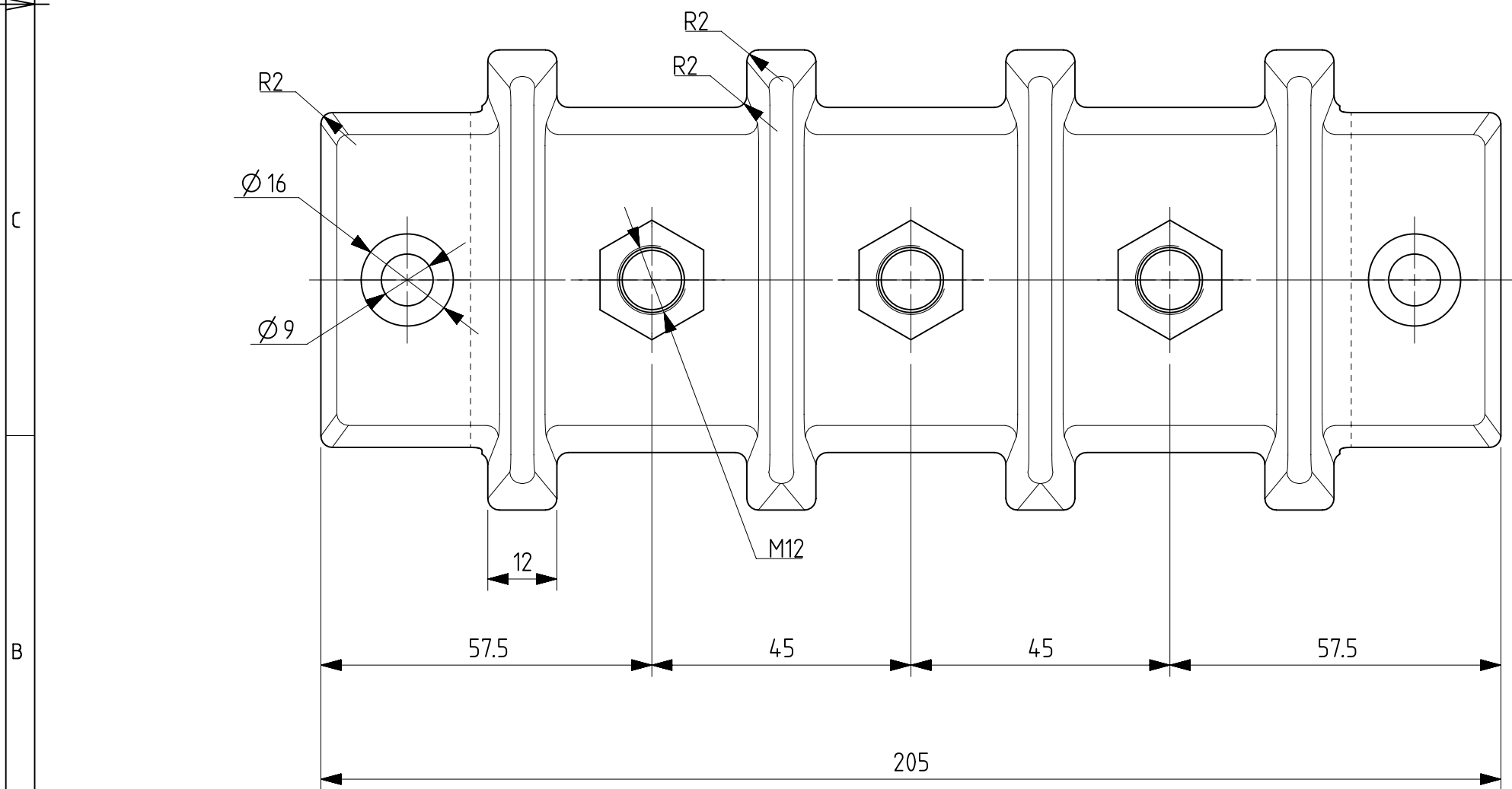
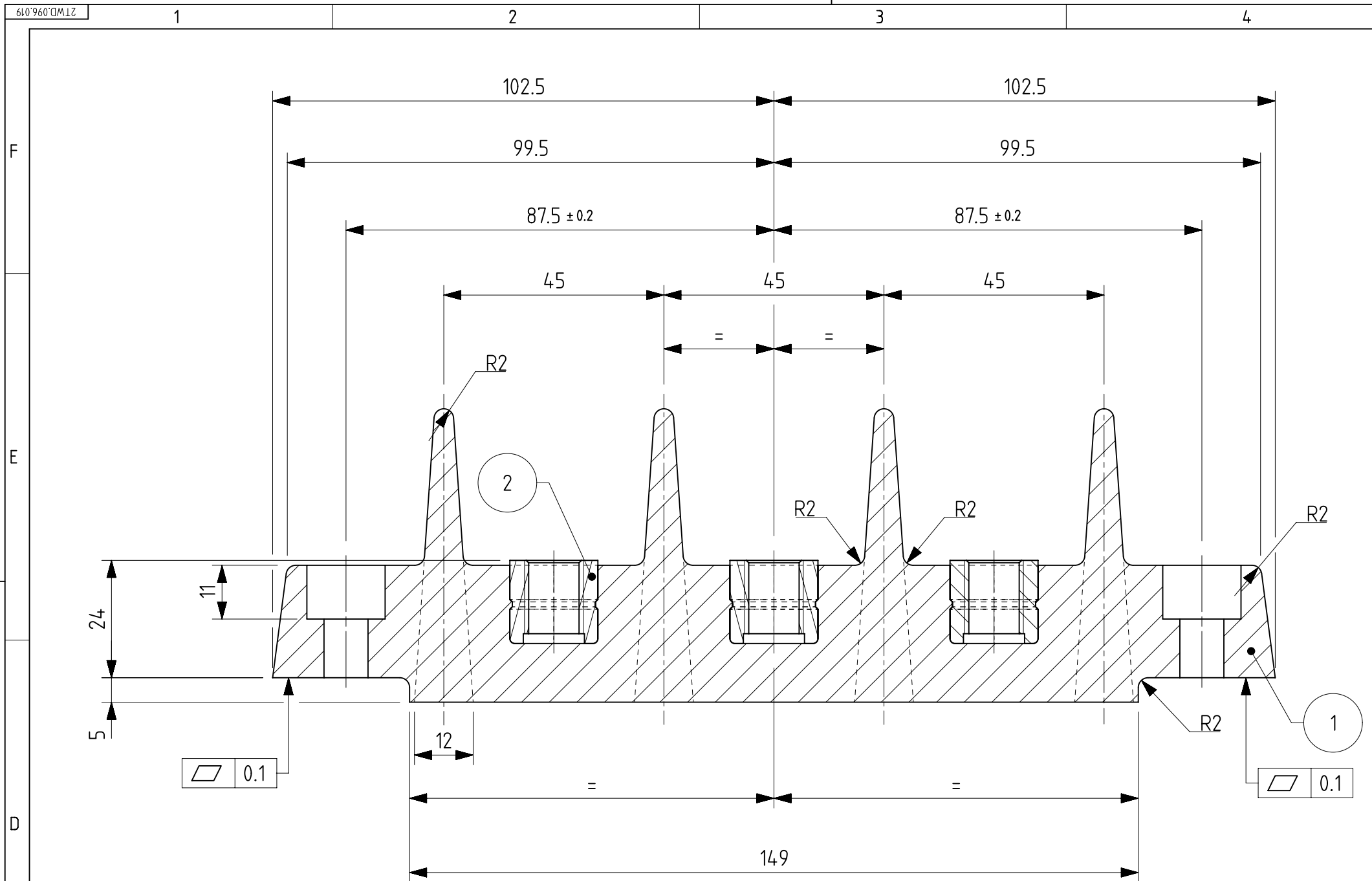
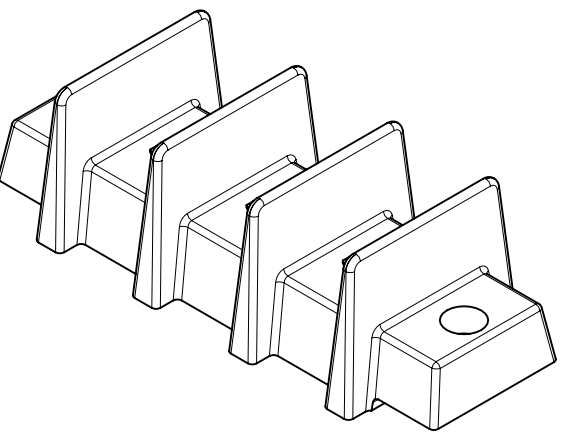


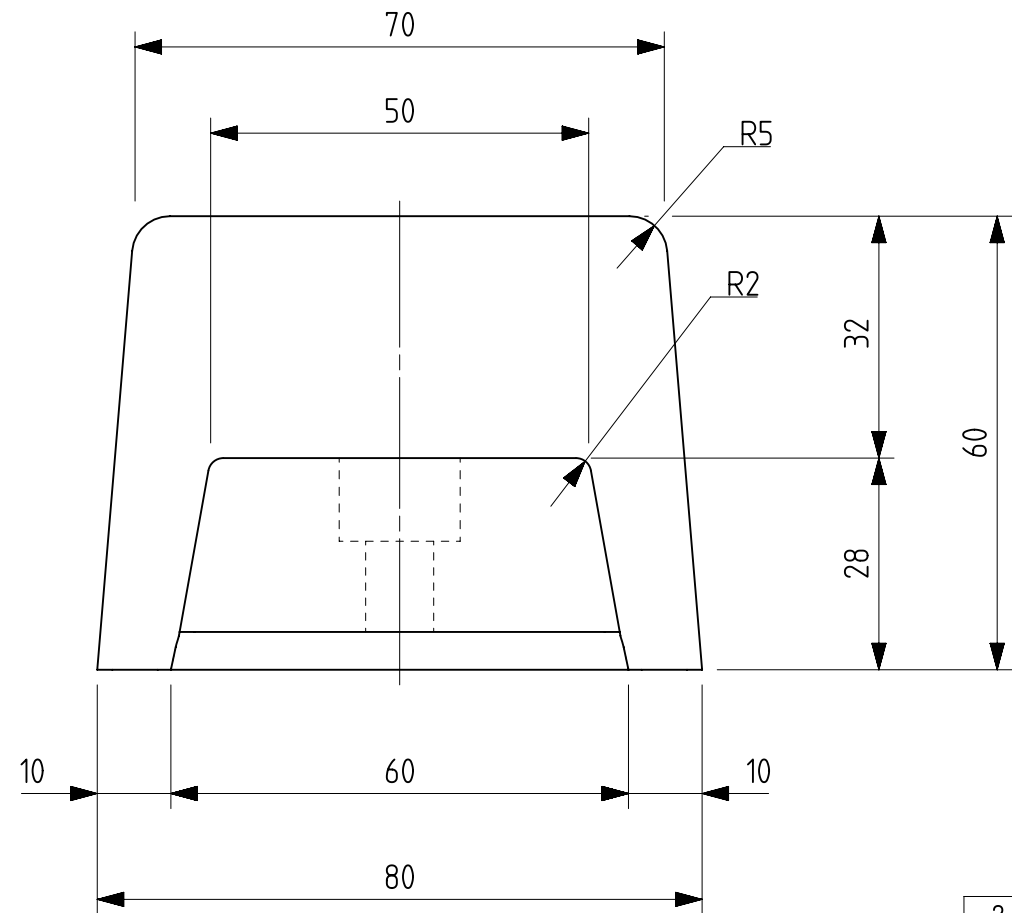


GENERAL TOLERANCE FOR LINEAR AND ANGULAR MEASUREMENTS ACCORDING TO ISO:2768					
RATED MEASUREMENT IN mm	> 0.5...3	> 3...6	> 6...30	> 30...120	> 120...400
DEVIATION	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5



NOTES:-

1. MATERIAL:- FOR REF.1 - DOUGH MOULDING COMPOUND TO SPECIFICATION NO. 4TMS.096.025.
2. FOR REF.2. MATERIAL ST 12, SHAPE G CLOSED BY PLATE AND LONG (DIN 16903) WITHOUT BORDER AND THREADED DEPTH 17mm.
3. REMOVE ALL SHARP EDGES.



C&D NO. 5715/600
QTY./TM: 1 NO

2	5715/602		INSERT M12	3	SEE NOTE 2	-
1	5715/601		TERMINAL BOARD	1	SEE NOTE 1	-
निर्देश संख्या	लागत एवं वितरण संख्या	अंग आरेखण संख्या	वर्णन	मात्रा	पदार्थ	प्रति भार कि. ग्रा.
REF. NO.	C&D NO.	PART DRG. NO.	DESCRIPTION	QTY.	MATL	WT. EACH IN K.G.
अधिकारित DGN						
जीवा व.अ.अ. CHD SSE	Nihar Ranjan Nondal					
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE	RISHAP CHAUD HARI					
अनुमोदित चक्रवि.अ. APPROVED DYCEE	KAGAN KAGAN PRADHAN					
दिनांक DATE	11-08-20					
दृष्टिक अनुपात SCALE	1:1					
परिवर्तन संख्या ALT. NO.	1					
प्राधिकार AUTHY						
वर्णन DESCRIPTION						
संदर्भ / REF. HMMT211214						
आरेखण संख्या DRAWING NO.						
परिवर्तन संख्या ALTERATION NO.	1					
पर्ण SHEET	1 OF 1					
						A2

Signature Not Verified
Digitally signed by Nihar Ranjan Nondal
Date: 2022.04.20 12:15:07 IST

SPECIFICATION FOR

‘POLYESTER MOULDING COMPOUND (DMC)’

i.e. DOUGH MOULDING COMPOUND

APPROVED BY

CEE/TM

RAJIV KUMAR BARNWAL	Digitally signed by RAJIV KUMAR BARNWAL Date: 2022.11.22 17:26:05 +05'30'
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**SPECIFICATION FOR
‘POLYESTER MOULDING’
FOR 3-PHASE TRACTION MOTOR**

**CHITTARANJAN LOCOMOTIVE WORKS
WEST BENGAL , INDIA
No. 4TMS.096.025 , Rev.1
First Issued on: 17.02.1999**

(Prepared &
Checked by)

**NIHAR
RANJAN
MONDAL**

Digitally signed by
NIHAR RANJAN
MONDAL
Date: 2022.11.15
11:31:12 +05'30'

(Reviewed by)

Dy.CEE/ TMD
5

**RANJAN
KUMAR
PRAMANIK**

Digitally signed by
RANJAN KUMAR
PRAMANIK
Date: 2022.11.16
16:17:13 +05'30'

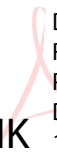
Signature Not
Verified

Digitally signed by
NIHAR RANJAN
MONDAL
Date: 2022.11.26
11:23:51 IST

Reason: HEP-096025 (Misc)/7333/2026-HEP-TXM20500 (Computer No. 345666)
Location: New Delhi

ALTERATION SHEET				
Alt.No	Description of modification	Authority	Signature	Date

SPECIFICATION FOR 'POLYESTER MOULDING' FOR 3-PHASE TRACTION MOTOR	CHITTARANJAN LOCOMOTIVE WORKS WEST BENGAL , INDIA No. 4TMS.096.025 , Rev.1 First Issued on: 17.02.1999
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(Prepared & checked by) SSE/TMDO	NIHAR RANJAN MONDAL  Digitally signed by NIHAR RANJAN MONDAL Date: 2022.11.15 11:31:29 +05'30'	(Reviewed by) Dy.CEE/ TMD 6	RANJAN KUMAR PRAMANIK  Digitally signed by RANJAN KUMAR PRAMANIK Date: 2022.11.16 16:18:17 +05'30'
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1.0 SCOPE:

This Specification covers the technical requirement of fiber glass moulding compound (DMC). Dough Moulding Compound to be used in manufacture of 3-phase traction motor type 6FRA-6068/6FXA-7059. The material shall comply with this specification instructions in physical properties, mechanical properties and electrical properties and all other listed requirements. This specification is based on M/s. BHEL's corporate purchasing specification No. AA 22826.

2.0 REQUIREMENT :

Fibre glass polyester moulding compound consisting essentially of unsaturated polyester resin system. Combined with mineral fillers and/or reinforcing glass fibres to form a dough which is soft and pliable at normal room temperature and cured as moulding under a pressure of 100 – 300 g/cm² at a temp. of 165° + 5° C. The moulding are self extinguishing and has a temp. index of at least 155° C.

3.0 PROPERTIES :

3.1 Physical Properties:

3.1.1 Specific gravity	: 1.7 g/ cm ³ (min.)
3.1.2 Bulk Factor	: 2 (max.)
3.1.3 Water Absorption	: 30 mg (max.)
3.1.4 Martens Heat Distortion temp.	: 175°C (min.)
3.1.5 Resin Contents (As per Annex. I)	: 30 ± 5% by wt.
3.1.6 Resistance to carbon Arc ASTMD 495	: 180 seconds (min.)

3.2 Mechanical properties:

3.2.1 Tensile strength	: 40 to 70 N/mm ²
3.2.2 Cross Breaking strength	: 85 to 155 N/mm ²
3.2.3 Compressive strength	: 125 to 155 N/mm ²
3.2.4 Impact Strength	: 2.8 to 7 J

SPECIFICATION FOR 'POLYESTER MOULDING' FOR 3-PHASE TRACTION MOTOR	CHITTARANJAN LOCOMOTIVE WORKS WEST BENGAL , INDIA No. 4TMS.096.025 , Rev.1 First Issued on: 17.02.1999
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3.3 Electrical Properties :

- 3.3.1 Electric Strength in Oil : 6 KV/mm
at 90° C
- 3.3.2 Volume Resistivity : 10 log 10 ohm cm (min.)

3.4 Type Test :

- 3.4.1 Shrinkage : 0.15 % max.
- 3.4.2 Flammability (Annex. II) : Self extinguishing
- 3.4.3 Comparative Tracking Index : 700 (min.)

3.5 Marking :

Each component shall be legibly marked with the following information

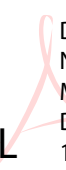
- (a) Grade of material
- (b) Supplier's name/Identification mark, Sl. no. , batch no. etc by which it can be easily traced out.

3.6 Deviations :

While submitting the offer tenderer shall furnish a list deviations if any, from this specification concerned/drawing. Even if tenderer has no particular deviations in their offer a 'NIL' statement shall be submitted.

3.7 Packing :

The material shall be suitably packed to prevent transit damage/long storing damage.

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(Prepared & checked by) SSE/TMDO	NIHAR RANJAN MONDAL  Digitally signed by NIHAR RANJAN MONDAL Date: 2022.11.15 11:32:07 +05'30'	(Reviewed by) Dy.CEE/ TMD 8	RANJAN KUMAR PRAMANIK  Digitally signed by RANJAN KUMAR PRAMANIK Date: 2022.11.16 16:20:30 +05'30'

ANNEXURE-I RESIN CONTENT

100 gms of dough compound shall be dried in an oven at $105 \pm 5^\circ\text{C}$ for 4 hours and then be cooled and weighed (W1). The compound shall then be refluxed with a suitable blend of solvent mixture in a soxhlet apparatus for a 4 hours or till it is free from resin content. The compound shall be allowed to dry in air for 10 minutes and then transferred in to an oven at $105 \pm 5^\circ\text{C}$, dried for 1 hour, cooled and reweighed (W2).

$$\text{Resin content \%} = \frac{W1-W2}{W1} * 100$$

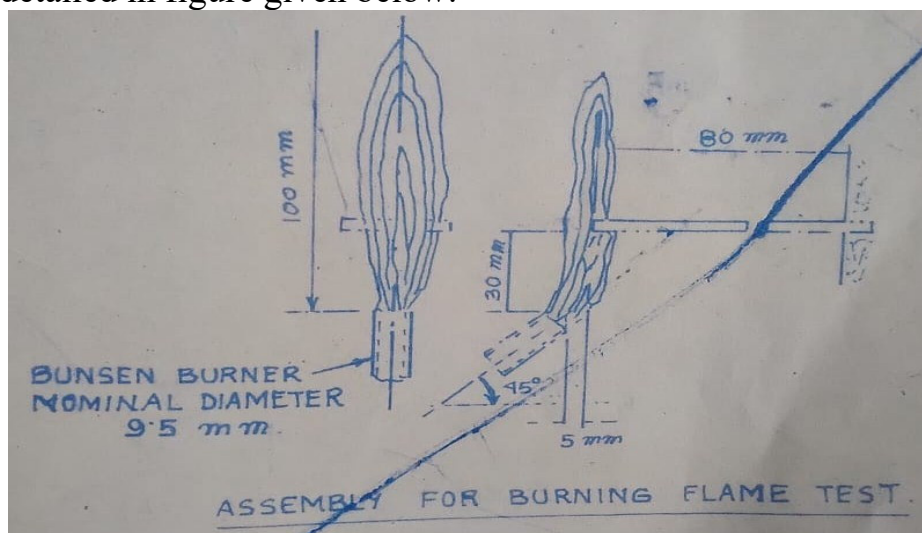
Where, W1 = Weight of volatile free sample, grams.

W2 = Weight of resin free sample after solvent extraction, grams.

Annexure-II TEST METHOD FOR FIRE RETARDANT TEST

1.0 Test Pieces :

Use five test pieces 10 to 15 mm wide, of thickness of the shell under test. However, if thickness of sheet exceeds 3 mm then thickness shall be reduced to 3 mm keeping one surface intact. Length of test place shall be such that the exposed length is 80 mm or more as detailed in figure given below:



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(Prepared & checked by) SSE/TMDO	NIHAR RANJAN MONDAL Digitally signed by NIHAR RANJAN MONDAL Date: 2022.11.15 11:32:25 +05'30'	(Reviewed by) Dy.CEE/ TMD 9	RANJAN KUMAR PRAMANIK Digitally signed by RANJAN KUMAR PRAMANIK Date: 2022.11.16 16:21:42 +05'30'

2.0 CONDITIONING :

Test the material in the as received condition.

3.0 APPARATUS:

The following apparatus are required:

3.1 Draught free enclosure that permits observations for safety and convenience it is desirable that this enclosure be fitted with a device, such as an exhaust fan to remove products of combustion that may be toxic. However, it is important that this device be turned off during the actual test.

3.2 Bunsen burner of nominal diameter 9.5 mm and gas supply.

NOTE : It has been found that for a wide range of materials the character of the flame i.e. luminous or non-luminous, using common gases does not affect the result obtained by this method of test.

3.3 Installation to fix the test piece and the Bunsen burner in the positions specified.

3.4 Stop Watch.

4.0 PROCEDURE :

Clamp the test piece horizontally by one end so that the width dimension is in the horizontal plane. The Bunsen burner should be fixed at an angle of 45° towards the unclamped end of the test piece so that it is 30 mm below the bottom edge and 5 mm away from the test piece (see figure).

Adjust the Bunsen burner, with closed air-ports (see note to 3.2) to produce a flame approximately 100 mm long whilst in the vertical position. Whenever it is desired to ignite the test piece, the burner should be placed in the 45° position described above. It should not be moved during the test (see note below). After 60s turn the burner off. Check the burning time with the aid of the stop watch from the moment at which the flame is turned off.

NOTE : No burning time can be assigned if, during the 60s ignition period the test piece distorts away from and out of reach of the flame.

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(Prepared & checked by) SSE/TMDO	NIHAR RANJAN MONDAL  Digitally signed by NIHAR RANJAN MONDAL Date: 2022.11.15 11:32:44 +05'30'	(Reviewed by) Dy.CEE/ TMD 10	RANJAN KUMAR PRAMANIK  Digitally signed by RANJAN KUMAR PRAMANIK Date: 2022.11.16 16:23:03 +05'30'

5.0 EXPRESSION OF RESULTS :

For each of the five test pieces, record the time in seconds from the moment at which the Bunsen flame is turned off until the test piece ceases to burn provided some of the test piece remains unburned. Report the arithmetic mean of the results obtained on the five test pieces as

Burning time of test piece 10 mm to 15 mm wide:seconds.

Alternatively, report if any test piece has burnt away completely or has distorted away from and out of reach of the flame.

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(Prepared & checked by) SSE/TMDO	NIHAR RANJAN MONDAL Digitally signed by NIHAR RANJAN MONDAL Date: 2022.11.15 11:33:00 +05'30'	(Reviewed by) Dy.CEE/ TMD 11	RANJAN KUMAR PRAMANIK Digitally signed by RANJAN KUMAR PRAMANIK Date: 2022.11.16 16:24:33 +05'30'



BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL

QUALITY ASSURANCE PLAN FOR TERMINAL BOARD TO BHEL ORDERING SPECIFICATION/DRAWING AS PER PO

QUALITY PLAN NO. – QAP/QT/M/VENDOR QAP/2021-22/TERMINAL BOARD DTD 29.05.2021 REV 00
Reference Document- PO DRAWING/SPECIFICATION

Page : 1 of 1

SL. NO	COMPONENT	CHARACTERISTICS	TYPE OF CHECK	QUANTAM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	INSPECTION AGENCY	REMARKS
				TP	TP/A					
1)	Raw material	All tests	TC verification	100%	100%	AA22826	As per Specification	MTC	BHEL/TP/A	TEST LAB NABL/EQUIVALENT ACCREDITED/SOURCE MILL/Supplier to get the raw material correlated with material TC
2)	Dimension	Dimension	TC verified & Measurement	100%	20%	As per drawing & specification	As per drawing & Specification	Supplier record	BHEL/TP/A	Witness 14
3)	Testing	Routine test	TC verified & testing	100%	10%	As per drawing & specification	As per drawing & Specification	Supplier record	BHEL/TP/A	Witness
4)	Identification vendor name, PO & job serial no.	Visual	Visual	100%	10%	As per drawing & specification	As per drawing & Specification	Supplier record	BHEL/TP/A	Witness
5)	Packing to avoid transit damage	Visual	Visual	100%	20%	As per drawing & specification	As per drawing & specification	Packing list for each kit box	BHEL/TP/A	Packing to be such that no damages should occur during transit. 1 kit items should be placed in on 1 box

Prepared By

गोपबन्धन सिंह राय / General Manager (OPD)
अतिरिक्त प्रमुख, अतिरिक्त प्रमुख, अतिरिक्त प्रमुख (OPD)
गोपबन्धन सिंह राय / General Manager (OPD)
अतिरिक्त प्रमुख, अतिरिक्त प्रमुख, अतिरिक्त प्रमुख (OPD)
गोपबन्धन सिंह राय / General Manager (OPD)

Approved By

F.A. TOPPO
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