BS EN 60455-2:2015



BSI Standards Publication

Resin based reactive compounds used for electrical insulation

Part 2: Methods of test

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National foreword

This British Standard is the UK implementation of EN 60455-2:2015. It is identical to IEC 60455-2:2015. It supersedes BS EN 60455-2:1999, which will be withdrawn on 30 July 2018.

The UK participation in its preparation was entrusted by Technical Committee GEL/15, Solid electrical insulating materials, to Subcommittee GEL/15/7, Resins and varnishes.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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English Version

Resin based reactive compounds used for electrical insulation - Part 2: Methods of test (IEC 60455-2:2015)

Composés réactifs à base de résines utilisés comme isolants électriques - Partie 2: Méthodes d'essai (IEC 60455-2:2015)

Reaktionsharzmassen für die Elektroisolierung - Teil 2: Prüfverfahren (IEC 60455-2:2015)

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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European foreword

The text of document 15/751/FDIS, future edition 3 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 60455-2:2015.

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)	2016-05-20
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2018-07-30

This document supersedes EN 60455-2:1999.

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.

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

Endorsement notice

The text of the International Standard IEC 60455-2:2015 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	Harmonized as EN ISO 2578:1998.

Annex ZA
(normative)
Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When 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.cenelec.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 60093	1980	Methods of test for volume resistivity and surface resistivity of solid electrical insulating materials	HD 429 S1	1983
IEC 60112	2003	Method for the determination of the proof and the comparative tracking indices of solid insulating materials	EN 60112	2003
IEC 60216	series	Electrical insulating materials - Thermal endurance properties	EN 60216	series
IEC 60243-1	1998	Electrical strength of insulating materials - Test methods -- Part 1: Tests at power frequencies	EN 60243-1	1998
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	2012	Fluids for electrotechnical applications - Unused mineral insulating oils for transformers and switchgear	EN 60296	2012
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	EN 60455-3	series
IEC 60455-3-8	2013	Resin based reactive compounds used for electrical insulation -- Part 3: Specifications for individual materials -- Sheet 8: Resinous compounds for cable accessories	EN 60455-3-8	2013
IEC 60695-11-10	1999	Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods	EN 60695-11-10	1999
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 61033	2006

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	EN ISO 178	2010
ISO 179-1	2010	Plastics - Determination of Charpy impact properties - Part 1: Non-instrumented impact test	EN ISO 179-1	2010
ISO 179-2	1997	Plastics - Determination of Charpy impact properties -- Part 2: Instrumented impact test	EN ISO 179-2	1999
ISO 291	-	Plastics - Standard atmospheres for conditioning and testing	EN ISO 291	-
ISO 306	2004	Plastics- Thermoplastic materials- Determination of Vicat softening temperature (VST)	EN ISO 306	2004
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	2012	Plastics- Methods for determining the density of non-cellular plastics- Part1: Immersion method, liquid pyknometer method and titration method	EN ISO 1183-1	2012
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	EN ISO 1675	1998
ISO 2039-1	1993	Plastics - Determination of hardness -- Part 1: Ball indentation method	EN ISO 2039-1	1996
ISO 2114	1996	Plastics- Unsaturated polyester resins - Determination of partial acid value and total acid value	EN ISO 2114	1996
ISO 2431	1993	Paints and varnishes - Determination of flow time by use of flow cups	EN ISO 2431	1996
ISO 2535	1997	Plastics - Unsaturated polyester resins - Measurement of gel time at 25 degrees C	EN ISO 2535	1997
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	EN ISO 2555	1999

ISO 2592	1973	Petroleum products - Determination of flash and fire points - Cleveland open cup method	EN 22592	1993
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	EN ISO 3219	1994
ISO 3451-1	1997	Plastics- Determination of ash- Part1: 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	-	-
ISO 11359-3	2002	Plastics - Thermomechanical analysis (TMA) - Part 3: Determination of penetration temperature	-	-
ISO 14896	2009		EN ISO 14896	2009
ISO 15528	2000	Paints, varnishes and raw materials for paints and varnishes - Sampling	-	-

CONTENTS

FOREWORD....5
INTRODUCTION....7
1 Scope....8
2 Normative references....8
3 Terms and definitions....11
4 General notes on methods of test....11
4.1 Preparation and conditioning....11
4.2 Sequence of tests....12
4.3 Test report....12
5 Methods of test for reactive compounds and their components....12
5.1 Flash point....12
5.2 Density....12
5.3 Viscosity....12
5.4 Viscosity after storing at elevated temperature....12
5.5 Content of volatile organic components....13
5.6 Isothermal increase of viscosity (processing time)....13
5.7 Shelf life....13
5.8 Colour....13
5.9 Softening temperature....14
5.10 Ash content....14
5.11 Filler content....14
5.12 Chlorine content....14
5.12.1 Total chlorine content of unsaturated polyesters and epoxide resins....14
5.12.2 Inorganic chlorine content of epoxide resins and glycidyl esters....14
5.12.3 Easily saponifiable chlorine content of epoxide resins and related materials....14
5.13 Tendency of cristallisation....14
5.14 Epoxide equivalent of epoxide resins....14
5.15 Content of isocyanate....14
5.16 Water content (Karl Fischer method)....14
5.17 Hydroxyl value....15
5.17.1 Polyester resins....15
5.17.2 Resins other than polyester....15
5.18 Acid value of polyester resins....15
5.19 Amount of double bonds of unsaturated polyester and acrylate resins....15
5.20 Acid and acid-anhydride content of acid-anhydride hardeners....15
5.21 Amine value....15
5.22 Pot life....15
5.22.1 General....15
5.22.2 Resinous compounds for cable accessories....15
5.23 Gel time....16
5.23.1 Unsaturated polyester based compounds....16
5.23.2 Phenolic resin based compounds....16
5.23.3 Other compounds....16
5.24 Exothermic temperature rise....16
5.24.1 Unsaturated polyester based compounds....16
5.24.2 Resinous compounds for cable accessories....16

5.24.3 Other compounds 17
5.25 Total volume shrinkage of epoxide and unsaturated polyester based compounds 17
5.26 Curing in presence of water 17
5.26.1 General 17
5.26.2 Apparatus and materials 17
5.26.3 Pouring device 18
5.26.4 Procedure 18
5.26.5 Test report 18
5.27 Determination of the degree of curing 18
5.28 Curing in thick layer and emissions during curing 18
5.28.1 General 18
5.28.2 Equipment 19
5.28.3 Test specimen 19
5.28.4 Procedure 19
6 Methods of test for cured reactive compounds 20
6.1 General 20
6.2 Test specimens 20
6.2.1 General 20
6.2.2 Preparation of the reactive compound 20
6.2.3 Preparation of test specimens 21
6.2.4 Type and number of test specimens 21
6.3 Density 21
6.4 Mechanical properties 21
6.4.1 Tensile properties 21
6.4.2 Compressive properties 21
6.4.3 Flexural properties 22
6.4.4 Impact strength 22
6.4.5 Hardness 22
6.5 Thermal properties 22
6.5.1 Bond strength at elevated temperature 22
6.5.2 Linear thermal expansion 22
6.5.3 Thermal conductivity 22
6.5.4 Glass transition 23
6.5.5 Flammability 23
6.5.6 Thermal shock 23
6.5.7 Dry heat resistance of resins for cable accessories – Method of test 23
6.5.8 Wet heat resistance of resins for cable accessories 24
6.5.9 Loss of mass 26
6.5.10 Temperature index 27
6.6 Chemical properties 27
6.6.1 Water absorption 27
6.6.2 Effect of liquid chemicals 28
6.6.3 Resistance to mould growth 28
6.6.4 Water vapour permeability 28
6.7 Electrical properties 28
6.7.1 Effect of water immersion on volume resistivity 28
6.7.2 Dielectric dissipation factor (tan δ) and relative permittivity (ε_r) 29
6.7.3 Breakdown voltage and electric strength 30

6.7.4 Proof tracking index (PTI)....31
6.7.5 Electrolytic corrosion....31
Annex A (informative) Health and safety....36
Bibliography....37

Figure 1 – Test apparatus for curing in presence of water test....32
Figure 2 – Test set-up for volume resistivity....33
Figure 3 – Example of electrode arrangement for flexible cured compound....34
Figure 4 – Example of electrode arrangement for rigid cured compound....35

Table 1 – Condition of the top side....19
Table 2 – Condition of the bottom side....19
Table 3 – Condition of the interior....20

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

This third edition cancels and replaces the second edition published in 1998. 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 standard is based on the following documents:

FDIS	Report on voting
15/751/FDIS	15/757/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.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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 publication will remain unchanged until the stability 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.

A bilingual version of this publication may be issued at a later date.

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 (IEC 60455-1);
– Part 2: Methods of test (IEC 60455-2);
– Part 3: Specifications for individual materials (IEC 60455-3).

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, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 60093:1980, *Methods of test for volume resistivity and surface resistivity of solid electrical insulating materials*

IEC 60112:2003, *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 60243-1:1998, *Electrical strength of 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 60296:2012, *Fluids for electrotechnical applications – Unused mineral insulating oils for transformers and switchgear*

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 requir*ements

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

IEC 60455-3-8:2013, *Resin based reactive compounds used for electrical insulation – Part 3: Specifications for individual materials – Sheet 8: Resins for cable accessories*