SECTION 08 16 13 - FIBERGLASS (FRP) SPECIALTY DOORS & FRAMES

PART 1 - PART 1 - GENERAL

1.1 SCOPE AND DEFINITIONS

A. Furnish and install doors, frames of FRP composite construction in accordance with details and schedule shown on the project drawings and as specified herein. Door and frame products of aluminum, steel or wood constructions that use FRP face sheets are strictly excluded.

B. FRP is defined as "Fiberglass Reinforced Polyester"

1.2 Related Sections

A. Section 04 20 00: Unit Masonry mortar

B. Section 05 50 00: Metal Fabrications

C. Section 08 71 00: Door Hardware

1.3 QUALITY ASSURANCE

A. Referenced Standards

1. American Society for Testing and Materials (ASTM)

2. Society of Automotive Engineers (SAE)

3. International Building Code, Plastics (Chapter 26)

B. Experience: Manufacturer shall be ISO 9001 certified and been engaged in the manufacture of FRP door and frame systems for a minimum of five (5) years documented experience prior to the start of this work, and who has a history of successful production acceptable to the Architect.

C. Process: Certify that FRP doors are manufactured via F.L.O.A.T. method of assembly.

D. Warranty: Provide limited written guarantee for FRP doors and frames as follows:

1. Commercial Duty doors shall be guaranteed for the life of the product against failure due to corrosion from the specific chemical environment named at the time of purchase. Furthermore, all products are inspected prior to shipment and guaranteed against defective workmanship for a period of ten (10) calendar years after the date of purchase.

1.4 SUBMITTALS

A. Product Data: Provide catalog cut of FRP door detailing internal construction and reinforcements, materials used and description of assembly process.

B. Shop Drawings: To include the following specific information:

1. Specifications relating to FRP door thickness, resin type, core material, method of construction, finish color, type of glass and glazing, anchor systems, joint construction and complete warranty information.

2. Complete schedules or drawings of FRP doors and frames (and associated Door Hardware) showing identifying mark numbers, door and frame types, typical elevations, nominal sizes, handing, actual dimensions and clearances, and required hardware preps and reinforcements.

3. Supporting reference drawings pertaining to frame mounting details, door light or louver installation, hardware locations, and factory hardware cutouts and reinforcements.

C. Color Samples: Provide a complete set of available finish colors from the manufacturer for color selection upon request.

D. Installation instructions: Include manufacturer's specific information describing procedures, sequence and required fasteners for frame and door installation.

E. Production of FRP doors and frames shall not proceed until final approval of submittals and all necessary manufacturing information is received from customer.

1.5 DELIVERY, STORAGE AND HANDLING

A. FRP doors and frames to be delivered to project site in boxes with foam sheet separations.

B. Upon receipt of shipment, remove and inspect the doors and frames for damage. Note any damage on the shipping papers prior to accepting. If there is any noted (visible or concealed) damage, notify Manufacturer, immediately.

C. Handling and storage of the doors and frames after receipt is the responsibility/liability of the customer. It is recommended that the doors be stored indoors in a vertical position, clear of the floor, with blocking between the doors to permit air circulation between the doors and prevent damage to the door faces. Rain/water or condensation must not be allowed to collect or lay between stored doors. Do not wrap in plastic sheeting as it will promote condensation formation within. Permanent discoloration can result. Failure to comply with the receiving and reporting instructions could void the Door Manufacturer's warranty.

D. Use care in handling FRP doors and frames to prevent damage to factory finishes. Wear protective gloves and do not slide or drag doors or frames against one another.

PART 2 - PRODUCTS

2.1 Manufacturer

A. Provide the following basis-of-design or approved equal: Commercial Duty FRP Doors and Frames as manufactured by Overly/Tiger Door, 574 West Otterman Street, Greensburg, PA 15601, ph 800-979-7300, fax 724-830-2871 - www.tigerdoor.com.

2.2 FRP DOORS

A. Commercial Duty Non-fire rated FRP Doors

1. Design: FRP doors shall be of seamless construction. Laminated FRP face sheets shall be bonded to an internal door stile and rail channel subframe/core assembly. The composite door panel must be bonded over its entire surface area, not just adhesive-bonded at perimeter stiles and rails.

2. Stiles & Rails: A 1-3/4" wide x 1-1/2" deep x 5/8" web pultruded FRP Channel subframe is to be provided within the door. All connections shall be chemically welded. No mechanical fasteners will be allowed. The use or inclusion of aluminum, steel, gypsum or wood into stile and rail construction is not permitted.

3. Core: For maximum rigidity and compressive strength a triangular shaped 3/8" cell phenolic resin impregnated kraft paper honeycomb. Molding pressure and adhesive gel time shall be sufficient to allow for penetration of resin into the cellular structure of the core to maximize shear and peel strengths at the skin/core interface. The honeycomb is to be completely enclosed within the stile and rail subframe. Use of foam or balsa wood is not permitted.

4. Internal Reinforcement: High-density polymer compression blocks, or plastic compression blocking at all hardware locations. No wood blocking, steel or aluminum reinforcing plates, ribs or fittings shall be used. A minimum of 900 lbs of pullout strength is required for each factory supplied hinge screw.

5. Faces: Door facings shall utilize a chemical resistant modified polyester copolymer resin system with fiber reinforcing layers. Supplier shall furnish door faces as shown on the drawings and in the door elevations. Structural reinforcement of the face skin shall be in the form of random chopped fiberglass roving.

6. Finish: The exposed FRP door faces shall have a 3-4 mils (wet) factory applied two-part aliphatic polyurethane fully cured coating of industrial urethane. Coating shall have a minimum hardness of H to 2H. Finish shall be a slightly textured semi-gloss to minimize the visual effects of wear and tear.

7. Astragals: All pairs of doors shall be furnished with an astragal from door manufacturer made of same pultruded FRP material as door stile, rail and edge as required. Astragal shall be located on the meeting stile edge of each inactive leaf of double door pairs. Architect shall advise active leaf of door, and astragal shall be installed to cover meeting stile gap to effect seal and security.

8. Lights: Glass per job specification shall be factory furnished, glazed and installed. Standard glass thickness is ¼". Centered glazing shall be installed between 45 degree pultruded FRP glazing stops and vinyl foam tape with concealed compression retainers for ¼" glazing. No exposed fasteners or exposed silicone will be allowed for securing ¼" glazing. Stainless steel screws may be allowed for other glazing thicknesses. Offset glazing shall be installed against a molded-in 5/8" wide exterior face flange with a bed of tape caulk, square 5/8" pultruded glazing stops with stainless steel screws shall complete the installation to secure the glazing in place and cover all unsightly caulking. Double flush ¼" glazing shall be installed with vinyl foam tape and silicone sealant at all edges to complete flush appearance. All glazing stop material shall be pultrued FRP with a minimum fiberglass content of 50%. Metal, pvc, or vinyl "Glass Kit" type lights are not acceptable for non-fire rated openings.

9. Louvers: Fiberglass inverted V blade privacy or flat blade lovers shall be factory furnished and installed. All louvers and louver trim shall be manufactured exclusively from putruded FRP profiles with a minimum fiberglass content of 50%. All louvers shall be coated to match door in color and sheen. Inverted V blade minimum thickness shall be 3/32" thick, flat blade louver minimum thickness shall be 3/16" thick. Adhesives for louver assembly shall meet or exceed all requirements set forth in section 2.05.1 Mechanical Properties and test performance. Metal, pvc, vinyl or other non-fiberlgass louvers are not acceptable for non-fire rated openings.

10. Raised panels and plants: All doors shown in elevation to have raised panels or plants shall be equipped with plants in configuration as shown on plans and in door schedule. Plants shall be applied by the door manufacturer as an integral part of the door face. Plants shall be bonded to the door skin; no mechanical fasters shall be permitted. All applied moldings shall be of resin material, and shall be installed by the manufacturer to resemble a raised panel door. Field applied plants or moldings shall not be acceptable.

11. Provisions for lights and louvers shall be performed during manufacture and shall not be attempted in the field. Cutouts are to be totally enclosed by pultruded FRP stiles and rails incorporated into the door structure. Light and louver cutouts that expose core material are not acceptable.

2.3 FRP FRAMES

A. FRP Frames:

1. Design: FRP Door frames furnished under this specification shall utilize a high-modulus pultruded structural FRP shape. The frame section shall be standard double rabbeted 5-3/4" deep x 2" face, 3/16" thick, with integral 5/8" doorstop with 1 15/16" soffits, to match typical hollow metal configurations.

2. Corner Joints: Frame jambs and header shall be joined at corners via miter connections with hidden FRP angle clips and associated fasteners. Post and beam corners will not be acceptable. Exposed fasteners for miter connections will not be acceptable except for wrap wall applications.

3. Hardware Reinforcements: FRP reinforcing shall be chemically welded to door frame material at required locations. Minimum screw pullout strength of 1100 lb per #12 x 1" sheet metal screw is required. Mechanically fastened reinforcements are not permitted.

4. Anchors:

   a. BOLT-IN: Provide manufacturer's required number of 3/8" diameter x 4" long flat head stainless steel sleeve anchors for masonry openings, 3/8" diameter x 4" machine screw with nut and washers for structural steel openings, #14 x 4" stainless steel flat head sheet metal screws for wood or steel stud openings. Include extra anchors for additional frame height in two foot increments above 8'-0". Provide single bolt anchor at center of all headers over four feet in nominal width. Stainless Steel fasteners shall be furnished by the factory.

b. GROUT-IN: Provide manufacturer's required number of wire or strap type masonry anchors for installation into block wall. Fill frame cavity with grout.

5. Finish: Frames shall have a 3-4 mils (wet) factory applied two-part aliphatic polyurethane fully cured coating of industrial urethane. Industrial urethane chemical coating color topcoat, to match the color and sheen of the doors, for superior weatherability. Gelcoat may not be sprayed onto the frame as a secondary coating.

2.4 MECHANICAL PROPERTIES AND TEST PERFORMANCE

A. Pultruded structural shapes for stiles; rails, frames, and astragals shall exhibit the following minimum longitudinal coupon properties (per ASTM):

1. Tensile strength (D638) 30,000 psi
2. Comprehensive strength (D695) 30,000 psi
3. Flexural strength (D790) 30,000 psi
4. Flexural modulus (D790) 1,600,000 psi
5. Shear strength (D2846) 4,500 psi
6. Impact, notched (D256) 25 ft-lb/in
7. Barcol hardness (D2853) 50

B. Core material shall exhibit the following minimum coupon properties (per ASTM):

1. Core material must comply with the International Building Code (IBC) chapter 26 requirements for use with a plastic skin.
2. Shear strength, longitudinal direction (C273) 68.2 psi
3. Shear strength, transverse direction (C273) 25.8 psi
4. Shear modulus, longitudinal direction (C273) 6940 psi
5. Shear modulus, transverse direction (C273) 1878 psi
6. Shear elongation, longitudinal direction (C393 short beam) 1.79%
7. Shear elongation, transverse direction (C393 short beam) 2.72%
8. Maximum facing stress, longitudinal direction (C393 short beam) 735 psi
9. Maximum facing stress, transverse direction (C393 short beam) 289 psi
10. Maximum core shear stress, longitudinal direction (C393 short beam) 63.8 psi
11. Maximum core shear stress, transverse direction (C393 short beam) 24.9 psi

12. Modulus of elasticity (EI) per 1" width, longitudinal direction (C393 short beam) 4.92E+04 psi

13. Modulus of elasticity (EI) per 1" width, transverse direction (C393 short beam) 1.97E+04 psi

14. Maximum facing stress, longitudinal direction (C393 long beam) 9011 psi

15. Maximum facing stress, transverse direction (C393 long beam) 4727 psi

16. Maximum core shear stress, longitudinal direction (C393 long beam) 48.3 psi

17. Maximum core shear stress, transverse direction (C393 long beam) 23.5psi

18. Modulus of elasticity (EI) per 1" width, longitudinal direction (C393 long beam) 1.14E+05 psi

19. Modulus of elasticity (EI) per 1" width, transverse direction (C393 long beam) 7.23E+05 psi

20. Stiffness "D", longitudinal direction (C393 long beam) 379,270 psi

21. Stiffness "D", longitudinal direction (C393 long beam) 260,608 psi

22. Compressive strength (C365) 53 psi

23. Compressive modulus (C365) 2110 psi

24. Density (C271) 2.42 lb/ft^3

C. Adhesive for bonding pultrusions shall exhibit the following minimum coupon properties (per SAE)

1. Tensile Strength (D882-83A modified) minimum 2000 psi

2. 8 day 25º C at 100% humidity Cross Peel (SAE J1553) minimum 330 psi

3. 7 day immersion in seawater Cross Peel (SAE J1553) minimum 330 psi

4. 30 day immersion in saltwater Cross Peel (SAE J1553) minimum 330 psi

5. 72 hour immersion in gasoline Cross Peel (SAE J1553) minimum 330 psi

6. 72 hour immersion in 20% sulfuric acid Cross Peel (SAE J1553) minimum 300 psi

2.5 FASTENERS

A. All fasteners for all hardware shall be type 304 CRSS (18-8 series corrosion resistant stainless steel). No carbon steel or aluminum components shall be used.

2.6 HARDWARE

A. Doors shall be factory mortised and drilled for mortise template butt hinges, with #12x2" long stainless steel screws provided by Tiger for hinge attachment. Provide 161 cylindrical lock bore, rim deadbolt, ANSI 86 mortise lock edge prep and pocket, or flushbolt cutouts as required.

B. Frames shall be factory machined and drilled for all hardware requiring mortises, with #12x1" long stainless steel screws pre-installed for hinge attachment.

C. Hardware shall be furnished as listed in section 08 71 00 and shall be coordinated by GC and installed by experienced mechanics.

D. Supplier shall furnish manufacturer's standard templates, installation instructions, or full size approved door and frame preparation instructions as approved by the architect and as required by door and frame manufacturer prior to door and frame factory initiated manufacture. Standard factory lead-time for production of FRP doors and frames shall commence only and when all distributor required preparation information is received and acknowledged by the door and frame manufacturer.

PART 3 - EXECUTION

3.1 IDENTIFICATION

A. Factory mark all doors and frames using a chemical resistant plastic tag or indelible marker with identifying number, keyed to shop drawings, prior to shipment.

3.2 INSTALLATION

A. Frames: Install in strict accordance with manufacturer's printed instructions. Set plumb and square, using shims for bolt-in of existing openings, or wood bracing prior to grouting of jambs. Use at least two 2x6 wood spreaders inside frame to maintain critical opening dimensions during grouting.

B. Doors: Hang per manufacturer's printed instructions using special screws provided for hinge attachment. Install doors to swing freely and to stand open at any angle. After installation make final adjustments to hardware to allow for proper door operation and latching. All surface applied hardware shall be thru bolted.

3.3 CLEANING

A. Clean exposed surfaces of FRP doors and frames with a mild, non-abrasive cleaner and water.

END OF SECTION