



TITAN® come in standard and custom designs, and result in smaller footprints than conventional systems. The submerged membrane eliminates clarifiers and sand filters while still producing significantly better effluent quality. Integral zones can be added to meet particular effluent goals, including nutrient removal, disinfection and post-aeration.

**System Overview & Diagram**

TITAN MBR™ is the complete MBR package — developed by Smith & Loveless Inc., the company with 60 years of wastewater engineering and manufacturing experience.

**TITAN MBR™ Design & Technical Data**

Flow Capacities: 22,730 litres per day and larger

**Effluent Levels**

Effluent Quality: < 3 mg/l BOD & < 1 mg/l TSS  
 Turbidity: < 0.2 NTU  
 TKN < 2 mg/l  
 NH3 < 1 mg/l

Typical Design consists of:

- Flow Equalization
- Dual Anoxic Zones [Denitrification]
- Aeration Zone with Submerged, Flat Plate Membrane Modules
- Clearwell & Chlorination
- Recycle Pump
- Mixer
- Fine Bubble Diffusers
- Membrane Module
- Recycle Line [Denitrification]

**Design Benefits**

- 60 years of S&L engineering & manufacturing expertise
- Easy-clean Flat-Plate membrane design
- S&L-exclusive epoxy-coated, V-Crimped tank walls
- Proven factory-built designs and quality-control
- Flexible process options with minimal operation required
- Process guarantees and full customer support

TITAN MBR™ delivers results with value-added engineering experience available from Pinnacle will provide long-term durability.

**Test Data**

Research & Development operated two full-scale TITAN MBR™ demonstration systems, including a 37,854 litres per day unit at the Kansas WWTP.

The following are sampling test results:

**TITAN MBR™**

Actual Plant Test Results

Weekly Sample Number	INFLUENT LEVELS		
	BOD5 mg/l	TSS mg/l	TKN mg/l

INFLUENT LEVELS			
BOD5 mg/l	TSS mg/l	TKN mg/l	NH3 mg/l

Sam 1	276	148	36
Sam 2	270	224	36
Sam 3	359	178	53
Sam 4	228	204	28
Sam 5	275	157	43
Sam 6	246	157	37
Sam 7	126	244	21
Sam 8	195	244	47
Sam 9	330	139	58
Sam 10	70	202	29
Sam 11	294	230	34
Sam 12	35	196	47
Sam 13	336	127	47
Sam 14	360	210	34
Sam 15	265	174	31

NA	BDL	NA	0.30
NA	BDL	0.90	0.40
BDL	BDL	0.80	1.30
1.2	BDL	0.71	0.03
1.7	BDL	0.38	0.05
0.6	BDL	0.53	0.03
0.0	BDL	0.16	0.65
4.0	BDL	0.64	0.10
4.0	BDL	0.69	0.87
2.0	BDL	0.81	0.02
0.9	BDL	0.62	0.02
0.0	BDL	0.39	0.12
0.0	BDL	0.34	0.07
0.0	BDL	0.19	0,02
1.5	BDL	0.00	0,22

Average	243	189	39
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1.2	BDL	0.51	0.28
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NA = Not available

BDL = Below Detectable Limits