

**TIPTON ENVIRONMENTAL PRODUCTS, INC.
PACKAGED RAPID SAND FILTER
TERTIARY FILTER SYSTEM**

1.0 General

- 1.1** The contractor shall furnish and install one prefabricated wastewater treatment system, complete and ready for operation in accordance with the plans and specifications stated herein and furnished as an integral section of the secondary treatment system. The treatment plant shall be a "Tipton-Environmental" Model _____ prefabricated steel package unit as manufactured by Tipton Environmental International, Inc., Milford, OH. The wastewater treatment system is of the tertiary treatment type, specifically known as rapid sand filter, designed for treating a total of ____,000 gallons per day of __ PPM-BOD5 domestic sewage based on composite sewage samples of the average daily flow. The complete system includes all necessary equipment for efficient plant operation.
- 1.2** The system will be factory assembled, so far as possible, with all piping and controls. All surfaces shall be factory painted.
- 1.3** Other Service and Equipment
- 1.3.1 The field contractor shall perform and or make the following arrangements for this above grade installation:
- A. Field unloading and settling of the wastewater treatment plant on its foundation pad, anchoring in position where required.
 - B. Assemble into position, at the location shown on the plans, the ancillary equipment which has been disconnected at the factory for shipping purposes.
 - C. Interconnection of piping and wiring which may have been disconnected at the factory for shipping purposes.
 - D. Tie-in of all piping, power, and wiring connections to site utilities.
 - E. Furnish all foundation pad to set the system on.
 - F. Attach system to foundation pad by anchoring.
 - G. Touch-up painting of those areas damaged during installation.
 - H. Install drain plugs and fill tankage with water to prevent flotation.

2.0 Process and Operating Instructions

2.1 Influent Characteristics

The system is capable of treating ____,000 gallons per day of secondary treated domestic sewage, having an organic strength of __ PPM 5 day BOD, and __ PPM suspended solids. No substances will be introduced in quantities which are toxic to biological organisms. The system is designed to handle average daily flows fluctuating over the range of 60% to 100% of the design flow and peak hourly flow rates not to exceed 250% of the design flow. The total flow is filtered through two(2) filter cells each having 10.4 square feet of filter area.

3.0 Tank Construction

- 3.1** The system shall be constructed as an integral section to the main secondary system. All tank vessels shall be fabricated of one-fourth inch structural grade steel plates, (ASTM A-36) joined by arc welding will fillets of adequate section for the joint involved. All walls shall be continuous and watertight and shall be supported by structural reinforcing

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members where required. Fabrication and erection shall conform to the requirements of "AISC Specifications for Buildings". Connection shall conform to the requirements of the American Welding Society's Code and shall develop the full strength of the member.

3.2 All tank piping shall be schedule 40 painted steel, unless specified otherwise.

3.3 The system shall be transported to the job site in one section. The contractor shall be responsible for field assembly, including bolting or welding when required.

4.0 Coating and Corrosion Control

4.1 All vessel surfaces to be painted shall 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 extraneous matter shall be removed by means of cleaning by wire brushing or whatever means necessary. All vessel surfaces shall be painted with two (2) coats of Koppers Superservice Coal Tar, 8-10 mils TDFT.

5.0 Foundation

5.1 A poured foundation pad shall be constructed conforming to the specifications for level and flatness as required by the manufacturer. Anchoring tabs shall be provided attached to the tank so the field contractor can attach the anchors mounted in the pad to these tabs.

EQUIPMENT SECTION

6.0 Inlet Connection

6.1 The influent connection shall be one 6" standard diameter inlet port connection.

7.0 Filtrate Holding Chamber

7.1 Two (2) filtrate holding chambers, each located above the filter media shall be of sufficient capacity and surface area to entrap and hold floating, suspended and settleable solids until such time these solids are returned to the wastewater treatment system during filter media backwash by means of the mudwell and return pumps. The volume of each chamber shall not be less than __ gallons. Each chamber shall have a minimum water depth of 24 inches above filter media to prevent freezing of filter media.

7.2 Means shall be provided in each chamber for manual dumping of the suspended solids into the mudwell. An access and inspection plate shall be provided in the sidewall filtrate holding chamber to allow inspection and maintenance of the filter bed.

8.0 Filter Cells

8.1 There shall be furnished two(2) filter cells for filtering the flow of the "Tipton Environmental" Tertiary Filter System. Each cell shall have not less than __ square feet of filter surface area. The filter cells shall be located at the bottom of the filtrate holding chamber. Filtrate shall percolate through the filter bed and filter nozzles to the false bottom. From the false bottom, filtered water shall flow to the clear well chamber. Each filter shall be accessible for inspection and maintenance of the filter media. The filter media shall be shown on the plans and as herein after specified.

9.0 Filter Media

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- 9.1** Filter media shall be furnished in sealed bags not to exceed 100 pounds each. the filter media shall be packed in a plywood crate and shipped to the plant site with the filter system. The contractor shall position the filter media in the tertiary filter as shown on the plans and in the field. The filter media bed shall consist of eight inches (8") of sand, 0.80 to 1.20 MM effective size with a uniform coefficient of 1.4 through 1.7 and twelve inches (12") of anthracite 1.08 MM effective size with a uniform coefficient of 1.42.

10.0 Clear Well

- 10.1** The clear well shall be located so that the filtrate from the filter cell shall discharge into the clear well from the false bottom below the media through a riser and through the backwash pumps. The clear well shall not have less than ____ gallons for sufficient volume for backwashing. An overflow weir shall be provided for gravity effluent discharge.

11.0 Backwash Pumps

- 11.1** Two(2) backwash pumps shall be furnished and installed in the clear well so as to automatically backwash each filter cell through the water distribution manifold when required to maintain filtration conditions. Each pump shall be rated at ____ GPM at ____ TDH. The operating horsepower shall be ____ HP, ____ Volt, __ Hz, __ phase. Both pumps shall be manufactured by Gould's Pump Inc., Seneca Falls, New York; or approved equal. The backwash rate shall be a minimum of __ GPM per square foot of filter surface area.

12.0 Clear Well Aeration

- 12.1** Air diffuser drop assemblies shall be provided in the clear well to increase the amount of dissolved oxygen in the tertiary effluent. Air shall be supplied from the air scour motor-blower units during periods that air scouring of filtering media is not occurring.

13.0 Mud Well Chamber

- 13.1** A mudwell chamber of the tertiary filter system shall be of such size as to handle the total volume of the filtrate backwash. The Volume of this chamber shall not be less than 1641 gallons. A duplex set of pumps shall be provided and installed in the mud well chamber for returning the filtrate backwash liquid to the secondary wastewater treatment. The capacity for each pump shall be 20 GPM. The operating horsepower shall be ____ HP, ____ Volt, __ Cycles, __ Phase. The pumps shall be manufactured by Gould's Pumps, Inc., Seneca Falls, New York; or approved equal. A throttling facility shall be provided on the pump manifold to minimize hydraulic return to the secondary treatment system.

14.0 Air Supply Blower Motor Units

- 14.1** A total of two (2) positive displacement blower motor unit(s) shall be supplied, capable of providing the required CFM for air scouring. The blower(s) shall be located on the plant as shown on the plans.

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- 14.2 Each blower shall be capable of delivering ___ CFM when operating at 5 PSI. The blower shall be manufactured by Roots Division of Dresser Industries, Inc., Connorsville, Indiana; or Sutorbilt blower, Fuller Company, Compton, California; or approved equal. The model number of the blower will be _____.
- 14.3 The motor shall be ___ Horsepower for operation on ___ Volt, ___ Phase, ___ Cycle service ___ RPM. It shall be of the ODP type.
- 14.4 Each blower shall be mounted on a fiberglass. The base structure shall be adequately reinforced to support the blower and motor unit.
- 14.5 For easy adjustment of the "V" belt drive connection between the blower and motor, the motor will be furnished with an adjustable motor mounting base.
- 14.6 The blower shall be fitted with a dry type filter silencer at the air intake. Furthermore, the blower discharge shall be fitted with a check valve when required, and a flexible rubber discharge coupling.
- 14.7 Each blower shall be enclosed within a fiberglass weatherproof enclosure. The fiberglass hood is designed for easy access to service the unit. It shall be equipped with a lifting handle and locking facilities. All enclosure surfaces shall be properly prepared in a neat manner to obtain a smooth, clean and dry surface. The enclosure shall be blue in color.
- 14.8 To help reduce blower vibration and noise, the blower motor enclosure shall be mounted on vibration dampners. For purposes of determining the blower performance, and/or diffuser condition, a pressure relief valve and pressure gauge shall be mounted in the air manifold.
- 14.9 Facilities for air scouring the filter media prior to backwash shall be provided. An air distribution system shall be provided under the filter media.

15.0 Electrical Control Center

- 15.1 An electrical control center shall be installed within a weatherproof enclosure and shall be provided for mounting as indicated on the plans.
- 15.2 When the resistance of the flow through the filter media causes the water level in the filtrate collection chamber to rise to a predetermined liquid level, a liquid level switch shall initiate the automatic air scour cycle. This cycle is controlled by a timer in the control panel. The automatic program cycle will allow air scouring until backwash is required.
- 15.3 The enclosure shall be NEMA 4 Fiberglass. The electrical controls shall consist of magnetic starters, timers, and switches necessary to automatically control all electrical devices and/or motors on the tertiary treatment system. The blower motor shall be controlled by H-O-A selector switches and magnetic starters in conjunction with the program timer. All electrical equipment and circuitry shall be protected by properly sized circuit breakers or fuses. All duplex or standby equipment shall be designed so that it may be operated by devices within the control system.
- 15.4 All wire and conduit required between the control panel and electrical power service shall be furnished and installed by the purchaser. Wiring and conduit between the control panel and plant equipment shall be furnished by the manufacturer of the treatment plant. The panel may be detached for shipping. The main power supply shall be ___ Volt, ___ Phase, ___ Cycle, with a control circuit of 120 Volt, 1 Phase, 60 Cycle.

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16.0 Chlorination System

- 16.1 For disinfection of the effluent a complete chlorination system shall be supplied complete with a 30 minute chlorine contact tank, and a tablet type chlorine feeder. The chlorine contact tank shall have a capacity of _____ gallons , based on thirty minute retention of the total design flow. The tank shall be constructed as an integral part of the secondary treatment system. The tank structure shall have the structural requirements of the secondary system.

19.0 Filter By-Pass

- 19.1 A by-pass shall be supplied to allow manual by-pass of the filter cells. The by-pass shall consist of the necessary flow troughs, flow vanes, etc., to direct either to the filter cells or to the tertiary outlet port.
- 19.2 The flow distribution trough shall be so designed as to divert the incoming flow proportionally to each filtrate collection chamber. This shall be done by means of diversion vanes.

20.0 Service Walkway

- 20.1 A service walkway shall be provided for service area only to service the plant equipment. Grating panels shall be constructed of 18 gauge, galvanized sheet steel with a maximum yield strength of 37,000 PSI. Each grating panel has a standard 9-inch surface width and 2-1/2 inch rib depth. Furthermore, each panel shall be so supported so as to have a safe uniform load carrying capacity of 50 pounds per square foot. Refer to the attached load bearing chart for grating carrying capacity.

21.0 Chlorine Contact Chamber

- 21.1 A baffle type chlorine contact chamber shall be provided, constructed as an integral part of the tertiary treatment system. The contact chamber shall be installed immediately following the clarifier. The tank shall be sized for a capacity of 625 gallons based on 30 minute retention of the design flow rate. Baffles shall be provided to prevent short circuiting and shall be designed to keep floating material from leaving the chamber.
- 22.2 Sufficient flow baffles will be supplied to assure proper mixing of the chlorine solution with the system effluent. A Tablet type chlorinator shall be supplied complete with mounting facilities. The tablet feeder shall be a Sanuril Model 1000 or approved equal.

23.0 Flow Measurements

- 23.1 For measuring the flow rate through the tertiary system, a flow measuring weir shall be supplied. The weir shall be a 60 degree "V" notch weir located at the outlet end of the chlorine contact tank at the location shown on the drawings.

24.0 Effluent Connection

- 24.1 The effluent connection of the tertiary treatment system shall be located as shown on the plans and shall consist of one 6" diameter standard pipe npt 6 inches long

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25.0 Field Assembly

- 25.1** In almost every case, shipment of your prefabricated treatment plant is done by special lowboy trucks. When your plant is shipped by our truck, delivery will be made directly to the job site. The equipment necessary to unload the plant and set it on the foundation pad must be furnished by the customer. A crane of adequate size is usually the simplest method for unloading the plant. Lifting lugs are supplied on the vessel to ease handling.
- 25.2** When the plant arrives at the job site, the owner's contractor should have available the necessary equipment to unload and set the vessel on the foundation pad. A crane of adequate size is the easiest and fastest method. Lifting lugs are provided on the vessel to simplify handling. After setting the plant in position, a check should be made to see that it is level, and in the correct position.
- 25.3** Our package steel treatment systems shall be completely assembled units and are shipped as a unit where shipping height limitations permit this procedure. If a portion of the equipment must be removed to meet shipping height limitations, this equipment will be packaged separately at the factory for field assembly. This equipment and tankage should be field assembled and installed by the owner's contractor in the field.

26.0 Field Service

- 26.1** At the time the tertiary treatment system is filled with water or sewage, and all power connections have been completed, and all equipment is approved for service, the contractor shall be provided the services of a representative of the manufacturer who shall instruct the owner's representative in proper operation and maintenance of the tertiary treatment system, including instructions in conducting all required operational tests. The manufacturer's representative shall for a period of one(1) year after delivery is made, make periodic inspections of the system, advising the owner's representative of any operational difficulties.

27.0 Manufacturer Qualifications

- 27.1** The manufacturer of specified equipment must have a minimum of five(5) years active experience in the design and manufacture of similar wastewater treatment equipment, and upon request, furnish supporting evidence.

28.0 Guarantee

- 28.1** The manufacturer of the treatment system shall guarantee for one(1) year from the date of shipment that the vessel and all component equipment shall be free from defective materials and workmanship. The manufacturer shall furnish replacement parts for any component considered in the opinion of the manufacturer to be defective, whether of his or other manufacturer's during the guarantee period.

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