# Alfa Laval MF spiral membranes

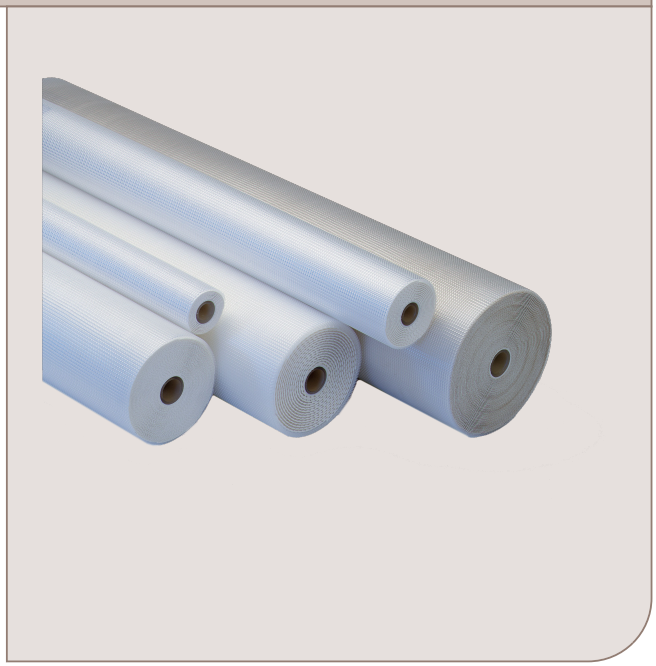
## Sanitary spiral membranes for microfiltration

### Introduction

Cross-flow membrane filtration by Alfa Laval separates out the different components in a feed stream on the basis of the size and the shape of the micro-particles within it.

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 MF spiral membranes have the advantage of eliminating the frequent replacement and disposal of the cartridges and other consumables used in traditional dead-end filtration.



### Applications

Alfa Laval spiral 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

- sanitary and compact full-fit design
- low initial investment and replacement costs
- cost-effective operation thanks to low energy consumption
- tolerance to high pH and temperature
- operation at low temperature possible
- different types and sizes available
- the same basic membranes available in spiral and flat sheet configurations
- 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

### Spiral membrane data

Alfa Laval MF spiral membranes are based on a unique construction of a polymeric membrane of either polysulphone or fluoro polymer with polypropylene (PP) support material that 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

## Spiral membrane designation

| | | |
|---|---|---|
| Example: **Alfa Laval MFG1–6338/48** | | |
| Alfa Laval MFG1 | = | Membrane type |
| 63 | = | Outer diameter of spiral (6.3") |
| 38 | = | Length of spiral (38") without ATD system |
| 48 | = | Thickness of feed spacer (48 mil) |

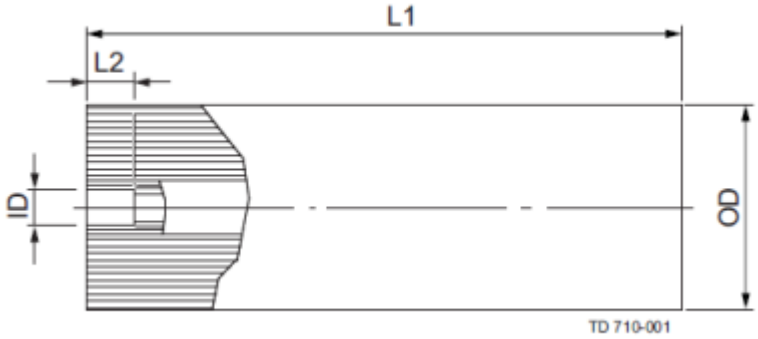
## Standard configurations

| Size[1] | | Membrane type and code number[2] | | | |
|---|---|---|---|---|---|
| **Spiral** | **Spacer** | **MFG1** | **MFG2** | **MFP2** | **MFP5** |
| 2517 | 48 | 531068 | 531576 | 528902 | 528995 |
| 2538 | 48 | 540910 | 529966 | 529965 | 541046 |
| 3838 | 48 | 531632 | 531049 | 524871 | 525474 |
| | 80 | 527942 | 527940 | 524822 | 524823 |
| 6338 | 48 | 531647 | 531648 | 524859 | 524858 |
| | 80 | 531633 | 531649 | 533860 | 529902 |
| 8038 | 48 | 531635 | 531634 | — | 533861 |
| (id 28.9 mm) | 80 | 531637 | 531636 | 533866 | 533862 |
| 8338 | 48 | 531639 | 531638 | 533867 | 533863 |
| (id 28.9 mm) | 80 | 531641 | 531640 | 533868 | 533864 |

[1] For other sizes, please contact Alfa Laval

[2] Please specify code number when ordering

## Dimensions




OD = outer diameter of spiral membrane
HD = nominal inner diameter of housing[1]
L1 = total length of spiral membrane without ATD
ID = diameter of ATD socket
L2 = depth of ATD socket

[1] For specific measurements of Alfa Laval housings please see the product specification

## Standard sizes

| Size[1] | Outer diameter (OD) | | Housing diameter (HD) | | Spiral length (L1)[2] | | ATD socket diameter (ID) | | ATD socket depth (L2) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | mm | inches | mm | inches | mm | inches | mm | inches | mm | inches |
| 2517 | 64.0– 65.0 | 2.52– 2.56 | 66.0 | 2.60 | 432 | 17.01 | 21.10 | 0.83 | 50.0 | 1.97 |
| 2538 | 64.0– 65.0 | 2.52– 2.56 | 66.0 | 2.60 | 965 | 37.99 | 21.10 | 0.83 | 50.0 | 1.97 |
| 3838 | 95.0– 96.5 | 3.74– 3.80 | 97.55 | 3.84 | 965 | 37.99 | 21.10 | 0.83 | 50.0 | 1.97 |
| 6338 | 160.0–162.0 | 6.30–6.38 | 163.10 | 6.42 | 965 | 37.99 | 28.90 | 1.14 | 76.0 | 2.99 |
| 8038 | 198.5–201.5 | 7.82– 7.93 | 204.14 | 8.04 | 965 | 37.99 | 28.90 | 1.14 | 76.0 | 2.99 |
| 8338 | 208.5–210.5 | 8.21–8.29 | 213.10 | 8.34 | 965 | 37.99 | 28.90 | 1.14 | 76.0 | 2.99 |

[1] For other sizes, please contact Alfa Laval

[2] Without ATD system

## Cross-flow and pressure drop

Typical cross-flow ($m^3/h$) and max. pressure drop (bar) at cP 1:

| **Outer diameter:** | 2.5” | | 3.8” | | 6.3” | | 8.0” | | 8.3” | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Spacer thickness:** | $m^3/h$ | bar | $m^3/h$ | bar | $m^3/h$ | bar | $m^3/h$ | bar | $m^3/h$ | bar |
| 48 mil | 1.3 | 0.6 | 8 | 1.1 | 23 | 1.1 | 25 | 1.0 | 30 | 1.0 |
| 80 mil | — | — | 11 | 1.1 | 30 | 1.1 | 35 | 1.1 | 35 | 1.1 |

Note: Calculated at tight fit of spiral membrane and housing by use of standard ATD system

Maximum pressure drop across the entire housing not to exceed 4.1 bar

## Recommended operating limits

| **Production** | **MFG1 / MFG2** | **MFP2 / MFP5** |
|---|---|---|
| pH range (reference temperature 25°C) | 1.5 — 12 | 1 — 11 |
| Typical operating pressure, bar | 0.3 — 2.5 | 0.3 — 2.5 |
| Temperature, °C | 5 — 75 | 5 — 60 |

| **Cleaning[1] (3 hours per day)** | **MFG1 / MFG2** | **MFP2 / MFP5** |
|---|---|---|
| pH range (reference temperature 25°C) | 1 — 13 | 1 — 11.5 |
| Typical pressure, bar | 0.3 — 1.5 | 1 — 5 |
| Temperature, °C | 5 — 75 | 5 — 65 |

[1] Please consult the Alfa Laval cleaning instructions and water quality specifications

Note:

- Washing procedure indicated on the cover of each spiral 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 spiral 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 spiral membranes.
- After initial wetting, the spiral 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 spiral membranes should be immersed in a protective solution.
- Avoid permeate-side back pressure at all times.
- Alfa Laval recommends using a rigid stainless steel ATD end device at the housing outlet end.
- Alfa Laval recommends that the inner diameter of the housing should be approx. 2 mm (0.08”) bigger than the outer diameter of the spiral membrane.
- For storage conditions, please see Shelf Life and Storage document.
- For warranties, please see spiral membrane warranty document.

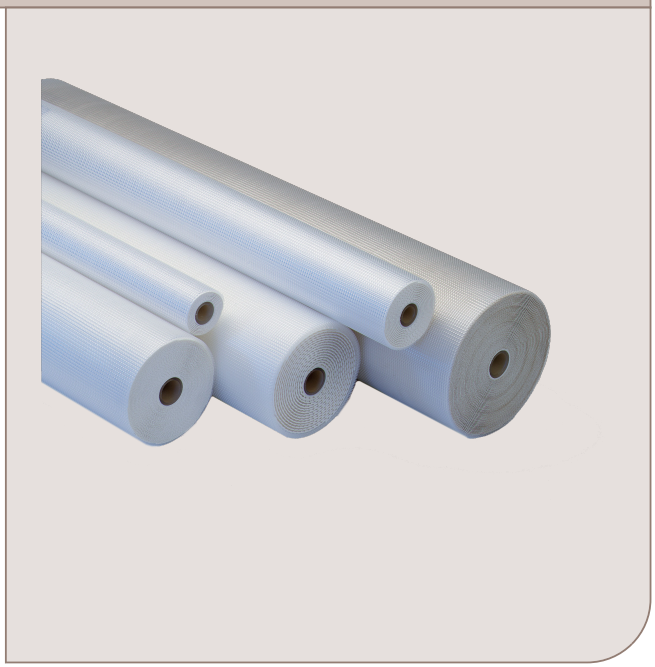
### Operating guidelines

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.

# Alfa Laval NF and RO spiral membranes

## Sanitary spiral membranes for nanofiltration and reverse osmosis



### Introduction

Cross-flow membrane filtration by Alfa Laval separates out the different components in a feed stream on the basis of the size and the shape of the micro-particles within it.

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

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

### Applications

Alfa Laval spiral 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

- sanitary and compact full-fit design
- low initial investment and replacement costs
- cost-effective operation thanks to low energy consumption
- tolerance to high pH and temperature
- operation at low temperature possible
- different types and sizes available
- the same basic membranes available in spiral and flat sheet configurations
- 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
- USDA approved and Halal certified

### Spiral membrane data

Alfa Laval NF and RO spiral membranes are based on a unique construction of a thinfilm composite polyamide membrane with either polyester (PET) or polypropylene (PP) support material that 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

## Spiral membrane designation

| | | |
|---|---|---|
| Example: **Alfa Laval RO90-8038/30** | | |
| Alfa Laval RO90 | = | Membrane type |
| 80 | = | Outer diameter of spiral (8.0") |
| 38 | = | Length of spiral (38") without ATD system |
| 30 | = | Thickness of feed spacer (30 mil) |

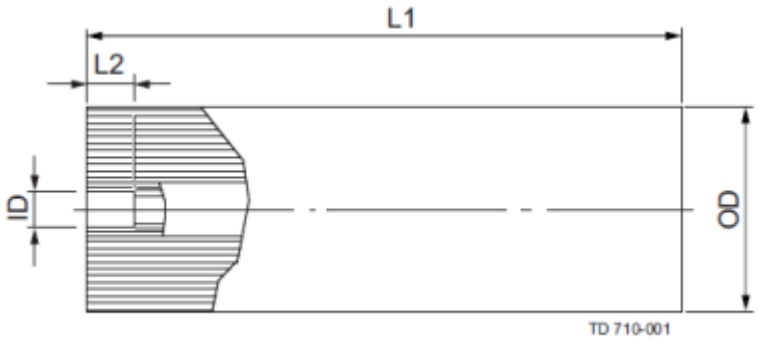
## Standard configurations

| Size[1] | | Membrane type and code number[2] | | | | |
|---|---|---|---|---|---|---|
| **Spiral** | **Spacer** | **NF** | **NF99HF** | **RO90** | **RO99** | **RO98 pHt™** |
| 2517 | 48 | 519770 | 522311 | 525507 | 522318 | 517592 |
| 2538 | 48 | 534807 | 533928 | 540855 | 540094 | 533929 |
| 3838 | 30 | 530979 | 522292 | 525508 | 523570 | 516645 |
| | 48 | 521231 | 521681 | 525509 | 522319 | 516646 |
| | 65 | 527936 | — | — | 522320 | 522333 |
| 3938 | 48 | — | — | — | 527938 | — |
| 8038 (id 28.58 mm) | 30 | 522314 | 523488 | 534782 | 522363 | 525469 |
| | 48 | 522315 | — | — | 522322 | 525470 |
| | 65 | 522316 | 528043 | — | 522323 | 529633 |
| 8038 (id. 28.9 mm) | 30 | 521183 | 524261 | 526003 | 534784 | 517314 |
| | 48 | 522163 | 524310 | 534785 | — | 518424 |
| | 65 | 524263 | 537519 | 531629 | 534786 | 522332 |

[1] For other sizes, please contact Alfa Laval

[2] Please specify code number when ordering

## Dimensions




OD = outer diameter of spiral membrane
HD = nominal inner diameter of housing[1]
L1 = total length of spiral membrane without ATD
ID = diameter of ATD socket
L2 = depth of ATD socket

[1] For specific measurements of Alfa Laval housings please see the product specification

## Standard sizes

| Size[1] | Outer diameter (OD) | | Housing diameter (HD) | | Spiral length (L1)[2] | | ATD socket diameter (ID) | | ATD socket depth (L2) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **mm** | **inches** | **mm** | **inches** | **mm** | **inches** | **mm** | **inches** | **mm** | **inches** |
| 2517 | 64.0– 65.0 | 2.52– 2.56 | 66 | 2.6 | 432 | 17.01 | 21.1 | 0.831 | 50 | 1.97 |
| 2538 | 64.0– 65.0 | 2.52– 2.56 | 66 | 2.6 | 965 | 37.99 | 21.1 | 0.831 | 50 | 1.97 |
| 3838 | 95.0– 96.5 | 3.74– 3.80 | 97.55 | 3.84 | 965 | 37.99 | 21.1 | 0.831 | 50 | 1.97 |
| 3938 | 98.5–99.0 | 3.88–3.90 | 101.00 | 4.00 | 965 | 37.99 | 21.1 | 0.831 | 50 | 1.97 |
| 8038 | 198.5–201.5 | 7.82– 7.93 | 204.14 | 8.04 | 965 | 37.99 | 28.58 | 1.125 | 76 | 2.99 |
| 8038 | 198.5–201.5 | 7.82– 7.93 | 204.14 | 8.04 | 965 | 37.99 | 28.9 | 1.138 | 76 | 2.99 |

[1] For other sizes, please contact Alfa Laval

[2] Without ATD system

## Cross-flow and pressure drop

Typical cross-flow ($m^3/h$) and max. pressure drop (bar) at cP 1:

| Outer diameter: | 2.5” | | 3.8”/3.9” | | 8.0” | |
|---|---|---|---|---|---|---|
| **Spacer thickness:** | $m^3/h$ | bar | $m^3/h$ | bar | $m^3/h$ | bar |
| 30 mil | — | — | 6 | 1.1 | 18 | 0.9 |
| 48 mil | 1.5 | 0.6 | 8 | 1.1 | 29 | 0.9 |
| 65 mil | — | — | 10 | 1.1 | 32 | 0.9 |

Note: Calculated at tight fit of spiral membrane and housing by use of standard ATD system

Maximum pressure drop across the entire housing not to exceed 4.1 bar

## Recommended operating limits

| Production | NF / NF99HF | RO90 / RO99 | RO98 pHt™ |
|---|---|---|---|
| pH range (reference temperature 25°C) | 3 — 9 | 3 — 10 | 2 — 10 |
| Typical operating pressure, bar | 15 — 35 | 15 — 40 | 15 — 40 |
| Maximum operating pressure at 30°C, bar | 55 | 55 | 55 |
| Maximum operating pressure at 60°C, bar | — | — | 27 |
| Temperature, °C | 5 — 50 | 5 — 50 | 5 — 60 |
| Free chlorine concentration, ppm | <0.1 | <0.1 | <0.1 |
| Hydrogen peroxide, continuous operation at 25°C | <20 | <20 | <20 |

| Cleaning[1] (3 hours per day) | NF / NF99HF | RO90 / RO99 | RO98 pHt™ |
|---|---|---|---|
| pH range (reference temperature 25°C) | 1.5 — 11 | 1.5 — 11 | 1 — 12.5 |
| Typical pressure, bar | 1 — 5 | 1 — 5 | 1 — 5 |
| Temperature, °C | 30 — 50 | 30 — 50 | 25 — 60 |

[1] Please consult the Alfa Laval cleaning instructions and water quality specifications

| Sanitization (1 hour per week) | | | |
|---|---|---|---|
| Hydrogen peroxide at 25°C, ppm | <1000 | <1000 | <1000 |

| OPTION: Hot water sanitization (only for RO98 pHt™ spiral membranes)[1] | | | |
|---|---|---|---|
| Max. sanitization temperature (<1.7 bar), °C | — | — | 80 |

[1] Please see the guidelines overleaf

Note:

- Washing procedure indicated on the cover of each spiral 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 spiral 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 spiral membranes.
- After initial wetting, the spiral 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 spiral membranes should be immersed in a protective solution.
- Avoid permeate-side back pressure at all times.
- Alfa Laval recommends using a rigid stainless steel ATD end device at the housing outlet end.
- Alfa Laval recommends that the inner diameter of the housing should be approx. 2 mm (0.08”) bigger than the outer diameter of the spiral membrane.
- For storage conditions, please see Shelf Life and Storage document.
- For warranties, please see spiral 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.

## OPTION: Hot water sanitization guidelines (only for RO98 pHt™ spiral membranes)

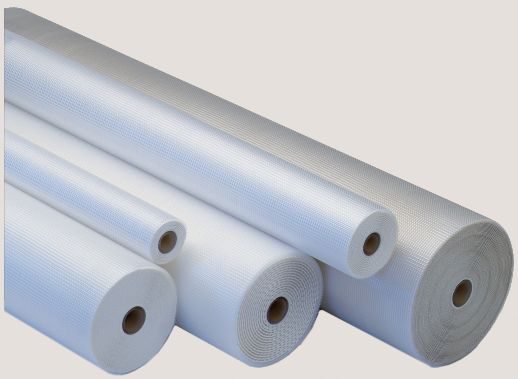
Cleaning (CIP) of the plant to be performed prior to sanitization for optimum result. The cleaning procedure should be in accordance with the instructions provided in the Alfa Laval product leaflet for the spiral membrane concerned and available on alfalaval.com.

A safe sanitizing procedure comprises of:

1. Flush the plant to drain using above type water quality
2. Start recycling and heating the water to max. 80°C (176°F) while maintaining a very low transmembrane pressure of <1.7 bar (<25 psi) with max. 3 bar (45 psi) feed pressure. Temperature changes should be gradual with not more than 5°C (9°F) change per minute.
3. Maintain the max. temperature for 60–90 minutes. Maintain the very low transmembrane pressure <1.7 bar (<25 psi) with max. 3 bar (45 psi) feed pressure.
4. Cool down the water / the plant gradually (not more than 5°C (9°F) change per minute) until 40°C (104°F).
5. Flush to drain with new suitable good water quality using the same very low transmembrane pressure <1.7 bar (<25 psi) with max. 3 bar (45 psi) feed pressure.

# Alfa Laval UF spiral membranes — DAIRY

## Sanitary spiral membranes for ultrafiltration (Dairy UF-PET and Dairy UF-pHt™)



### Introduction

Cross-flow membrane filtration by Alfa Laval separates out the different components in a feed stream on the basis of the size and the shape of the micro-particles within it.

Alfa Laval spiral membranes for dairy applications have a sanitary and full-fit design which offers optimum cleaning conditions and minimized stagnant spaces.

The Dairy UF-pHt™ spiral membranes are based on polypropylene (PP) support material permitting an extended pH and temperature range.

### Applications

Alfa Laval spiral membranes for dairy applications are tailor-made and used for the processing of:

- acid dairy products (GR60 membranes)
- milk and sweet whey (GR61 membranes)
- milk and whey (GR70, GR73 and GR82 membranes)

### Benefits

- sanitary and compact full-fit design
- low initial investment and replacement costs
- cost-effective operation thanks to low energy consumption
- tolerance to high pH and temperature (Dairy UF-pHt™)
- operation at low temperature possible
- different types and sizes available
- the same basic membranes available in spiral and flat sheet configurations (Dairy UF-pHt™)
- 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
- USDA approved and Halal certified
- all spiral membranes are shipped dry

### Spiral membrane data

Alfa Laval spiral membranes for dairy applications are based on a unique construction of a polymeric membrane of either polysulphone or polyethersulphone with polyester (PET) or polypropylene (PP) support material that provides optimum cleaning conditions.

| Membrane type, Dairy UF-PET | Support material | Characteristics | MWCO[1] value |
|---|---|---|---|
| GR61PE | Polyester | Polysulphone | 10,000 |
| GR70PE | Polyester | Polysulphone | 10,000 |
| GR73PE | Polyester | Polyethersulphone | 10,000 |
| GR82PE | Polyester | Polyethersulphone | 5,000 |

[1] measured MWCO on typical dairy products

| 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

## Spiral membrane designation

| Example: **Alfa Laval GR73PE-6338/48** | | |
|---|---|---|
| Alfa Laval GR73PE | = | Membrane type |
| 63 | = | Outer diameter of spiral (6.3") |
| 38 | = | Length of spiral (38") without ATD system |
| 48 | = | Thickness of feed spacer (48 mil) |

## Standard configurations

| Size[1] | | Dairy UF-PET membrane type and code number[2] | | | |
|---|---|---|---|---|---|
| **Spiral** | **Spacer** | **GR61PE** | **GR70PE** | **GR73PE** | **GR82PE** |
| 2517 | 48 | — | — | 533663 | 533685 |
| 3838 | 48 | — | — | 533664 | 533687 |
| | 80 | — | — | 533666 | 533688 |
| 6338 | 30 | — | 517824 | 528943 | 529671 |
| | 48 | 516697 | 517829 | 528944 | 528912 |
| | 65 | 518475 | — | 531645 | 533689 |
| | 80 | 516742 | 517831 | 528945 | 529667 |
| 8038 (id 28.9) | 30 | 533293 | 533299 | 529636 | 533690 |
| | 48 | 533294 | 533300 | 529972 | 533691 |
| | 65 | 533643 | 529937 | 529939 | 533692 |
| | 80 | 533295 | 533301 | 533667 | 533693 |
| 8338 (id 28.9) | 30 | 533296 | 533302 | 533668 | 533694 |
| | 48 | 533297 | 533303 | 533669 | — |
| | 65 | 533644 | 533649 | 533670 | 533696 |
| | 80 | 533298 | 533304 | 533671 | 533697 |

[1] For other sizes, please contact Alfa Laval

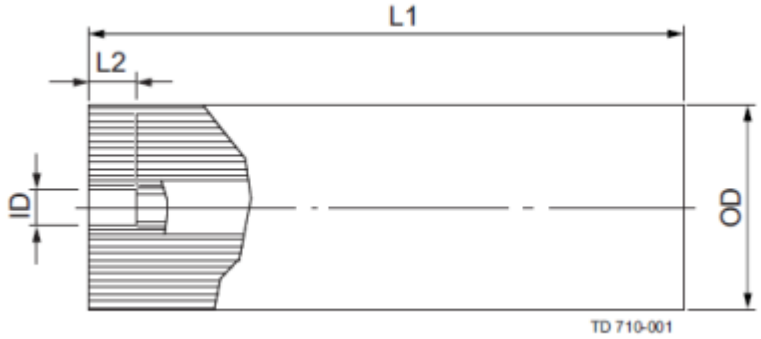
[2] Please specify code number when ordering

| Size[1] | | Dairy UF-pHt™ membrane type and code number[2] | | | | |
|---|---|---|---|---|---|---|
| **Spiral** | **Spacer** | **GR60PP** | **GR61PP** | **GR70PP** | **GR73PP** | **GR82PP** |
| 2517 | 48 | 517584 | 547585 | — | 533650 | 533672 |
| 2538 | 48 | 540985 | 528041 | — | 541048 | 541049 |
| 3838 | 30 | — | 516495 | — | — | — |
| | 48 | 516544 | 516496 | — | 530984 | 529872 |
| | 80 | 516545 | 516497 | — | 533652 | 533356 |
| 6338 | 30 | 516540 | 516435 | 519398 | 529017 | 533675 |
| | 48 | 516541 | 516436 | 519399 | 529018 | 533676 |
| | 65 | 519892 | 522547 | 524292 | 533653 | 533677 |
| | 80 | 516542 | 516437 | — | 529960 | 533678 |
| 8038 (id 28.9) | 30 | — | 532021 | — | 533654 | 531934 |
| | 48 | 532015 | — | — | 533655 | 531628 |
| | 65 | 533633 | — | — | 533656 | 533679 |
| | 80 | 532016 | — | 533350 | 533657 | 531626 |
| 8338 (id 28.9) | 30 | 532017 | 532024 | 533351 | 533658 | 533680 |
| | 48 | 532018 | 531981 | 533352 | 536559 | 533681 |
| | 65 | 533634 | 533641 | 533647 | 533660 | 533682 |
| | 80 | 532019 | 531982 | 533353 | 533661 | 533683 |

[1] For other sizes, please contact Alfa Laval

[2] Please specify code number when ordering

## Dimensions




OD = outer diameter of spiral membrane
HD = nominal inner diameter of housing[1]
L1 = total length of spiral membrane without ATD
ID = diameter of ATD socket
L2 = depth of ATD socket

[1] For specific measurements of Alfa Laval housings please see the product specification

## Standard sizes

| Size[1] | Outer diameter (OD) | | Housing diameter (HD) | | Spiral length (L1)[2] | | ATD socket diameter (ID) | | ATD socket depth (L2) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | mm | inches | mm | inches | mm | inches | mm | inches | mm | inches |
| 2517 | 64.0– 65.0 | 2.52– 2.56 | 66.0 | 2.60 | 432 | 17.01 | 21.10 | 0.83 | 50.0 | 1.97 |
| 2538 | 64.0– 65.0 | 2.52– 2.56 | 66.0 | 2.60 | 965 | 37.99 | 21.10 | 0.83 | 50.0 | 1.97 |
| 3838 | 95.0– 96.5 | 3.74– 3.80 | 97.55 | 3.84 | 965 | 37.99 | 21.10 | 0.83 | 50.0 | 1.97 |
| 6338 | 160.0–162.0 | 6.30–6.38 | 163.10 | 6.42 | 965 | 37.99 | 28.90 | 1.14 | 76.0 | 2.99 |
| 8038 | 198.5–201.5 | 7.82– 7.93 | 204.14 | 8.04 | 965 | 37.99 | 28.90 | 1.14 | 76.0 | 2.99 |
| 8338 | 208.5–210.5 | 8.21–8.29 | 213.10 | 8.34 | 965 | 37.99 | 28.90 | 1.14 | 76.0 | 2.99 |

[1] For other sizes, please contact Alfa Laval

[2] Without ATD system

## Cross-flow and pressure drop

Typical cross-flow ($m^3/h$) and max. pressure drop (bar) at cP 1:

| Outer diameter: | 2.5” | | 3.8” | | 6.3” | | 8.0” | | 8.3” | |
|---|---|---|---|---|---|---|---|---|---|---|
| Spacer thickness: | $m^3/h$ | bar | $m^3/h$ | bar | $m^3/h$ | bar[1] | $m^3/h$ | bar[2] | $m^3/h$ | bar[2] |
| 30 mil | — | — | 7 | 1.1 | 17 | 1.1 | 19 | 0.9 | 21 | 0.9 |
| 48 mil | 1.5 | 0.5 | 9 | 1.1 | 21 | 1.1 | 23 | 0.9 | 26 | 0.9 |
| 65 mil | — | — | — | — | 25 | 1.1 | 27 | 0.9 | 31 | 0.9 |
| 80 mil | — | — | 13 | 1.1 | 29 | 1.1 | 32 | 0.9 | 36 | 0.9 |

Note: Calculated at tight fit of spiral membrane and housing by use of standard ATD system

Maximum pressure drop across the entire housing not to exceed 4.1 bar

[1] During production at <50°C, 1.3 bar

[2] During production at <50°C, 1.1 bar

## Recommended operating limits

| Production | Dairy UF-PET | Dairy UF-pHt™ |
|---|---|---|
| pH range (reference temperature 25°C) | 2 — 9 | 2 — 10 |
| Typical operating pressure, bar | <10 | <10 |
| Temperature, °C | 5 — 50 | 5 — 75 |

| Cleaning[1] | Dairy UF-PET (2 hours per day) | Dairy UF-pHt™ (3 hours per day) |
|---|---|---|
| pH range (reference temperature 25°C) | 2 — 11.5 | 1 — 13 |
| Typical pressure, bar | <4 | <4 |
| Temperature, °C | 5 — 55 | 5 —70 |

[1] Please consult the Alfa Laval cleaning instructions and water quality specifications

| Cleaning and sanitization limitations — caustic / chlorine | |
|---|---|
| GR61PP, GR61PE: | <200 ppm at 50°C, pH 10.5–11.0, max. ½ hour per day |
| GR60PP, GR70PP, GR70PE, GR73PP, GR73PE, GR82PP, GR82PE: | <200 ppm at 50°C, pH 10.5–11.0, max exposure: ppm x hours <25000 ppm hours |

Note:

- Washing procedure indicated on the cover of each spiral 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 spiral 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 spiral membranes.
- After initial wetting, the spiral 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 spiral membranes should be immersed in a protective solution.
- Avoid permeate-side back pressure at all times.
- Alfa Laval recommends using a rigid stainless steel ATD end device at the housing outlet end.
- Alfa Laval recommends that the inner diameter of the housing should be approx. 2 mm (0.08”) bigger than the outer diameter of the spiral membrane.
- For storage conditions, please see Shelf Life and Storage document.
- For warranties, please see spiral 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.

# Alfa Laval UF-PET spiral membranes

## Sanitary spiral membranes for ultrafiltration

### Introduction

Cross-flow membrane filtration by Alfa Laval separates out the different components in a feed stream on the basis of the size and the shape of the micro-particles within it.

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.

Alfa Laval UF-PET spiral membranes are manufactured in a sanitary full-fit design that offers optimum cleaning conditions and minimized stagnant spaces.

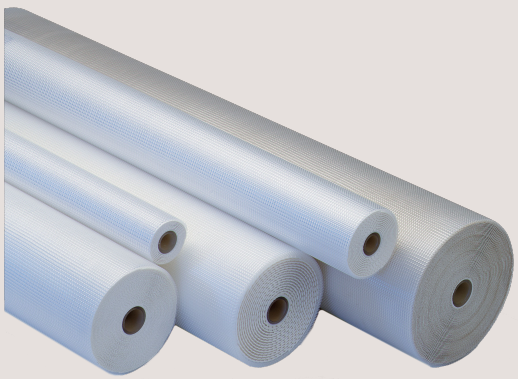
### Applications

Alfa Laval spiral 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

- sanitary and compact full-fit design
- low initial investment and replacement costs
- cost-effective operation thanks to low energy consumption
- operation at low temperature possible
- different types and sizes available
- the same basic membranes available in spiral and flat sheet configurations (RC10PE)
- 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
- USDA approved (GR61PE, GR70PE).
- Halal certified (GR61PE, GR70PE, GR80PE, GR90PE)



### Spiral membrane data

Alfa Laval UF-PET spiral membranes are based on a unique construction of a polymeric membrane with different characteristics and polyester (PET) support material.

| Membrane type | Support material | Characteristics | MWCO value |
|---|---|---|---|
| GR61PE | Polyester | Polysulphone | 20,000 |
| GR70PE | Polyester | Polysulphone | 20,000 |
| GR80PE | Polyester | Polyethersulphone | 10,000 |
| RC10PE | Polyester | Regenerated cellulose | 10,000 |
| GR90PE | Polyester | Polyethersulphone | 5,000 |

## Spiral membrane designation

| | | |
|---|---|---|
| Example: **Alfa Laval GR80PE-6338/48** | | |
| Alfa Laval GR80PE | = | Membrane type |
| 63 | = | Outer diameter of spiral (6.3") |
| 38 | = | Length of spiral (38") without ATD system |
| 48 | = | Thickness of feed spacer (48 mil) |

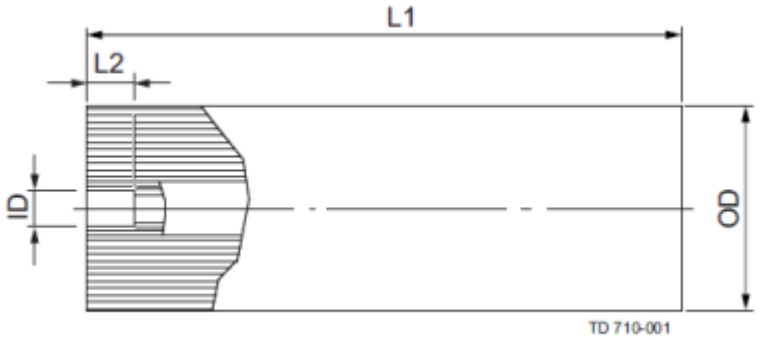
## Standard configurations

| Size[1] | | UF-PET membrane type and code number[2] | | | | |
|---|---|---|---|---|---|---|
| **Spiral** | **Spacer** | **GR61PE** | **GR70PE** | **GR80PE** | **GR90PE** | **RC10PE** |
| 2517 | 48 | — | — | — | — | 536783 |
| 2538 | 48 | — | — | — | — | 541045 |
| 3838 | 48 | — | — | — | — | 537478 |
| | 80 | — | — | — | — | 536818 |
| 6338 | 30 | — | 517824 | 533310 | 533324 | — |
| | 48 | 516697 | 517829 | 533311 | 533325 | 536867 |
| | 65 | — | — | — | — | 536779 |
| | 80 | 516742 | 517831 | 533312 | 533326 | 536819 |
| 8038 (id 28.9) | 30 | 533293 | 533299 | 533313 | 533327 | — |
| | 48 | 533294 | 533300 | — | 533328 | — |
| | 80 | 533295 | 533301 | 533315 | 533329 | — |
| 8338 (id 28.9) | 30 | 533296 | 533302 | 533316 | 533330 | — |
| | 48 | 533297 | 533303 | 533317 | — | 537553 |
| | 65 | — | — | — | — | 537552 |
| | 80 | 533298 | 533304 | 533318 | 533332 | 537554 |

[1] For other sizes, please contact Alfa Laval

[2] Please specify code number when ordering

## Dimensions




OD = outer diameter of spiral membrane
HD = nominal inner diameter of housing[1]
L1 = total length of spiral membrane without ATD
ID = diameter of ATD socket
L2 = depth of ATD socket

[1] For specific measurements of Alfa Laval housings please see the product specification

## Standard sizes

| Size[1] | Outer diameter (OD) | | Housing diameter (HD) | | Spiral length (L1)[2] | | ATD socket diameter (ID) | | ATD socket depth (L2) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **mm** | **inches** | **mm** | **inches** | **mm** | **inches** | **mm** | **inches** | **mm** | **inches** |
| 2517 | 64.0– 65.0 | 2.52– 2.56 | 66.0 | 2.60 | 432 | 17.01 | 21.10 | 0.83 | 50.0 | 1.97 |
| 2538 | 64.0– 65.0 | 2.52– 2.56 | 66.0 | 2.60 | 965 | 37.99 | 21.10 | 0.83 | 50.0 | 1.97 |
| 3838 | 95.0– 96.5 | 3.74– 3.80 | 97.55 | 3.84 | 965 | 37.99 | 21.10 | 0.83 | 50.0 | 1.97 |
| 6338 | 160.0–162.0 | 6.30–6.38 | 163.10 | 6.42 | 965 | 37.99 | 28.90 | 1.14 | 76.0 | 2.99 |
| 8038 | 198.5–201.5 | 7.82– 7.93 | 204.14 | 8.04 | 965 | 37.99 | 28.90 | 1.14 | 76.0 | 2.99 |
| 8338 | 208.5–210.5 | 8.21–8.29 | 213.10 | 8.34 | 965 | 37.99 | 28.90 | 1.14 | 76.0 | 2.99 |

[1] For other sizes, please contact Alfa Laval

[2] Without ATD system

## Cross-flow and pressure drop

Typical cross-flow ($m^3/h$) and max. pressure drop (bar) at cP 1:

| For GR61PE, GR70PE, GR80PE and GR90PE: | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Outer diameter:** | 2.5” | | 3.8” | | 6.3” | | 8.0” | | 8.3” | |
| **Spacer thickness:** | $m^3/h$ | bar | $m^3/h$ | bar | $m^3/h$ | bar | $m^3/h$ | bar | $m^3/h$ | bar |
| 30 mil | — | — | — | — | 17 | 1.1 | 18 | 0.9 | 23 | 0.9 |
| 48 mil | 1.3 — 1.8 | 0.6 | 8 | 1.1 | 23 | 1.1 | 29 | 0.9 | 32 | 0.9 |
| 80 mil | — | — | 11 | 1.1 | 30 | 1.1 | 34 | 0.9 | 36 | 0.9 |
| Note: Calculated at tight fit of spiral membrane and housing by use of standard ATD system | | | | | | | | | | |
| Maximum pressure drop across the entire housing not to exceed 4.1 bar | | | | | | | | | | |

| For RC10PE: | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Outer diameter:** | 2.5” | | 3.8” | | 6.3” | | 8.3” | |
| **Spacer thickness:** | $m^3/h$ | bar | $m^3/h$ | bar | $m^3/h$ | bar | $m^3/h$ | bar |
| 48 mil | 1.5 | 0.5 | 8 | 1 | 21 | 1 | 29 | 0.9 |
| 65 mil | — | — | 9 | 1 | 28 | 1 | 34 | 0.9 |
| 80 mil | — | — | 12 | 1 | 31 | 1 | 38 | 0.9 |
| Note: Calculated at tight fit of spiral membrane and housing by use of standard ATD system | | | | | | | | |
| Maximum pressure drop across the entire housing not to exceed 4.1 bar | | | | | | | | |

## Recommended operating limits

| Production | GR61PE / GR70PE / GR80PE / GR90PE | RC10PE |
|---|---|---|
| pH range (reference temperature 25°C) | 3 — 9 | 2 — 10 |
| Typical operating pressure, bar | 1 — 10 | 1 — 10 |
| Temperature, °C | 5 — 50 | 5 — 60 |

| Cleaning[1] (3 hours per day) | GR61PE / GR70PE / GR80PE / GR90PE | RC10PE |
|---|---|---|
| pH range (reference temperature 25°C) | 1 — 11.5 | 1 — 11.5 |
| Typical pressure, bar | 1 — 4 | 1 — 4 |
| Temperature, °C | 5 — 55 | 5 — 65 |

[1] Please consult the Alfa Laval cleaning instructions and water quality specifications

| Cleaning and sanitization limitations — caustic / chlorine | |
|---|---|
| GR61PE: | <200 ppm at 50°C, pH 10.5–11.0, max. ½ hour per day |
| GR70PE, GR80PE, GR90PE: | <200 ppm at 50°C, pH 10.5–11.0, max exposure: ppm x hours <25000 ppm hours |
| RC10PE: | <20 ppm at 50°C, pH 10.5–11.0, max. ½ hour per day |

Note:

- Washing procedure indicated on the cover of each spiral 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 spiral 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 spiral membranes.
- After initial wetting, the spiral 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 spiral membranes should be immersed in a protective solution.
- Avoid permeate-side back pressure at all times.
- Alfa Laval recommends using a rigid stainless steel ATD end device at the housing outlet end.
- Alfa Laval recommends that the inner diameter of the housing should be approx. 2 mm (0.08”) bigger than the outer diameter of the spiral membrane.
- For storage conditions, please see Shelf Life and Storage document.
- For warranties, please see spiral membrane warranty document.

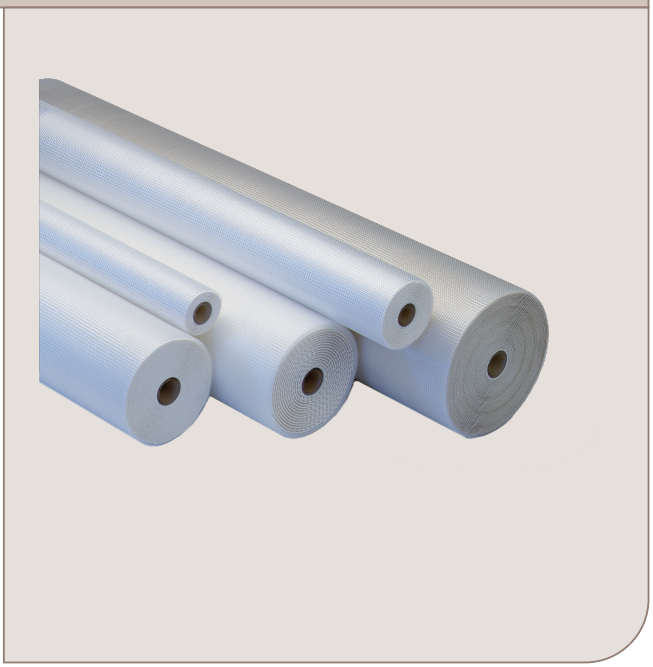
## Operating guidelines

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.

# Alfa Laval UF-pHt™ spiral membranes

## Sanitary spiral membranes for ultrafiltration - GR types



### Introduction

Cross-flow membrane filtration by Alfa Laval separates out the different components in a feed stream on the basis of the size and the shape of the micro-particles within it.

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™ spiral membranes are characterized by their tolerance to high temperatures and pH values.

### Applications

Alfa Laval spiral 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

- sanitary and compact full-fit design
- low initial investment and replacement costs
- cost-effective operation thanks to low energy consumption
- tolerance to high pH and temperature
- operation at low temperature possible
- different types and sizes available
- the same basic membranes available in spiral and flat sheet configurations
- 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
- USDA approved (GR40PP, GR60PP, GR61PP, GR70PP, GR95PP)
- Halal certified (GR60PP, GR61PP, GR70PP, GR80PP, GR90PP)

### Spiral membrane data

Alfa Laval UF-pHt™ spiral membranes are based on a unique construction of a polymeric membrane of either polysulphone or polyethersulphone with polypropylene (PP) support material that 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 |

## Spiral membrane designation

| | | |
|---|---|---|
| Example: **Alfa Laval GR61PP-8038/30** | | |
| Alfa Laval GR61PP | = | Membrane type |
| 80 | = | Outer diameter of spiral (8.0") |
| 38 | = | Length of spiral (38") without ATD system |
| 30 | = | Thickness of feed spacer (30 mil) |

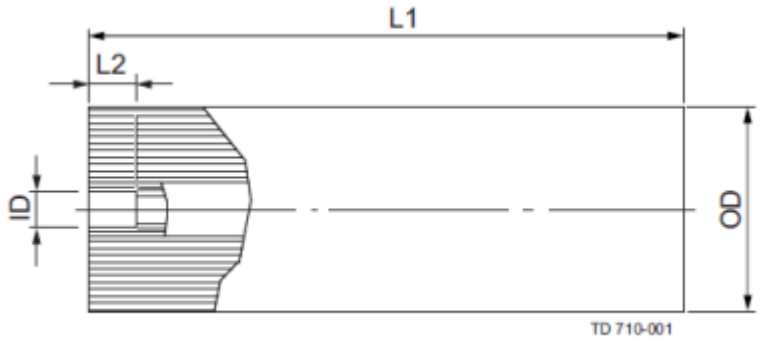
## Standard configurations

| Size[1] | | Membrane type and code number[2] | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Spiral** | **Spacer** | **GR40PP** | **GR60PP** | **GR61PP** | **GR70PP** | **GR80PP** | **GR90PP** | **GR95PP** |
| 2517 | 48 | 517582 | 517584 | 517585 | — | 532026 | 533251 | 517587 |
| 2538 | 48 | 536785 | 540985 | 528041 | — | 536815 | 533926 | 533927 |
| 3838 | 30 | — | — | 516495 | — | — | — | — |
| | 48 | 516739 | 516544 | 516496 | — | 532028 | 533253 | 516825 |
| | 80 | 516768 | 516545 | 516497 | — | 532029 | 533254 | 517890 |
| 6338 | 30 | — | 516540 | 516435 | 519398 | 532030 | 533255 | 518144 |
| | 48 | 518142 | 516541 | 516436 | 519399 | 532031 | 533256 | 517142 |
| | 80 | 518143 | 516542 | 516437 | — | 532032 | — | 518145 |
| 8038 (id 28.9) | 30 | 532002 | — | 532021 | — | 532033 | 533258 | 533264 |
| | 48 | 532003 | 532015 | — | — | 532034 | 533259 | 533265 |
| | 80 | 532004 | 532016 | — | 533350 | 532035 | 533260 | 533266 |
| 8338 (id 28.9) | 30 | 532005 | 532017 | 532024 | 533351 | 532036 | 533261 | 533267 |
| | 48 | 532006 | 532018 | 531981 | 533352 | 532037 | 533262 | 533268 |
| | 80 | 532007 | 532019 | 531982 | 533353 | 532038 | 533263 | 533269 |

[1] For other sizes, please contact Alfa Laval

[2] Please specify code number when ordering

## Dimensions




OD = outer diameter of spiral membrane
HD = nominal inner diameter of housing[1]
L1 = total length of spiral membrane without ATD
ID = diameter of ATD socket
L2 = depth of ATD socket

[1] For specific measurements of Alfa Laval housings please see the product specification

## Standard sizes

| Size[1] | Outer diameter (OD) | | Housing diameter (HD) | | Spiral length (L1)[2] | | ATD socket diameter (ID) | | ATD socket depth (L2) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **mm** | **inches** | **mm** | **inches** | **mm** | **inches** | **mm** | **inches** | **mm** | **inches** |
| 2517 | 64.0– 65.0 | 2.52– 2.56 | 66.0 | 2.60 | 432 | 17.01 | 21.10 | 0.83 | 50.0 | 1.97 |
| 2538 | 64.0– 65.0 | 2.52– 2.56 | 66.0 | 2.60 | 965 | 37.99 | 21.10 | 0.83 | 50.0 | 1.97 |
| 3838 | 95.0– 96.5 | 3.74– 3.80 | 97.55 | 3.84 | 965 | 37.99 | 21.10 | 0.83 | 50.0 | 1.97 |
| 6338 | 160.0–162.0 | 6.30–6.38 | 163.10 | 6.42 | 965 | 37.99 | 28.90 | 1.14 | 76.0 | 2.99 |
| 8038 | 198.5–201.5 | 7.82– 7.93 | 204.14 | 8.04 | 965 | 37.99 | 28.90 | 1.14 | 76.0 | 2.99 |
| 8338 | 208.5–210.5 | 8.21–8.29 | 213.10 | 8.34 | 965 | 37.99 | 28.90 | 1.14 | 76.0 | 2.99 |

[1] For other sizes, please contact Alfa Laval

[2] Without ATD system

## Cross-flow and pressure drop

Typical cross-flow ($m^3/h$) and max. pressure drop (bar) at cP 1:

| Outer diameter: | 2.5” | | 3.8” | | 6.3” | | 8.0” | | 8.3” | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Spacer thickness:** | $m^3/h$ | bar | $m^3/h$ | bar | $m^3/h$ | bar | $m^3/h$ | bar | $m^3/h$ | bar |
| 30 mil | — | — | 6 | 1.1 | 17 | 1.1[1] | 18 | 0.9 | 23 | 0.9 |
| 48 mil | 1.3–1.8 | 0.6 | 8 | 1.1 | 23 | 1.1[1] | 29 | 0.9 | 32 | 0.9 |
| 80 mil | — | — | 11 | 1.1 | 30 | 1.1[1] | 34 | 0.9 | 36 | 0.9 |

Note: Calculated at tight fit of spiral membrane and housing by use of standard ATD system

Maximum pressure drop across the entire housing not to exceed 4.1 bar

[1] During production at < 50°C, 1.3 bar

## Recommended operating limits

| **Production**[1] | |
|---|---|
| pH range (reference temperature 25°C) | 2 — 10 |
| Typical operating pressure, bar | 1 — 10 |
| Temperature, °C | 5 — 75 |

[1] Tolerant to wider pH ranges and higher temperatures under certain conditions. Please contact Alfa Laval for specific requirements

| **Cleaning**[1] **(3 hours per day)** | |
|---|---|
| pH range (reference temperature 25°C) | 1 — 13 |
| Typical pressure, bar | 1 — 4 |
| Temperature, °C | 5 — 70 |

[1] Please consult the Alfa Laval cleaning instructions and water quality specifications

| **Cleaning and sanitization limitations — caustic / chlorine** | |
|---|---|
| GR40PP, GR61PP, GR95PP: | <200 ppm at 50°C, pH 10.5–11.0, max. ½ hour per day |
| GR60PP, GR70PP, GR80PP, GR90PP: | <200 ppm at 50°C, pH 10.5–11.0, max exposure: ppm x hours <25000 ppm hours |

Note:

- Washing procedure indicated on the cover of each spiral 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 spiral 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 spiral membranes.
- After initial wetting, the spiral 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 spiral membranes should be immersed in a protective solution.
- Avoid permeate-side back pressure at all times.
- Alfa Laval recommends using a rigid stainless steel ATD end device at the housing outlet end.
- Alfa Laval recommends that the inner diameter of the housing should be approx. 2 mm (0.08”) bigger than the outer diameter of the spiral membrane.
- For storage conditions, please see Shelf Life and Storage document.
- For warranties, please see spiral membrane warranty document.

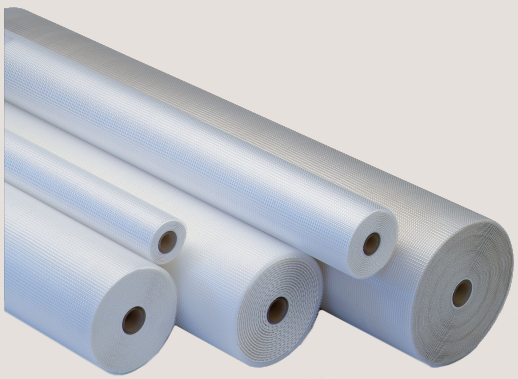
## Operating guidelines

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.

# Alfa Laval UF-PP spiral membranes

## Sanitary spiral membranes for ultrafiltration — FS, RC and ETNA types



### Introduction

Cross-flow membrane filtration by Alfa Laval separates out the different components in a feed stream on the basis of the size and the shape of the micro-particles within it.

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.

Alfa Laval UF-PP spiral membranes are manufactured in a sanitary full-fit design that offers optimum cleaning conditions and minimized stagnant spaces.

### Applications

Alfa Laval spiral 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

- sanitary and compact full-fit design
- low initial investment and replacement costs
- cost-effective operation thanks to low energy consumption
- operation at low temperature possible
- different types and sizes available
- the same basic membranes available in spiral and flat sheet configurations
- 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
- Halal certified (FS40PP)

### Spiral membrane data

Alfa Laval UF-PP spiral membranes are based on a unique construction of a polymeric membrane with different characteristics and polypropylene (PP) support material that provides optimum cleaning conditions.

| Membrane type | Support material | Characteristics | MWCO value |
|---|---|---|---|
| FS40PP | Polypropylene | Fluoro polymer | 100,000 |
| RC70PP | Polypropylene | Regenerated cellulose | 10,000 |
| ETNA10PP | Polypropylene | Composite fluoro polymer | 10,000 |
| ETNA01PP | Polypropylene | Composite fluoro polymer | 1,000 |

## Spiral membrane designation

| | | |
|---|---|---|
| Example: **Alfa Laval RC70PP-6338/48** | | |
| Alfa Laval RC70PP | = | Membrane type |
| 63 | = | Outer diameter of spiral (6.3") |
| 38 | = | Length of spiral (38") without ATD system |
| 48 | = | Thickness of feed spacer (48 mil) |

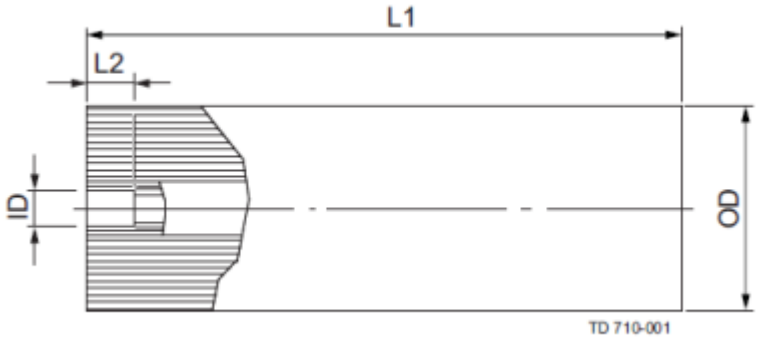
## Standard configurations

| Size[1] | | Membrane type and code number[2] | | | |
|---|---|---|---|---|---|
| **Spiral** | **Spacer** | **ETNA01PP** | **ETNA10PP** | **FS40PP** | **RC70PP** |
| 2517 | 48 | 518265 | 517590 | 517588 | 517591 |
| 2538 | 48 | 536853 | 536852 | 537567 | 536814 |
| 3838 | 48 | 517906 | 517184 | 517903 | 516745 |
| | 80 | 517907 | 517508 | 516710 | 516746 |
| 6338 | 30 | 533719 | 517509 | — | 517529 |
| | 48 | 517833 | 517490 | 518153 | — |
| | 80 | 518158 | 517510 | 518154 | 516750 |
| 8038 (id 28.9) | 30 | — | — | 533971 | 533959 |
| | 48 | 533721 | 533727 | 533972 | — |
| | 80 | 533722 | 533728 | 533967 | — |
| 8338 (id 28.9) | 30 | 533723 | 533729 | 533968 | 533962 |
| | 48 | 533724 | 533850 | 533969 | 533965 |
| | 80 | 533725 | 533851 | 533970 | 533966 |

[1] For other sizes, please contact Alfa Laval

[2] Please specify code number when ordering

## Dimensions




OD = outer diameter of spiral membrane
HD = nominal inner diameter of housing[1]
L1 = total length of spiral membrane without ATD
ID = diameter of ATD socket
L2 = depth of ATD socket

[1] For specific measurements of Alfa Laval housings please see the product specification

## Standard sizes

| Size[1] | Outer diameter (OD) | | Housing diameter (HD) | | Spiral length (L1)[2] | | ATD socket diameter (ID) | | ATD socket depth (L2) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **mm** | **inches** | **mm** | **inches** | **mm** | **inches** | **mm** | **inches** | **mm** | **inches** |
| 2517 | 64.0– 65.0 | 2.52– 2.56 | 66.0 | 2.60 | 432 | 17.01 | 21.10 | 0.83 | 50.0 | 1.97 |
| 2538 | 64.0– 65.0 | 2.52– 2.56 | 66.0 | 2.60 | 965 | 37.99 | 21.10 | 0.83 | 50.0 | 1.97 |
| 3838 | 95.0– 96.5 | 3.74– 3.80 | 97.55 | 3.84 | 965 | 37.99 | 21.10 | 0.83 | 50.0 | 1.97 |
| 6338 | 160.0–162.0 | 6.30–6.38 | 163.10 | 6.42 | 965 | 37.99 | 28.90 | 1.14 | 76.0 | 2.99 |
| 8038 | 198.5–201.5 | 7.82– 7.93 | 204.14 | 8.04 | 965 | 37.99 | 28.90 | 1.14 | 76.0 | 2.99 |
| 8338 | 208.5–210.5 | 8.21–8.29 | 213.10 | 8.34 | 965 | 37.99 | 28.90 | 1.14 | 76.0 | 2.99 |

[1] For other sizes, please contact Alfa Laval

[2] Without ATD system

## Cross-flow and pressure drop

Typical cross-flow ($m^3/h$) and max. pressure drop (bar) at cP 1:

| Outer diameter: | 2.5” | | 3.8” | | 6.3” | | 8.0” | | 8.3” | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Spacer thickness:** | $m^3/h$ | bar | $m^3/h$ | bar | $m^3/h$ | bar | $m^3/h$ | bar | $m^3/h$ | bar |
| 30 mil | — | — | — | — | 17 | 1.1 | 18 | 0.9 | 23 | 0.9 |
| 48 mil | 1.3 — 1.8 | 0.6 | 8 | 1.1 | 23 | 1.1 | 29 | 0.9 | 32 | 0.9 |
| 80 mil | — | — | 11 | 1.1 | 30 | 1.1 | 34 | 0.9 | 36 | 0.9 |

Note: Calculated at tight fit of spiral membrane and housing by use of standard ATD system

Maximum pressure drop across the entire housing not to exceed 4.1 bar

## Recommended operating limits

| **Production** | |
|---|---|
| pH range (reference temperature 25°C) | 2 — 10 |
| Typical operating pressure, bar | 1 — 10 |
| Temperature, °C | 5 — 60 |

| **Cleaning[1] (3 hours per day)** | |
|---|---|
| pH range (reference temperature 25°C) | 1 — 11.5 |
| Typical pressure, bar | 1 — 4 |
| Temperature, °C | 5 — 65 |

[1] Please consult the Alfa Laval cleaning instructions and water quality specifications

Note:

- Washing procedure indicated on the cover of each spiral 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 spiral 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 spiral membranes.
- After initial wetting, the spiral 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 spiral membranes should be immersed in a protective solution.
- Avoid permeate-side back pressure at all times.
- Alfa Laval recommends using a rigid stainless steel ATD end device at the housing outlet end.
- Alfa Laval recommends that the inner diameter of the housing should be approx. 2 mm (0.08”) bigger than the outer diameter of the spiral membrane.
- For storage conditions, please see Shelf Life and Storage document.
- For warranties, please see spiral 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.