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## **PACKAGE WASTEWATER TREATMENT PLANT SPECIFICATIONS 3,000 GPD – 100,000 GPD PLANTS**

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

One (1) prefabricated carbon steel packaged wastewater treatment plant and related equipment designed and constructed in accordance with the plans and specifications stated herein. The package plant will be Model \_\_\_\_\_. The package plant will be the activated sludge type, specifically known as "Extended Aeration", designed for treating \_\_\_\_ GPD of \_\_\_\_ PPM-BOD<sub>5</sub> wastewater.

**A. General Specifications**

Equalization Chamber Volume: \_\_\_\_\_  
Sludge Holding Chamber Volume: \_\_\_\_\_  
Aeration Chamber Volume: \_\_\_\_\_  
Clarifier 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 of 1/4" structural grade ASTM designation A-36 steel plates joined by arc welding with fillets of adequate section for the joint involved. All walls will be continuous and watertight and will be supported by structural reinforcing members where required. Connections will conform to the requirements of the American Welding 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 otherwise in other sections of the specifications or called for on the plans.

### **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. Inlet Bar Screen**

A bar screen will be provided at the influent port to remove any unusually large solids from the incoming raw sewage. The bar screen will be fabricated from 1/2" diameter bars spaced 1" apart and arranged as shown on the drawings. The bars shall be sloped to permit easy cleaning of accumulating debris. A deck will be furnished for drying this debris. The bar screen shall have the same protective coating as specified for the plant.

### **E. Flow Equalization Chamber**

A flow equalization chamber will be supplied with a volume designed to handle 25% to 100% of the daily design flow. The flow equalization chamber allows for a constant flow through the plant by equalizing flow surges that may be incurred during peak flow times.

Flow control will be accomplished by pumping the plant influent to a flow control box containing an adjustable overflow broad weir and a v-notch discharge weir. The overflow broad weir will be adjustable so that a measured amount of pumped influent will discharge through the V-notch weir to the aeration chamber, while recycling the remaining pumped influent back to the equalization chamber.

A duplex set of equalization pumps will be furnished and installed within the chamber. The pumps will be rated \_\_\_ HP, \_\_\_ volt, \_\_\_ phase, and \_\_\_ cycle. An emergency overflow will be provided between the equalization and aeration chamber.

A blower/motor unit mounted in a fiberglass housing will be supplied to meet the air requirements of the equalization chamber. The blower unit will be capable of delivering \_\_\_ CFM when operating at \_\_\_ PSI. The motor will be \_\_\_ HP, ODP type for operating on \_\_\_ volts, \_\_\_ phase, \_\_\_ cycle service. Liquid level sensors will regulate the pumps and blower/motor unit. Controls will be provided in the plant control panel.

### **F. Sludge Holding Chamber**

The chamber will be of the aerated type. The volume of the sludge holding chamber is based on 3 cu. ft. per capita. Diffused air will be supplied by the plant blower system supplying 30 CFM of air per 1000 cubic feet of volume. The diffusers will be located parallel

to and near the bottom of the tank. All piping and valves within the chamber will be factory installed. A fixed supernatant decant pipe will be provided within this chamber.

### **G. *Aeration Chamber***

The aeration chamber will be of sufficient capacity to provide a minimum of 24 hours retention of the average daily flow, and/or maximum loading of 15 pounds of BOD5 per 1,000 cubic feet of aeration tank volume. To insure maximum retention, enhance spiral rotation and eliminate short-circuiting of raw sewage, the aeration chamber will be constructed with fillets top and bottom, air diffusers will be placed longitudinally along one side of the chamber, and flow control baffles will be provided. To insure adequate circulation velocity, the proportion of chamber width to depth, in the direction of rotation will not exceed 1.33 to 1. The velocity of rotation will be sufficient to scour the chamber bottom and prevent sludge filleting as well as to prevent the escape to the surface of minuscule air diffusion bubbles, causing their entrapment to provide maximum oxygenation efficiency.

### **H. *Clarifier Chamber***

The clarifier chamber will be sized to provide a minimum of 4 hours retention, based upon the same design flow rates governing the aeration chamber, and will have proper baffling to prevent short circuiting and to provide maximum uniform retention.

The total settling volume will include the volume of the upper one-third of the sludge hopper. The bottom of the chamber will be formed into an inverted pyramidal hopper or hoppers. The flat bottom area of the hopper will in no case be greater than one square foot. The slope of the hopper walls will not be less than 1.7 vertical to 1.0 horizontal.

Settled sludge will be returned from the clarifier sludge hopper to the aeration chamber by the positive sludge return system, consisting of one or more airlift pumps. The clarifier effluent will pass over the edge of the baffled effluent weir into the effluent trough and then out of the chamber. The effluent weir trough will be equipped with an adjustment to permit precise leveling of the serrated weir after plant installation.

### **I. *Sludge Recirculation System***

There will be installed within the clarifier chamber a positive sludge recirculation system consisting of one (1) \_\_\_ inch diameter airlift sludge return assembly per hopper. The airlift pump will have the recirculation capacity ranging from 0% to 150% of the design flow. The airline supplying air to the pump will be equipped with a cock valve to vary the amount of air supplied to each pump, thus varying the capacity of the pump. The airlift pump will be firmly supported and equipped with a clean-out plug to allow for easy cleaning and maintenance.

**J. Scum Recirculation System**

There will be installed within each clarifier chamber a positive scum and skimming recirculation system consisting of \_\_\_\_ ( ) 2" diameter airlift skimming device. The skimming device will be a positive airlift pump type, located in a position to skim and return floating material to the aeration chamber. The airline supplying air to the skimming device will be equipped with a valve to regulate the rate of return. The scum intake will have an adjustment assembly that will enable exact positioning of the skimmer at water level.

**K. Chlorine Contact Chamber**

A chlorine contact chamber will be provided for proper disinfection of the treated wastewater prior to discharging from the plant. The chlorine contact tank will have \_\_\_\_ minutes of retention based on the design flow. Sufficient flow baffles will be supplied to ensure proper mixing of the chlorine solution with the plant effluent. A tablet style chlorinator feeder will be provided for use with Sanuril 115 tablets.

**L. Air Diffusion System**

An air distribution manifold constructed of rectangular hollow steel tubing with diffuser drop assemblies will be installed longitudinally on one side along the entire length of the plant.

Each diffuser drop assembly will be equipped with an air regulation and/or shut-off cock valve, a disconnecting union and a diffuser bar with air diffuser nozzles mounted thereon. The diffusers will be parallel to and near the base of the vessel sidewall and at the proper elevation providing optimum diffusion and mixing of the vessel contents.

Each air diffuser will be constructed with an integral air check diaphragm designed to handle a wide range of airflow. The oxygen transfer capacity of each diffuser will be such that an adequate supply of oxygen will be maintained in the aeration chamber to meet treatment requirements of the design sewage load.

**M. Blower/Motor Units**

To meet the air requirements of this wastewater treatment system, \_\_\_\_ ( ) positive displacement blower/motor unit(s) will be supplied. The blower/motor unit(s) shall be mounted on the plant or at a remote location as indicated on the plans. The blower/motor unit(s) will be capable of providing a minimum of 2050 cubic feet of air per pound of BOD5 plant loading.

Each (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.

#### ***N. Central Control Panel***

A central control system installed within a weatherproof enclosure will be provided. The enclosure will be rated NEMA 4X-F Fiberglass. The electrical controls will consist of magnetic starters, program timers and switches necessary to automatically control all electrical devices and/or motors on the sewage treatment system.

M-O-A selector switches and magnetic starters in conjunction with the program timer will control the blower/motor. The program timers will have the capability to operate the treatment system when required as determined by the variation in the daily flow rate. Properly sized circuit breakers and fuses will protect all electrical equipment and circuitry. The control system will be designed to operate all duplex or standby equipment. The enclosure will be wired for \_\_\_ volt, \_\_\_ phase, \_\_\_ wire, incoming power.

#### ***O. 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. On doublewide plants, the service walkways will be provided with handrails.

#### ***P. Service Handrails***

Service handrails will be provided for all standard PCS doublewide tanks. Service 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 hand railing 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.

**Q. *Cathodic Protection (Below Grade Installations)***

For cathodic protection for tanks partially or fully buried, \_\_\_\_, 17-pound magnesium anode packages will be supplied. Anodes should be buried by the field contractor, 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.

**R. *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, whether of his or other manufacturer during the guarantee period.

## **OPTIONAL EQUIPMENT AVAILABLE**

A wide variety of optional equipment is available for installation on your package wastewater treatment 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. *Comminutor***

A sewage grinding comminutor will be provided at the inlet of the plant to reduce the organic solids to 1/4" in size or smaller that will pass through 1/4" slots in the rotating sewage drum. The comminutor will be a Model \_\_\_\_\_ designed to pass maximum flows of \_\_\_\_\_ gallons per minute. The motor will be Totally Enclosed Fan Cooled (TEFC) and will operate at \_\_\_\_\_ volts, \_\_\_\_\_ phase, \_\_\_\_\_ cycle operation.

**CC. *Grinder/Shredder Pumps***

A duplex set of grinder or shredder pumps will be provided and installed within the Flow Equalization Chamber. The pumps will be rated for \_\_\_HP, \_\_\_volt, \_\_\_phase, and \_\_\_cycle service.

For ease of removal, grinder or shredder pumps can be supplied with slide rail assemblies.

***DD. 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.

***EE. Dechlorination***

A dechlorination chamber shall 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.

***FF. 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.

***GG. Effluent Flow Meter***

For measurement of the effluent of the wastewater treatment system, a v-notch weir plate will be 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.

### ***HH. Full Tank Grating***

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

### ***II. 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.

### ***JJ. 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.