

SECTION 06 82 00

GLASS-FIBER-REINFORCED PLASTIC

PART 1 GENERAL

1.1 REFERENCES

- A. Comply with the latest edition of the following statutes, codes and standards and all amendments thereto.
 - 1. 2010 National Building Code of Canada (NBC) with 2011 Manitoba Amendments.
 - 2. Occupational Health and Safety Act (OHSA).
 - 3. ASTM D635 Standard Test Method for Rate of Burning and/or Extent and Time of Burning Plastics in a Horizontal Position.
 - 4. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 5. CAN/CSA S806 Design and Construction of Building Components with Fibre-Reinforced Polymers.

1.2 DESIGN REQUIREMENTS

- A. This section contains components and connectors that require Contractor design.
- B. Design systems and components as required for post disaster structures in accordance with applicable Codes.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Submit engineering calculations or data verifying the capacity of members to meet design requirements. Calculations to be sealed and signed by Contractor's Professional Structural Engineer.
 - 2. Product Data: Catalog information and catalog cuts showing materials, shapes, weights, design tasks, and showing load, span, and deflection; include manufacturer's specifications.
 - 3. Grating: Show dimensions, weight, size, and location of connections to adjacent grating, supports, and other Work.
 - 4. Grating Supports: Show dimensions, weight, size, location, and anchorage to supporting structure.
 - 5. Railing: Show dimensions, weight, size, and location of connections to adjacent supports and other Work. Show design loads and other structural parameters considered.
- B. Samples: Each type of grating, railing, and rail connection showing material composition, colour and texture of finish.

- C. Other Submittals:
1. Handling and storage requirements.
 2. Manufacturer's installation instructions.
 3. Factory test reports for physical properties of product.
 - a. Test data for all components showing load and deflection due to load, in enough detail to prove grating is strong enough and satisfies national, provincial, local standards, regulations, code requirements, and the Occupational Health and Safety Act, using design loads specified.
 - b. Test data for railing and supports may supplement load calculations providing data covers the complete system, including anchorage.
 - c. Include test data for railing and post connections, railing wall connections, post and base connections, and railing expansion joint connections.
 4. Manufacturer's qualification experience.
 5. Independent laboratory test report, dated within 2 years of submittal date, of fire retardant testing conducted on exact type of grating proposed (not a resin test report).

1.4 QUALIFICATIONS

- A. Manufacturer:
1. Minimum of 5 years' experience in manufacturing of products meeting these specifications.
 2. Membership in good standing of the Canadian Plastics Industry Association.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Shipment:
1. Insofar as is practical, factory assemble items provided hereunder.
 2. Ship ladders fully shop-fabricated and assembled.
 3. Package and clearly tag parts and assemblies that are of necessity shipped unassembled in a manner that will protect materials from damage, and facilitate identification and final assembly in field.
- B. Provide storage and handling instructions: In accordance with manufacturer's recommendations and in such a manner as to prevent damage of any kind, including overexposure to sunlight.

PART 2 PRODUCTS

2.1 GENERAL

- A. Like Items of Materials: Where possible, provide end products of one manufacturer in order to achieve standardization for appearance, maintenance, and replacement.
- B. Unless otherwise specified, provide all products manufactured by a pultruded process using vinyl ester resin.

- C. Provide products manufactured with ultra-violet (UV) inhibitor additives.
- D. Furnish molded products as an option where permitted by specifications.
- E. Fire Retardance:
 - 1. Maximum flame spread less than 25 as measured by ASTM E84.
 - 2. Include combinations of aluminum trihydrate, halogen, and antimony trioxide, where required to meet fire retardance, in the resin system.
 - 3. Meet self-extinguishing requirements of ASTM D635.
- F. Disperse colour pigment in resin system.
- G. Fabricate FRP products exposed to outdoor conditions with an additional 0.025 mm thick UV coating to shield product from UV light.
- H. Seal all cut ends, holes, and abrasions of FRP shapes with resin to prevent intrusion of moisture.
- I. Design units to applicable parameters established by the NBC with Manitoba Amendments and CAN/CSA S806 including snow loads and wind loads for return period of 1 in 50.
- J. Design for erection loads, effect of creep and other causes of dimensional change.
- K. Design for strength and integrity at service conditions in accordance with engineering practices prevalent in the field of fibreglass reinforced plastics.
- L. Provide products free of defects such as voids, porosity, cracks, pits, scratches, dry spots, and any other irregularity.

2.2 GRATING AND STAIR TREADS

- A. General:
 - 1. 4.8 kN/m² minimum, unless otherwise shown.
 - 2. Maximum Deflection: 6 mm, unless otherwise shown.
 - 3. Stair Tread: 4.8 kPa uniform load or concentrated load of 1.3 kN on area of 2600 mm² located in center of tread, whichever produces greater stress.
- B. Molded Type:
 - 1. Nonskid No. 200 silica grit affixed to top of bar surface or a concave, meniscus top to all bars, providing skid resistance.
 - 2. Load bars in both directions with equal stiffness.
 - 3. Square mesh, 38 mm maximum spacing.
- C. Pultruded Type:
 - 1. Main bars joined by cross bars secured in holes drilled in main bars.
 - 2. Cross bars, with 150 mm maximum spacing, shall mechanically lock main bars in position such that they prevent movement.
 - 3. Intersections: Bond using adhesive as corrosive-resistant as pultrusion resin.

4. Main Bar Ends: Minimum bearing support width of 38 mm.
 5. Skid-Resistant Surface: No. 200 silica grit adhesively bonded, manufacturer's standard.
 6. Provide extra stiffness around openings.
- D. Hold-Down Clamps: Same material as grating or Type 316 stainless steel.
- E. Bolts, Connectors and Supports:
1. Corrosion-resistant FRP or Type 316 stainless steel.
 2. Size and strength to meet Code requirements.
- F. Fabrications:
1. Field measure areas to receive grating. Verify dimensions of new fabricated supports, and fabricate to dimension required for specified clearances.
 2. Section Length: Sufficient to prevent its falling through clear opening when oriented in span direction when one end is touching either concrete or vertical leg of grating support.
- G. Manufacturers:
1. Fibergrate Composite Structures, Inc.
 2. IKG/Borden.
 3. Strongwell Corp.

2.3 RAILING

- A. Thermal Movement:
1. Allow for maximum range of ambient temperature change (difference between high or low and installation temperature).
 2. Temperature Change Range: as specified in Section 01 61 00, Common Product Requirements, for non-wetted components.
- B. Rails and Posts:
1. 43 mm nominal square or round tubing posts.
 2. 43 mm nominal round or square rails.
 3. 2-rail system.
- C. Kickplates: Corrugated, 125 mm by 12 mm by 3 mm thick or 125 mm by 14 mm thick at all railing locations.
- D. Kickplate Connectors and Splices: Continuous with provision for expansion and contraction without distortion or buckling.
- E. Connections, Mounts, Bases: Fibreglass or Type 316 stainless steel. For Type 316 stainless steel, apply a protective coating to protect against corrosion due to chlorine vapours in accordance with Section 09 90 00, Painting and Coating.

F. Pultruded Parts:

Minimum Mechanical Properties	Test Method	Values
Tensile Stress	ASTM D638	207 MPa
Tensile Modulus	ASTM D638	17.2 x 10 ³ MPa
Compressive Stress	ASTM D695	207 MPa
Compressive Modulus	ASTM D695	17.2 x 10 ³ MPa
Flexural Stress	ASTM D790	207 MPa
Flexural Modulus	ASTM D790	11.0 x 10 ³ MPa
Shear Stress	ASTM D2344	31.0 MPa
Density	ASTM D792	1.72-1.94 x 10 ⁻³ g/mm ³
24-Hour Water Absorption	ASTM D570	0.6% max.
Coefficient of Thermal Expansion	ASTM D696	8 x 10 ⁻⁶ mm/mm/degree C
Flexural Stress	Full Section	248 MPa
Flexural Modulus	Full Section	25.5 x 10 ³ MPa

G. Manufacturers:

1. Strongwell Corp.
2. Fibergrate Composite Structures, Inc.

PART 3 EXECUTION

3.1 GENERAL

A. Examination:

1. Examine surfaces to which work is to be anchored, and job conditions.
2. Report surfaces and conditions which would adversely affect installation.
3. Do not commence installation until unsatisfactory surfaces and conditions are corrected.

B. For factory installation, install in accordance with manufacturer's written instructions.

C. Install plumb or level, rigid and neat, as applicable.

D. Furnish fasteners and anchorages for complete installation.

E. Seal field cut holes, edges, and abrasions with catalyzed resin compatible with original resin.

3.2 GRATING

- A. Anchor grating securely to supports to prevent displacement.
- B. Install each grating section such that it is easily removable.
- C. Clearance (Grating to Vertical Surfaces): 6 mm (plus or minus 3 mm tolerance).

3.3 RAILING

- A. Provide and install expansion and contraction connections in accordance with manufacturer's written instructions.

END OF SECTION