ICS 17.220.99, 29.035.01 SLOVENSKÁ TECHNICKÁ NORMA December 2023

STN	**Reaktívne zmesi na báze živíc na elektrické izolácie Časť 2: Skúšobné metódy**	**STN EN IEC 60455-2** 34 6509

Resin based reactive compounds used for electrical insulation - Part 2: Methods of test

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 11/23

Obsahuje: EN IEC 60455-2:2023, IEC 60455-2:2023

Oznámením tejto normy sa od 31.08.2026 ruší
STN EN 60455-2 (34 6509) z júla 2016

137668

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60455-2

September 2023

ICS 17.220.99; 29.035.01

Supersedes EN 60455-2:2015

English Version

Resin based reactive compounds used for electrical insulation - Part 2: Methods of test (IEC 60455-2:2023)

Composés réactifs à base de résines utilisés comme isolants électriques - Partie 2: Méthodes d'essai (IEC 60455-2:2023)

Reaktionsharzmassen für die Elektroisolierung - Teil 2: Prüfverfahren (IEC 60455-2:2023)

This European Standard was approved by CENELEC on 2023-08-31. 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 CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN IEC 60455-2:2023 E

EN IEC 60455-2:2023 (E)

European foreword

The text of document 15/1006/FDIS, future edition 4 of IEC 60455-2, prepared by IEC/TC 15 "Solid electrical insulating materials" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60455-2:2023.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2024-05-31
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2026-08-31

This document supersedes EN 60455-2:2015 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 60455-2:2023 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

ISO 2578:1993 NOTE Approved as EN ISO 2578:1998 (not modified)

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cencenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60050	series	International electrotechnical vocabulary	-	series
IEC 60068-2-10	2005	Environmental testing - Part 2-10: Tests - Test J and guidance: Mould growth	EN 60068-2-10	2005
IEC 60112	2020	Method for the determination of the proof and the comparative tracking indices of solid insulating materials	EN IEC 60112	2020
IEC 60216	series	Electrical insulating materials - Thermal endurance properties	EN 60216	series
IEC 60296	2020	Fluids for electrotechnical applications - Mineral insulating oils for electrical equipment	EN IEC 60296	2020
IEC 60426	2007	Electrical insulating materials - Determination of electrolytic corrosion caused by insulating materials - Test methods	EN 60426	2007
IEC 60455-1	1998	Resin based reactive compounds used for electrical insulation - Part 1: Definitions and general requirements	EN 60455-1	1998
IEC 60455-3	series	Resin based reactive compounds used for electrical insulation - Part 3: Specifications for individual materials	EN 60455-3	series
IEC 60455-3-8	2021	Resin based reactive compounds used for electrical insulation - Part 3-8: Specifications for individual materials - Resins for cable accessories	EN IEC 60455-3-8	2021
IEC 60695-11-10	2013	Fire hazard testing - Part 11-10: Test flames - 50 W horizontal and vertical flame test methods	EN 60695-11-10	2013
IEC 60814	1997	Insulating liquids - Oil-impregnated paper and pressboard - Determination of water by automatic coulometric Karl Fischer titration	EN 60814	1997
IEC 61033	1991	Test methods for the determination of bond strength of impregnating agents to an enamelled wire substrate	-	-

EN IEC 60455-2:2023 (E)

Publication	Year	Title	EN/HD	Year
IEC 61099	2010	Insulating liquids - Specifications for unused synthetic organic esters for electrical purposes	EN 61099	2010
ISO 37	2011	Rubber, vulcanized or thermoplastic - Determination of tensile stress-strain properties	-	-
ISO 62	2008	Plastics - Determination of water absorption	EN ISO 62	2008
ISO 75	series	Plastics and ebonite – Determination of temperature of deflection under load	EN ISO 75	series
ISO 175	2010	Plastics - Methods of test for the determination of the effects of immersion in liquid chemicals	EN ISO 175	2010
ISO 178	2010	Plastics - Determination of flexural properties	-	-
ISO 179-1	2010	Plastics - Determination of Charpy impact properties - Part 1: Non-instrumented impact test	-	-
ISO 179-2	1997	Plastics - Determination of Charpy impact properties - Part 2: Instrumented impact test	-	-
ISO 291	-	Plastics - Standard atmospheres for conditioning and testing	EN ISO 291	-
ISO 306	2013	Plastics - Thermoplastic materials - Determination of Vicat softening temperature (VST)	-	-
ISO 527	series	Plastics – Determination of tensile properties	EN ISO 527	series
ISO 584	1982	Plastics - Unsaturated polyester resins - Determination of reactivity at 80 degrees C (conventional method)	EN ISO 584	1997
ISO 604	2002	Plastics - Determination of compressive properties	EN ISO 604	2003
ISO 868	2003	Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness)	EN ISO 868	2003
ISO 1183-1	2019	Plastics – Methods for determining the density of non-cellular plastics – Part 1: Immersion method, liquid pycnometer method and titration method	EN ISO 1183-1	2019
ISO 1513	2010	Paints and varnishes - Examination and preparation of test samples	EN ISO 1513	2010
ISO 1523	2002	Determination of flash point - Closed cup equilibrium method	EN ISO 1523	2002
ISO 1675	1985	Plastics - Liquid resins - Determination of density by the pyknometer method	-	-
ISO 2039-1	1993	Plastics - Determination of hardness - Part 1: Ball indentation method	-	-
ISO 2114	2000	Plastics (polyester resins) and paints and varnishes (binders) - Determination of partial acid value and total acid value	EN ISO 2114	2000
-	-		+ AC	2005

Publication	Year	Title	EN/HD	Year
ISO 2431	1993	Paints and varnishes - Determination of flow time by use of flow cups	-	-
ISO 2535	1997	Plastics - Unsaturated polyester resins - Measurement of gel time at 25 degrees C	-	-
ISO 2554	1997	Plastics - Unsaturated polyester resins - Determination of hydroxyl value	EN ISO 2554	1998
ISO 2555	1989	Plastics - Resins in the liquid state or as emulsions or dispersions - Determination of apparent viscosity by the Brookfield test method	-	-
ISO 2592	1973	Petroleum products - Determination of flash and fire points - Cleveland open cup method	-	-
ISO 3001	1997	Plastics - Epoxide compounds - Determination of epoxide equivalent	-	-
ISO 3219	1993	Plastics - Polymers/resins in the liquid state or as emulsions or dispersions - Determination of viscosity using a rotational viscometer with defined shear rate	-	-
ISO 3451-1	1997	Plastics - Determination of ash - Part 1: General methods	-	-
ISO 3521	1997	Plastics - Unsaturated polyester and epoxy resins - Determination of overall volume shrinkage	EN ISO 3521	1999
ISO 3679	1983	Paints, varnishes, petroleum and related products; Determination of flashpoint; Rapid equilibrium method	-	-
ISO 4573	1978	Plastics - Epoxide resins and glycidyl esters - Determination of inorganic chlorine	-	-
ISO 4583	1998	Plastics - Epoxide resins and related materials - Determination of easily saponifiable chlorine	-	-
ISO 4615	1979	Plastics - Unsaturated polyesters and epoxide resins - Determination of total chlorine content	EN ISO 4615	1999
ISO 4625	1980	Binders for paints and varnishes - Determination of softening point - Ring-and-ball method	-	-
ISO 4895	-	Plastics - Liquid epoxy resins - Determination of tendency to crystallize	-	-
ISO 7056	-	Plastics laboratory ware - Beakers	-	-
ISO 9396	1997	Plastics - Phenolic resins - Determination of the gel time at a given temperature using automatic apparatus	EN ISO 9396	2000
ISO 11357-2	1999	Plastics - Differential scanning calorimetry (DSC) - Part 2: Determination of glass transition temperature	-	-
ISO 11359-2	1999	Plastics - Thermomechanical analysis (TMA) – Part 2: Determination of coefficient of linear thermal expansion and glass transition temperature	-	-

EN IEC 60455-2:2023 (E)

Publication	Year	Title	EN/HD	Year
ISO 11359-3	2002	Plastics - Thermomechanical analysis (TMA) - Part 3: Determination of penetration temperature	-	-
ISO 14896	2009	Plastics – Polyurethane raw materials – Determination of isocyanate content	EN ISO 14896	2009
ISO 15528	2000	Paints, varnishes and raw materials for paints and varnishes - Sampling	-	-

IEC 60455-2

Edition 4.0 2023-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Resin based reactive compounds used for electrical insulation – Part 2: Methods of test

Composés réactifs à base de résines utilisés comme isolants électriques – Partie 2: Méthodes d'essai

IEC 60455-2:2023-07(en-fr)

IEC 60455-2

Edition 4.0 2023-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Resin based reactive compounds used for electrical insulation – Part 2: Methods of test

Composés réactifs à base de résines utilisés comme isolants électriques – Partie 2: Méthodes d'essai

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 17.220.99, 29.035.01 ISBN 978-2-8322-7283-1

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

RESIN BASED REACTIVE COMPOUNDS USED FOR ELECTRICAL INSULATION –

Part 2: Methods of test

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 60455-2 has been prepared by IEC technical committee 15: Solid electrical insulating materials. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2015. This edition constitutes a technical revision.

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

a) Introduction of test methods related to IEC 60455-3-8;
b) Additional and updated test methods for resins.

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

Draft	Report on voting
15/1006/FDIS	15/1015/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 60455 series, published under the general title *Resin based reactive compounds used for electrical insulation*, 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,
- replaced by a revised edition, or
- amended.

INTRODUCTION

This part of IEC 60455 is one of a series which deals with solvent-free resin based reactive compounds and their components used for electrical insulation.

The series consists of three parts:

- Part 1: Definitions and general requirements;
- Part 2: Methods of test;
- Part 3: Specifications for individual materials.

RESIN BASED REACTIVE COMPOUNDS USED FOR ELECTRICAL INSULATION –

Part 2: Methods of test

1 Scope

This part of IEC 60455 specifies methods of test to be used for testing resin based reactive compounds, their components and cured compounds used for electrical insulation.

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 60050 (all parts), *International Electrotechnical Vocabulary (available at http://www.electropedia.org)*

IEC 60068-2-10:2005, *Environmental testing – Part 2-10: Tests – Test J and guidance: Mould growth*

IEC 60112:2020, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60216 (all parts), *Electrical insulating materials – Thermal endurance properties*

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

IEC 60296:2020, *Fluids for electrotechnical applications – Mineral insulating oils for electrical equipment*

IEC 60426:2007, *Electrical insulating materials – Determination of electrolytic corrosion caused by insulating materials – Test methods*

IEC 60455-1:1998, *Resin based reactive compounds used for electrical insulation – Part 1: Definitions and general requirements*

IEC 60455-3 (all parts), *Resin based reactive compounds used for electrical insulation – Part 3: Specifications for individual materials*

IEC 60455-3-8:2021, *Resin based reactive compounds used for electrical insulation – Part 3-8: Specifications for individual materials – Resins for cable accessories*

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

IEC 60814:1997, *Insulating liquids – Oil-impregnated paper and pressboard – Determination of water by automatic coulometric Karl Fischer titration*

IEC 61033:1991, *Test methods for the determination of bond strength of impregnating agents to an enamelled wire substrate*

IEC 61099:2010, *Insulating liquids – Specifications for unused synthetic organic esters for electrical purposes*

ISO 37:2011, *Rubber, vulcanized or thermoplastic – Determination of tensile stress-strain properties*

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

ISO 75 (all parts), *Plastics and ebonite – Determination of temperature of deflection under load*

ISO 175:2010, Plastics – *Methods of test for the determination of the effects of immersion in liquid chemicals*

ISO 178:2010, *Plastics – Determination of flexural properties*

ISO 179-1:2010, *Plastics – Determination of Charpy impact properties – Part 1: Non-instrumented impact test*

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

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

ISO 306:2013, *Plastics – Thermoplastic materials – Determination of Vicat softening temperature (VST)*

ISO 527 (all parts), *Plastics – Determination of tensile properties*

ISO 584:1982, *Plastics – Unsaturated polyester resins – Determination of reactivity at 80 degrees C (conventional method)*

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

ISO 868:2003, *Plastics and ebonite – Determination of indentation hardness by means of a durometer (Shore hardness)*

ISO 1183-1:2019, *Plastics – Methods for determining the density of non-cellular plastics – Part 1: Immersion method, liquid pycnometer method and titration method*

ISO 1513:2010, *Paints and varnishes – Examination and preparation of test samples*

ISO 1523:2002, *Determination of flash point – Closed cup equilibrium method*

ISO 1675:1985, *Plastics – Liquid resins – Determination of density by the pycnometer method*

ISO 2039-1:1993, *Plastics – Determination of hardness – Part 1: Ball indentation method*

ISO 2114:2000, *Plastics (polyester resins) and paints and varnishes (binders) – Determination of partial acid value and total acid value*

ISO 2431:1993, *Paints and varnishes – Determination of flow time by use of flow cups*

ISO 2535:1997, *Plastics – Unsaturated polyester resins – Measurement of gel time at 25 degrees C*

ISO 2554:1997, *Plastics – Unsaturated polyester resins – Determination of hydroxyl value*

ISO 2555:1989, *Plastics – Resins in the liquid state or as emulsions or dispersions – Determination of apparent viscosity using a single cylinder type rotational viscometer method*

ISO 2592:1973, *Petroleum products – Determination of flash and fire points – Cleveland open cup method*

ISO 3001:1997, *Plastics – Epoxy compounds – Determination of epoxy equivalent*

ISO 3219:1993, *Plastics – Polymers/resins in the liquid state or as emulsions or dispersions – Determination of viscosity using a rotational viscometer with defined shear rate*

ISO 3451-1:1997, *Plastics – Determination of ash – Part 1: General methods*

ISO 3521:1997, *Plastics – Unsaturated polyester and epoxy resins – Determination of overall volume shrinkage*

ISO 3679:1983, *Paints, varnishes, petroleum and related products – Determination of flashpoint – Rapid equilibrium method*

ISO 4573:1978, *Plastics – Epoxide resins and glycidyl esters – Determination of inorganic chlorine*

ISO 4583:1998, *Plastics – Epoxide resins and related materials – Determination of easily saponifiable chlorine*

ISO 4615:1979, *Plastics – Unsaturated polyesters and epoxide resins – Determination of total chlorine content*

ISO 4625:1980, *Binders for paints and varnishes – Determination of softening point – Ring-and-ball method*

ISO 4895, *Plastics – Liquid epoxy resins – Determination of tendency to crystallize*

ISO 7056, *Plastics laboratory ware – Beakers*

ISO 9396:1997, *Plastics – Phenolic resins – Determination of the gel time of resols under specific conditions using automatic apparatus*

ISO 11357-2:1999, *Plastics – Differential scanning calorimetry (DSC) – Part 2: Determination of glass transition temperature and step height*

ISO 11359-2:1999, *Plastics – Thermomechanical analysis (TMA) – Part 2: Determination of coefficient of linear thermal expansion and glass transition temperature*

ISO 11359-3:2002, *Plastics – Thermomechanical analysis (TMA) – Part 3: Determination of penetration temperature*

ISO 14896:2009, *Plastics – Polyurethane raw materials – Determination of isocyanate content*

ISO 15528:2000, *Paints, varnishes and raw materials for paints and varnishes – Sampling*