

## **GLASSFIBER REINFORCED PLASTICS (GRP) PRODUCTS**

### **GENERAL**

All Glass Reinforced Plastic (GRP) Products shall be designed, supplied and installed by Yeung's Fiberglass Company, a Specialist Contractors in the "Supply and Installation of Glass (or Fibre) Reinforced Plastic Units" category of the list of approved Suppliers of Materials and Specialist Contractors for Public Works of HKSAR Government.

The Contractor should be in the approved list of registered sub-contractor under PROVISIONAL CONSTRUCTION INDUSTRY CO-ORDINATION BOARD of Hong Kong and should have more than 20 years proven solid experiences on manufacturing GRP Products.

ISO 9001:2000 certification must be obtained and submitted in tender stage.

### **PERFORMANCE**

- (1) The design loads and effects for the Products including fixings and supports shall be those specified by the Consulting Engineer.
- (2) The maximum deflection shall not exceed 1% of the span measured between centres of consecutive supports.

### **GRP MATERIAL AND PROFILES**

Glass Reinforced Plastic Sheets to Quality Control BS 4154: Part 1 with thermo-setting polyester resin to BS 3532:

- (a) Profile : as shown on the drawing;
- (b) Light Diffusion Class : Very heavily diffusing;
- (c) Colour : To approval
- (d) GRP Shall be ultra-violet resistant and special high quality pigment shall be adopted for the gel coat layer to avoid rapid discoloring
- (e) GRP shall have a hardness, as measured by the Barcol test, of 35 minimum
- (f) Colour shall be uniform across the GRP panel
- (g) The Contractor shall provide setting drawings, templates, directions, and similar aids for ensuring adequate / proper support of the work.
- (h) The surface of the GRP panel shall exhibit no sign of crazing on any surface.
- (i) Fulfill Impact Test based on BS 6206 and must be carried out by the University of Hong Kong
- (j) GRP external finish shall be in a plain gloss colour with an isophthalic colours fast gel coat. Colour shall be to the Engineer's approval.
- (k) GRP internal finish shall be a coloured stipple finish to the Engineer's approval.
- (l) The Contractor shall be responsible for the establishment of panel dimensions based upon site measurement.

- (m) A full scale sample panel for each panel shall be submitted to the Engineer for approval of colour, texture, finish, consistency and tolerance prior to production and incorporation in the works. The place of inspection shall be approved by the Engineer.
- (n) The Contractor shall submit to the Engineer copies of the GRP manufacturer's record sheets for each unit produced stating:
- (i) Details of casting
  - (ii) Resin Mix and Type
  - (iii) Mass of fibre and Type
  - (iv) Panel Weight
  - (v) Detail of finishes
  - (vi) Mechanical Properties Test Report
- GRP Panel must have the following mechanical properties (Yeung's Test Report)
- |                               |   |                             |
|-------------------------------|---|-----------------------------|
| Type of GRP Laminate          | = | 35% glass content by weight |
| Tensile Strength              | = | 171 Nmm <sup>-2</sup>       |
| Elongation                    | = | 1.8 %                       |
| Tensile Modulus               | = | 12600 Nmm <sup>-2</sup>     |
| Compress Strength             | = | 102 Nmm <sup>-2</sup>       |
| Flexural Strength             | = | 250 Nmm <sup>-2</sup>       |
| Flexural Modulus              | = | 12810 Nmm <sup>-2</sup>     |
| Inter-laminate Shear Strength | = | 18.5 Nmm <sup>-2</sup>      |
- (o) Marked with the manufacturer's name or trademark, the BS number 4154 and the designation of samples tested to BS 476: Part 3
- (p) GRP Products shall comply with Fire Retardant Requirement BS 476 Part 3, 6 and 7 Standard and test reports of these tests shall be submitted in tender

#### ATTACHMENT OF GRP

- (a) Layout and install each item in accordance with approved shop drawing
- (b) Space screw fasteners at 300mm c.c max. around GRP units
- (c) At all exposed screw fasteners locations, countersink the GRP and set the screw heads below the finish surface

#### FINISHING OF JOINTS

- (a) Fit GRP units as tightly together as possible along joint lines
- (b) Where butt joint result in a gap less than 6mm its widest point, fill the opening with resin paste with pigmented colour.
- (c) Where butt joint result in a gap 6mm or wider at its narrowest point, fill the opening with chopped strand mat and resin paste with pigmented colour
- (d) Finish all joint surfaces, including screw fastener depressions, to match adjacent GRP unit surfaces.

- (e) Sand the surfaces before any finish is applied.
- (f) Prepare joint surfaces as specified for other surfaces, and apply painting materials to match and blend with adjacent finishes such that joint lines will be imperceptible in the finish work.

#### **SITE DELIVERY AND STORAGE**

- (1) Before delivery to Site the Contractor shall set aside an area for storage of the GRP units
- (2) The storage area shall be dry, protected from direct sunlight, secure and clearly designated for the sole purpose of storing GRP units.
- (3) During storage the GRP units shall be supported along the edges over their full length and kept out of direct sunlight. Separating pieces, to the manufacturer's recommendations, shall be inserted between all units.

#### **ERECTION OF GRP UNITS**

- (1) All GRP units shall be protected against damage during transport storage and construction operations as recommended by the manufacturer until handover of the structure to the Employer.
- (2) The handling and method of erection of the GRP units shall be to the manufacturer's recommendations.

#### **CLEANING OF GRP UNITS**

- (1) The GRP units shall be hosed down with clean fresh water to remove any dust build up.
- (2) No abrasive materials or scouring action shall be used which will score the surface.
- (3) For removal of any stubborn dirt the manufacturer shall be consulted for recommendations.