Sand Filter

Sand filtration is a frequently used very robust method to remove suspended solids from water. The filtration medium consists of a multiple layer of sand with a variety in size and specific gravity. Pressure Sand filters are used to purify the water from the impurities that are present in the water through filter bed. The filter beds absorbs the impurities in the filter bed. A backwash is given in a fixed interval to get ready the water for next level of filtration.

Water treatment equipment

Scan this code To access the Pakman product selection application and select this product.

Scan this code to receive a 3D product file.

More info about this product.

Applications for sand filtration:

- Preparation of cooling water
- Treatment of waste water
- Production of drinking water
- Filtration in swimming pools
- Pre filtration for membrane systems
- Filtration of grey or surface
- water Removal of iron

When the filters are loaded with particles, the flow direction is reversed and the flow is increased to clean the filter again. This step is called a backwash. The time for the cleaning is determined by one of the following criteria: Depending on the type of water, suspended solids concentration, oil and grease, COD/ BOD, iron contents, sand filters are sized differently. The arrangement of sands allows the largest dirt particles to be removed at the top media bed and the smaller and smaller dirt particles being retained deeper and deeper in the media. This down-flow filtration permits delivery of high quality filtered water at much faster flow rates.

PACKMAN Sand Filter Properties

PACKMAN Sand Filters are used to filter water-insoluble particles with a diameter of more than 1 NTU. These Filters which are used in swimming pools and industrial applications, are made of steel plate of ST37 grade (recommended for the manufacture of pressure vessels-no direct fire contact). In the case of customer request, the filters can be made of 17MN4 (suitable for boiler construction) without any changing in product price.

The Sand filters are vertical cylinders with two heads in different diameters. The diameter of the fitting, the nozzle number and the filtration velocity are the most important features of the sand filters.

The installed geyser on top of the sand filter, uniforms the water flow and cause the water to pass through the silica substrate in a balanced manner.

Manufacturing Standards

ASME Sec VIII, Div. 1 is used in the construction of sand filter tanks.

Torispherical/Elliptical Head

PACKMAN's sand filter head is Torispherical. This type of head has a longer life and a higher pressure strength at the same thickness against other shapes. The production price/per kilo of these heads is even up to two times the size of the usual heads on the market.

Welding Procedure

Welding is done by using the Swedish ISBU submerged arc welding equipment. After constructing the tank and welding the lugs, the body of the tank is connected to the heads by welding with a submerged welding method. In addition, the head is welded internally and externally, which increases the time life and the strength of the heads. In the welding root pass, the TIG, argon or welding methods with the 6010 cellulose electrode is used. The EW7018 electrode is used in welding fill pass. The submerged method using EW7018 electrodes in the welding cover pass.

Beck Wash Piping

PACKMAN Sand Filters are equipped with necessary valve. If it is required, the Back-Wash piping, is possible.

Silica sand filter

High grade silica with a purity of 98% with the following specification will be delivered along with the tanks:

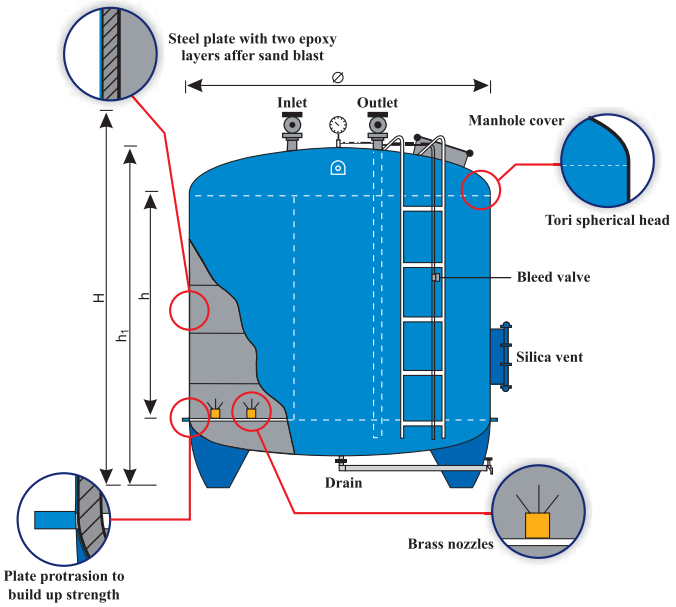
Silica Specification	
0.5-1.5 mm	Silica diameter-Grade 1
1.5-3 mm	Silica diameter-Grade 2
3-5 mm	Silica diameter-Grade 3
5-8 mm	Silica diameter-Grade 4
1 m	Total height of Silica
1.35	The silica uniformity coefficient inside the filters

Sand filter coating

The outer coating of the sand filters consist of special industrial color and epoxy in three layers (275 microns thickness). The internal coating is made up of 100 micron thickness epoxy on a sandblasted layer.

Nozzles

The nozzles used in PACKMAN sand filters are all made of brass, and for each square meter of sand surface, about 50 nozzles are placed, which makes the optimum washing procedure.



Product Capacity Calculation & Selection:

The best way to select the sand filter capacity is to determine the mass flow rate of filtration and select the model via the manufacturer catalogue. The recommended filtration velocity is about 7 gpm/ft2. Otherwise one can use the following formula. The maximum infiltration rate (Qmax) through the sand filter is computed using Equation:

$$Q_{max} = K_{sat} .A. \frac{H_{max} + d}{d}$$

Where K is the hydraulic conductivity of coarse sand = 3600 m/s (Engineers Australia 2003

A is the surface area of the sand filter = 30 m²

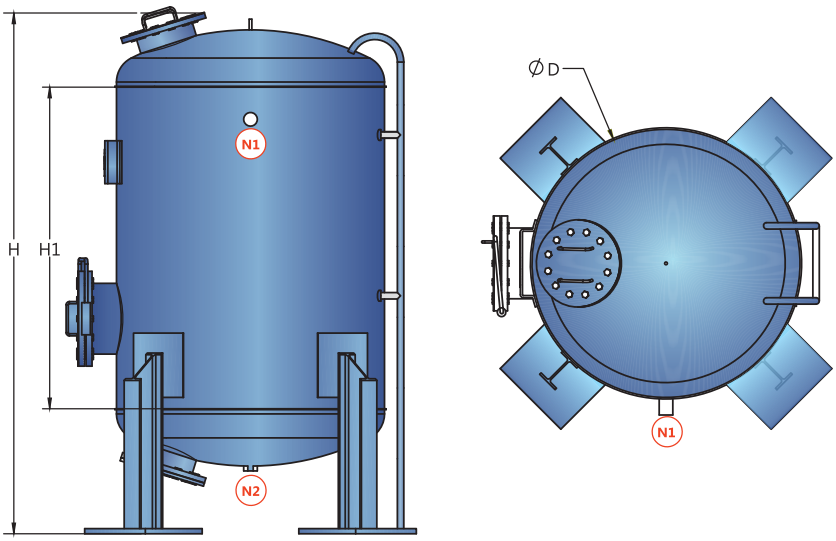
h_{max} is the depth of pondage above the sand filter = 0.2 m

d is the depth of the sand filter = 0.6 m

The sand filter is to be sized to remove the 125 µm particles. Pollutant removal is estimated using following equation:

$$R = 1 - \left[1 + \frac{1}{n} . \frac{V_s}{Q/A} . \frac{(d_e + d_p)}{(d_e + d)} \right]^{-n}$$

By defining the diameter of the sand filter, the capacity could be defined assuming some input data about height and sand.



Model	Capacity (gpm)	Diameter	Height/Length	Total height	Water inlet	Water Outlet
PSF-24	21	600	880	1600	1,1/4"	1,1/4"
PSF-32	38	800	1050	1800	1,1/2"	1,1/2"
PSF-44	70	1100	1585	2300	2"	2"
PSF-50	90	1250	1850	2400	2,1/2"	2,1/2"
PSF-60	135	1500	2100	2500	3"	3"
PSF-70	185	1750	2440	3000	4"	4"
PSF-80	245	2000	2590	3000	5"	5"
PSF-90	300	2250	2830	3000	5"	5"
PSF-100	325	2500	3115	3000	5"	5"
PSF-120	470	3000	3570	3000	6"	6"

● The measures and weights might be different from final product by less than 10%