	pH Range	Typical Solutions
		A-3011	100	0 – 12	20% H ₂ SO ₄
	Acid	A-3012	200	0 – 12	20% HCl 4% HNO₃ 30% H₃PO₄
		A-3014	400	0 – 12	15% CH₃COOH
NanoPro™	Pace	B-4021	100	3 – 14	20% NaOH
NanoPro™	Base	B-4022	200	3 – 14	10% KOH
	Solvent	S-3011	100	2 – 12	 Methanol, Ethanol,
		S-3012	200	2 – 12	Propanol, Hexane, THF, Acetone, Acetonitrile,
		S-3014	400	2 – 12	Ethyl acetate, DMF
	Acid	A-U301	2,500	0 – 12	20% H₂SO₄ 20% HCl — 4% HNO₃
UltraPro™	Aciu	A-1801	10,000	0 – 12	30% H₃PO₄ 15% CH₃COOH
	Solvent	S-U301	2,500	2 – 12	Methanol, Ethanol, Propanol, Hexane, THF,
	Solvent	S-1801	10,000	2 – 12	Acetone, Acetonitrile, Ethyl acetate, DMF



AMS NanoPro™ A-3011

Acid Stable Nanofiltration Spiral Wound Element

Description	The AMS NanoPro™ membrane is developed for long-term performance with high and						
	stable fluxes in very acidic er	nvironment, featu	uring high pre	ssure and tem	perature		
	compatibility. AMS NanoPro™ elements are used for acid purification and metals concentration in low pH streams. Typical solutions include:						
	• 20% H ₂ SO ₄ • 20% HCl						
	• 30% H ₃ PO ₄ • 10% (CH₃COOH					
Performance	Cut-off Rate ⁽¹⁾ :	100 dalton					
	Water Flux ^(2, 3) :	65 liter/m²/hoน	ır (38 gal/ft/d	ay)			
	MgSO ₄ Rejection ^(2, 4) :	≥ 99 %					
Limits	Typical operating pressure:	15-40 bar (217-	-580 psi)				
	Max Pressure Drop:	0.5 bar (7.3 psi))				
	Max Temperature ⁽⁵⁾ :	Operating: 50 °	C (122 °F)				
		Cleaning: 50 °C	(122 °F)				
	pH Range ⁽⁵⁾ :	Operating: 0 – 12					
		Cleaning: 0 – 13	3				
	Recirculation Flow:	1.8" element: 4.0 – 8.0 liter/min (1.0 – 2.1 gal/min)					
		2.5" element: 7.5 – 17 liter/min (2.0 – 4.4 gal/min)					
		4" element: 22	– 42 liter/mir	n (5.8 – 11.1 ga	al/min)		
		8" element: 90	– 167 liter/m	in (23 – 42.7 g	gal/min)		
	Pressurization&	< 0.7 bar/secon	nd (10psi/seco	ond)			
	Depressurization rate						
	Heating & cool down rate	< 5°C /minute (41 °F/minute)			
Area	m ² (ft ²)	1812	2540	4040	8040		
	B 31 mil Spacer	0.32 (3.4)	1.8 (19)	6.2 (67)	29 (312)		
	C 46 mil Spacer	0.25 (2.7)	1.6 (17)	4.9 (53)	24 (260)		

⁽¹⁾ Only for indication;

⁽²⁾ Test conditions: pressure 40 bar (580 psi), temperature 30 °C (86 °F);

⁽³⁾ Flux measured with demineralized (RO) water, flux may vary for individual element within ±20% range;

⁽⁴⁾ Feed solution is 0.2% MgSO₄ in demineralized (RO) water;

⁽⁵⁾ Consult UNISOL Membrane Technology when intend to operate at elevated pressure, temperature or concentrations.



Dimensions Male Configuration Female Configuration C C mm (inch) 1812 2540 4040 8040 **Female** Male Male **Female** Type 305 (12) Α 965 (38.0) 965 (38.0) 1016 (40.0) B (Ø) 62 (2.4) 99.4 (3.9) 200.5 (7.9) 46 (1.8) 305 (12) 1016 (40.0) 1016 (40.0) 1016 (40.0) D (Ø) 19 (0.75) 16 (0.6) 19 (0.75) 28.8 (1.125)

Handling

Recommended Cleaning Materials. Depending on the nature of the feed material, a choice can be made among the following cleaning agents:

- Sodium hydroxide at pH 10 − 12, temperature ≤ 40 °C (104 °F);
- Hydrochloric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Nitric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Na-EDTA of 0.2 $^-$ 1.0 % w/w at pH 10.5 $^-$ 11, temperature \leq 35 °C (91 °F);
- Anionic surfactant (e.g. sodium dodecyl sulfate) of 0.5 % at pH 10.5 11, temperature \$\leq\$ 35 °C (91 °F).

Only demineralized (RO) water must be used for cleaning. Consult UNISOL Membrane Technology regarding the use of other cleaning materials.

Lubricants. During installation, use only water or glycerin to lubricate seals. The use of petroleum or vegetable-based oils or solvents may damage the element and void any warranty.

Preservation and Storage. Plan ahead to use new membranes. The element should not be allowed to dry: store it in a sealed bag, at $4-30\,^{\circ}\text{C}$ (39 $-86\,^{\circ}\text{F}$). Storage solutions should be made with: 1.5 % w/w sodium metabisulfite. Please refer to "UNISOL Membrane Element Storage and Handling Instructions."



AMS NanoPro™ A-3012

Acid Stable Nanofiltration Spiral Wound Element

Description	iption The AMS NanoPro™ membrane is developed for long-term performance with hig						
	and stable fluxes in very acidic environment, featuring high pressure and temperature						
	compatibility. AMS NanoPro™ elements are used for acid purification and metals						
	concentration in low pH stre	ams. Typical s	solutions inclu	ide:			
	• 20% H ₂ SO ₄ • 20% H	20% HCl					
	• 30% H₃PO₄ • 10% 0	CH₃COOH					
Performance	Cut-off Rate ⁽¹⁾ :	200 dalton					
	Water Flux ^(2, 3) :	75 liter/m²/	hour (39 gal/f	ft/day)			
	MgSO4 Rejection ^(2, 4) :	≥ 96 %					
Limits	Typical operating pressure:	15-40 bar (2	217-580 psi)				
	Max Pressure Drop:	0.5 bar (7.3 psi)					
	Max Temperature ⁽⁵⁾ :	Operating: 50 °C (122 °F)					
		Cleaning: 50 °C (122 °F)					
	pH Range ⁽⁵⁾ :	Operating: 0 – 12					
		Cleaning: 0 – 13					
	Recirculation Flow:	1.8" element: 4.0 – 8.0 liter/min (1.0 – 2.1 gal/min)					
		2.5" elemer	nt: 7.5 – 17 lit	er/min (2.0 – 4	1.4 gal/min)		
		4" element	: 22 – 42 liter/	′min (5.8 – 11.	1 gal/min)		
		8" element	: 90 – 167 lite	r/min (23 – 42	.7 gal/min)		
	Pressurization&	< 0.7 bar/se	cond (10psi/s	econd)			
	Depressurization rate						
	Heating & cool down rate	< 5°C /minu	te (41 °F/min	ute)			
Area	m^2 (ft ²)	1812	2540	4040	8040		
	B 31 mil Spacer	0.32 (3.4)	1.8 (19)	6.2 (67)	29 (312)		
	C 46 mil Spacer	0.25 (2.7)	1.6 (17)	4.9 (53)	24 (260)		

⁽¹⁾ Only for indication;

⁽²⁾ Test conditions: pressure 40 bar (580 psi), temperature 30 °C (86 °F);

⁽³⁾ Flux measured with demineralized (RO) water, flux may vary for individual element within ±20% range;

⁽⁴⁾ Feed solution is 0.2% MgSO₄ in demineralized (RO) water;

⁽⁵⁾ Consult UNISOL Membrane Technology when intend to operate at elevated pressure, temperature or concentrations.



Dimensions Male Configuration **Female Configuration** D↓ C C mm (inch) 1812 2540 4040 8040 Female Male Male **Female** Type 965 (38.0) 965 (38.0) 1016 (40.0) Α 305 (12) B (Ø) 99.4 (3.9) 46 (1.8) 62 (2.4) 200.5 (7.9) 305 (12) 1016 (40.0) 1016 (40.0) 1016 (40.0) D (Ø) 16 (0.6) 19 (0.75) 19 (0.75) 28.8 (1.13)

Handling

Recommended Cleaning Materials. Depending on the nature of the feed material, a choice can be made among the following cleaning agents:

- Sodium hydroxide at pH 10 − 12, temperature ≤ 40 °C (104 °F);
- Hydrochloric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Nitric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Na-EDTA of 0.2 1.0 % w/w at pH 10.5 11, temperature ≤ 35 °C (91 °F);
- Anionic surfactant (e.g. sodium dodecyl sulfate) of 0.5 % at pH 10.5 11, temperature
 \$\leq\$ 35 °C (91 °F).

Only demineralized (RO) water must be used for cleaning. Consult UNISOL Membrane Technology regarding the use of other cleaning materials.

Lubricants. During installation, use only water or glycerin to lubricate seals. The use of petroleum or vegetable-based oils or solvents may damage the element and void any warranty.

Preservation and Storage. Plan ahead to use new membranes. The element should not be allowed to dry: store it in a sealed bag, at $4-30\,^{\circ}\text{C}$ (39 $-86\,^{\circ}\text{F}$). Storage solutions should be made with: 1.5 % w/w sodium metabisulfite. Please refer to "UNISOL Membrane Element Storage and Handling Instructions."

Chemical Exposure. Do not expose the membrane to chlorine or other oxidants. Sodium metabisulfite (without catalysts such as cobalt) is the preferred chemical to eliminate free chlorine or other oxidizers in the feed.



AMS NanoPro™ A-3014

Acid Stable Nanofiltration Spiral Wound Element

Description	The AMS NanoPro™ membrane is developed for long-term performance with high and							
	stable fluxes in very acidic environment, featuring high pressure and temperature compatibility. AMS NanoPro™ elements are used for acid purification and metals							
	concentration in low pH streams. Typical solutions include::							
	• 20% H ₂ SO ₄ • 20% HCl							
	• 30% H₃PO₄ • 10% C	H₃COOH						
Performance	erformance Cut-off Rate ⁽¹⁾ : 400 dalton							
	Water Flux ^(2, 3) :	90 liter/m ² /	hour (53 gal/f	t/day)				
	MgSO ₄ Rejection ^(2, 4) :	≥ 92 %						
Limits	Typical operating pressure:	15-40 bar (2	17-580 psi)					
	Max Pressure Drop:	0.5 bar (7.3 psi)						
	Max Temperature ⁽⁵⁾ :	Operating: 50 °C (122 °F)						
		Cleaning: 50 °C (122 °F)						
	pH Range ⁽⁵⁾ :	Operating: 0 – 12						
		Cleaning: 0 – 13						
	Recirculation Flow:	1.8" element: 4.0 – 8.0 liter/min (1.0 – 2.1 gal/min)						
		2.5" element: 7.5 – 17 liter/min (2.0 – 4.4 gal/min)						
		4" element:	22 – 42 liter/	min (5.8 – 11.:	1 gal/min)			
		8" element:	90 – 167 liter	/min (23 – 42.	.7 gal/min)			
	Pressurization&	< 0.7 bar/second (10psi/second)						
	Depressurization rate							
	Heating & cool down rate	< 5°C /minute (41 °F/minute)						
Area	m² (ft²)	1812	2540	4040	8040			
	B 31 mil Spacer	0.32 (3.4)	1.8 (19)	6.2 (67)	29 (312)			
	C 46 mil Spacer	0.25 (2.7)	1.6 (17)	4.9 (53)	24 (260)			

⁽¹⁾ Only for indication;

⁽²⁾ Test conditions: pressure 40 bar (580 psi), temperature 30 °C (86 °F);

⁽³⁾ Flux measured with demineralized (RO) water, flux may vary for individual element within ±20% range;

⁽⁴⁾ Feed solution is 0.2% MgSO₄ in demineralized (RO) water;

⁽⁵⁾ Consult UNISOL Membrane Technology when intend to operate at elevated pressure, temperature or concentrations.



Dimensions	Ma	le Configuration		Female Configuration		
	-	A	→	A	→	
	В		D b B		D	
	4	С		С	→	
	mm (inch)	1812	2540	4040	8040	
	Type	Female	Male	Male	Female	
	Α	305 (12)	965 (38.0)	965 (38.0)	1016 (40.0)	
	B (∅)	46 (1.8)	62 (2.4)	99.4 (3.9)	200.5 (7.9)	
	С	305 (12)	1016 (40.0)	1016 (40.0)	1016 (40.0)	
	D (Ø)	16 (0.6)	19 (0.75)	19 (0.75)	28.8 (1.13)	

Handling

Recommended Cleaning Materials. Depending on the nature of the feed material, a choice can be made among the following cleaning agents:

- Sodium hydroxide at pH 10 − 12, temperature ≤ 40 °C (104 °F);
- Hydrochloric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Nitric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Na-EDTA of 0.2 $^-$ 1.0 % w/w at pH 10.5 $^-$ 11, temperature \leq 35 °C (91 °F);
- Anionic surfactant (e.g. sodium dodecyl sulfate) of 0.5 % at pH 10.5 11, temperature ≤ 35 °C (91 °F).

Only demineralized (RO) water must be used for cleaning. Consult UNISOL Membrane Technology regarding the use of other cleaning materials.

Lubricants. During installation, use only water or glycerin to lubricate seals. The use of petroleum or vegetable-based oils or solvents may damage the element and void any warranty.

Preservation and Storage. Plan ahead to use new membranes. The element should not be allowed to dry: store it in a sealed bag, at $4-30\,^{\circ}\text{C}$ (39 $-86\,^{\circ}\text{F}$). Storage solutions should be made with: 1.5 % w/w sodium metabisulfite. Please refer to "UNISOL Membrane Element Storage and Handling Instructions."



AMS NanoPro™ B-4021

Base Stable Nanofiltration Spiral Wound Element

Description	The AMS NanoPro™ B-series	membranes are o	developed for lo	ng-term perf	ormance with		
	high and stable fluxes in a very base environment, featuring high pressure and						
	temperature compatibility. A	MS NanoPro™ B-	series elements	are used for	alkali		
	purification and components concentration in high-pH streams. Typical solutions include:						
	• 20% NaOH • 10% K	ЮН					
Performance	Cut-off Rate ⁽¹⁾ :	100 dalton					
	Water Flux ^(2, 3) :	45 liter/m²/hou	r (26 gal/ft/day)				
	MgSO ₄ Rejection ^(2, 4) :	≥ 99 %					
Limits	Typical operating pressure:	15-40 bar (217-580 psi)					
	Max Pressure Drop:	0.5 bar (7.3 psi)					
	Max Temperature ⁽⁵⁾ :	Operating: 50 °C (122 °F)					
		Cleaning: 50 °C (122 °F)					
	pH Range ⁽⁵⁾ :	Operating: 3 – 14					
		Cleaning: 2 – 14					
	Recirculation Flow:	1.8" element: 4.0 – 8.0 liter/min (1.0 – 2.1 gal/min)					
		2.5" element: 7.5 – 17 liter/min (2.0 – 4.4 gal/min)					
		4" element: 22 -	– 42 liter/min (5	.8 – 11.1 gal/	'min)		
		8" element: 90 -	– 167 liter/min (23 – 42.7 gal	/min)		
	Pressurization&	< 0.7 bar/second (10psi/second)					
	Depressurization rate						
	Heating & cool down rate	< 5°C /minute (4	11 °F/minute)				
Area	m² (ft²)	1812	2540	4040	8040		
	B 31 mil Spacer	0.32 (3.4)	1.6 (17)	6.1 (66)	28 (300)		
	C 46 mil Spacer	Not available	Not available	4.7 (51)	23 (250)		

⁽¹⁾ Only for indication;

⁽²⁾ Test conditions: pressure 40 bar (580 psi), temperature 30 °C (86 °F);

⁽³⁾ Flux measured with demineralized (RO) water, flux may vary for individual element within ±20% range;

⁽⁴⁾ Feed solution is 0.2% MgSO₄ in demineralized (RO) water;

⁽⁵⁾ Consult UNISOL Membrane Technology when intend to operate at elevated pressure, temperature or concentrations.



Dimensions Male Configuration Female Configuration D \ C C mm (inch) 2540 4040 8040 1812 Female Male Male Female Type 965 (38.0) 965 (38.0) Α 305 (12) 1016 (40.0) B (Ø) 99.4 (3.9) 46 (1.8) 62 (2.4) 200.5 (7.9) C 305 (12) 1016 (40.0) 1016 (40.0) 1016 (40.0) $D(\emptyset)$ 16 (0.6) 19 (0.75) 19 (0.75) 28.8 (1.13)

Handling

Recommended Cleaning Materials. Depending on the nature of the feed material, a choice can be made among the following cleaning agents:

- Sodium hydroxide at pH 10 − 12, temperature ≤ 40 °C (104 °F);
- Hydrochloric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Nitric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Na-EDTA of 0.2 1.0 % w/w at pH 10.5 11, temperature ≤ 35 °C (91 °F);
- Anionic surfactant (e.g. sodium dodecyl sulfate) of 0.5 % at pH 10.5 11, temperature
 35 °C (91 °F).

Only demineralized (RO) water must be used for cleaning. Consult UNISOL Membrane Technology regarding the use of other cleaning materials.

Lubricants. During installation, use only water or glycerin to lubricate seals. The use of petroleum or vegetable-based oils or solvents may damage the element and void any warranty.

Preservation and Storage. Plan ahead to use new membranes. The element should not be allowed to dry: store it in a sealed bag, at $4-30\,^{\circ}\text{C}$ (39 $-86\,^{\circ}\text{F}$). Storage solutions should be made with: 1.5 % w/w sodium metabisulfite. Please refer to "UNISOL Membrane Element Storage and Handling Instructions."



AMS NanoPro™ B-4022

Base Stable Nanofiltration Spiral Wound Element

Description The AMS NanoPro™ B-series membranes are developed for long-term per							
	high and stable fluxes in a very base environment, featuring high pressure and						
	temperature compatibility. AMS NanoPro™ B-series elements are used for alkali						
	purification and components concentration in high-pH streams. Typical solutions include:						
	• 20% NaOH • 10% k	ЮН					
Performance	Cut-off Rate ⁽¹⁾ :	200 dalton					
	Water Flux ^(2, 3) :	70 liter/m²/ho	ur (41 gal/ft/day	y)			
	MgSO ₄ Rejection ^(2, 4) :	≥ 96 %					
Limits	Typical operating pressure:	15-40 bar (217	7-580 psi)				
	Max Pressure Drop:	0.5 bar (7.3 psi)					
	Max Temperature ⁽⁵⁾ :	Operating: 50 °C (122 °F)					
		Cleaning: 50 °C (122 °F)					
	pH Range ⁽⁵⁾ :	Operating: 3 – 14					
		Cleaning: 2 – 14					
	Recirculation Flow:	1.8" element: 4.0 – 8.0 liter/min (1.0 – 2.1 gal/min)					
		2.5" element:	7.5 – 17 liter/m	in (2.0 – 4.4 g	gal/min)		
		4" element: 2	2 – 42 liter/min	(5.8 – 11.1 ga	al/min)		
		8" element: 90	0 – 167 liter/mir	n (23 – 42.7 g	al/min)		
	Pressurization&	< 0.7 bar/seco	nd (10psi/secon	ıd)			
	Depressurization rate						
	Heating & cool down rate	< 5°C /minute	(41 °F/minute)				
Area	m² (ft²)	1812	2540	4040	8040		
	B 31 mil Spacer	0.32 (3.4)	1.6 (17)	6.1 (66)	28 (300)		
	C 46 mil Spacer	Not available	Not available	4.7 (51)	23 (250)		

⁽¹⁾ Only for indication;

⁽²⁾ Test conditions: pressure 40 bar (580 psi), temperature 30 °C (86 °F);

⁽³⁾ Flux measured with demineralized (RO) water, flux may vary for individual element within ±20% range;

⁽⁴⁾ Feed solution is 0.2% MgSO₄ in demineralized (RO) water;

⁽⁵⁾ Consult UNISOL Membrane Technology when intend to operate at elevated pressure, temperature or concentrations.



Dimensions Male Configuration **Female Configuration** $\mathsf{D} \downarrow$ C mm (inch) 1812 2540 4040 8040 Female Male Male Female Type 305 (12) 965 (38.0) 965 (38.0) Α 1016 (40.0) B (Ø) 99.4 (3.9) 46 (1.8) 62 (2.4) 200.5 (7.89) C 305 (12) 1016 (40.0) 1016 (40.0) 1016 (40.0) D (Ø) 16 (0.6) 19 (0.75) 19 (0.75) 28.8 (1.13)

Handling

Recommended Cleaning Materials. Depending on the nature of the feed material, a choice can be made among the following cleaning agents:

- Sodium hydroxide at pH 10 − 12, temperature ≤ 40 °C (104 °F);
- Hydrochloric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Nitric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Na-EDTA of 0.2 1.0 % w/w at pH 10.5 11, temperature ≤ 35 °C (91 °F);
- Anionic surfactant (e.g. sodium dodecyl sulfate) of 0.5 % at pH 10.5 − 11, temperature ≤ 35 °C (91 °F).

Only demineralized (RO) water must be used for cleaning. Consult UNISOL Membrane Technology regarding the use of other cleaning materials.

Lubricants. During installation, use only water or glycerin to lubricate seals. The use of petroleum or vegetable-based oils or solvents may damage the element and void any warranty.

Preservation and Storage. Plan ahead to use new membranes. The element should not be allowed to dry: store it in a sealed bag, at $4-30\,^{\circ}\text{C}$ (39 $-86\,^{\circ}\text{F}$). Storage solutions should be made with: 1.5 % w/w sodium metabisulfite. Please refer to "UNISOL Membrane Element Storage and Handling Instructions."



AMS NanoPro™ S-3011

Solvent Stable Nanofiltration Spiral Wound Element

Description	The AMS NanoPro™ membrane is developed for long-term performance with high and							
	stable fluxes in presence of solvents, featuring high pressure and temperature							
	compatibility. AMS NanoPro™ elements are used for solvent purification and component							
	concentration. Typical solvents include*:							
	 Methanol, Ethanol, Propa 	anol • Hexa	ne •	THF				
	 Acetone, Acetonitrile 	Ethyl	acetate	• DMF				
Performance	Cut-off Rate ⁽¹⁾ :	100 dalton						
	Water Flux ^(2, 3) :	65 liter/m ² /h	our (38 gal/ft	:/day)				
	MgSO ₄ Rejection ^(2, 4) :): ≥ 99 %						
Limits	Typical operating pressure:							
	Max Pressure Drop:							
	Max Temperature ⁽⁵⁾ :	Operating: 50 °C (122 °F)						
		Cleaning: 50 °C (122 °F)						
	pH Range ⁽⁵⁾ :	Operating: 2 – 12						
		Cleaning: 1 – 13						
	Recirculation Flow:	1.8'' element: $4.0 - 8.0$ liter/min ($1.0 - 2.1$ gal/min)						
		2.5" element: 7.5 – 17 liter/min (2.0 – 4.4 gal/min)						
		4" element: 2	22 – 42 liter/ı	min (5.8 – 11.1 ga	l/min)			
		8" element: 9	90 – 167 liter,	/min (23 – 42.7 ga	al/min)			
	Pressurization&	< 0.7 bar/sec	ond (10psi/se	econd)				
	Depressurization rate							
	Heating & cool down rate	< 5°C /minute (41 °F/minute)						
Area	m² (ft²)	1812	2540	4040	8040			
	B 31 mil Spacer	0.32 (3.4)	1.8 (19)	6.2 (67)	29 (312)			
	C 46 mil Spacer	0.25 (2.7)	1.6 (17)	4.9 (53)	24 (260)			

⁽¹⁾ Only for indication;

⁽²⁾ Test conditions: pressure 40 bar (580 psi), temperature 30 °C (86 °F);

⁽³⁾ Flux measured with demineralized (RO) water, flux may vary for individual element within ±20% range;

⁽⁴⁾ Feed solution is 0.2% MgSO₄ in demineralized (RO) water;

⁽⁵⁾ Consult UNISOL Membrane Technology when intend to operate at elevated pressure, temperature or concentrations.

^{*} Consult UNISOL Membrane Technology about the concentration for these typical solvents.



Dimensions Male Configuration **Female Configuration** D↓ в] C C mm (inch) 1812 2540 4040 8040 **Female** Male Male Female Type Α 305 (12) 954 (37.6) 965 (38.0) 1016 (40.0) B (Ø) 46 (1.8) 62 (2.4) 99.4 (3.9) 200.5 (7.9) C 305 (12) 1016 (40.0) 1016 (40.0) 1016 (40.0) $D(\emptyset)$ 16 (0.6) 19 (0.75) 19 (0.75) 28.8 (1.13)

Handling

Recommended Cleaning Materials. Depending on the nature of the feed material, a choice can be made among the following cleaning agents:

- Sodium hydroxide at pH 10 − 12, temperature ≤ 40 °C (104 °F);
- Hydrochloric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Nitric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Na-EDTA of 0.2 1.0 % w/w at pH 10.5 11, temperature \leq 35 °C (91°F);
- Anionic surfactant (e.g. sodium dodecyl sulfate) of 0.5 % at pH 10.5 11, temperature
 \$\leq\$ 35 °C (91 °F).

Only demineralized (RO) water must be used for cleaning. Consult UNISOL Membrane Technology regarding the use of other cleaning materials.

Lubricants. During installation, use only water or glycerin to lubricate seals. The use of petroleum or vegetable-based oils or solvents may damage the element and void any warranty.

Preservation and Storage. Plan ahead to use new membranes. The element should not be allowed to dry: store it in a sealed bag, at $4-30\,^{\circ}\text{C}$ (39 $-86\,^{\circ}\text{F}$). Storage solutions should be made with: 1.5 % w/w sodium metabisulfite. Please refer to "UNISOL Membrane Element Storage and Handling Instructions."



AMS NanoPro™ S-3012

Solvent Stable Nanofiltration Spiral Wound Element

Description	The AMS NanoPro™ membrane is developed for long-term performance with high and						
	stable fluxes in presence of solvents, featuring high pressure and temperature compatibility. AMS NanoPro™ elements are used for solvent purification and						
	component concentration. T	ypical solvents in	clude*:				
	 Methanol, Ethanol, Propa 	anol • Hexa	ne	• THF			
	 Acetone, Acetonitrile 	Ethy	l acetate	• DMF			
Performance	Cut-off Rate ⁽¹⁾ :	200 dalton					
	Water Flux ^(2, 3) :	75 liter/m²/hour (44 gal/ft/day)					
	MgSO ₄ Rejection ^(2, 4) :	≥ 96 %					
Limits	Typical operating pressure:	15-40 bar (217-580 psi)					
	Max Pressure Drop:	0.5 bar (7.3 psi)					
	May Tamparatura (5).	Operating: 50 °C (122 °F)					
	Max Temperature ⁽⁵⁾ :	Cleaning: 50 °C (122 °F)					
	pH Range ⁽⁵⁾ :	Operating: 2 – 12					
		Cleaning: 1 – 13					
	Recirculation Flow:	1.8'' element: $4.0 - 8.0$ liter/min ($1.0 - 2.1$ gal/min)					
		2.5" element: 7	7.5 – 17 liter	/min (2.0 – 4.4	gal/min)		
		4" element: 22	– 42 liter/m	nin (5.8 – 11.1 g	al/min)		
		8" element: 90	- 167 liter/	min (23 – 42.7 g	gal/min)		
	Pressurization&	< 0.7 bar/secon	id (10psi/se	cond)			
	Depressurization rate						
	Heating & cool down rate	< 5°C /minute (41 °F/minut	:e)			
Area	m ² (ft ²)	1812	2540	4040	8040		
	B 31 mil Spacer	0.32 (3.4)	1.8 (19)	6.2 (67)	29 (312)		
	C 46 mil Spacer	0.25 (2.7)	1.6 (17)	4.9 (53)	24 (260)		

⁽¹⁾ Only for indication;

⁽²⁾ Test conditions: pressure 40 bar (580 psi), temperature 30 °C (86 °F);

⁽³⁾ Flux measured with demineralized (RO) water, flux may vary for individual element within ±20% range;

⁽⁴⁾ Feed solution is 0.2% MgSO₄ in demineralized (RO) water;

⁽⁵⁾ Consult UNISOL Membrane Technology when intend to operate at elevated pressure, temperature or concentrations.

^{*} Consult UNISOL Membrane Technology about the concentration for these typical solvents.



Dimensions Male Configuration Female Configuration D↓ C C mm (inch) 1812 2540 4040 8040 **Female** Male Male Female Type 305 (12) 954 (37.6) 965 (38.0) 1016 (40.0) Α 99.4 (3.9) B (Ø) 46 (1.8) 62 (2.4) 200.5 (7.9) C 305 (12) 1016 (40.0) 1016 (40.0) 1016 (40.0) $D(\emptyset)$ 16 (0.6) 19 (0.75) 19 (0.75) 28.8 (1.13)

Handling

Recommended Cleaning Materials. Depending on the nature of the feed material, a choice can be made among the following cleaning agents:

- Sodium hydroxide at pH 10 − 12, temperature ≤ 40 °C (104 °F);
- Hydrochloric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Nitric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Na-EDTA of 0.2 1.0 % w/w at pH 10.5 11, temperature \leq 35 °C (91 v);
- Anionic surfactant (e.g. sodium dodecyl sulfate) of 0.5 % at pH 10.5 $^-$ 11, temperature \leq 35 °C (91 °F).

Only demineralized (RO) water must be used for cleaning. Consult UNISOL Membrane Technology regarding the use of other cleaning materials.

Lubricants. During installation, use only water or glycerin to lubricate seals. The use of petroleum or vegetable-based oils or solvents may damage the element and void any warranty.

Preservation and Storage. Plan ahead to use new membranes. The element should not be allowed to dry: store it in a sealed bag, at $4-30\,^{\circ}\text{C}$ (39 $-86\,^{\circ}\text{F}$). Storage solutions should be made with: 1.5 % w/w sodium metabisulfite. Please refer to "UNISOL Membrane Element Storage and Handling Instructions."



AMS NanoPro™ S-3014

Solvent Stable Nanofiltration Spiral Wound Element

Description	The AMS NanoPro™ membrane is developed for long-term performance with high and						
	stable fluxes in presence of solvents, featuring high pressure and temperature						
	compatibility. AMS NanoPro™ elements are used for solvent purification and						
	component concentration. Typical solvents include*:						
	 Methanol, Ethanol, Propagation 	anol • H	lexane	• THF			
	 Acetone, Acetonitrile 	• 6	Ethyl acetate	DMF			
Performance	Cut-off Rate ⁽¹⁾ :	400 dalton					
	Water Flux ^(2, 3) :	90 liter/m ² /hour (53 gal/ft/day)					
	MgSO ₄ Rejection ^(2, 4) :	≥ 92 %					
Limits	Typical operating pressure:	15-40 bar (217-580 psi)					
	Max Pressure Drop:	0.5 bar (7.3 psi)					
	Max Temperature ⁽⁵⁾ :	Operating: 50 °C (122 °F)					
		Cleaning: 50 °C (122 °F)					
	pH Range ⁽⁵⁾ :	Operating: 2 – 12					
		Cleaning: 1 – 13					
	Recirculation Flow:	1.8" element: 4.0 – 8.0 liter/min (1.0 – 2.1 gal/min)					
		2.5" elemen	t: 7.5 – 17 liter/ı	min (2.0 – 4.4 g	gal/min)		
		4" element:	22 – 42 liter/mii	n (5.8 – 11.1 ga	al/min)		
		8" element:	90 – 167 liter/m	nin (23 – 42.7 g	al/min)		
	Pressurization&	< 0.7 bar/sec	ond (10psi/seco	ond)			
	Depressurization rate						
	Heating & cool down rate	< 5°C /minut	e (41 °F/minute)			
Area	m ² (ft ²)	1812	2540	4040	8040		
	B 31 mil Spacer	0.32 (3.4)	1.8 (19)	6.2 (67)	29 (312)		
	C 46 mil Spacer	0.25 (2.7)	1.6 (17)	4.9 (53)	24 (260)		

⁽¹⁾ Only for indication;

⁽²⁾ Test conditions: pressure 40 bar (580 psi), temperature 30 °C (86 °F);

⁽³⁾ Flux measured with demineralized (RO) water, flux may vary for individual element within ±20% range;

⁽⁴⁾ Feed solution is 0.2% MgSO₄ in demineralized (RO) water;

⁽⁵⁾ Consult UNISOL Membrane Technology when intend to operate at elevated pressure, temperature or concentrations.

^{*} Consult UNISOL Membrane Technology about the concentration for these typical solvents.



Dimensions Male Configuration **Female Configuration** D↓ в] C C mm (inch) 1812 2540 4040 8040 Female Male Male Female Type 965 (38.0) Α 305 (12) 954 (37.6) 1016 (40.0) B (Ø) 46 (1.8) 62 (2.4) 99.4 (3.9) 200.5 (7.9) C 305 (12) 1016 (40.0) 1016 (40.0) 1016 (40.0) $D(\emptyset)$ 16 (0.6) 19 (0.75) 19 (0.75) 28.8 (1.13)

Handling

Recommended Cleaning Materials. Depending on the nature of the feed material, a choice can be made among the following cleaning agents:

- Sodium hydroxide at pH 10 − 12, temperature ≤ 40 °C (104 °F);
- Hydrochloric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Nitric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Na-EDTA of 0.2 1.0 % w/w at pH 10.5 11, temperature ≤ 35 °C (91 °F);
- Anionic surfactant (e.g. sodium dodecyl sulfate) of 0.5 % at pH 10.5 11, temperature
 \$\leq\$ 35 °C (91 °F).

Only demineralized (RO) water must be used for cleaning. Consult UNISOL Membrane Technology regarding the use of other cleaning materials.

Lubricants. During installation, use only water or glycerin to lubricate seals. The use of petroleum or vegetable-based oils or solvents may damage the element and void any warranty.

Preservation and Storage. Plan ahead to use new membranes. The element should not be allowed to dry: store it in a sealed bag, at $4-30\,^{\circ}\text{C}$ (39 $-86\,^{\circ}\text{F}$). Storage solutions should be made with: 1.5 % w/w sodium metabisulfite. Please refer to "UNISOL Membrane Element Storage and Handling Instructions."



AMS UltraPro™ A-U301

Acid Stable Ultrafiltration Spiral Wound Element

Description	Description The AMS UltraPro™ membrane is developed for long-term performance with high							
	stable fluxes in very acidic e	environment, featuring high pressure and temperature						
	compatibility. AMS UltraPro™ elements are used for either pre-filtration before							
	nanofiltration or as stand-a	lone membrane	s in acid purifi	cation and metals	;			
	concentration. Typical solut	ions include:						
	• 20% H ₂ SO ₄ • 20%	HCl						
	• 30% H₃PO₄ • 10%	CH₃COOH						
Performance	Cut-off Rate ⁽¹⁾ :	> 2,500 dalton						
	Water Flux ^(2, 3) :	100 liter/m ² /h	our (59 gal/ft/	day)				
Limits	Max Pressure:	40 bar (580 ps	i)					
	Max Pressure Drop:	0.5 bar (7.3 ps	i)					
	Max Temperature ⁽⁵⁾ :	Operating: 50	°C (122 °F)					
		Cleaning: 50 °C	C (122 °F)					
	pH Range ⁽⁵⁾ :	Operating: 0 –	12					
		Cleaning: 0 – 1	.3					
	Recirculation Flow:	1.8" element: 4.0 – 8.0 liter/min (1.0 – 2.1 gal/min)						
		2.5" element: 7.5 – 17 liter/min (2.0 – 4.4 gal/min)						
		4" element: 2	2 – 42 liter/mii	n (5.8 – 11.1 gal/n	nin)			
		8" element: 90 – 167 liter/min (23 – 42.7 gal/min)						
	Pressurization&	< 0.7 bar/seco	nd (10psi/seco	ond)				
	Depressurization rate							
	Heating & cool down rate < 5°C /minute (41 °F/minute)							
Area	m ² (ft ²)	1812	2540	4040	8040			
	B 31 mil Spacer	0.32 (3.4)	1.8 (19)	6.2 (67)	29 (312)			
	C 46 mil Spacer	0.25 (2.7)	1.6 (17)	4.9 (53)	24 (260)			

⁽¹⁾ Only for indication;

⁽²⁾ Test conditions: pressure 40 bar (580 psi), temperature 30 °C (86 °F);

⁽³⁾ Flux measured with demineralized (RO) water, flux may vary for individual element within ±20% range;

⁽⁴⁾ Cut-off rate was determined by suitable markers (please consult UNISOL Membrane Technology);

⁽⁵⁾ Consult UNISOL Membrane Technology when intend to operate at elevated pressure, temperature or concentrations.



Dimensions	Male Configuration			Female Configuration		
	-	A		A		
	В		D b B		D	
	4	С		С	>	
	mm (inch)	1812	2540	4040	8040	
	Туре	Female	Male	Male	Female	
	Α	305 (12)	965 (38.0)	965 (38.0)	1016 (40.0)	
	B (Ø)	46 (1.8)	62 (2.4)	99.4 (3.9)	200.5 (7.9)	
	С	305 (12)	1016 (40.0)	1016 (40.0)	1016 (40.0)	
	D (Ø)	16 (0.6)	19 (0.75)	19 (0.75)	28.8 (1.13)	

Handling

Recommended Cleaning Materials. Depending on the nature of the feed material, a choice can be made among the following cleaning agents:

- Sodium hydroxide at pH 10 − 12, temperature ≤ 40 °C (104 °F);
- Hydrochloric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Nitric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Na-EDTA of 0.2 1.0 % w/w at pH 10.5 11, temperature \leq 35 °C (91 °F);
- Anionic surfactant (e.g. sodium dodecyl sulfate) of 0.5 % at pH 10.5 11, temperature
 35 °C (91 °F).

Only demineralized (RO) water must be used for cleaning. Consult UNISOL Membrane Technology regarding the use of other cleaning materials.

Lubricants. During installation, use only water or glycerin to lubricate seals. The use of petroleum or vegetable-based oils or solvents may damage the element and void any warranty.

Preservation and Storage. Plan ahead to use new membranes. The element should not be allowed to dry: store it in a sealed bag, at $4-30\,^{\circ}\text{C}$ (39 $-86\,^{\circ}\text{F}$). Storage solutions should be made with: 1.5 % w/w sodium metabisulfite. Please refer to "UNISOL Membrane Element Storage and Handling Instructions."



AMS UltraPro™ A-1801

Acid Stable Ultrafiltration Spiral Wound Element

Description	The AMS UltraPro™ membrane is developed for long-term performance with high and stable fluxes in very acidic environment, featuring high pressure and temperature compatibility. AMS UltraPro™ elements are used for either pre-filtration before					
	nanofiltration or as stand-alo	ne membranes ir	acid purificat	ion and metal	S	
	concentration. Typical solutions include: • 20% H ₂ SO ₄ • 20% HCl					
	• 30% H ₃ PO ₄ • 10% 0	CH₃COOH				
Performance	Cut-off Rate ⁽¹⁾ :	> 10,000 dalton				
	Permeability ^(2, 3) :	18 liter/m ² /hou	18 liter/m ² /hour/bar (0.73 gal/ft/day/psi)			
Limits	Max. pressure:	10 bar (145 psi)				
	Max Pressure Drop:	0.5 bar (7.3 psi)				
	Max Temperature ⁽⁵⁾ :	Operating: 50 °C (122 °F)				
		Cleaning: 50 °C (122 °F)				
	pH Range ⁽⁵⁾ :	Operating: 0 – 12				
		Cleaning: 0 – 13				
	Recirculation Flow:	1.8" element: 4.0 – 8.0 liter/min (1.0 – 2.1 gal/min)				
		2.5" element: 7.5 – 17 liter/min (2.0 – 4.4 gal/min)				
		4" element: 22 – 42 liter/min (5.8 – 11.1 gal/min)				
		8" element: 90 – 167 liter/min (23 – 42.7 gal/min)				
	Pressurization&	< 0.7 bar/second (10psi/second)				
	Depressurization rate					
	Heating & cool down rate	< 5°C /minute (4	11 °F/minute)			
Area	m² (ft²)	1812	2540	4040	8040	
	B 31 mil Spacer	0.32 (3.4)	1.8 (19)	6.2 (67)	29 (312)	
	C 46 mil Spacer	0.25 (2.7)	1.6 (17)	4.9 (53)	24 (260)	

⁽¹⁾ Only for indication;

⁽²⁾ Test conditions: pressure 2 bar (30 psi), temperature 30 °C (86 °F);

⁽³⁾ Flux measured with demineralized (RO) water, flux may vary for individual element within ±20% range;

⁽⁴⁾ Cut-off rate was determined by suitable markers (please consult UNISOL Membrane Technology);

⁽⁵⁾ Consult UNISOL Membrane Technology when intend to operate at elevated pressure, temperature or concentrations.



Dimensions Male Configuration **Female Configuration** D 1 C C mm (inch) 1812 2540 4040 8040 Female Male Male Female Type 305 (12) 965 (38.0) Α 965 (38.0) 1016 (40.0) B (Ø) 46 (1.8) 99.4 (3.9) 62 (2.4) 200.5 (7.9) C 305 (12) 1016 (40.0) 1016 (40.0) 1016 (40.0) D (Ø) 16 (0.6) 19 (0.75) 19 (0.75) 28.8 (1.13)

Handling

Recommended Cleaning Materials. Depending on the nature of the feed material, a choice can be made among the following cleaning agents:

- Sodium hydroxide at pH 10 − 12, temperature ≤ 40 °C (104 °F);
- Hydrochloric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Nitric acid at pH 1 − 2, temperature ≤ 40 °C (104 °F);
- Na-EDTA of 0.2 1.0 % w/w at pH 10.5 11, temperature \leq 35 °C (91 °F);
- Anionic surfactant (e.g. sodium dodecyl sulfate) of 0.5 % at pH 10.5 11, temperature
 \$\leq\$ 35 °C (91 °F).

Only demineralized (RO) water must be used for cleaning. Consult UNISOL Membrane Techonology regarding the use of other cleaning materials.

Lubricants. During installation, use only water or glycerin to lubricate seals. The use of petroleum or vegetable-based oils or solvents may damage the element and void any warranty.

Preservation and Storage. Plan ahead to use new membranes. The element should not be allowed to dry: store it in a sealed bag, at $4-30\,^{\circ}\text{C}$ (39 $-86\,^{\circ}\text{F}$). Storage solutions should be made with: 1.5 % w/w sodium metabisulfite. Please refer to "UNISOL Membrane Element Storage and Handling Instructions."



AMS UltraPro™ S-U301

Solvent Stable Ultrafiltration Spiral Wound Element

Description	The AMS UltraPro™ membrane is developed for long-term performance with high and stable fluxes in presence of solvents, featuring high pressure and temperature						
	compatibility. AMS UltraPro	o™ elen	nents are used for	either pre-filtratio	n before		
	nanofiltration or as stand-a	lone me	embranes in solvei	nt purification and	component		
	concentration. Typical solvents include*:						
	 Methanol, Ethanol, Pro 	oanol • Hexane		• THF			
	 Acetone, Acetonitrile 		 Ethyl acetate 	DMF			
Performance	Cut-off Rate ⁽¹⁾ :	> 2,50	00 dalton				
	Water Flux ^(2, 3) :	100 lit	100 liter/m ² /hour (59 gal/ft/day)				
Limits	Max Pressure:	40 bar (580 psi)					
	Max Pressure Drop: 0.5 bar (7.3 psi)						
	Max Temperature ⁽⁵⁾ :	Operating: 50 °C (122 °F)					
		Cleaning: 50 °C (122 °F)					
	pH Range ⁽⁵⁾ :	Operating: 2 – 12					
		Cleaning: 1 – 13					
	Recirculation Flow:	1.8'' element: $4.0 - 8.0$ liter/min ($1.0 - 2.1$ gal/min)					
		2.5" element: 7.5 – 17 liter/min (2.0 – 4.4 gal/min)					
		4" element: 22 – 42 liter/min (5.8 – 11.1 gal/min)					
		8" element: 90 – 167 liter/min (23 – 42.7 gal/min)					
	Pressurization&	< 0.7 bar/second (10psi/second)					
	Depressurization rate						
	Heating & cool down rate	< 5°C /minute (41 °F/minute)					
Area	m ² (ft ²)	1812	2540	4040	8040		
	B 31 mil Spacer	0.32 (3.4) 1.6 (17)	6.1 (66)	28 (300)		
	C 46 mil Spacer	0.25 (2.7) 1.3 (14)	4.7 (51)	23 (250)		

⁽¹⁾ Only for indication;

⁽²⁾ Test conditions: pressure 40 bar (580 psi), temperature 30 °C (86 °F);

⁽³⁾ Flux measured with demineralized (RO) water, flux may vary for individual element within ±20% range;

⁽⁴⁾ Cut-off rate was determined by suitable markers (please consult UNISOL Membrane Technology);

⁽⁵⁾ Consult UNISOL Membrane Technology when intend to operate at elevated pressure, temperature or concentrations.

^{*} Consult UNISOL Membrane Technology about the concentration for these typical solvents.



Dimensions	Male Configuration	Female Configuration		
	← A	<u> </u>		
	B↓	D t		
	C	C		

mm (inch)	1812	2540	4040	8040
Туре	Female	Male	Male	Female
Α	305 (12)	954 (37.6)	965 (38.0)	1016 (40.0)
B (Ø)	46 (1.8)	62 (2.4)	99.4 (3.9)	200.5 (7.9)
С	305 (12)	1016 (40.0)	1016 (40.0)	1016 (40.0)
D (Ø)	16 (0.6)	19 (0.75)	19 (0.75)	28.8 (1.13)

Handling

Recommended Cleaning Materials. Depending on the nature of the feed material, a choice can be made among the following cleaning agents:

- Sodium hydroxide at pH 10 12, temperature ≤ 40 °C (104 °F);
- Hydrochloric acid at pH 1 2, temperature ≤ 40 °C (104 °F);
- Nitric acid at pH 1 2, temperature ≤ 40 °C (104 °F);
- Na-EDTA of 0.2 1.0 % w/w at pH 10.5~11, temperature ≤ 35 °C (91 °F);
- Anionic surfactant (e.g. sodium dodecyl sulfate) of 0.5 % at pH 10.5 11, temperature \leq 35 °C (91 °F).

Only demineralized (RO) water must be used for cleaning. Consult UNISOL Membrane Technology regarding the use of other cleaning materials.

Lubricants. During installation, use only water or glycerin to lubricate seals. The use of petroleum or vegetable-based oils or solvents may damage the element and void any warranty.

Preservation and Storage. Plan ahead to use new membranes. The element should not be allowed to dry: store it in a sealed bag, at $4-30\,^{\circ}\text{C}$ (39 $-86\,^{\circ}\text{F}$). Storage solutions should be made with: 1.5 % w/w sodium metabisulfite. Please refer to "UNISOL Membrane Element Storage and Handling Instructions."

Chemical Exposure. Do not expose the membrane to chlorine or other oxidants. Sodium metabisulfite (without catalysts such as cobalt) is the preferred chemical to eliminate free chlorine or other oxidizers in the feed.



AMS UltraPro™ S-1801

Solvent Stable Ultrafiltration Spiral Wound Element

Description	The AMS UltraPro™ membrane is developed for long-term performance with high and stable fluxes in presence of solvents, featuring high pressure and temperature compatibility. AMS UltraPro™ elements are used for either pre-filtration before					
	nanofiltration or as stand-a	alone membrar	nes in solvent p	ourification and	component	
	concentration. Typical solvents include*:					
	 Methanol, Ethanol, Pro 	panol • He	kane	• THF		
	 Acetone, Acetonitrile 	• Eth	yl acetate	• DMF		
Performance	Cut-off Rate ⁽¹⁾ :	> 10 000 dalt	on			
	Permeability ^(2, 3) :	18 liter/m²/h	18 liter/m²/hour/bar (0.73 gal/ft/day/psi)			
Limits	Max Pressure:	10 bar (145 psi)				
	Max Pressure Drop:	0.5 bar (7.3 psi)				
	Max Temperature ⁽⁵⁾ :	Operating: 50 °C (122 °F)				
	wax remperature .	Cleaning: 50 °C (122 °F)				
	pH Range ⁽⁵⁾ :	Operating: 2 – 12				
	prinainge .	Cleaning: 1 – 13				
	Recirculation Flow:	, , ,				
		2.5" element: 7.5 – 17 liter/min (2.0 – 4.4 gal/min) 4" element: 22 – 42 liter/min (5.8 – 11.1 gal/min)				
		8" element: 90 – 167 liter/min (23 – 42.7 gal/min)				
	Pressurization&	< 0.7 bar/second (10psi/second)				
	Depressurization rate					
	Heating & cool down rate	< 5°C /minute	e (41 °F/minut	e)		
Area	m ² (ft ²)	1812	2540	4040	8040	
	B 31 mil Spacer	0.32 (3.4)	1.6 (17)	6.1 (66)	28 (300)	
	C 46 mil Spacer	0.25 (2.7)	1.3 (14)	4.7 (51)	23 (250)	

⁽¹⁾ Only for indication;

⁽²⁾ Test conditions: pressure 2 bar (30 psi), temperature 30 °C (86 °F);

⁽³⁾ Flux measured with demineralized (RO) water, flux may vary for individual element within ±20% range;

⁽⁴⁾ Cut-off rate was determined by suitable markers (please consult UNISOL Membrane Technology);

⁽⁵⁾ Consult UNISOL Membrane Technology when intend to operate at elevated pressure, temperature or concentrations.

^{*} Consult UNISOL Membrane Technology about the concentration for these typical solvents.



Dimensions	Male Configuration			Female Configuration		
	-	A		· · ·	4	
	В		D b B		D I	
	4	С			→	
	mm (inch)	1812	2540	4040	8040	
	Туре	Female	Male	Male	Female	
	Α	305 (12)	954 (37.6)	965 (38.0)	1016 (40.0)	
	B (∅)	46 (1.8)	62 (2.4)	99.4 (3.9)	200.5 (7.9)	
	С	305 (12)	1016 (40.0)	1016 (40.0)	1016 (40.0)	
	D (Ø)	16 (0.6)	19 (0.75)	19 (0.75)	28.8 (1.13)	

Handling

Recommended Cleaning Materials. Depending on the nature of the feed material, a choice can be made among the following cleaning agents:

- Sodium hydroxide at pH 10 12, temperature ≤ 40 °C (104 °F);
- Hydrochloric acid at pH 1 2, temperature ≤ 40 °C (104 °F);
- Nitric acid at pH 1 2, temperature ≤ 40 °C (104 °F);
- Na-EDTA of 0.2 1.0 % w/w at pH 10.5 11, temperature $\leq 35 \%$ (91 °F);
- Anionic surfactant (e.g. sodium dodecyl sulfate) of 0.5 % at pH 10.5 11, temperature \leq 35 °C (91 °F).

Only demineralized (RO) water must be used for cleaning. Consult UNISOL Membrane Technology regarding the use of other cleaning materials.

Lubricants. During installation, use only water or glycerin to lubricate seals. The use of petroleum or vegetable-based oils or solvents may damage the element and void any warranty.

Preservation and Storage. Plan ahead to use new membranes. The element should not be allowed to dry: store it in a sealed bag, at $4-30\,^{\circ}\text{C}$ (39 $-86\,^{\circ}\text{F}$). Storage solutions should be made with: 1.5 % w/w sodium metabisulfite. Please refer to "UNISOL Membrane Element Storage and Handling Instructions."

Chemical Exposure. Do not expose the membrane to chlorine or other oxidants. Sodium metabisulfite (without catalysts such as cobalt) is the preferred chemical to eliminate free chlorine or other oxidizers in the feed.



UNISOL MEMBRANE TECHNOLOGY

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