

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. National Building Code of Canada 2010 with 2011 Manitoba Amendments (NBC).
 2. Occupational Health and Safety Act (OHSA).
 3. ASTM C177 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot-Plate Apparatus.
 4. ASTM D570 Standard Test Method for Water Absorption of Plastics.
 5. ASTM D635 Standard Test Method for Rate of Burning and/or Extent and Time of Burning Plastics in a Horizontal Position.
 6. ASTM D638 Standard Test Method for Tensile Properties of Plastics.
 7. ASTM D695 Standard Test Method for Compressive Properties of Rigid Plastics.
 8. ASTM D696 Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 Degrees C and 30 Degrees C with a Vitreous Silica Dilatometer.
 9. ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 10. ASTM D792 Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
 11. ASTM D2344 Standard Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates.
 12. ASTM D2583 Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
 13. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 14. CAN/CSA S806 Design and Construction of Building Structures with Fibre-Reinforced Polymers.
 15. UL 94 UL Standard for Safety Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

1.2 DESIGN REQUIREMENTS

- A. This section contains components and connectors that require Contractor design.

NORTH END SEWAGE TREATMENT PLANT (NEWPCC) HEADEND DISCHARGE WELL
STRUCTURAL UPGRADES
BID OPPORTUNITY NO. 366-2016

1.3 SUBMITTALS

- A. Shop Drawings:
1. Submit engineering calculations or data verifying the capacity of items to meet design requirements. Calculations to be sealed and signed by a Professional Structural Engineer licensed in Province of Manitoba.
 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:
 - a. Show dimensions, weight, size, and location of connections to adjacent supports and other Work.
 - b. Structural calculations for railing, and other fabrications shown, including design loads and other structural parameters considered.
- B. Samples: Each type of grating, railing, and railing connection showing material composition, colour and texture of finish.
- C. Information Submittals:
1. Handling and storage requirements.
 2. Manufacturer's installation instructions.
 3. Factory test reports for physical properties of product.
 - a. Test data for railing and supports may supplement load calculations providing data covers the complete system, including anchorage.
 - b. Test data for all components showing load and deflection due to load, in enough detail to prove railing is strong enough and satisfies national, provincial, local standards, regulations, code requirements, and the Occupational Health and Safety Act, using design loads specified.
 - c. Include test data for the following:
 - 1) Railing and post connections.
 - 2) Railing wall connections.
 - 3) Post and base connections.
 - 4) Railing expansion joint connections.
 4. Manufacturer's Certification of Compliance for specified products.
 5. Fabricator's qualification experience.
 6. Manufacturer's qualification experience.
 7. 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).

NORTH END SEWAGE TREATMENT PLANT (NEWPCC) HEADEND DISCHARGE WELL
STRUCTURAL UPGRADES
BID OPPORTUNITY NO. 366-2016

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 Society of the Plastics Industry of Canada.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Shipment:
1. Insofar as is practical, factory assemble items provided hereunder.
 2. 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. Storage and Handling: In accordance with manufacturer's recommendations and in such a manner as to prevent damage of any kind, including overexposure to sunlight.

1.6 WARRANTY

- A. Submit a two year warranty for work of this Section against defects in materials and workmanship including, but not limited to:
1. Performance failure of units.
 2. Fading, discolouration or evidence of other defects of exterior surface.

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. Provide exterior surfaces with a synthetic surface veil covering.
- E. Furnish molded products as an option where permitted by specifications.
- F. 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.

NORTH END SEWAGE TREATMENT PLANT (NEWPCC) HEADEND DISCHARGE WELL
STRUCTURAL UPGRADES
BID OPPORTUNITY NO. 366-2016

- G. Disperse colour pigment in resin system.
- 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 and CAN/CSA S806.
- 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

- A. General:
 - 1. 5.0 kPa uniform load minimum, unless otherwise shown.
 - 2. Maximum Deflection: 6 mm, unless otherwise shown.
- B. 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.
- C. Hold-Down Clamps: Same material as grating or Type 316 stainless steel.
- D. Bolts, Connectors and Supports:
 - 1. Corrosion-resistant FRP or Type 316 stainless steel.
 - 2. Size and strength to meet Code requirements.
- E. 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 it's falling through clear opening when oriented in span direction when one end is touching either concrete or vertical leg of grating support.
- F. Manufacturers:
 - 1. Fibergrate Composite Structures, Inc.
 - 2. IKG/Borden.
 - 3. Strongwell Corp.

NORTH END SEWAGE TREATMENT PLANT (NEWPCC) HEADEND DISCHARGE WELL
STRUCTURAL UPGRADES
BID OPPORTUNITY NO. 366-2016

2.3 RAILING

- A. Structural Criteria:
1. Design railing system in accordance with the requirements of NBC and CAN/CSA S806, including top rails, posts, mid-rails, brackets, connections, mounts, bases, and anchors.
- B. Thermal Movement:
1. Allow for maximum range of ambient temperature change (difference between high or low and installation temperature).
 2. Temperature Change Range: -30 degrees C to 30 degrees C.
- C. Rails and Posts:
1. 43 mm nominal square or round tubing posts.
 2. 43 mm nominal round or square rails.
 3. Maximum Post Spacing: 1.5 m.
 4. 2-rail system.
- D. Kickplates: Corrugated, 125 mm by 12 mm by 3 mm thick or 125 mm by 14 mm thick at all railing locations.
- E. Kickplate Connectors and Splices: Continuous with provision for expansion and contraction without distortion or buckling.
- F. Connections, Mounts, Bases: Fibreglass or Type 316 stainless steel.
- G. 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

NORTH END SEWAGE TREATMENT PLANT (NEWPCC) HEADEND DISCHARGE WELL
STRUCTURAL UPGRADES
BID OPPORTUNITY NO. 366-2016

Minimum Mechanical Properties	Test Method	Values
Flexural Modulus	Full Section	25.5 x 10 ³ MPa

- H. 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. 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 as shown on approved Shop Drawings.

END OF SECTION