

POREX[®] Tubular Membrane Filter Modules for Solids / SDI Reduction

Choosing Tubular Membrane Filter Modules (TMF) for Silt Density / Solids Reduction

The two (2) main technologies used to reduce suspended solids are clarification or media filtration. Clarifiers require continual supervision because they require a high level of monitoring and to prevent the passing large slugs of solids based upon temperature and chemistry changes. The organic polymers used in clarifiers (used to promote flocculation) can also cause problems. An excess of these polymers will foul downstream filtration equipment such as RO membranes or Nanofilters. Since these polymers are organic, they present a potential food source of bacteria which resulting biological growth and biofouling of piping and downstream equipment.

Reverse osmosis and Nanofiltration systems require protection from particulates and in many cases there are particle dispersions in the low or submicron size range that are not adequately handled by multimedia, cartridge or bag filtration. In the case of cartridge or bag filtration, change outs need to occur so frequently that it is cost prohibitive and labor intensive when trying to reduce the SDI (Silt Density Index) to an adequate level. Failure to reduce the level of the SDI will result in poor system performance, plugging and fouling of the RO membrane, increased cleaning frequency and therefore a reduced lifespan of the RO modules. These situations translate into higher operating costs. In most cases where these difficult prefiltration conditions occur, the problem would best be addressed with a microfiltration system using POREX Tubular Membrane Filter Modules (TMF).

Designing a TMF System for Solids/SDI Removal

The TMF systems are very similar to Reverse Osmosis systems, where a booster pump, piping, valves and TMF elements are mounted to a steel frame. See Figure 3 and 4 to see how the process is typically designed and what a typical TMF system looks like.

Typically, between 75 and 95% of the water passes through as permeate and is sent to the RO or Nanofilter system. The concentrate is recycled up stream of the Tubular Membrane Filter Modules at the Concentration Tank for re-dilution. Solids concentration is kept at 3-5% with the excess solids sent to a filter press for de-wetting or to disposal. The number of Tubular Membrane Filter Modules required is dependent upon the total flow rate of the system needed and the modules are typically placed in series of up to 12 modules. Systems are designed to allow at least one train or series of modules to be available for further cleaning if required. It is always best to run a small pilot test system as a means of determining the ideal flux rates through the modules and identify any issues, such as colloids, that might require further module cleaning.

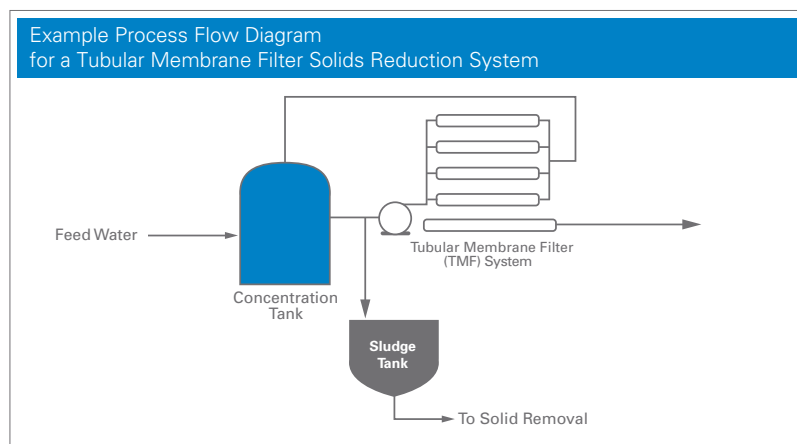


Figure 1 – Process Flow Diagram for a TMF Solids Reduction System

▶ POREX® Tubular Membrane Filter Modules for Solids / SDI Reduction

How long will TMF modules last?

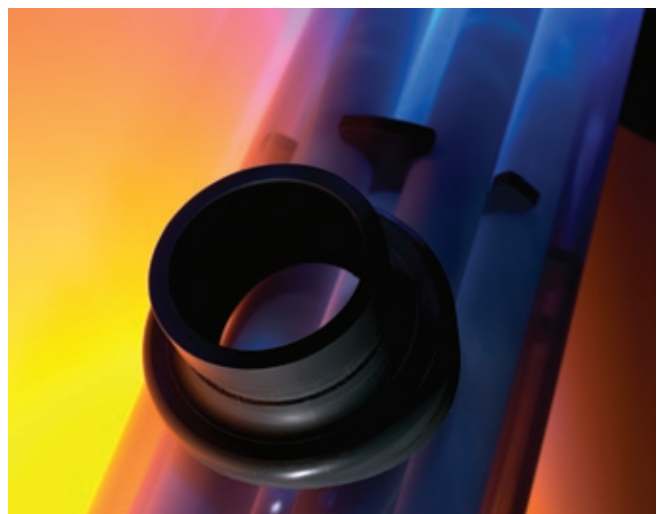
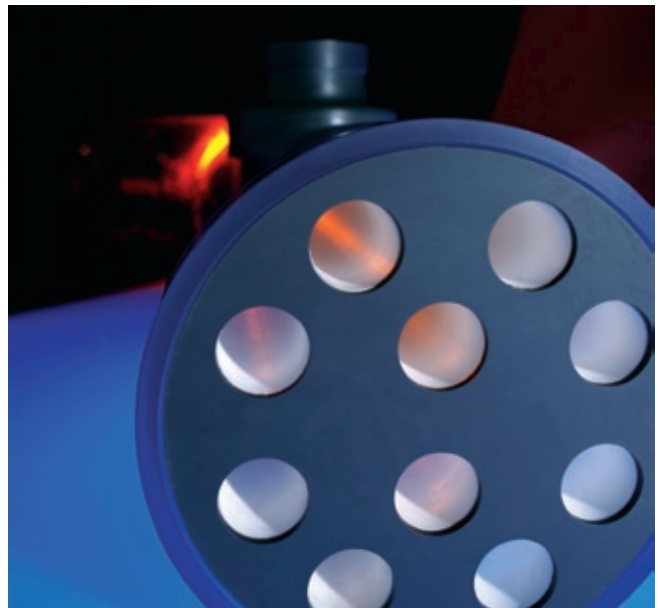
The typical lifespan of a Tubular Membrane Filter Module is 3 to 5 years or longer with the total TMF system designed for approximately 20 years of operation. The PVDF membranes and the PE or PVDF substrates used in the Tubular Membrane Filter Modules are extremely robust. They are designed to withstand harsh environments and will resist abrasion, high temperature, and pH environments from 0-14 without a decrease in retention efficiency.

Summary

Tubular Microfiltration or Ultrafiltration systems using POREX Tubular Membrane Filter Modules offer:

- Easy operation, maintenance and control
- Continuous operation and performance
- Resistance to abrasion and temperature fluctuations
- High flux rates

When used to reduce SDI to an RO or Nanofilter, operating a Tubular Membrane Filter Module system will yield a significant process improvement, typically resulting in much longer RO or Nanofilter module life and reduced cleaning frequency. Tubular Membrane Filter Modules provide a cost effective alternative to changing filter bags or cartridge filters on a daily basis. For solids removals, TMF systems offer a compact alternative to bulky clarifiers which are greatly affected by temperature changes, require significant floor space. TMF is a filtration technology that can handle process streams with a high solids concentration that presents a challenge to other membrane based technologies.




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