

**Dielectric and resistive properties of solid insulating materials - Part 1: General**

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## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 62631-1:2011 sisaldab Euroopa standardi EN 62631-1:2011 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 29.07.2011 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 17.06.2011.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 62631-1:2011 consists of the English text of the European standard EN 62631-1:2011.

This standard is ratified with the order of Estonian Centre for Standardisation dated 29.07.2011 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 17.06.2011.

The standard is available from Estonian standardisation organisation.

ICS 29.035.01

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English version

**Dielectric and resistive properties of solid insulating materials -  
Part 1: General  
(IEC 62631-1:2011)**

Propriétés diélectriques et résistives des  
matériaux isolants solides -  
Partie 1: Généralités  
(CEI 62631-1:2011)

Dielektrische und resistive Eigenschaften  
fester Elektroisierstoffe -  
Teil 1: Grundlagen  
(IEC 62631-1:2011)

This European Standard was approved by CENELEC on 2011-06-02. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

**CENELEC**

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**Management Centre: Avenue Marnix 17, B - 1000 Brussels**

## Foreword

The text of document 112/169/FDIS, future edition 1 of IEC 62631-1, prepared by IEC TC 112, Evaluation and qualification of electrical insulating materials and systems, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62631-1 on 2011-06-02.

This European Standard partially supersedes HD 429 S1:1983, HD 438 S1:1984 and HD 568 S1:1990.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2012-03-02
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2014-06-02

Annex ZA has been added by CENELEC.

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## Endorsement notice

The text of the International Standard IEC 62631-1:2011 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

|             |      |                           |
|-------------|------|---------------------------|
| IEC 60216-1 | NOTE | Harmonized as EN 60216-1. |
| IEC 60247   | NOTE | Harmonized as EN 60247.   |
| IEC 60505   | NOTE | Harmonized as EN 60505.   |

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## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

| <u>Publication</u> | <u>Year</u> | <u>Title</u>   | <u>EN/HD</u> | <u>Year</u> |
|--------------------|-------------|--|--------------|-------------|
| IEC 60050-212      | -           | International Electrotechnical Vocabulary (IEV) - Chapter 212: Insulating solids, liquids and gases  | -            | -           |
| IEC 60093          | 1980        | Methods of test for volume resistivity and surface resistivity of solid electrical insulating materials  | HD 429 S1    | 1983        |
| IEC 60167          | 1964        | Methods of test for the determination of the insulation resistance of solid insulating materials   | HD 568 S1    | 1990        |
| IEC 60250          | 1969        | Recommended methods for the determination of the permittivity and dielectric dissipation factor of electrical insulating materials at power, audio and radio frequencies including metre wavelengths | -            | -           |
| IEC 60345          | 1971        | Method of test for electrical resistance and resistivity of insulating materials at elevated temperatures  | HD 438 S1    | 1984        |
| IEC 60377-1        | 1973        | Methods for the determination of the dielectric properties of insulating materials at frequencies above 300 MHz - Part 1: General  | -            | -           |
| IEC 60377-2        | 1977        | Methods for the determination of the dielectric properties of insulating materials at frequencies above 300 MHz - Part 2: Resonance methods  | -            | -           |
| ISO 291            | -           | Plastics - Standard atmospheres for conditioning and testing   | EN ISO 291   | -           |
| ISO 558            | -           | Conditioning and testing - Standard atmospheres - Definitions  | -            | -           |

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## INTRODUCTION

The IEC 62631 series is divided into four main parts, which are further subdivided into component parts. The present Part 1 of IEC 62631 considers, general aspects related to the measurement of dielectric and resistive properties of solid electric insulating materials. Parts 2 and 3 outline basic procedures for the measurement of dielectric and resistive properties by means of AC and DC methods. These parts will gradually replace hitherto existing International Standards. Part 4 will cover special methods of measurement and computational methods.

Table 1 shows the planned future structure of IEC 62631, together with the standards it will replace.

**Table 1 – Planned structure of IEC 62631**

| Main title    | DIELECTRIC AND RESISTIVE PROPERTIES OF SOLID INSULATING MATERIALS  |  |
|---------------|--|--|
| Part number   | Part title   | Remarks  |
| IEC 62631-1   | <b>– General</b>   | Amends and replaces IEC 60093, IEC 60167, IEC 60250, IEC 60345 |
| IEC 62631-2   | <b>– Permittivity and dielectric dissipation factors (AC methods)</b>                                      | New  |
| IEC 62631-2-1 | – Technical frequencies (1 Hz to 100 MHz)  | Replaces IEC 60250   |
| IEC 62631-2-2 | – High frequencies (1 MHz to 300 MHz)  | Replaces IEC 60250   |
| IEC 62631-2-3 | – Very high frequencies (above 300 MHz)  | Replaces IEC 60377-1 and IEC 60377-2                           |
| IEC 62631-2-4 | – Low frequencies (1 MHz to 1 kHz)   | New  |
| IEC 62631-3   | <b>– Resistive properties (DC methods)</b>   | New  |
| IEC 62631-3-1 | – Volume resistance and volume resistivity   | Replaces IEC 60093   |
| IEC 62631-3-2 | – Surface resistance and surface resistivity   | Replaces IEC 60093   |
| IEC 62631-3-3 | – Insulation resistance  | Replaces IEC 60167   |
| IEC 62631-3-4 | – Special requirements for the determination of resistive material properties at elevated temperatures     | Replaces IEC 60345   |
| IEC 62631-4   | <b>– Special methods</b>   | New  |
| IEC 62631-4-1 | – Computational methods for the evaluation of data gained by the use of broadband dielectric spectrometers | New  |
| IEC 62631-4-2 | – Thermal analysis by means of observation of dielectric properties  | New  |

Measured values of dielectric and resistive properties of solid insulating materials are dependent upon different factors such as the magnitude and time of voltage application, frequency, the nature and geometry of the electrodes, the surface condition, contamination, temperature and humidity of the ambient atmosphere and of the specimens during conditioning and measurement and, in certain cases, on electric field strength also.

Therefore, the electrical and dielectric properties covered by the IEC 62631 series may only be comparable as far as the circumstances of the measurement's parameters are stipulated. The test specimen's shape and dimensions, as well as the measurement parameters, may be defined in product standards or the relevant parts of this series of standards dealing with test procedures, depending on the requirements to be considered for a certain demand of measurement. Care should be taken when using measured values from the IEC 62631 series for the purposes of designing an electric product.

NOTE It is not possible to give a comprehensive overview covering the dielectric and resistive properties of solid electrical insulating materials within a framework of an International Standard. Therefore, the user is encouraged to read up on the literature such as that recommended in the bibliography.

# DIELECTRIC AND RESISTIVE PROPERTIES OF SOLID INSULATING MATERIALS –

## Part 1: General

### 1 Scope

This part of IEC 62631 gives general guidelines for the determination of dielectric and resistive properties of solid electrical insulating materials.

### 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 60050-212, *International Electrotechnical Vocabulary – Part 212: Electrical insulating solids, liquids and gases*

NOTE For IEC 60050, free online access is provided by [www.electropedia.org](http://www.electropedia.org).

IEC 60093:1980, *Methods of test for volume resistivity and surface resistivity of solid electrical insulating materials*

IEC 60167:1964, *Methods of test for the determination of the insulation resistance of solid insulating materials*

IEC 60250:1969, *Recommended methods for the determination of the permittivity and dielectric dissipation factor of electrical insulating materials at power, audio and radio frequencies including metre wavelengths*

IEC 60345:1971, *Method of test for electrical resistance and resistivity of insulating materials at elevated temperatures*

IEC 60377-1:1973, *Recommended methods for the determination of the dielectric properties of insulating materials at frequencies above 300 MHz – Part 1: General*

IEC 60377-2:1977, *Recommended methods for the determination of the dielectric properties of insulating materials at frequencies above 300 MHz – Part 2: Resonance methods*

ISO 291, *Plastics – Standard atmospheres for conditioning and testing*

ISO 558, *Conditioning and testing – Standard atmospheres – Definitions*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions, as well as those given in IEC 60050-212, apply.