VPC Fiberglass FRP Trough Specification 1360222

PART 1 GENERAL

1.1. SUMMARY

This section covers fiberglass reinforced plastic (FRP) troughs for use in effluent clarifiers and filtration systems, as shown on the Contract Drawings

1.2. QUALITY ASSURANCE

A. The material covered by these specifications shall be furnished by a reputable and qualified manufacturer of proven ability that is regularly engaged in the manufacture and installation of FRP products.

B. The fabricator shall have demonstrated experience in manufacturing FRP products for wastewater applications similar to this project and possess adequate production capacity to meet project demands without impacting the construction schedule

C. Must be Manufactured in the U.S.A.

1.3. SUBMITTALS

A. The following shall be submitted in accordance with the General and Special Provisions.

i. Shop Drawings
   - a Dimensions.
   - b Job specific layout.
   - c Sectional assembly.
   - d Location and identification mark.
   - e Weir locations and attachment
   - f Scum Baffle locations and attachment.
   - g Accessories, attachments, transition pieces.
   - h Connection details.

ii. Manufacturer's catalog data showing:
   - a Dimensions, spacing, and construction details
   - b Materials of construction.
   - c Description.

iii. Certificates
   - a Submit Manufacturer's certification that all materials furnished are in compliance with the applicable requirements of this specification.

iv. Manufacturer's Instructions

a Submit complete information and instructions relating to the storage, handling, installation, and inspection of all equipment related to this Section.

1.4. SHIPPING AND STORAGE INSTRUCTIONS

A. All FRP components shall be shop fabricated and assembled into the largest practical size suitable for transporting.

B. The parts and assemblies that are shipped unassembled shall be packaged and tagged in a manner that will protect the equipment from damage and facilitate the final assembly in the field.

C. All FRP materials shall be stored before, during, and after shipment in a manner to prevent cracking, twisting, bending, breaking, chipping or damage of any kind to the materials.

PART 2 PRODUCTS

2.1. MANUFACTURERS

A. The following manufacturer is named to establish a standard of quality necessary for the Project:

VPC Fiberglass (Virtual Polymer Compounds, LLC) 10478 Ridge Road Medina, NY 14103 - Phone: (585) 735-9668 - Website: www.vpcfiberglass.com

2.2 DESIGN CRITERIA

A. Gravity Load - Downward vertical loads shall include the weight of the trough and appurtenance attachments, such as weir plates, baffles and spreader bars, together with the weight of water to fill the trough. Any additional loads, such as piping, etc., shall also be considered.

B. Buoyant Load - The buoyant load shall act vertically upward, its magnitude equal to the weight of displaced water (trough weight neglected). The line of action passes through the centroid of the submerged cross-sectional area.

C. Lateral Load - Loads acting against the trough sidewalls; specifically those induced by differential water levels on either side of the trough walls. The maximum possible differential, existing when the trough is empty and the tank is full, or, when the trough is full and when the tank is empty, shall be used when calculating deflection, fiber stress, etc.

D. Thermal Stresses - The troughs shall be designed to accommodate temperature induced stresses resulting from differences in coefficients of thermal expansion (contraction) between the trough and tank/support materials over temperature range of -10°F to 100°F.

E. Deflection under Load - Maximum vertical deflection under full buoyant or gravity load shall be less than or equal to L/240, where L is defined as the unsupported trough length in inches. Under no circumstances shall the maximum vertical deflection, measured at mid-point between trough supports, exceed 1/8".

2.3 MATERIALS

A. The trough laminate shall meet the following minimum physical and mechanical requirements:

Table 1. Laminate Mechanical and Physical Properties

Property	Test	Value
Tensile Strength	ASTM D-638	24,000 psi
Flexural Strength	ASTM D-790	35,000 psi
Flexural Modulus	ASTM D-790	2.0×10^6 psi
Barcol Hardness	ASTM D-2853	42
Notched Izod	ASTM D-256	15 ft-lbs/in
Water Absorption	ASTM D-570	<1%

B. Resin - The resin shall be a commercial grade isophthalic polyester thermosetting resin, acceptable for use in a waste treatment plant environment.

C. Fillers: The resin shall contain no fillers. Thixotropic agents for viscosity control are acceptable. Colorants which have been determined by a least five years previous service to be acceptable for the service condition are acceptable. The standard color for the trough shall be green. Ultraviolet stabilizers are required in all trough laminates. Catalysts, accelerators and/or promoters shall be added to provide complete cure of the laminate and must meet the physical properties as indicated in Section 2.3 Table 1.

D. Ultraviolet Resistance - Ultraviolet resistance is required in all laminates exposed to ultraviolet light, whether it be in the form of pigmentation or ultraviolet absorbers or a surface veil.

E. Metal Reinforcement - When metal reinforcements are used, they shall be free of rust, oil and any foreign matter. They shall be completely encapsulated with a minimum of 1/8" thick laminate.

F. Other Reinforcement – Additional reinforcement in the form of foam or balsa sheet for

*******high stress areas at the sides and bottom of the trough shall be completely encapsulated within the laminate. Care shall be taken to insure that these areas of the trough laminate are not designated as attachment points or drilled for any purpose.*****

G. Laminate Construction –

1. Structural layers shall consist of plies of chopped strand mat with a maximum of 2 ounces per square foot per spray-up pass. Each successive pass of reinforcement shall be thoroughly wetted with resin and shall be well rolled to exclude all air pockets and bubbles prior to the application of additional reinforcement.

2. Outer trough surface shall consist of a resin rich layer not less than 0.020 inches thick. The outer layer resin shall be applied after cure of the structural layer and suitably embed all reinforcing fibers.

3. Finished trough shall be a minimum of 30% fiber reinforced with a minimum thickness of not less than 1/4". The laminate tolerance thickness shall be ±10%.

H. Materials used in the manufacture of the FRP troughs shall be new stock of the best quality and shall be free from all defects and imperfections that might affect the performance of the finished product.

2.4 DESIGN AND MANUFACTURE

A. The inner surface of the trough shall be smooth and resin rich. The outer surface shall be reasonably smooth, resin rich, and no glass fibers shall be exposed. The size and number of air bubbles shall be held to a minimum. Laminations shall be dense and without voids, dry spots, cracks or crazes.

B. The top edges of the trough shall be level and parallel with a tolerance of plus or minus 1/8" (measured when the trough is not loaded).

E. The length of a trough section shall have a tolerance of ± 1/8" per 10 ft. length.

F. Horizontal stiffening flanges shall be integrally molded along the top edge of each trough side. These flanges shall be 1" to 3" wide, depending upon the trough configuration and shall face outward.

G. End flanges, where required to bolt trough sections together, and blind ends for securing to a wall, shall be a minimum of 1-1/2 times the nominal thickness of the trough.

H. An integrally molded water Rib shall be provided on the trough whenever the trough is grouted into and/or passes through a wall.

I. Horizontal stiffeners shall be provided across the width of the trough to increase the structural rigidity of the trough system. The stiffeners shall be 1" diameter PVC pipe .

J. After fabrication, all cut edges, holes and abrasions shall be sanded smooth and sealed with a compatible resin coating to prevent the intrusion of water.

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2.5 GUARANTEE

A. The equipment manufacturer shall guarantee each unit being supplied to the Owner against defects in workmanship and material for a period of 3 years under normal use, operation and service. The guarantee shall be in printed form.

B. In the event a component fails to perform as specified or is proven defective in service during the guarantee period, the manufacturer shall provide a replacement part without cost to the Owner. The contractor shall provide, without cost, such labor as may be required to replace, repair or modify all materials and equipment provided pursuant to this specification.

EXECUTION

3.1 STORAGE

A. Should it be necessary to store product prior to installation, precautions should be taken to prevent cracking, twisting, warping, distortion, bending, breaking, chipping or damage of any kind to the materials.

3.2 INSTALLATION

A. Install troughs and supports in accordance with manufacturer's instructions and approved shop drawings.

B. Field cutting of troughs is allowed if necessary. All field cut edges and field drilled holes shall be sealed per the manufacturer's instructions.

B. Ensure that troughs and supports are installed plumb and true, free of warp or twist, within the tolerances specified by the manufacturer and as shown on the drawings.

C. After the manufacturer has approved the installation, and prior to startup, the Contractor shall clean all surfaces in accordance with the manufacturer's instructions.

END OF SECTION