

SPECIFICATION: FIBERGLASS REINFORCED PLASTIC (FRP) DENSITY CURRENT BAFFLE

PART 1 – GENERAL

1.01 Description of Work

The work covered by this section shall include materials and installation for the fiberglass reinforced plastic (FRP) Density Current (Stamford) Baffle Panels, which includes but is not limited to:

- A. FRP Density Current Baffle panels.
- B. FRP or stainless-steel support brackets.
- C. Stainless steel fasteners and connections.

1.02 Quality Assurance

- A. The manufacturer must be ISO 9001 certified and manufacture the FRP components in their own facilities.
- B. The contractor shall be responsible for verifying all field dimensions for development and approval of manufacturer's drawings and shall coordinate the FRP products with the any other participating equipment manufacturers.
- C. Density current baffle components (excluding any associated concrete items) shall be provided by a single manufacturer to ensure coordination and compatibility of component parts.
- D. The manufacturer shall maintain a continuous quality control program with supporting documentation.
- E. The manufacturer shall warrant the density current baffles to be free of defects in materials and workmanship for a period of one year after the date of delivery.
- F. FRP material shall be manufactured with a UV stabilized isophthalic polyester resin with corrosion-resistant properties.

1.03 Product Substitutions

- A. Substitutions shall be considered only if the consulting engineer has received a written request at least two weeks prior to the bid date. All bidders shall be notified by addendum if substitutions are acceptable prior to the bid.
- B. Requests for substitutions shall include technical information and any other information required for evaluation.

1.04 Performance Testing

- A. Materials shall comply with Federal and Local laws or ordinances, applicable codes, standards, regulations, and/or regulatory agency requirements including:
 - 1. ASTM D 638, Standard Test Method for Tensile Properties of Plastics
 - 2. ASTM D 790, Standard Test Method for Flexural Strength, and Flexural Modulus Properties of Plastics
 - 3. ASTM D 570, Standard Test Method for Water Absorption of Materials
 - 4. ASTM D 256, Standard Test Method for Izod Impact (Notched)
 - 5. ASTM D 696, Standard Test for Average Coefficient of Thermal Expansion
 - 6. ASTM D 2853, Standard Test for Barcol Hardness

1.05 Design Criteria

Formed by influent flows entering the clarifier, dense currents race out across the tank above the sludge blanket effectively disturbing lighter solids on top. Left unchecked, currents collect those solids and deposit them over the weir into the effluent stream, thereby "short circuiting" the clarification process and reducing hydraulic capacity of the tank.

Density current baffle improves clarifier hydraulic performance (capacity) by significantly recapturing effluent solids by redirecting the dense current flows back to the center of the tank allowing them to decelerate away from the effluent stream and then redeposit suspended solids back onto the sludge blanket where they belong. The clarifier configuration largely determines the ideal baffle size and mounting location to maximize solids retention.

The density current baffles shall be able to withstand a buoyant force equal to the weight of water displaced from the volume beneath the baffle and shall also be able to support its own weight plus snow and/or wind loads when the tank is empty. Vents located near the top of the panel shall relieve the buildup of gases that may collect underneath the baffle.

1.06 Design Parameters:

The manufacturer relies on the following critical information to provide an accurate arrangement for the baffle to function as intended. Actual design requirements, which vary from plant to plant with process, must be established for each application.

Standard Design Parameters (Imperial or Metric):

Tank design (internal or external launder) = _____ Baffle mounting location (wall or launder) = _____
Tank wall inner radius = _____ Baffle outer radius = _____
Weir wall inner radius (for internal launder) = _____ Baffle inclination angle (from horizontal) = _____
Side water depth (weir to tank floor) = _____ Baffle throw (distance from tank wall) = _____
Sludge blanket depth (if known) = _____ Known obstructions = _____

1.07 Submittals

Submittals shall include, but not be limited to:

- A. Drawings include dimensional layouts, product description, connection details; fastener types and location spacing, bill of materials, shipping, handling, storage and protection information, and installation guidelines.
- B. Information from the manufacturer including materials of construction, resin and glass fiber content, material certifications, physical samples, catalog information, warranty information, certified test reports of physical and mechanical properties of the product, preliminary installation, operation, and maintenance (if applicable).

PART 2 – PRODUCTS

2.01 Manufacturer(s)

- A. The standard for design and characteristics shall be based on materials and components provided by:
 1. Enduro Composites, Inc., Houston, TX, (713) 358-4000. www.endurocomposites.com
 2. Approved equal by Engineer.

2.02 Materials

- A. FRP density current baffle panels and appurtenances shall be fiberglass reinforced plastic molded to produce uniform smooth surfaces with resin rich outer layer for durability, free of voids and porosity, without dry spots, crazes or unreinforced areas and shall provide for increased corrosion resistance. Density current baffle panels shall include glass fiber reinforcements 30% (minimum) of the material weight embedded within UV stabilized isophthalic polyester resin with corrosion-resistant properties. The glass reinforcement shall be an ECR or boron-free glass suitable for the production process. The color shall be standard gray. FRP material shall have a resin rich surface on both the top side and bottom side. Factory cut edges and drilled holes shall be sealed with compatible resin.
- B. FRP Density current baffle panels shall exhibit these properties (minimum unless noted otherwise):

a. Tensile Strength	12,000 psi	ASTM D 638
b. Flexural Strength	20,000 psi	ASTM D 790
c. Flexural Modulus	1.0×10^6 psi	ASTM D 790
d. Izod Impact (Notched)	12.0 ft-lb/in	ASTM D 256
e. Water Absorption	.20% maximum	ASTM D 570
f. Barcol Hardness	40 (nominal)	ASTM D 2853
g. Average Coefficient of Thermal Expansion	10.5×10^{-6} inch per inch °F	ASTM D 696
- C. FRP Density Current Baffle Panels
 - a. Standard nominal panel size of 1/4" thick x 8'-0" long (full panel dimension) to the "width" as determined for the maximum retention of solids, unless otherwise indicated on the drawings.
 - b. Panel shall be designed and molded of fiberglass-reinforced isophthalic polyester resin composite laminate to the tank curvature (if round) or straight (if rectangular), unless otherwise indicated on the drawings.
 - c. The horizontal upper mounting flange along the top of the panel shall be 1/4" thick x 5" high x panel length on launder mounted applications and 1/4" thick x 3" high x panel length on tank wall mounted applications, unless otherwise indicated on the drawings.
 - d. The horizontal lower reinforcing flange placed vertically shall be 1/4" thick x 3" high and shall include additional glass reinforcing along the length of the baffle panel for all panels.
 - e. For additional strength and rigidity between adjacent sections, panel design shall include a 3" wide (min) recessed end to form a continuous flush top surface around the tank across the entire installation.
 - f. Panel shall slope inward and downward from the mounting location to resist solids build-up on the baffle.
 - g. All panel edges, mounting holes and top surface lap holes shall be factory drilled and sealed with resin. Mating holes in the top surface at the recessed end shall be field drilled.
 - h. Mounting and assembly fasteners shall be stainless steel concrete anchors or hex bolt type fasteners.
 - i. Provide support brackets for each baffle segment at a minimum of one bracket per baffle segment.
 - j. Vents shall be provided in the DCB to prevent the buildup of gases below the DCB. Vents shall be large enough to ensure sludge buildup does not block the vent holes.

D. Hardware

- a. Shall be 316 stainless-steel for fasteners, anchorage, and other structural hardware (as indicated) provided by the manufacturer.
- b. Baffle lap fasteners shall be nut and bolt type assembly with washers and lock washer.
- c. Mounting anchors shall be expansion (wedge) type or adhesive type (sized as required).

PART 3 - EXECUTION

3.01 Material Handling

- A. At the time of delivery, all materials shall be inspected for shipping damage. The freight company and the manufacturer shall be notified immediately of any damage or quantity shortages noted.
- B. The contractor shall protect FRP materials from cuts, scratches, gouges, abrasions, and impacts. When lifting crated FRP materials, spreader bars shall be used with straps (not wire slings unless materials are fully protected). FRP components shall not be dragged across one another unless separated by a non-scratching spacer.

3.02 Installation

- A. Before placing and attaching components, the contractor shall confirm the alignment and location of baffle across the entire installation. All contact surfaces must be solid, free of voids or grout, relatively smooth, level, clean and free of debris.
- B. Unacceptable surfaces shall be corrected, modified, or even replaced by the contractor to create a level or smooth surface for density current baffle panel attachment.
- C. Installer shall erect the baffle panels according to sequence shown or stated on the approved installation drawings. Unless noted otherwise, FRP baffle panels shall be attached to the supporting structure as follows:
 - a. For concrete structures - use 3/8" diameter concrete anchors (min) with oversized 1/8" thick x 2" (min.) stainless steel washers.
 - b. For other structures like steel tanks or steel launder - use 3/8" hex head type fasteners (min) with oversized 1/8" thick x 2" (min.) stainless steel washers.
- D. Adjacent baffle panel end laps shall be connected with 1/4" hex head bolts, 2 fender washers, lock washer and hex nut spaced as shown in the approved drawings. Refer to manufacturer's instructions in the Enduro Installation - Operation - Maintenance manual (IOM) and approved drawings for proper fastener selection and procedure.
- E. Installer shall field cut materials only as directed by Enduro Composites according to Enduro IOM manual. Field modifications (cuts, copes, holes, etc.) unless shown on the drawings are not allowed without the manufacturer's written approval.
- F. Installer shall seal field cut edges and field drilled holes with an approved material.
- G. FRP baffle panels shall be properly aligned by the installer at all mounting and lap connection conditions to form a professional looking rigid structure.
- H. The installer shall install other miscellaneous components or hardware as shown on the approved drawings.

3.03 Adjust and Clean

- A. Surfaces are to be cleaned according to manufacturer's instructions according to Enduro IOM manual.
- B. Remove excess materials of construction and trash to leave site in a clean condition for subsequent operation.