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VARIABLE PORE FILTER

PRETREATMENT PROCESS FOR RECLAIMED WATER REUSE
AND INDUSTRIAL WATER SUPPLY TREATMENT





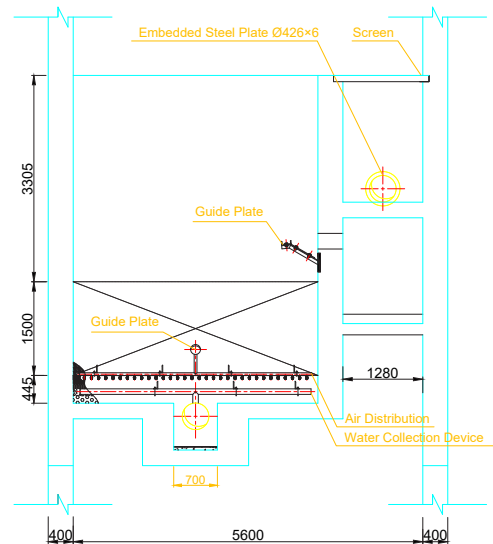
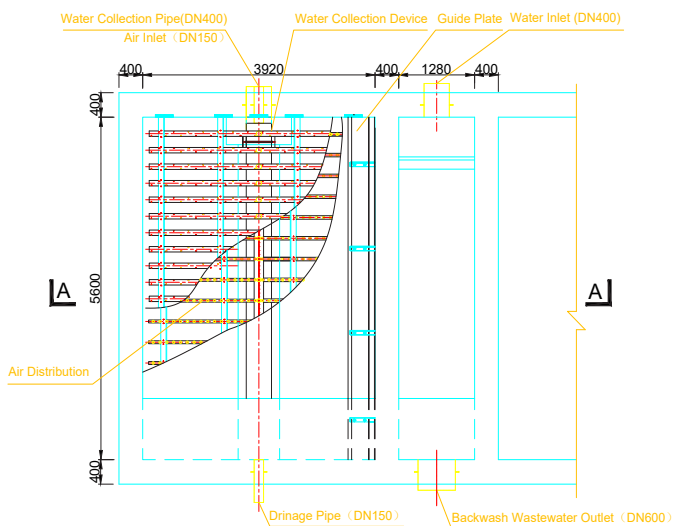
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VARIABLE PORE FILTER



Application

- Reclaimed water reuse
- Pretreatment process for industrial wastewater treatment
- Pretreatment process for ZLD treatment



KWI Group is considered one of the pioneers of Solid-Liquid separation technology with nearly 70 years' experience.

Main products include DAF, Filter and aerator, as well as custom designs to meet all customer requirements.

Parameter

Max. Velocity of Filtration	21 m ³ /(m ² ·h)
Max. SS of influent	20 mg/L
Turbidity	≤ 3 NTU
Max Capacity per tank	10,000 m ³ /d
Water Backwash Intensity	~12 L/(m ² ·s)
Air Backwash Intensity	~15 L/(m ² ·s)
Filter Media	Double Media (Coarse & Fine) 1.5 m
Backwash Frequency	24 h
Size	5.60 x 3.92 x 5.85 m (L x W x H)

Advantages

- Higher hydraulic load, 18~21 m³/(m²·h)
- Better effluent water quality
- Turbidity removal rate is up to 98%
- Less backwash water
- Lower electricity consumption
- Longer operation duration
- Smaller footprint

■ *Introduction*

Variable pore filter has a specially design in which the filter media is mixed with two sands of different particle sizes. This kind of structure will form a tortuous flow channel, which makes the flow velocity of each part within big difference. Therefore, when those tiny suspended particles and colloids pass through the bed, they tend to collide and flocculate in the part with high velocity change, and grow large enough to be trapped by the filter layer. It is mainly used for percolation filtration, which has advantages of small resistance of filter layer, high removal rate and high filtration velocity.

■ *Principle*

Variable porosity filter is a kind of positive flow deep bed filter designed with the theory of ‘coacervating’. It is mainly characterized by the use of two different particle sizes of filtration media, namely coarse sand (particle size 1.2-2.8 mm) and fine sand (particle size 0.5-1 mm). The composition ratio of coarse sand and fine sand is 30:1. Before operation, the fine sand is mixed with coarse sand by air stirring and water backwash, and the fine sand is distributed evenly on the whole bed, rather than gathered on the surface like ordinary filter. Therefore pores formed are not uniform but so-called ‘variable pore’ and extend throughout the depth of the bed. The larger gap between coarse sand and coarse sand is like the upper end of the funnel; and the smaller gap between coarse sand and mixed fine sand forms the cone bottom of the funnel. Since most of the pores are formed between coarse sand and impurity water flows through these pores to the depth of the bed, filtration occurs not only near the surface but throughout the bed. This is the so-called variable pore deep bed sand filter, variable pore for short.

■ *Structure*

The filter tank is mainly composed of filter media, supporting layer, air inlet device, water distribution device, inlet and outlet weir chamber and valve group.



■ Filter Media

The biggest difference between variable pore filter and ordinary filter is the filter media. The filter bed is thicker than the general filter tank, up to 1500mm, composed of coarse sand and fine sand. The sand is natural sea sand, while artificial broken quartz sand can't be used. Because there has a certain degree of roundness requirements. Due to the impact of perennial moon water, the geometric shape of natural sea sand is streamlined, which can form relatively regular filtration micropores, which is also conducive to reducing filtration resistance.

Parameter	Value
Density (g/cm ³)	2.5~2.7
Solid Concentration	<1%
Solubility in HCl	<3.5%
Sum of crushing rate and wear rate	<2%
Silicon Concentration (SiO ₂)	≥ 85%
Loss on Ignition	≤ 0.7%
Light substance with a density less than 2g/cm ³	≤0.2%

■ Operation Sequence Table

No.	Valve	Operation	Discharge	Air Scouring	Backwash
1	Inlet Valve (V1)	Turn On	Turn Off	Turn Off	Turn Off
2	Outlet Valve (V2)	Turn On	Turn Off	Turn Off	Turn Off
3	Backwash Wastewater Discharge Valve (V3)	Turn Off	Turn On	Turn On	Turn On
4	Backwash Water Inlet Valve (V4)	Turn Off	Turn Off	Turn Off	Turn On
5	Air Scouring Valve (V5)	Turn Off	Turn Off	Turn On	Turn On

SafBon specialists have vast expertise and experience ranging from engineering to building and commissioning, and from investment to operation.

Please feel free to contact us for support!

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