

Pre-Oxidation, Flocculation, and Sedimentation Skid

Carollo Engineers' pre-oxidation, flocculation, and sedimentation skid is part of a series of modular pilot equipment that is fully compatible and can be combined to form an integrated treatment train. Our standard pre-oxidation, flocculation, and sedimentation pilot plant offers a flexible and cost-effective solution for evaluating a wide range of conventional pretreatment alternatives. This skid has a

Carollo's pretreatment skid offers the following benefits:

- ▼ Provides pre-oxidation contactors with hydraulics representative of full-scale contactors.
- ▼ Offers facilities for five separate chemical feeds to fully optimize pretreatment.
- ▼ Includes plate settlers with process performance representative of full-scale sedimentation.

nominal treatment capacity of 6 gpm, although the variable-speed feed pump has a maximum capacity of 10 gpm. This skid features a rugged metal outer frame that is polymer coated to provide a durable finish and to prevent corrosion. The frame facilitates crating, and therefore protects process components during transportation.

Instrumentation

The skid includes continuous measurement of the following treatability parameters: raw water pH, temperature, turbidity, and the settled water turbidity, along with chemical dosages. The data may be collected using Carollo's remote data acquisition and control (RDAC) system, or recorded manually.

Pre-oxidation

The head of the pilot plant includes two parallel 8-inch-diameter columns, which are typically used for pre-ozonation. The columns provide a 5-minute contact time at 6 gpm, and hydraulics representative of full-scale pre-ozonation facilities. These columns may also be used to evaluate and optimize other alternative pre-oxidation chemicals.

Flash Mix and Flocculation

A chemical mixer provides flash mixing, with G values in the range of 500 to 1,000 s^{-1} . Three stages of flocculation are provided so that mixing energy can be tapered and optimized in successive flocculation

stages. The skid includes five chemical feed systems which include storage tanks and peristaltic pumps that maximize the turndown ratio. All chemical feed pumps use the same pump head and drive to reduce the size and complexity of the spare parts inventory, and to simplify repairs and maintenance. The pumps are controlled with variable frequency drives (VFDs) to easily adjust the chemical dosage. Optical level sensors that minimize mechanical hardware and are easy to use and are provided on the chemical feed tanks.

Sedimentation

Sedimentation is provided with plate settlers for overall process performance representative of full-scale facilities. Sludge is removed from the sedimentation basin via a manual valve and peristaltic pump arrangement. This system provides the best control of the sludge removal rate, while eliminating plugging of the blow down tubing.



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Design Criteria		
	Value	Additional Information
Design Flow	6 gpm	
Pre-Oxidation		
Type	-	Fine bubble diffuser
Hydraulic Retention Time	5 min	Two parallel 8-inch-diameter columns, 6-foot height
Flash Mix		
Type	-	Vertical shaft, variable speed
Flash Mix Volume	1.0 gal	
Hydraulic Retention Time	0.16 min	
G-Value	500 to 1000 sec-1	
Flocculation		
Type	-	Vertical shaft, variable speed, custom paddles
Paddle d/D Ratio	0.85	
Number of Stages	3	
Stage Dimensions (L x W x H)	24 in x 24 in x 24 in	
Detention Time Per Stage	10 min	
Typical G-Values, Stage 1, 2, 3	70 sec-1, 40 sec-1, 20 sec-1	
Sedimentation		
Type	-	Plate settlers at 60°
Surface Loading Rate	0.9 gpm/ft ²	
Sludge Removal Type	-	Blowdown valve, peristaltic pumping

Technical Specifications	
Skid Weight	3,000 lbs
Skid Dimensions (L x W x H)	171 in x 56 in x 92 in
Electrical Requirements	208 VAC, 3 Phase, 30 A (WYE connection) Optional Transformer requires 480 V, 3 Phase (Delta connection)
Influent, Effluent, Overflow Connections	1-inch Cam Lock
Typical Rental Fee	\$4,000 per month