# IEC 60893-2

Edition 3.0 2023-11
REDLINE VERSION

# INTERNATIONAL STANDARD

colour inside

**Insulating materials – Industrial rigid laminated sheets based on thermosetting resins for electrical purposes –**
**Part 2: Methods of test**



IEC 60893-2:2023-11 RLV(en)



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## Insulating materials – Industrial rigid laminated sheets based on thermosetting resins for electrical purposes – Part 2: Methods of test

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.035.01

ISBN 978-2-8322-7858-1

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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# INSULATING MATERIALS – INDUSTRIAL RIGID LAMINATED SHEETS BASED ON THERMOSETTING RESINS FOR ELECTRICAL PURPOSES –

## Part 2: Methods of test

## FOREWORD

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**This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60893-2:2003. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.**

IEC 60893-2 has been prepared by IEC technical committee 15: Solid electrical insulating materials. It is an International Standard.

This third edition cancels and replaces the second edition published in 2003. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) removal of reference to withdrawn specification IEC 60167:1964;
b) inclusion of reference to IEC 62631-3-3:2015, which supersedes IEC 60167:1964. Details in 6.3 have been updated accordingly. The actual performance of the test has not changed;
c) normative references have been updated.

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

| Draft | Report on voting |
|---|---|
| 15/1017/FDIS | 15/1023/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 60893 series, published under the general title *Insulating materials – Industrial rigid laminated sheets based on thermosetting resins for electrical purposes*, 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.

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# INTRODUCTION

This document is one of a series which deals with industrial rigid laminated sheets based on thermosetting resins for electrical purposes.

This series consists of four parts:

- Part 1: Definitions, designations and general requirements (IEC 60893-1);
- Part 2: Methods of test (IEC 60893-2);
- Part 3: Specifications for individual materials (IEC 60893-3);
- Part 4: Typical values (IEC TR 60893-4).

# INSULATING MATERIALS – INDUSTRIAL RIGID LAMINATED SHEETS BASED ON THERMOSETTING RESINS FOR ELECTRICAL PURPOSES –

## Part 2: Methods of test

## 1 Scope

This part of IEC 60893 describes methods of test for the materials defined in IEC 60893-1 (referred to also as Part 1).

## 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 60112, *Method for ~~determining the comparative and the proof tracking indices of solid insulating materials under moist conditions~~ the determination of the proof and the comparative tracking indices of solid insulating materials*

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

IEC 60212:~~1971~~2010, *Standard conditions for use prior to and during the testing of solid electrical insulating materials*

IEC 60216-1:~~2001~~2013, *Electrical insulating materials – ~~Properties of~~ Thermal endurance properties – Part 1: Ageing procedures and evaluation of test results*

IEC 60243-1:~~1998~~2013, *Electric strength of ~~solid~~ insulating materials – Test methods – Part 1: Tests at power frequencies*

~~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 60296:~~1982~~2012[1], ~~*Specification for unused mineral insulating oils for transformers and switchgear*~~ *Fluids for electrotechnical applications – Unused mineral insulating oils for transformers and switchgear*

IEC 60587:~~1984~~2007[2], ~~*Test method for evaluating resistance to tracking and erosion of electrical insulating materials used under severe ambient conditions*~~ *Electrical insulating materials used under severe ambient conditions – Test methods for evaluating resistance to tracking and erosion*

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1 A fifth edition of this standard has been published in 2020.

2 A fourth edition of this standard has been published in 2022.

IEC 60695-11-10:~~1999~~2013, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

IEC 60893-1, *Insulating materials – Industrial rigid laminated sheets based on thermosetting resins for electrical purposes – Part 1: Definitions, designations and general requirements*[3]

IEC 60893-3 (all parts~~–3~~), *Insulating materials – Industrial rigid laminated sheets based on thermosetting resins for electrical purposes – Part 3: Specifications for individual materials*

IEC TR 60893-4~~:2003~~, *Insulating materials – Industrial rigid laminated sheets based on thermosetting resins for electrical purposes – Part 4: Typical values*

IEC 62631-3-3:2015, *Dielectric and resistive properties of solid insulating materials – Part 3-3: Determination of resistive properties (DC methods) – Insulation resistance*

ISO 62:~~1999~~2008, *Plastics – Determination of water absorption*

ISO 178:~~2001~~2010[4], *Plastics – Determination of flexural properties*

ISO 179-1:2000[5], *Plastics – Determination of Charpy impact properties – Part 1: Non-instrumented impact test*

ISO 179-2:1997[6], *Plastics – Determination of Charpy impact properties – Part 2: Instrumented impact test*

ISO 180:2000[7], *Plastics – Determination of Izod impact strength*

ISO 527-1:~~1993~~2012[8], *Plastics – Determination of tensile properties – Part 1: General principles*

ISO 527-4:1997[9], *Plastics – Determination of tensile properties – Part 4: Test conditions for isotropic and orthotropic fibre-reinforced plastic composites*

ISO 604:2002, *Plastics – Determination of compressive properties*

~~ISO 1183:1987, *Plastics – Methods for determining the density and relative density of non-cellular plastics*~~

ISO 1183-1:2012[10], *Plastics – Methods for determining the density of non-cellular plastics – Part 1: Immersion method, liquid pyknometer method and titration method*

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~~3 Use edition 2 when published.~~

4 A sixth edition of this standard has been published in 2019.

5 A third edition of this standard has been published in 2023.

6 A second edition of this standard has been published in 2020.

7 A fifth edition of this standard has been published in 2023.

8 A third edition of this standard has been published in 2019.

9 A third edition of this standard has been published in 2023.

10 A third edition of this standard has been published in 2019.

ISO 3611:~~1978~~2010[11], ~~*Micrometer callipers for external measurement*~~ *Geometrical product specifications (GPS) – Dimensional measuring equipment: Micrometers for external measurements – Design and metrological characteristics*

## 3 Terms and definitions

No terms and definitions are listed in this document.

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

## 4 Conditioning of test specimens

Unless otherwise specified, test specimens shall be conditioned for at least 24 h in standard atmosphere B according to IEC 60212:2010 (temperature ~~23 °C ± 2 K~~ 23 ± 2 °C, relative humidity (50 ± 5) %).

Unless otherwise specified, each specimen shall be tested in the conditioning atmosphere and at the conditioning temperature, or the tests shall commence within 3 min of removal of each test specimen from the conditioning atmosphere.

Where testing at an elevated temperature is required in one of the specification sheets of IEC 60893-3, test specimens shall be conditioned for 1 h at that elevated temperature immediately before testing.

## 5 Dimensions

### 5.1 Thickness

#### 5.1.1 General

Any method which enables the thickness of the laminated sheet to be measured at an appropriate number of points may be used, provided that the equipment used and the method of measurement are capable of a precision of 0,01 mm or better.

The following reference method has been shown to be suitable and shall be used in cases of dispute.

#### 5.1.2 Test apparatus for reference method

In case of dispute, an external screw type micrometer in accordance with ISO 3611 having faces with diameters between 6 mm and 8 mm shall be used.

#### 5.1.3 Procedure for reference method

Measure the thickness of the rigid laminated sheet as delivered to the nearest 0,01 mm at eight points, two along each edge but not less than 20 mm from the edge.

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[11] A third edition of this standard has been published in 2023.