



Soluciones para una Economía Circular: Tratamiento de Agua mediante Reactores de Membrana MBR Alfa Laval.

- Alfa Laval LowResist MBR Membranes

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Proven effective barrier to microplastic pollution



- Award winning R&D project collaboration in Roskilde Fjord, Denmark

- The “invisible” menace – in 2050 it is expected that the mass of plastics in the oceans will be bigger than the mass of fishes



Extract from Alfa Laval HERE magazine, no.36

- Microplastics are the invisible part
- Includes: Microbeads, Fibres, Flakes, Films
- Alfa Laval MBR membranes are proven to be an effective barrier to microplastic pollution



1Plastfri Roskilde Fjord partners including Alfa Laval pose after receiving the Global Energy Award Denmark 2018

Circular Economy

– A vision



My First MBR Time

– Japan 2012



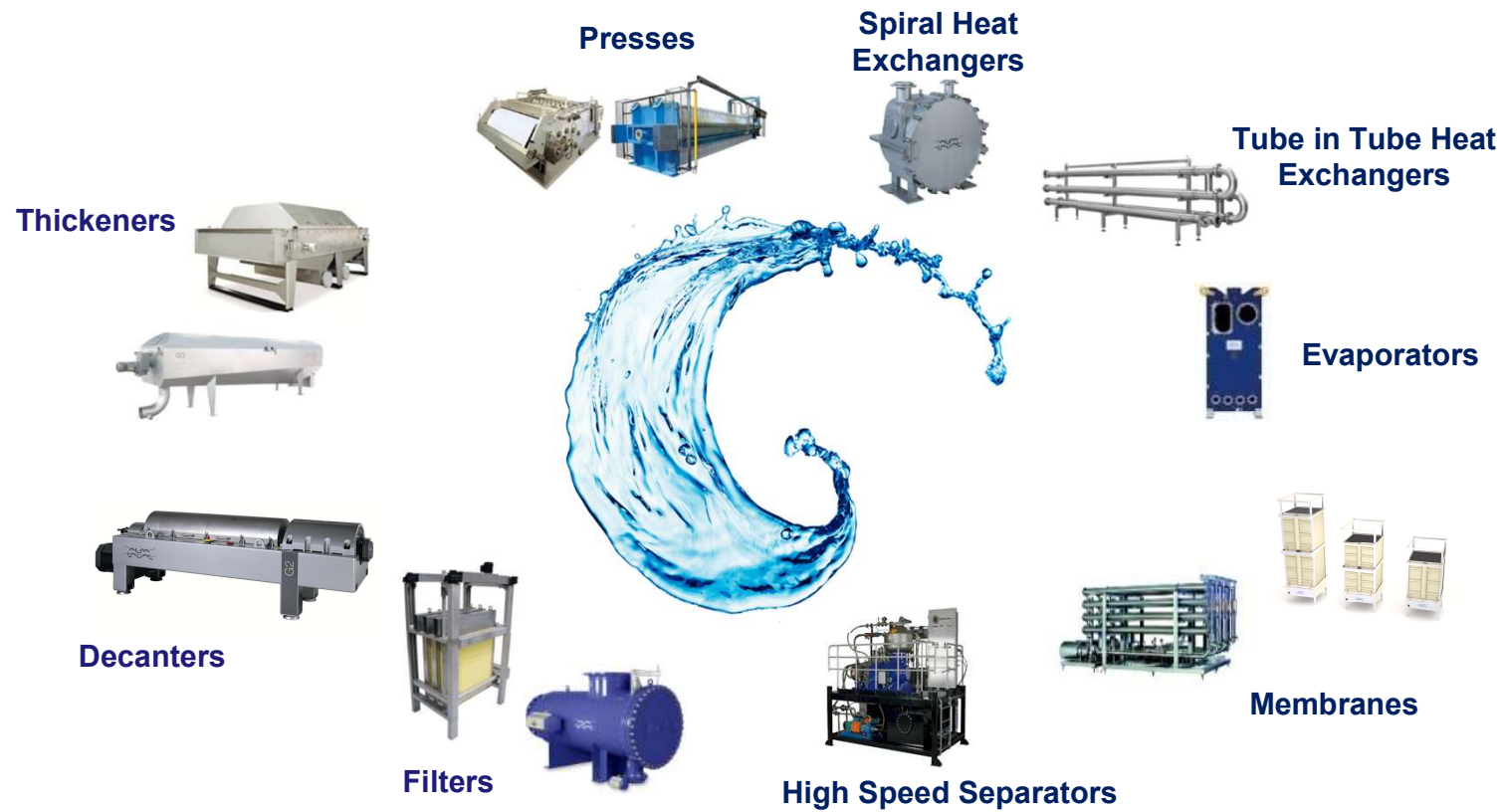
Our purpose

– Advancing better™

A large, vibrant blue underwater scene featuring two dolphins swimming gracefully. The larger dolphin is in the foreground, moving towards the right, while a smaller one is slightly behind and to the left. Sunlight rays filter down from the surface, creating a serene and dynamic atmosphere. Bubbles are visible in the water, adding to the sense of movement.

“We exist to accelerate
success for our customers,
people and planet”

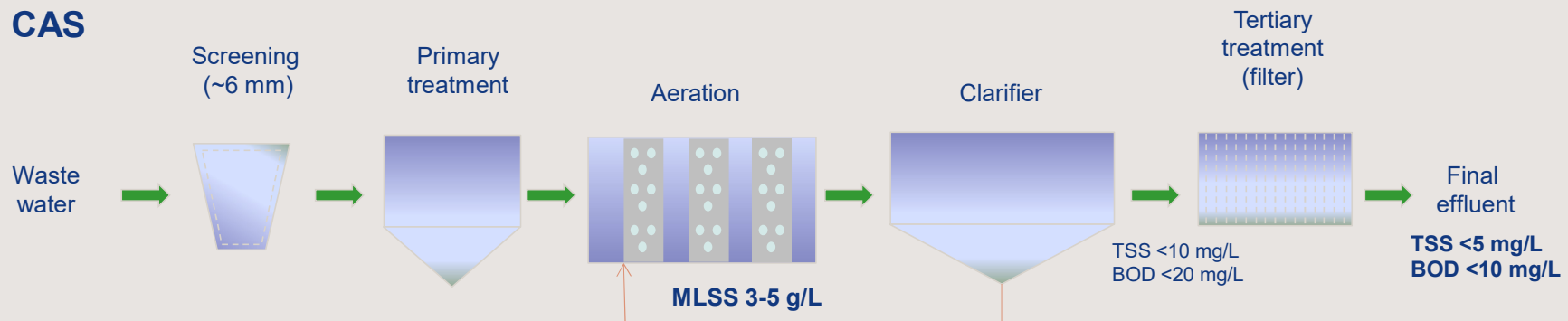
Alfa Laval's Water & Waste treatment portfolio



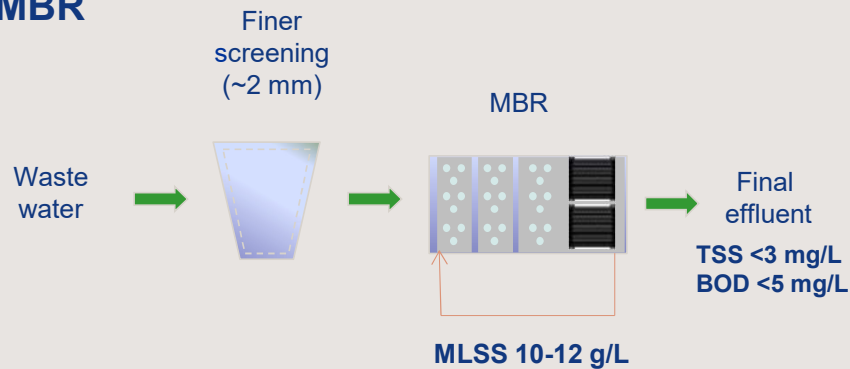
MBR Process

– Conventional Activated Sludge (CAS) versus MBR

CAS



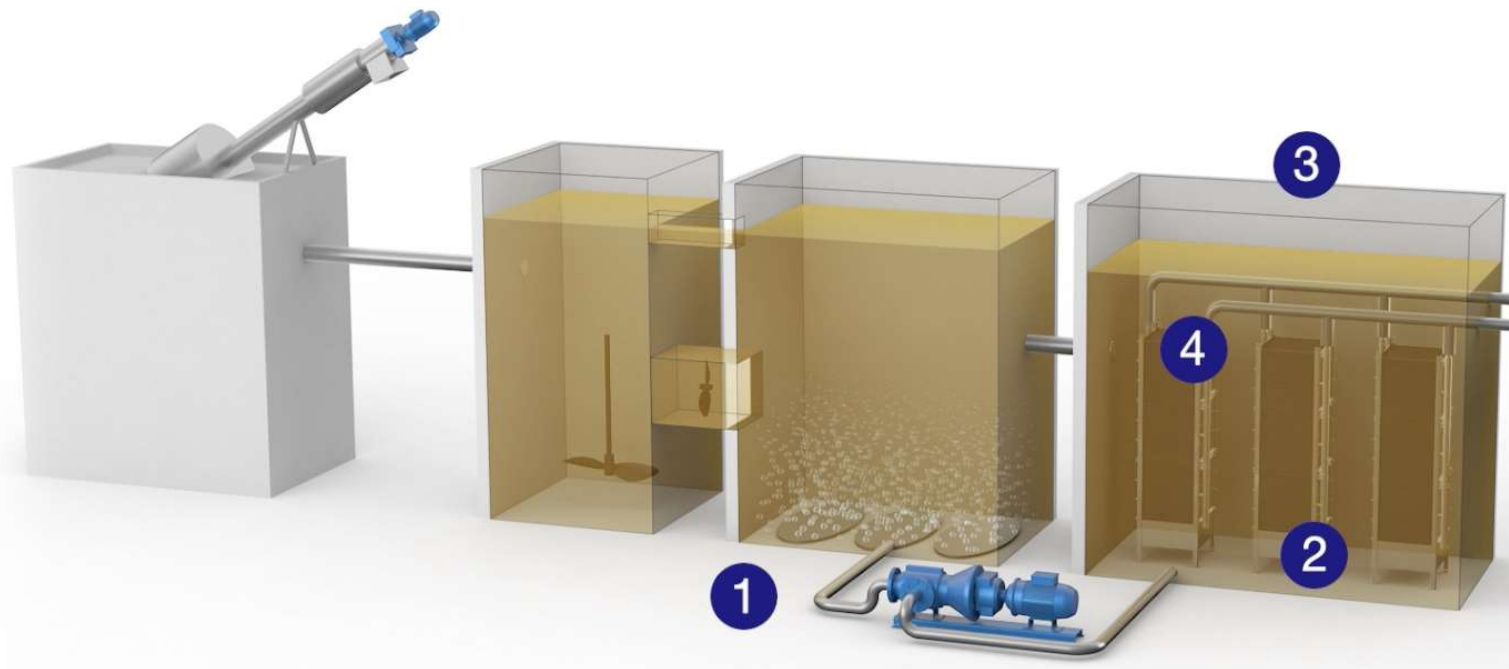
MBR



A wastewater treatment plant involving MBR membranes require only **< 50%** of the area required by the conventional process

MBR Process

– Details on the MBR process description



1. Sludge recirculation ensures that sludge concentration is kept stable in the whole biological process.
2. Modules have aerators at the bottom to prevent fouling/blockages inside
3. Membranes are installed in a separate tank
4. The permeate outlets are connected at the top of the modules.

Why build an MBR

– Process benefits



- Complete removal of solids from treated water
 - Membrane pores remove all solids using physical separation
- High quality effluent
 - Reduced N, P and BOD in effluent
- Compact and efficient
- A short-cut to reuse of valuable water resources

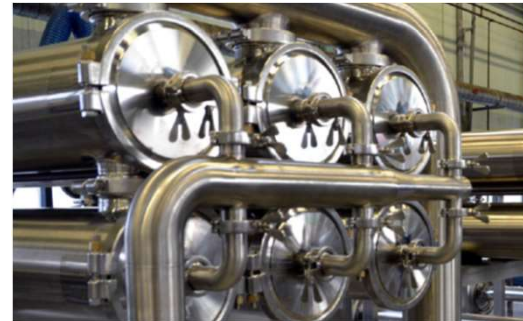
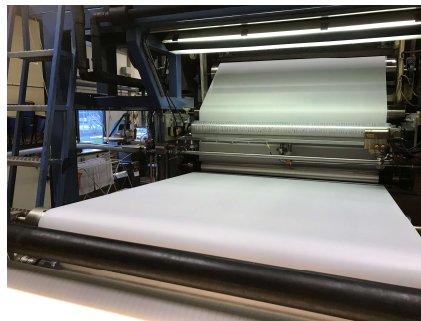


A strong history of high-quality membrane production

– Alfa Laval's membrane factory, Nakskov Denmark



- More than 50+ years of membrane and membrane system experience
- Wide membrane and system product portfolio for microfiltration, ultrafiltration, nanofiltration and reverse osmosis.
- More than 3,000 references world-wide

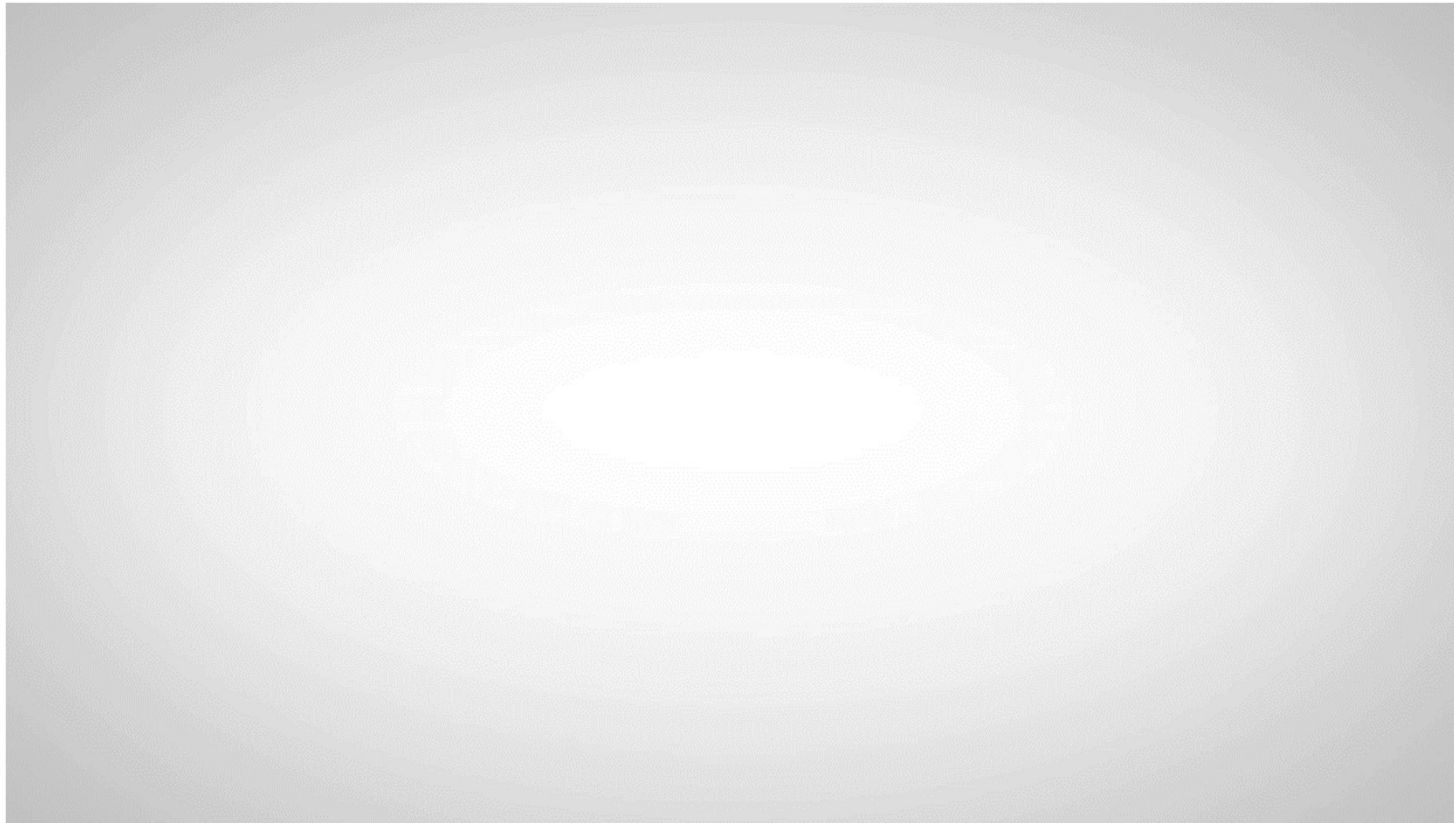


Alfa Laval MBR membrane development

– A short history



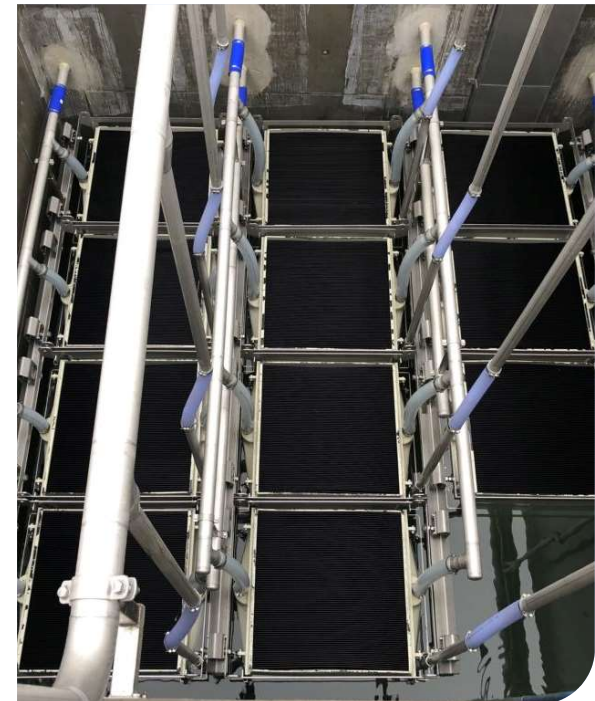
MBR ¿How it works?



Naturally efficient MBR operation



- **LowResist™** technology ensures ultra-low TMP – gravity is all the pressure you need!
- **S-Aerator™** easy to flush diffuser ensures perfect air distribution at all times
- **QuickSwap™** design allows for low lifting height and 10 min. membrane pack swap



Yes – Alfa Laval MBR membranes are reliable

– Testimonial



KMC, DK – Industrial WW

“The water we discharge from our system is now incredibly clean, and we’ve been able to dispense with investing in a large new settlement tank”

“The Alfa Laval people put a lot of effort into helping us and were so confident about the capabilities of their system that they were fully prepared to give us the kind of process and durability guarantees we needed.

KMC Technical Director Jesper Jensen



Yes – Alfa Laval MBR membranes are reliable

– Testimonial



Schwander Polska – Municipal WW

"Schwander is now the leading supplier of MBR systems in Poland"

"In our opinion, Alfa Laval have a product that no other company in the world can offer"

"Our aim is to be the best in the world.....With a partner like Alfa Laval, I am sure we will reach this goal"

Stanislaw Malinowski, President – Schwander Polska



Stanislaw Malinowski
President
Schwander Polska

Alfa Laval LowResist™ MBR membranes

– Material and typical performance data



Parameters	Information/Range
Membrane material	PVDF - 0.2 µm pore size
Transmembrane pressure (TMP)	10 - 40 mbar (0.15 - 0.58 psig)
Aeration demand*	1.6 – 9 NI/m ² /min
Mixed liquor suspended solids (MLSS)	< 14 g/l
Energy consumption*	0.10 – 0.28 kWh/m ³
Flux*	10 – 35 LMH (6-21 gfd)

*Depending on actual wastewater conditions and composition

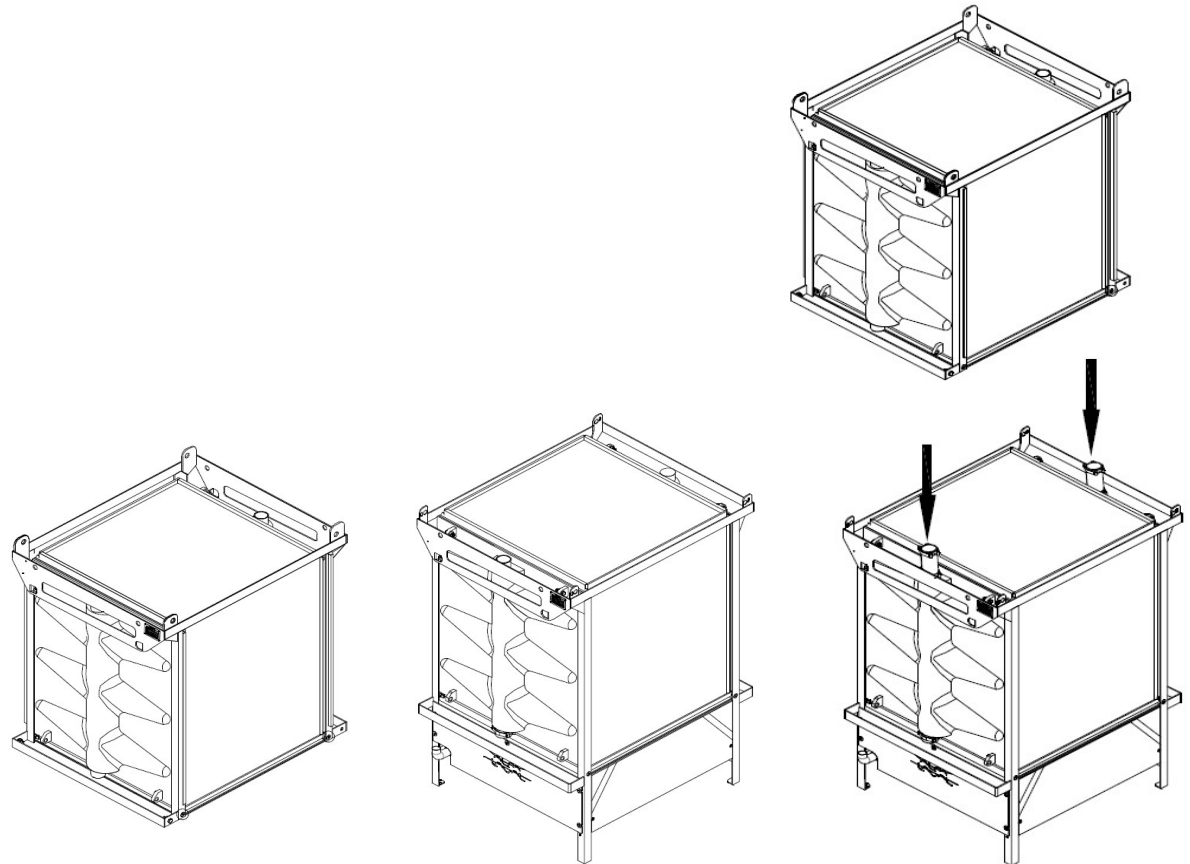


QuickSwap™ - Saving time and money

- Low maintenance with high performance

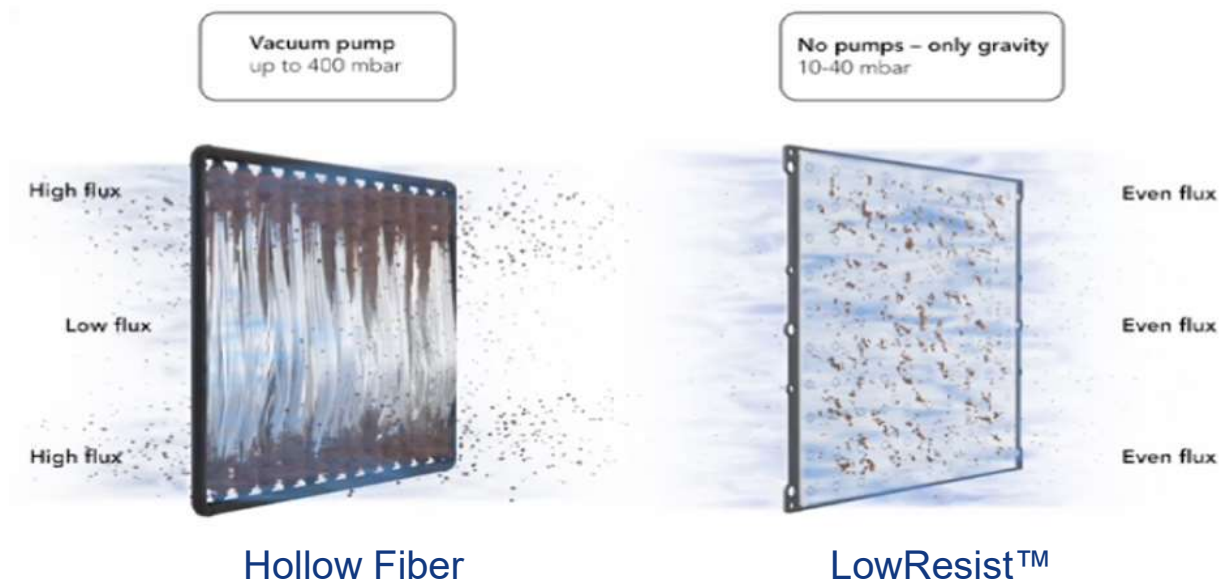


- Modules can be split for installation
- Reduces required lifting height – ideal for indoor installations
- Membrane pack can be swapped in minutes



Ultra low TMP filtration reduces fouling


– Low pressure and even distribution leads to fewer cleanings



Reduced fouling = lower chemical consumption

- Less cleaning means lower costs and longer membrane lifetime

Vacuum pump up to 400 mbar	
CIP Weekly	

Small CIP pump to TMP tank 20 mbar	
CIP 4-6 Times/year	



Hollow Fiber



LowResist™

Simple and effective CIP to reduce costs

- Efficient CIP installations reduce man hours required



CIP solution tank



CIP pump

TMP-CIP tanks

CIP return pipe

Service Agreement to deliver peace of mind

– Ensure you get the performance you need

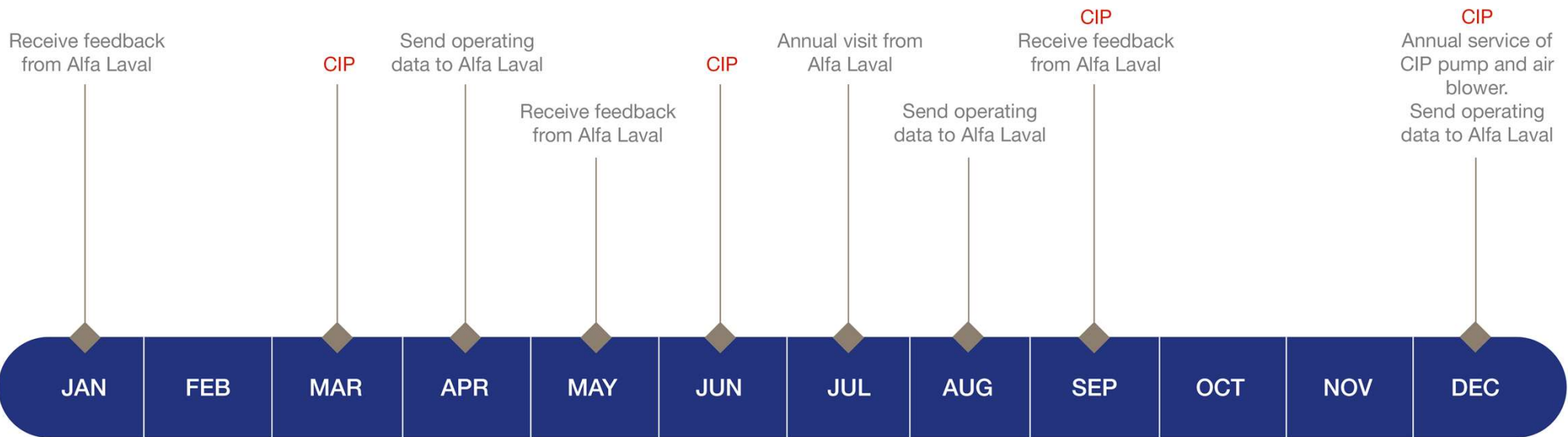


- A service agreement ensures you get the full service package from Alfa Laval
- We are committed to our product in your installation
- Operators and engineers can rely on our membranes
- Puts the full capability of Alfa Laval behind your MBR



A year in the life of an Alfa Laval MBR membrane

– Low OPEX costs and man hours required



Design - Example

– MWW 86.4 m3/d



Biology data entry

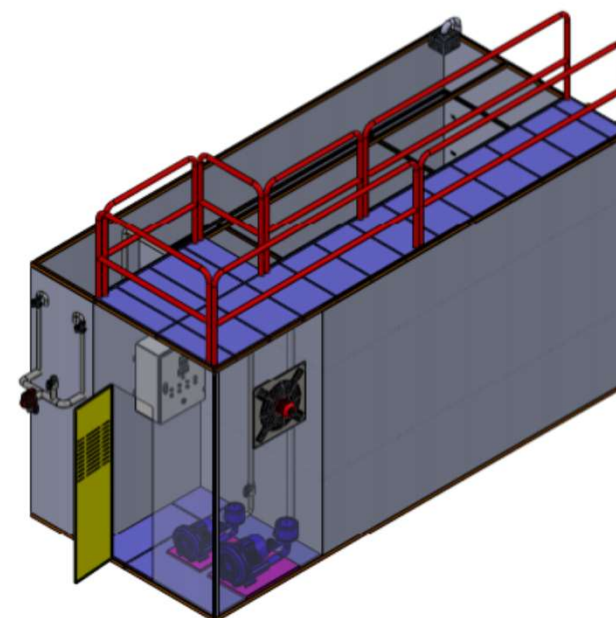
Type of process (select drop-down list))	MBR Inlet to Biology
Type of application (select drop-down list))	Municipal
you can use the preliminary sizing tool to make a budget quotation and preliminary sizing	
AL SIS Code	314
COD (mg/L)	800
BOD5 (mg/L)	375
SS (mg/L)	300
TN (or TKN) (mg/L)	40
TP	20
pH - min	7.15
pH - max	7.15

MFM type selection

	MFM used for non-binding quotation	MFM for comparison (if necessary)
Type of Module (select)	MFM080-129	MFM120-193
Number of m2 per module	129	193

Cleaning

Cleaning solution per MFM per CIP (m3)	1.8		2.4	
Cleaning chemicals estimation	Low range	High range	Low range	High range
Estimated amount of CIP (CIP/y)	3	8	3	8
Acid cleaning				
Cleaning solution concentration (g/L)	5.0	5.0	5.0	5.0
Citric acid consumption (kg active product/y)	54	144	36	96
Hypochlorite cleaning				
Cleaning solution concentration (g/L)	0.5	0.5	0.5	0.5
Hypochlorite consumption (kg active product/y)	5	14	4	10



Alfa Laval LowResist™ MBR membranes

– The naturally efficient solution



Alfa Laval LowResist™ MBR membrane modules

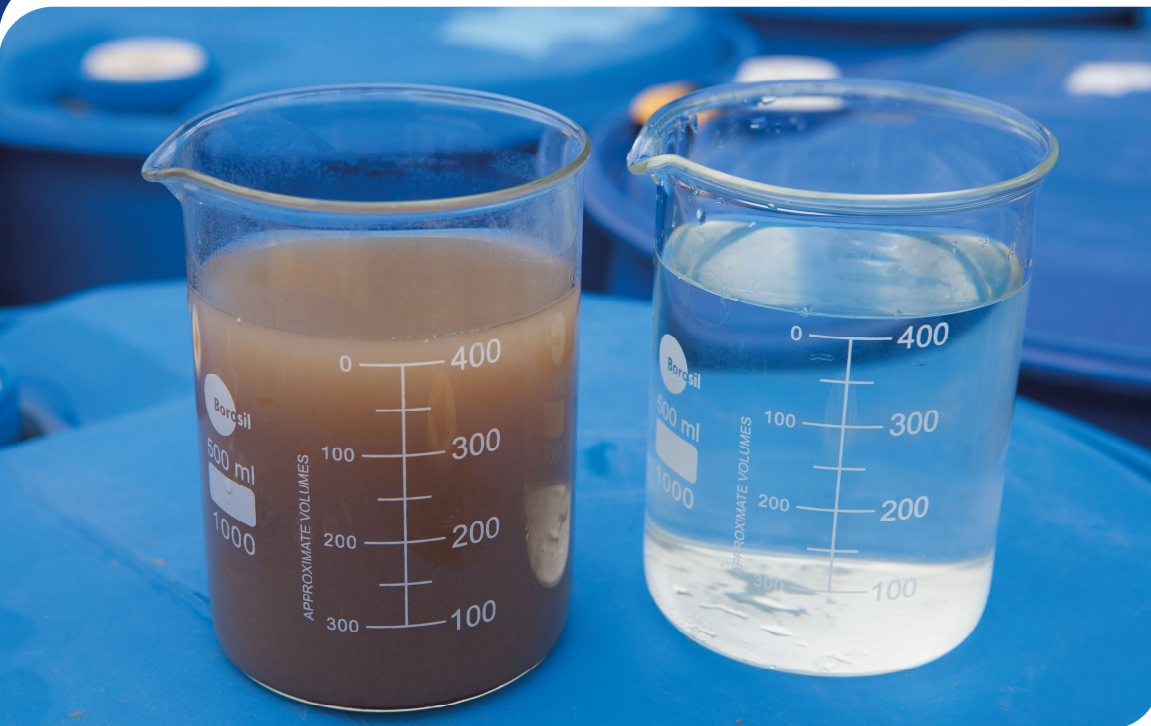


– Delivering MBR membranes to municipal and industrial applications

- Global reference split:
 - 50% Municipal
 - 50% Industrial
- Industrial references in:
 - Winery
 - Dairy
 - Brewery
 - Other food applications (soft drink, vegetable oil, snacks, etc.)
 - Pharmaceutical
 - Chemical plants
 - Refinery



Where can I learn more?



www.alfalaval.com/MBR

Or contact your local Alfa Laval representative and ask about LowResist™ MBR membranes

People behind MBR



José Tomás Robles Pérez

Ingeniero Ambiental | Maestro en Alta Dirección |
Business Developer Wastewater



Jessica Bengtsson

Manager Membrane Water & Food



Dmitriy Didrikh

Food&Water department Global S...



Emmanuel Joncquez

Global Technology - Application E...



Eline Suijlen

Global Technology - Process Engin...



Christian MorkHansen

Test Engineer



Niada Taekker Madsen

Global Sales Business Development

ALFA
LAVET