

Insulating and sheathing materials of electric and optical fibre cables — Common test methods —

**Part 5-1: Methods specific to filling
compounds — Drop point —
Separation of oil — Lower temperature
brittleness — Total acid number —
Absence of corrosive components —
Permittivity at 23 °C — D.C resistivity
at 23 °C and 100 °C**

The European Standard EN 60811-5-1:1999, with the incorporation of amendment A1:2004, has the status of a British Standard

ICS 29.035.01

National foreword

This British Standard is the official English language version of EN 60811-5-1:1999. It was derived by CENELEC from IEC 60811-5-1:1990. It supersedes BS 6469-5.1:1992 which is withdrawn.

The CENELEC common modifications have been implemented at the appropriate places in the text and are indicated by a side line in the margin.

The UK participation in its preparation was entrusted to Technical Committee GEL/20, Electric cables, to Subcommittee GEL/20/3, Insulation and sheath, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
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**Insulating and sheathing materials of electric and optical
fibre cables — Common test methods**

**Part 5-1: Methods specific to filling compounds —
Drop point — Separation of oil — Lower temperature
brittleness — Total acid number — Absence of corrosive
components — Permittivity at 23 °C — D.C resistivity
at 23 °C and 100 °C**

(includes amendment A1:2004)
(IEC 60811-5-1:1990 modified + A1:2004)

Matériaux d'isolation et de gainage des câbles
électriques et des câbles à fibres optiques —
Méthodes d'essais communes
Partie 5-1: Méthodes spécifiques pour les matières
de remplissage — Point de goutte —
Séparation d'huile — Fragilité à basse
température — Indice d'acide total — Absence de
composés corrosifs — Permittivité à 23 °C —
Résistivité en courant continu à 23 °C et 100 °C
(inclut l'amendement A1:2004)
(CEI 60811-5-1:1990 modifiée + A1:2004)

Isolier- und Mantelwerkstoffe für Kabel und isolierte
Leitungen —
Allgemeine Prüfverfahren
Teil 5-1: Besondere Prüfverfahren für Füllmassen —
Tropfpunkt — Ölabscheidung —
Kälterissbeständigkeit — Gesamtsäurezahl —
Abwesenheit korrosiver Bestandteile —
Dielektrizitätskonstante bei 23 °C —
Gleichstromwiderstand bei 23 °C und 100 °C
(enthält Änderung A1:2004)
(IEC 60811-5-1:1990 modifiziert + A1:2004)

This European Standard was approved by CENELEC on 1999-04-01, amendment A1 was approved by CENELEC on 2004-03-01. 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

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

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Foreword

The text of the International standard IEC 60811-5-1:1990, prepared by IEC TC 20, Electric cables, together with common modifications prepared by the Technical Committee CENELEC TC 20, Electric cables, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 60811-5-1 on 1999-04-01.

This European Standard supersedes HD 505.5.1 S1:1992.

Where reference is made to HD 505.5.1 S1:1992 (IEC 60811-5-1:1990) in another standard, users should refer to this EN 60811-5-1:1998 for the current information.

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) 2000-04-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2001-04-01

Annexes designated “normative” are part of the body of the standard. In this standard, Annex A and Annex ZA are normative.

Annex ZA has been added by CENELEC.

Foreword to amendment A1

The text of document 20/650/FDIS, future amendment 1 to IEC 60811-5-1:1990, prepared by IEC TC 20, Electric cables, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 60811-5-1:1999 on 2004-03-01

The following dates were fixed:

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- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2007-03-01

Contents

	Page
1. Scope	3
2. Test Value	3
3. Applicability	3
4. Drop-point	3
5. Separation of oil	7
6. Low temperature brittleness	7
7. Total acid number	8
8. Absence of corrosive components	10
9. Permittivity at 23 °C	12
10. D.C resistivity at 23 °C and 100 °C	12
Appendix A - Specification for p-Naphtholbenzein	13
Figures	14
Annex ZA	18

INTERNATIONAL ELECTROTECHNICAL COMMISSION

Insulating and sheathing materials of electric and optical fibre cables – Common test methods

Part 5: Methods specific to filling compounds
Section One - Drop-point - Separation of oil -
Lower temperature brittleness - Total acid number -
Absence of corrosive components - Permittivity at 23 °C -
D.C. resistivity at 23 °C and 100 °C

1. Scope

This standard specifies the test methods for filling compounds of electric and optical cables used with telecommunications equipment, including cables used in ships and in offshore applications.

This Section One of Part 5 gives the methods for drop-point, separation of oil, lower temperature brittleness, total acid number, absence of corrosive components, permittivity at 23 °C, d.c. resistivity at 23 °C and 100 °C.

2. Test values

Any test requirements which are given in this standard may be modified by the relevant cable standard to suit the needs of a particular type of cable.

3. Applicability

Conditioning values and testing parameters are either specified in the materials specifications or in the product specifications.

4. Drop-point

Note.- These tests are intended for classification purposes only.

4.1 General

The drop-point test may be used as an indication of the maximum temperature to which a filling compound can be exposed without complete liquefaction or excessive oil separation.

4.2 Method A (reference method)

4.2.1 Apparatus

A chromium plated brass cup conforming to the dimensions shown in figure 1.

A heat-resistant glass test tube conforming to the dimensions shown in figure 2 with three indentations to support the cup.

Thermometers with a range $-5\text{ }^{\circ}\text{C}$ to $300\text{ }^{\circ}\text{C}$ (76 mm immersion) marked in degrees Celsius with a scale accuracy of $1\text{ }^{\circ}\text{C}$. The bulb lengths shall be 10 mm to 15 mm, and the bulb diameters shall be 5 mm to 6 mm.

An oil bath consisting of a 400 ml beaker and suitable oil, a ring stand and ring for the support of the oil bath, clamps for the thermometers, two corks as shown in figure 2, a polished metal rod 1.2 mm to 1.6 mm in diameter and 150 mm in length, and a suitable means for heating and stirring the oil bath.

4.2.2 Test procedure

Place the corks on one of the thermometers as shown in figure 2 and adjust the position of the upper cork so that the tip of the thermometer bulb is about 3 mm above the bottom of the cup when the apparatus is assembled for test. Suspend a second thermometer in the oil bath so that its bulb is at approximately the same level as the bulb of the thermometer in the test tube.

Fill the cup by presenting its larger opening into the filling compound until the cup is filled, taking care to avoid working the filling compound as far as possible. Cut away excess compound. The cup shall be held in a vertical position with its smaller opening at the bottom while it is gently pressed down over the metal rod until the rod protrudes about 25 mm above the larger opening. Press the rod against the cup in such a manner that the rod makes contact with both the upper and lower peripheries of the cup. Maintain this contact while rotating the cup around its axis and simultaneously moving the cup down the rod until the cup passes over the lower end of the rod. This spiral-like motion will cause the compound to adhere along the rod leaving a conical void of compound in the cup and a compound coating having reproducible geometry on the inside of the cup.

Place the cup and the thermometer in the test tube and suspend the test tube in the oil bath with the oil level within 6 mm of the rim. If the cork holding the thermometer in the test tube has been properly chosen, the 76 mm immersion mark on the thermometer will coincide with the lower edge of the cork. The assembly should be immersed to this point.

Stir the oil bath and heat at a rate of 4 K/min to 7 K/min until the bath reaches a temperature approximately 17 °C below the expected drop-point of the compound. Then reduce the rate of heating so that the temperature in the test tube will be within 2 °C or less of the temperature in the oil bath before the oil bath temperature increases an additional 2.5 K.

Continue heating at a rate such that the difference between the temperature in the test tube and in the oil bath is maintained between 1 °C and 2 °C. This condition is established when the oil bath is heated at a rate of about 1 K/min to 1.5 K/min. As the temperature increases, material will gradually protrude through the orifice of the cup. When the first drop of material falls, note the temperature on the two thermometers.

4.2.3 Expression of results

Record the average of the two thermometers as the drop-point of the filling compound.

4.3 Method B

4.3.1 Apparatus

A chromium plated brass cup conforming to the dimensions shown in figure 3. The cup may be made from another suitable metal which is not affected by the compound being tested. The top of the cup and the bottom of the tube forming the orifice are smooth, parallel to each other, and at right angles to the axis of the cup. The wide part of the cup has an approximately hemispherical lower portion and an internal depth such that when a steel ball 7.0 mm in diameter is placed in the cup, the top of the ball is 12.2 ± 0.15 mm above the bottom of the tube forming the orifice. The bottom edge of the orifice should have neither chamfer nor radius.

A cylindrical metal sleeve, attached to the thermometer, and a metal case which screws to the sleeve, conforming to the dimensions shown in figures 4 and 5. The metal sleeve is fixed to the thermometer so that, when the metal case is screwed on to the sleeve, the bottom of the thermometer bulb is 8.0 ± 0.1 mm below the rim stop and the thermometer stem is coaxial with the sleeve and case. The thermometer is fixed to the sleeve with cement that is suitable for the temperature range of the thermometer.