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, EU Regulation (EC) 2023/2006 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 $MgSO_4$, 5 bar, 25°C

[2] measured on 2000 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 – 10	1.5 – 11	1.5 – 12.5
Pressure, bar	1 – 5	1 – 5	1 – 5	1 – 5
Temperature, °C	30 – 50	30 – 45	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. Please see detailed instructions on the packaging of the product.
- 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.
- For storage conditions, please see Shelf life and storage document.
- For warranties, please see Flat sheet membrane warranty document.

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 (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.

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How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com