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REFRENCE

Government of India
Ministry of Railways
(Railway Board)

(SEAL)
INDIAN RAILWAY
STANDARD SPECIFICATION
FOR
FRP MATERIAL TO BE USED FOR SIGNALLING EQUIPMENTS

1.0 FOREWORD

1.1 This specification is issued under the fixed serial No.151 the final number indicates the year of original adoption as standard, or in the case of revision the year of last revision.

ISSUED 1996, REVISED 1997

01.2 This specification requires reference to the following Indian Railway Standard (IRS) and American Society of Testing Materials (ASTM) specification:

IRS:S23:ELECTRICAL AND ELECTRONIC BASED SIGNALLING AND INTERLOCKING EQUIPMENT

ASTM:D256:Test method for impact resistance of plastics and electrical insulating materials.

ASTM:D790:Test method for flexural properties of unreinforced and reinforced plastics and electrical insulating materials.

0.3 Wherever in this specification, any of the above mentioned specifications is referred to by number only without mentioning the year of issue, the latest issue of the specification is implied, otherwise the particular issue referred to is meant.

0.4 This specification is intended chiefly to cover the technical provisions and it does not include all the necessary provisions of a contract.

1. SCOPE

1.1 This specification covers the technical requirements of FRP material to be used for manufacture of items for outdoor use such as covers for signalling equipments etc.

2. GENERAL REQUIREMENTS

2.1 The material shall consist of an unsaturated epoxy or polyester resin system, combined with fillers and chopped strand glass reinforcement to form a mix which is capable of being cured by moulding under heat and pressure. The glass fibre shall be made from E-glass, which is low alkali glass containing not more than 1% of alkali metal oxides expressed as Na2O.

2.2 The glass fibre content in the material shall be approximately 30%.

2.3 The surfaces of FRP components shall be smooth, sound and free from moulding defects, such as bubbles, surface streaks, splash marks, burn marks, voids, surface-sinking, crazing and blistering of the surface, windows, warping, weld lines, laminations, cracks etc. All edges shall be neatly finished and free from flash.

2.4 The FRP components shall be free from liability to distortion under service conditions, storage or transhipment. These components shall withstand all the extremities of the environment, viz. dry, cold and humid conditions.

2.5 A guarantee shall be given by the manufacturer that no reconstituted or recovered material has been used for manufacture of components.

3. MARKING

3.1 The moulded FRP components shall be clearly marked to indicate:

a) Name/trade mark of the manufacturer
b) Reference to this specification

4. INSPECTION AND TESTING

4.1 Type tests: The type tests shall be conducted to verify compliance of FRP component to the specification. The following shall constitute type tests, which shall be conducted on standard test specimens as prescribed in ASTM:D790 and ASTM:D256 in respect of flexural strength and izod impact strength respectively. The flammability test shall be conducted on one moulded sample and also on one test specimen of each type as per ASTM:D790 and ASTM:D256.

S.N.	Properties	Value		Method of Test
		For FRP components to be used upto a height of 1 mtr.above rail level.	For FRP components to be used at a height of more than 1mtr.above rail level	
i)	Flexural strength	200 MPa(min.)	150 MPa(min.)	ASTM:D790
ii)	Izod impact strength	1000 Joules/m (min)	700 Joules/m (min)	ASTM:D256
iii)	Flammability	Self-extinguishing(within 30 sec.)	Self-extinguishing(within 30Sec)	Appendix 'A'
iv)	Glass filler by ash (%)	30 ± 5	30 ± 5	

4.2 **Acceptance Tests**

4.2.1 The following shall constitute acceptance tests which shall be conducted on standard test specimen as prescribed in ASTM:D256.The flammability test shall also be conducted on one moulded sample selected at random from the lot offered for inspection.

S.N.	Properties	Value	method of test
i)	Izod impact strength	1000J/m(min.) for FRP components to be used upto a height of 1 mtr.above rail level. 700 J / m (min.) for FRP components to be used at a height of more than 1 mtr. above rail level.	ASTM:D256
ii)	Flammability	Self extinguishing (within 30 Sec.)	Appendix 'A'
iii)	Glass filler by ash (%)	30 ± 5	

5. REJECTION

5.1 The FRP components which do not comply with any of t requirements of this specification and/or any other specificatio and/or drawings as approved by the purchaser may be rejected.

6. PACKING

6.1 The FRP components shall be suitably packed to permit convenient handling and to protect against loss or damage during transit and storage.

APPENDIX 'A'
FLAMMABILITY CHARACTERISTICS

The moulded sample shall be subjected to luminous batswing flame preferably supplied by a bunsen burner. The sample shall be held with the flat side up, its longitudinal axis at an angle of 45 degrees to the horizontal.The flame shall be of 25mm width across the tips. The lower end of sample shall be at the mid point of the flame.The flame shall be applied for 30 seconds and removed for a similar period and then applied again at the same location for a second period of 30 secs and then again removed.The tests shall be carried out on the other side of the specimen also.

Should the specimen get ignited, it shall not continue to burn for more than 10 seconds after the flame has been removed and shall not drip.