

Moulded Fibreglass Grating and Pultruded Structural Fabrications

Design Manual

Part 1. General

- 1.01 Related documents
- A Contract drawings
 - B General specification sections
- 1.02 Summary
- A This section includes:
 1. GRP grating and stair treads
 2. GRP embedment angles
 3. GRP structural fabrications
 4. GRP stairs
 5. GRP handrails
 6. GRP ladders and safety cages
- 1.03 Scope of works
- A The contractor shall supply all labour, materials and equipment as required to properly install all GRP products specified herein.
- 1.04 Quality Assurance
- A All GRP products and fabrications shall be supplied by an experienced company who has continually engaged in the manufacture or fabrication of fibreglass reinforced plastic for a minimum of 5 years.
 - B The installation contractor shall assure that all dimensions are taken accurately and communicated properly to the fabricator. The installation contractor shall also ensure that all manufacturers instructions and recommendations are carried out.
 - C No substitution of materials will be accepted unless they are submitted for review and the Architect/Engineer approves their use.
- 1.05 Design Requirements
- A All GRP gratings shall fully conform to BS4592 part 4 1992 as it pertains to worker safety and dimensions.
 - B GRP grating shall be designed to support 5kn sqm. Deflection shall not exceed 1/100th of the width.
 - C GRP Pultruded structural profiles shall conform to BS EN 13706 Part 2 2002.
 - D Stairs, ladders and walkways shall conform to BS5395 Part 3 1985.
- 1.06 Submittals
- A Submit complete shop drawings and engineering data for all GRP materials and fabrications as required by the scope of work.
 - B
 - 1 Manufacturers catalogue with load data for all GRP gratings.
 - 2 Manufacturers catalogue with data for all structural profiles.
 - 3 Drawings showing all GRP materials are required and include all dimensions, fasteners, tolerances, assembly and installation details.

Part 2. Products

- 2.01 General
- A All GRP materials shall be manufactured with either isophthalic or vinyl ester resins.
 - B All structural profiles shall be manufactured using chopped strand roving, transverse mat and synthetic veil including UV light inhibitors.
 - C All structural profiles shall be fire retardant and conform to ASTM E-84 class 1 flame spread of 20 or less. Also to BS 476 class 1 and receive a class 1 flame spread of 20 or less.
 - D After fabrication all cuts, holes and abrasions shall be sealed to prevent corrosion.

- 2.02 GRP Grating and Stair Treads
- A GRP grating shall be moulded fibreglass grating made with either isophthalic polyester or vinyl ester resins.
 - B Grating shall be either 25mm, 38mm or 50mm thick according to the application and loadings required.
 - C Colour may be selected from the RAL colour range.
 - D All gratings to have UV inhibitors.
 - E All gratings and stair treads shall have integral grit surface for added slip resistance.
 - F Stair treads shall have a 38mm black nosing for added contrast.
 - G All gratings and stair treads shall be attached using 316 stainless steel grating clips. A minimum of 4 clips per piece shall be used.
 - H Manufacturers. Anglia Composites Ltd 01787 377 322.

- 2.03 GRP Embedment Angles
- A All GRP gratings set in concrete openings shall have a GRP embedment angle frame.
 - B Embedment angles shall be of the correct depth to suit the grating to be installed and shall have a minimum 30mm support for gratings.
 - C Embedment angle shall have a continuous integral anchor.
 - D GRP embedment angles to be manufactured from vinyl ester resin.
 - E Manufacturers. Anglia Composites Ltd 01787 377 322.

- 2.04 GRP Structural Profiles
- A Minimum Physical Properties (E17 Grade)

Property	Unit	Test Method	Properties
1.1 Full section test	GPa	Annex D EN13706-2	17
1.2 Tension modulus-axial	GPa	EN ISO 527-4	17
1.3 Tension modulus-transverse	GPa	EN ISO 527-4	5
1.4 Tension strength-axial	MPa	EN ISO 527-4	170
1.5 Tension strength-transverse	MPa	EN ISO 527-4	30
1.6 Pin bearing strength-axial	MPa	Annex E EN13706-2	90
1.7 Pin bearing strength-transverse	MPa	Annex E EN13706-2	50
1.8 Flexural strength-axial	MPa	EN ISO 14125	170
1.9 Flexural strength-transverse	MPa	EN ISO 14125	70
1.10 Interlaminar shear strength-axial	MPa	EN ISO 14125	15

- B Structural profiles shall be fabricated as per the drawings with good quality workmanship, closely fitted joints and in accurate position to permit installation and proper jointing of parts on site.
- C All fixings shall be 316 stainless steel.
- D All joint surfaces to be bonded shall be properly abraded to remove surface shine and be free of burrs or other foreign materials that would prevent proper adhesion.
- E Use high-strength epoxy adhesives designed for use with GRP and mechanical fasteners.
- F All pieces shall be clearly marked and identified.
- G Shop assemble pieces into the largest practical assembly suitable for shipping.
- H Manufacturers. Anglia Composites Ltd 01787 377 322.

- 2.05 GRP Stairs
- A Fabricate from GRP structural profiles as noted in section 2.04.
 - B Refer to BS 5395 Part 3 for minimum and maximum riser and going dimensions.
 - C Use stair treads as specified in section 2.02.
 - D Use GRP handrails as specified in section 2.06.
 - E Use stainless steel fixings throughout.
 - F Manufacturers. Anglia Composites Ltd 01787 377 322.

- 2.06 GRP Handrails
- A The handrail system profiles shall be manufactured using either isophthalic or vinyl ester resins.
 - B All handrail profiles shall be fire retardant as specified in section 2.01 part C.
 - C Handrail posts shall be 50 x 50 x 6 square tube.
 - D All handrail components shall be manufactured in either yellow or grey.
 - E All post to rail connections to be fully bonded.
 - F GRP handrail system shall have a minimum of one top rail, one midrail and one kick plate.
 - G Manufacturers. Anglia Composites Ltd 01787 377 322.
- 2.07 GRP Ladders and Safety Cages
- A Ladders and safety cages shall be manufactured using either isophthalic or vinyl ester resins.
 - B All ladder and safety cages shall be fire retardant as specified in section 2.01 part C.
 - C Ladder rails shall be 50 x 50 x 6 square tube. Ladder rungs shall be 32 dia splined tube.
 - D Ladders and safety cages shall be manufactured in either yellow or grey.
 - E Ladder rungs shall penetrate into the posts and fixed into place using 4 No. 316 stainless steel fixings to prevent rung rotation.
 - F Ladder stand-off brackets are to be GRP or 316 stainless steel and to be installed at a maximum 2000mm centres. All fixings shall be 316 stainless steel.
 - G Ladder cages, if required, shall be fabricated from GRP hoops and straps. GRP hoops shall be manufactured from 100mm x 6mm. GRP straps shall be 40mm x 20mm x 3mm 'U' section. Hoops and straps shall be bonded with epoxy resin and bolted together using 316 stainless steel fixings.
 - H Manufacturers. Anglia Composites Ltd 01787 377 322.

Part 3. Execution

3.01 Inspection

- A Upon receipt of materials at job site, the contractor shall inspect all materials for shipping damage.

3.02 Handling and Storage

- A Handle all GRP materials with reasonable care to prevent damage. Do not drag GRP materials.
- B IF GRP materials are not being installed immediately, store to prevent twisting, bending or breakages of any kind.

3.03 Installation

- A Installation contractor shall co-ordinate and verify that other construction trades and materials as per the contract drawings and that they are accurate in location, alignment, elevation and are plumb and level.
- B Install GRP materials in accordance with the installation drawings as supplied by the GRP supplier.
- C Install materials accurately in location and elevation ensuring all materials are level and plumb.
- D All field cuts, holes and abrasions must be sealed with resin to prevent corrosion.

END