IS/IEC 60371-3-9:1995 (1995): Specification for Insulating Materials Based on MICA, Part 3: Specification for Individual Materials, Section 9: Moulding Micanite [ETD 2: Solid Electrical Insulating Materials and Insulation Systems]

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IS/IEC 60371-3-9 : 1995
[Superseding IS 9299 (Part 3/Sec 2) : 1982]

भारतीय मानक

अभ्रक आधारित उष्मारोधी सामग्री की विशिष्टि

भाग 3 एकल सामग्री की विशिष्टियाँ

अनुभाग 9 संचकन माइकेनाइट

Indian Standard

SPECIFICATION FOR INSULATING MATERIALS BASED ON MICA

PART 3 SPECIFICATIONS FOR INDIVIDUAL MATERIALS

Section 9 Moulding Micanite

ICS 29.035.50

BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

May 2012 **Price Group 4**

Solid Electrical Insulating Materials and Insulating Systems Sectional Committee, ETD 02

NATIONAL FOREWORD

This Indian Standard (Part 3/Sec 9) which is identical with IEC 60371-3-9 : 1995 'Insulating materials based on mica — Part 3: Specifications for individual materials — Sheet 9: Moulding micanite' issued by the International Electrotechnical Commission (IEC) was adopted by the Bureau of Indian Standards on the recommendation of the Solid Electrical Insulating Materials and Insulating Systems Sectional Committee and approval of the Electrotechnical Division Council.

This standard was first published as IS 9299 (Part 3/Sec 2) : 1982 'Insulating materials based on built-up mica or treated mica paper: Part 3 Specifications for individual materials, Section 2 Moulding mica materials for electrical purposes'. The committee has now decided to adopt the IEC Standard to harmonize it with the latest developments taken place at international level. This standard is now being published in single number based on IEC 60371 in various parts/sections. Other parts in this series are:

Part 1 Definitions and general requirements

Part 2 Methods of test

Part 3 Specifications for individual materials,

- Section 1 Commutator separators and materials
- Section 2 Mica paper
- Section 3 Specification for rigid mica materials for heating equipment
- Section 4 Polyester film-backed mica paper with a B-stage epoxy resin binder
- Section 5 Glass-backed mica paper with an epoxy resin binder for post-impregnation (VPI)
- Section 6 Glass-backed mica paper with a B-stage epoxy resin binder
- Section 7 Polyester film mica paper with an epoxy resin binder for single conductor taping
- Section 8 Mica paper tapes for flame-resistant security cables

This standard supersedes IS 9299 (Part 3/Sec 2) : 1982 and after the publication of this standard IS 9299 (Part 3/Sec 2) shall be treated as withdrawn.

The text of IEC Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain terminology and conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their respective places are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
IEC 60216-1 : 1990 Guide for the determination of thermal endurance properties of electrical insulating materials — Part 1: General guidelines for ageing procedures and evaluation of test results	IS 8504 (Part 1) : 1994 Guide for determination of thermal endurance properties of electrical insulating materials: Part 1 General guidelines for ageing procedures and evaluation of test results (*first revision*)	Technically Equivalent
IEC 60243-1 : 1988[1)] Method of test for electric strength of solid insulating materials — Part 1: Tests at power frequencies	IS 2584 : 1963 Method of test for electric strength of solid insulating materials at power frequencies	do
IEC 60371-2 : 1987[2)] Specification for insulating materials based on mica — Part 2: Methods of test	IS/IEC 60371-2 : 2004 Specification for insulating materials based on mica: Part 2 Methods of test	do
IEC 60371-3-2 : 1991[3)] Specification for insulating materials based on mica — Part 3: Specifications for individual materials — Sheet 2: Mica paper	IS/IEC 60371-3-2 : 2005 Specification for insulating materials based on mica: Part 3 Specifications for individual materials, Section 2 Mica paper	do
IEC 60554-3-2 : 1983 Specification for cellulosic papers for electrical purposes — Part 3: Specifications for individual materials — Sheet 2: Capacitor paper	IS 9335 (Part 3/Sec 2) : 1985 Cellulosic papers for electrical purposes: Part 3 Specifications for individual materials, Section 2 Capacitor paper	Identical
IEC 60674-3-2 : 1992 Specification for plastic films for electrical purposes — Part 3: Specification for individual materials — Sheet 2: Requirements for balanced biaxially oriented polyethylene terephthalate (PET) films used for electrical insulation	IS 11298 (Part 3/Sec 3) : 1998 Plastic films for electrical purposes: Part 3 Spcifications for individual materials, Section 3 Requirements for balanced biaxially oriented polyethylene terephthalate (PET) films used for electrical insulation	do

The technical committee has reviewed the provision of the following International Standard referred in this adopted standard and has decided that it is acceptable for use in conjunction with this standard:

International Standard	*Title*
ISO 6386 : 1981	Muscovite mica splittings — Grading and visual classification

Amendment No. 1 issued in the year 2007 to the above International Standard has been given at the end of this standard.

[1)] Since revised in 1998.
[2)] Since revised in 2004.
[3)] Since revised in 2005.

Only the English language text of the International Standard has been retained while adopting it in this Indian Standard, and as such the page numbers given here are not the same as in the IEC Standard.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)' . The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SPECIFICATION FOR INSULATING MATERIALS BASED ON MICA

PART 3 SPECIFICATIONS FOR INDIVIDUAL MATERIALS

Section 9 Moulding Micanite

1 Scope

This International Standard specifies the requirements for different types of moulding micanite. They are composed of mica splittings or mica paper, with or without reinforcement, bonded with a suitable binder and may be supplied as sheets or rolls.

Moulding micanites with B-stage resins are of a consistency ranging from rigid to soft. All types are mouldable when heated.

This specification covers material having a nominal thickness from 0,10 mm to 7 mm.

Materials which conform to this specification meet established levels of performance. However, the selection of a material for a specific application should be based on the actual requirements necessary for adequate performance in that application and not based on this specification alone.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 216-1: 1990, *Guide for the determination of thermal endurance properties of electrical insulating materials – Part 1: General guidelines for ageing procedures and evaluation of test results*

IEC 243-1: 1988, *Methods of test for electric strength of solid insulating materials – Part 1: Tests at power frequencies*

IEC 371-2: 1987, *Specification for insulating materials based on mica – Part 2: Methods of test*

IEC 371-3-2: 1991, *Specification for insulating materials based on mica – Part 3: Specifications for individual materials – Sheet 2: Mica paper*

IEC 554-3-2: 1983, *Specification for cellulosic papers for electrical purposes – Part 3: Specifications for individual materials – Sheet 2: Capacitor paper*

IEC 674-3-2: 1992, *Specification for plastic films for electrical purposes – Part 3: Specifications for individual materials – Sheet 2: Requirements for balanced biaxially oriented polyethylene terephthalate (PET) films used for electrical insulation*

ISO 6386: 1981, *Muscovite mica splittings – Grading and visual classification*

3 Designation

Material shall be designated as shown in table 1.

4 Requirements: raw materials

4.1 *Mica splittings*

Mica splittings referred to in this specification shall comply with the requirements of ISO 6386.

4.2 *Mica paper*

Mica paper referred to in this specification shall comply with the requirements of IEC 371-3-2.

4.3 *Glass fabric*

The glass yarn shall be continuous filament glass made from E-glass. The glass fabric shall be in the loom state and have a size (binder) content not greater than 3 %.

4.4 *Polyester film*

Plastic film used as backing material shall be made from PET and shall comply with the requirements of IEC 674-3-2.

4.5 *Capacitor paper*

The capacitor paper shall comply with the requirements of IEC 554-3-2.

4.6 *Resins*

Any shellac, alkyd, epoxy or silicone resin system may be used which enables the material to meet the requirements of this specification; other binders may be used, subject to the purchase contract.

The resin content shall be subject to purchase contract and the limits of table 1.

5 Requirements: composition and tolerances

When tested by the method of clause 6 of IEC 371-2, the composition of the products shall lie within the limits given in table 1.

Table 1 – Designation, composition and tolerances

Type	Mica raw material	Binder		Surfacing material	Nominal thickness range mm	Thickness tolerance
		Type	Content % max.			
MS1	Mica splittings, clear, muscovite	Shellac	15	—	0,20 to 2,00	According to table 2
MS2	Mica splittings, clear, muscovite	Shellac	25	—	0,10 to 1,00	
MS3	Mica splittings, spotted, muscovite	Shellac	25	—	0,10 to 7,00	
MS4	Mica splittings, clear, muscovite	Shellac	20	Capacitor paper on both sides	0,20 to 2,00	
MS5	Mica splittings, clear, muscovite	Shellac	30	—	0,20 to 2,00	
MS6	Mica splittings, clear, muscovite	Alkyd	30	—	0,20 to 2,00	
MS7	Mica splittings, clear, muscovite	Silicone	30	—	0,20 to 2,00	
MP1	Mica paper, muscovite	Epoxy	25	Glass fabric on both sides	0,20 to 1,00	According to table 2
MP2	Mica paper, muscovite	Epoxy	40	—	0,13 to 2,00	
MP3	Mica paper, muscovite	Epoxy	25	Polyester film on both sides	0,20 to 1,00	
MP4	Mica paper, muscovite	Silicone	30	—	0,13 to 1,00	
MP5	Mica paper, phlogopite	Silicone	30	—	0,13 to 1,00	

6 Requirements of materials (as received)

6.1 *General*

All materials in any one consignment shall have the same properties, within the limits of this specification, throughout the length of each roll or number of sheets.

The surfaces shall be uniform and free from defects such as bubbles, pin-holes, creases and flaws.

Material supplied in rolls shall be capable of being unrolled continuously without damage, and the force required to unroll the material shall be substantially uniform.

Where interleaving is necessary or required by the purchaser, it shall not have any deleterious effects.

6.2 *Width, length*

The width and the length of the material shall not differ by more than the amount shown in table 2.

Table 2 – Tolerances on width and length

	Width	Length
Master sheet	+5 −0 mm	+5 −0 mm
Master roll	+5 −0 mm	+0,3 −0 m
Cut piece (≥50 mm)	±5 %	±5 %

6.3 *Thickness*

The thickness when measured in accordance with clause 3.1.1 of IEC 371-2 shall be within the appropriate limits given in table 3.

For material of nominal thickness greater than 1 mm, the thickness tolerance should be subject to the purchase contract.

Table 3 – Permissible thickness ranges and tolerances

Type	Nominal thickness range mm	Permissible thickness	
		Thickness tolerance mm	Individual measurements mm
MS1 to MS7	0,1-0,3 >0,3-0,5 >0,5-0,8 >0,8-1,0	±0,08 ±0,12 ±0,14 ±0,15	±0,12 ±0,17 ±0,25 ±0,35
MP1 to MP5	0,1-0,3 >0,3-0,5 >0,5-0,8 >0,8-1,0	±0,07 ±0,08 ±0,10 ±0,10	±0,10 ±0,12 ±0,15 ±0,15

7 Requirements (after curing)

When required by the purchase contract, the supplier shall provide evidence that the material meets the requirements of this clause. Curing conditions shall be according to the data given by the manufacturer (curing time, temperature and pressure).

7.1 *Thermal endurance*

This should be carried out in accordance with IEC 216-1. Both the choice of end-point criterion and the required temperature index should be subject to purchase contract.

NOTE – This determination need not be repeated unless the manufacturer has made a significant change in the composition or method of manufacture of the material.

7.2 *Electrical strength*

When tested by the method of clause 15 of IEC 371-2 with electrodes according to 4.1.2 of IEC 243-1, the electrical strength shall meet the requirements of table 4.

Table 4 – Electric strength

Type	Electric strength kV/mm minimum
MS1	8
MS2	10
MS3	8
MS4	8
MS5	8
MS6	8
MS7	8
MP1	10
MP2	10
MP3	12
MP4	10
MP5	10

8 Packing

The materials should be packaged to ensure adequate protection during transport, handling and storage. Any necessary packing requirements should be the subject of purchase contract.

Each package containing a number of unit packs shall have the following information, clearly and indelibly marked on it:

a) description of the material and the number of this specification;

b) for material delivered in rolls, the width of the material and the length per roll;

c) for material delivered in sheets, the dimensions of the sheet;

d) the number of sheets/rolls in each package;

e) the date of manufacture;

f) shelf-life and storage conditions.

The manufacturer's reference number and batch number shall be identified on each package or roll.

AMANDMENT NO. 1

Page 1

1 Scope

Insert the following new text:

Safety warning

It is the responsibility of the user of the methods contained or referred to in this document to ensure that they are used in a safe manner.

2 Normative references

Replace the whole of this clause by the following:

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60243-1:1998, *Electrical strength of insulating materials – Test methods – Part 1: Tests at power frequencies*

IEC 60371-2:2004, *Specification for insulating materials based on mica – Part 2: Methods of test*

IEC 60371-3-2:2005, *Insulating materials based on mica – Part 3: Specifications for individual materials – Sheet 2: Mica paper*

IEC 60554-3-2:1983, *Specification for cellulosic papers for electrical purposes – Part 3: Specifications for individual materials – Sheet 2: Capacitor paper*

IEC 60674-3-2:1992, *Specification for plastic films for electrical purposes – Part 3: Specifications for individual materials – Sheet 2: Requirements for balanced biaxially oriented polyethylene terephthalate (PET) films used for electrical insulation*

Page 2

4 Requirements: raw materials

4.1 Mica splittings

Replace the existing text by the following:

Mica splittings referred to in this specification shall comply with the requirements of IEC 60371-2.

5 Requirements: composition and tolerances

Replace the first paragraph of this subclause by the following new text:

When tested by the method of Clause 7 of IEC 60371-2, the composition of the products shall lie within the limits given in Table 1.

Page 4

6.3 Thickness

Replace the first paragraph of this subclause by the following new text:

The thickness when measured in accordance with 4.1.1 of IEC 60371-2 shall be within the appropriate limits given in Table 3.

7.1 Thermal endurance

Replace the first sentence of this subclause by the following new sentence:

This should be carried out in accordance with Clause 21 of IEC 60371-2.

Page 5

7.2 Electrical strength

Replace the first paragraph of this subclause by the following new text:

When tested by the method of Clause 16 of IEC 60371-2 with electrodes according to 4.1.1.1 (25/75 mm diameter) of IEC 60243-1, the electrical strength shall meet the requirements of Table 4.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard alongwith amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc No.: ETD 02 (6097).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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