

SECTION 06600FIBERGLASS REINFORCED PLASTIC FABRICATIONSPART 1 - GENERAL1.1 SECTION INCLUDES

- A. Grating
- B. Structural Shapes
- C. Other items fabricated of fiberglass shown to be provided on the Contract Drawings and not included in other sections.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Embedded angle

1.3 RELATED SECTIONS

- A. Section 01340 - Submittals
- B. Section 03300 - Cast-in-Place Concrete

1.4 REFERENCES

- A. ASTM D256-02 - Test Methods for Determining the Izod Pendulum Impact Resistant of Plastics
- B. ASTM D570-98 - Test Method for Water Absorption of Plastics
- C. ASTM D635-98 - Test Method for Rate of Burning and/or Extent and time of Burning of Plastics in a Horizontal Position
- D. ASTM D638-02 - Test Method for Tensile Properties of Plastics
- E. ASTM D695-02a - Test Method for Compressive Properties of Rigid Plastics
- F. ASTM D696-98 - Test Method for Coefficient of Linear Thermal Expansion of Plastics between - 30 EC and 30 EC with a Vitreous Silica Dilatometer
- G. ASTM D732-02 - Test Method for Shear Strength of Plastics by Punch Tool
- H. ASTM D790-02 - Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
- I. ASTM D792-00 - Test Method for Specific Gravity (Relative Density) and Density of Plastics by Displacements.
- J. ASTM D1505-98 - Test Method for Density of Plastics by the Density-Gradient Technique.
- K. ASTM D2583-98el - Test Method for Indentation Hardness of Rigid

- L. ASTM D3917-96 (2002ei) - Specification for Dimensional Tolerance of thermo setting Glass-Reinforced Plastic Pultruded Shapes.
- M. ASTM E84-01a - Test Method for Surface Burning Characteristics of Building Materials

1.5 DESIGN

- A. Structural Shapes (Connections)
 - 1. Connections shall be designed for the maximum allowable beam uniform load for the given span. The maximum load shall be the maximum of the allowable loads based on bending stress and an allowable deflection of Span/240.
- B. Grating
 - 1. Live load as indicated on the Drawings.
 - 2. Maximum deflection of Span/250 at the design live load.
- C. Factors of Safety
 - 1. Connections - 4.0
 - 2. Beams - 2.5
 - 3. Columns - 3.0

1.6 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Submit complete shop drawings showing fabrication, complete dimension details, sizes, thickness, gauges, material, connection details including layout, arrangement and accessories and load tables for grating.

1.7 QUALITY ASSURANCE

- A. All fiberglass fabrications shall be supplied by a single manufacturer experienced in the fabrication of FRP products.
- B. Dimensional tolerances of pultruded shapes shall conform to ASTM D3917.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Coordinate delivery of products.
- B. Protect from damage prior to and after installation. Store in enclosed areas. Do not store in direct sunlight.
- C. Remove damaged material from the site.

1.9 COORDINATION

- A. The Contractor shall coordinate with the work of other Sections. Verify at the site both the dimensions and the work of other trades adjoining items prior to fabrication and installation of items herein specified.
- B. Furnish to pertinent trades all items included under this section that are built into the work of other sections.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Strongwell, Bristol, VA.
- B. IKG Fiberglass Systems, Nashville, TN
- C. Or equivalent.

2.2 MATERIALS

- A. All FRP products in this Section shall be manufactured using a pultruded process utilizing either an isophthalic polyester or vinyl ester resin with flame retardant and ultra-violet (UV) inhibitor additives. A flame spread of 25 or less in accordance with ASTM E84 shall be exhibited in all FRP products.
- B. All cut ends, holes and abrasions of FRP products shall be sealed with a compatible resin coating.
- C. A synthetic surface veil wrap shall be applied over the outer surface of all FRP products.
- D. Fiberglass reinforcing shall consist of a combination of fiberglass roving, continuous strand mat and veil materials as required by the application and/or physical properties.

2.3 STRUCTURAL SHAPES

- A. All structural shapes shall be manufactured from the pultrusion process and exhibit the following mechanical properties (See Table 1).
- B. Connections.
 - 1. Beam-to-beam connections
 - a. Beam connections shall be made utilizing a minimum size L 3x3x3/8" FRP clip angles. The clip angles shall be fastened to the beams utilizing a minimum of 2 FRP bolts and an epoxy adhesive.
 - b. Connections shall be designed by the fabricator.
 - 2. Beam-to-concrete connections
 - a. Beam connections shall be made utilizing a minimum size L 3x3x3/8" FRP clip angles. The clip angles shall be fastened to the beams utilizing a minimum of 2 FRP bolts and an epoxy adhesive. Connection to the concrete shall be made as indicated on the Drawings.
 - b. FRP clip angles and bolts shall be designed by the fabricator.
 - 3. Design loads and factors of safety shall be specified in Part 1.4 of this Section.

TABLE 1
 FIBERGLASS PULTRUDED MATERIAL PROPERTIES
 MINIMUM ULTIMATE COUPON PROPERTIES (UN)

PROPERTIES	ASTM TEST METHOD	UNITS/VALUE	STRESS
MECHANICAL			
Tensile Stress (LW)	D638	psi	30,000
Tensile Stress (CW)	D638	psi	7,000
Tensile Modulus (LW)	D638	10 ⁶ psi	2.5
Tensile Modulus (CW)	D638	10 ⁶ psi	.8
Compressive Stress (LW)	D695	psi	30,000
Compressive Stress (CW)	D695	psi	15,000
Compressive Modulus (LW)	D695	10 ⁶ psi	2.5
Compressive Modulus (CW)	D695	10 ⁶ psi	1
Flexural Stress (LW)	D790	psi	30,000
Flexural Stress (CW)	D790	psi	10,000
Flexural Modulus (LW)	D790	10 ⁶ psi	1.6
Flexural Modulus (CW)	D790	10 ⁶ psi	.8
Modulus of Elasticity		10 ⁶ psi	2.6
Shear Modulus (LW)		10 ⁶ psi	.425
Bearing Stress (LW)	D953	psi	30,000

2.4 FRP GRATING

- A. Material: Vinyl ester resin with a synthetic surface veil wrap over the continuous strand mat meeting Class 1 flame spread rating. All materials shall meet the mechanical properties list in Table 1, Section 2.3.
- B. Color: Gray
- C. Type: 1 bar grating with 1-1/2 inch deep bearing bar spaced at 1 inch on center with cross bars at six (6) inch on center with non-skid epoxy resin surface. Grating shall be formed by passing FRP pultruded cross rods through the web of each bearing bar. Continuous chemical bonding shall be achieved between the cross rods and bearing bars locking the entire panel together to resist twist and prevent internal movement of the bearing bars.
- D. Fasteners: Provide a minimum of 4 Type 316 stainless steel saddle clips per grating section.
- F. Acceptable Manufacturers:
 - 1. Duradek by Strongwell.
 - 2. Corgrate FW by IKG Borden.
 - 3. Or equal.

PART 3 - EXECUTION

3.1 FABRICATION AND INSTALLATION

- A. All field cut edges, holes and abrasions shall be sealed with a resin compatible with the resin matrix used.
- B. All work shall be executed by workmen skilled and experienced.
- C. Install FRP products as shown on the Drawings and in strict accordance with the manufacturer's recommendations and instructions.
- D. Joints shall be flush and nearly invisible.

3.2 PROTECTION

- A. The fabricator and contractor shall exercise precautions necessary to protect fiberglass protruded items from abuse to prevent breakage, nicks, gouges, dents, paint and other material during fabrication, handling and installation.

3.3 CLEANING

- A. Clean fiberglass items in strict accordance with manufacturer's recommendations and instructions.

END OF SECTION