
VortClarex® Specification

PART 1.00 GENERAL

1.1 INTRODUCTION

- A. The VortClarex® system, with the performance specifications as described in Section 2.2, shall remove essentially all free and dispersed, non-emulsified oil and settleable solids from an oil/water mixture at the specified flow rates and operating temperatures. The system design shall utilize the difference in specific gravity between oil and water (i.e., buoyancy force) to separate these fluids. The separation process shall be enhanced through the use of proprietary VortClarex coalescing media. The separator shall be designed to receive non-emulsified oily water by gravity or pumped flow and shall process it on a once-through basis. The system shall be a single wall, rectangular tank installed below grade.

1.2 DESCRIPTION

The VortClarex system shall be housed within a rectangular, precast reinforced concrete tank. Within the precast concrete vault, parallel-corrugated plate coalescing media shall be utilized to provide enhanced gravity separation of oil and water mixtures. The separator shall include a baffled inlet compartment, separation chamber, and clean water outlet chamber.

A. INLET COMPARTMENT

The inlet compartment shall be of sufficient volume to effectively reduce influent suspended solids, dissipate energy and begin separation. The inlet shall be comprised of a non-clog diffuser to distribute the flow across the width of the separation chamber. A sediment baffle will be provided to retain settleable solids and prevent sediment from entering the separation chamber.

B. SEPARATION CHAMBER

The oil separation chamber shall contain VortClarex coalescing media. The parallel corrugated plates shall be at a 45° angle with respect to longitudinal axis of the plate corrugations, and spaced 1/2-inch (13 mm) apart for removal of free oil 60 microns in size or greater, and settleable solids. System configuration shall not promote solids buildup on the plates, which may increase velocities and result in the discharge of an effluent of unacceptable quality.

Laminar flow with a Reynolds Number of less than 500 shall be maintained throughout the coalescing media over the range of operating flow rates (treatment through maximum conveyance flow), to prevent re-entrainment of oils with water. Flow through the coalescing media shall be cross-flow perpendicular to plate corrugations so that the oil collects and coalesces at the high point of corrugations and rises to the top of the media pack without clogging.

C. CLEAN WATER OUTLET CHAMBER

An oil retention baffle or inverted T-pipe section shall be provided to prevent free-floating oil from exiting the system.

D. PIPE CONNECTIONS

Internal SDR 35 piping shall extend through the external precast concrete wall of the vault. Influent and effluent pipes shall be connected to the VortClarex® pipe system by means of a Fernco type coupling.

1.3 QUALITY CONTROL INSPECTION

- A. The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection by the Engineer. Such inspection may be made at the place of manufacture, or on the work site after delivery, or at both places, and 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 that have been damaged beyond repair during delivery will be rejected and, if already installed, shall be repaired to the Engineer's acceptance level, if permitted, or removed and replaced, entirely at the manufacturer's expense.
- B. All sections shall be inspected for general appearance, dimensions, soundness, etc. The surface shall be dense, close-textured and free of blisters, cracks, roughness and exposure of reinforcement.
- C. Imperfections may be repaired, subject to the acceptance of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final acceptance. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi (28 MPa) at the end of 7 days and 5,000 psi (34 MPa) at the end of 28 days when tested in 3-inch (76 mm) by 6-inch (152 mm) cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs.

1.4 SUBMITTALS

- A. 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, reinforcing, joints and any cast-in-place appurtenances. 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 3/16-inches per foot (1:75).

PART 2.00 PRODUCTS

2.1 MATERIALS AND DESIGN

- A. Concrete for the precast VortClarex system shall conform to ASTM C 857 and C 858 and meet the following additional requirements:
 - 1. The exterior wall thickness shall not be less than 6-inches (152 mm) or as shown on the dimensional drawings prepared by Contech Engineered Solutions LLC. In all cases the wall thickness shall be no less than the minimum thickness necessary to sustain HS20 (MS18) loading requirements as determined by a Licensed Professional Engineer.
 - 2. Sections shall have tongue-and-groove joints or shiplap joints and be sealed with a butyl mastic sealant designed to be resistant to fuel and oil such as ConSeal™ Brand CS-440 or approved equal. All joints will be above the resting water level.
 - 3. Cement shall be Type II Portland cement, or approved equal, conforming to ASTM C 150.
 - 4. All precast concrete sections shall be cured by an approved method. Sections shall not be shipped until the concrete has attained a compressive strength of 4,000 psi (28 MPa) or until 5 days after fabrication and/or repair, whichever is longer.

- B. Coalescing media shall be made of PVC, with corrugation angles no less than 45° with respect to longitudinal axis of the plate corrugations. Plates shall be spaced at ½-inch (13 mm) intervals and be stacked and bound together with sturdy rods and supports to form modular plate packs.
- C. Polyurethane elastomeric sealant shall comply with ASTM D-412 and GSA Specification TT-S-00230C, Type II, Class A and ASTM C-920, Type S, Grade NS.
- E. Manhole frames and covers shall be provided by the manufacturer in the numbers and configurations as shown on the dimensional drawings prepared by Contech.
- E. Hatchways shall be provided by the manufacturer in the numbers and configurations as shown on the dimensional drawings prepared by Contech. Hatchways shall be made of Cast Iron, steel or aluminum, and shall meet HS20-44 (MS18) loading requirements.
- F. Brick or masonry used to build the casting and hatchway frames to grade shall conform to ASTM C 32 or ASTM C 139 and shall be installed in conformance with all local requirements.

2.2 MANUFACTURER

The manufacturer of said VortClarex system shall have been regularly engaged in the engineering design and production of systems for the physical treatment of stormwater runoff for a minimum of 5 years.

Each VortClarex system shall be manufactured by Contech Engineered Solutions, or approved equal.

PART 3.00 EXECUTION

3.1 INSTALLATION

- A. Each VortClarex system shall be constructed according to the sizes shown on the drawings and as specified herein. Install at elevations and locations shown on the drawings or as otherwise directed by the engineer.
- B. Place the precast base unit on a granular subbase of minimum thickness of 6 inches (152 mm) after compaction or of greater thickness and compaction if specified elsewhere. The granular subbase shall be checked for level prior to setting and the precast base section of the vault shall be checked for level at all four corners after it is set. If the slope from any corner to any other corner exceeds 0.5% the base section shall be removed and the granular subbase material re-leveled.
- C. Prior to setting subsequent sections place ConSeal™ brand CS-440 butyl mastic sealant, or approved equal in conformance with ASTM C 990-91, along the construction joint in the section that is already in place.
- D. After setting the precast roof section of the VortClarex system, set riser sections to the height required to bring the cast iron manhole covers or hatches to grade, so that the sections are vertical and in true alignment with a ¼-inch (6 mm) maximum tolerance allowed. Backfill in a careful manner, bringing the fill up in 6-inch (152 mm) lifts on all sides. If leaks appear, clean the inside joints and caulk with lead wool to the satisfaction of the Engineer. Precast sections shall be set in a manner that will result in a watertight joint. In all instances, installation of the VortClarex system shall conform to ASTM specification C 891 "Standard Practice for Installation of Underground Precast Utility Structures".

- E. Holes made in the concrete sections for handling or other purposes shall be plugged with a non-shrink grout or by using grout in combination with concrete plugs.