



PACKAGE TERTIARY FILTER SYSTEM SPECIFICATIONS MODELS TF-2-6-C THROUGH TF-2-35-C

Pollution Control Systems Inc. (PCS) is pleased to provide the following equipment specifications for your consideration.

One (1) prefabricated carbon steel Tertiary Filter System and related equipment designed and constructed in accordance with the plans and specifications stated herein. The tertiary filter will be a Model TF-2-____. The tertiary filter will be of the granular multi-media filter type for filtering biological treatment plant effluent at a rate of _____ gallons per day of 30 mg/l BOD5 and 30 mg/l TSS. The filter is capable of providing an effluent quality of less than 10 mg/l BOD5 and less than 10 mg/l TSS when properly operated and maintained.

Process Description

The packaged tertiary filter provides for flow division, filtration, air scouring, backwashing, surge control and disinfection of the wastewater.

The secondary effluent will enter the filter through a flow division chamber where the flow will be divided equally to each of the two (2) filter cells. Each filter cell will provide for the filtration of biological treatment plant effluent by the use of a dual media. This media contains both sand and anthracite to accomplish the sequential filtration and removal of suspended solids. The filter media is fully submerged to evenly distribute the water over the entire filter cell.

The water percolates through the filter cells and then into the area below the filter nozzle plates. From there the filtrate flows through the backwash pipe, backwash pumps and into the clearwell.

The filtrate in the clearwell will then overflow into the disinfection chamber. The disinfection chamber will provide for the addition and mixing of a disinfectant with the filtrate. The disinfection chamber will also provide the required retention time to ensure the thorough disinfection of the effluent.

As the surface of the filter cells become covered with solids, the water level begins to rise. The rising wastewater level activates the air scouring and backwash cycles. The backwash cycle will use filtrate from the clearwell to backwash and dislodge the solids entrapped in

the media. The media will be automatically air scoured and backwashed as air and clean filtrate water is pumped through the filter media from the bottom up, dislodging the retained solids.

The air scouring cycle will provide for the agitation of the solids that have been collected in the upper portion of the media. The rising backwash water overflows into the surge chamber. The surge chamber collects the backwash water and pumps it back to the head of the biological treatment system over several hours by using the flow control valves in the discharge line.

A. General Specifications

Number of Filter Cells: _____
Square Feet of Filter Surface Area: _____ /Cell
Clearwell Chamber Volume: _____
Surge Chamber Volume: _____
Chlorine Contact Chamber Volume: _____
Overall Length/Width/Height: _____ x _____ x _____
Shipping Weight: _____ (approximate)

B. Materials of Construction

All tank vessels will be fabricated from 1/4" structural grade ASTM designation A-36 steel plates joined by arc welding. All walls will be continuous and watertight and will be supported by structural reinforcing members where required. Fabrication and erection will conform to the appropriate requirements of "AISC Specification for Buildings". Connections will conform to the requirements of the American Society's Code and will develop the full strength of the member.

All piping within the plant will be Schedule 40 steel pipe except as may be noted on other sections of the specifications.

C. Surface Preparation and Coating

All vessel surfaces to be painted will be properly prepared in a workmanlike manner so as to obtain a smooth, clean and dry surface. All rust, dust, and mill scale, as well as other extraneous matter, will be removed from the interior surfaces by means of near white sandblast SSPC-SP10. All external surfaces will be commercial sandblasted to SSPC-SP6. All interior and exterior vessel surfaces will be painted with 8-10 mils total dry film thickness (TDFT) of a coal tar epoxy type coating.

D. Flow Division Trough

A flow division trough will be provided at the inlet of the tertiary system. The trough will be designed so as to divert the incoming flow equally to each of the two (2) filter cells.

A manual by-pass gate is provided in the inlet trough to by-pass the filter cells and clearwell in the event of a filter cell shutdown.

E. Filter Media

Filter media will be furnished in sealed bags not to exceed 100 pounds each. The filter media is to be installed in the field by the installing contractor. The filter media bed will consist of 8" of sand, .80 to 1.20 MM effective size with a uniform coefficient of 1.4 to 1.7, and 12" of anthracite, 1.08 MM effective size with a uniform coefficient of 1.42.

F. Clearwell

The clearwell will be located so the filtrate from the filter cell will discharge into the clearwell from the false bottom below the media through a riser pipe and backwash pump. An overflow weir trough will be provided for gravity discharge to the chlorine contact tank. The clearwell capacity will have volume capable of storing at least two (2) backwash cycles.

G. Backwash Pumps

Two (2) backwash pumps will be furnished and installed in the clearwell to automatically backwash the filter cells at a backwash rate of 15 GPM per square foot of filter surface area. Each pump will be rated at ____ GPM, at ____ TDH, and will be ____ HP, ____ volt, 60 cycles, ____ phase.

H. Surge Chamber

The surge chamber of the tertiary system will be of such size to handle the total volume of the clearwell and the average incoming flow during backwash cycle. A duplex set of pumps will be provided in the surge chamber for returning the backwash liquid to the secondary sewage treatment system. The capacity of each pump will be ____ GPM, at ____ TDH, and will be ____ HP, ____ volt, 60 cycles, ____ phase. A throttling and recycle valve are provided on the pump discharge piping to assure the return flow rate does not exceed 15 percent of the design average flow to the secondary treatment system.

I. Chlorine Contact Chamber

The chlorine contact tank will have ____ minutes of retention based on the design flow. Sufficient mixing baffles will be supplied to ensure proper mixing of the chlorine solution with the filter effluent. A tablet style chlorinator feeder will be provided for use with Sanuril 115 tablets.

J. Air Supply for Media Air Scouring

Facilities for air scouring the filter media prior to backwash will be provided. An air distribution system will be provided within the filter media.

To meet the air requirements of this wastewater treatment system, a positive displacement blower/motor unit will be supplied. The blower/motor unit shall be mounted on the plant or at a remote location as indicated on the plans. The blower/motor unit will be capable of providing a minimum of 1 cfm of air per square foot of filter area during the backwash cycle air scour period.

The blower unit will be capable of delivering ____ CFM when operating at ____ PSI. The motor will be ____ HP, ODP type, for operation on ____ volt, ____ phase, ____ cycle service.

The blower/motor unit assembly will be mounted on a molded fiberglass base. The base structure will be adequately reinforced to support the blower/motor unit.

The blower/motor will be enclosed within a molded fiberglass weatherproof hood mounted to the base. The fiberglass-locking hood is designed for easy access to service the unit.

To help reduce blower vibration and noise, the blower/motor base will be mounted on vibration dampeners.

For easy adjustment of the V-belt drive connection between the blower and motor, the motor will be mounted on an adjustable motor mounting base. The blower will be fitted with a dry type filter/silencer at the air intake. Each blower discharge will be fitted with a check valve, and a flexible rubber discharge coupling.

For purposes of determining the blower performance and/or diffuser condition, a pressure relief valve and pressure gauge will be mounted in the air manifold.

K. Tertiary Control Panel

A tertiary control system will be provided. When resistance of the flow through the filter media causes the water level in the filter cells to rise to a predetermined level, a sensing device will initiate the automatic air scour/backwash cycle. The cycle will be set up for an air scour time of four minutes, a settling time of two minutes, backwash time of five minutes and a final settling time of 19 minutes.

The controls are housed in a NEMA 4X fiberglass enclosure. Properly sized circuit breakers or fuses will protect all electrical equipment and circuitry. The panel will be wired for ____ volt, __ phase, ____ cycle service.

L. Service Walkways

A service walkway will be provided to service the plant equipment. Grating panels will each consist of one-piece skid resistant steel plank. All grating panels will be constructed of 18 gauge, galvanized steel sheet. Each grating panel has a standard 6" or 9" surface width and a 2-1/2 " rib depth. Each panel will be supported to insure a safe uniform load carrying capacity of 80 pounds per square foot.

M. Cathodic Protection (Below Grade Installations)

For cathodic protection, __, 17-pound magnesium anode packages will be supplied for burying, adjacent to the sides of the vessel and securely connected thereto by heavy copper wire in good electrical contact with the connector lugs on the steel vessel.

N. Guarantee

PCS will guarantee for one (1) year from the date of shipment that the vessel and all component equipment will be free from defective materials and workmanship. PCS will furnish replacement parts for any component considered in the opinion of PCS to be defective, during the guarantee period.

OPTIONAL EQUIPMENT AVAILABLE

A wide variety of optional equipment is available for installation on your tertiary filter system. The following items are those most commonly requested.

AA. *Surface Coating*

A variety of painting systems and colors are available to meet specific project requirements. Please consult factory for recommendations.

BB. *Ultra-Violet Disinfection*

Trojan Ultra-Violet Disinfection units are available as an alternative means for effluent disinfection.

For below grade filter installations, the UV modules are mounted in a stainless steel channel, which is located in an integral chamber after the clearwell overflow weir trough.

For above grade installations, the UV module will be provided with inlet and outlet transition connection boxes. This will produce a freestanding structure to be located off the filter structure on a concrete pad. These boxes will contain connections for flanged inlet and outlet piping.

CC. *Dechlorination*

A dechlorination chamber will be supplied with sufficient capacity to effectively dechlorinate the chlorinated effluent being discharged from the chlorine contact tank. A table type dechlorinator feeder will be provided in this chamber for use with Sanuril dechlor tablets.

DD. *Effluent Chamber*

An effluent chamber with adequately sized effluent pumps will be supplied to facilitate the transfer of the wastewater effluent to a remote location. As a PCS standard, the electrical controls for this chamber will be located in the central control panel. The volume of this chamber and the pump requirements will be sized based on the needs of the receiving location.

EE. *Effluent Flow Meter*

For measurement of the effluent of the tertiary filter system, a v-notch weir plate will be provided at the end of the _____ chamber. This v-notch will be used with the ultrasonic flow meter and circular chart recorder to record, indicate and totalize the flow through the wastewater system. Both the flowmeter and recorder are mounted within the same NEMA 4X enclosure

The flow meter consists of an ultrasonic transducer remotely mounted above the liquid surface and a microprocessor based electronic control unit. The control unit will be mounted within a NEMA 4X control panel directly above the transducer at the tertiary filter outlet.

The circular chart recorder will record flows on circular unit charts that are 10" in diameter. The unit includes one box of 24-hour circular charts, and one (1) felt tipped pen for recording.

FF. Full Tank Grating

Full tank grating can be supplied to cover the entire tank top and will meet the specifications stated above.

GG. Perimeter Handrails

Perimeter handrails can be provided for above grade installations that have full tank grating or below grade installations for safety purposes. The handrails are supplied with mounting flanges for bolting into place. The rails and posts are fabricated from 1-1/4" diameter schedule 40 carbon steel pipe. Longer sections of handrailing are spliced to allow for easier handling and installation. Carbon steel handrails are painted with enamel paint, black, or safety yellow. Due to shipping limitations, handrails are shipped loose for field mounting by the field contractor.

HH. Access Ladder

A plant access ladder can be provided for PCS tanks being installed above or partially below grade. Standard ladders are fabricated of carbon steel with 3/8" thick rails and 3/4" diameter rungs and can be provided with a walk through extension if required. Carbon steel ladders are coated with an enamel painting system provided in black or safety yellow.

Aluminum or other optional materials can be provided to meet specific applications.