



WTS – Wastewater Treatment System

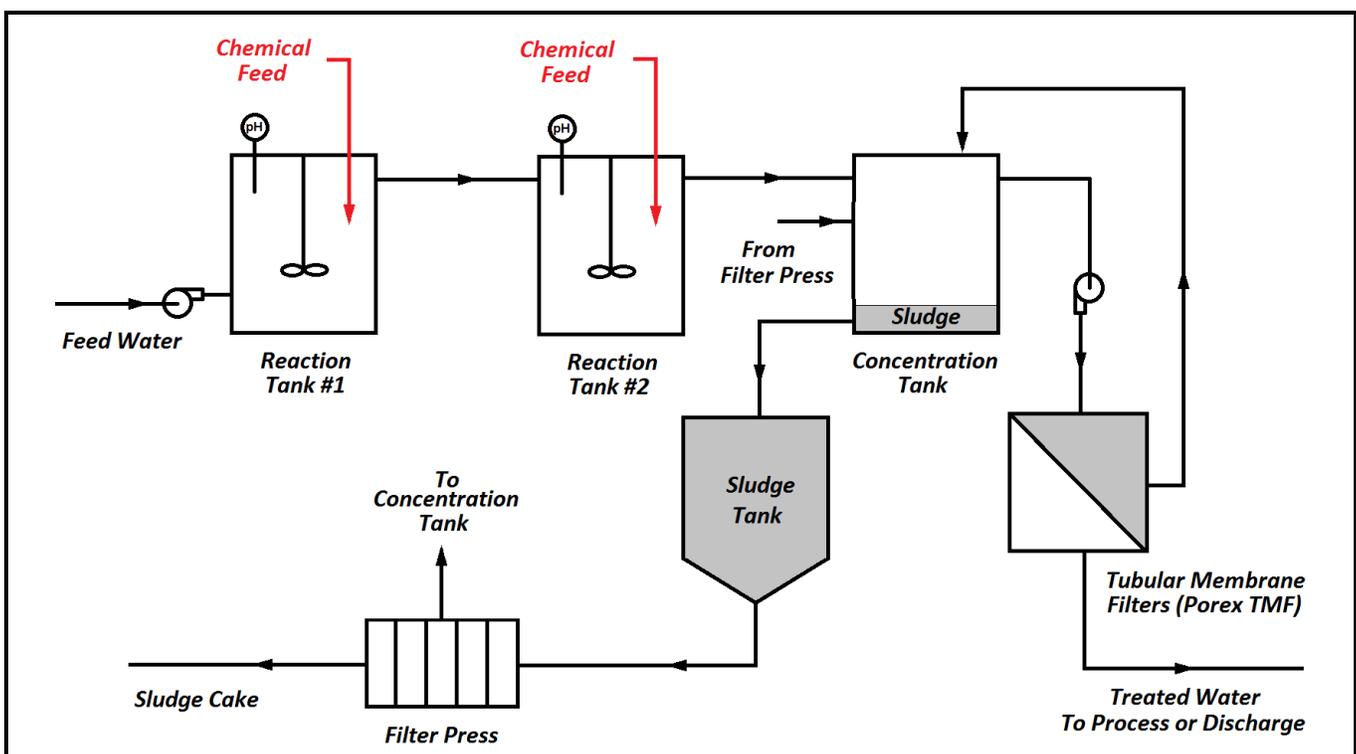
Membrane Filtration for Wastewater Treatment and Process Fluid Recycling

Metal Removal in Wastewater Treatment

Industrial processes can often result in wastewater contaminated with heavy metals. Heavy Metals, when in significant concentrations in water, may pose detrimental health effects. They include lead, silver, mercury, copper, nickel, chromium, zinc, cadmium and tin that must be removed to regulated water standard levels to meet discharge requirements. The WTS system offered by Filtration Solutions combines chemical precipitation with modern tubular membrane filters (TMF) to provide an excellent solution for reduction of heavy metals. The treated effluent from the system is ready for either disposal into existing municipal waste systems or further treatment for plant reuse/recycling. Treated effluent levels of less than 1 ppm suspended solids and less than 0.1 ppm metals are typical. Cleaning of the TMF modules is simple and involves the use of standard non-toxic chemicals which will allow for many years of service.

WTS Treatment Process

- 1) The feed water containing dissolved metals is fed to reaction tank #1 where chemicals (e.g. NaOH) are added to form solids (metal hydroxides).
- 2) The water is then fed to reaction tank #2 where additional chemicals and coagulants (e.g. ferric chloride) are added to control pH to further enhance precipitation and solids formation.
- 3) The water is then sent to a concentration tank to be treated by a tubular membrane filtration system, in which the permeate is discharged or can be further treated for reuse as the concentrate is recycled back to the concentration tank.
- 4) Solids level in the tank is usually maintained at 3-5% and the settled sludge is periodically removed to a sludge tank.
- 5) The accumulated sludge is sent to a filter press for de-wetting and then properly disposed. The excess water from the press is piped back to the concentration tank.



WTS The Solution for Metal Removal in Wastewater

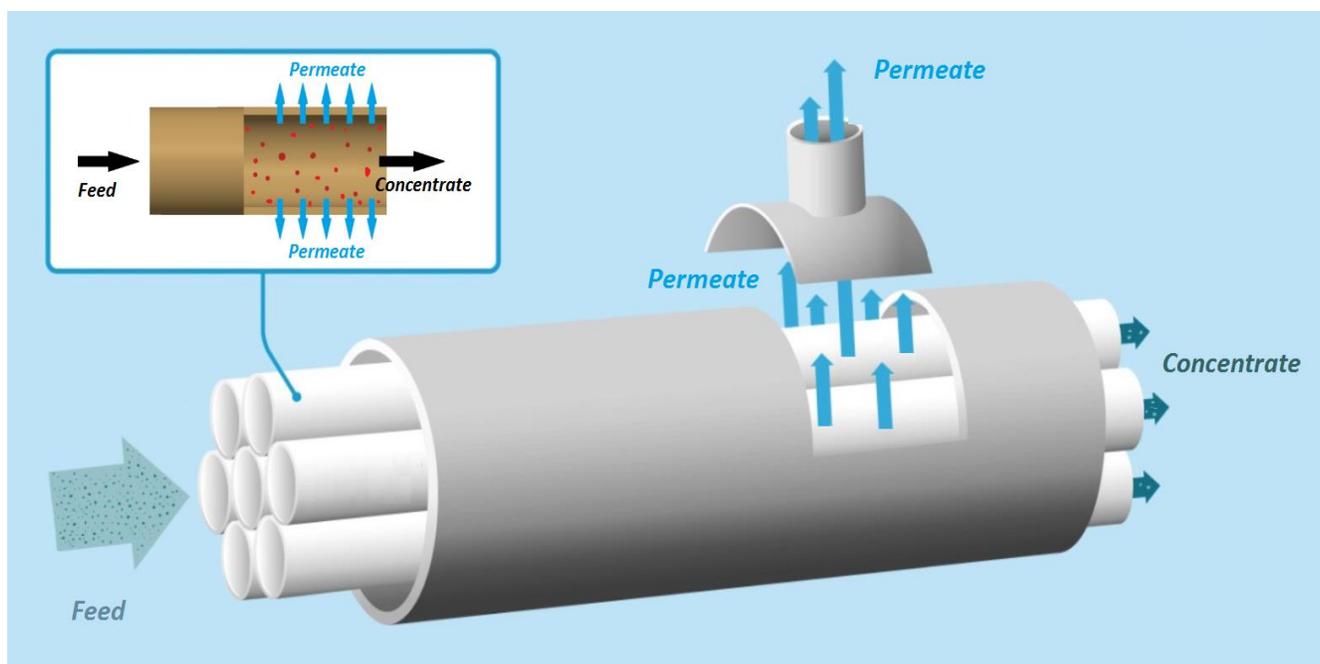
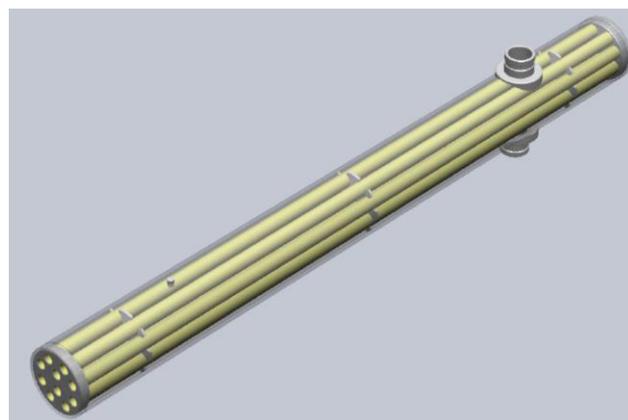
Design of a TMF System

TMFs are well known for their greater tolerance of high solids, which is ideal in this application. Through years of experience and numerous qualitative evaluations, FSI has selected the tubular membrane filters from Porex for the system design. The robust structure of the TMF has been proven to withstand harsh environments and will resist abrasion and high temperature. The PVDF membrane provides excellent flux rate as well as chemical resistance from pH 0 to 14. These characteristics allow constant membrane back-washing and chemical cleaning to be built into the system to provide the filters with years of reliable service life.

To ensure a proper system design, FSI can provide a small pilot test system to determine the ideal flux rates through the modules and engineer the most suitable cleaning protocols. The FSI designed system is known to be easy to operate and maintain while providing sustainable performance.

TMF Operation Mode

The TMF in the system is designed to operate in a crossflow mode, where process fluid is pumped along the membrane surface in a sweeping action. This operation has the processed fluid flow from inside-to-outside with retained fluid flowing through the center and permeate passing through the tube wall to the outside of the membrane. This design maintains stable filtration rates for process streams with high concentrations of particles of size as large as 0.5 mm in diameter.



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