TECHNICAL SPECIFICATION

NIT No.: SRO/MKT/TH/367

January 22, 2015

1. FIBRE GLASS REINFORCED PLASTIC (FRP) DOOR FRAMES

1.0 Door Frames shall be three legged of cross section 90 mm x 45 mm having single rebate of size 32 mm x 15 mm to receive shutter of 30 mm thickness. The frame shall be made of laminate of thickness of 2 mm and shall be filled with wooden blocks of exterior grade MDF or seasoned and treated hard wood inside the laminate in all the three legs of the frame. The frame to be moulded by either hand lay up or resin transfer moulding process. The process shall consist of laying gelcoat at 1000 g/m² and laid over with layer of FRP Mat (CSM mat) gelcoat and FRP (CSM Mat) are defined in IS 14856.

The CSM mat shall be bonded with Isophatholic resin in the ratio not less than 1:2 (One part of Mat to two parts of Isophathic resin and fillers & additives) by weight. The edge shall be sealed with gelcoat and FRP mat to obtain smooth finish. Sufficient roving shall be laid in the corner to have smooth curve while laying the CSM mat.

1.1 FRP door shall be manufactured as per specifications laid down in IS 14856, nomenclature of items & direction of Engineer-in-Charge.

1.2 Tolerance
As per CPWD specification.

1.3 Finish
The surface of the moulded frame shall be free from any visible defects such as small pores, crazing, blistering, wrinkling, impurities, defective impregnation, colour blots and aggregate defects, as mentioned in IS 14856. Scattered pin holes duly repaired and finished by applying resin and not noticeable shall be acceptable. Frame laminate shall be flat and shall have smooth and level surface. Laminate shall be finished in colour & shade as approved by Engineer-in-Charge.

1.4 Fixing of Frame
The frames are to be fixed in prepared openings in the walls. All civil work and tiling should be completed before the fixing of the frames. The frames are to be fixed directly on the plastered wall. In case tiling is to be done in the place the frames are to be fitted, a 50 mm strip should be left untiled at the location where the frames are to be fitted. The frames are erected in the prepared opening such that the vertical members of the door frame are embedded 50 mm in the floor. The frame shall be fitted truly in plumb. A minimum of three anchor bolts or screws of size 65/100 shall be used to fix each vertical member. One bolt shall be fixed at 200 mm from the top member and one bolt shall be fixed at 200 mm from the floor. The third anchor bolt shall be fixed in the center. The top horizontal member shall be fixed using two 65/100 size anchor bolts or screws at a distance of 200 mm from both the corners.

1.5 Measurement
The outer length of the vertical and horizontal members of FRP door frame shall be measured in running metres including embedded length in floor corrected upto a cm.
2. FIBRE GLASS REINFORCED PLASTIC (F.R.P.) SHUTTERS

2.1 F.R.P. Shutters shall be manufactured conforming to the specifications as per IS 14856 and nomenclature of item & direction of Engineer-in-Chargee.

2.2 Blocks of any seasoned hardwood of bulk density not less than 450 kg./m$^3$ at 12 per cent moisture content or any other material of sufficient thickness and length shall be provided inside the shutter at suitable place to hold fittings and fixtures such as aldrops, tower bolt, handle, sliding door bolt, mortice lock etc. Blocks for hinges shall be provided at three locations, unless otherwise specified by the purchaser. One at the centre and other two at 200 mm from the top and the bottom of the shutter. Blocks shall be provided at predetermined places in the shutter so as to fix hinges mortice locks, tower bolts, aldrops, door closures, etc. The finished surface shall be buffed and polished with wax.

2.3 Location of Fittings and Accessories
The lock rail of door shutters shall be so placed that its centre line is at a height 850 + 5 mm from the bottom of the shutter. Door shutter shall be fixed to the frame with three hinges, unless otherwise specified by the purchaser, of the type specified. These locations shall be, one at centre and other two at 200 mm from the top and the bottom of the shutter, where blocks have already been provided and suitable indication by depressing the profile has been made. Screws for fixing the hinges shall be screwed in with screwdrivers & not hammered. The length of screw should be 8/30 mm. The hinges used shall be stainless steel or aluminum.

2.4 Sampling & Criteria for Conformity

2.4.1 General Precautions

2.4.1.1 The test specimens shall not have been exposed to a temperature below 40oC for 24 hours immediately preceding the test and shall be free from all visible moisture. The specimen shall be inspected and any specimen with visible flaws shall be discarded.

2.4.1.2 If any test specimen fails because of mechanical reason, such as failure of testing equipment or improper specimen preparation, it shall be discarded and another specimen taken.

2.4.2 Sampling

2.4.2.1 Sampling criteria for conformity shall be in accordance with IS 4020 (Part –I)

2.4.2.2 Lot in any consignment of shutters shall be of the same grade and type and manufactured under similar conditions of production which shall be grouped together to form a lot.

2.4.2.3 The number of shutters to be selected at random from a lot shall depend upon its size and shall be in accordance with Col. 1 and Col. 2 of Table 1.1.
Table 1.1

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Sample size</th>
<th>Permissible</th>
<th>No. of Defects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>26 to 50</td>
<td>8</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>51 to 100</td>
<td>13</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>101 to 150</td>
<td>20</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>151 to 300</td>
<td>32</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>301 to 500</td>
<td>50</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>501 and above</td>
<td>80</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

2.5 Finish

As per clause 1.3.

2.6 Tests

The door shutters shall be subjected to the following tests in accordance with IS 4020 (Part 1 to 16).

(a) Dimension and Squareness Test: Door shutters when tested in accordance with IS 4020 (Part 2) the dimensions of nominal width and height will be within a limit of + 5 mm. The door shutter shall not deviate by more than 1 mm on a length of 500 mm. The thickness of the door shutter shall be uniform throughout with the permissible variation of not more than 0.8 mm between any two points. The nominal thickness of the shutter shall be within a limit of + 1.5 mm.

(b) General Flatness Test: Door shutter, when tested in accordance with IS 4020 (Part 3) the twist, cupping and warping shall not exceed 6 mm.

(c) Local Planeness Test: Door shutters, when tested in accordance with IS 4020 (Part 4), the depth of deviation measured at any point shall not be more than 0.5 mm.

(d) Impact Indentation Test: Door shutters, when tested in accordance with IS 4020 (Part 5), shall have no defects such as cracking, tearing or delamination and the depth of indentation shall not be more than 0.2 mm.

(e) Edge Loading Test: Door shutters, when tested in accordance with IS 4020 (Part 7) the deflection of the edge at the maximum load shall not be more than 5 mm. On removal of the loads, the residual deflection shall not be more than 0.5 mm, failing which the test may be repeated on the other edge in the reverse direction. Also there shall be no lateral buckling by more than 2 mm during loaded condition and no residual lateral buckling after removal of the load.

(f) Shock Resistance Test: Door shutters, when tested in accordance with 2.1 of IS 4020 (Part 8), there shall be no visible damage in any part of the door after twenty five blows on each end.

(g) Buckling Test: Door shutters, when tested in accordance with IS 4020 (Part 9), shall not show any deterioration and any residual deformation more than 5 mm after 15 min. of unloading and the initial deflection also shall not be more than 50 mm.
(h) **Slamming Test** : Door shutters, when tested in accordance with 2.1 of IS 4020 (Part 10), shall not have any damage in any part of the door at the end of successive impacts. Door shutters, when tested in accordance with 3.1 of IS 4020 (Part 10), shall not have any visible damage in part of the door at the end of 100 successive impacts.

(i) **Misuse Test** : Door shutters, when tested in accordance with IS 4020 (Part 11), there shall not be any permanent deformation of the fixing or any other part of the door set in hindering its normal working after the test.

### 2.7 Fixing of Shutter

FRP door shutter shall be side hung on three bolt hinges of size 100 mm, one at the centre and the other two at 200 mm from the top and bottom of the shutter. The flat of the hinges shall be neatly counter sunk in to the recesses cut out to the exact dimensions of the hinge flap. The door shall be drilled on the thickness to fit hinges. Screws for fixing the hinges shall be screwed in with screwdrivers and not hammered. The length of the screws should be 8 mm/30 mm. The hinges used should be of stainless steel.

### 2.8 Tolerance

As per CPWD specification.

### 2.9 Measurement

Length and width of the shutters shall be measured to the nearest cm in closed position covering the rebates of the frames but excluding the gap between the shutter and the frame. Area is calculated to the nearest 0.01 sqm.