Welcome to Industrial Waste Management Forum

For

Sustainable Water Treatment & ZLD for Textile Industries

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Pall Company Cluster

Danaher (2017 Revenue: $16.5B*)

Life Sciences $2.5B	Diagnostics $4.8B	Water Quality $2.0B
SCIEX Beckman Coulter Life Sciences Leica Microsystems Molecular Devices	Beckman Coulter Leica Biosystems Radiometer	ChemTreat HACH Trojan Technologies
Product ID $1.6B	**Pall $2.8B**	**Dental $2.9B**
Videojet Esko x-rite Pantone	Pall	KaVo. Dental Excellence. Kerr Nobel Biocare

- Pall and other companies working under DANAHER umbrella
- Danaher Founded in 1984
  - Headquartered in Washington, DC
  - New York Stock Exchange Ticker: DHR
  - Global team of ~57,400 associates (including Pall)

** Reflects aggregate revenues from constituent businesses (including with respect to "Future Danaher," Pall) for the respective, most recently completed fiscal year. Pall revenues are based on 2014 FYE ended July 31, 2014. Includes $0.7B of annual revenues for Nobel Biocare and $0.2B of annual revenues for Devicor, each of which was acquired in December 2014.*

Process Technologies Markets Served






Markets

- Refineries
- Oil & Gas
- Chemicals
- Power generation
- Mining / Metals
- Alternative Energy
- Drinking, Mobile & Industrial Water
- Mining
- Auto/In-plant
- Primary Metals
- Pulp & Paper
- OEMs (Mining, In-plant Turbines)

Focus Areas - Water

- Incoming water (River /Sea/Lake)
- Textile Effluent Water
- Boiler feed water
- Zero Liquid Discharge
- Cooling water Blow Down
- Reuse & Recycle
- Gasification
- Mining

Pall Water Product Range


Cartridge Filters


Bag Filters


Cartridge Filter Housing


Bag Filter Housings


Claris® Series Filter Cartridges

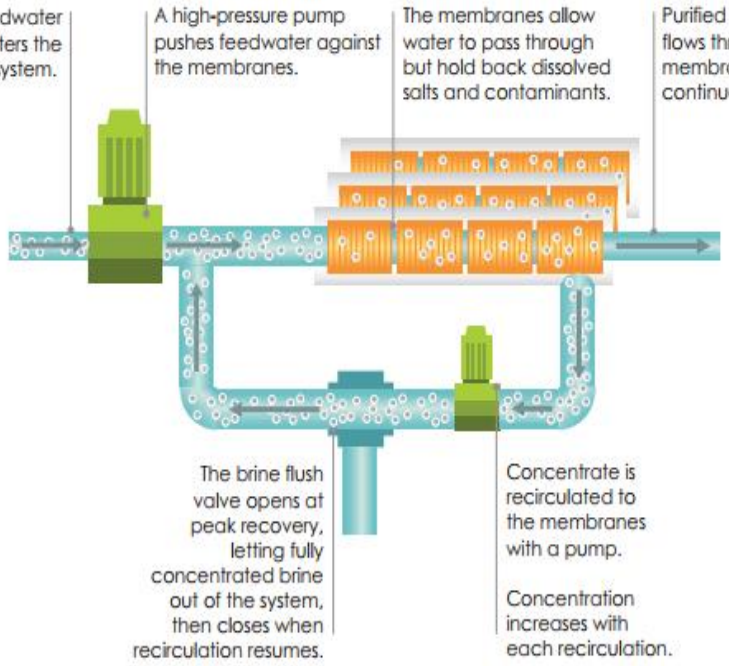

Ultipleat® HF Filter Cartridges

Pall Water Product Range

Desalitech

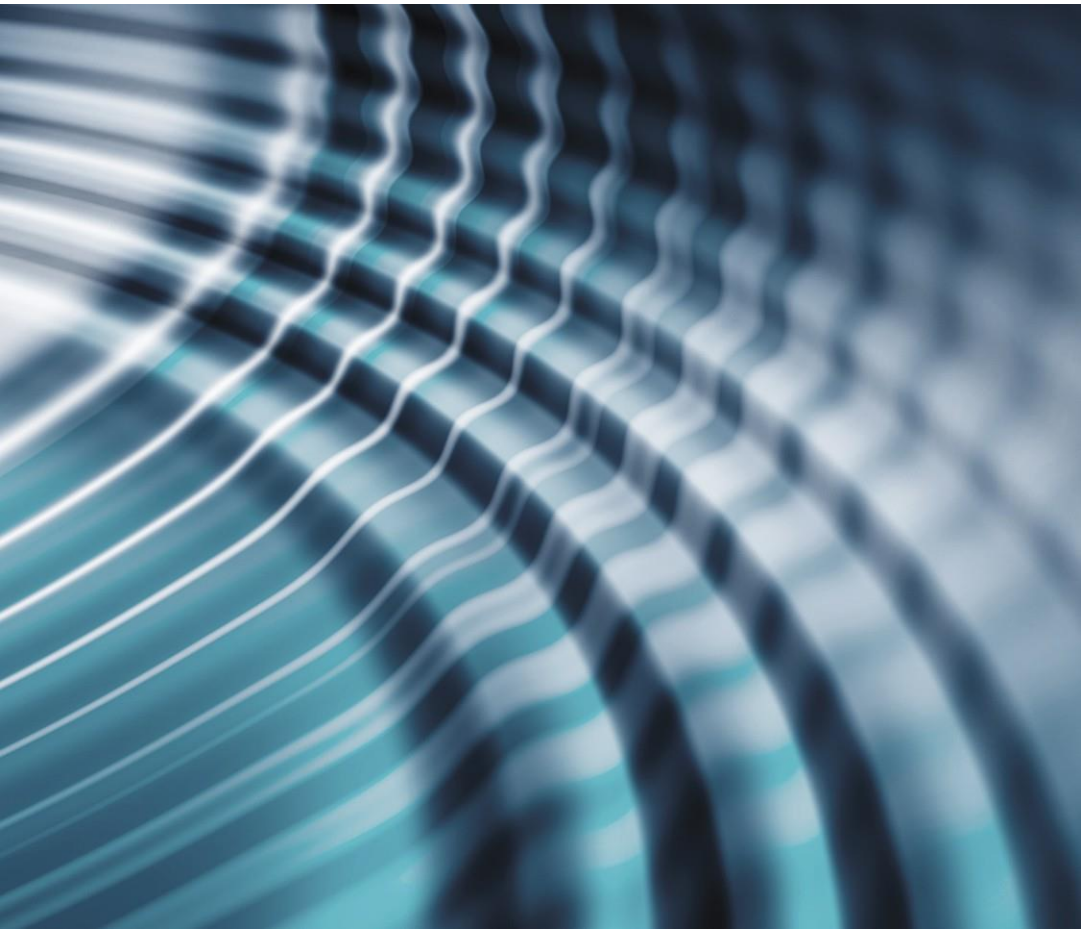
FACT SH

Desalitech – The Performance Benchmark for Reverse Osmosis



Pall Corporation

*Better Lives. Better Planet.*SM



Success Stories on Filtration of ETP Treated Water for RO Pretreatment

Common Customer Concerns in ZLD

- RO Membrane frequent fouling
- RO Membrane Scaling
- Cartridge Filters Choking
- Less RO Recovery
- Less Membrane Life
- More Reject from RO
- High Load on Evaporator
- High Chemical consumption

Solution

You need Good RO Feed

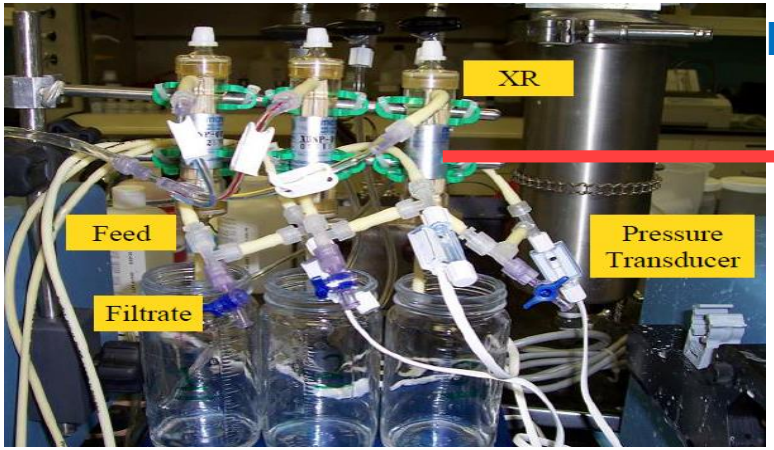
How to achieve Good RO Feed

- **Good RO Feed can not be achieved through PSF/DMF and ACFs**
- **It can only be achieved by Installing Membrane System**
- **To eliminate the TSS load going to RO**
- **More importantly choosing the correct membrane system**
- **We have done several trials & several successful installations to find out the perfect membrane/system.**

R&D, Trials and Piloting

Research and Modelling Unit

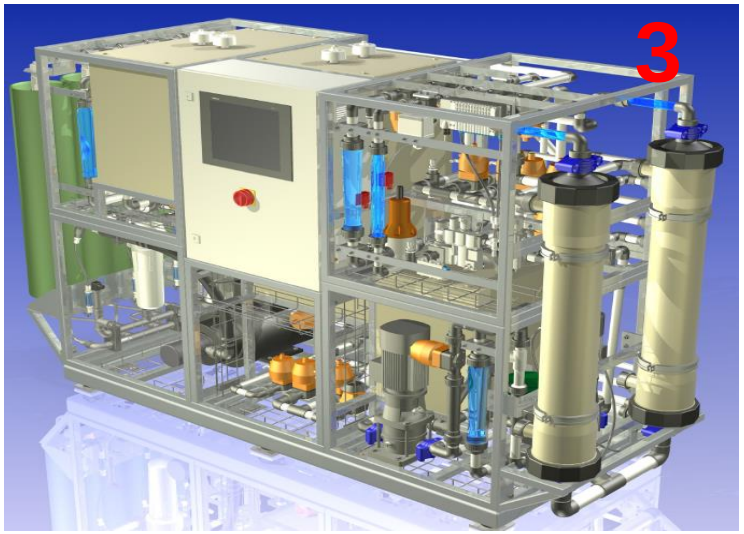
Microza Module



Membrane Performance Index Test

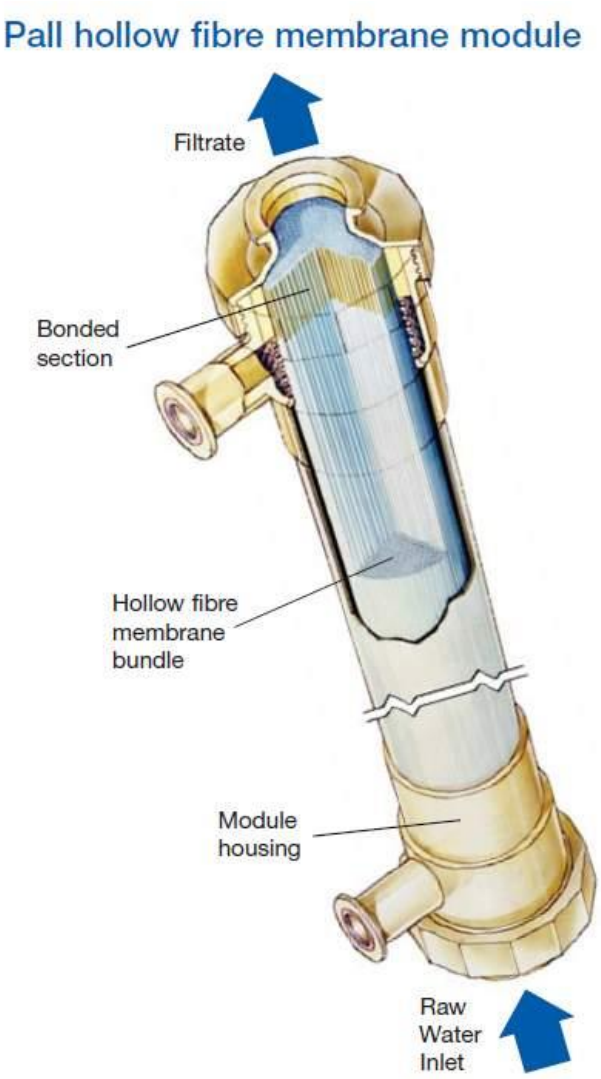
Pencil Module

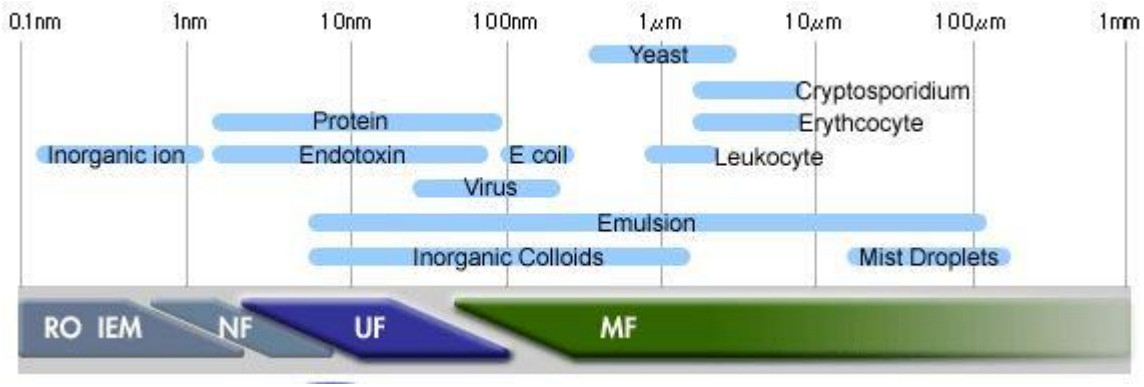
R&D, Trials and Piloting



1. Pall Aria MF Pilot
2. MF-RO Pilot
3. MF-RO-DTRO Pilot

What is PVDF Membranes?





Separation Techniques based on Micron sizes

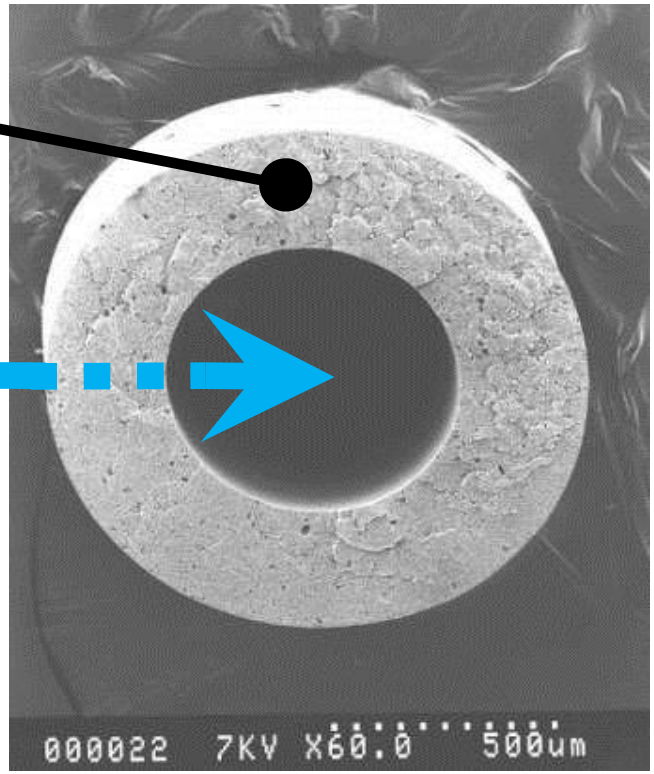
- **0.1 & 0.01 µ cross flow hollow fibers are configured in a Module.**
- **Approximately 6000 fibers are present in a Module.**

Pall Membranes 0.1 & 0.01 Micron

Homogenous
fiber material
made of HC- PVDF

Outside-Inside
flow

Chlorine resistant
(3.6 Million ppm hours exposure)



Homogenous material = high mechanical resistance

High Crystalline Polyvinylidene fluoride (PVDF) = high chemical resistance

Pall Membranes 0.1 & 0.01 Micron

PVDF UF 0.01 Micron

OPERATING PARAMETER DIMENSIONS

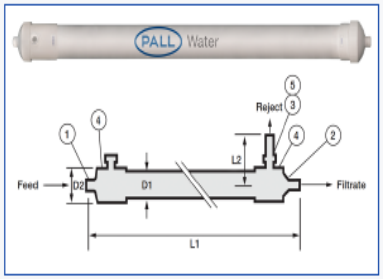
PERFORMANCE	
Process Capacity Typical Range	2.2 – 10.0 m³/h / 10 – 44 gpm
SPECIFICATIONS	
Membrane Area	60 m²
Molecular Weight Cut Off	150 kDa
Nominal Pore Size	0.01 µm
OPERATING CONDITIONS	
Max. Operating Temperature	40°C
Max. Transmembrane Pressure	3 bar
Max. Inlet Pressure	3 bar
pH Range (Short Term for Cleaning)	1 – 12
MATERIALS	
Membrane	PVDF
Housing	PVC Resin
Potting Material	Epoxy

PART NO. / ORDERING / DIMENSIONS

Model Part Number	MSA-620A
Length (L1)	2332 mm / 91.8 in
Length (L2)	150 mm / 5.9 in
Diameter (D1)	178 mm / 7.0 in
Diameter (D2)	220 mm / 8.7 in

ACCESSORIES & SPARE PARTS

ITEM:	MATERIAL:
1. Adapter Feed Connection	PVC
2. Adapter Permeate Connection	PVC
3. Adapter Reject Connection	PVC
4. O-Ring for Feed & Permeate	EPDM
5. Gasket Reject Connection Adapter	EPDM



PVDF MF 0.1 Micron

OPERATING PARAMETERS

PERFORMANCE**	
Process Capacity Typical Range	2.2 – 6.8 m³/h / 10 – 30 gpm
DIMENSIONS	
Membrane Area	50 m² / 538 ft²
Module Length	2160 mm / 85 in
Module Diameter	165 mm / 6.5 in
OPERATING CONDITIONS	
Max. Operating Temperature	40°C / 104°F
Max. Transmembrane Pressure	3 bar / 45 psi
Max. Inlet Pressure	3 bar / 45 psi
pH Range	1 – 10
MATERIALS	
Membrane	PVDF
Housing	ABS
Potting Material	Polyurethane
Gaskets	Silicone
Preservative	40% calcium chloride

**Please contact Pall Water for operating manual and system sizing, as capacity per module is dependent on feed water quality, temperature and other factors.

Unit conversion: 1 bar = 100 kilopascals

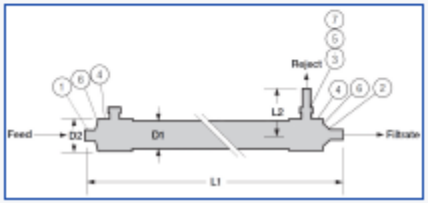
PART NO. / ORDERING INFORMATION

Model Part Number	UNA-620A
Length (L1)	2364 mm / 93 in
Length (L2)	272 mm / 10.7 in
Diameter (D1)	165 mm / 6.5 in
Diameter (D2)	221 mm / 8.7 in

ACCESSORIES & SPARE PARTS

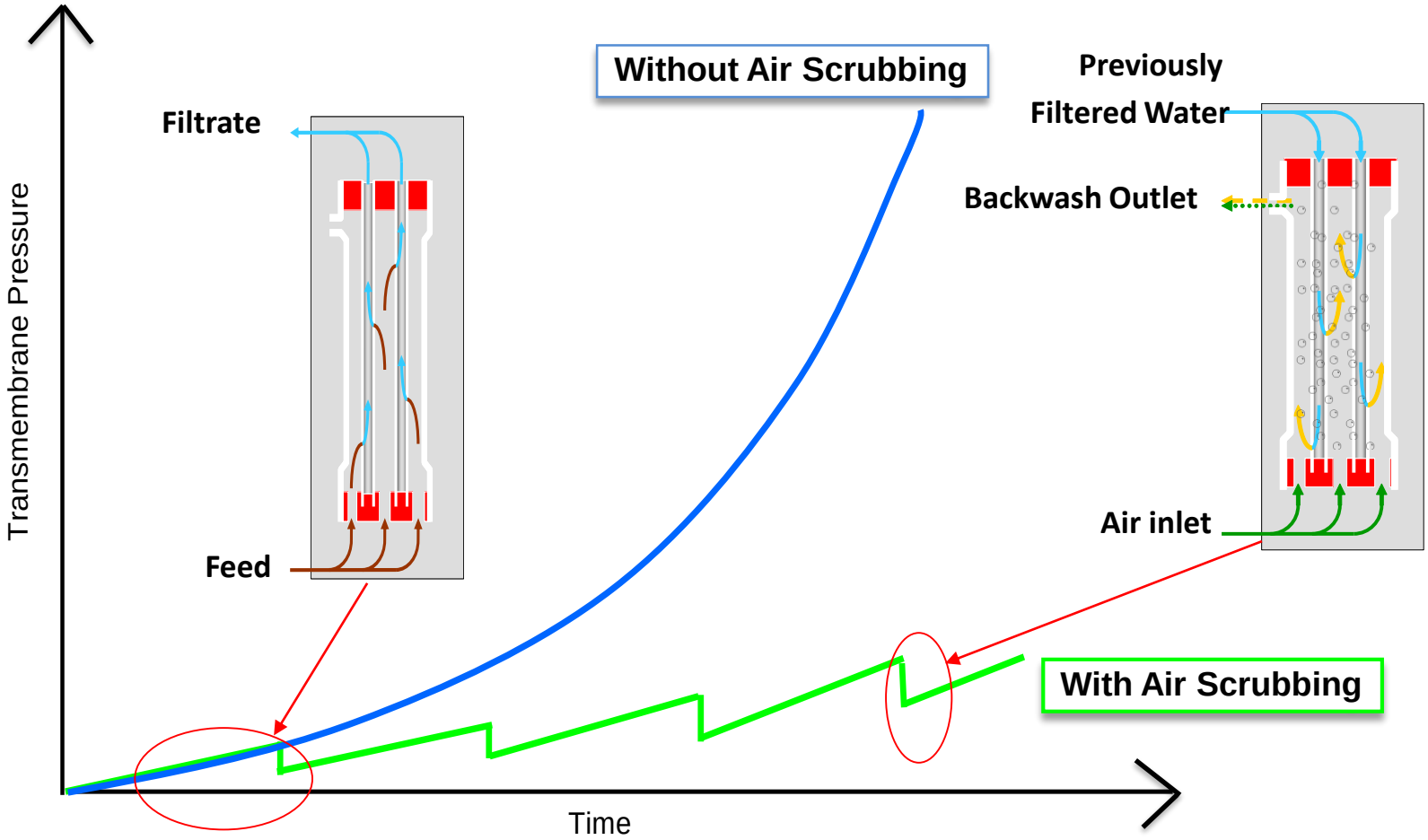
ITEM:	MATERIAL:
1. Adapter Feed Connection	304 SS
2. Adapter Permeate Connection	PVC
3. Adapter Reject Connection	PVC
4. Cap Nut Feed & Permeate Connections	AS (20% GF)
5. Nut Reject Connection	PVC
6. O-Ring for Feed & Permeate Adapter	Silicone
7. Gasket Reject Connection	Silicone

Note: The information provided in this literature was reviewed for accuracy at the time of publication. Product specifications may be subject to change without notice. For current information, consult your local Pall Water distributor or contact Pall Water directly.

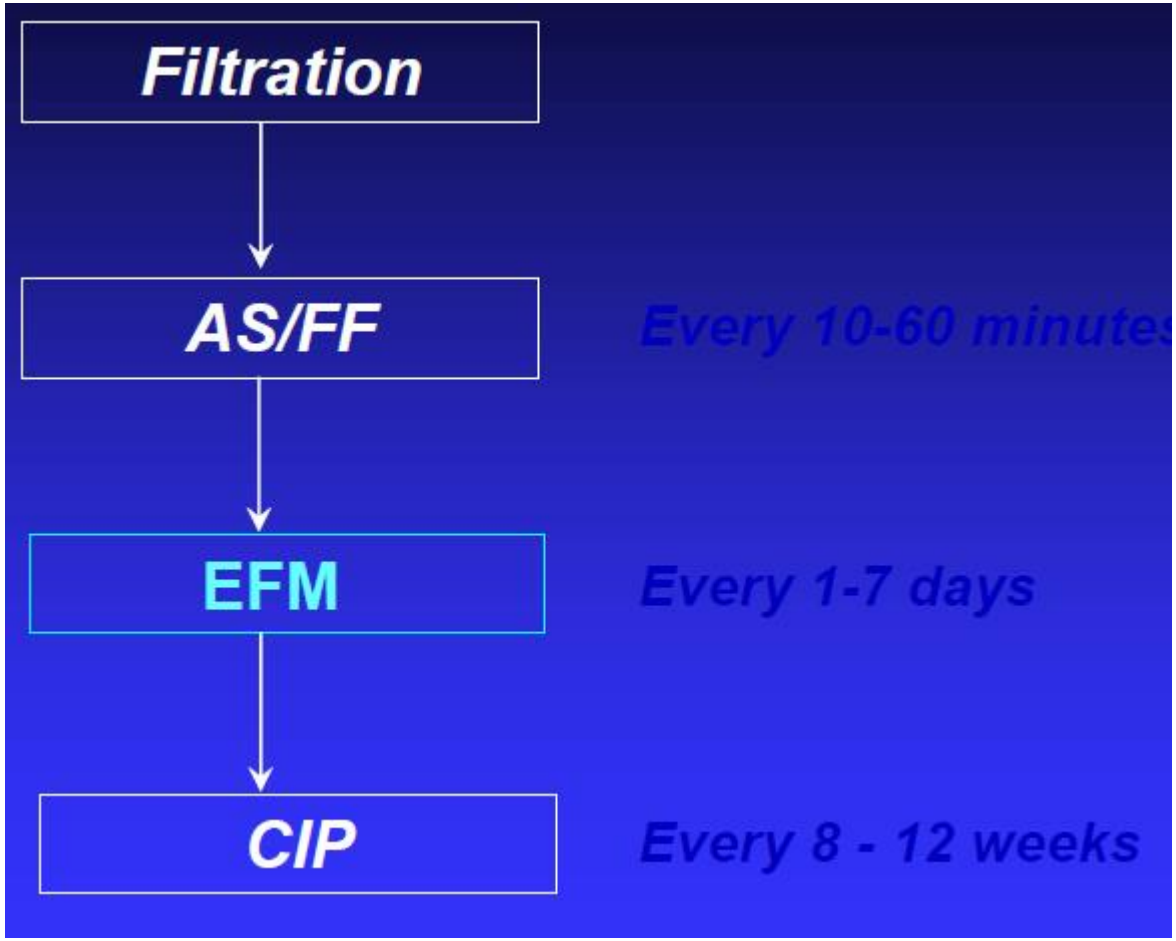


TMP Profile with ASRF

- **Physical Regeneration of Membrane by Air Scrubbing and Reverse Filtration**
- **It helps to retain the TMP for longer period, hence increases Recovery**



TMP Fouling Control



Advantages of Aria MF™ System

- Strong chemical resistance of membrane
- Can apply strong chemical cleaning condition
- MICROZA membrane's chemical cleaning condition up to

5,000 ppm of Chlorine, 4% of NaOH

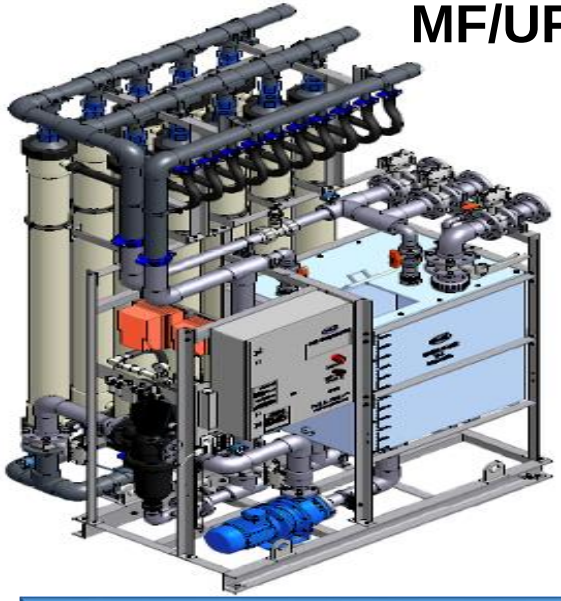
10% of HCl, H2SO4, Citric Acid, 1% H2O2

Advantages of Aria System

- Membrane Life more than 5-7 years
- Handles Turbidity up-to 300 NTU
- Handles TSS Spikes, Shock loads
- Handles ETP/Clarifier Upsets
- Increased RO Recovery
- Increased RO Life
- Reduction in Chemical consumption

MF-RO based Technological Platform

MF/UF



RO

IMPRO-FAST

Micro Filtration Reverse Osmosis (MFRO) Freshwater Generator produces safe shipboard drinking water from a variety of water, including rivers and harbors with high levels of contamination.

Large Scale Successful Installations

RPCL: 16 Racks of 100 Module Each

Large Scale Successful Installations

Veerapandi CETP: 2 Racks of 108 Module Each

Next: Angeripalayam CETP: 2 Racks of 108 Modules

Small Scale Successful Installations

1. Rohini Textiles
2. Best Colors
3. Free-look Fashions
4. Bannari Amman Spinning Mills
5. Naveena Printing Mills
6. SSM Dyeing

References

Customer Name	Company Platform	Plant Location	Flowrate (KLPD)	Application	Commissioning Date
Novozymes	Pharma Company	Bengaluru, Karnataka	400	Surface Water Filtration	2010 - June
Rohini Textiles	Textile Company, Dyeing Unit	SIPCOT, Perandurai,Erode, Tamilnadu	3,500	Textile Effluent ETP treated water	2012 - July
Wolkswagen	Automobile Company	Chakan MIDC, Pune, Maharashtra	200	Cooling Tower Water Filtration	2013 - January
Raymond UCO Denim	Textile Company, Denim Unit	MIDC, Yavatmal, Maharashtra	200	Surface Water Filtration	2013 - February
Best Colors	Textile Company, Dyeing Unit	SIPCOT, Perandurai,Erode, Tamilnadu	600	Textile Effluent ETP treated water	2013 - December
Freelook Fashion	Textile Company, Dyeing Unit	SIPCOT, Perandurai,Erode, Tamilnadu	600	Textile Effluent ETP treated water	2015 - April
Manipal Hospital	Hospital	Bengaluru, Karnataka	400	POE Water	2015 - May
Kingfisher UB Mysore	Brewery Company	Nanjangud, Mysore, Karnataka	1000	Surface Water Filtration	2015 - May
Reliance Jamnagar	Oil & Gas	Gagva, Jamnagar, Gujarat	150	Surface Water Filtration	2015 - September
Bannari Aamman	Textile Company, Dyeing Unit	SIPCOT, Perandurai,Erode, Tamilnadu	1000	Textile Effluent ETP treated water	2015 - December
RPCL, L&T	Thermal Power Plant	Raichur, Karnataka	90,000	Surface Water Filtration	2016 - February
Naveena Textiles	Printing Mill	Perandurai,Erode, Tamilnadu	350	Textile Effluent ETP treated water	2016- April
Veerapandi CETP	Common Effluent Treatment Plant	Tirupur, Tamilnadu	4,000	Textile Effluent ETP treated water	2017- February
Reliance Jamnagar	Sea Water Filtration	Gagva, Jamnagar, Gujarat	2,500	Sea Water Filtration	2017- February
SSM Dyeing	Textile Company, Dyeing Unit	Tirupur, Tamilnadu	450	Textile Effluent ETP treated water	2017- July
Veerapandi CETP 2nd Rack	Common Effluent Treatment Plant	Tirupur, Tamilnadu	4,000	Textile Effluent ETP treated water	2017- September
Angeripalayam CETP	Common Effluent Treatment Plant	Tirupur, Tamilnadu	4,000	Textile Effluent ETP treated water	2018 - March
Danavarshini Exports	Textile Company, Dyeing Unit	Perandurai,Erode, Tamilnadu	600	Textile Effluent ETP treated water	2018 - March