



Innovative Flat-Plate Membrane BioReactor Technology

TITAN MBR MEM-FRAME™ Features

- Engineered and pre-assembled in S&L's quality-controlled factory
- Designed for insertion into any concrete aeration basin
- Contains robust, flat-plate **TITAN MBR™** Membranes
- Maintains high permeability and consistent flux
- Clean in place without plant interruption
- Frame fixed to tank, membrane modules removable with no draining

Benefits with TITAN MBR MEM-FRAME™

- Best-Available Technology for new treatment plants
- Superior effluent quality / potential for water reuse
- Achieve complete nitrification
- Gravity flow eliminates need for permeate vacuum pumps
- No recycle between aeration and membrane zones
- S&L offers significant process experience



Can be used in both new construction in concrete tanks as well as retrofitting of existing tankage with side wall heights of 11'-6" (3.5 m) or more.

TITAN MBR™ Membrane Advantages vs. Alternative Designs

Durable Membrane & Module Composition

- Composed of PVDF [polyvinylidene fluoride] and PET non-woven fabric
- Membrane Sheets never collide during operation
- Robust design prevents breakage experienced in alternatives
- Produces higher flux rates over the life of the membrane
- Gravity feed into system eliminates need for pumps

TITAN MBR™ Membrane Data (typical)

Design Flux	13 gpd/sf (22 l/mh)
Pore Sizing	0.08 microns
Transmembrane Pressure	0.50 - 2.00 psi (metric)
Cleaning (In-tank)	Semi-annual

Flat-Plate Design Superior to Hollow Fiber

- Eliminates clogs experienced in hollow fiber membranes
- Smooth, continuous surface negates bundling by stringy solids
- Facilitates air scouring much more effectively

More Economical Cleaning Method: Clean in Place (CIP)

- CIP reduces operating costs
- Requires less chemicals and operator time
- No backpulsing is required; eliminates associated equipment

TITAN MBR MEM-FRAME™ Sizing Data

Model	Custom Design Flow gpd (cmd)	Total Plant Volume gallons (cm)	Flow with TITAN MBR MEM-FRAME™ gpd (cmd)
1	25,000 (95)	50,000 (190)	62,000 (230)
1.5	32,000 (120)	59,000 (220)	80,000 (300)
2	50,000 (190)	94,000 (350)	125,000 (470)
3	76,000 (285)	145,000 (545)	190,000 (715)

TITAN MBR MEM-FRAME™ Components

The complete equipment provided by Smith & Loveless includes:

- Membrane modules
- Coarse bubble diffusers
- Required ball valves
- Controls and instrumentation
- Piping
- Frame work
- Blowers
- Chemical clean in place

