INTERNATIONAL STANDARD

IEC 60371-3-1

Third edition
2006-06

Specification for insulating materials based on mica –

Part 3: Specifications for individual materials – Sheet 1: Commutator separators and materials

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SPECIFICATION FOR INSULATING MATERIALS BASED ON MICA –

Part 3: Specifications for individual materials – Sheet 1: Commutator separators and materials

FOREWORD

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International Standard IEC 60371-3-1 has been prepared by IEC technical committee 15: Insulating materials.

This third edition of IEC 60371-3-1 replaces the second edition, published in 1984, and constitutes a technical revision.

The main changes with regard to the previous edition concern the modification of clause numbers to align with clause numbering in the latest edition of IEC 60371-2:2004.

The text of this standard is based on the following documents:

FDIS	Report on voting
15/307/FDIS	15/330/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

This part of IEC 60371 forms part of a series which deals with insulating materials built up from mica splittings or mica paper, with or without reinforcement, and with mica paper in its pure state for use in electrical equipment.

IEC 60371 consists of three parts under the main title *Specification for insulating materials based on mica:*

Part 1: Definitions and general requirements

Part 2: Methods of test

Part 3: Specifications for individual materials

This standard contains one of the sheets comprising part 3, as follows:

Sheet 1: Commutator separators and materials

SPECIFICATION FOR INSULATING MATERIALS BASED ON MICA –

Part 3: Specifications for individual materials – Sheet 1: Commutator separators and materials

1 Scope

This sheet of IEC 60371-3 applies to several types of rigid materials based on mica splittings or mica paper for commutator separators. These products shall be made from muscovite or phlogopite mica, built up from mica splittings or mica paper by the use of a suitable bonding medium. They are supplied in the following forms:

– sheets in the dimensions in which they are pressed or after trimming;
– strips cut from sheets;
– commutator separators having the shapes and dimensions and in the conditions ordered by the user.

The normal manufacturing thicknesses lie between 0,3 mm and 2 mm.

Materials which conform to this specification meet established levels of performance.

However, the selection of material by a user 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.

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

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*

3 General requirements

The material as supplied shall be of uniform hardness, free from soft patches and foreign matter.

The bonding medium used shall be agreed between supplier and purchaser.

The materials, when tested in accordance with the methods given in IEC 60371-2, shall comply with the requirements of this publication.

4 Thickness

4.1 Definition of nominal thickness

The nominal thickness is that stated when ordering, being the thickness on delivery (before assembly of the commutator).

4.2 Measurements and tolerances

The tolerances with respect to the nominal thickness, in millimetres, are given in Tables 1 and 2.

4.2.1 Sheets, strips and separators having a surface area ≤10 cm^2

Specimen: as in 4.2.1 and 4.2.4 of IEC 60371-2. The thickness shall be measured with the apparatus given in 4.1.3 of that standard (diameter of measuring faces 6 mm to 8 mm, pressure: 7 MPa).

The thickness measurements shall be in accordance with 4.3 of IEC 60371-2.

Table 1 – Thickness tolerances for sheets, strips and separators having a surface ≤10 cm^2

Property	Mica splittings	Mica paper (normal tolerance)	Mica paper (close tolerance)
Tolerance of specimen	±0,03 mm	±0,03 mm	±0,02 mm
Difference between maximum and minimum values of thickness on same specimen	0,06 mm	0,06 mm	0,04 mm

4.2.2 Separators having a surface area greater than 10 cm^2

4.2.2.1 Separators supplied individually

Specimen: as in 4.2.5 a) of IEC 60371-2.

The thickness measurement shall be in accordance with 4.3 of IEC 60371-2.

Table 2 – Thickness tolerances for separators having a surface area greater than 10 cm^2

Property	Mica splittings	Mica paper
Tolerance of specimen	±0,02 mm	±0,015 mm
Difference between maximum and minimum values of thickness on same specimen	0,04 mm	0,03 mm

4.2.2.2 Stack height of separators supplied in packeted stacks

The nominal height of the stack and the number of separators per stack should be stated when material is ordered. The stack height shall be measured in accordance with 4.1.4 of IEC 60371-2. With a pressure of 30 MPa the variation in height from the nominal shall be agreed upon between purchaser and supplier.

5 Dimensions, other than thickness

5.1 Sheets

The tolerance on the nominal length and on the nominal width on sheets trimmed to size is ±5 %.

NOTE Where sheets are not trimmed to size, tolerance on mass shall be agreed upon.

5.2 Strips

The tolerance on length is ±5 % and the tolerance on the nominal width is ±0,5 mm.

5.3 Separators

The tolerances on overall dimensions are

±0,3 mm for separators with surface areas not exceeding 10 cm^2,

±0,5 mm for separators with a surface area over 10 cm^2.

6 Detection of defects and conducting particles in sheets

As stated in Clause 19 of IEC 60371-2, until a method of detection of defects has been agreed, the type and number of defects shall be subject to contract.

7 Characteristics

Tables 3 and 4 give the specified values for the characteristics of products based on mica material for commutator separators, in whatever form they are delivered.

8 Form

Products based on mica or mica splittings for commutator separators are generally supplied:

– in sheets approximately 1 000 mm long and 500 mm to 1 000 mm wide;

– in strips approximately 1 000 mm long and not more than 200 mm wide;

– shaped commutator separators having a surface area up to 10 cm^2 are generally supplied in bulk (unless otherwise agreed between manufacturer and user);

– shaped commutator separators having surface area over 10 cm^2 are delivered either in bulk, in non-calibrated packets or in packeted stacks. The number of separators per packet, generally between 20 and 50, is subject to special agreement. Also, according to the type of material, intermediate layers may be used.

9 Marking

Packages shall be marked with the IEC publication reference and type of product (e.g. IEC 60371-3-1 Type P7), the manufacturer's identification, the nominal thickness and dimensions, and the number of pieces and/or weight in each package.

For products supplied in packets, the following additional indications shall be given on each packet:

– non-calibrated packets: the number of separators per packet;

– calibrated packets: the number of separators per packet and the total height of the stack (after subtracting the thicknesses of the intermediate layers).

Table 3 – Requirements for materials based on mica splittings

Type	Description	Nominal thickness	Minimum mica content	Resistance to exudation and displacement	Elastic compression	Plastic compression	Temperature of compression measurement	Electric strength
		mm	%	°C [a]	max. %	max. %	°C	kV/mm [b]
S1 S2	Punching quality, muscovite Punching quality, phlogopite	0,3 to 1,6	92	No requirement	3	5	150	7
S3 S4	Standard quality, muscovite Standard quality, base sheet, phlogopite	0,5 to 2	95	200	3	5	160	7
S5 S6	Special quality A, muscovite Special quality A, phlogopite	0,5 to 2	95	220	2	4	200	7
S15 S16	Special quality B, muscovite Special quality B, phlogopite	0,5 to 2	95	300	2	3	200	7
Relevant clause number of IEC 60371-2: Methods of test		4	7.6	12	13	13	13	16

[a] At the temperature specified, no exudation of binder or displacement of mica shall be detectable with normal corrected vision.

[b] 6 mm electrodes for strips and separators; 25 mm to 75 mm electrodes for sheet materials.

NOTE The density of all materials is in the range of 2,2 g/cm^3 to 2,6 g/cm^3.

Table 4 – Requirements for materials based on mica paper

Type	Description	Nominal thickness	Minimum mica content	Resistance to exudation and displacement	Elastic compression	Plastic compression	Temperature of compression measurement	Electric strength
		mm	%	°C [a]	Max. %	Max. %	°C	kV/mm [b]
P7 P8	Punching quality, muscovite Punching quality, phlogopite	0,3 to 1,6	90	No requirement	5	5	150	7
P9 P10	Standard quality, muscovite Standard quality, base sheet, phlogopite	0,5 to 2	90	200	4	5	160	7
P11 P12	Special quality A, muscovite Special quality A, phlogopite	0,5 to 2	90	220	2	4 [c]	200	7
P13 P14	Special quality B, muscovite Special quality B, phlogopite	0,5 to 2	90	300	2	3 [c]	200	7
Relevant clause number of IEC 60371-2 Methods of test		4	7,6	12	13	13	13	16

[a] At the temperature specified, no droplets of binder or displacement of mica should be observed in test in Clause 12.

[b] 6 mm electrodes for strips and separators; 25 mm to 75 mm electrodes for sheet materials.

[c] This may be reduced to 2 % when required by the purchaser.

NOTE The density of all materials is in the range of 2,0 g/cm^3 to 2,4 g/cm^3.

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