

S.No-20



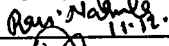

RAIL COACH FACTORY KAPURTHALA
(MECHANICAL DESIGN DEPARTMENT)

SCHEDULE OF TECHNICAL REQUIREMENTS OF FRP LAVATORY MODULE

MDTS 003 REV-1

PAGE OF

Dt. 03.12.2001

NAME	DESIGNATION	SIGN	DATE	LEVEL
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REV. NO.	DETAILS OF CHANGES	DATE
0.0	First Issue	FEB. 1993
1.0	i) CLAUSE 2.1.1, 2.1.1.2, 2.1.1.3, 2.1.1.4, , 2.1.2.2, 2.1.5, 2.1.6, 5.1, 5.2.2, 5.2.4, 5.2.5, 5.2.6 REVISED. ii) CLAUSE 2.1.1.1, 2.1.1.5, 2.1.1.6, 2.1.1.7, 2.1.2.1, 2.1.2.3 to 2.1.2.7, 5.2.1, 5.2.7, 5.2.8, 5.3, 7.0 & 7.1 ADDED. iii) CLAUSE 5.2 DELETED.	DEC 2001


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MDTS 003 REV-1

PAGE 1 OF 5

Dt. 03.12.2001

1.0 **SCOPE**

This schedule covers the technical requirements, method of sampling and testing of lavatory module fabricated from resin and fibre glass to be used in various types of coaches in RCF by hand lamination process.

2.0 **REQUIREMENTS**

2.1 Lavatory modules shall consist of resin, fibre reinforcement and additives processed uniformly.

2.1.1 The resin shall be isopathalic fire retardant to IS: 6746-94 type-I with following values.

2.1.1.1 Colour: The colour of the resin shall be slightly thick cream to white. It should be opaque liquid of uniform consistency and free from agglomerates possessing hand-laying properties.

2.1.1.2 Viscosity: Viscosity of resin when tested with Brookfield Viscometer shall be 800 to 1200 cps when tested at 25 degree Cel. as per annex. - 'A' of IS: 6746-94. and easy to apply by brush for hand laying process

2.1.1.3 Acid Value: The acid value of resin when expressed as mgKOH/G shall be 15 (max) , when tested as per Annex.-B of IS: 6746-94.

2.1.1.4 Volatile Content: The Volatile Content shall be $33\pm 3\%$ when tested as per Annex.-C of IS: 6746-94.

2.1.1.5 Gel Time: The details of catalyst and accelerator and their mixing ratios shall be furnished by the supplier and after mixing of the same in the proper proportion, the gel time of the resin system shall be 20 ± 5 minutes at 25°C , when tested as per Annex. - D of IS: 6746-94.

2.1.1.6 Relative density shall be between 1.15 to 1.25 at 27°C , when tested as per Annex.- F of IS: 6746-94.



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MDTS 003 REV-1

PAGE 2 OF 5

Dt. 03.12.2001

2.1.1.7 Styrene content : Max. styrene contents shall be 27 % of total mass when tested as per Annex. 'M' of IS: 6746-94.

2.1.2 Properties of Cured Cast Resin :

A clear cast resin sample (without reinforcement) of thickness 3 ± 0.15 made from resin system followed by 24 hours curing at room temperature and 4 hrs. post curing at 70°C shall possess following properties.

2.1.2.1 Physical state : Hard and tough

2.1.2.2 Barcol Hardness : 42 to 45, when tested as per Annex. - 'J' of IS: 6746-94.

2.1.2.3 Percentage water absorption : 0.5% (Test as per Annex.K of IS: 6746-94).

2.1.2.4 Oxygen index : 28 minimum [Test as per IS: 13360 (Part 6 / Sec. 6)-92] *

2.1.2.5 Tensile strength (kg/cm sq.) : 400 Min. (Test as per IS: 1998-62).

2.1.2.6 Cross breaking strength (kg/cm sq.) : 350 Min. (Test as per IS: 1998-62)

2.1.2.7 Heat deflection temp. : 90°C Min. (Test as per Annex.-H of IS: 13411-92)

2.1.3 The accelerator and catalyst should be compatible with above resin.

2.1.4 The pigment should suit the above resin.

2.1.5 The fibre glass chopped strand mat of density $450\text{gm}/\text{m}^2$ to IS:11551-96 with polyester resin system (Three layers).

2.1.6 Woven roving of density $360\text{gm}/\text{m}^2$ to IS : 11273-92 Type 'C' (one layer)

2.1.7 Fibre glass surface mat of density $30\text{gm}/\text{m}^2$ one layer on top.

2.1.8 No filler should be used.


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MDTS 003 REV-1

PAGE 3 OF 5

Dt. 03.12.2001

2.2 DIMENSION AND TOLERANCE

Dimensions and tolerances shall be as per relevant contract drawing for manufacturing of lavatory modules.

2.3 The lavatory modules are required to withstand the prevailing environmental temp. variations of 0 to 65°C.

2.4 WORKMANSHIP AND FINISH

The lavatory module shall be free from gel cracks, blisters, porosity, air bubbles and other surface defects.

2.5 The weight of lavatory module shall be as per relevant contract drawings.

3.0 IN PROCESS INSPECTION

The supplier shall permit in process inspection of FRP components during manufacturing for checks to be carried out so that the components are being manufactured according to this specification.

4.0 THICKNESS

Measure the thickness of lavatory modules in condition as received at 10 points equally spaced of the sheet and take average value.

5.0 TEST

Test shall be carried out on finished component as per method given for respective properties at temp. 15 to 35°C and relative humidity 45-75%.

5.1 Samples shall be selected at random from each lot of lavatory module .

5.2 These test specimens when tested as per the method of test indicated against each test shall confirm to the requirement as laid down in table-1 .



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MDTS 003 REV-1

PAGE 4 OF 5

Dt. 03.12.2001

TABLE-1

S. NO.	Properties	Method of test	Specific value
5.2.1	Specific gravity	IS:8543(Pt.1/Sec2)-79	1.2 ± 0.2
5.2.2	Flammability	As per clause 5.3	Self extinguishing
5.2.3	Fibre glass content	IS: 12866-89 Annex.A	Not less than 30 %
5.2.4	Water absorption	IS: 12866-89 Annex. B	0.5 % (max.)
5.2.5	Flexural Strength at Rupture	IS: 13411-92 Annex. F	900Kg/cm ²
5.2.6	Tensile strength	IS : 1998-62	500 Kg/cm ² (Minimum)
5.2.7	Compressive strength	IS: 1998-62	1100 Kg/cm ² (min.)
5.2.8	Izod strength	IS: 1998-62	500 Joule/Mtr.(min.)

5.3 TEST FOR RESISTANCE TO SPREAD OF FLAME

The material shall be tested for resistance to spread of flame in the manner given below:

1. Test specimens of material measuring about 150x50 mm of full thickness of the product, shall be subjected to the luminous flame from Bunsen burner of 10 mm ID. The specimen shall be held with both the longitudinal & transverse axes at an angle of 45° to the horizontal. The flame height shall be 40 mm. and bottom edge of the specimen shall be placed at the middle of the flame.


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MDTS 003 REV-1

PAGE 5 OF 5

Dt. 03.12.2001

2. This test shall be carried out with decorative surface facing downwards.
3. The flame shall be applied to the specimen at the end for 30 seconds and removed for similar period and then supplied again to the same end for a second period of 30 seconds and then again removed.
4. Should the specimen get ignited when tested in either way, it shall not continue to burn for more than 30 seconds after the flame have been finally removed.
5. The test shall be conducted with three test specimens.

6.0 **SAMPLING AND CRITERIA FOR CONFORMITY :**

6.1 10% of the lot offered for inspection (Min. 2) shall be visually examined for conformity as per clause 2.4 .

6.2 Dimensional checks as per clause 2.2 & 4.0 shall be carried out on 5% of the lot offered for inspection (min. 2) nos. of sample to be taken .

6.3 No. of samples to be selected for test as per clause 5.2 shall be minimum 1 or 0.5% of the lot offered whichever is higher .

6.4 Should any one of the lavatory module tested as per clause 6.1 to 6.3 fails to meet the requirements the manufacturer will be allowed to segregate and re-offer . Should any of the lavatory module selected as per clause 6.3 fails to meet anyone of the requirement as given in the clause 5.2, double the quantity of sample stipulated in clause 6.3 shall be selected . Should any of the lavatory module fails to meet the requirements of any of the test the entire lot shall be rejected.

7.0 **MARKING**

7.1 Each lavatory module shall have suitable marking on the back side of vertical wall ,bearing name of manufacturer and manufacturing date .



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