

SPEC NO: ADD-200000-225032
SPECIFICATION FOR GLASSFIBRE REINFORCED PLASTIC
PRODUCTS AND FABRICATION

1. GENERAL

1.1 CONTENTS

This specification covers the following GRP Products:

- GRP Cable ladders

1.2 RELATED DOCUMENTS

- Fibretek Specifications for profiles
- Contract Drawings
- Contract Specifications

1.3 SCOPE OF WORK

To supply all material necessary to install the glass reinforced plastic (GRP) cable ladders 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 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 In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work.

1.5 DESIGN CRITERIA

- 1.5.1 The design of GRP products shall be in accordance with governing building codes and standards as applicable. The Fibretek cable ladder conforms to the internationally recognised NEMA FG1 Class A, with a load capacity of 75kg/lineal metre and maximum recommended span of 3.5 metre.

1.6 SUBMITTALS

1.6.1 Shop drawings of all GRP cable ladders shall be submitted to the Engineer for approval.

1.6.2 Manufacturer's catalogue data showing:

1. Dimensions, spacing and construction of cable ladder
2. Materials of construction

1.6.3 Detail shop drawings shown:

1. Dimensions of cable ladder
2. Sectional assembly
3. Location and identification mark

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 necessary for the fabrication and installation of the cable ladders 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 flame spread of 25 or less in accordance with ASTM E 84.

- 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. Fibretex Pultrusion Technology
 2. Or approved equal

2.2 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 rovings 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)**

<u>Material Properties</u>	<u>Test Method</u>	<u>Values</u>
Tensile Stress	ASTM D638	206.8 MPa
Tensile Modules	ASTM D638	17.2 GPa
Compressive Stress	ASTM D695	206.8 MPa
Compressive Modules	ASTM D695	17.2 GPa
Flexural Stress	ASTM D790	206.8MPa
Flexural Modules	ASTM D790	11 031.6MPa
Shear Stress	ASTM D2344	31.0 MPa
Density	ASTM D792	1.661 – 1.938 glcc ³
24 hr. Water Absorption	ASTM D570	0.6% max
Coef. of Thermal Expansion	ASTM D696	4.4 x 10 ⁻⁶
Flexural Stress	Full Section	2482.1 MPa
Flexural Modules	Full Section	25510.6 MPa

3. GLASS FIBRE REINFORCED PLASTIC (GRP) CABLE LADDERS

3.1 SCOPE

This specification covers glass fibre reinforced plastic (GRP) cable ladders fabricated from structural sections produced by the pultrusion process.

3.2 DESIGN CRITERIA

- 1.7.4 The Fibretek cable ladder conforms to the internationally recognised NEMA FG1 Class A, with a load capacity of 75kg/lineal metre and maximum recommended span of 3.5 metre. The ladder shall also be capable of supporting a concentrated vertical load of 500kg applied at the mid-span of the rung.

3.3 MATERIALS & CONSTRUCTION

- 3.3.1 The side rails and rungs shall be fibreglass-reinforced pultruded (isophthalic polyester or Vinyl ester) with a grey pigment. An industrial grade polyurethane coating may be applied to the finished ladder for outdoor application.
- 3.3.2 The side rails shall be an E section channel 75 x 35 x 5mm and the rungs shall be a square box bearer bar with dimensions 25x25x3mm. Dowels (\varnothing 8mm) and polyurethane adhesive is used for the connection between the cross rung and side rail. The spacing between rungs is 300mm.
- 3.3.3 The following GRP accessories is available:
- 90° Bends
 - 45° Bends
 - Equal T's
 - 4 Ways
 - Reducers
 - Splice sets
- 3.3.4 Fibreglass rails, rungs and solid rod to be manufactured by Fibretek Pultrusion Technology.