

1755748/2023/HEP-SWM20961



PRODUCT STANDARD

SWITCHGEAR ENGINEERING DIVISION

SG 10707 REV.05

PAGE 1 OF 3

FLAME RETARDANT SHEET MOULDING COMPOUND

LPMC / SMC SHEETS

1. APPLICATION :-

This specification governs the requirements of flame retardant sheet moulding compound sheets LPMC / SMC of electrical grade which are used as an insulating material for barriers in the indoor metal clad switchgear.

It consists essentially of an unsaturated polyester resin system with glass fiber reinforcing and cured as moulding under a pressure of 100-300 Kg/cm² for SMC and 150 Kg/cm² pressure for LPMC. These moulded sheets are fire retardant grade and have a temperature index of at least 155.

2. SIZES :-

Thickness : 1.5 mm to 15 mm

Sheet size : 1000 mm x 1000 mm

3. COLOUR :-

Standard : Off-white

Others : Signal red

4. PROPERTIES :

Important properties of SMC / LPMC sheets are as following :

<u>PROPERTY</u>	<u>UNIT</u>	<u>TEST METHOD</u>	<u>VALUE</u>
<u>PHYSICAL</u>			
Specific gravity	-	IS 10192-1982 Appendix-A	1.8 to 2.0
Glass content	% by weight	IS 14399 Appendix-E (Cl. B)	20 to 25
Water absorption	%	IS 10192-1982 Appendix B	0.20 max
<u>FLAMMABILITY</u>			
Flame Class	Class	UL94	V0

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REV.	05	PRINTS TO :-		APPROVED –		
ALTD.	H.R.PATEL	SWM(P) QC/SCR SWE	1 1 1	R.K.SHUKLA		
APPD.	INDRAPAL			PREPARED	ISSUED	DATE
DATE.	25.08.2001			S.M.M	B.P.N	30.8.99

755748/2023/HEP-SWM20961



PRODUCT STANDARD

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SG 10707 REV.05

PAGE 2 OF 3

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<u>PROPERTY</u>	<u>UNIT</u>	<u>TEST METHOD</u>	<u>VALUE</u>
<u>ELECTRICAL</u>			
Electrical strength (Proof) in oil at 90 deg C (Testing on 3mm thick sheet as per IEC-243 Part-I)	kV/mm	IS 1998 Cl.13	>or=10
Volume resistivity	Ohm-cm	IS 3396	> 10 ¹⁴
Surface resistivity	Ohm	IS 3396	> 10 ¹²
Comparative Tracking Index	Volts	IEC 112-1979	> 600
Arc Resistance	sec	ASTM-D495	> 180
<u>MECHANICAL</u>			
Tensile strength	N/sq mm	IS 14399	> 50
Cross breaking strength	N/sq mm	IS 14399	> 130
Impact strength	J/sq cm	IS 1998	> 4.0

5. FINISH :


The SMC / LPMC moulded sheets shall be smooth, compact, bright and free from cracks, blisters, gas pockets, foreign inclusions etc and with uniformly distributed bonds. No warpage, undulation or deformation in sheets is allowed.

6. ACCEPTANCE CRITERIA :

6.1 For approved suppliers.

6.1.1 Supplier shall submit type test certificates with offer of any Govt. approved external agency for all the properties mentioned in para 4.

6.1.2 For subsequent lots test values for water absorption, electrical strength and flammability as stated in Para 4 shall be verified for acceptance of the lot 2 no. test samples each of size 3 x 300 x 300 mm shall be supplied along with the supply lot.

			PRODUCT STANDARD SWITCHGEAR ENGINEERING DIVISION	SG 10707 REV.05
		<p>6.2 For new suppliers -</p> <p>6.2.1 In addition of meeting the requirement mentioned in clause 6.1.1, for new supplier all the properties of para 4 shall be verified for 3 consecutive lots against P.O. 2 nos. each sample sheet of sizes 3 x 300 x 300 mm and 4 x 300 x 300 mm and test pieces 7 each for tensile and cross breaking strength shall be supplied with supply each lot for testing at BHEL works. Supplier shall be approved to supply the material as per SG10707 only when the material properties have been found OK after the tests.</p> <p>6.2.2 After the approval for subsequent lots test values for water absorption, electrical strength and flammability as stated in para 4 shall be verified for acceptance of the lot. Test samples of 2 sheets size 3 x 300 x 300 mm shall be supplied alongwith the supply lot.</p> <p>7. <u>IDENTIFICATION</u> :-</p> <p>Supplier shall provide appropriate markings on each sheet giving following details:</p> <ul style="list-style-type: none"> - Suppliers name - PO No and date - Production batch no. and date. <p>8. <u>PACKAGING, STORAGE AND HANDLING</u> :-</p> <p>The sheets shall be suitably packed by providing protective papers between each sheet & stretch wrap film to prevent scratches during handling.</p> <p>The sheets shall be stacked over one another and packed in wooden crates with internal lining of 150 micron thick polythelene sheet and bitumen coated Hessian re-inforced craft paper.</p>		
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1755 48/2023/HEP-SV M20961



TSD 6206 A

PLANT PURCHASING SPECIFICATION BHOPAL

BP22962

Rev. No. 04

PAGE 1 OF 2

SUPERSEDES
BP 22962 Rev. 03

NYLON EXTRUSIONS AND MOULDING (TYPE 6)

1. GENERAL :

This specification governs the quality of nylon extrusions and mouldings made from Type 6 general purpose nylon. The material shall not be affected by alkaline, weak acids, alcohols and other common solvents. Superior electrical grade materials are covered by BP 22961 (Nylon Type 11).

2. APPLICATION :

Used as cable bush and oil injection plug in A.C. Machines, as rod form in switchgear and for manufacturing of sealing washers for use in Transformers.

3. COMPLIANCE WITH NATIONAL STANDARDS :

There is no Indian Standard covering this type of material.

4. DIMENSIONS AND TOLERANCES V

Shall be stated on order or the drawing accompanying the order.

5. FINISH:

The material shall be smooth and free from surface imperfections and blow holes.

6. TEST METHODS :

Unless otherwise specified, the test shall be conducted in accordance with the relevant methods of BS: 7663-1993. In case of components, density, water absorption and hardness shall done on the components itself.

7. SAMPLE FOR TEST :

Six no. of samples in size 3 tk x 150 x 150 mm moulded from the same batch and in the same manner as the consignment concerned, shall be supplied for testing and approval purpose.

8. PHYSICAL PROPERTIES :

8.1 Density at Room Temp. : 1.13 ± 0.05 g/cc.

8.2 Water Absorption at Room Temp. : 1.5% Max.

Revision :
Reviewed & brought upto date.

Issued by :
STANDARDS AND MATERIALS GROUP
TECHNICAL SERVICES DEPARTMENT

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TSD 6207 A

PLANT PURCHASING SPECIFICATION BHOPAL

BP22962

Rev. No. 04

PAGE 2 OF 2

9. MECHANICAL PROPERTIES :

9.1. Tensile Strength : 60 N/mm², Min. (OPTIONAL TEST)

In case of rod, the test shall be done in as received condition

9.2. Hardness (ASTM D 785) : 110 ± 10, Rockwell 'L'.

10. ELECTRICAL PROPERTIES :

10.1. Electrical Strength (BDV) at Room Temp.

Unless otherwise specified on the drawing, BDV value shall be 10 kV/mm on a 3mm thick test specimen.

11. CHEMICAL PROPERTIES :

11.1. Identification of material :

The material shall be nylon when identified by Infra-red spectrophotometer or by any conventional method.

12. TEST CERTIFICATE :

Three copies of test certificates shall be supplied with each consignment.

In addition, the supplier shall ensure to enclose one copy of test certificate along with their dispatch documents to facilitate quick clearance of the material.

The test certificate shall bear the following information.

BP 22962 (Rev. 04) : Nylon Extrusions and Mouldings (Type 6) :

Our Order No.

Batch/Lot No.

Test values obtained/certificate for compliance for clause 5 and 8 to 11.

13. PACKING AND MARKING :

The nylon extrusions and mouldings shall be suitable packed to avoid contamination and damage in transit. Packages shall be labelled with the following information.

BP 22962 : Nylon Extrusions and Mouldings (Type 6)

Our Order No.

Supplier's / Manufacture's Name & Grade.

Date of Manufacture.

Drawing and Item Nos.

Net and gross weight