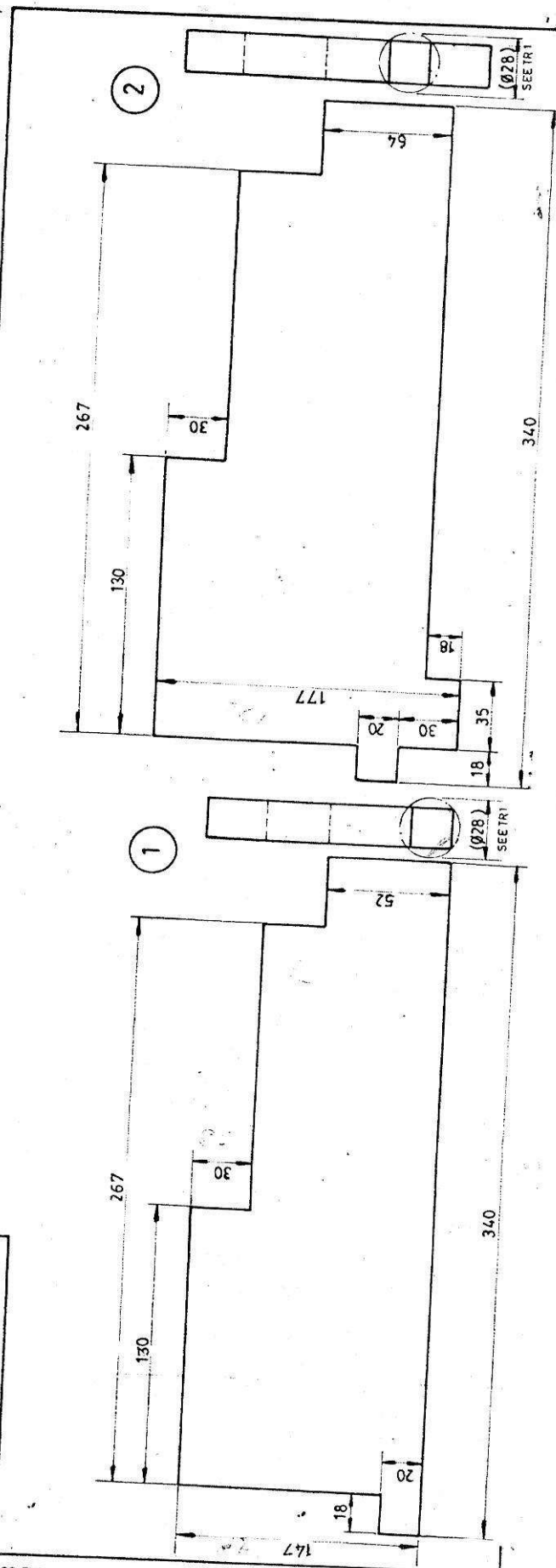


DRG. NO. 34026146137

(ALL DIMENSIONS ARE IN mm)



**TESTING REQUIREMENTS:--**

1. IT IS TO BE ENSURED THAT THE FOUR CORNERS OF THIS, SQ. LIES ON THE CIRCUMFERENCE OF THE CIRCLE OF Ø28.

2. ALL DIMENSIONS TO BE WITH IN TOLERANCE OF ±1 UNLESS OTHERWISE STATED:

3. MAT. TO BE USED 20 +0.1  
-0.

TECH. REQUIREMENTS:—			
1. IT IS TO BE ENSURED THAT THE FOUR CORNERS OF THIS SQ. LIES ON THE CIRCUMFERENCE OF THE CIRCLE OF Ø28.			
2. ALL DIMENSIONS TO BE WITH IN TOLERANCE OF ±1 UNLESS OTHERWISE STATED.			
3. MAT. TO BE USED 20 +0.1 -0			

NDE		02		COIL SUPPORT BRACKET		20 TKX177X340		2-10	
DE		01		COIL SUPPORT BRACKET		20 TKX147X340		1-18	
VAR. NO.	REMARKS	74	75	76	77	78	79	80	81
VAR. NO.	REMARKS	26	27	28	29	30	31	32	33
DESCRIPTION		DRAWING NO.		MATL. CODE		MATL. SPEC.		QTY.	
28 → CARD TYPE-1		28 → CARD TYPE-2		28 → CARD TYPE-3		28 → CARD TYPE-4		28 → CARD TYPE-5	

ADDITIONAL INFORMATION		W.O. 43236 A 421-11		STATUS OF DRAWING		DISTRIBUTION OF PRINTS		O C-1, PLM-4, CIM-4, TCX (PLM)-1	
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		M/S CHANDRAPUR TPS		1TF 7642		भारत हेवी इलेक्ट्रिकल्स लिमिटेड		भोपाल	
भारत हेवी इलेक्ट्रिकल्स लिमिटेड		भोपाल		BHARAT HEAVY ELECTRICALS LTD.		BHO PAL		BHO PAL	

REV.		DATE		ALTERED		CHECKED		APPROVED	
ZONE									

INVENTORY NO.		SIGN. & DATE		REF. DRG. NO.		THE	

REV. NO.		DATE		REV. NO.		DATE		REV. NO.	
1		15.3.95		1		15.3.95		1	
2		21.3.95		2		21.3.95		2	

REV. NO.		DATE		REV. NO.		DATE		REV. NO.	
1		15.3.95		1		15.3.95		1	
2		21.3.95		2		21.3.95		2	

REV. NO.		DATE		REV. NO.		DATE		REV. NO.	
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2		21.3.95		2		21.3.95		2	

REV. NO.		DATE		REV. NO.		DATE		REV. NO.	
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2		21.3.95		2		21.3.95		2	

REV. NO.		DATE		REV. NO.		DATE		REV. NO.	
1		15.3.95		1		15.3.95		1	
2		21.3.95		2		21.3.95		2	

REV. NO.		DATE		REV. NO.		DATE		REV. NO.	
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2		21.3.95		2		21.3.95		2	

REV. NO.		DATE		REV. NO.		DATE		REV. NO.	
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2		21.3.95		2		21.3.95		2	

REV. NO.		DATE		REV. NO.		DATE		REV. NO.	
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2		21.3.95		2		21.3.95		2	

REV. NO.		DATE		REV. NO.		DATE		REV. NO.	
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2		21.3.95		2		21.3.95		2	

REV. NO.		DATE		REV. NO.		DATE		REV. NO.	
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2		21.3.95		2		21.3.95		2	

REV. NO.		DATE		REV. NO.		DATE		REV. NO.	
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2		21.3.95		2		21.3.95		2	

REV. NO.		DATE		REV. NO.		DATE		REV. NO.	
1		15.3.95		1		15.3.95		1	
2		21.3.95		2		21.3.95		2	

REV. NO.		DATE		REV. NO.		DATE		REV. NO.	
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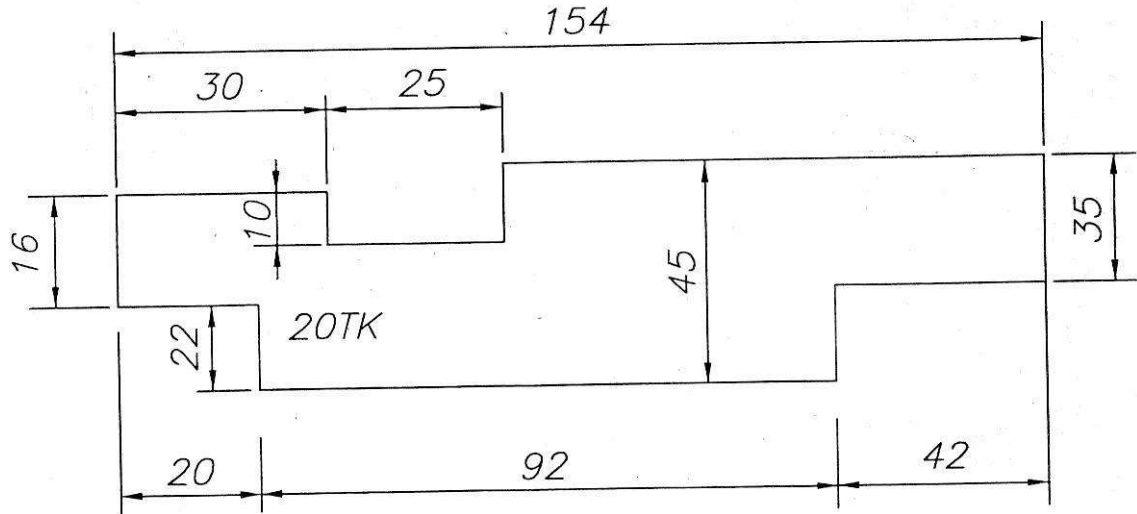
361984/2024/HEP-LEM21700

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm.)

REV.	DATE	ALTERED	REV.	DATE	ALD PANKAJ	ADDITIONAL INFORMATION	
		CHECKED			CHD AKM		W.O. 41271A404-61
		APPROVED			APPD BSR		STATUS OF DRAWING
			01 22.06.13			DIMENSION 22 WAS 7mm.	
						DISTRIBUTION OF PRINTS	
						AME - 1      TEX (IMM) - 1	
						IMM - 3      CIM - 1	

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED  
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

**NOTE :-**

ALL SHARP CORNERS TO BE ROUNDED OFF.

REF. DRG. NO.

SIGN &amp; DATE

INVENTORY NO.

BOT-OUT

001

SUPPORT BRACKET  
20 x 45 x 154

AA22414

0.250

REMARKS

ITEM  
NO.

DESCRIPTION

MATL. CODE

MATL. SPECN.

A  
C  
UNIT

UNIT WT.

QTY.

BHARAT HEAVY ELECTRICALS LTD.  
BHOPAL

DRN

P.K.DUBEY

SIGN.

-sd-

DATE

21.02.13

NO. OF  
ITEM

CHD

AKM

-sd-

21.02.13

APPD

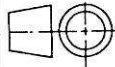
BSR/BA

-sd-

21.02.13

DEPT. AME  
CODE 404

UNTOL DIMS GR.



SCALE

NTS

WEIGHT(KG.)

0.20

REF. TO ASSY. DRG.

24026042313

ITEM NO.

11

NO. OF  
ITEM

TITLE

SUPPORT BRACKET  
1LA7714-4

DRAWING NO.

4 40261 47901

REV

01

SHEET NO. 1

NO. OF SHEETS 1

(ALL DIMENSIONS ARE IN mm.)

1152

Diagram of a rectangular box with height 1 and width 1. The top edge is labeled  $1\sqrt{15}$  and the right edge is labeled  $1\sqrt{15}$ .

TECH REQUIREMENTS: -



1. ALL PARTS WEDGES SHOULD HAVE CHAMFER ON ONE SIDE THE  
ENDPART TO HAVE IT ON JOINT SIDE.
2. WEDGE TO BE MANUFACTURED IN ONE PIECE AND THEN PARTED OFF  
TO SPECIFIED LENGTH.
3. ALL PART WEDGES WHEN ASSEMBLED SHOULD FORM TO THE GIVEN  
LENGTH SPLITTING ALLOWANCE TO BE DECIDED SUITABLY BY SUPPLIER.
4. EACH ITEM TO BE GIVEN SUITABLE IDENTIFICATION TAG WHEN SUPPLIED.
5. SHARP EDGES TO BE ROUNDED OFF.

[illegible][illegible]

DRG. NO



ITEM NO.	A	B	C	WT.
17	100	12	25	0.03
18	135	14	25	0.122
19	145	14	25	0.15
20	127	15	26	0.09
21	152	15	26	0.142
22	105	17	25	0.1
23	118	11	26	0.116
24	133	13	21	0.125
25	104	9	17	0.064
26	117	8.0	20	0.059
27	35	7.5	11.5	0.015
28	107	14	22	0.089
29	129	14	24	0.118
30	110	15	26	0.109

1. SURFACES NOT TO BE DEBARRED.
2. DIRECTION OF LAMINATION SHALL BE PARALLEL AS SHOWN.

SIZE A3



361984

2024/H/21/00

REV. DATE 23/88

ADDITIONAL INFORMATION 44061A422-11

IN DISTRIBUTION OF PRINTS, IMM &amp; TEX (IMM) ADDED

ST. NO. 900302715 WAS NDI, OM

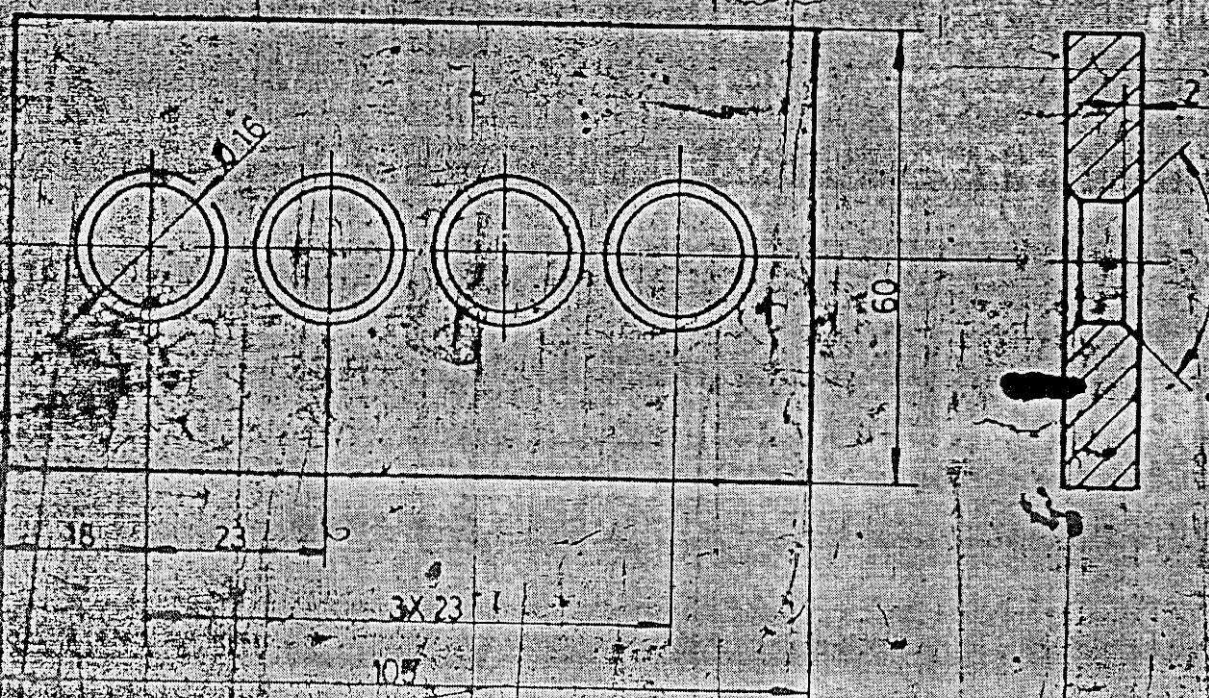
STATE OF DRAWING

REV. DATE 25/6/04 CKD

DISTRIBUTION AME-1 PLM-4 GTG (IMM)-1

IN DISTRIBUTION - DTG WAS TEX

OF PRINTS GTG (PLM-1) QAX-1 IMM-3



01	BRACING PLATE 10TKX60X105	900302715	0.19
65	REMARKS	AA22414	
25	ITEM NO.	58	UNIT WT.
27		59	QTY.
29	DESCRIPTION	54	
58		55	
59		56	
34		57	
45		58	
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		100	

CARD TYPE 3 28 28 CARD TYPE 1 CARD TYPE 2

BHARAT HEAVY ELECTRICALS LTD  
BHOPAL

AME	GRADE OR UNTOL.	SCALE	WEIGHT
206	DM. C/MF	NTS	0.19

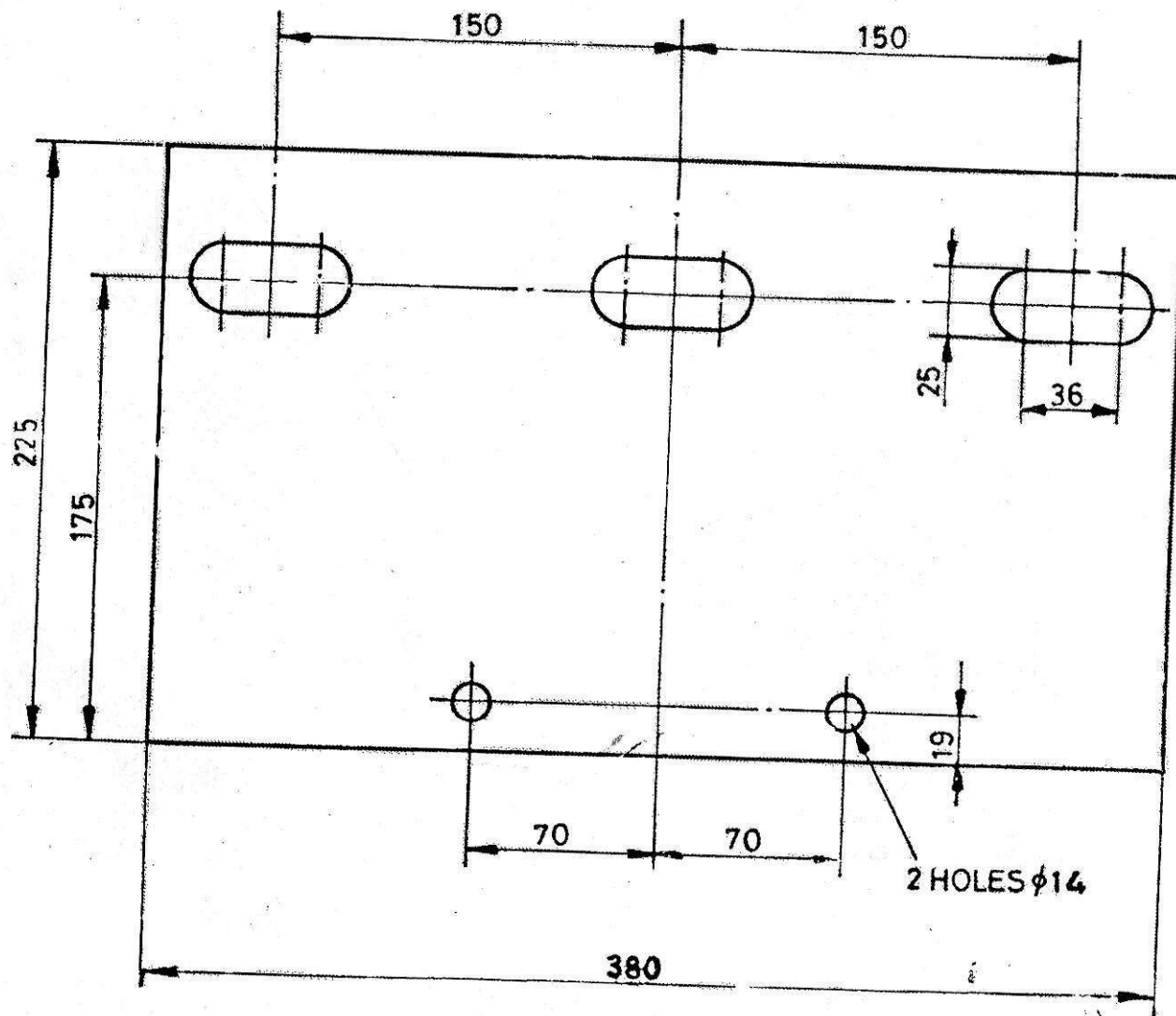
DATE	SIGN	DATE
23.4.85	Ravi Boppana	26.4.85
26.4.85	Manoj	26.4.85
26.4.85		
ASSY. DRG.	ITEM NO.	76 77

14026146102

3619842024/HEP-L

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IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

REV.	DATE	ALTERED	REV.	DATE	ALTERED	ADDITIONAL INFORMATION
		CHECKED			CHECKED	
		APPROVED			APPROVED	
						STATUS OF DRAWING
						DISTRIBUTION OF PRINTS
						OC. - 1 PLM-4 TEX (PLM 1)



	01	TERMINAL SUPPORT 40TK X 225 X 380				6.1
REMARKS	ITEM NO.	DESCRIPTION	STD.	MATL. CODE	A/C	UNIT
				MATL. SPECN.		QTY.



भारत हेवी इलेक्ट्रिकल्स लिमिटेड  
भोपाल  
BHARAT HEAVY ELECTRICALS LTD.  
BHOPAL

नाम / NAME	हस्ता / SIGN	दि. / DATE	वेरि. की संख्या / NO. OF VAR.
A. L. CHAUDHARI		21/10/17	
जांचा / CKD.	P. K. SARKAR	21/10	
स्वीकृत / APPD.	S.B.	22/10	

विभाग / DEPT.	अन. टोल. नाप की श्रेणी / UNTOL. DIMS. GR.	अनुपात / SCALE	भार (कि.ग्रा.) / WEIGHT (K.G.)	असे. ड्राईंग का संदर्भ / REF. TO ASSY. DRG.	मद. क्र. / ITEM NO.	मद. संख्या / NO. OF ITEM
कोड / CODE	604	NTS	6.1			

शीर्षक / TITLE

TERMINAL SUPPORT

ड्राईंग क्र. / DRAWING NO.

4 403 63 46 001

पुन./REV.

0

INVENTORY NO.

SIGN &amp; DATE

REF. DRG. NO.

403 2575 - 377730





# CORPORATE PURCHASING SPECIFICATION

AA22414

Rev No.04

PAGE 1 of 4

## EPOXY GLASS MAT LAMINATED SHEETS

### 1.0 GENERAL:

This specification governs the quality of epoxy based, press moulded, chopped strand glass mat sheets. The material shall have good electrical properties, low water absorption, high mechanical strength and temperature index of at least 155.

### 2.0 APPLICATION:

Used for nuts, bolts, slot wedges, insulation brackets, pole flanges, packing blocks and other components of electrical machines.

### 3.0 COMPLIANCE WITH NATIONAL STANDARDS:

The material shall comply, with the requirements of the following National Standard and also meet the requirements of this specification.

IS:10192 – 1982 : Synthetic Resin Bonded Glass Fibre Sheets For Electrical Purposes.  
Grade: EP 2

### 4.0 DIMENSIONS AND TOLERANCES:

#### 4.1 Dimensions:

##### 4.1.1 Sizes:

Thickness x Width X Length of the sheet shall be as stated on the order.

##### 4.1.2 Preferred Thicknesses:

3, 4, 5, 6, 8, 10, 12, 20, 25, 30, 40, 50, 60, 70 mm

Any other thickness may also be ordered but not less than 3 mm

#### 4.2 Tolerances:

##### 4.2.1 On Thicknesses:

Nominal Thickness, mm		Tolerance, ± mm
Above	Up to and incl.	
–	6	0.6
6	10	0.8
10	20	1.0
20	30	1.2
30	40	1.5
40	50	1.8
50	–	2.1

#### Revisions:

As per Clause No.40.4 of MOM of MRC – E&IM

#### APPROVED:

INTERPLANT MATERIAL RATIONALISATION  
COMMITTEE – MRC(E&IM)

Rev No.04

Amd No.

Reaffirmed

Prepared

Issued

Dt. of 1<sup>st</sup> Issue

AA22414

Rev No.04

PAGE 2 of 4

# CORPORATE PURCHASING SPECIFICATION



## 4.2.2 On Width and Length:

Width/Length, mm	Tolerance, ± mm
Below 1000	35
1000 and above	50

## 4.2.3 On Flatness:

The flatness of sheets shall be such that when a sheet is placed without restraint on a flat surface, concave side, if present, up departure at any point of the surface from a light straight edge laid in any direction upon it shall not exceed the following

- a) 0.5 mm under a 300 mm straight edge
- b) 3 mm under a 600 mm straight edge and
- c) 6 mm under a 1000 mm straight edge

## 5.0 FINISH:

The surface of the sheets shall be even, smooth, free from visible defects like blisters, loose fibres, resin concentration wrinkles, local deformation and dents.

The sheet shall be supplied with trimmed edges.

## 6.0 TEST SAMPLES:

### 6.1 Test on Sheets:

One sheet chosen at random out of every 20 sheets of a supply shall be subjected to routine tests. In addition, one sheet of size 300 mm × 300mm × 10mm thick prepared from the same batch of consignment shall be supplied for Marten' s Heat Distortion Temperature test.

### 6.2 Test on Components:

All possible tests shall be carried out on components.

## 7.0 COMPOSITION:

### 7.1 Resin:

Bisphenol A based liquid epoxy resin having epoxy equivalent of 180 to 220, with appropriate hardener for temperature index 155

or

Novalak epoxy resin of low molecular weight having epoxy equivalent of 175 to 200, with appropriate hardener for temperature index 155.

### 7.2 Diluents and Viscosity Reducers

Not to be used.

### 7.3 Glass Mat:

Silane treated, bonded with epoxy compatible binder of 450 GSM (0.8 mm thick) or 300 GSM (0.5 mm thick). Mats shall be thoroughly dried to remove moisture. This shall be checked by burning the bond at 600°C for sufficient time.





# CORPORATE PURCHASING SPECIFICATION

AA22414

Rev No.04

PAGE 3 of 4

## 8.0 PROPERTIES:

When tested as per relevant clauses of the BHEL Standard AA0851701: Methods of Tests for Laminated Sheets, the test sample shall show the following properties.

### 8.1 PHYSICAL PROPERTIES:

#### 8.1.1 Specific Gravity:

1.8 ± 0.1

#### 8.1.2 Water Absorption:

The maximum permissible water absorption after immersion in water for 24 hours at 20°C shall be as follows:

Thickness, mm		Percent,
Above	Up to and incl.	Maximum
-	5	0.30
5	10	0.20
10	15	0.20
15	20	0.15
20	25	0.15
25	-	0.15

**Note:** Thickness above 25 mm shall be machined to 25 mm keeping one side intact.

#### 8.1.3 Marten's Heat Distortion Temperature:

160°C minimum

### 8.2 MECHANICAL PROPERTIES:

#### 8.2.1 Machine ability:

The material shall be capable of being sawn, milled, drilled tapped with a M 3.5 tap and being shaped in a shaping machine without showing any signs of splitting, cracking or chipping.

#### 8.2.2 Tensile Strength:

230 N/mm<sup>2</sup> minimum

#### 8.2.3 Cross Breaking Strength:

320 N/mm<sup>2</sup> minimum

#### 8.2.4 Shear Strength:

100 N/mm<sup>2</sup> minimum

#### 8.2.5 Compression Strength (Proof):

360 N/mm<sup>2</sup>

#### 8.2.6 Splitting Load, Edge wise:

(For Sheets of Thickness 10 mm and above)

2.25 kN minimum

### 8.3 ELECTRICAL PROPERTIES:

#### 8.3.1 Insulation Resistance:

(After immersion in water at 20°C for 24 hours)

2500 Megohms minimum

AA22414

Rev No.04

PAGE 4 of 4

# CORPORATE PURCHASING SPECIFICATION



## 8.3.2 Electric Strength (Proof) In Oil at 90°C

### 8.3.2.1 Flatwise up to 5 mm thickness:

10 kV/mm

### 8.3.2.2 Edgewise above 5 mm thickness:

30 kV

## 9.0 TYPE TEST:

### 9.1 Comparative Track Index (CTI):

200 minimum

## 10.0 TEST CERTIFICATES:

Unless otherwise stated, three copies of test certificates shall be supplied along with each consignment giving the following information:

AA22414 (Rev No.04): EPOXY GLASS MAT LAMINATED SHEETS

BHEL Order No.

Manufacturer's/Supplier's Name.

Batch/Lot No.

Date of Manufacture.

Test Results of clause 4, 7, 8 and 9

## 11.0 PACKING AND MARKING:

Identification slips shall be pasted suitably on all the four corners of each board giving the size of the board and manufacturer's code number/grade.

The boards shall be packed in wooden cases lined with water proof paper from inside. Each sheet shall be separated from other sheet by a thick paper or card board.

Each container shall be marked with the following information

AA22414 : EPOXY GLASS MAT LAMINATED SHEETS

BHEL Order No.

Manufacturer's/Supplier's Name.

Batch/Lot No.

Thickness, Width and Length.

Number of Sheets.

Date of Manufacture.

Quantity supplied.



**BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL**

**QUALITY PLAN FOR – EPOXY LAMINATED GLASS FABRIC BASE SHEET TO SPEC. AA 22414**

**QUALITY PLAN NO. QA/MT/BOI/063 REV 00**

**DATE:07/09/2020**

**ABBREVIATION:**

#	1. In case TCs of NABL Lab, results of TC shall be strictly as per scope/range of NABL accreditation. BHEL/TPIA witness shall be waived off in such case. TC/TR shall be cleared based on Record Review basis.	
	2. In case of TCs of Labs other than accredited by NABL, traceability shall be verified by inspection agency for the equipment/ instrument used for conducting the test and shall be reported in the TCs. BHEL/TPIA shall witness the tests in such cases.	
V	Visual,	
M	Measurement	
T	Testing	
RT	Routine Test	
TT	Type test (Validity in 2 years)	



SL NO	COMPONENT	CHARACTERISTICS	TYPE OF CHECK	QUANT AM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	INSPECTION AGENCY	REMARKS
1.0		<b>Physical Properties</b> Specific Gravity, Water Absorption, Martens's Heat Distortion Temperature	T	Sample	AA22414	AA22414	TC	BHEL/TPIA	#
2.0		<b>Dimensional check</b>	M	Random Sample	Drawing	Drawing	TC	BHEL/TPIA	"Witness" as per Sampling Plan (enclosed)
3.0		<b>Mechanical properties</b> Machine ability, Cross Breaking Strength, Tensile Strength, Compression Strength (Proof), Shear strength and Splitting Load, Edge wise (For Sheets of Thickness 10 mm and above)	T	Sample	AA22414	AA22414	TC	BHEL/TPIA	# RT



**BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL**  
**QUALITY PLAN FOR – EPOXY LAMINATED GLASS FABRIC BASE SHEET TO SPEC. AA 22414**

QUALITY PLAN NO. QA/MT/BOI/063 REV 00

DATE:07/09/2020

4.0		<b>Electrical Properties</b> Insulation Resistance Electric Strength (Proof) In Oil at 90°C,- Flatwise up to 5 mm thickness & Edgewise above 5 mm thickness:	T	Sample	AA22414	AA22414	TC	BHEL/TPIA	RT
5.0		<b>Comparative Track Index (CTI)</b>	T	Sample	AA22414	AA22414	TC	BHEL/TPIA	TT
6.0	<b>PACKING AND MARKING:</b>	<b>Marking</b> BHEL order No. Manufacturer's / Supplier's Name Batch/Lot No. Thickness, Width and Length. The items shall be suitably packed in wooden case lined with water proof paper from inside.	V	100%	AA22414/PO	AA22414/PO	----	----	
<b>PREPARED BY:</b>  उत्पादन प्रबंधक (उ.प्र.) आपक प्रमाणन विभाग (आ.प्र.) भारत भारी विद्युत, भोपाल				<b>APPROVED BY</b>  निर्देशक (नि.) / फ.आ. उपप्रा. आपक प्रमाणन / आ.प्र. उपप्रा. आपक प्रमाणन / आ.प्र. उपप्रा.					