

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. The scope of this specification shall include materials for fiberglass reinforced plastic (FRP) flat tank covers, which may include, but not limited to:

1. Tank cover deck panels
2. Structural supports
3. Flashing and trim
4. Fasteners and anchors
5. Bulb gaskets and sealant
6. Accessories and appurtenances

1.2 QUALITY ASSURANCE

- A. Contractor shall be responsible for verifying all field dimensions for development of manufacturer's drawings.
- B. Contractor shall review and confirm in writing the approval of manufacturer's drawings.
- C. Tank cover manufacturer shall have full responsibility for design, manufacturing, and fabrication for FRP tank cover materials. Split responsibility for these items is not acceptable.
- D. Within the last five years, tank cover manufacturer shall have completed a minimum of five (5) projects of similar type as those required in this scope.

1.3 PRODUCT SUBSTITUTIONS

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

1.4 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 D638, Standard Test Method for Tensile Properties of Plastics
  2. ASTM D790, Standard Test Method for Flexural Properties of Plastics
  3. ASTM D695, Standard Test Method for Compressive Strength of Plastics
  4. ASTM E84, Standard Test Method for Surface Burning Characteristics of Plastics
- B. Structural framing and deck panels shall meet the performance and design criteria listed herein for the span conditions indicated on the drawings. Individual units shall demonstrate compliance with design criteria by full-scale testing.
  1. FRP Deck Panels: Uniform Load and Deflection Test
  2. FRP Structural Components: 3 Point Load Bending Test

1.5 DESIGN CRITERIA

- A. Design Loads shall comply with local codes with combined loads determined by Allowable Stress Method.
  1. Live or Snow: \_\_\_\_\_ psf
  2. Wind Uplift: \_\_\_\_\_ psf
  3. Dead Load: \_\_\_\_\_ psf
    - a. Deck panels: Individual unit weight plus other materials attached to and supported by deck panels.
    - b. Structure: Cover structure weight plus other material attached to and supported by cover structure.

B. Design Limits

1. Dead + Live or Snow Load: Limit =  $L/180$  (min); Factor of Safety = 2.5
2. Wind Uplift less Dead Load: Deflection Limit =  $L/120$ ; Factor of Safety = 1.88
3. Personnel Load: Cover shall be capable of supporting a 300 lb. concentrated load over a 30" x 30" area located at midspan between structural supports with maximum deflection of  $L/240$ .

C. Air Leakage

1. Air leakage shall not exceed 1 CFM/LF at gasketed panel joints and 2.2 CFM/LF at cover perimeter under -.5-inch water pressure per HVAC Air Duct Leakage Test in accordance with NEBB "Procedural Standards for Adjusting and Balancing of Environmental Systems".
2. Compliance shall be certified by approved National Environmental Balancing Bureau (NEBB) agency.

D. Cover Panel Removability:

1. Each cover panel shall be removable without having to remove no more than its two, adjacent panels.  
*Note: Enduro XL6 male panels can each be removed individually.*
2. Each cover panel shall be removable vertically and without cutting of a cover component.

## 1.6 SUBMITTALS

- A. Submittals shall include, but not be limited to:
1. Drawings including layouts; product description; connection and framing details; fastener types and spacing.
  2. Material certifications.
  3. Engineering calculations signed by a registered professional engineer.
  4. Operation and Maintenance Data for FRP cover and hatches.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURER

- A. The standard for design, characteristics, and performance shall be XL6 Cover System as manufactured by Enduro Composites, Inc., located at 16602 Central Green Blvd., Houston, TX 77032; 713-358-4000, 800-231-7271; [www.endurocomposites.com](http://www.endurocomposites.com).

### 2.2 MATERIALS

- A. Fiberglass reinforced plastic (FRP) structural components including cover panels, beams, and framing shall be manufactured by pultrusion process. Contact molded or hand-laid up fiberglass materials are not acceptable as structural components.

#### B. XL6 Tank Cover Panels

1. Resin type for FRP tank cover decking shall be UV stabilized isophthalic polyester. Orthothalic (general purpose) polyester shall not be acceptable.
2. Glass fiber reinforcements shall be 50% (min) of the material weight.
3. Materials shall be fire retardant and have a flame spread rating of 25 or less per ASTM E84.
4. Materials shall exhibit these physical properties (at a minimum):
 

Tensile Strength	30,000 psi	ASTM D 638
Flexural Strength	30,000 psi	ASTM D 790
Flexural Modulus	2,959,000 psi	ASTM D 790
Compressive Strength	30,000 psi	ASTM D 695
Izod Impact (Notched)	20 ft-lb/in	ASTM D 256
Water Absorption	.20% max	ASTM D 570
5. Cover panels shall be sealed at side-laps with non-adhesive, 1" diameter neoprene bulb gasket per ASTM C864. Side-lap gaskets shall be factory installed and oriented vertically so they are compressed when an adjacent panel is placed into position.
6. Top of tank cover decking shall be flat and non-profiled with a non-skid, tape (factory applied).
7. Color of deck panels shall be standard gray.

#### C. Access Hatches (if indicated on drawings)

1. Access hatches shall be raised with one-leaf hatch door and fabricated from pultruded fiberglass components.
2. Access hatches and framing shall fit inside a single deck panel so individual deck panels with hatches can be removed without affecting adjacent panels. Standard sizes include 22" or 24"x 30", 36", or 48" dimensions.
3. Underside of hatch lids shall be sealed with factory installed, 3/8" diameter neoprene bulb gasket. Perimeter hatch curb shall be sealed to decking surface with adhesive sealant.
4. Hatches shall have stainless steel hold-open device (optional) to prevent door from blowing open or closing on itself. Hatches shall be secured with hand-operable latches and without special tools.
5. Hatch lids shall have factory applied non-skid, UV resistant surface with plastic or stainless steel lift handles.
6. Flat view port hatches, if indicated on drawings, shall be 12 inches square or less.
7. Hatch openings shall be factory cut in cover decking panel by manufacturer.

#### D. FRP Structural Framing (if indicated on drawings)

1. Resin type for FRP beams and framing members shall be vinyl ester.
2. Glass fiber reinforcements shall be 50% (min) of the material weight.
3. Structural components shall be fire retardant and have a flame spread rating of 25 or less per ASTM E84.
4. Metallic angles or plates attached to FRP beams or fastening connections shall be 316 Stainless Steel.

#### E. Sampling Ports

1. Sampling ports shall be sized and located as indicated on drawings.

#### F. Flashing and Trim

1. Fiberglass flashing shall be isophthalic polyester with dimensions, and profile as shown on the drawings.
2. Non-radius end flashing shall be factory attached to individual deck panels.
3. Flashing with a radius or at the perimeter of a circular tank shall be a separate part and field attached by the installing contractor.
4. Slide gate flashings (if indicated on drawings) shall be aluminum brush type.

G. Air Vents and Connections (if indicated on drawings)

1. FRP gooseneck ventilation piping (if indicated on drawings) with bird screen shall be provided by cover manufacturer.
2. FRP stub-vent connections with a blind flange (if indicated on drawings) shall be provided by cover manufacturer. Connections shall extend at least 6 inches from top of tank cover deck.

H. Pipe Penetrations

1. Existing or new pipe penetrations shall be retrofitted by contractor to penetrate cover at a 90-degree angle.
2. Pipe penetrations shall be flashed in the field with a Sealtite retrofit, zipper type, pipe flashing or equal as provided by cover manufacturer.

I. Hardware

1. Fasteners, anchorage, hinges, and other structural accessories located on underside of cover shall be 316 Stainless Steel.
2. Perimeter flashing anchors, concrete anchors, or other hardware not exposed to the inside environment of the tank shall be 304 Stainless Steel.
3. Fasteners to attach tank cover decking to structural supports shall be 316 Stainless Steel.

J. Gaskets and Sealants

1. All panel side laps and perimeter conditions shall be gasketed.
2. Gaskets located at panel side laps between panels shall be factory installed, 1" diameter neoprene, bulb type.
3. Gaskets under non-radius end flashing shall be factory installed, bulb type.
4. Gaskets under flashing with a radius and at perimeter of circular tanks shall be installed by the contractor.
5. Adhesive sealant shall be applied by contractor at various locations as required by manufacturer for odor containment.

PART 3 – EXECUTION

3.1 MATERIAL HANDLING

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

3.2 INSTALLATION

- A. Before placing and attaching components, the erector must confirm alignment and location of bearing plates, surfaces, brackets, saddles, etc. All bearing surfaces must be clean and free of debris.
- B. Before placing secondary framing members or deck, the erector must check the alignment and location of supports.
- C. Erection shall proceed according to sequence shown on the approved drawings.
- D. If applicable, contractor shall install structural members, beam seats or ledger angles in locations shown on the approved drawings. Contractor shall assemble trusses as required.
- E. Position FRP tank cover beams (if applicable) in locations, as shown on the manufacturer's drawings. Field modifications (cuts, copes, holes, etc.) other than work shown on the drawings are not allowed without the manufacturer's written consent.
- F. Anchor FRP beams and adjust tank cover components into final position with proper bearing and alignment at joints, laps, and supports before fastening. Refer to manufacturer's installation instructions for proper fastener selection, fastener location, driving techniques, and pertinent information for fastening equipment.
- G. Starting at the end shown on the manufacturer's drawings, position and place cover deck panels in locations as shown. Field modifications (cuts, copes, holes, etc.) other than work shown on the drawings are not allowed without the manufacturer's written consent.
- H. Fasten or anchor FRP cover deck panels into location as shown on the drawings.
- I. Place and attach flashing as shown on the drawings.