

VPMF

VARIABLE PORE MICRO FILTER



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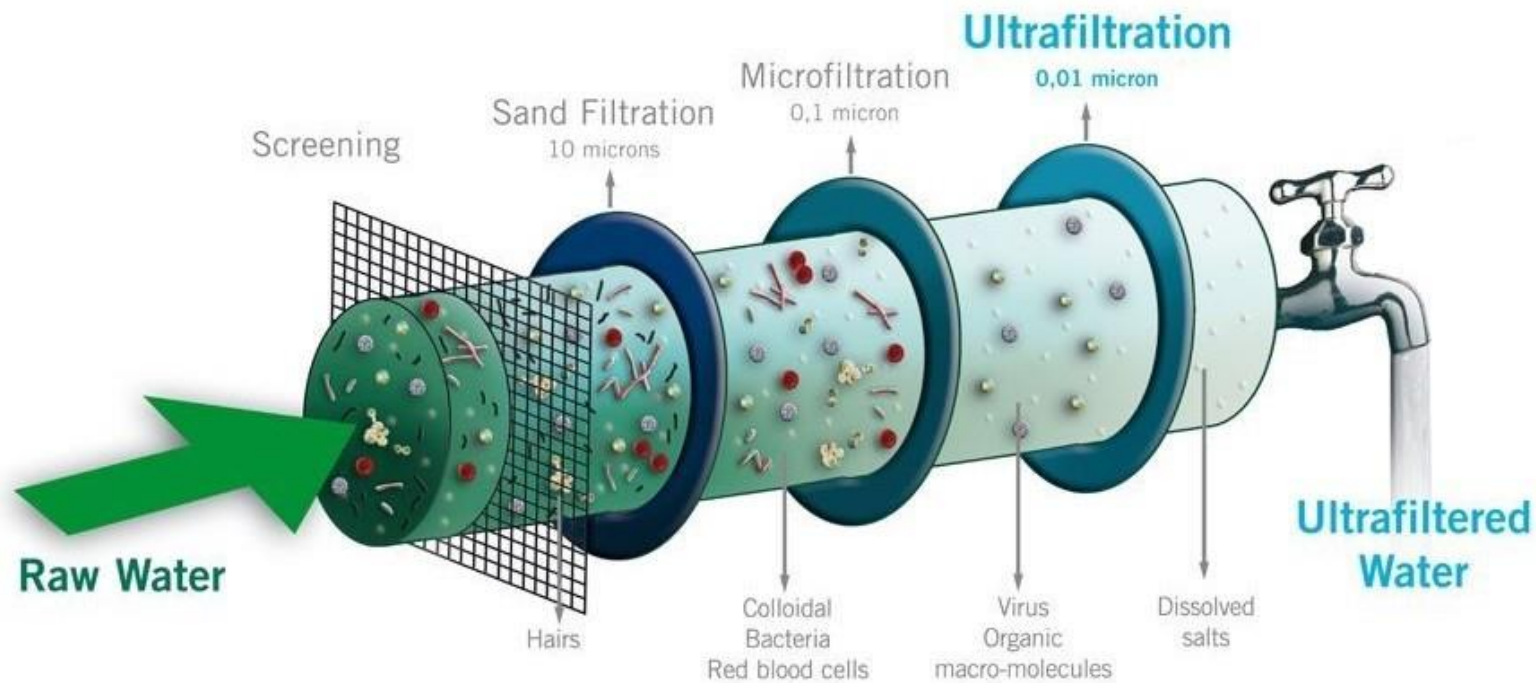
Product Presentation

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VARIABLE PORE MICRO FILTER

What is the difference between sand filter, microfiltration and ultrafiltration?

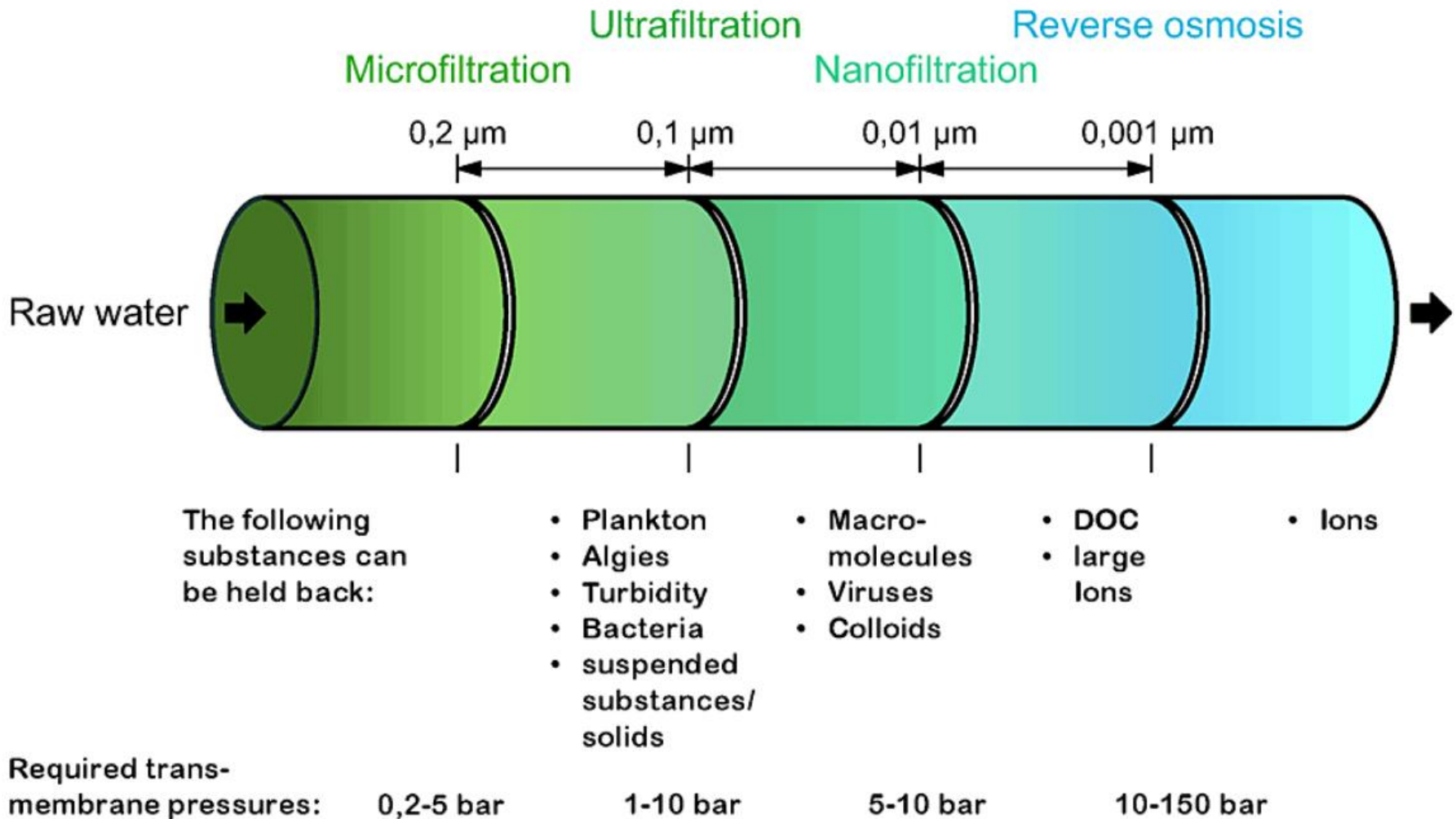
The main objective of the filtration is to remove or separate the suspended solids (SS) present in water, passing it through a filtering porous material. Ultimately they all do the same job but remove different elements depending on the suspended solids diameter in water. The size of particles that can be removed during filtration depends upon the size of the pores of the filter.



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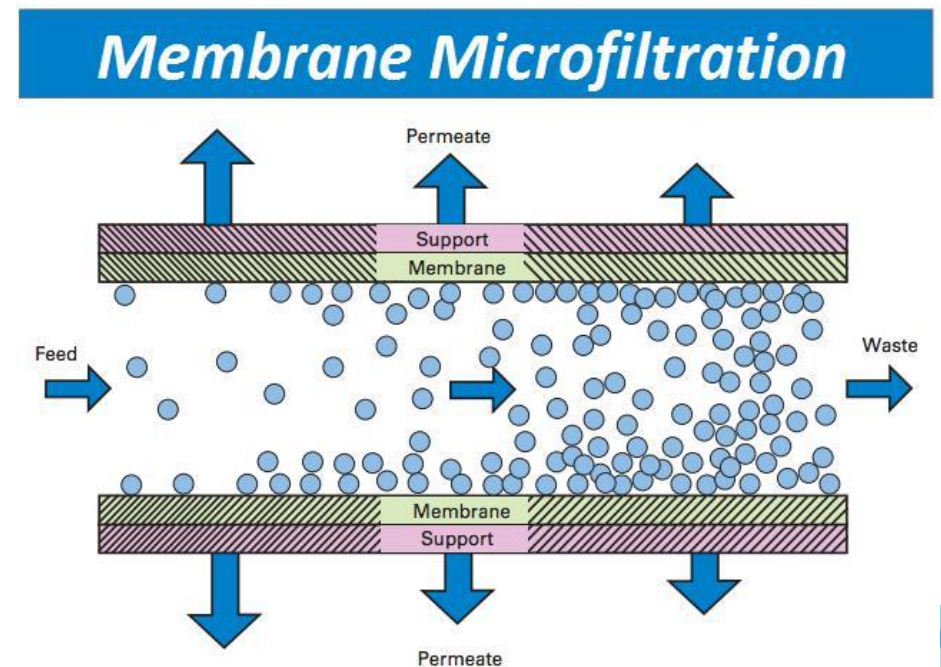
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What is Microfiltration ?



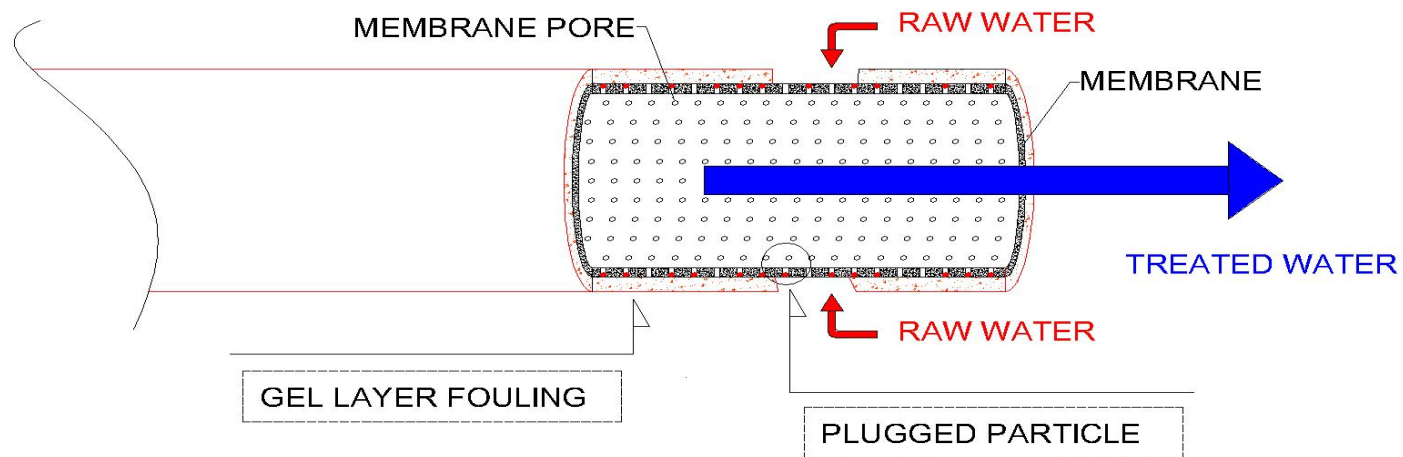
What is Fixed Pore Filtration ?

FIXED PORE filtration systems (cartridge filter, bag filter and membrane filter) is capable of producing high quality filtered water. However, these filters are difficult to be backwashed once the surface is coated with solids.



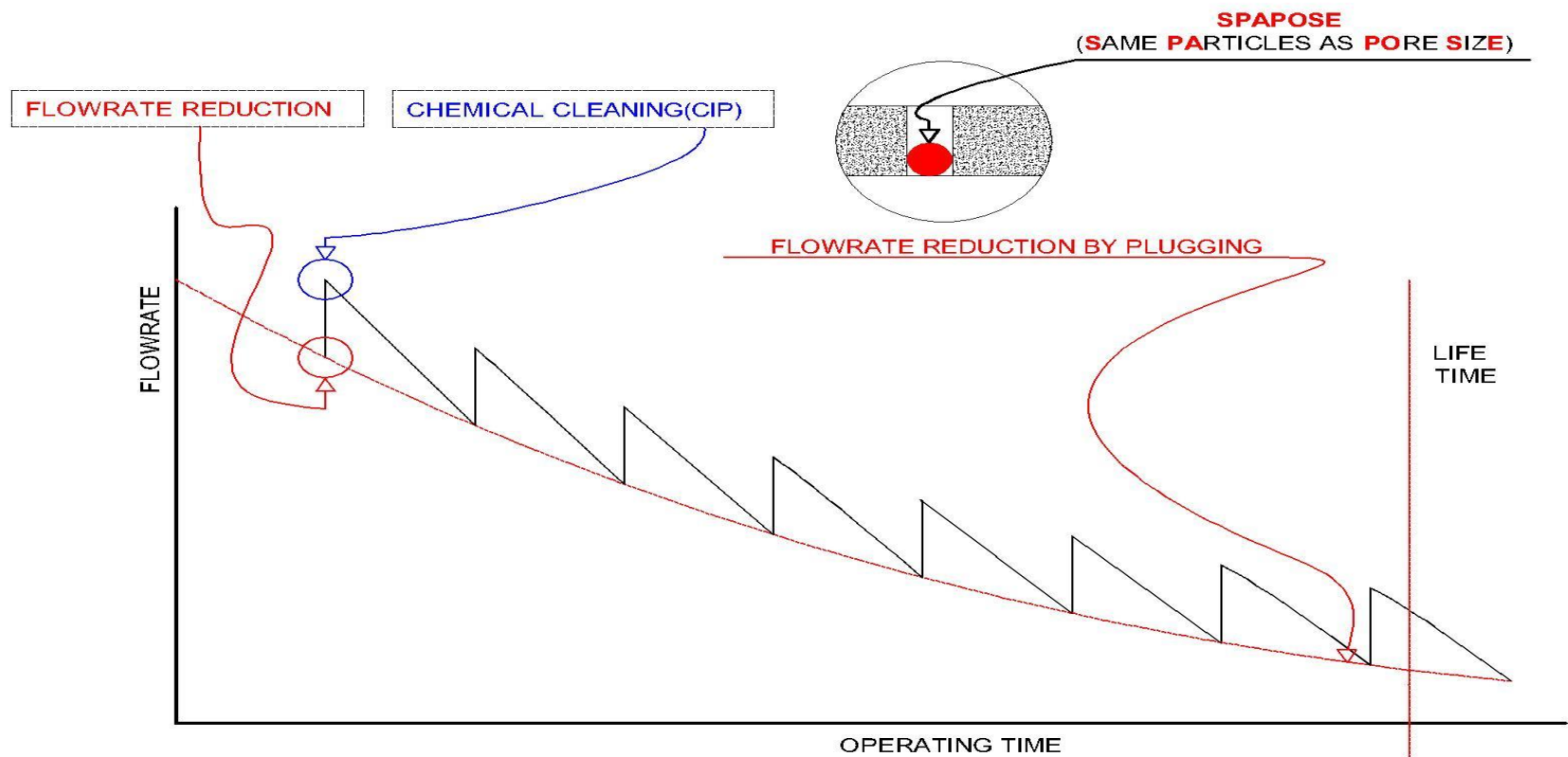
Disadvantage of Fixed Pore Filter

Fouling & Plugging Problem of Fixed Pore Filter



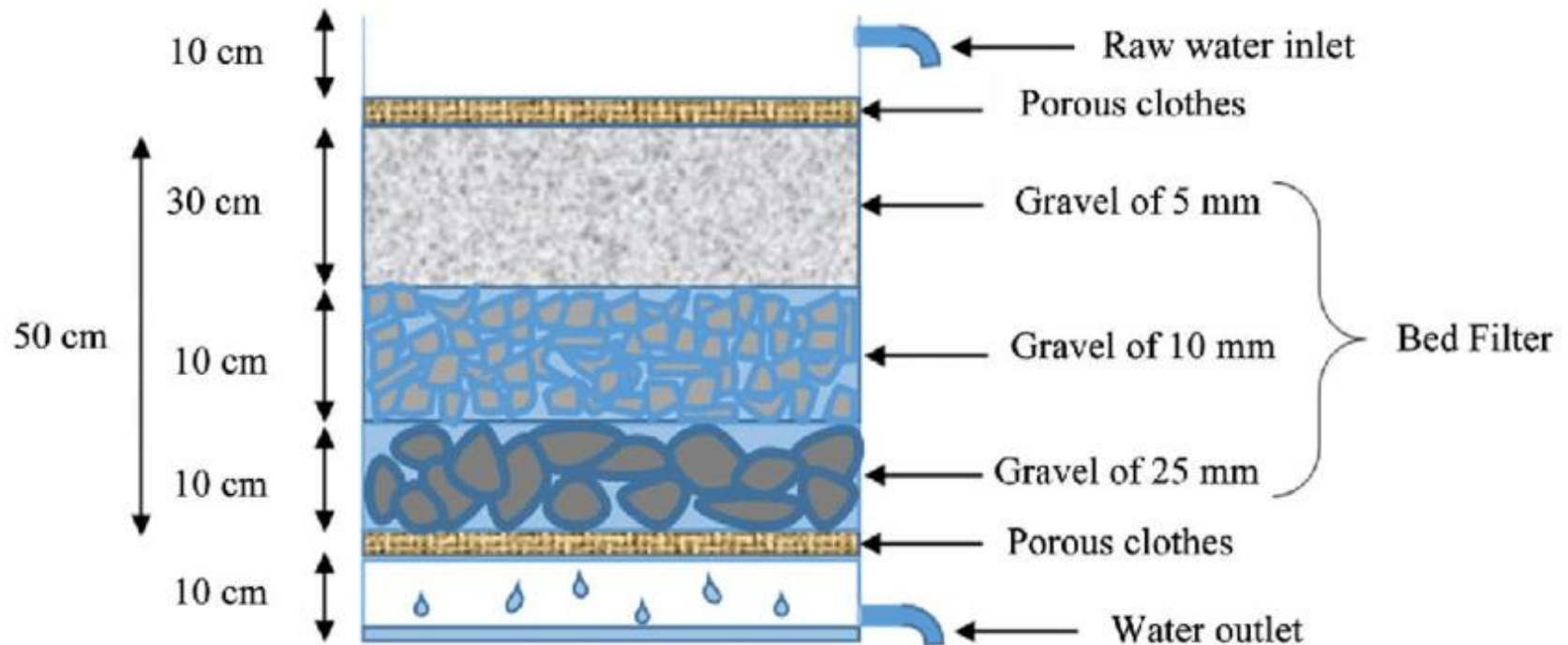
Disadvantage of Fixed Pore Filter

Flow Rate Curve VS operating Time



What is Variable Pore Filtration ?

VARIABLE PORE filters (i.e: sand filter) is easier to be backwashed compared to FIXED PORE filter but will not be able to produce high quality water due to the large pore size 5-20 micron.



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VARIABLE PORE MICRO FILTER

VPMF (Variable Pore-structure Micro Filter) is developed to produce high quality filtered water and this new concept filter is also easy to be backwashed. The superiority of VPMF has been widely accepted by Japan, Korea and other European countries. It has been defined as perfect backwashable micro filter and officially patented in USA.



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VARIABLE PORE MICRO FILTER

Modular Design, Compact and High Flow Capacity



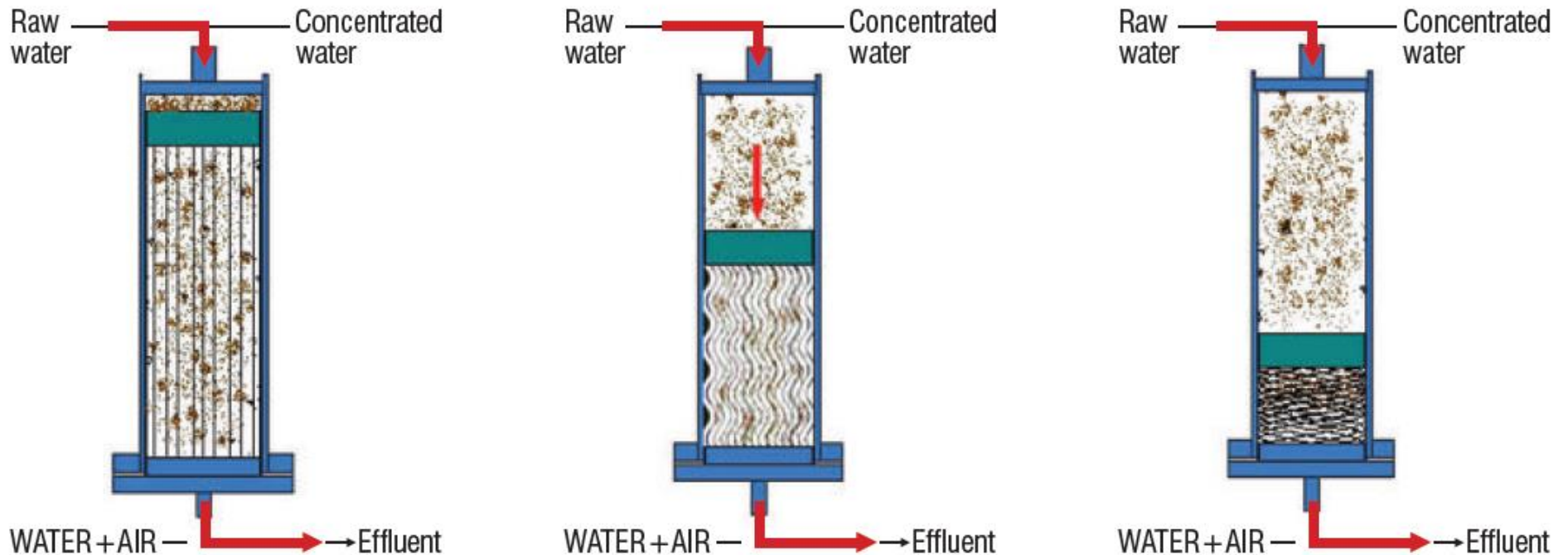
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HERE'S HOW IT WORKS

FILTER CYCLE

The inflow of raw water gradually compresses the cylindrical filter media. When the filter pressure reaches critical (or optimum) depth, no further filter pressure will occur and the raw water will be filtered for discharge.

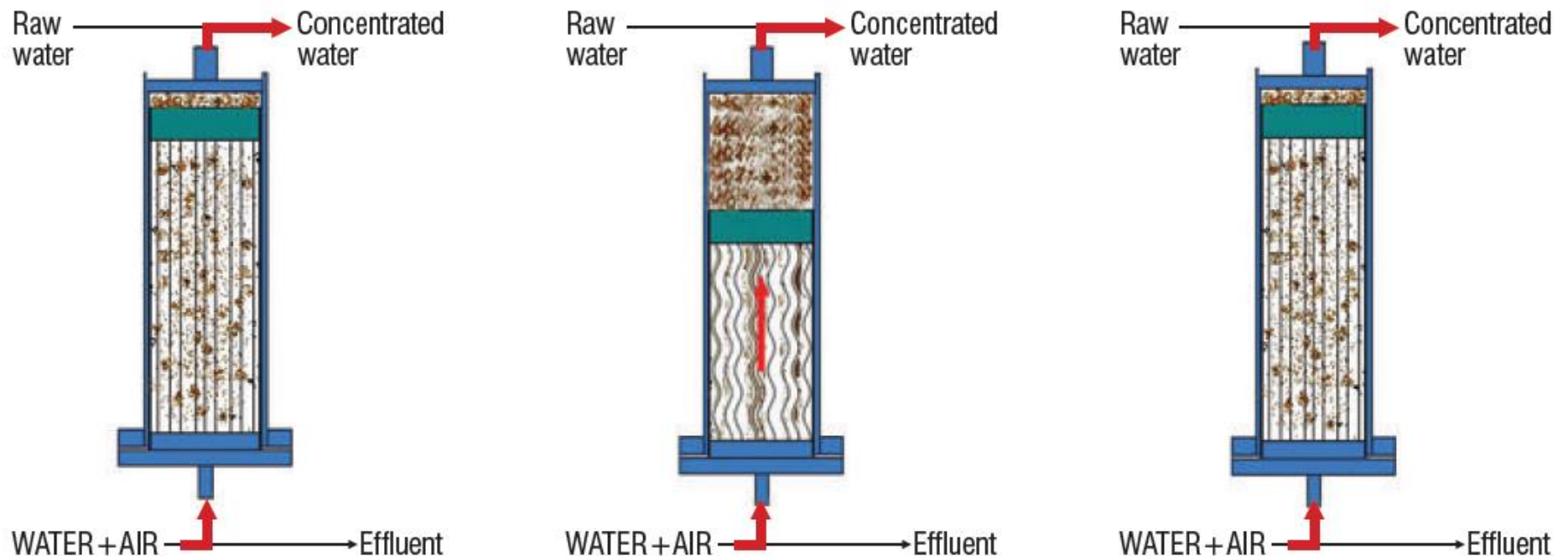


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BACKWASH CYCLE

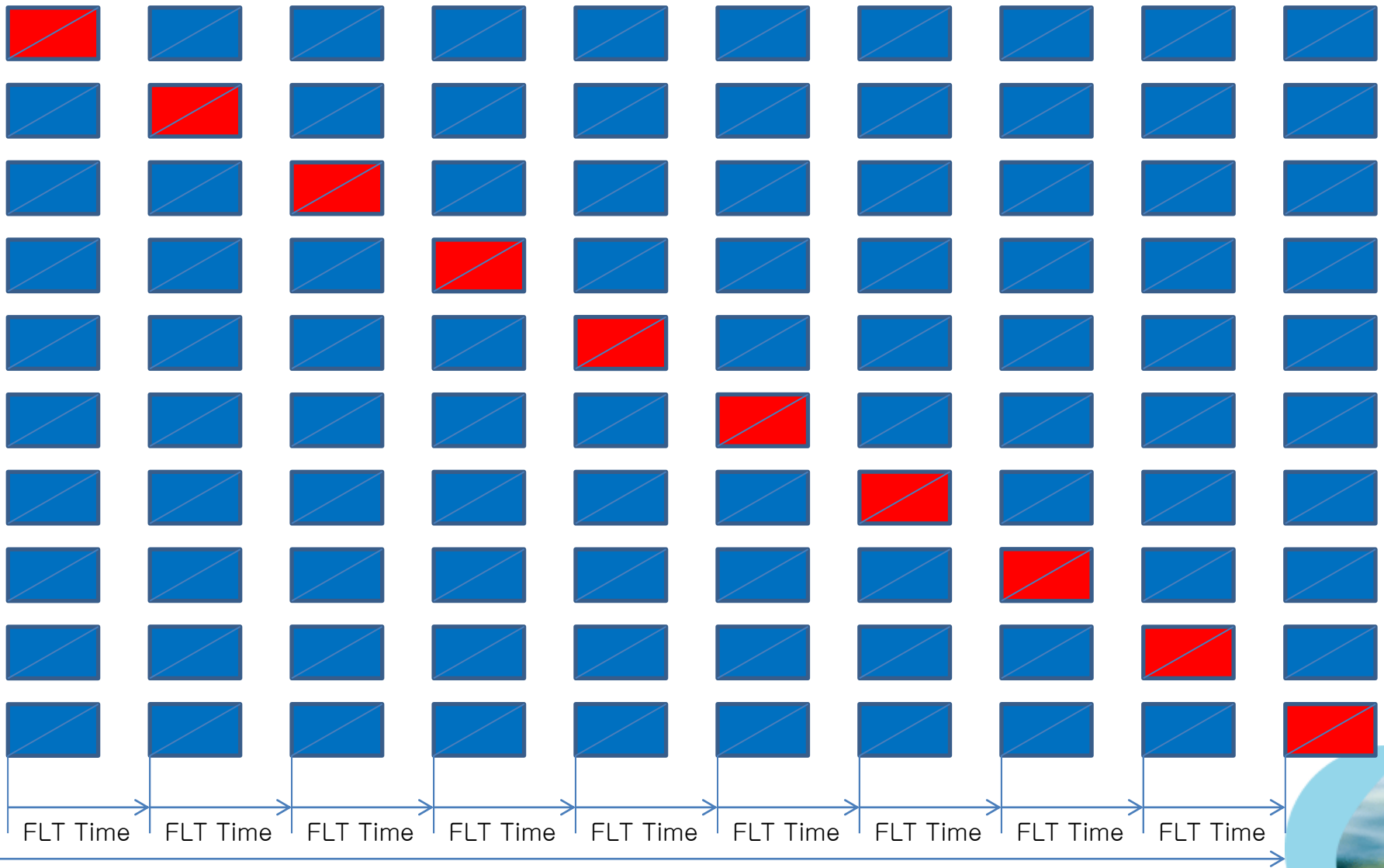
During backwash, water and air are forced through the effluent end of the filter and the compressed filter is gradually expanded in an upward direction. The pore structure divides into strings and the fine air bubbles separate the pollutants discharging them to the raw water outlet. The cylindrical filter media vibrates vigorously resulting in a synergism of washing and thus conducts full backwashing.



Process Flow of VPMF

Multi Skid Operation(1 Skid BW / 9Skids FLT)

-  Backwash
-  Filtration



Operating Time



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THE VPMF MODEL RANGE

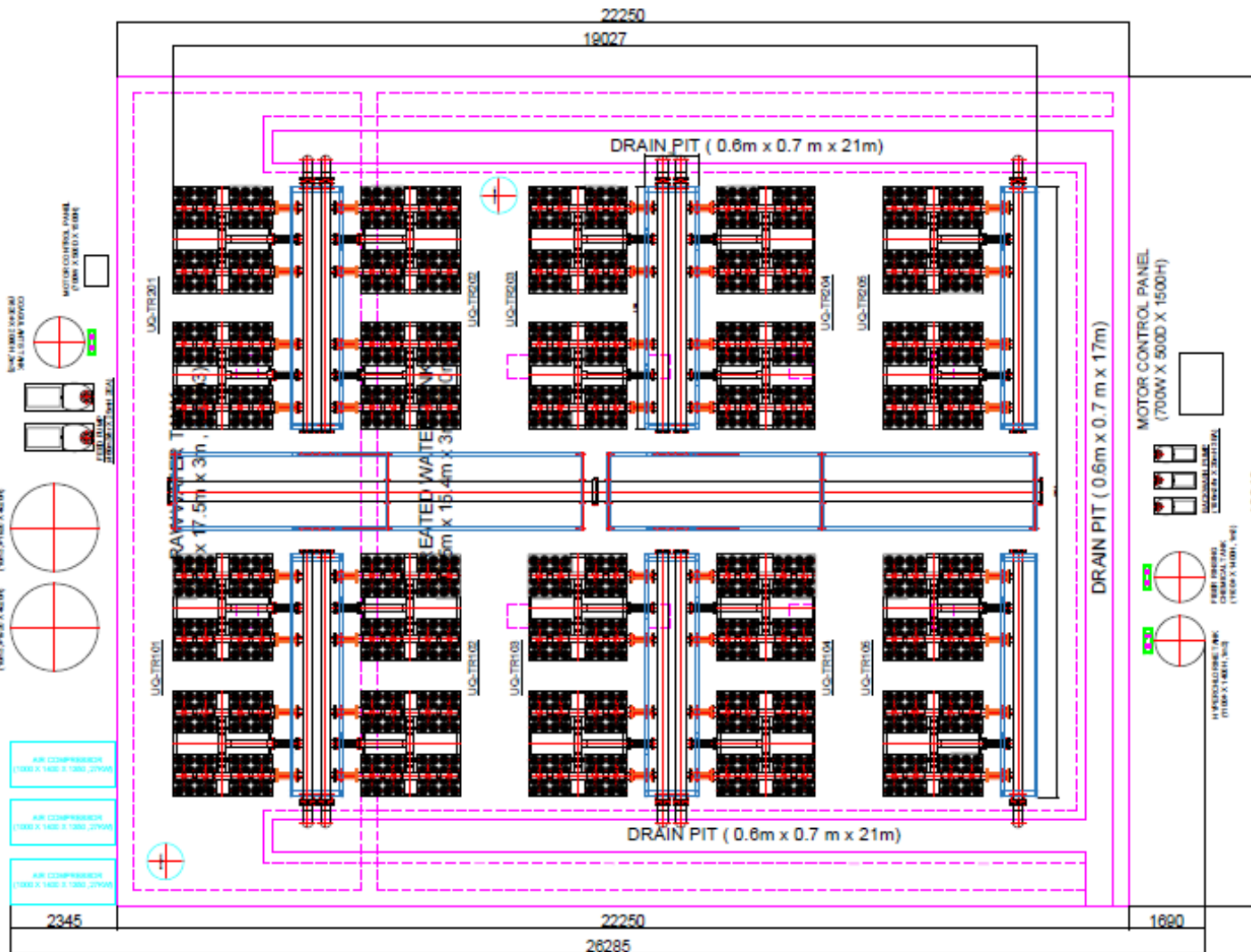
| Model | Pore | Housing | Flow rate per module | Application |
|-------|-----------|--------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LQ | 25 μ | S20 | 3.5m ³ /hr | <ul style="list-style-type: none"> • General Filtration • Cooling Water Recycling • Green Algae Filtration • Lakes • Fish Farming |
| | | S(P) 20-TB16 | 56m ³ /hr | |
| | | S(P)20-TB64 | 224m ³ /hr | |
| TQ | 10 μ | S20 | 3.0m ³ /hr | <ul style="list-style-type: none"> • Replace cartridge and sand filters • Removal of SS in industrial wastewater • Swimming pools |
| | | S(P)20-TB16 | 48m ³ /hr | |
| | | S(P)20-TB64 | 192m ³ /hr | |
| MQ | 5 μ | S20 | 2.5m ³ /hr | <ul style="list-style-type: none"> • Replace cartridge and sand filters • Removal of SS in industrial wastewater • Removal of BOD & SS in sewage treatment • Pretreatment for membrane filters (R/O), NF) |
| | | S(P)20-TB16 | 40m ³ /hr | |
| | | S(P)20-TB64 | 160m ³ /hr | |
| HQ | 1 μ | S20 | 1.5m ³ /hr | <ul style="list-style-type: none"> • Replace sand filter in water treatment plant • Swimming pools • Pretreatment for high-level treatment (activated carbon, ion exchange resin, ozone, UV, etc.) • Pretreatment for membrane filters (R/O), NF) |
| | | S(P)20-TB16 | 24m ³ /hr | |
| | | S(P)20-TB64 | 96m ³ /hr | |
| SQ | 0.5 μ | HP20 | 1.2m ³ /hr | <ul style="list-style-type: none"> • Filtering of industrial water and recycling of industrial wastewater • Pretreatment for membrane filters (R/O), NF) • Sewage & grey water treatment by direct filtering |
| | | HP20-TB16 | 19m ³ /hr | |
| | | HP20-64 | 77m ³ /hr | |
| UQ | 0.2 μ | HP20 | 0.9m ³ /hr | <ul style="list-style-type: none"> • Drinking water treatment by direct filtration • Wastewater recycling • Pretreatment for membrane filters (R/O), NF) • Sewage & grey water treatment by direct filtering |
| | | HP20-TB16 | 14m ³ /hr | |
| | | HP20-TB63 | 58m ³ /hr | |

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Plant Capacity : 10 MLD

22250 mm



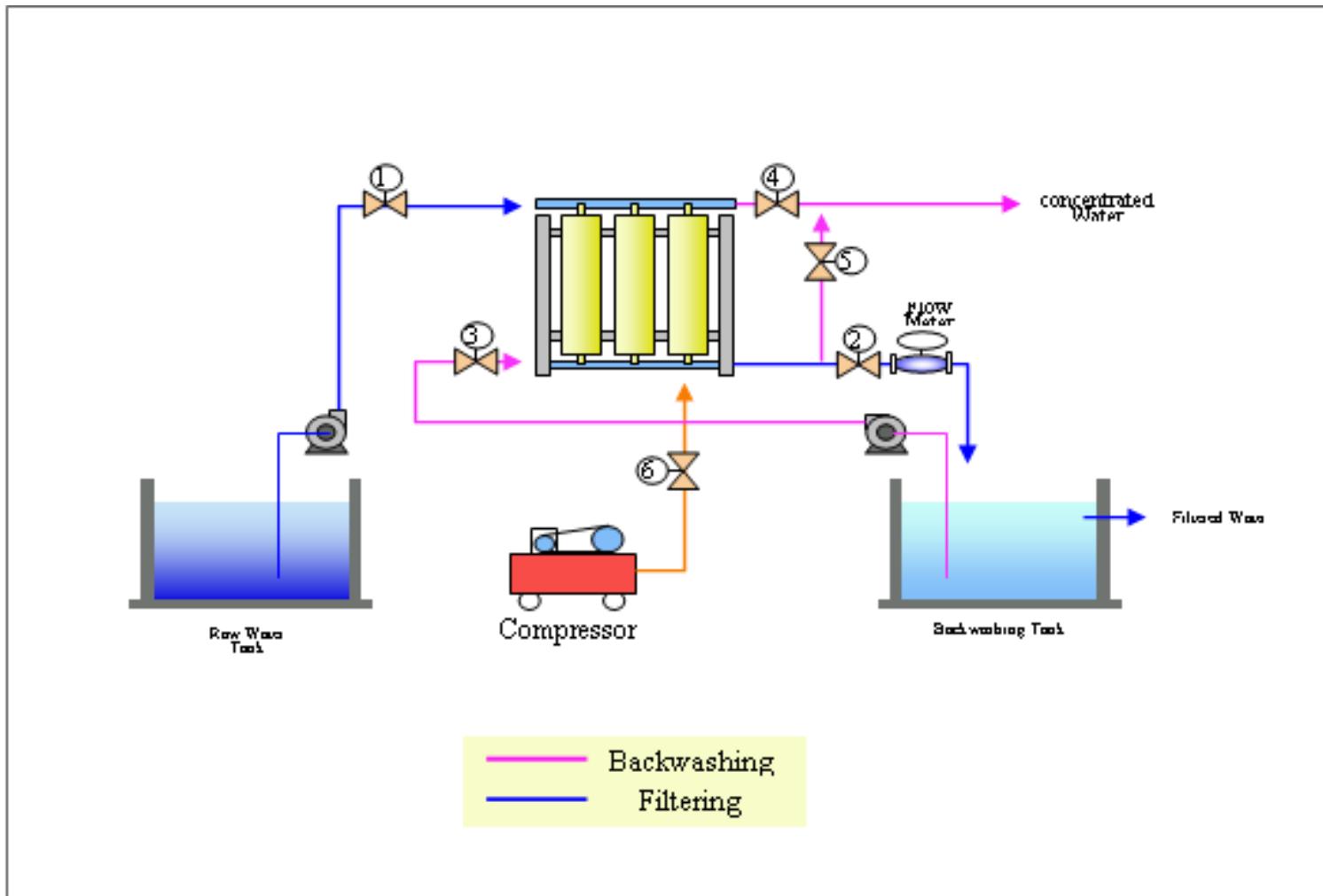
18243 mm



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VPMF PROCESS FLOW



Potable Water Treatment Process

| Process | 1 st Filter | 2 nd Filter | Turbidity(NTU) | |
|---------|------------------------|------------------------|----------------|-------|
| | | | Before | After |
| MHQ | MQ(5micron) | HQ(1micron) | 1,000~30 | <2 |
| MSQ | MQ(5micron) | SQ(0.5micron) | | <0.5 |
| HUQ | HQ(1micron) | UQ(0.2micron) | | <0.2 |



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THE RANGE OF APPLICATIONS

1. RIVER WATER PURIFICATION PLANTS

The VPMF is capable of replacing conventional sand filters, cartridge filters and MF membrane systems.

SUBSTITUTION OF CLARIFIER AND SAND FILTER



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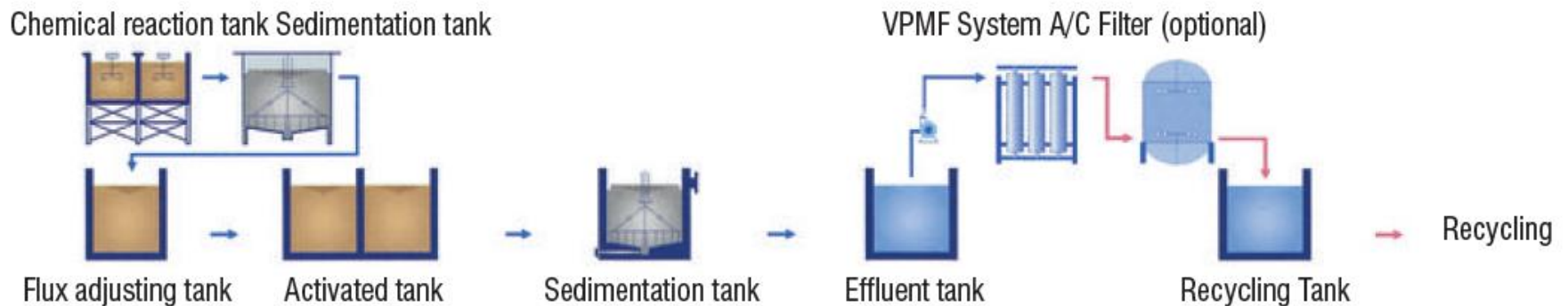
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THE RANGE OF APPLICATIONS

2. POLLUTED WATER TREATMENT

The VPMF is able to remove the SS, and to reduce the BOD after biological treatment.

RECYCLING OF WASTEWATER



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THE RANGE OF APPLICATIONS

3. SEWAGE WATER TREATMENT

After biological treatment, the effluent from the VPMF systems can be utilized for irrigation purposes.

ADVANCED TREATMENT OF SEWAGE



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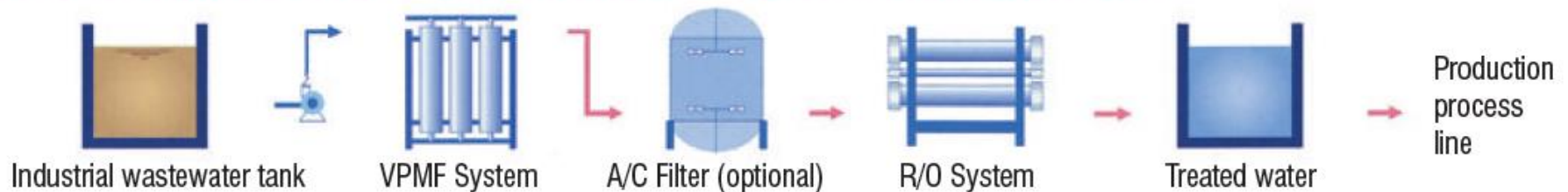
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THE RANGE OF APPLICATIONS

4. PRE-TREATMENT FOR ADVANCED WATER TREATMENT

The VPMF may be utilized as pre-treatment for membrane systems, ion-exchange, ozone, activated carbon, and UV systems.

PRETREATMENT OF R/O SYSTEM FOR INDUSTRIAL WASTEWATER



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THE RANGE OF APPLICATIONS

5. REMOVAL OF ALGAE AND OTHER ORGANISMS

The VPMF has been found to provide excellent performance in removal of chlorophyceae in aquatic fish ponds, process water recirculation, cooling tower filtration, vehicle washing recirculation and numerous other raw water conditions.

RECYCLING OF COOLING WATER



Comparison with Membrane Process

| Item | | MF/UF Membrane | VPMF-HUQ |
|-------------------------------------------------|-------------------|-----------------|---------------------|
| Space | | 1~0.8 | 1 |
| Water Quality to be treated | | 0.08~0.2NTU | 0.1~0.2NTU |
| Running Cost | Power Consumption | 1 | 1 |
| | Chemical Cleaning | A | None |
| | Filter Exchange | 6 | 1 |
| Total | | 7 + A | 2 |
| Gel Fouling Trouble | | Serious | None |
| Plugging Trouble | | Serious | None |
| Possible pollution of treated water through CIP | | Yes | No |
| Life time of filter | | 2~3years | 6~8years |
| Method to exchange filter | | Module Exchange | Filter Element only |



Comparison with Coagulation Process VARIABLE PORE MICRO FILTER

| Capacity | | 10,000m ³ /day | |
|---------------------------------------------|-------------------|--------------------------------------|--------------------------------|
| Item | | Coag/Sed/Sand Filter | VPMF-HUQ |
| Space | | 10~20 | 1 |
| Water Quality to be treated | | 0.1~0.3NTU | 0.1~0.2NTU |
| Running Cost | Coagulants | Alum : 0.01US\$/m ³ | None |
| | Sludge Disposal | 0.025US\$/m ³ | None |
| | Power Consumption | 0.005US\$/m ³ | 0.008US\$/m ³ |
| | Filter Exchange | Sand Media : 0.01US\$/m ³ | 0.02US\$/m ³ |
| Total | | 0.05US\$/m³ | 0.028US\$/m³ |
| Dehydrator of Sludge | | Need | No Need |
| Density flow in Sedimentation Tank | | Occurs sometimes | None |
| Assistant Analyzer for optimum coagulation | | Need | No Need |
| Availability for variation of concentration | | Weak | Strong |
| Maintenance Manpower | | Many | Small |
| Control for q'ty of produced water | | Difficult | Easy |



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SUMMARY BENEFITS

The VPMF has been developed to meet the needs of the next generation of technology for filtration and separation.

- 1 Reduced maintenance compared to conventional media filtering systems
- 2 Reduced water consumed in the back wash process
- 3 Less floor space is required, which results in lower capital cost
- 4 Excellent backwashing relates to cost savings of energy
- 5 Extended life expectancy due to the superior backwashing performance
- 6 Modular design allows for easy expansion in capacity
- 7 Cost effective in terms of CAPEX investment
- 8 Excellent removal capacity of suspended solids



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THANK YOU

