

Commonwealth of Pennsylvania
Department of Environmental Protection (DEP)
Bureau of Point and Non-Point Source Management
Harrisburg, PA

Issued to: Norweco, Inc.
220 Republic Street
Norwalk, OH 44857
Phone: 1-800-NORWECO or (419) 668-4471
www.norweco.com

Technology: Norweco Singulair 960 & Hydro-Kinetic Bio-Film Reactor (Norweco Singulair 960-HKBFR)

Classification Type: Alternate technology (A2015-0028-0001)

Classification Date: December 10, 2015

In accordance with Title 25, Chapter 73, Section 73.72, DEP classifies the Norweco Singulair 960 & Hydro-Kinetic Bio-Film Reactor (Norweco Singulair 960-HKBFR) combination for use as an alternate onlot sewage treatment system. This classification permits the use of the Norweco Singulair 960-HKBFR as a pair of treatment components used in series for the specific purposes of reducing CBOD₅ and TSS in the sewage effluent prior to discharge to an absorption area. This system has demonstrated that it can produce an effluent which shall not exceed 10 mg/L CBOD₅ and 10 mg/L TSS as monthly averages. With the use of an optional ultraviolet (uv) disinfection, the uv unit can also reduce fecal coliform concentrations to treatment levels which shall not exceed 200 cfu/100 ml on a monthly average basis. The inclusion of a uv disinfection unit is at the discretion of the homeowner.

Note: Norweco Singulair Green 960 are referred in this document as Norweco Singulair 960.

I. Technology Description

The Singulair wastewater treatment system comprises a pair of treatment tanks used in series. The first tank in the treatment process is the Singulair 960 tank. The second tank in the treatment process is the HKBFR.

The first compartment of the Singulair 960 tank is known as the pretreatment chamber. This chamber physically removes easily separable solids in the wastewater. The second compartment of the Singulair 960 tank utilizes extended aeration and activated sludge to achieve treatment. At the aeration chamber, infused air provides oxygen for the aerobic bacteria on a timed run cycle. The third and last chamber of the Singulair 960 tank houses the Bio-Kinetic[®] System. The Bio-Kinetic System serves the treatment tank for clarification and flow equalization.

The second treatment tank in the series is the HKBFR. The HKBFR receives flow equalized liquid from the clarifier by entering the influent chamber. As liquid travels up through the proprietary attached growth media, further reduction of organic matter shall take place. The

effects of gravity cause solids to settle to the bottom of the tank. After passing through the filtration media for final polishing, the treated sewage is then discharged from the HKBFR filter through the outlet tee.

II. Design Requirements

A. Location: The Norweco Singulair 960-HKBFR may be installed for the treatment of domestic strength wastewater (as defined by Table 1 of Miscellaneous Data to be used in Conjunction with PA DEP listings) serving a new construction or as a repair.

B. Size: The Norweco Singulair 960 units with the following base model numbers itemized in Section II.B are acceptable for use. All acceptable Norweco Singulair 960 units must bear the seal of the NSF Standard No. 40 or equivalent. Tank materials are either concrete or high density polyethylene (HDPE). The HDPE tanks are labelled as Green in the tank model.

- Singulair 960, 960LP, 960OP
- Singulair Green 960

LP = low profile; OP = one piece tank

C. Construction:

- (1) The Norweco Singulair 960-HKBFR units must be installed according to the manufacturer's installation manual and by a Norweco trained and authorized installer.
- (2) Aerobic treatment tanks must be in compliance with Section 73.32.
- (3) For flow rates ranging 400 gpd to 800 gpd, the treatment sequence must consist of (a) a Norweco Singulair 960 aerobic treatment tank, (b) a HKBFR, (c) a dosing tank, and (d) an absorption area described by Section II.E.
- (4) For flow rates ranging 801 gpd to 1500 gpd, the treatment sequence must consist of (a) an external pretreatment tank supplied by Norweco, (b) a Norweco Singulair 960 aerobic treatment tank, (c) two HKBFRs, (d) a dosing tank, and (e) an absorption area described by Section II.E.

The size of the pretreatment tank for given flow rates are shown in Table 1.

Table 1
Pretreatment Tank Capacity for Given Flow Rate

Flow Rate (gpd)	Pretreatment Tank Capacity (gal)
1000	1000
1250	1250
1500	1500

- (5) Depending upon the flow rate, multiple HKBFRs shall be placed in parallel. Each HKBFR can treat up to 800 gpd.
- (6) Both the Norweco Singulair 960 and the HKBFR units must be watertight and all outlets properly sealed against liquid and solid infiltration and exfiltration.
- (7) A single Bio-Static sludge return assembly is installed in 500 gpd, 750 gpd, and 1000 gpd flow rates. Two Bio-Static sludge return assemblies are required to be installed for 1250 gpd and 1500 gpd flow rates.
- (8) The HKBFR and dosing tank combined vessel has a maximum capacity of 800 gpd.
- (9) Sites that utilize water softeners must plumb the water softener backwash into the treatment tank.
- (10) The Norweco telemetry system is recommended unless the subject site does not have telemetry capabilities.

D. Installation:

- (1) An onsite preconstruction conference attended by the sewage enforcement officer, designer, installer, and the property owner prior to construction is recommended.
- (2) Tanks should not be installed in saturated clay, areas with a high water table, bogs, swampy areas, landfills where the soil is soft or wet, areas containing expansive soils or soils with an ultimate bearing capacity of less than 1,500 pounds/ft².
- (3) Tank Leveling Pad- To insure that the tank bottom will be bearing the weight evenly, all tanks should be set on a four inch thick pad of gravel, sand, or fine crushed stone. The pad should be installed and leveled by the contractor before delivery and setting of any tank takes place. The tank pad must be leveled to within 1/4" from side to side and end to end.
- (4) For the Singulair Green 960 tank, anti-flotation measures may be necessary where there is a high water table. Consult with the manufacturer's Shallow Burial and Reduced Soil Density Hold Down Requirements shown as Table 2 to determine the amount of additional hold down weight. Soil densities that fall between the interval listed in Table 2 can be rounded down to the lower soil density interval. Additional hold down weight can be made possible by using either a pair of concrete beams placed at the base of the excavation or 0.60 CCA treated lumber beams.

Table 2
 Singulair Green 960
 Shallow Burial and Reduced Soil Density Hold Down Requirements

Soil Density (lbs/ft ³)	80	90	100	110	120	130
Fill Over Tank (inches)	Additional Weight Required (lbs)					
6	6,915	5,935	4,956	3,976	2,996	2,017
8	6,091	5,008	3,926	2,843	1,761	678
10	5,267	4,081	2,896	1,710	525	*
12	4,443	3,155	1,866	578	*	*
14	3,619	2,228	836	*	*	*
16	2,796	1,301	Standard Installation	*	*	*
18	1,972	374	*	*	*	*
20	1,148	*	*	*	*	*
22	324	*	*	*	*	*
24	*	*	*	*	*	*

Notes: * Hold Down Weight Not Required

- (5) For the Green HKBFR, anti-flotation measures may be necessary where there is a high water table. Consult with the manufacturer's Shallow Burial and Reduced Soil Density Hold Down Requirements shown as Table 3 to determine the amount of additional hold down weight. Soil densities that fall between the interval listed in Table 3 can be rounded down to the lower soil density interval. Additional hold down weight can be made possible by using either a pair of concrete beams placed at the base of the excavation or 0.60 CCA treated lumber beams.

Table 3
 Green Hydro-Kinetic Bio-Film Reactor
 Shallow Burial and Reduced Soil Density Hold Down Requirements

Soil Density (lbs/ft ³)	80	90	100	110	120	130
Fill Over Tank (inches)	Additional Weight Required (lbs)					
6	2,725	2,377	2,029	1,681	1,333	985
8	2,382	1,991	1,600	1,209	818	428
10	2,038	1,605	1,171	737	304	*
12	1,695	1,218	742	265	*	*
14	1,352	832	313	*	*	*
16	1,009	446	Standard Installation			*
18	665	*	*	*	*	*
20	322	*	*	*	*	*
22	*	*	*	*	*	*
24	*	*	*	*	*	*

Notes: * Hold Down Weight Not Required

- (6) The appropriate backfill materials for the treatment tanks should be pea gravel such as AASHTO #8 aggregate until the inlet line is covered. The remaining excavation cover may be fine, loose earth.
- (7) For the Norweco Singulair tank, a fresh air vent is designed into the perimeter of the access cover above the Singulair aerator. The perimeter vent supplies fresh air to the aerator, which is drawn through the aspirator and into the wastewater. Finished landscaping should be maintained three to six inches below the top of the vented access cover and graded to drain runoff away from the cover. Do not obstruct the vented access cover or allow plants, shrubbery, mulch, or landscaping of any type to restrict the flow of air to the perimeter vent.
- (8) For the pretreatment chamber, the inspection cover must project a minimum of 3 to 6 inches above finished grade. Pretreatment chamber access covers should never be vented and should be sealed with mastic.
- (9) The top of the covers of the treatment tanks must project a minimum of 6" above finished grade. Individual precast Bio-Kinetic system riser castings may be added in 12" increments when necessary.

E. Use of the Component/System and Siting Requirements:

- (1) For final treatment and disposal for an onlot system described in Chapter 73 other than IRSIS, up to a 40 percent reduction in the size of the absorption area is allowed where the percolation rate is in the range of 3 to 60 minutes per inch (min/in), inclusive. However, where the percolation rate is in the range of 61 to 180 min/in, inclusive, no reduction in absorption area sizing is permitted. Sufficient soil profiles must be conducted to ensure that a minimum of 20 inches of suitable soil is present under the entire area proposed for the absorption area.

- (2) On sites exhibiting limiting zones greater than or equal to 20 inches from the mineral soil surface, the absorption area must be designed in accordance with the alternate at-grade absorption area. The soil profile must show that there is a minimum of 20 inches of suitable soil between the bottom of the proposed area and the limiting zone. Where the percolation rate is in the range of 3 to 60 minutes per inch, inclusive, up to a 40% reduction in the size of the absorption area is allowed. However, where the percolation rate is in the range of 61 to 180 min/in, inclusive, no reduction in absorption area sizing is permitted.
- (3) On sites exhibiting limiting zones less than 20 inches from the mineral soil surface, the absorption area must be designed in accordance with the specifications described by the alternate shallow limiting zone at-grade absorption area. Ultraviolet (uv) disinfection is optional.
- (4) The absorption area may also be designed in accordance with the specifications described by the alternate drip irrigation.
- (5) Where sizing reductions are proposed, they are not cumulative. No additional sizing reduction is allowed for use of either an aerobic tank or infiltration chambers.
- (6) If sizing reductions are proposed, where the system is used to serve a new dwelling, the soil profile evaluations and percolation testing must document that sufficient area is available for installation of a full-sized absorption area (prior to the calculation of the 40% reduction).
- (7) For repairs, system sizing must be maximized up to the square footage of a full-sized system.
- (8) The system must be designed to take full advantage of the slope to move effluent out from under the absorption area and downgradient with the laterals placed parallel to the contour.

III. Minimum Maintenance Standards

- A. Service Contract: A service contract with a Service Provider qualified to maintain the Norweco treatment system is required. The service contract will require a minimum of two (2) site visits annually.
- B. The manufacturer's representative must meet with the property owner within one (1) month of system start-up and/or occupancy of the dwelling and with the local agency's SEO upon request, to explain the operation and maintenance of the system and provide written instructions to the property owner that includes:
 - (1) Norweco's Owner's Manual;
 - (2) Instructions on the operation and maintenance of the system;
 - (3) The locations of all parts of the system;
 - (4) A commitment that the manufacturer's service provider will investigate and troubleshoot system problems;
 - (5) Contact information for the manufacturer, the manufacturers' representatives, and manufacturer's service provider;
- C. Warranty: The manufacturer must provide a minimum 2-year warranty on all defects due to materials or workmanship.

D. Inspection:

- (1) Inspection of the area around the soil absorption area every 6 months by the homeowner to ensure that there is no ponding of effluent or downgradient seepage.
- (2) The service provider shall inspect at least the following items at an interval frequency recommended by the manufacturer's requirements:
 - a) Inspect aerobic tanks for structural integrity of the tank, inlets, and outlet baffles, buoyed solids retainer, pumps, siphons, and electrical connections.
 - b) Inspect HKBFR tanks, dosing tanks, and lift pump tanks for structural integrity of the tank, inlet and outlet baffles, solids retainer, pumps, siphons, and electrical connections;
 - c) Ensure that the pumping system is operational.
- (3) The service provider shall inspect and pump excess solids in accordance with the manufacturer's requirements.

IV. Permitting Requirements

- A. A sewage enforcement officer who has successfully completed an appropriate Department sponsored training course that included the absorption area that this listing will discharge may independently review the design and issue the permit for components under this listing. All other proposals under this listing must be submitted to the Department for review and comment.
- B. The sewage enforcement officer shall include on both the *Application for An Onlot Sewage Disposal* permit (Part III, Section 1) and the permit, the classification number itemized in the Classification Type of this listing.

V. Planning Requirements

Not applicable