



Aqua-Swirl™ Specifications

GENERAL

This specification shall govern the performance, materials and fabrication of the Stormwater Treatment System.

SCOPE OF WORK

The Aqua-Swirl™ Concentrator shall be provided by AquaShield™, Inc. 2733 Kanasita Drive, Chattanooga, TN (423-870-8888) and shall adhere to the following material and performance specifications at the specified design flows, and storage capacities.

MATERIALS

- A. Stormwater Treatment System shall be made from high-density polyethylene (HDPE) resins meeting the following requirements:
 - 1) HDPE Material – The HDPE material supplied under this specification shall be high density, high molecular weight as supplied by manufacturer. The HDPE material shall conform to ASTM D3350-02 with minimum cell classification values of 345464C.
 - 2) PHYSICAL PROPERTIES OF HDPE COMPOUND
 - a) Density - the density shall be no less than 0.955 g/cm³ as referenced in ASTM D 1505.
 - b) Melt Index - the melt index shall be no greater than 0.15 g/10 minutes when tested in accordance with ASTM D 1238- Condition 190/2.16.
 - c) Flex Modulus - flexural modulus shall be 110,000 to less than 160,000 psi as referenced in ASTM D 790.
 - d) Tensile Strength at Yield - tensile strength shall be 3,000 to less than 3,500 psi as referenced in ASTM D 638.
 - e) Slow Crack Growth Resistance shall be greater than 100 hours (PENT Test) as referenced in ASTM F 1473 or greater than 5000 hours (ESCR) as referenced in ASTM D 1693 (condition C).

- f) Hydrostatic Design Basis shall be 1,600 psi at 23 degrees C when tested in accordance with ASTM D 2837.
- g) Color – black with minimum 2% carbon black.

- B. REJECTION - The Stormwater Treatment System may be rejected for failure to meet any of the requirements of this specification.

PERFORMANCE

- A. The Stormwater Treatment System shall include a ___-inch inner diameter (ID) circular hydrodynamic flow-through treatment chamber to treat the incoming water. A tangential inlet shall be provided to induce a swirling flow pattern that will cause sedimentary solids to accumulate in the bottom center of the chamber in such a way as to prevent re-suspension of captured particles. An arched baffle wall shall be provided in such a way as to prevent floatable liquid oils and solids from exiting the treatment chamber while enhancing the swirling action of the stormwater.
- B. The Stormwater Treatment System shall have a sediment storage capacity of ___ cubic feet and be capable of capturing ___ gallons of petroleum hydrocarbons. The Stormwater Treatment System shall have a treatment capacity of _____ cubic feet per second (cfs). The Stormwater Treatment System shall be capable of removing floating trash and debris, floatable oils and 80% of total suspended solids from stormwater entering the treatment chamber.
- C. Service access to the Stormwater Treatment System shall be provided via 30-inch inner diameter (ID) access riser(s) over the treatment chamber such that no confined space entry is required to perform routine inspection and maintenance functions.

TREATMENT CHAMBER CONSTRUCTION

- A. The treatment chamber shall be constructed from solid wall high-density polyethylene (HDPE) ASTM F 714 cell class 345464C. For sizes above 63-inch OD, the treatment chamber shall be constructed from profile wall HDPE ASTM F 894 RSC 250 pipe or solid wall HDPE.
- B. The bottom thickness of the treatment chamber will be determined in accordance with ASTM F 1759. Calculations must be provided to justify the thickness of the bottom.

- C. The inlets and outlets shall be extrusion welded on the inside and outside of the structure using accepted welding practice.
- D. The arched baffle wall shall be constructed from HDPE and shall be extrusion welded to the interior of the treatment chamber using accepted welding methods with connections made at 180 degrees of each end.
- E. HDPE lifting supports may be provided on the exterior of the Stormwater Treatment System in such a way as to allow the prevention of undue stress to critical components of the Stormwater Treatment System during loading, off-loading and moving operations. The lifting supports shall be constructed as an integral part of the treatment chamber and extrusion welded using accepted welding practices.
- F. Top of the treatment chamber shall be built to the requirements of the drawings. Deep burial applications shall require a reinforced HDPE top.

Reinforced concrete pads spanning the treatment chamber will be required with traffic rated frames and covers when the Stormwater Treatment System is used in traffic areas. A professional engineer shall approve the design of the concrete pad and the calculations must be included in the submittal.

The manufacturer upon request can supply anti-flotation/ buoyancy calculations. In addition, typical drawings of the AquaShield Stormwater Treatment System with concrete anti-flotation structures can also be provided. Anti-flotation structure design and approval are ultimately the responsibility of the specifying engineer. The contractor shall provide the anti-flotation structures.

INSTALLATION

- A. **Excavation and Bedding**

The trench and trench bottom shall be constructed in accordance with ASTM D 2321, Section 6, Trench Excavation, and Section 7, Installation. The HDPE Stormwater Treatment System shall be installed on a stable base consisting of 12 inches of Class I stone materials (angular, crushed stone or rock, crushed gravel; large void content, containing little or no fines) as defined by ASTM D 2321, Section 5, Materials, and compacted to 95% proctor density.

All required safety precautions for Stormwater Treatment System installation are the responsibility of the Contractor.

B. Backfill Requirements

Backfill materials shall be Class I or II stone materials (well graded gravels, gravelly sands; containing little or no fines) as defined by ASTM D 2321, Section 5, Materials and compacted to 90% proctor density. Class I materials are preferred. Backfill and bedding materials shall be free of debris. Backfilling shall conform to ASTM F 1759, Section 4.2, "Design Assumptions". Backfill shall extend at least 3.5 feet beyond the edge of the Swirl Concentrator for the full height to sub grade and extend laterally into undisturbed soils.

C. Pipe Couplings

Pipe couplings to and from the Stormwater Treatment System shall be Fernco®, Mission™ or equal type flexible boot with stainless steel tension bands. A metal sheer guard shall be used to protect the flexible boot.

DIVISION OF RESPONSIBILITY

A. Stormwater Treatment System Manufacturer

The Manufacturer shall be responsible for delivering the Stormwater Treatment System to the site. The system includes the treatment chamber with debris baffle, inlet and outlet stub-outs, lifting supports, 30-inch ID service access riser(s) to grade with temporary cover, and manhole frame(s) and cover(s).

B. Contractor

The Contractor shall be responsible for preparing the site for the system installation including, but not limited to, temporary shoring, excavation, cutting and removing pipe, new pipe, bedding, and compaction. The Contractor shall be responsible for furnishing the means to lift the system components off the delivery trucks. The Contractor shall be responsible for providing any concrete anti-floatation/anti-creep restraints, anchors, collars, etc. with any straps or connection devices required. The Contractor shall be responsible for field cutting, if necessary, HDPE service access risers to grade. The Contractor shall be responsible for sealing the pipe connections to the Stormwater Treatment System, backfilling and furnishing all labor, tools, and materials needed.

SUBMITTALS

The Contractor shall be provided with dimensional drawings and, when specified, utilize these drawings as the basis for preparation of shop drawings showing details for construction and reinforcing. Shop drawings shall be annotated to indicate all materials to be used and all applicable standards for materials, required tests of materials and design assumptions for structural analysis. Shop drawings shall be prepared at a scale of not less than 1/4 inch per foot. Three (3) hard copies of said shop drawings shall be submitted to the Specifying Engineer for review and approval.

QUALITY CONTROL INSPECTION

A. Materials

The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection by the Specifying Engineer. Such inspection may be made at the place of manufacture, or on the work site after delivery, or at both places. The sections shall be subject to rejection at any time if material conditions fail to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site shall be marked for identification and shall be removed from the site at once. All sections, which are damaged beyond repair after delivery will be rejected and, if already installed, shall be repaired to the Specifying Engineer's acceptance level, if permitted, or removed and replaced, entirely at the Contractor's expense.

B. Inspection

All sections shall be inspected for general appearance, dimensions, soundness, etc.

C. Defects

Structural defects may be repaired, subject to the acceptance of the Specifying Engineer, after demonstration by the manufacturer that strong and permanent repairs will be made. The Specifying Engineer before final acceptance of the components shall carefully inspect repairs.