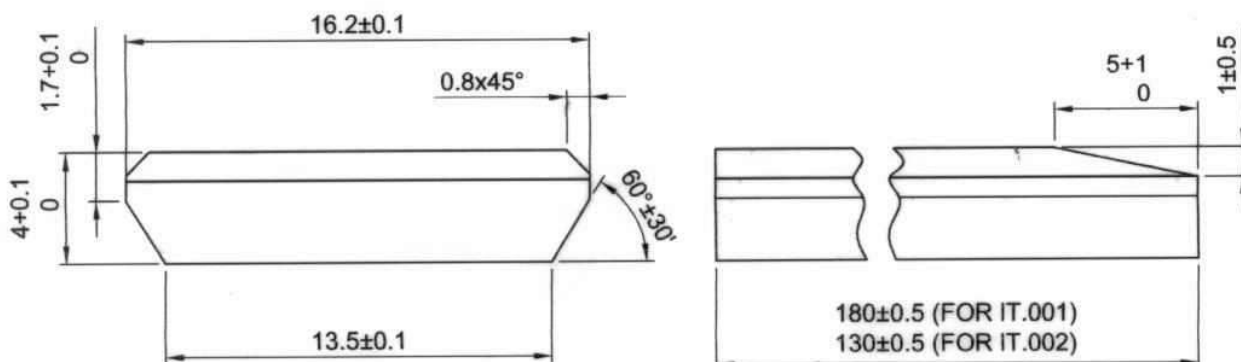


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REV.	DATE	ALTERED	REV.	DATE	ALTERED <i>del.</i>	ADDITIONAL INFORMATION
		CHECKED			CHECKED <i>Done</i>	
		APPROVED			APPROVED <i>Q</i>	
			09	20/2/09		STATUS OF DRAWING
			DRG. UPDATED & DIGITISED, STYLE LIST ADDED.			DISTRIBUTION TME -1 TNX -1 OF PRINTS TAM -3



STYLE LIST		
VAR.	IT.NO.	STYLE NO.
-	001	BP9064696802
-	002	BP9094626126

NOTES:

1. ITEM 001 FOR TA10102CW & ITEM 002 FOR TA10106AZ.

B.O.	002	SLOT WEDGE 4TK.x20x130LG.	1	BP2241791016 BP22491	A Z	KG	0.015
	001	SLOT WEDGE 4TK.x20x180LG.	1	BP2241791016 BP22491	A Z	KG	0.020
REMARKS	ITEM NO.	DESCRIPTION	STD	MATL. CODE	A C	UNIT	UNIT WT.
				MATL. SPECN.			QTY.
CARD TYPE 3 → 28		28 → CARD TYPE 1	28		CARD TYPE 2		
<div>बी.एच.ई.एल. </div> <div>BHARAT HEAVY ELECTRICALS LTD. BHOPAL</div>			DRN.	NAME	SIGN	DATE	NO.OF VAR.
			CKD.	H.S.MANDAL	Sd-	20.4.82	-
			APPD.	KDG	Sd-	01.5.82	
				GCS/PS	Sd-	21.5.82	
DEPT. TIME CODE 405	UNTOOL. DIMS. GR. F AA0230208	SCALE NTS	WEIGHT(KG) -	REF.TO ASSY.DRG. 043033323001 043033325004 043033344001	ITEM NO. 035 018 018	NO.OF ITEM 002	
TITLE SLOT WEDGE				DRAWING NO. 44303323004		REV 09	

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TA10106AZ

01

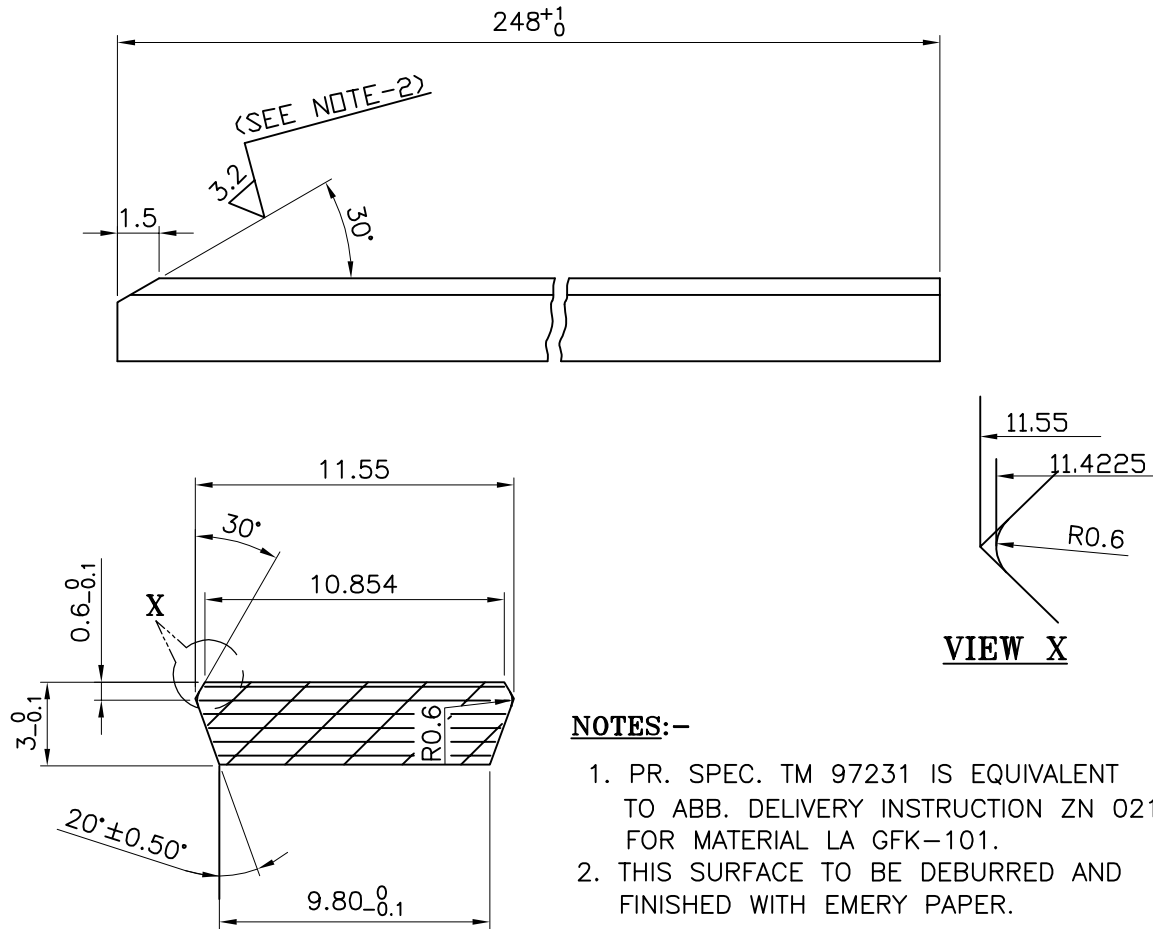
01

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FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

REV.	DATE	ALTERED	REV.	DATE	ALTERED	ADDITIONAL INFORMATION	SIM DRG. NO.
		CHECKED	01	12.09.13	CHECKED		3EHM 413048
		APPROVED			APPROVED		
ZONE			ZONE		DRG. DIGITIZED & UPDATED.	STATUS OF DRAWING	
						DISTRIBUTION OF PRINTS	TME-1, TNX-1 TXM-3



NOTES:-

1. PR. SPEC. TM 97231 IS EQUIVALENT TO ABB. DELIVERY INSTRUCTION ZN 02148 FOR MATERIAL LA GFK-101.
2. THIS SURFACE TO BE DEBURRED AND FINISHED WITH EMERY PAPER.
3. THIS DRG IS SIMILAR TO CLW DRG. NO. 4 TWD 096.050 ALT-2.

			001	STATOR SLOT WEDGE								KG	0.013 []	
59	64	65	75	25	27	29	58	59	34	45	55	56	58	65
VAR00			REMARKS			ITEM NO.	DESCRIPTION	STD	MATL. CODE		A	UNIT	UNIT WT.	
									MATL. SPCN.		C		QTY. []	
28 → CARD TYPE-3						28 → CARD TYPE-1				28 → CARD TYPE-2				



BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SIGN	DATE	NO. OF VAR.
DRN.	R.B.V.	-SD-	03.09.10	
CHD.	D.K.	-SD-	03.09.10	
APPD.	VIKAS	-SD-	03.09.10	00

DEPT.	TME	UNTOL. DIMS. GR.	SCALE	WEIGHT (K.G.)	REF. TO ASSY. DRG.	ITEM NO.	NO. OF ITEM
CODE	405	GR. 'M' TM20079	N.T.S.	0.013	04453364053	008	001
TITLE					DRAWING NO.		REV.
					4 445 33 64 051		01
					SHT. NO.	01	NO. OF SHT.
							01

STATOR SLOT WEDGE

6FRA 6068

16

SIZE A4



PLANT PURCHASING SPECIFICATION BHOPAL

BP 22491

REV NO. 09

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SUPERSEDES
BP 22491 Rev 08

EPOXY GLASS CLOTH LAMINATED SLOT WEDGES SUPERIOR QUALITY

1. GENERAL :

This specification governs the quality of slot wedges machined from epoxy resin bonded woven glass cloth laminated sheet having very high mechanical strength and good electrical properties, low absorption of moisture and suitable for operation in tropical conditions. The material has temperature index of at least 155.

2. APPLICATION :

The slot wedges are used for retaining windings of traction motors in rotor slots. The slot wedges are subjected to the centrifugal force exerted by the windings and should withstand temperature upto 155°C without distorting. The slot wedges shall not delaminate when inserted in the slots by hitting at the ends.

3. COMPLIANCE WITH NATIONAL STANDARDS:

There is no Indian Standard covering this type of material.

4. DIMENSIONS & TOLERANCES:

Dimensions shall be stated on the drawing accompanying the order.

5. FINISH:

The surface of the slot wedges shall be smooth, free from flaws, cracks, folds, loose fibres, resin concentration, wrinkles, local deformation, dents, tool marks, grinding defects etc.

6. TEST METHODS:

As stated against each clause.

7. SAMPLES FOR TEST:

One sheet of 250 x 250 mm of 3-5 mm thickness shall be supplied with each consignment for mechanical testing.

Revision : Reviewed & No technical change

Issued by :

Signature
05/10/2020

STANDARDS AND MATERIALS GROUP
TECHNICAL SERVICES DEPTMENT

Rev. 09

Date : 05.10.2020

Date of first Issue: July . 1987



TSD 6207A

PLANT PURCHASING SPECIFICATION BHOPAL

BP 22491

REV NO. 09

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8. COMPOSITION REQUIRMENTS

Resin -

Bisphenol - A liquid epoxy resin having epoxy equivalent of 180 to 200,
OR
Novalak epoxy resin of low molecular weight having epoxy equivalent of 175 to 180.

Curing Agent:

4 -4' Diamino Diphenyl Sulphone (DOS).

Accelerator :

Boron Trifluoride Mon ethyl Amine Complex or Tertiary Amine Base.

Diluent & Viscosity Reducers : Not to be used

Glass Cloth :

Plain weave of 0.18 mm thickness as per our corporate Purchasing specification AA 25601 "Glass Fibre Woven Cloth" except that it shall be with silane / volan treatment. The glass cloth shall be suitably dried to remove moisture.

9 PROPERTIES :

9.1 Cross Breaking Strength: (BS EN ISO 178)

9.1.1 At room temperature after 100 hours of ageing at, 200 to 208°C,

390 N/mm², Min.

9.1.2 At 150 to 154°C after one hour of ageing at 150 to 154°C (Type Test)

200 N/mm², Min.

9.1.3 At 150 to 154°C, after 100 hours of ageing at 200 to 208°C (Type Test)

200 N/mm², Min.

9.1.4 At 150 to 154°C, after 1000 hours of ageing at 200 to 208°C (Type Test)

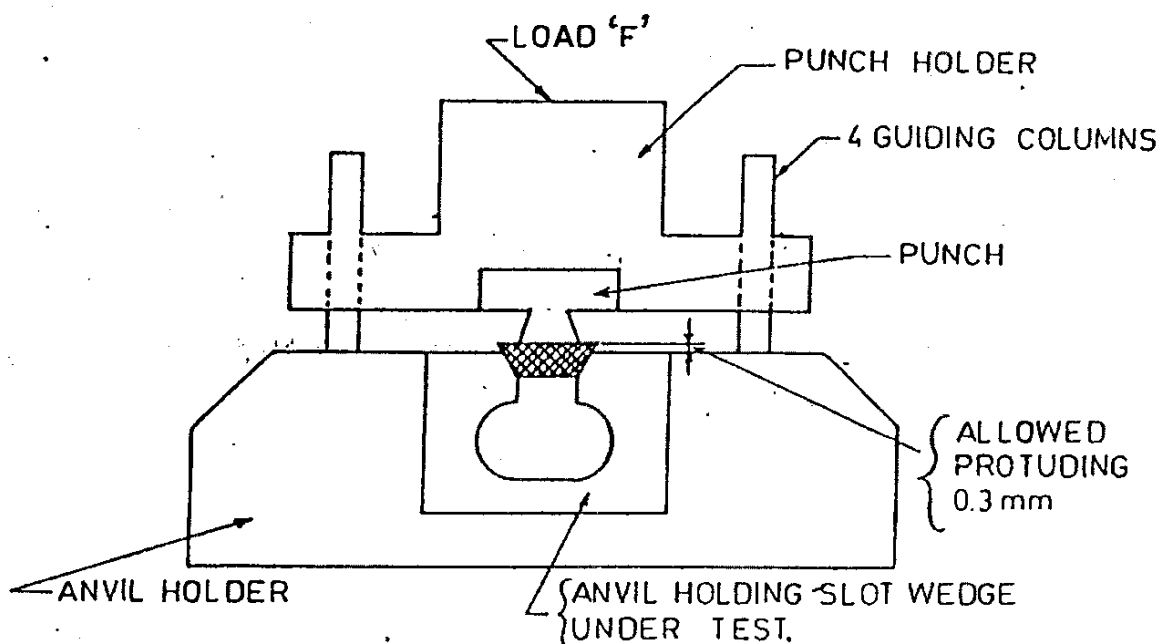
Not less than 75% of the measured value as per cl. 9.1.3.

ANNEXURE — I

TEST METHOD FOR DETERMINATION OF SHEAR STRENGTH

The test specimen shall be a piece of 50 ± 0.3 mm length cut from slot wedge. The cut face must be clean & free from loose fibers etc. and at right angles to the face of slot wedges.

The test fixture shall be as shown in the figure below:




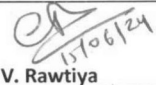
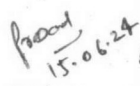
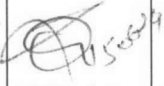
The specimen shall perfectly rest on the profile surfaces of the fixture when inserted in the anvil. The load shall be applied to the specimen gradually at such a rate that the final value at which the specimen shears is reached in 15 to 45 seconds from the time of initial application of load.


Shear strength shall be calculated from the following formula.

$$\text{Shear Strength (N/mm}^2\text{)} = \frac{F}{50 \times 2 \times t}$$

Where F is the load at failure in Newton

t is thickness in mm.

 TME/2011	PRODUCT STANDARD TME DIVISION, BHOPAL		TM 23611		
			Rev 02		
			PAGE	01	OF 04
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company	<u>SPECIFICATION OF EPOXY SLOT WEDGE</u>				
	1.0 General				
	1.1 Scope: This specification covers the requirements for Epoxy Stator Slot wedge used in Traction Machines. Slot Wedge's dimensions & tolerances to be as per the respective drawing as specified in the PO.				
	1.2 Construction Requirements: Slot wedges covered under this specification are of Fiberglass Reinforced Plastic (FRP) slot wedges which are made from parallel glass fibre roving by continuous drawing, using heat resistant epoxy resin as a binder.				
	1.3 Testing & Sample: The specification is the summary of the particulars & regulations that apply to the delivery. BHEL reserves the right to test all the requirements listed. Accordingly, vendor has to provide 3 nos. test samples of size 300 X 300 mm of component thickness.				
2.0 Requirements					
2.1 General Requirements No cracks must be visible in the cut surface of the wedge under a magnifying glass.					
2.2 Properties Refer Table-1.0 Refer corresponding notes for items with (*).					
Revision: 02 Date: 15-06-2024	Distribution	Qty.	Approved:  V. Rawtiya		
	TXM QTM TME	1 1 1	Prepared:  P Telang	Checked:  S K Yadav	First Issue Date: 15-03-2023

 TME/2011	PRODUCT STANDARD TME DIVISION, BHOPAL				TM 23611	
					Rev 02	
					PAGE 02 OF 04	

COPYRIGHT AND CONFIDENTIAL 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	Table 1.0					
	Sl. No.	Size item	Unit	Values	Test Method	Ref. Note
	1	Composition Glass fibre content	%	≥60	ISO 1172 (=DIN EN 60)	*3
	2	Density	g/cm ³	≥ 1.8	ISO1183 (=DIN 53479)	*3
	3	Flexural bending strength delivered *4			ISO 178 (= DIN 53452, SN 277103)	
	3.1	At 23 °C	N/mm ²	>500		*3
	3.2	At 150 °C relative to the measured value at 23 °C	%	≥50		*3
	3.3	Aged for 30 days at 180 °C measured at 23 °C	N/mm ²	>450		*1
	4	Pressure shear strength in the dummy slot			ASTM D3846	
	4.1	Short time at 23°C	N/cm	>3000		*3
	4.2	Short time at 150°C		>2000		*2
	5	Splitting load at 23°C in longitudinal direction *5	N	>1200	DIN 53436	*3
	6	Heat Shock Test	Visual inspection as specified in method *6			*3

Note:

***1 Qualification Test**
Report of conducted tests in past to be submitted.

***2 Type Test**
In addition to all the routine tests as denoted by *3, type test (with *2 marked tests) must be carried out on a normal wedge (as shown in note 7) to assess the material.

To be conducted on wedges in first lot of the PO.

***3 Routine Test**
To be carried out on wedges with cross section which corresponds to the order, after the result of the type test has confirmed that the supplier is in a position to fulfil the requirements for the standard wedge.

Test to be conducted and report submitted against each consignment.

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TME/2011

TM 23611

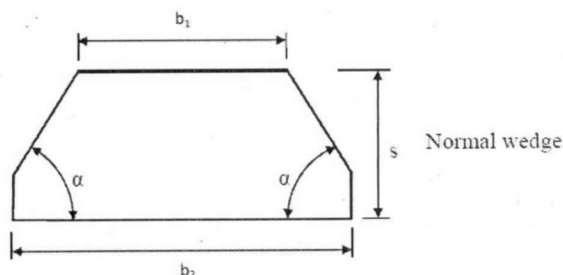
Rev 02

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*6. Procedure & Evaluation for Heat Shock Test

A specimen of size 100x100 of ordered thickness is kept in an oven maintained at $250 \pm 5^\circ\text{C}$ for 15 minutes. The specimen is removed directly to ambient conditions (i.e. Room temperature) after this period and observed. The material is considered satisfactory in this test, if no delamination, cracks, splitting, blistering or resin oozing is observed at the end of the test.

*7. Normal Wedge



b_1	$5.5 \pm 0.1\text{mm}$
b_2	$9.6 \pm 0.1\text{mm}$
S	$5.5 \pm 0.05\text{mm}$
α	66°

2.3 Identification

Each item of the consignment (crate, palate etc.) must be labelled securely and indelibly (e.g. with an adhesive label or /and appendage) with the following details: Drawing No, Material Designation and component description quantity and eventually batch and test numbers.

3.0 Test Certificates:

Following TCs to be enclosed with each lot of finished component to BHEL:

- 3.1 Raw Material TC (per batch)
- 3.2 Test samples to BHEL as per Cl. 1.3 with first lot of the PO and with each consignment above 5000 Nos wedges.
- 3.3 Copy of Qualification test report as detailed in Note 1 of Cl.2.2.
- 3.4 Type Test report of the first consignment of the PO as per Note 2 of Cl 2.2.
- 3.5 Routine Test report per consignment as per Note 3 of Cl. 2.2.
- 3.6 Dimensional Report of the Wedge (10 nos. wedges per consignment)



BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL
QUALITY ASSURANCE PLAN FOR SLOT WEDGE TO BHEL ORDERING SPECIFICATION/DRAWING AS PER PO

QUALITY PLAN NO. – QAP/QTM/VENDOR QAP/2024-25/SLOT WEDGE DTD 13.08.2024 REV 00
Reference Document- PO DRAWING/SPECIFICATION

SL. NO	COMPONENT	CHARACTERISTICS	TYPE OF CHECK	QUANTAM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	INSPECTION AGENCY	REMARKS
				TP	Inspection Agency					
1)	Raw material	All tests	TC verification	100%	100%	As per PO drawing & Specification	As per drawing & Specification	Supplier record	BHEL/TPIA	TEST LAB NABL/EQUIVALENT ACCREDITED/SOURCE MILL /Supplier to get the raw material correlated with material TC. 3 sample/per heat/batch to be sent duly stamped by TPIA as per specification.
2)	Dimension Visual	Dimension	Measurement	10 nos.	5 nos	As per drawing & specification	As per drawing & Specification	Supplier record	BHEL/TPIA	Witness
3)	Visual heck	Cracks, Burr, smoothness,	visual	100%	5 nos	As per drawing & specification	As per drawing & specification	Supplier record	BHEL/TPIA	BHEL/TPIA
4)	Testing	Routine test	testing	2 sample	1 sample	As per drawing & specification	As per drawing & Specification	Supplier record	BHEL/TPIA	Witness
		Type test (only on first consignment of PO)	testing	2 sample	1 sample					

Prepared By

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क्यू.टी.एम.डी.एल.ओ.भारत
BHEL

Approved By

गोपाल सिंह राठौर/G.S. RATHORE
क्यू.टी.एम.डी.एल.ओ.भारत
BHEL



BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL
QUALITY ASSURANCE PLAN FOR SLOT WEDGE TO BHEL ORDERING SPECIFICATION/DRAWING AS PER PO

QUALITY PLAN NO. – QAP/QT/M/VENDOR QAP/2024-25/SLOT WEDGE DTD 13.08.2024 REV 00
Reference Document- PO DRAWING/SPECIFICATION

5	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
6	Packing to avoid transit damage	Visual	Visual	100%	20%	As per drawing & specification	As per drawing & specification		BHEL/TP/A	Packing to be such that no damages should occur during transit

Prepared By

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