

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Insulating materials based on mica –
Part 3: Specifications for individual materials –
Sheet 2: Mica paper

Matériaux isolants à base de mica –
Partie 3: Spécifications pour matériaux particuliers –
Feuille 2: Papier de mica

STANDARD PREVIEW
(standards.iteh.ai)

IEC 60371-3-2:2005

<https://standards.iteh.ai/catalog/standards/sist/588a81a1-3061-425c-880b->



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2005 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in 14 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC publications search - www.iec.ch/searchpub

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Glossary - std.iec.ch/glossary

More than 55 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Catalogue IEC - webstore.iec.ch/catalogue

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 14 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Recherche de publications IEC - www.iec.ch/searchpub

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

Glossaire IEC - std.iec.ch/glossary

Plus de 55 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.



IEC 60371-3-2

Edition 2.0 2005-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Insulating materials based on mica –
Part 3: Specifications for individual materials –
Sheet 2: Mica paper**

STANDARD PREVIEW
(standards.iteh.ai)

**Matériaux isolants à base de mica –
Partie 3: Spécifications pour matériaux particuliers –
Feuille 2: Papier de mica**

[IEC 60371-3-2:2005](http://standards.iteh.ai/catalog/standards/sist/588a81a1-3061-425c-880b-000000000000/iec-60371-3-2-2005)

<http://standards.iteh.ai/catalog/standards/sist/588a81a1-3061-425c-880b-000000000000/iec-60371-3-2-2005>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

M

ICS 29.035.10; 29.035.50

ISBN 978-2-8322-1596-8

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
3 General	6
3.1 Classification and designation	6
3.2 Standard forms of delivery.....	7
3.3 Marking.....	7
4 General requirements.....	7
4.1 Conditions as received	7
4.2 Properties	8
5 Tests.....	8
5.1 Test specimens	8
5.1.1 Sampling and preparation of test specimens.....	8
5.1.2 Dimensions of test specimens	8
Figure 1 – Mica paper – Air porosity	10
Figure 2 – Mica paper – Penetration	11
Figure 3 – Mica paper – Tensile strength	12
Table 1 – Dimensions of test specimens.....	8
Table 2 – Requirements for mica paper.....	9

STANDARD PREVIEW

(standards.iteh.ai)

IEC 60371-3-2:2005
<https://standards.iteh.ai/catalog/standards/sist/588a81a1-3061-425c-880b-e0a4e9dd4bdc/iec-60371-3-2-2005>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INSULATING MATERIALS BASED ON MICA –**Part 3: Specifications for individual materials –
Sheet 2: Mica paper**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60371-3-2 has been prepared by IEC technical committee 15: Standards on specifications for electrical Insulating materials.

This bilingual version (2014-05) corresponds to the English version, published in 2005-10.

This second edition cancels and replaces the first edition, published in 1991, and constitutes a technical revision.

The main changes with regard to the previous edition include adjustments to align this standard with changes included in the latest edition of IEC 60371-2.

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

FDIS	Report on voting
15/227/FDIS	15/245/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.

The French version of this standard has not been voted upon.

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.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[IEC 60371-3-2:2005](#)

<https://standards.iteh.ai/catalog/standards/sist/588a81a1-3061-425c-880b-e0a4c9dd4bdc/iec-60371-3-2-2005>

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 2: Mica paper

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[IEC 60371-3-2:2005](https://standards.iteh.ai/catalog/standards/sist/588a81a1-3061-425c-880b-e0a4c9dd4bdc/iec-60371-3-2-2005)

<https://standards.iteh.ai/catalog/standards/sist/588a81a1-3061-425c-880b-e0a4c9dd4bdc/iec-60371-3-2-2005>

INSULATING MATERIALS BASED ON MICA –

Part 3: Specifications for individual materials – Sheet 2: Mica paper

1 Scope

This part of IEC 60371 gives requirements for electrical insulating materials made from mica paper which is to be processed for built-up mica materials according to IEC 60371-1, such as rigid flat mica materials, flexible mica materials, curable flexible mica materials and shaped pieces.

Materials which conform to this specification meet established levels of performance. However, the selection of a 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.

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 60371-1:2003, *Specification for insulating materials based on mica – Part 1: Definitions and general requirements*

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

IEC 60554-2:2001, *Cellulosic papers for electrical purposes – Part 2: Methods of test*

IEC 60589:1977, *Methods of test for the determination of ionic impurities in electrical insulating materials by extraction with liquids*

ISO 534:2005, *Paper and board – Determination of thickness and apparent bulk density or apparent sheet density*

ISO 536:1995, *Paper and board – Determination of grammage*

ISO 5636-5:2003, *Paper and board – Determination of air permeance and air resistance (medium range) – Part 5: Gurley method*

3 General

3.1 Classification and designation

Mica papers are classified in several types depending on the nature of the mica minerals used and the manufacturing procedure. These types have different characteristics as regards thickness, mass per unit area and physical and chemical properties.

The nature of the mica minerals is designated by the symbols MPM or MPP, as follows:

MPM = mica paper, muscovite;

MPP = mica paper, phlogopite.

Since it would not be possible to harmonize the many-sided interests connected with mica paper made by diverse procedures, the following four main classes have been chosen:

Class 1 MPM: mica paper based on calcined muscovite, chemical process;

Class 2 MPM: mica paper based on calcined muscovite, mechanical process;

Class 3 MPM: mica paper based on uncalcined muscovite;

Class 4 MPP: mica paper based on uncalcined phlogopite.

The above classes are distinguished from each other by characteristic properties such as porosity, penetration and tensile strength. These properties are plotted versus mass per unit area in Figures 1 to 3 showing the possible ranges of the four different classes.

NOTE The base materials for MPM-types classes 1 and 2 can be blended in order to achieve a mica paper with characteristics lying between class 1 and class 2 types, and should be subject to contract.

The letter symbols for the nature of the mica minerals are followed by four digits indicating the class (first digit) and the mass per unit area (second to fourth digits).

Example: designation of mica paper based on calcined muscovite (MPM), with a mass per unit area of 50 g/m², whose properties meet the requirements given in Table 2 for class 1: Mica paper - IEC 60371-3-2 MPM-1050.

3.2 Standard forms of delivery

Mica papers may be supplied in rolls or sheet form.

3.3 Marking

Rolls and packets of mica paper supplied as complying with this specification shall be marked with the following:

- supplier, manufacturer and trade name;
- batch/roll number;
- designation in accordance with 3.1;
- net mass of roll or packet.

The marks shall be durable and fixed in such a manner that they can be read until the mica paper is completely unrolled, or the packet has been completely used.

4 General requirements

The mica paper shall comply with the requirements of IEC 60371-1 and with this standard.

4.1 Conditions as received

Mica paper shall be supplied wound on cores sufficiently tightly to enable the material to be unwound smoothly without telescoping. On receipt, the roll end shall form a plane circular surface with no apparent telescoping.

The difference between the roll width and the paper width shall be subject to contract between purchaser and supplier.

The width of the rolls and their core and outer diameter shall be subject to contract between purchaser and supplier.

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

Mica paper in sheets or when unrolled shall be flat and smooth, free from defects such as compressed spots, holes, creases and contamination, e.g. large hard mica particles and electrically conductive inclusions.

Splices in mica paper are not acceptable.

4.2 Properties

When tested according to Clause 5, the measured values shall conform with the requirements given in Table 2.

5 Tests

5.1 Test specimens

The number of test specimens necessary for each test is indicated in the test method.

If delivered in rolls, the two outermost layers of mica paper shall be removed prior to taking a sample of about 1 m².

If mica paper is delivered in sheets, one sheet constitutes the specimen which has to meet the requirements for the respective batch.

5.1.1 Sampling and preparation of test specimens

For any test, the specimens shall be cut in such a manner that the full width of the material is represented. The cut edge shall be straight and free from tears and cracks. Die cutting is preferred when possible.

5.1.2 Dimensions of test specimens

The dimensions of the test specimens for each test are given in Table 1.

The mean thickness is the average of ten thickness measurements made on the test sheet or sample, at approximately equispaced locations across the diagonal of the sheet or sample.

Table 1 – Dimensions of test specimens

Requirements	Test method		Test specimens	
	Publication	Clause or subclause	Dimensions mm	Tolerances mm
Mass per unit area	IEC 60554-2	3	100 × 100 alternatively	± 0,2
Conductivity of the aqueous extract	IEC 60589			±0,2
Loss of mass at 500 °C	IEC 60371-2	7.4.1	∅ 113	
Tensile strength	IEC 60554-2	5	15 × 250	± 0,2
Air porosity	ISO 5636-5		50 × 120	± 1
Penetration	IEC 60371-2	20	75 × 75	± 1

Table 2 – Requirements for mica paper

Class	Range of mass per unit area	Preferred types	Mass per unit area			Thickness		Air porosity	Impregnation time Non-sieve side	Conductivity of an aqueous extract	Loss of mass	Tensile strength
			Nominal	Admissible deviation between mean value and nominal value	Admissible deviation between individual values and nominal value	Expected thickness	Maximum difference between individual readings and mean of all values					
	g/m ²		g/m ²	%	%	μm	%	s	μS/cm (max.)	% (max.)	N/cm width	
https://standards.iteh.ai/catalog/standards/sist/588a81a1-3061-425c-880b-e0a4c0444b/iec-60371-3-2-2005 IEC 60371-3-2:2005 and ISO 536 Test method according to IEC 60554-2, 5.1 and ISO 534												
1	50 ... 120	MPM 1050 MPM 1060 MPM 1075	±4	±6		45 50 60	±10	Figure 1	Figure 2	70	0,5	Figure 3
			±4	±7	90 110 130 180	±14						
			±5	±7 ... ±12 ¹⁾	55 85 105 160 240	±15						
2	120 ... 300	MPM 2120 MPM 2150 MPM 2180 MPM 2250	±4	±7		60 75 95	±15	Figure 1	Figure 2	10	0,4	Figure 3
			±5	±7 ... ±12 ¹⁾								
3	80 ... 560	MPP 4080 MPP 4120 MPP 4160	±5	±7 ... ±12 ¹⁾				Figure 1	Figure 2	10	0,4	Figure 3
4	60 ... 250							Figure 1	Figure 2	10	0,4	Figure 3

¹⁾ The figures indicate that the maximum deviation between individual values of thickness and the nominal value for these classes of mica paper may range from ± 7 % to ± 12 %, dependent upon the specific grade of material.

The actual admissible deviation shall be subject to contract between purchaser and supplier.

²⁾ Air Porosity shall be measured in accordance with ISO 5636/5: 2003, clause 3.2 "Air Resistance". Results shall be expressed in seconds per 100 ml.

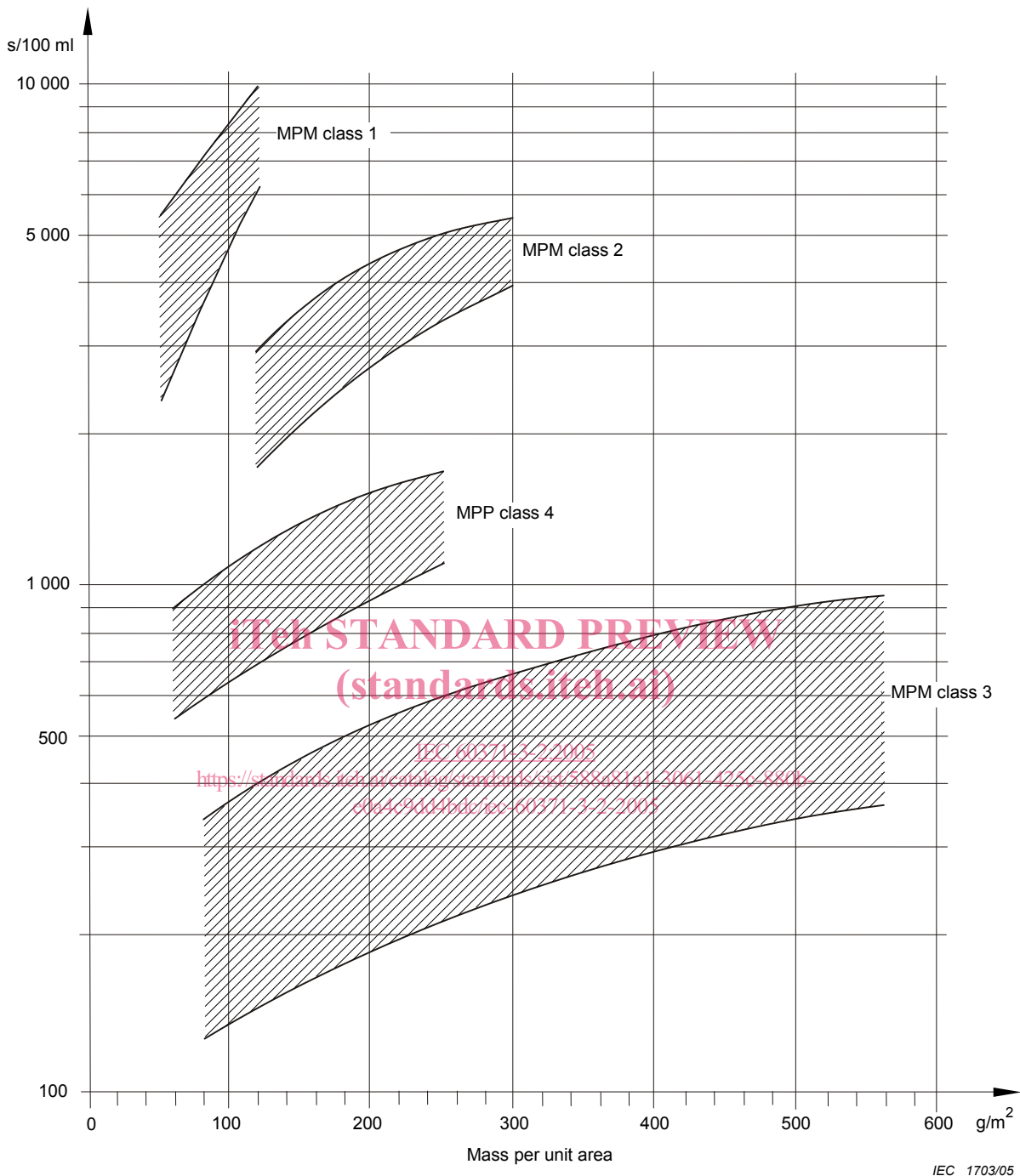


Figure 1 – Mica paper – Air porosity