



CORPORATE PURCHASING SPECIFICATION

A A 257 16

REV. No. 04

PREFACE SHEET

## POLYESTER RESIN IMPREGNATED WEFTLESS GLASS TAPE

FOR INTERNAL USE ONLY  
REMOVE THIS PREFACE BEFORE ISSUE TO SUPPLIER

### COMPARABLE STANDARDS :

### SUGGESTED PROBABLE SUPPLIERS AND GRADES :

1. M/S. FIBRETECH : U.S.A. RESI GLASS - TYPE G  
(AGENT : GLOBAL CONNECTIONS INC. USA)
2. M/S. ISOLA, ITALY - TYPE POLYGLAS - 31
3. M/S. JOHN STROUD INSULATION U.K. HYPERTEN - 1431
4. M/S. TVT LTD., FRANCE. TEXTI - NAP - TYPE F

### USER PLANTS AND REPLACED PLANT SPECIFICATIONS/REFERENCES:

BHOPAL : MC 26509

JHANSI : MC 26509

Revision : FAX TSD / SM / 420 dt : 10-08-98

BHEL, BHOPAL

Approved: INTERPLANT MATERIAL  
RATIONALISATION COMMITTEE - MRC (E)

Rev No. 04	Amd. No.	Reaffirmed	Prepared	Issued	Dt. of 1st issue
Dt. May '99	Dt.	Year:	BHOPAL	CORP. R& D	Feb. '80



### POLYESTER RESIN IMPREGNATED WEFTLESS GLASS TAPE

#### 1.0 GENERAL :

This specification governs the quality requirements of a weftless uni-directional tape, impregnated with a catalysed polyester resin formulation. It shall be supplied in 'B' stage semi cured condition in a soft well balanced flat ribbon form, thus assuring that each yarn bears an equal share of the load. The tape when cured, has high tensile strength, high modulus, low elongation, high impact strength, and a temperature index of atleast 155.

#### 2.0 APPLICATION :

Used for banding cores of Transformers.

#### 3.0 COMPLIANCE WITH NATIONAL STANDARDS :

There is no Indian Standard covering this type of material.

#### 4.0 DIMENSIONS AND TOLERANCES :

##### 4.1 Sizes:

Thickness, width and length/roll shall be stated on the order.

##### 4.2 Thickness:

0.3, 0.4 mm with tolerance  $\pm 10\%$

##### 4.3 Width :

40  $\pm$  3 mm However other widths can also be ordered.

##### 4.4 Length/Roll:

100 m.

COPYRIGHT AND CONFIDENTIAL  
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It is not to be used directly or indirectly in any way detrimental to the interest of the company.

Revision : FAX TSD / SM / 420 dt : 10-08-98  
BHEL, BHOPAL

Approved : INTERPLANT MATERIAL  
RATIONALISATION COMMITTEE - MRC (E)

Rev No. 04	Amd. No.	Reaffirmed	Prepared	Issued	Dt. of 1st issue
Dt. May '99	Dt.	Year :	BHOPAL	CORP. R& D	Feb. '80

**5.0 SHELF LIFE :**

At 20°C - 6 months, Min.

At 5°C - 12 months, Min.

The date of manufacture shall be clearly indicated on each roll. The date of manufacture shall not be earlier than 30 days at the time of despatch.

**6.0 SAMPLE FOR TEST :**

A roll shall be supplied for testing and approval purposes.

**7.0 PROPERTIES OF TAPE AS SUPPLIED :****7.1 Identification of varnish: (Type Test)**

The varnish used shall be polyester when tested through infrared spectrophotometer or any other conventional method:

**7.2 Resin Content ( B.S 2782 : Pt 10 : Method 1006 ) :**

29±4%

**7.3 Sealing (Solder) Test:**

The resin of the tape shall flow and stick to other layers within one minute, when hot pressed with a soldering iron at  $160^{\circ} \pm 2^{\circ}\text{C}$ .

**7.4 Warp yarns (Ends/cm):**

$30 \pm 3$

**7.5 Softening Point of Resin:**

235°C Max.

Shall be tested by Koeffler Apparatus in accordance with Appendix - I.

**8.0 PROPERTIES OF CURED TAPE :****8.1 Breaking Load:**

Measured in fully cured condition at room temperature in accordance with Appendix - II.

Standard Thickness (mm)	Breaking Load per turn, Min N/mm width
0.30	200
0.40	250

**9.0 TEST CERTIFICATE :**

Unless otherwise stated, three copies of test certificates shall be supplied along with each consignment.

In addition, the supplier shall ensure to send one copy of test certificates along with their despatch documents to facilitate quick clearance of the material.

The test certificates, shall bear the following information:

AA 25716 : [Revision 03] Polyester Resin Impregnated Weftless Glass Tape

BHEL Order No.

Batch/Lot No.

ShelfLife -

Thickness & Width

No. of Rolls & length per roll

Test values obtained & certificates for compliance with clause 4, 7 & 8.

**10.0 PACKING AND MARKING :**

In rolls of ordered width and length, suitably packed to protect from contamination and damage during the transit.

Each package shall be marked with the following information:

AA 25716 : Polyester Resin Impregnated Weftless Glass Tape.

BHEL Order No.

Batch/Lot No.

Manufacturer's Name and Grade

Thickness & width

Date of manufacture on each roll

No. of rolls & length/Roll



## APPENDIX - I

**PROCEDURE FOR THE DETERMINATION OF SOFTENING  
AND CURE INITIATION TEMPERATURE OF BINDER  
USED IN RESIGLAS TAPE BY MEANS OF KOEFFLER APPARATUS**

**1.0 Summary of the Method:**

This procedure deals with the determination of temperatures at which the binder or resiglas tape begins to soften and starts converting into infusible state. The method consists in placing 2 layers of the tape on the heated surface of Koeffler Apparatus for a specified period under a fixed load and then observing its condition.

**2.0 Apparatus:**

2.1 Koeffler Apparatus (IEC 455-2 1977)

2.2 Metallic weights.

2.3 Aluminium sheet padded on one side with rubber.

2.4 Aluminium foil, 0.025 mm thick.

2.5 Set of calibration compounds.

**3.0 Procedure:**

Switch on the apparatus and allow to stabilise for 45 to 60 minutes. Calibrate the temperature of apparatus with pure substances of known melting points. Place two test pieces of tape equal in length to that of the hot plate over each other and sandwich them between aluminium foil.

Place the tape and foil on the hot plate and immediately place aluminium sheet with rubber facing the foil and required weight to give a pressure of 60 gms/sq. cm on the test piece. Allow the test piece to be on hot plate for a period of 20 seconds. Remove the test piece from the plate. Remove the aluminium foil and starting from cold end, try to separate the pieces of tapes. Mark the point at which first sign of sticking between two pieces of tape (the layers of tape do not get separated easily and there is transfer of resin from one layer to another). Continue to separate the tapes till it is no longer possible to do so without breaking one of the layers. Mark this point also. Measure the distance of these two points from cold and read corresponding temperature on the hot plate.

Take the average of three readings. If there is a difference of more than 3 deg. C. between two readings, repeat the tests on two more samples.



**4.0 Report the results as follows:**

4.1 Temperature for Initial Softening.

4.2 Temperature for attaining infusible state (Softening Point) - °C

**NOTE:**

- i) It may sometimes be necessary to apply a releasing agent in the aluminium foil. Silicone grease is suitable for this purpose.
- ii) Allow the apparatus to return to steady state after making test. 10 to 15 minutes waiting time is usually adequate.
- iii) Some times it has been found that the pieces stick together at temperature less than 50° C. Report initial softening temperature to be less than 50° C.

\* \* \*



## APPENDIX - II

## METHOD OF TEST FOR BREAKING LOAD OF FULLY CURED TAPE.

## 1.0 Preparation of Test Specimens.

Three split disc rings of 125 mm dia and having a circumferential groove of 3 mm depth and 75 mm width are banded with six turns. Initial and final turns shall have extra half turn (overlap) so that full six turns are available for breaking load test.

The tape is laid in the groove in a smooth, flat manner such that the centre line of the tape coincides with the centre line of the groove. Tension of 100 N/mm width, consistent throughout the banding operation, is applied to the tape. The tape end is maintained under tension till the band end is sealed with a heat gun.

The bands are cured for 5 hours at 150°C for 16 hours at 130°C in a preheated forced air oven.

## 2.0 Determination of Breaking Load at Room Temperature.

The bands are broken on a suitable tensile testing machine, the breaking load of each band being recorded.

The breaking load of the tape is calculated as under :

$$P = \frac{F}{2TB}$$

Where, P - Breaking load in N/mm width of the tape,

F - Average of the breaking loads of the six bands in N.

T - Number of turns of tape per disc ring, (i.e. 6)

B - Width of the tape in mm.