

SPEC NO: ADD-200000-225029

SPECIFICATION FOR GLASSFIBRE REINFORCED PLASTIC PRODUCTS AND FABRICATION

1. GENERAL

1.1 CONTENTS

This specification covers the following GRP Products:

- GRP Grating
- GRP Stair treads

1.2 RELATED DOCUMENTS

- Fibretek Specifications for profiles
- Contract Drawings
- Contract Specifications

1.3 SCOPE OF WORK

To supply material necessary to install the glass reinforced plastic (GRP) grating and stair treads as shown on the drawings and as specified herein.

1.4 QUALITY ASSURANCE

- 1.4.1 The material covered by these specifications shall be furnished by a reputable and qualified manufacturer of proven ability who has regularly engaged in the manufacture and installation of GRP systems.
- 1.4.2 Substitution of any component or modification of system shall be made only when approved by the Consulting or Project Engineer.
- 1.4.3 Fabrication Qualifications: Firm experienced in successfully producing GRP fabrications similar to that indicated for this project, with sufficient production capacity to produce required units without causing delay in the work.
- 1.4.4 Products are manufactured in accordance with procedure manuals and quality inspection sheets.

1.5 DESIGN CRITERIA

- 1.5.1 The design of GRP products shall be in accordance with governing building codes and standards as applicable.
- 1.5.2 Grating deflection at the centre of a simple span shall not exceed 10mm. Deflection in any direction shall not be more than L/200 of span for structural members. Connections shall be designed to transfer the above loads. Loading tests done in accordance with BS 4592 part 4.
- 1.5.3 Appendix A: Loading capacity Table for Fibretek Gratings

1.6 SUBMITTALS

- 1.6.1 Shop drawings of all GRP structural members, grating and stair treads shall be submitted to the Engineer for approval.
- 1.6.2 Manufacturer's catalogue data showing:
1. Dimensions, spacing and construction of grating
 2. Design tables showing limits for span length and deflection under various uniform and concentrated loads
 3. Materials of construction
- 1.6.3 Detail shop drawings shown:
1. Dimensions of gratings, stair treads and structural members
 2. Sectional assembly
 3. Location and identification mark
 4. Size and type of supporting frames required
- 1.6.4 Samples of each type of grating proposed shall be submitted for approval prior to placement of purchase orders.

1.7 SHIPPING AND STORAGE INSTRUCTIONS

- 1.7.1 All systems, sub-systems and structures shall be shop fabricated and assembled into the largest practical size suitable for transporting.
- 1.7.2 All materials and equipment necessary for the fabrication and installation of the grating, stair treads and structural shapes shall be stored before, during and after shipment in a manner to prevent cracking, twisting, bending, breaking, chipping or damage due to over exposure to the sun. Any material which, in the opinion of the Engineer, has become damaged as to be unfit for use, shall be promptly removed from the site of work, and the Contractor shall receive no compensation for the damaged material or its removal.
- 1.7.3 Identify and match-mark all materials, items and fabrications for installation and field assembly.

2. PRODUCTS

2.1 GENERAL

- 2.1.1 Materials used in the manufacture of the GRP products shall be new stock of the best quality and shall be free from all defects and imperfections that might affect the performance of the finished product.
- 2.1.2 All materials shall be of the kind and quality specified, and where the quality is not specified, it shall be the best of the respective kinds and suitable for the purpose intended.

- 2.1.3 All GRP products noted in 1.1 shall be manufactured using a pultruded process utilizing either an isophthalic polyester or a vinyl ester resin with ultra-violet (UV) inhibitor additives. A synthetic surface veil shall be the outermost layer covering the exterior surface. Isophthalic polyester resin is available with flame-retardant additives, which will achieve a Class 1 rating for flame spread in accordance with SABS 0177:Part IV "Surface fire index test for floor coverings".
- 2.1.4 After fabrication, all cut ends, holes and abrasions of GRP shapes shall be sealed with a compatible resin coating to prevent intrusion or moisture.
- 2.1.5 GRP products exposed to weather shall contain an ultraviolet inhibitor and shall additionally receive one mil thick UV coating to shield from ultra-violet light if specified or requested.
- 2.1.6 All exposed surfaces shall be smooth and true to form.
- 2.1.7 Manufacturers:
1. Fibretek Pultrusion Technology
 2. Or approved equal

2.2 GRATINGS AND TREADS

2.2.1 General

- A. Grating shall be shipped from the manufacturer, palletised and banded with exposed edges protected by cardboard to prevent damage in shipment
- B. Each piece shall be clearly marked showing manufacturer's applicable drawing number.
- C. Grating shall be Fibretek GRP pultruded grating.

2.2.2 Design

- A. The panels shall be 25mm or 38mm deep and sustain a deflection of no more than 10mm under a uniform distributed load for the span lengths shown in the table (AppendixA).
- B. The bearing bars shall be joined into panels by passing continuous length fibreglass pultruded cross rods through the web of each bearing bars. The pultruded cross assembly shall consist of one cross rod spacer that have notches cut into them at 30mm or 40mm on centre to fit the distance between the web of each bearing bar. A continuous fibreglass pultruded bar shaped section shall be wedged between the two cross rod spacers mechanically locking the notches in the cross rod spacers to the web of the bearing bars. Chemical bonding shall be achieved between the cross rod spacer and the bearing web and between the bar shaped wedge and the cross rod spacer locking the entire panel together to give a panel that resists twist and prevents internal movement of the bearing bars.
- C. The top surface of all panels shall have a non-skid grid affixed to the surface by a cured resin followed by a topcoat of cured resin.

- D. Panels shall be fabricated to the sizes shown on the drawings.
- E. Hold down clamps shall be type 316L stainless steel. A minimum of 4 each per panel. Clamps to be supplied by the GRP manufacturer.
- F. Colour shall be grey. (OSHA safety grey)
- G. All bearing bars that are to be exposed to UV shall be coated (optional) with polyurethane coating of a minimum thickness of 1mm if desired.

2.2.3 Products

- A. The GRP grating (Appendix B) and stair treads (Appendix C), shall be fabricated from bearing bars and cross rod manufactured by the pultrusion process. The bearing bars shall be 25 or 38mm deep with an 8mm wide top flange, a 7mm wide bottom flange and a web thickness of 5mm. The glass fibre reinforcement for the bearing bars shall be a core of continuous glass strand roving wrapped with continuous strand glass mat. A synthetic surface veil shall be the outermost layer covering the exterior surfaces.
- B. Fibreglass Grating and Stair Treads
 - 1) Fibreglass grating and stair treads shall be made from a premium grade chemical resistant, isophthalic polyester or vinyl ester resin system. UV inhibitors are added to the resin.
- C. Grating with a Solid Top
 - 1) Grating shall be the same as described above in this section.
 - 2) The solid top shall be Fibretek Flatsheet
 - 3) The flatsheet shall be manufactured using a premium grade iso-polyester or vinyl ester resin. Flatsheet shall contain an UV inhibitor.
 - 4) The solid top will be epoxy bonded to the grating, and a non-skid grid will be affixed to the top surface of the assembly by a cured resin, followed by a topcoat of resin.
- D. All cut and machinery edges, holes and abrasions shall be sealed with a resin compatible with the resin matrix used in the bearing bars and cross rods.
- E. All panels shall be fabricated to the sizes shown on the approved shop drawing.

2.3 STRUCTURAL SHAPES

- A. Structural shapes shall be made from a premium grade iso-polyester or vinyl ester resin. All structural shapes shall contain a UV inhibitor.
- B. Manufactured by the pultrusion process

Structural GRP members composition shall consist of a glass fibre reinforced polyester or vinyl ester resin matrix, approximately 50% resin to glass ratio. A synthetic surface veil shall be the outermost layer covering the exterior surfaces. Continuous glass strand roving shall be used internally for longitudinal strength. Continuous strand glass mats shall be used internally for transverse strength.

- C. The following minimum mechanical properties shall apply:

**Table 1 - Fibreglass Pultruded Material Properties
Minimum ultimate coupon properties (UN)**

Material Properties	ASTM Test Method	(Mpa)
Pultruded Fibreglass Structural Shapes		
Ultimate tensile stress in longitudinal direction	D638	207
Ultimate compressive stress in longitudinal direction	D695	207
Ultimate flexural stress in longitudinal direction	D790	207
Ultimate short beam shear in longitudinal direction	D2344	31
Ultimate tensile stress in transverse direction	D638	48
Ultimate compressive stress in transverse direction	D695	103
Ultimate flexural stress in transverse direction	D790	69
Density (g/cm ³)	D792	1.66-1.94
Water absorption (24-h immersion)	D570	0.60 max, % by weight
Barcol Hardness	D2583	45
Coefficient of thermal Expansion	D696	8
	-	4.4
Thermal conductivity	C177	4