IS/IEC 60371-3-8 (1995): Insulating Materials Based on MICA, Part 3: Specification for Individual Materials, Section 8: Mica Paper Tapes for Flame – Resistant Security Cables [ETD 2: Solid Electrical Insulating Materials and Insulation Systems]

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IS/IEC 60371-3-8 : 1995

भारतीय मानक

अभ्रक आधारित उष्मारोधी सामग्री की विशिष्टि

भाग 3 एकल सामग्री की विशिष्टियाँ

अनुभाग 8 ज्वाला-प्रतिरोधी सुरक्षा केबल के लिए अभ्रक पेपर टेप

Indian Standard

SPECIFICATION FOR INSULATING MATERIALS BASED ON MICA

PART 3 SPECIFICATIONS FOR INDIVIDUAL MATERIALS

Section 8 Mica Paper Tapes for Flame-Resistant Security Cables

ICS 29.035.50

BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

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NATIONAL FOREWORD

This Indian Standard (Part 3/Sec 8) which is identical with IEC 60371-3-8 : 1995 'Insulating materials based on mica — Part 3: Specifications for individual materials — Sheet 8: Mica paper tapes for flame-resistant security cables' 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 is a part of series of standards based on IEC 60371 series. 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 9 Moulding micanite

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 60371-2 : 1987[1)] 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	Technically Equivalent

[1)] Since revised in 2004.

(*Continued on third cover*)

Indian Standard

SPECIFICATION FOR INSULATING MATERIALS BASED ON MICA

PART 3 SPECIFICATIONS FOR INDIVIDUAL MATERIALS

Section 8 Mica Paper Tapes for Flame-Resistant Security Cables

1 Scope

This International Standard specifies the requirements for an electrical insulating material containing mica paper with glass fabric or plastic film and impregnated with a suitable resin. The material is supplied in a flexible state. It may be supplied in the form of sheets or rolls. The product is designed for use in cables capable of operating after a fire.

This specification covers material having a nominal thickness from 0,05 mm to 0,15 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 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*

3 Designation

When ordering material to this specification, only the specification and type numbers need be quoted (see tables 1, 2, 3 and 4).

Example: IEC 371-3-8: type 8.1.01

The type number is derived from:

- the specification sheet number 8
- plus the sheet table number 8.1
- plus the number of the product in the sheet table 8.1.01.

The descriptive code quoted in table 1, i.e. G23/M50/R20 for type 8.1.01, table 1, is derived from:

- glass content (G) 23 g/m²
- muscovite mica content (M) 50 g/m²
- resin content (R) 20 g/m².

NOTE – If film is used instead of glass, the thickness of the film (in µm) is used in the descriptive code, see IEC 371-3-7, clause 3.

4 Requirements: raw materials

4.1 *Mica paper*

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

4.2 *Glass fabric*

Normally the glass fabric shall be in the loom state and shall have a size content not greater than 3 % by weight. By agreement between purchaser and seller, it may be treated.

4.3 *Film*

As an alternative to glass fabric, films may be used as the backing material. The type of film should be subject to the purchase contract.

Table 1 – Composition for glass fabric and calcined muscovite mica paper (IEC 371-3-2, classes 1 and 2)

Type	Descriptive code	Glass content g/m²		Mica content g/m²		Resin content g/m²		Mass/ unit area g/m²		Permissible thickness range mm		Volatile content
		Nom.	Tol. ±	Nom.	Tol. ±	Nom.	Tol. ±	Nom.	Tol. ±	Mean	Individual	Max. %
8.1.01	G23/M50/R20	23	2	50	4	20	5	93	9	0,07-0,09	0,06-0,10	1,0
8.1.02	G23/M60/R21	23	2	60	5	21	5	104	11	0,07-0,09	0,06-0,10	1,0
8.1.03	G23/M75/R32	23	2	75	6	32	7	130	13	0,10-0,12	0,09-0,13	1,0
8.1.04	G23/M90/R34	23	2	90	8	34	8	147	15	0,10-0,12	0,09-0,13	1,0
8.1.05	G23/M120/R40	23	2	120	10	40	9	183	18	0,12-0,15	0,11-0,16	1,0

NOTE – Combinations with other glass fabrics are possible.

Table 2 – Composition for glass fabric and uncalcined muscovite and phlogopite mica paper (IEC 371-3-2, classes 3 and 4)

Type	Descriptive code	Glass content g/m²		Mica content g/m²		Resin content g/m²		Mass/ unit area g/m²		Permissible thickness range mm		Volatile content
		Nom.	Tol. ±	Nom.	Tol. ±	Nom.	Tol. ±	Nom.	Tol. ±	Mean	Individual	Max. %
8.2.01	G23/P60/R16	23	2	60	5	16	4	99	10	0,07-0,09	0,06-0,10	1,0
8.2.02	G23/P75/R18	23	2	75	6	18	4	116	12	0,10-0,12	0,09-0,13	1,0
8.2.03	G23/P80/R18	23	2	80	7	18	4	121	12	0,10-0,12	0,09-0,13	1,0
8.2.04	G23/M80/R18	23	2	80	7	18	4	121	12	0,10-0,12	0,09-0,13	1,0
8.2.05	G23/P90/R21	23	2	90	8	21	5	134	13	0,10-0,12	0,09-0,13	1,0
8.2.06	G23/M90/R21	23	2	90	8	21	5	134	13	0,10-0,12	0,09-0,13	1,0
8.2.07	G32/P120/R23	32	3	120	10	23	6	175	18	0,12-0,14	0,11-0,16	1,0
8.2.08	G32/M120/R23	32	3	120	10	23	6	175	18	0,12-0,14	0,11-0,16	1,0
8.2.09	G32/P160/R30	32	3	160	14	30	7	222	22	0,13-0,16	0,12-0,17	1,0
8.2.10	G32/M160/R30	32	3	160	14	30	7	222	22	0,13-0,16	0,12-0,17	1,0

NOTE – Combinations with other glass fabrics are possible.

Table 3 – Composition for film and calcined muscovite mica paper (IEC 371-3-2, classes 1 and 2)

Type	Descriptive code	Film content g/m²		Mica content g/m²		Resin content g/m²		Mass/ unit area g/m²		Permissible thickness range mm		Volatile content
		Nom.	Tol. ±	Nom.	Tol. ±	Nom.	Tol. ±	Nom.	Tol. ±	Mean	Individual	Max. %
8.3.01	F23/M50/R14	34	5	50	4	14	5	98	10	0,05-0,08	0,04-0,09	1,0
8.3.02	F23/M60/R14	34	5	60	5	14	5	108	11	0,05-0,08	0,04-0,09	1,0
8.3.03	F23/M75/R16	34	5	75	6	16	5	125	13	0,06-0,09	0,05-0,10	1,0
8.3.04	F23/M90/R18	34	5	90	8	18	6	142	14	0,06-0,09	0,05-0,10	1,0
8.3.05	F23/M120/R20	34	5	120	10	20	6	174	17	0,10-0,12	0,09-0,13	1,0

NOTE – Combinations with other film thicknesses are possible.

Table 4 – Composition for film and uncalcined muscovite and phlogopite mica paper (IEC 371-3-2, classes 3 and 4)

Type	Descriptive code	Film content g/m²		Mica content g/m²		Resin content g/m²		Mass/ unit area g/m²		Permissible thickness range mm		Volatile content
		Nom.	Tol. ±	Nom.	Tol. ±	Nom.	Tol. ±	Nom.	Tol. ±	Mean	Individual	Max. %
8.4.01	F23/P60/R11	34	5	60	5	11	4	105	11	0,05-0,08	0,04-0,09	1,0
8.4.02	F23/P75/R15	34	5	75	6	15	5	124	12	0,06-0,09	0,05-0,10	1,0
8.4.03	F23/P80/R15	34	5	80	7	15	5	129	13	0,06-0,09	0,05-0,10	1,0
8.4.04	F23/M80/R15	34	5	80	7	15	5	129	13	0,06-0,09	0,05-0,10	1,0
8.4.05	F23/P90/R16	34	5	90	8	16	6	140	15	0,06-0,09	0,05-0,10	1,0
8.4.06	F23/M90/R16	34	5	90	8	16	6	140	15	0,06-0,09	0,05-0,10	1,0
8.4.07	F23/P120/R22	34	5	120	10	22	6	176	18	0,10-0,12	0,09-0,13	1,0
8.4.08	F23/M120/R22	34	5	120	10	22	6	176	18	0,10-0,12	0,09-0,13	1,0
8.4.09	F23/P160/R32	34	5	160	14	32	9	226	23	0,11-0,13	0,10-0,14	1,0
8.4.10	F23/M160/R32	34	5	160	14	32	9	226	23	0,11-0,13	0,10-0,14	1,0

NOTE – Combinations with other film thicknesses are possible.

4.4 *Resin*

Any resin system may be used which enables the material to meet the requirements of this specification.

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 of tables 1 to 4 for the appropriate grade of mica paper.

6 Requirements of material (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.

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.

Unless otherwise specified in the purchase contract, the material shall be rolled with the mica surface on the outside.

6.2 *Width*

This specification contains no requirements for widths of tape. However, the following widths are preferred: 6 mm, 8 mm, 10 mm, 12 mm, 15 mm, 20 mm, 25 mm, 30 mm, 40 mm and 50 mm.

The maximum trimmed width of full width material and sheet normally available is 1 000 mm.

The tolerance on the width of the material shall be as in table 5.

Table 5 – Tolerance on width

Nominal width mm	Tolerance mm
≤ 20	±0,5
> 20 ≤ 500	±1,0
> 500	±5,0

6.3 *Thickness*

Measure the thickness in accordance with clause 3 of IEC 371-2, using the appropriate apparatus given in 3.1.1 of that standard, making 10 measurements on one thickness of material.

The measured values shall be in accordance with the requirements given in tables 1 to 4.

6.4 *Length*

There are no requirements in this specification for roll length, and these should therefore be subject to the purchase contract.

Preferred lengths are 250 m, 500 m and 750 m.

6.5 *Cores*

The tape shall be supplied compactly wound on cores of 76 mm interior diameter which shall be free from sharp edges.

The width of the cores in relation to that of the tape should be subject to the purchase contract.

Full width material and material wider than 100 mm shall be supplied on 55 mm or 76 mm cores.

6.6 *Joins*

The number of rolls with joins shall be limited to 25 % of any one consignment. Joined rolls of length less than or equal to 300 m shall contain no more than one join.

The number of joins in rolls of length greater than 300 m and the method of making the join should be subject to the purchase contract.

6.7 *Tensile strength*

When tested by the method of clause 7 of IEC 371-2, the tensile strength in the warp and weft directions shall be as shown in table 6.

Table 6 – Tensile strength

Glass substance g/m²	Minimum tensile strength N/10 mm
23 32	80 140
Film substance g/m²	
34	25

6.8 *Stiffness*

The stiffness of the material should be subject to the purchase contract. When the stiffness is specified, the material shall be tested by the method of clause 10 of IEC 371-2.

6.9 *Flame-resisting characteristics*

There is currently no flame-resisting test method for these tapes. However, experience has shown that these tapes can be used in correctly designed fire survival cables that meet the requirements of IEC 331.

7 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 and the number of sheets in a stack, or the weight of the stack;

d) the number of rolls;

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.

Rolls with joins shall be packed together and clearly labelled on the outside of the container.

Annex A
(informative)

Bibliography

IEC 331: 1970, *Fire-resisting characteristics of electric cables*

AMENDMENT 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 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*

Page 4

5 Requirements: composition and tolerances

Replace the text 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 of Table 1 to Table 4 for the appropriate grade of mica paper.

Page 5

6.3 Thickness

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

Measure the thickness in accordance with Clause 4 of IEC 60371-2, using the appropriate apparatus given in 4.1.1 of that standard, making 10 measurements uniformly distributed on one thickness of material.

Page 6

6.7 Tensile strength

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

When tested by the method of Clause 8 of IEC 60371-2, the tensile strength in the warp and weft directions shall be as shown in Table 6.

6.8 Stiffness

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

The stiffness of the material should be subject to the purchase contract. When the stiffness is specified, the material shall be tested by the method of Clause 11 of IEC 60371-2.

6.9 Flame-resisting characteristics

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

However, experience has shown that these tapes can be used in correctly designed fire survival cables that meet the requirements of IEC 60331.

(*Continued from second cover*)

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
IEC 60371-3-2 : 1991[1)] Specification for insulating materials based on mica — Part 3: Specifications for individual materials — Sheet 2: Mica paper	IS/IEC 60371-3-2 : 2005 Specification insulating materials based on mica: Part 3 Specifications for individual materials, Section 2 Mica paper	Technically Equivalent

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

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.

[1)] Since revised in 2005.

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 (6096).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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