

 An ISO 9001:2015 Company BHOPAL	INSULATION SKETCH		IN. SK. 46052
	INSULATION SYSTEMS ENGINEERING		Rev. No.: 01
	GLASS BACKED RESIN POOR EPOXY BONDED MICA PAPER TAPE / WRAPPER (WITH DECA ZINC ACCELERATOR)		Rev. Dt.: 28/07/2020
			Sht. 1 of 6 shts.

INSULATION CLASS - F

1. GENERAL

This specification governs the quality requirements of epoxy resin bonded glass fabric backed mica paper tape/ wrapper suitable for VPI insulation system for electrical machines. The mica paper shall be of **uncalcined muscovite** grade. The glass fabric backing shall be basket/ plain weave dexol treated. The tape/ wrapper shall contain accelerator (**DECA ZINC**) necessary for curing of insulation. The coils/ bars insulated with this tape/ wrapper shall undergo VPI process with a solventless epoxy resin & hardener mix and shall have a temperature index of ≥ 155 deg.C.

Important: Bonding of mica paper with glass cloth should be strong enough to avoid separation, cracking or falling of mica during hand/ machine taping or re-rolling. The mica paper tape should be suitable for both hand and machine taping.

2. APPLICATION

Used for main insulation of stator coils/ bars & rotor bars of electrical machines with VPI system.

3. COMPLIANCE WITH NATIONAL STANDARDS

There is no Indian standard covering this type of material.

4. DIMENSIONS AND TOLERANCES

4.1 Sizes:

The thickness, width and length shall be as stated on the order.

4.2 Thickness:

4.2.1 Standard thickness: 0.14 mm

4.2.2 Tolerance on thickness: ± 0.02 mm

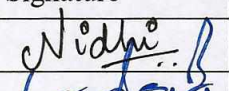
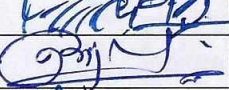
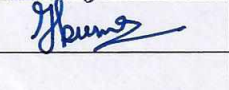
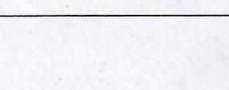
4.3 Width:

4.3.1 Standard width : 25, 30, 35, 40, 1000 mm

4.3.2 Tolerance on width: ± 0.5 mm

4.4 Length/Roll : 50 m for hand taping and 80 m for machine taping.

However, for special applications, any other length may be ordered.

Distribution:	Date of Rev. 00: 11/05/2009	Name	Signature
CIM QFD MDX TSD AME	Prepared by	Nidhi Gupta	
	Checked by	Bishwanath Oraon	
	Approved by	Anirudha Tijare	
	Issued by	Gautam Kumar	

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5.

SHELF LIFE AND STORAGE

≤ 5 deg. C: 18 months, minimum from the date of delivery

> 5 to ≤ 25 deg. C: 12 months, minimum from the date of delivery

6.

TEST METHODS

Unless otherwise specified, all the tests shall be conducted as per the relevant methods of IEC 60371-2.

7.

SAMPLE FOR TESTS

Two rolls shall be sent to TSD for testing from every consignment.

8.

CONSTITUENTS

8.1.

Mica Paper

:

The mica paper shall be of uncalcined muscovite grade.

8.2

Glass Fabric

:

Glass fabric shall be made from E-glass (low alkali glass containing ≤ 1% alkali metal oxide, expressed as Na₂O) as prescribed in IS 11320 with thread count as below :

Warp	:	EC 5-5.5 Tex, 26 fd/cm
Weft	:	EC 5-5.5 Tex, 15 fd/cm.

Dexol content ≤ 3%.

8.3

Binder

:

Epoxy Resin Type Bisphenol-A

8.4

Accelerator

:

Deca Zinc 11/12 from M/s OMG Borchers GmbH, Germany

8.5

Colouring Dye

:

Sudan Red

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9.0

COMPOSITION

When tested as per conventional method, composition shall be as given below:

Total substance

:

198 ± 20 g/m²

Mica Paper

:

160 ± 16 g/m²

Glass Content

:

23 ± 2 g/m²

Bond Content

:

12 g/m² (Minimum)

(including accelerator)

18 g/m² (Maximum)

Volatile Content

:

1.0 % Max.

9.1

Accelerator content (For information only):

Deca Zinc accelerator with Zinc content = (480 ± 120) mg Zn / sq. m.

10.0

MECHANICAL PROPERTIES

10.1

Tensile Strength at 3.0% Elongation:

80 N/cm, Min.

10.2

Stiffness (IEC : 60626 -2)

60 N/m, Max.

During test, mica shall be on top side.

11.0

ELECTRICAL PROPERTIES

11.1

Electric Strength (BDV) in air at Room Temp. IS 2584:

1.0 kV, Min.

12.

OVERLAP INDICATION

A centre line shall be drawn throughout the length of tape to indicate half over lap. Care shall be taken to use ink/ pen such that it does not deteriorate the quality of tape/ insulation.

13.

FINISH AND FREEDOM FROM DEFECTS

The mica paper and glass fabric must be bonded to each other firmly & in a wrinkle free manner and must not loosen during taping. Cracks and foreign ingredients are not permissible.

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The tape should be cut neatly so that the warp fibers must run strictly in longitudinal direction and should not loosen at the edges during taping.

14. JOINTS

The material shall be supplied in continuous lengths as stated on the order. Rolls having joint shall be packed separately and appropriately marked. 90% of the consignment shall be without joints. Material used for jointing shall not adversely affect the properties of the cured insulation. Maximum one joint per roll is permitted.

15. TEST CERTIFICATE

Unless otherwise specified three copies of test certificates shall be supplied.

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:

IN.SK.46052 : Glass Backed Resin Poor Epoxy Bonded Mica Paper Tape/wrapper
Rev. 01 (with deca zinc accelerator)

BHEL Order No.

Manufacturer's/Supplier's Name.

Batch No. /Lot No.

Date of Manufacture

Test results obtained for the properties and dimensional tolerances as per the specification.

16. PACKING AND MARKING

i) **Bobbin for hand taping:** The tape shall be supplied wound tightly on rigid plastic bobbins with rounded inner edges with ID-55 mm as shown in "Sketch-A".

Mica paper shall be on top side. The rolls shall be kept in a polythene bag, which in turn packed in polystyrene/ suitable corrugated boxes to avoid damage during transit/ storage.

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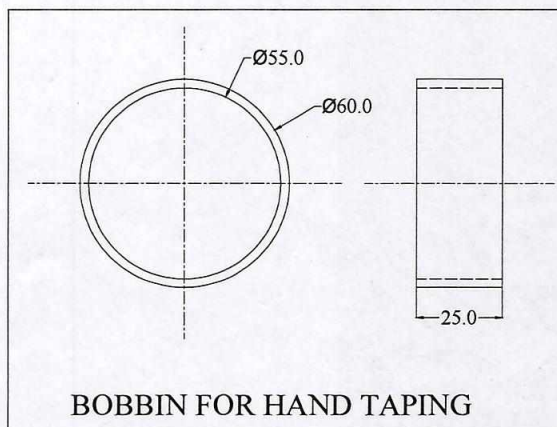
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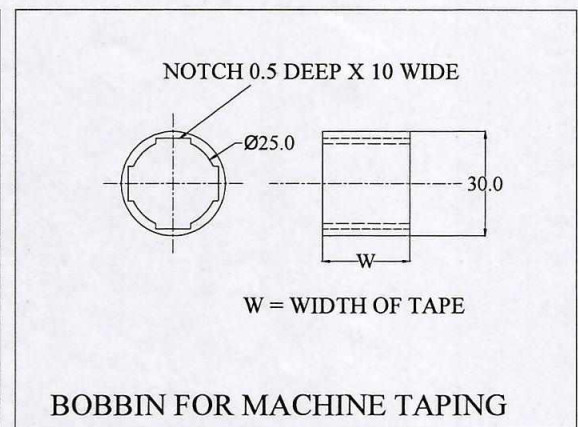
- ii) **Bobbin for machine taping:** The tape is to be supplied on plastic bobbin (as shown in the "Sketch B" below). The bobbin should have dimensions as follows:

Inner Diameter of Bobbin	:	25 + 0.2 / - 0.0 mm
Outer Diameter of Bobbin	:	30 mm
Material of Bobbin	:	Plastic
Notches	:	4 numbers equally distributed 0.5 deep 10 wide.



BOBBIN FOR HAND TAPING

SKETCH-A



BOBBIN FOR MACHINE TAPING

SKETCH-B

- iii) **General:**

The packing must be so selected that the rolls are not soiled or damaged during transportation and storage and are well protected from temperature and humidity. Material in tape form shall be supplied wrapped on solid, grease/ solvent resistant bobbins or tubes for material in wrapper form, without any creases/ folds. The end of rolls should be secured. The rolls with joint must be clearly visible and packed in separate boxes. The tape must be uniformly and so tightly wrapped over the entire length of the roll that it does not slip with a processing force of 1 N/mm.

Identification slip shall be pasted suitably on the bobbins of each roll indicating the manufacturer's code / grade, batch number and manufacturing date.

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Each package shall be marked with following information preferably on the face of the cartons/ boxes:

- I Name of the material and specification no. i.e. IN.SK.46052 : Glass Backed Resin Poor Epoxy Bonded Mica Paper Tape/ Wrapper (with deca zinc accelerator)
- ii) Dimensions of the material viz. thickness, width and length
- iii) BHEL purchase order number
- iv) Supplier's name and grade
- v) Date of manufacture, Shelf life, Batch no., Lot no. and Expiry date
- vi) Net weight and gross weight

17. ACCEPTANCE CERITERION

The material shall be accepted on the basis of the following:

Test certificate furnished by the supplier and/ or testing carried out at BHEL.

18. REJECTION

BHEL reserves the right to reject the part or entire lot of the material if found not conforming to this specification. Parts of the lot not subjected to testing but found to be defective and those with hidden defects can be rejected later on also.

19. CHANGES DUE TO REVISION

Accelerator type changed to Deca Zinc.
Specification reviewed and updated.

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