

Material characterisation – Part 1: Compounds for use in cable accessories:
Resinous compounds before cure and in the cured state

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English version

Material characterisation
Part 1: Compounds for use in cable accessories:
Resinous compounds before cure and in the cured state

Caractérisation des matériaux
Partie 1: Matières de remplissage des
accessoires de câbles: Composés
résineux avant et après polymérisation

Materialcharakterisierung
Teil 1: Vergußmassen für die
Anwendung in Kabelgarnituren:
Gießharzmassen vor dem Aushärten
und im ausgehärteten Zustand

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This Harmonization Document was approved by CENELEC on 1998-04-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document on a national level.

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

This Harmonization Document exists in three official versions (English, French, German).

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

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FOREWORD

This Harmonisation Document has been prepared by a task force under the direction of Working Group 11 of CENELEC TC20 'Electric Cables'. At its meeting in Copenhagen (June 1996) TC20 agreed to send it to Formal Voting.

This is Part 1 of HD 631, Materials Characterisation.

This Part defines a list of tests needed to characterise the solvent free polymerisable, reacting resinous compounds used for electrical insulation and mechanical protection in cable accessories covered by the following CENELEC HDs:

HD 623 (Specification for joints, stop ends and outdoor terminations for distribution cables of rated voltage 0,6/1,0 kV).

HD 629.1 (Test requirements on accessories for use on power cables of rated voltages from 3,6/6(7,2) kV up to 20,8/36(42) kV Part 1: Cables with extruded insulation).

HD 629.2 (Test requirements on accessories for use on power cables of rated voltage from 3,6/6(7,2) kV up to 20,8/36(42) kV Part 2: Cables with impregnated paper insulation).

Further parts will cover other material types used in cable accessories, e.g. heat shrink materials and cold shrink materials, and also screening tests.

The text of the draft was submitted to the formal vote and was approved by CENELEC as HD 631.1 S1 on 1998-04-01.

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The following dates were fixed:

- latest date by which the existence of the HD has to be announced at national level (doa) 1998-09-01
- latest date by which the HD has to be implemented at national level by publication of a harmonized national standard or by endorsement (dop) 1999-03-01
- latest date by which the national standards conflicting with the HD have to be withdrawn (dow) 1999-03-01



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1. Scope

This HD details a minimum number of simple tests, identifying the properties' profile of reacting resinous compounds used for casting or encapsulation in accessories for low and medium voltage cables up to 20,8/36(42) kV as specified in HD 623, HD 629.1 and HD 629.2.

For additional properties requested by the end users, reference should be made to IEC Publication 455 Parts 1, 2, 3 and 4 .

2. Normative references

This HD incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this HD only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

HD 623	Specification for joints, stop ends and outdoor terminations for distribution cables of rated voltage 0,6/1,0kV
HD 629.1	Test requirements on accessories for use on power cables of rated voltage from 3,6/6(7,2)kV up to 20,8/36(42)kV. Part 1: Cables with extruded insulation.
HD 629.2	Test requirements on accessories for use on power cables of rated voltage from 3,6/6(7,2) kV up to 20,8/36(42) kV. Part 2: Cables with impregnated paper insulation.
ISO 179	Plastics; determination of Charpy impact strength of rigid materials. https://standards.iteh.ai/catalog/standards/sist/e8cce116-2bf5-489d-8edb-7a678857e4d1/iso-179-1998
ISO 291	Plastics - Standard atmospheres for conditioning and testing.
ISO 868	Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness).
ISO 1183	Plastics - Methods for determining the density and relative density of non-cellular plastics.
ISO 1675	Plastics, liquid resins - Determination of density by the pycnometer method.
ISO 7056	Plastics laboratory ware - beakers.
IEC 455	Specification for solventless polymerisable resinous compounds used for electrical insulation.

3. Definitions

3.1 Resinous compound

A resinous compound for cable accessories is a compound made by the mixture of at least two components (resin and reagent) and which, for some applications, additional components such as filler may be added.

3.2 Resin

A resin for cable accessories is a liquid or liquefiable organic material that cures as a result of polyaddition or polymerisation by means of reagents (hardener, accelerator, etc.) without releasing additional volatile products.

3.3 Reagents

- 3.3.1 Accelerators for resins according to sub-clause 3.2 are substances which, when added in small quantities, accelerate curing.
- 3.3.2 Hardeners for resins according to sub-clause 3.2 are substances, or compounds of substances, which cause polyaddition or polymerisation by cross-linking of the molecules.

3.4 "Use before" date (Shelf-life)

The "use before" date is the date until which the components of a resinous compound, when stored under specified conditions of temperature and humidity, can be mixed to form a resinous compound with specified properties.

3.5 Pot life

Pot life is the time available to mix the components of the resinous compound together and pour or inject the compound into the cable accessory, such that it continues to flow smoothly and cohesively.

3.6 Gel-time

Gel-time is the time required for the curing mixture to reach a gelatinous state as defined by the test method.

3.7 Exotherm peak temperature

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The exotherm peak temperature is the highest temperature which is reached during the curing process of a defined volume of resinous compound mixed at a defined temperature.

3.8 Density

The density is the ratio of mass to volume.

3.9 Impact strength

The impact strength is a measure of the toughness or brittleness of a cured resin.

3.10 Shore hardness

The Shore hardness is a determination of the indentation hardness of material by means of durometers.

3.11 Deviation

The deviation is the acceptable variation of a property between the original test values of the resinous compound associated with the accessory type test and the test values measured on new samples later on, expressed as a percentage of the latter.

4. General Requirements

4.1 Packaging

Packaging shall be sufficient to ensure that any stated shelf life is maintained when stored under specified conditions of temperature and humidity such that the performance of the resinous compound, when forming part of the total accessory, is unaffected.

4.2 Marking and labelling

Packaging for the components of resinous compounds shall contain the following information in the relevant national language(s) :

With each individual packaging:

- the supplier's name or logo;
- the base resin of the resinous compound;
- the volume of the components of the resinous compound;
- the batch number(s) or identification;
- the specified storage conditions, if any;
- the "Use before date" (shelf life);
- the health and safety marking according to relevant EU or national legislation, and handling instructions, in relevant languages; SIST HD 631.1 S1:2002
- the disposal instructions in relevant languages (where relevant);
- the mixing instructions, in relevant languages.

4.3 Health and safety

The manufacturer/supplier shall make available safety data sheets in relevant languages that will enable the purchaser to transport, to use and to dispose of the casting resin and its packaging in a safe manner in accordance with the relevant EU or overriding national legislation.

4.4 Information to the end user

The following data shall be given by the manufacturer to the end user, upon request:

- safety data sheets according to relevant EU legislation;
- pot life at 5°C, 23°C and 40°C;
- exotherm peak temperature according to the test in Annex B, or as requested by end user;
- time before energising the accessory after completion, or dielectric strength of the uncured resin.

5. Resinous compound profile

5.1 Sampling

For the tests, which shall be carried out in accordance with the sequence given in Table 1, the components of the resinous compound, taken from their original containers, shall be used.

5.2 Preparation and conditioning

5.2.1 Curing stage

Compounds shall be prepared according to the supplier's instructions, and tested as defined in part 1 of the sequence of tests given in Table 1.

5.2.2 Cured stage and after ageing

Compounds shall be prepared according to the supplier's instructions and cured for 24 hours at room temperature unless otherwise specified. After that, specimens shall be post-cured at $(80 \pm 2)^\circ\text{C}$ for 24 hours, unless otherwise specified in the test method, and then cooled in a desiccator for 24 hours at room temperature.

Conditioning shall be made according to ISO 291 using atmosphere 23/50 (23°C and 50 % relative humidity).

Tests shall then be made according part 2 (cured stage) and part 3 (after ageing) of the sequence of tests given in Table 1.

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5.3 Reporting <https://standards.iteh.ai/catalog/standards/sist/e8cce116-2bf5-489d-8edb-2ed976b789f5/sist-hd-631-1-s1-2002>

The test report shall give the following data:

- packaging;
- lot number or identification;
- conformity of marking and labelling;
- test results;
- major test parameters, including calibrations, if any;
- processing conditions to mix the compound.