МЕМБРАННЫЕ ФИЛЬТРЫ

Alfa Laval MF flat sheet membranes

Flat sheet membranes for microfiltration

Introduction

The basic technology behind cross-flow membrane filtration by Alfa Laval involves using a semi-permeable membrane to separate a liquid into two distinct streams.

Microfiltration (MF) is used on feed streams where the aim is to remove small-diameter dispersed solids such as bacteria, fat and oil globules without affecting the balance of components dissolved within the stream.

Alfa Laval flat sheet membranes for microfiltration have pore sizes down to 0.1 µm.

Applications

Alfa Laval flat sheet membranes for microfiltration are used for a wide range of high-sanitary processes in the food, beverage, dairy, biotech and pharmaceutical industries such as:

- concentration and purification
- clarification and fractionation
- extraction
- product recycling and recovery
- product and effluent upgrading

Benefits

- available with different flux properties, pore sizes and rejection capabilities
- suitable for a wide range of processes
- tolerance to high pH and temperature
- the same basic membranes available in flat sheet and spiral configurations
- available by the metre, as standard sheets or precut to fit into Alfa Laval plate-and-frame modules
- delivered with the necessary lock and passage rings
- developed and manufactured by Alfa Laval
- all materials in compliance with EU Regulation (EC) 1935/2004, EU Regulation 10/2011 and FDA regulations (CFR) Title 21

Membrane data

Alfa Laval MF flat sheet membranes are made of either polysulphone or fluoro polymer based on a unique construction of polypropylene (PP) support material which provides optimum cleaning conditions.

Membrane type	Support material	Characteristics	Pore size [1]
MFG1	Polypropylene	Polysulphone	0.1 µm
MFG2	Polypropylene	Polysulphone	0.2 µm
MFP2	Polypropylene	Fluoro polymer	0.2 µm
MFP5	Polypropylene	Fluoro polymer	0.5 µm

[1] measured by standard bubble point method

Standard sizes

Membrane type	Sheets 20 x 20 cm	Alfa Laval module M10	Alfa Laval module M20	Alfa Laval module M38	Alfa Laval module M39
MFG1	531058	531032	529745	530970	531046
MFG2	528950	531561	529746	536068	529914
MFP2	526084	526083	525485	529752	526916
MFP5	526856	528010	526006	528007	525424

Note: For other sizes, please contact Alfa Laval

Recommended operating limits

Production	MFG1 / MFG2	MFP2 / MFP5
pH range (reference temperature 25°C)	1.5 – 12	1 – 11
Typical operating pressure, bar	1 – 3	1 – 3
Temperature, °C	5 – 75	5 – 60

Cleaning (3 hours per day)	MFG1 / MFG2	MFP2 / MFP5
pH range (reference temperature 25°C)	1 — 13	1 — 11.5
Pressure, bar	1 — 3	1 — 3
Temperature, °C	5 — 75	5 — 65

Note:

- Washing procedure indicated on the cover of each membrane package must be strictly followed. Please consult the Alfa Laval cleaning instructions and water quality specifications.
- The use of oxidation agents and similar chemicals might influence the membrane performance over time.

Important information

- New membranes must be cleaned prior to first use. The cleaning procedure should be in accordance with the instructions provided in the Alfa Laval cleaning description for the membrane type concerned.
- The customer is fully responsible for the effects that any incompatible chemicals may have on the membranes.
- After initial wetting, the membranes must be kept moist at all times.
- If the operating specifications provided in this product description are not strictly followed, the limited warranty will be null and void.
- To prevent biological growth during system shutdowns, Alfa Laval recommends that membranes should be immersed in a protective solution.
- Avoid permeate-side back pressure at all times.
- Alfa Laval recommends using original lock rings/strips for installation of the membrane sheets on the plates.

Operating guidelines

Alfa Laval recommends the following start-up procedure from standstill to operating condition:

- The unpressurized plant should be refilled with water.
- Feed pressure should be gradually increased over a 30–60 second time scale.
- Before initiating cross-flow at high permeate flux condition (e.g. start-up with high-temperature water), the set feed pressure should be maintained for 5–10 minutes.
- Cross-flow velocity at the set operating point should be gradually achieved over a period of 15–20 seconds.
- Temperature variations should be implemented gradually over a period of 3–5 minutes.
- Avoid any abrupt pressure or cross-flow variations on the membranes during start-up, shutdown, cleaning or other sequences in order to prevent possible damage.

Alfa Laval NF and RO flat sheet membranes

Flat sheet membranes for nanofiltration and reverse osmosis

Introduction

The basic technology behind cross-flow membrane filtration by Alfa Laval involves using a semi-permeable membrane to separate a liquid into two distinct streams.

Alfa Laval flat sheet membranes for nanofiltration (NF) have pore sizes down to 300 dalton. Operating at pressures of up to 55 bar small ions pass through the membrane, whereas larger ions and most organic components do not.

Alfa Laval flat sheet membranes for reverse osmosis (RO) have pores so minute that only small fractions of salts and very low molecular weight compounds can pass through the membrane, along with the water that is the prime component of the permeate.

The Alfa Laval RO98 pHt™ flat sheet membrane is characterized by its tolerance to high temperatures and pH values.

Applications

Alfa Laval flat sheet membranes for nanofiltration and reverse osmosis are used for a wide range of high-sanitary processes in the food, beverage, dairy, biotech and pharmaceutical industries such as:

- concentration and purification
- fractionation
- extraction
- product recycling and recovery
- product and effluent upgrading

Benefits

- available with different flux properties, molecular weight cut-off values and rejection capabilities
- suitable for a wide range of processes
- tolerance to high pH and temperature (RO98 pHt™)
- the same basic membranes available in flat sheet and spiral configurations
- available by the metre, as standard sheets or precut to fit into Alfa Laval plate-and-frame modules
- delivered with the necessary lock and passage rings
- developed and manufactured by Alfa Laval
- all materials in compliance with EU Regulation (EC) 1935/2004, EU Regulation 10/2011 and FDA regulations (CFR) Title 21

Membrane data

Alfa Laval NF and RO flat sheet membranes are made of thinfilm composite based on a unique construction of either polyester (PET) or polypropylene (PP) support material which provides optimum cleaning conditions.

Membrane type	Support material	Characteristics	Rejection
NF	Polyester	Thinfilm composite	≥ 99%[1]
NF99HF	Polyester	Thinfilm composite	≥ 99%[2]
RO90	Polyester	Thinfilm composite	≥ 90%[3]
RO99	Polyester	Thinfilm composite	≥ 98%[4]
RO98 pHt™	Polypropylene	Thinfilm composite	≥ 98%[4]

[1] measured on 2000 ppm $MgSO_4$, 9 bar, 25°C

[2] measured on 1000 ppm $MgSO_4$, 9 bar, 25°C

[3] measured on 2000 ppm NaCl, 9 bar, 25°C

[4] measured on 2000 ppm NaCl, 16 bar, 25°C

Standard sizes

Membrane type	Sheets 20 x 20 cm	Alfa Laval module M20	Alfa Laval module M30
NF	517819	517820	517732
NF99HF	522389	522372	522599
RO90	525517	525516	525518
RO99	522386	522369	524288
RO98 pHt™	100316	100457	100600
Note: For other sizes, please contact Alfa Laval			

Recommended operating limits

Production	NF / NF99HF	RO90 / RO99	RO98 pHt™
pH range (reference temperature 25°C)	3 – 10	3 – 10	2 – 11
Typical operating pressure, bar	15 – 42	15 – 42	15 – 42
Maximum operating pressure, bar	55	55	55
Temperature, °C	5 – 50	5 – 50	5 – 60
Free chlorine concentration, ppm	<0.1	<0.1	<0.1

Cleaning (3 hours per day)	NF / NF99HF	RO90 / RO99	RO98 pHt™
pH range (reference temperature 25°C)	1.5 – 11	1.5 – 11	1.5 – 12.5
Pressure, bar	1 – 5	1 – 5	1 – 5
Temperature, °C	30 – 50	30 – 50	30 – 60

Note:

- Washing procedure indicated on the cover of each membrane package must be strictly followed. Please consult the Alfa Laval cleaning instructions and water quality specifications.
- The use of oxidation agents and similar chemicals might influence the membrane performance over time. Agents such as chlorine are not allowed. Any contamination with chlorine must be avoided!

Important information

- New membranes must be cleaned prior to first use. The cleaning procedure should be in accordance with the instructions provided in the Alfa Laval cleaning description for the membrane type concerned.
- The customer is fully responsible for the effects that any incompatible chemicals may have on the membranes.
- After initial wetting, the membranes must be kept moist at all times.
- If the operating specifications provided in this product description are not strictly followed, the limited warranty will be null and void.
- To prevent biological growth during system shutdowns, Alfa Laval recommends that membranes should be immersed in a protective solution.
- Avoid permeate-side back pressure at all times.
- Alfa Laval recommends using original lock rings/strips for installation of the membrane sheets on the plates.

Operating guidelines

Alfa Laval recommends the following start-up procedure from standstill to operating condition:

- The unpressurized plant should be refilled with water.
- Feed pressure should be gradually increased over a 30–60 second time scale.
- Before initiating cross-flow at high permeate flux condition (e.g. start-up with high-temperature water), the set feed pressure should be maintained for 5–10 minutes.
- Cross-flow velocity at the set operating point should be gradually achieved over a period of 15–20 seconds.
- Temperature variations should be implemented gradually over a period of 3–5 minutes.
- Avoid any abrupt pressure or cross-flow variations on the membranes during start-up, shutdown, cleaning or other sequences in order to prevent possible damage.

Alfa Laval UF flat sheet membranes — DAIRY

Flat sheet membranes for ultrafiltration (Dairy UF-pHt™)

Introduction

The basic technology behind cross-flow membrane filtration by Alfa Laval involves using a semi-permeable membrane to separate a liquid into two distinct streams.

Ultrafiltration (UF) allows salts, sugars, organic acids and smaller peptides to pass through the pores of the membrane, whereas proteins, fats and polysaccharides are retained.

The Alfa Laval UF-pHt™ flat sheet membranes for dairy applications are based on polypropylene (PP) support material permitting an extended pH and temperature range.

Applications

Alfa Laval Dairy UF-pHt™ flat sheet membranes are tailor-made and used for the processing of:

- acid dairy products (GR60PP)
- milk and sweet whey (GR61PP)
- milk and whey (GR70PP, GR73PP and GR82PP)

Benefits

- available with different flux properties, molecular weight cut-off values and rejection capabilities
- tolerance to high pH and temperature
- the same basic membranes available in flat sheet and spiral membrane configurations
- available by the metre, as standard sheets or precut to fit into Alfa Laval plate-and-frame modules
- delivered with the necessary lock and passage rings
- developed and manufactured by Alfa Laval
- all materials in compliance with EU Regulation (EC) 1935/2004, EU Regulation 10/2011 and FDA regulations (CFR) Title 21
- Halal certified

Membrane data

Alfa Laval Dairy UF-pHt™ flat sheet membranes are made of either polysulphone or polyethersulphone polymer based on a unique construction of polypropylene (PP) support material which provides optimum cleaning conditions.

Membrane type, Dairy UF-pHt™	Support material	Characteristics	MWCO[1] value
GR60PP	Polypropylene	Polysulphone	20,000
GR61PP	Polypropylene	Polysulphone	10,000
GR70PP	Polypropylene	Polysulphone	10,000
GR73PP	Polypropylene	Polyethersulphone	10,000
GR82PP	Polypropylene	Polyethersulphone	5,000

[1] measured MWCO on typical dairy products

Standard sizes

Membrane type	Sheets 20 x 20 cm	Alfa Laval module M10	Alfa Laval module M20	Alfa Laval module M37
GR60PP	100464	101103	100458	100819
GR61PP	100470	101104	100454	100820
GR70PP	—	—	—	520446
GR73PP	533957	533958	529715	533955
GR82PP	531614	531666	531577	533956
Note: For other sizes, please contact Alfa Laval				

Recommended operating limits

Production	
pH range (reference temperature 25°C)	1 — 13
Typical operating pressure, bar	1 — 10
Temperature, °C	5 — 75

Cleaning (3 hours per day)	
pH range (reference temperature 25°C)	1 — 13
Pressure, bar	1 — 5
Temperature, °C	5 — 75

Note:

- Washing procedure indicated on the cover of each membrane package must be strictly followed. Please consult the Alfa Laval cleaning instructions and water quality specifications.
- The use of oxidation agents and similar chemicals might influence the membrane performance over time.

Important information

- New membranes must be cleaned prior to first use. The cleaning procedure should be in accordance with the instructions provided in the Alfa Laval cleaning description for the membrane type concerned.
- The customer is fully responsible for the effects that any incompatible chemicals may have on the membranes.
- After initial wetting, the membranes must be kept moist at all times.
- If the operating specifications provided in this product description are not strictly followed, the limited warranty will be null and void.
- To prevent biological growth during system shutdowns, Alfa Laval recommends that membranes should be immersed in a protective solution.
- Avoid permeate-side back pressure at all times.
- Alfa Laval recommends using original lock rings/strips for installation of the membrane sheets on the plates.

Operating guidelines

Alfa Laval recommends the following start-up procedure from standstill to operating condition:

- The unpressurized plant should be refilled with water.
- Feed pressure should be gradually increased over a 30–60 second time scale.
- Before initiating cross-flow at high permeate flux condition (e.g. start-up with high-temperature water), the set feed pressure should be maintained for 5–10 minutes.
- Cross-flow velocity at the set operating point should be gradually achieved over a period of 15–20 seconds.
- Temperature variations should be implemented gradually over a period of 3–5 minutes.
- Avoid any abrupt pressure or cross-flow variations on the membranes during start-up, shutdown, cleaning or other sequences in order to prevent possible damage.

Alfa Laval UF flat sheet membranes

Flat sheet membranes for ultrafiltration — FS, UFX, RC and ETNA types

Introduction

The basic technology behind cross-flow membrane filtration by Alfa Laval involves using a semi-permeable membrane to separate a liquid into two distinct streams.

Ultrafiltration (UF) allows salts, sugars, organic acids and smaller peptides to pass through the pores of the membrane, whereas proteins, fats and polysaccharides are retained.

Most of the Alfa Laval flat sheet membranes for ultrafiltration are based on polypropylene (PP) support material permitting an extended pH and temperature range.

Applications

Alfa Laval flat sheet membranes for ultrafiltration are used for a wide range of high-sanitary processes in the food, beverage, dairy, biotech and pharmaceutical industries such as:

- concentration and purification
- clarification and fractionation
- extraction
- product recycling and recovery
- product and effluent upgrading

Benefits

- available with different flux properties, molecular weight cut-off values and rejection capabilities
- suitable for a wide range of processes
- tolerance to high pH and temperature (UFX10 pHt™)
- the same basic membranes available in flat sheet and spiral configurations
- available by the metre, as standard sheets or precut to fit into Alfa Laval plate-and-frame modules
- delivered with the necessary lock and passage rings
- developed and manufactured by Alfa Laval
- all materials in compliance with EU Regulation (EC) 1935/2004, EU Regulation 10/2011 and FDA regulations (CFR) Title 21

Membrane data

Alfa Laval UF flat sheet membranes are made of different polymer types based on a unique construction of either polyester (PET) or polypropylene (PP) support material which provides optimum cleaning conditions.

Membrane type	Support material	Characteristics	MWCO value
FS40PP	Polypropylene	Fluoro polymer	100,000
UFX10 pHt™	Polypropylene	Polysulphone permanently hyprophilic	10,000
RC70PP	Polypropylene	Regenerated cellulose acetate	10,000
RC10PE	Polyester	Regenerated cellulose acetate	10,000
ETNA10PP	Polypropylene	Composite fluoro polymer	10,000
ETNA01PP	Polypropylene	Composite fluoro polymer	1,000

Standard sizes

Membrane type	Sheets 20 x 20 cm	Alfa Laval module M10	Alfa Laval module M20	Alfa Laval module M37	Alfa Laval module M38	Alfa Laval module M39
FS40PP	100486	100327	100447	100712	100713	100896
UFX10 pHt™	523519	524252	522578	523478	522285	522330
RC70PP	100320	101101	100319	100651	100652	100894
RC10PE	537485	537486	536771	537487	537488	534809
ETNA10PP	100479	101132	100467	100833	100839	100891
ETNA01PP	100478	101131	100465	100831	100837	517704

Note: For other sizes, please contact Alfa Laval

Recommended operating limits

Production	FS40PP / ETNA10PP / ETNA01PP	UFX10 pHt™	RC70PP / RC10PE
pH range (reference temperature 25°C)	1 — 11	1 — 13	1 — 10
Typical operating pressure, bar	1 — 10	1 — 10	1 — 10
Temperature, °C	5 — 60	5 — 75	5 — 60

Cleaning (3 hours per day)	FS40PP / ETNA10PP / ETNA01PP	UFX10 pHt™	RC70PP / RC10PE
pH range (reference temperature 25°C)	1 — 11.5	1 — 13	1 — 11.5
Pressure, bar	1 — 5	1 — 5	1 — 5
Temperature, °C	5 — 65	5 — 75	5 — 60

Note:

- Washing procedure indicated on the cover of each membrane package must be strictly followed. Please consult the Alfa Laval cleaning instructions and water quality specifications.
- The use of oxidation agents and similar chemicals might influence the membrane performance over time.

Important information

- New membranes must be cleaned prior to first use. The cleaning procedure should be in accordance with the instructions provided in the Alfa Laval cleaning description for the membrane type concerned.
- The customer is fully responsible for the effects that any incompatible chemicals may have on the membranes.
- After initial wetting, the membranes must be kept moist at all times.
- If the operating specifications provided in this product description are not strictly followed, the limited warranty will be null and void.
- To prevent biological growth during system shutdowns, Alfa Laval recommends that membranes should be immersed in a protective solution.
- Avoid permeate-side back pressure at all times.
- Alfa Laval recommends using original lock rings/strips for installation of the membrane sheets on the plates.

Operating guidelines

Alfa Laval recommends the following start-up procedure from standstill to operating condition:

- The unpressurized plant should be refilled with water.
- Feed pressure should be gradually increased over a 30–60 second time scale.
- Before initiating cross-flow at high permeate flux condition (e.g. start-up with high-temperature water), the set feed pressure should be maintained for 5–10 minutes.
- Cross-flow velocity at the set operating point should be gradually achieved over a period of 15–20 seconds.
- Temperature variations should be implemented gradually over a period of 3–5 minutes.
- Avoid any abrupt pressure or cross-flow variations on the membranes during start-up, shutdown, cleaning or other sequences in order to prevent possible damage.

Alfa Laval UF-pHt™ flat sheet membranes

Flat sheet membranes for ultrafiltration — GR types

Introduction

The basic technology behind cross-flow membrane filtration by Alfa Laval involves using a semi-permeable membrane to separate a liquid into two distinct streams.

Ultrafiltration (UF) allows salts, sugars, organic acids and smaller peptides to pass through the pores of the membrane, whereas proteins, fats and polysaccharides are retained.

The Alfa Laval UF-pHt™ flat sheet membranes are characterized by their tolerance to high temperatures and pH values.

Applications

Alfa Laval flat sheet membranes for ultrafiltration are used for a wide range of high-sanitary processes in the food, beverage, dairy, biotech and pharmaceutical industries such as:

- concentration and purification
- clarification and fractionation
- extraction
- product recycling and recovery
- product and effluent upgrading

Benefits

- available with different flux properties, molecular weight cut-off values and rejection capabilities
- suitable for a wide range of processes
- tolerance to high pH and temperature
- the same basic membranes available in flat sheet and spiral membrane configurations
- available by the metre, as standard sheets or precut to fit into Alfa Laval plate-and-frame modules
- delivered with the necessary lock and passage rings
- developed and manufactured by Alfa Laval
- all materials in compliance with EU Regulation (EC) 1935/2004, EU Regulation 10/2011 and FDA regulations (CFR) Title 21
- Halal certified (GR60PP, GR61PP, GR70PP, GR80PP, GR90PP)

Membrane data

Alfa Laval UF-pHt™ flat sheet membranes are made of either polysulphone or polyethersulphone polymer based on a unique construction of polypropylene (PP) support material which provides optimum cleaning conditions.

Membrane type	Support material	Characteristics	MWCO value
GR40PP	Polypropylene	Polysulphone	100,000
GR60PP	Polypropylene	Polysulphone	25,000
GR61PP	Polypropylene	Polysulphone	20,000
GR70PP	Polypropylene	Polysulphone	20,000
GR80PP	Polypropylene	Polyethersulphone	10,000
GR90PP	Polypropylene	Polyethersulphone	5,000
GR95PP	Polypropylene	Polyethersulphone	2,000

Standard sizes

Membrane type	Sheets 20 x 20 cm	Alfa Laval module M10	Alfa Laval module M20	Alfa Laval module M37	Alfa Laval module M38	Alfa Laval module M39
GR40PP	100348	100364	100365	100817	100814	100895
GR60PP	100464	101103	100458	100819	100804	100898
GR61PP	100470	101104	100454	100820	100805	100899
GR70PP	—	—	—	520446	519365	519401
GR80PP	531995	531997	531998	536797	536799	532000
GR90PP	531996	531992	531999	536798	536800	532001
GR95PP	516811	100368	101204	516810	101203	101216
Note: For other sizes, please contact Alfa Laval						

Recommended operating limits

Production	
pH range (reference temperature 25°C)	1 — 13
Typical operating pressure, bar	1 — 10
Temperature, °C	5 — 75

Cleaning (3 hours per day)	
pH range (reference temperature 25°C)	1 — 13
Pressure, bar	1 — 5
Temperature, °C	5 — 75

Note:

- Washing procedure indicated on the cover of each membrane package must be strictly followed. Please consult the Alfa Laval cleaning instructions and water quality specifications.
- The use of oxidation agents and similar chemicals might influence the membrane performance over time.

Important information

- New membranes must be cleaned prior to first use. The cleaning procedure should be in accordance with the instructions provided in the Alfa Laval cleaning description for the membrane type concerned.
- The customer is fully responsible for the effects that any incompatible chemicals may have on the membranes.
- After initial wetting, the membranes must be kept moist at all times.
- If the operating specifications provided in this product description are not strictly followed, the limited warranty will be null and void.
- To prevent biological growth during system shutdowns, Alfa Laval recommends that membranes should be immersed in a protective solution.
- Avoid permeate-side back pressure at all times.
- Alfa Laval recommends using original lock rings/strips for installation of the membrane sheets on the plates.

Operating guidelines

Alfa Laval recommends the following start-up procedure from standstill to operating condition:

- The unpressurized plant should be refilled with water.
- Feed pressure should be gradually increased over a 30–60 second time scale.
- Before initiating cross-flow at high permeate flux condition (e.g. start-up with high-temperature water), the set feed pressure should be maintained for 5–10 minutes.
- Cross-flow velocity at the set operating point should be gradually achieved over a period of 15–20 seconds.
- Temperature variations should be implemented gradually over a period of 3–5 minutes.
- Avoid any abrupt pressure or cross-flow variations on the membranes during start-up, shutdown, cleaning or other sequences in order to prevent possible damage.