

## FRP Launder Trough Systems

Corrosion Resistance Superior Strength Long Service Life

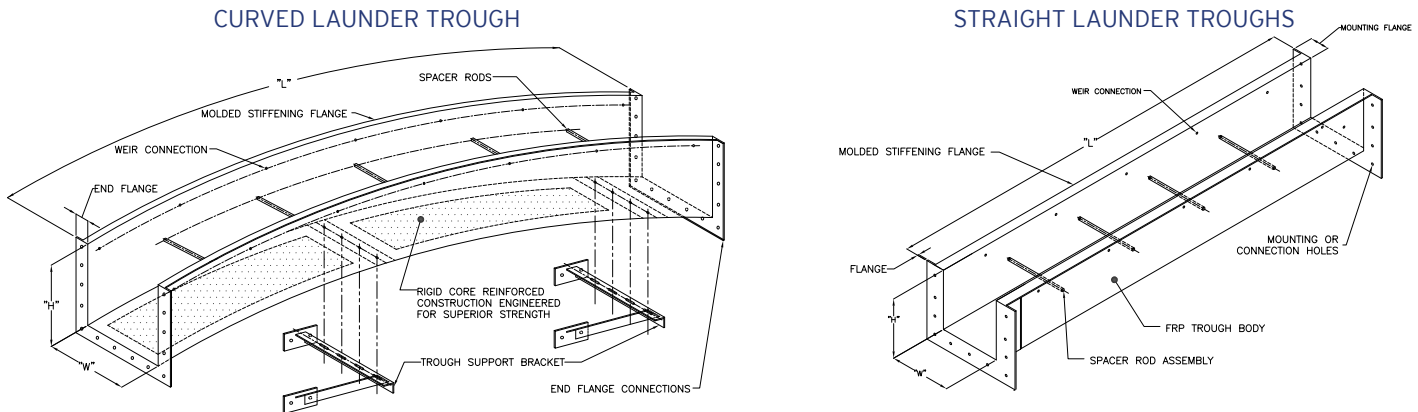
Engineered for high loads and corrosion resistance, FRP launder troughs by Enduro Composites give operators a superior, low maintenance structure to regulate and move fluids efficiently through treatment processes. Custom designed for round or rectangular tanks, the fiberglass launder troughs provide important value for water and wastewater operations:

- Exceptional strength & stiffness
- Corrosion resistance & UV protection
- Efficient fluid flow
- Custom built to suit application
- Long, maintenance-free, service life

### Outstanding Strength & Corrosion Resistance

50% stronger than conventional 1/4" units, Enduro reinforced plastic troughs are built with laminated layers of 24 oz. woven roving throughout. Its glass fiber reinforcing content and alignment produces outstanding rigidity and ability to support higher loads with minimal deflection. For increased lateral stability, its laminate construction can include embedded steel or FRP angles at the sides or bottom in addition to internal core of end-grain balsa, foam, or structural polypropylene panels. Material thickness is increased to 150% in critical areas such as flanges, closed blind ends, support connections, etc. for compliance with AWWA requirements.

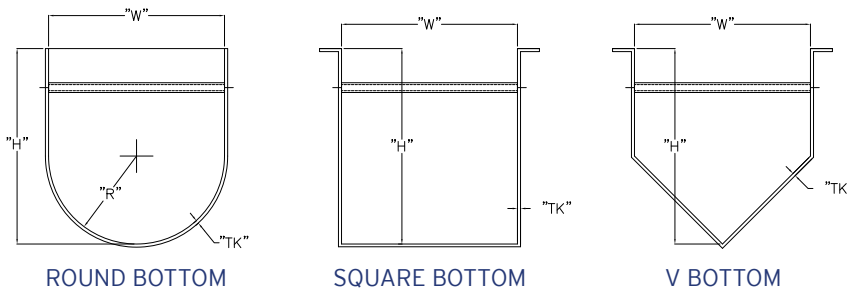
Enduro troughs are designed with premium, corrosion resistant and UV protected resins, woven roving reinforcing, stiffening flanges, spacer rods, and slip joint or flanged connections.



### System and Use Versatility

Enduro Launder Trough Systems are custom manufactured for a wide range of applications. Options include: 1) Variety of sizes and configurations; 2) Flat, round, or "V" shaped bottoms; 3) Circular, straight, or finger weir shapes; and 4) design to fit round, square, or rectangular tanks.

#### LAUNDER TROUGH SHAPES



For influent or effluent applications, troughs are used in a variety of processes including grit separation, aeration, settling basins, primary and secondary clarifiers, sludge thickening, and gravity filter backwash tanks.

Enduro trough systems are furnished complete with FRP, stainless or galvanized steel supports, FRP weirs and scum baffles, FRP effluent outlet boxes, spacer rods and include a full complement of stainless steel fasteners and anchors.

### Quality Assurance & Certifications

Troughs are manufactured to ANSI/AWWA F101-13 Standard for Contact-Molded, Fiberglass-Reinforced Plastic Wash-Water Troughs and Launderers. Enduro FRP products are manufactured under an ISO 9001 Certified Quality Assurance program to ensure outstanding performance for water and wastewater operations.

## SPECIFICATIONS: FIBERGLASS REINFORCED PLASTIC (FRP) LAUNDRER TROUGH

### PART 1 - GENERAL

#### 1.01 Description of Work

The scope of this section shall include fiberglass reinforced plastic (FRP) Launder Troughs; Support brackets; Stainless steel fasteners and connections.

#### 1.02 Design Criteria

A. Gravity or downward vertical load shall include weight of trough and attachments, such as weir plates, baffles and spreader bars, in addition to weight of water to fill the trough. Additional loads, such as connection piping, shall be considered separately.

B. Buoyant or vertical upward load shall be of magnitude equal to weight of displaced water less trough weight with line of action through centroid of the submerged cross-sectional area.

C. Lateral Load against trough sidewalls shall be higher differential of 1) empty trough and filled tank or 2) unfilled trough and empty tank.

1. Gravity and buoyant or gravity loads: Vertical deflection under full shall be less than or equal to  $L/1000$  with L defined as unsupported trough length. Bottom deflection shall be less than or equal to  $W/100$  with W defined as trough width.

2. Lateral load: Horizontal deflection under shall be less than or equal to  $D/100$  with D defined as trough depth.

3. Maximum deflection shall not exceed  $3/16$ " for any of these conditions.

D. Trough system shall be designed to resist torsional oscillations induced by flow of water over trough edges. Trough to trough stabilization; torsional stiffness; support spacing and rigidity; internal baffles and/or flow straighteners shall be considered.

E. Troughs shall be designed to accommodate stresses due to differences in thermal expansion and contraction between trough and tank/support for temperature range of  $-10^{\circ}\text{F}$  to  $100^{\circ}\text{F}$  without exceeding specified deflection or strain limits.

#### Standard Design Parameters (Imperial or Metric):

Tank design (wall mount or inset launder): \_\_\_\_\_

Tank wall inner radius: \_\_\_\_\_

Weir wall inner radius (for internal launder): \_\_\_\_\_

Trough width: \_\_\_\_\_

Trough depth: \_\_\_\_\_

Weir invert elevation: \_\_\_\_\_

Water surface elevation: \_\_\_\_\_

Side water depth (weir to tank floor): \_\_\_\_\_

Tank outlet size and location: \_\_\_\_\_

Known obstructions: \_\_\_\_\_

### PART 2 - PRODUCTS

#### 2.01 Manufacturer(s)

A. Standard design shall be based on units by Enduro Composites, Inc., Houston, TX (713) 358-4000, [www.endurocomposites.com](http://www.endurocomposites.com).

#### 2.02 Materials

A. FRP launder troughs and appurtenances shall be nominal  $1/4$ " thickness fiberglass reinforced plastic with surfaces free of voids and porosity, without dry spots, crazes, or unreinforced areas. Glass fiber reinforcements shall be 30% (min) of material weight and embedded within UV Stabilized Type 1, Polyester Resin. FRP material shall have surface veil on mold side and resin-rich coat on outside (or gel coat if specified). Color shall be dark gray.

B. FRP Launder Trough laminate shall exhibit these minimum properties:

Tensile Strength	14,000 psi	ASTM D 638
Flexural Strength	27,500 psi	ASTM D 790
Flexural Modulus	$1.00 \times 10^6$ psi	ASTM D 790
Izod Impact (Notched)	20 ft-lb/in	ASTM D 256
Water Absorption	.10% maximum	ASTM D 570
Barcol Hardness	40 (nominal)	ASTM D 2853

C. FRP Launder Troughs shall have smooth inner surface of either 1) .010 to .020 inch thick resin-rich layer, reinforced with Type C veil surfacing mat less than 20% of reinforcing material weight, or 2) Type I or Type II gel-coat with .015 to .020 inch thick resin layer suitable for water (if applicable).

D. Exterior or outer surface shall have relatively smooth surface with no exposed glass fibers and consist of resin rich layer not less than 0.020 in thick resin with paraffin to prevent air inhibition and ensure suitable embedment of reinforcing fibers.

E. Structural layer of reinforcements shall consist of chopped strand mat or spray-up passes with other structural reinforcing materials such as cloth, 24 oz. woven roving, or unidirectional rovings as required to meet design requirements.

F. Top edges of unfilled trough shall be level and parallel with tolerance of  $\pm 1/8$ " per 10 ft. length.

G. Metal reinforcing members, where required, shall be encapsulated with overlay laminate material and extend 2" (min) beyond metal members where feasible.

H. Structural elements such as core reinforcements or molded stiffening flanges shall be integrally molded into trough side or floor. Core element shall be encapsulated with minimum of  $1/8$ " thick laminate and extend 2" (min) beyond core element where feasible.

I. Connecting flanges to secure trough ends to each other or to tank wall shall be 1.5 (min) greater than nominal thickness of trough.

J. Trough ends grouted into and/or passing through tank wall shall have integrally molded water stop laminated onto the trough end outer surface to prevent short circuiting from one tank to another.

K. For increased rigidity, internal stiffeners shall be spaced as required with both ends secured and consist of 1" FRP tube or larger with internal  $1/2$ " stainless steel rod threaded horizontally across width.

L. Factory cut edges, drilled holes, and abrasions shall be sealed with approved resin material to prevent water intrusion.

M. Trough Manufacturer shall be responsible for design and fabrication of suitable trough supports, which shall be FRP \_\_\_\_\_, Galvanized Steel \_\_\_\_\_, 304 SS \_\_\_\_\_, 316 SS \_\_\_\_\_.

N. Anchorage and other connecting fasteners shall be Type 304SS \_\_\_\_\_, 316 SS \_\_\_\_\_. Mounting anchors shall be Expansion (wedge) \_\_\_\_\_ or Adhesive \_\_\_\_\_ type. Lap and connection fasteners shall be nut and bolt assembly with lock washers.

### PART 3 - EXECUTION

#### 3.01 Installation

A. Installer shall install troughs according to sequence and procedure shown on approved drawings. Installer shall field cut and seal products with compatible material only as directed by manufacturer.

B. Field modifications (cuts, copes, holes, etc.) unless shown on the drawings are not allowed without manufacturer's approval.