# IEC 62631-2-3

Edition 1.0 2024-04

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

colour inside

## Dielectric and resistive properties of solid insulating materials – Part 2-3: Relative permittivity and dissipation factor – Contact electrode method for insulating films – AC methods

## Propriétés diélectriques et résistives des matériaux isolants solides – Partie 2-3 : Permittivité relative et facteur de dissipation – Méthode d'électrode de contact pour films isolants – Méthodes en courant alternatif



IEC 62631-2-3:2024-04 (en-fr)

IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
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 corrigendum or an amendment might have been published.

**IEC publications search - webstore.iec.ch/advsearchform**
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 It also gives information on projects, replaced and withdrawn publications.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 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 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: sales@iec.ch.

**IEC Products & Services Portal - products.iec.ch**
Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

**Electropedia - www.electropedia.org**
The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

---

**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.

**Recherche de publications IEC - webstore.iec.ch/advsearchform**
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.

**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 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: sales@iec.ch.

**IEC Products & Services Portal - products.iec.ch**
Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications, symboles graphiques et le glossaire. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

**Electropedia - www.electropedia.org**
Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 500 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 25 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

IEC 62631-2-3

Edition 1.0 2024-04

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

colour inside

## Dielectric and resistive properties of solid insulating materials – Part 2-3: Relative permittivity and dissipation factor – Contact electrode method for insulating films – AC methods

## Propriétés diélectriques et résistives des matériaux isolants solides – Partie 2-3 : Permittivité relative et facteur de dissipation – Méthode d'électrode de contact pour films isolants – Méthodes en courant alternatif

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 17.220.99, 29.035.01

ISBN 978-2-8322-8684-5

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

# DIELECTRIC AND RESISTIVE PROPERTIES OF SOLID INSULATING MATERIALS –

## Part 2-3: Relative permittivity and dissipation factor – Contact electrode method for insulating films – AC methods

## 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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 62631-2-3 has been prepared by IEC technical committee 112: Evaluation and qualification of electrical insulating materials and systems. It is an International Standard.

The text of this International Standard is based on the following documents:

| Draft | Report on voting |
|---|---|
| 112/631/FDIS | 112/641/RVD |

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 62631 series, published under the general title *Dielectric and resistive properties of solid insulating materials*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

**IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

# INTRODUCTION

Measuring the relative permittivity and the dielectric dissipation factor (tan $\delta$) of thin insulating polymer films with a thickness of approximately 10 µm to 100 µm without any additional layer is important for insulation applications. There is currently a lack of suitable technology and standard for the measurement of the relative permittivity and dielectric dissipation factor of very thin single-layer polymer films. By using multilayer polymer films with 20 to 50 layers, it can be feasible to get the average value of the relative permittivity and dielectric dissipation factor of an insulating polymer film, but the effect of air gap inside should not be ignored. With metallized electrodes on the surface of the polymer film, it is possible to get acceptable results of the relative permittivity and dielectric dissipation factor of an insulating polymer film in research laboratory. This document provides the measuring technology and the test method for the relative permittivity and dielectric dissipation factor of thin insulating polymer films without any additional layer or metallization on the sample, under technical frequency.

# DIELECTRIC AND RESISTIVE PROPERTIES OF SOLID INSULATING MATERIALS –

## Part 2-3: Relative permittivity and dissipation factor – Contact electrode method for insulating films – AC methods

## 1 Scope

This part of IEC 62631 specifies the measuring technology and the test method for the relative permittivity and dielectric dissipation factor of thin single layer insulating polymer film without any additional metallization on the sample surface. The adaptive thickness range is approximately 10 µm to 100 µm. The proposed frequency is the power frequency (50 Hz or 60 Hz), and it is also suitable in the technical frequency range from 1 Hz to 1 MHz.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60674-2, *Specification for plastic films for electrical purposes – Part 2: Methods of test*

ISO 4593, *Plastics – Film and sheeting – Determination of thickness by mechanical scanning*

ISO 14644-1, *Cleanrooms and associated controlled environments – Part 1: Classification of air cleanliness by particle concentration*

ISO 21920-2, *Geometrical product specifications (GPS) – Surface texture: Profile – Part 2: Terms, definitions and surface texture parameters*

## 3 Terms, definitions, abbreviated terms and symbols

### 3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

**3.1.1**
**thin insulating polymer film**
insulating polymer film, planar, even and smooth, without any additional layer, with a 10 µm to 100 µm uniform thickness