BRITISH STANDARD

BS 6469 : Section 1.3 : 1992

Insulating and sheathing materials of electric cables

Part 1. Methods of test for general application

Section 1.3 Methods for determining the density — Water absorption tests — Shrinkage test

(Implementation of IID 505.1.3 S2)

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Cables and Insulation Standards Policy Committee (CIL/-) to Technical Committee CIL/20, upon which the following bodies were represented:

Aluminium Federation
Association of Consulting Engineers
Association of Manufacturers of Domestic Electrical Appliances
British Approvals Service for Cables
British Cable Makers' Confederation
British Plastics Federation
British Steel Industry
British Telecommunications plc
Department of the Environment (Property Services Agency)
Department of Trade and Industry (Consumer Safety Unit, CA Division)
Electricity Association
Engineering Equipment and Materials Users' Association
Institution of Electrical Engineers
London Regional Transport

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

British Railways Board
British Rubber Manufacturers' Association Ltd.
ERA Technology Ltd.
GAMBICA (BEAMA Ltd.)
Institution of Incorporated Executive Engineers
London Underground Ltd.
Queen Mary and Westfield College
Telecommunications Cables Group of BCMC

This British Standard, having been prepared under the direction of the Cables and Insulation Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on
15 August 1992

Amendments issued since publication

Amd. No.	Date	Text affected

The following BSI references relate to the work on this standard:
Committee reference CIL/20
Draft announced in *BSI News* December 1991

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Contents

National foreword

This Section of BS 6469 has been prepared under the direction of the Cables and Insulation Standards Policy Committee. BS 6469 : Parts 1 to 5 and Part 99 supersede BS 6469 : 1990 which is withdrawn.

Parts 1 to 5 implement CENELEC HD 505 : Parts 1 to 5 which were derived from IEC 811 : Parts 1 to 5. Part 99 describes test methods having national applicability only.

The International Electrotechnical Commission has completed its comprehensive update of the test methods previously given in IEC 538, IEC 538A and IEC 540, which are now largely brought together in IEC 811. Electrical tests from IEC 540 have been incorporated into IEC 885. The technical changes introduced during this update, and endorsed by CENELEC in HD 505, are now included in BS 6469.

BS 6469 : Section 4.2 includes a number of test methods described in BS 6234. Other test methods from BS 6234, from BS 6746 and from BS 6899 have been incorporated in BS 6469 : Part 99. The status of these test methods in BS 6234, BS 6746 and BS 6899 will be reviewed separately.

BS 6469 describes methods of test, but does not specify requirements for products or materials. These will be specified in the relevant cable standards or cable material standards.

This Section of BS 6469 implements CENELEC Harmonization Document HD 505.1.3 S2 : 1991, which was derived from IEC 811-1-3 : 1985 plus Amendment No. 1 (1990) plus Corrigendum 1986.

Definitions of terms relating to electric cables are given in BS 4727 : Part 2 : Group 08.

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

WARNING. The methods of test described in this British Standard do not necessarily detail all precautions necessary to meet the requirements of the Health and Safety at Work etc. Act 1974. Attention should be paid to any appropriate safety precautions and the tests should be carried out only by trained personnel.

The complete IEC standard (IEC 811) will eventually replace IEC Publications 538 and 540. To enable users to compare the relevant clauses in all three publications, a table of cross-references is given in appendix A.

Cross-references between the relevant clauses in BS 6469 : 1990 and those in BS 6469 : Parts 1 to 5 and Part 99 are given in table NA.1. Tests included in BS 6469 : Sections 1.3 and 5.1 which were not given in BS 6469 : 1990 are listed in table NB.1.

References to page numbers in the text relate to the IEC page numbers and should be ignored.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

HARMONIZATION DOCUMENT
DOCUMENT D'HARMONISATION
HARMONISIERUNGSDOKUMENT

HD 505.1.3 S2

April 1991

UDC 621.315.6 : 621.315.2 : 620.193.14

Descriptors: Electric cable, insulated cable, electrical insulation, sheath, density, water absorption test, shrinkage

English version

Common test methods for insulating and sheathing materials of electric cables

Part 1. Methods for general application

Section three — Methods for determining the density — Water absorption tests — Shrinkage test

(IEC 811-1-3 : 1985 + A1 : 1990)

Méthodes d'essais communes pour les matériaux d'isolation et de gainage des câbles électriques
Première partie: Méthodes d'application générale
Section trois: Méthodes de détermination de la masse volumique — Essais d'absorption d'eau — Essai de rétraction
(CEI 811-1-3 : 1985 + A1 : 1990)

Allgemeine Prüfungen für Isolier- und Mantelwerkstoffe für Kabel und isolierte Leitungen
Teil 1: Allgemeine Prüfverfahren
Hauptabschnitt 3: Prüfverfahren zur Dichtebestimmung — Wasseraufnahmeprüfungen — Schrumpfungsprüfung
(IEC 811-1-3 : 1985 + A1 : 1990)

This Harmonization Document was approved by CENELEC on 1991-03-15. 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 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, 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

Central Secretariat: rue de Stassart 35, B-1050 Brussels

Foreword

The CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 811-1-3 : 1985 and its Amendment 1 : 1990 could be accepted without textual changes, has shown that no CENELEC common modifications were necessary for the acceptance as Harmonization Document.

The reference document was submitted to the CENELEC members for formal vote and was approved by CENELEC as HD 505.1.3 S2 on 15 March 1991.

The following dates were fixed:

- latest date of announcement of the HD at national level (doa) 1991-09-01
- latest date of publication of a harmonized national standard (dop) 1992-03-01
- latest date of withdrawal of conflicting national standards (dow) 1992-03-01

For products which have complied with HD 505.1.3 S1 : 1988 before 1992-03-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1993-04-01.

Annexes designated 'normative' are part of the body of the standard. In this standard, annex ZA is normative.

CONTENTS

COMMON TEST METHODS FOR INSULATING AND SHEATHING MATERIALS OF ELECTRIC CABLES

Part 1: Methods for general application

SECTION THREE – METHODS FOR DETERMINING THE DENSITY – WATER ABSORPTION TESTS – SHRINKAGE TEST

1. Scope

This standard specifies the test methods to be used for testing polymeric insulating and sheathing materials of electric cables for power distribution and telecommunications including cables used on ships.

This Section Three of Part 1 gives the methods for determining the density, water absorption tests and shrinkage test which apply to the most common types of insulating and sheathing compounds (elastomeric, PVC, PE, PP, etc.).

2. Test values

Full test conditions (such as temperatures, durations, etc.) and full test requirements are not specified in this standard; it is intended that they should be specified by the standard dealing with the relevant type of cable.

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 specified for the most common types of insulating and sheathing compounds and of cables, wires and cords.

4. Type tests and other tests

The test methods described in this standard are intended, in the first instance, to be used for type tests. In certain tests, where there are essential differences between the conditions for type tests and those for more frequent tests, such as routine tests, these differences are indicated.

Note. – For multicore cables and cords, not more than three cores (of different colours, if any) need be tested unless otherwise specified in the relevant cable standard.

5. Pre-conditioning

All the tests shall be carried out not less than 16 h after the extrusion or vulcanization (or cross-linking), if any, of the insulating or sheathing compounds.

6. Test temperature

Unless otherwise specified, tests shall be carried out at room temperature.

Note. – In the UK room temperature is defined as 20 ± 5 °C.

7. **Median value**

When several test results have been obtained and ordered in an increasing or decreasing succession, the median value is the middle value if the number of available values is odd, and is the mean of the two middle values if the number is even.

8. **Methods for determining the density**

8.1 *Suspension method (general method)*

8.1.1 *Testing equipment*

- Ethanol (ethyl-alcohol) of analytical grade or another suitable liquid for densities below 1 g/ml.
- Zinc chloride solution for densities equal to or greater than 1 g/ml.
- Distilled water.
- Mixing cylinder.
- Thermostat.
- Hydrometer calibrated at 23 °C.
- Thermometer graduated in tenths of a degree Celsius.

8.1.2 *Procedure*

8.1.2.1 From the insulation or the sheath to be tested, a sample shall be taken perpendicularly to the conductor axis and cut into small pieces of 1 mm to 2 mm edge length. The density shall be determined by putting the sample in suspension in a liquid which does not react with the material to be tested.

The following liquids are suitable:

- for a density expected to be lower than 1 g/ml, a mixture of ethanol and water;
- for a density of 1 g/ml and higher, a mixture of zinc chloride and water.

8.1.2.2 Three pieces of the sample shall be placed in the liquid at a temperature of 23 ± 0.1 °C, avoiding any formation of air bubbles. Distilled water shall be added to the liquid until the pieces are freely suspended within the liquid in the mixing cylinder. The liquid mixture shall be homogeneous and maintained at the indicated temperature.

The density of the liquid mixture shall be determined by means of the hydrometer and indicated to three decimal places; the determined density is the same as that of the samples under test.

Note. — The ASTM-D 1505 method, "Density of plastics — gradient technique", works according to the same principle and may also be used.

8.2 *Pycnometer method (reference method)*

8.2.1 *Apparatus*

The apparatus for this method consists of:

- a balance with a precision of 0.1 mg;
- a pycnometer of 50 ml capacity;
- a liquid bath provided with a thermostatic control.

8.2.2 *Test piece*

The test piece shall be taken from the bare insulation or sheath. The mass of the test piece shall be not less than 1 g and not greater than 5 g. The test piece shall be made by cutting the sample of insulation or sheath into a number of small pieces; small tubes of insulation and sheath shall be cut longitudinally into two or more parts to prevent the enclosure of air bubbles.

8.2.3 *Conditioning*

The test pieces shall be at an ambient temperature of 23 ± 2 °C.

8.2.4 *Procedure*

After weighing the pycnometer empty and dry, a suitable quantity of the test piece shall be weighed in the pycnometer. The test piece shall be covered with the immersion liquid (alcohol, 96%) and all air removed from the test piece by, for example, applying a vacuum to the pycnometer standing in a desiccator. Any vacuum applied shall be broken and the pycnometer filled with immersion liquid which shall be brought to a temperature of 23 ± 0.5 °C in a liquid bath, the pycnometer being filled to the limits of its capacity. The pycnometer shall be wiped dry and weighed with its contents, after which it shall be emptied and filled with immersion liquid. Air shall be removed and the weight of the pycnometer and its contents determined at a temperature of 23 ± 0.5 °C.

8.2.5 *Calculation*

The density of the insulation and sheath shall be calculated as follows:

$$\text{density at 23 °C} = \frac{m}{m_1 - m_2} \times d$$

where:

m is the mass of test piece, in grams

m_1 is the mass of liquid required to fill the pycnometer, in grams

m_2 is the mass of liquid required to fill the pycnometer, when containing the test piece, in grams

d is the density of immersion liquid at 23 °C with ethanol at 96%, d = 0.7988 g/ml at 23 °C

8.3 *Correction for filled polyethylene (PE)*

Antioxidants and organic coloured pigments which are normally used in negligible quantities may be neglected. However, where other additives such as mineral fillers are used in considerable quantities an appropriate correction shall be made. This shall be done by determining the nature and quantity of the additive by reputable chemical means using the formula:

$$\delta = \frac{m \times \delta c \times \delta F}{m_c \times \delta F - m_F \times \delta c}$$

where:

δ is the density of the PE (corrected value), in g/cm³

δc is the measured density of PE compound, in g/cm³

δF is the density of additive or filler (measured value), in g/cm³

m is the mass of PE polymer (difference of m_c and m_F,) in grams

m_c is the mass of PE compound (measured value), in grams

m_F is the mass of filler (measured value), in grams

For compounds containing carbon black the correction is made by means of the following simplified formula:

$$\delta = \delta c - 0.0045 \times c_B$$

where:

c_B is the numerical value of the percentage of carbon black

9. Water absorption tests

9.1 *Electrical test*

9.1.1 *Test equipment*

- A.C. and d.c. voltage sources.
- Voltmeter.
- Water bath with heating equipment.

9.1.2 *Preparation of test pieces*

The cores to be tested shall be removed from a sample of cable approximately 3 m long. Care shall be taken to avoid damage to the insulation during removal of the cores.

9.1.3 *Test procedure*

a) Pre-test

The cores shall be immersed in a water-bath in which the water has been heated to the temperature specified in the standard for the type of cable.

The ends of the cores shall protrude sufficiently above the water level to prevent damage due to leakage current along the surface of the cores when the required voltage is applied between the conductors and the water.

After the cores have been immersed in the water for 1 h, an a.c. voltage of 4 kV shall be applied between the conductors and the water for 5 min. If any sample of core breaks down it shall be removed from the water-bath and not used in the main test specified in Item *b)* below. However, the test shall be repeated not more than twice, by taking another sample of the same core, which shall be subjected to the same pre-test.

The object of the pre-test is to ensure that only undamaged cores are used for the main test.

b) Main test

Cores which are satisfactory on the pre-test shall remain in the water-bath with the water still maintained at the temperature specified in the relevant standard.

A d.c. voltage in accordance with the table below shall be applied between the conductors and the water for the time specified in the standard for the type of cable, the negative pole being connected to the conductor of each test piece.

Thickness t of insulation specified Mean value (mm)	D.C. voltage (V)
0.8 and 0.9	800
1.0 and 1.2	1 000
$1.2 < t \leq 1.6$	1 400
$1.6 < t \leq 2.0$	2 000
$2.0 < t$	2 500

9.1.4 *Evaluation of results*

No breakdown shall occur.

9.2 *Gravimetric water absorption test*

9.2.1 *Preparation of test piece*

a) For cables with conductors of nominal cross-sectional area equal to or less than 25 mm^2 and rated voltage up to and including 0.6/1 kV:

Each test piece shall be a piece of core approximately 300 mm in length.

b) For all other cables:

Slices of 0.6 mm to 0.9 mm thickness shall be ground or cut in the insulation with surfaces approximately parallel and free from roughness.

Test pieces 80 mm to 100 mm long and 4 mm to 5 mm wide shall be punched out of the slices.

c) Two test pieces shall be prepared from each core to be tested.

9.2.2 *Testing procedure*

a) For test pieces as in Item *a)* of Sub-clause 9.2.1:

Clean the surface of the test piece by rubbing with a filter paper moistened with water.

Allow the test piece to dry at 70 ± 2 °C to constant weight. It may also be allowed to dry by placing it for 24 h in a low-pressure oven at not more than 6.6 mbar and 70 ± 2 °C. Cool the sampler in a desiccator.

Weigh the test piece to within 0.1 mg. Let M1 be the mass in milligrams.

Wind the test piece around a mandrel whose diameter is at least six to eight times that of the test piece so as to bend it to a U shape and force the ends through apertures bored in the cover of a suitable glass vessel. Only the two test pieces of the same core should be in the glass vessel.

Adjust the position of the test piece such that 250 mm of its length is immersed when the vessel is filled with water up to the edge of the fitted cover.

Use preboiled distilled water.

Allow the test piece to remain at the temperature and for the time specified in the product standard or, if this time is not specified, for two weeks for specified thicknesses up to 1.0 mm, three weeks for thicknesses between 1.1 mm and 1.5 mm, and four weeks for thicknesses above 1.5 mm. The water level shall be maintained up to the inside surface of the cover.

Now allow the water to cool to ambient temperature. Remove the test piece and shake off any drops of water adhering to it, wipe lightly with a filter paper and weigh to the nearest milligram within 2 min to 3 min of its being removed from the water. Let M2 be the new mass in milligrams.

Finally, dry out the test piece under the same conditions as were used before immersion, i.e. using whichever of the two alternative methods described above had been used before the first weighing. Let M3 be the final mass in milligrams.

b) For test pieces as in Item *b)* of Sub-clause 9.2.1:

The test pieces, with thoroughly cleaned surfaces, shall be heated at 70 ± 2 °C under vacuum (residual pressure close to 1 mbar) for 72 h. Materials of substantially different compositions shall not be treated in the same cell or oven at the same time.

After this treatment, the test pieces shall be cooled for 1 h in a desiccator and weighed to the nearest 0.1 mg (mass M1).

The test pieces shall then be immersed in deionized (or distilled) water at the temperature and for the time specified in the standard for the type of cable. Each test piece shall be completely immersed in a separate glass to be equipped with a condenser, or in a beaker covered with a glass lid.

If a condenser is used, its upper part shall be covered with aluminium foil to prevent any contamination.

After the time specified in the standard for the type of cable, or after 14 days if the time is not specified in the cable standard, the test pieces shall be transferred into deionized (or distilled) water at room temperature and kept there to cool. Then each test piece shall be removed from the water, shaken to detach any adherent drops, dried with special filter paper leaving no fibres, and weighed to the nearest 0.1 mg (mass M2). Finally the test piece shall be treated under the same conditions as were used before immersion. Let M3 be the final mass in milligrams.

9.2.3 *Expression of results*

a) The mass variation in milligrams shall be calculated from one of the following formulae:

i) if the final mass M3 is less than M1:

$$(M2 - M3)/A$$

ii) if the final mass M3 is greater than M1:

$$(M2 - M1)/A$$

where A is, for test pieces as in Item *a)* of Sub-clause 9.2.1, the surface area in square centimetres of the 250 mm long immersed portion of sample, and, for test pieces as in Item *b)* of Sub-clause 9.2.1, the total surface area of the immersed test piece in square centimetres.

b) The mean value of the mass variation of the two test pieces shall be recorded as the value for the core.

10. Shrinkage test

10.1 *Sampling*

One sample about 1.5 L mm in length of each core to be tested shall be taken at least 0.5 m away from the end of the cable length.

L is the length given in the relevant cable standard.

Note. – Unless given in the relevant cable standard, $L = 200$ mm.

10.2 *Preparation of test pieces*

All coverings, except adherent, extruded semi-conducting screens, if any, shall be removed from the samples of insulated conductor without delay.

Within an interval of not more than 5 min from the time of cutting the samples, a test length of $L \pm 5$ mm shall be marked on the middle part of each piece of core. The distance between the marks shall be measured to an accuracy of 0.5 mm. Each test piece shall then be prepared by cutting and removing the insulation from both ends of each sample up to positions between 2 mm and 5 mm away from the marks.

10.3 *Procedure*

The test pieces shall be supported horizontally in an air oven by the bare ends of conductors or on the surface of a talc bath, to permit free movement of the insulation. They shall be heated at the temperature and for the time specified in the standard for the type of cable.

The test pieces shall then be allowed to cool in air to room temperature and the distance between the two marks on each piece measured again to the nearest 0.5 mm.

10.4 *Expression of results*

The difference between the distances between the marks before the heat treatment and after the heating and cooling shall be recorded as a percentage of the distance between the marks before the treatment.

APPENDIX A

CORRESPONDING CLAUSES AND SUB-CLAUSES IN IEC PUBLICATIONS 538 AND 540 AND IEC PUBLICATION 811

A1. Corresponding clauses or sub-clauses in IEC Publications 538 and 811

Heading of clause in Publication 538*	538	811		
	Clause or sub-clause	Part	Section	Clause or sub-clause
General	1	All	All	1 to 7
Mechanical properties of insulation	2	1	1	9.1
Mechanical properties of sheath	3	1	1	9.2
Melt flow index (MFI)	4	4	1	10
Density	5	1	3	8
Ageing test for insulation and sheath	6.1	1	2	8
Shrinkage test for insulation	6.2	1	3	10
Bending test at low temperature				
insulation	6.3.1	1	4	8.1
sheath	6.3.2	1	4	8.2
Carbon black and/or mineral filler content	7	4	1	11
Measurement of thicknesses and diameters	App. A	1	1	8
Melt flow index	App. B	4	1	10
Heading of clause in Publication 538A**	**538A**	**811**		
	Clause	Part	Section	Clause
Wrapping test after thermal ageing in air	1	4	1	9
Resistance to environmental stress cracking	2	4	1	8

* Publication 538: Electric Cables, Wires and Cords: Methods of Test for Polyethylene Insulation and Sheath.

** Publication 538A: First Supplement to Publication 538 (1976): Additional Methods of Test for Polyethylene Insulation and Sheath of Electric Cables, Wires and Cords Used in Telecommunication Equipment and in Devices Employing Similar Techniques.

A2. Corresponding clauses in I E C Publications 540, 811 and 885 *

Heading of clause in Publication 540 *	540	811			885
	Clause	Part	Section	Clause	Part
Partial discharge tests	3	–	–	–	2
Measurement of thicknesses and diameters **	4	1	1	8	–
Tests for determining the mechanical properties of insulating and sheathing compounds	5	1	1	9	–
Thermal ageing methods	6	1	2	8	–
Loss of mass test for PVC insulations and sheaths	7	3	2	8	–
Pressure test at high temperature for PVC insulations and sheaths	8	3	1	8	–
Tests at low temperature for PVC insulations and sheaths	9	1	4	8	–
Tests for resistance of PVC insulations and sheaths to cracking	10	3	1	9	–
Method for determining the density of elastomeric and thermoplastic compounds	11	1	3	8	–
Measurement of the melt flow index of thermoplastic polyethylene	12	4	1	10	–
Ozone resistance test	13	2	1	8	–
Hot set test	14	2	1	9	–
Mineral oil immersion test for elastomeric sheaths	15	2	1	10	–
Electrical tests for cables, cords and wires for voltages up to and including 450/750 V	16	–	–	–	1
Thermal stability of PVC insulations and sheaths	17	3	2	9	–
Carbon black and/or mineral filler content in PE	18	4	1	11	–
Water absorption tests	19	1	3	9	–
Shrinkage test	20	1	3	10	–

* Publication 540: Test Methods for Insulations and Sheaths of Electric Cables and Cords (Elastomeric and Thermoplastic Compounds).
Publication 885: Electrical Test Methods for Electric Cables.

** Technically not identical.

ANNEX ZA (normative)

OTHER INTERNATIONAL PUBLICATIONS QUOTED IN THIS STANDARD WITH THE REFERENCES OF THE RELEVANT EUROPEAN PUBLICATIONS

IEC Publication	Date	Title	EN/HD	Date
538	1976	Electric cables, wires and cords: Methods of test for polyethylene insulation and sheath	–	–
538A	1980	First supplement: Additional methods of test for polyethylene insulation and sheath of electric cables, wires and cords used in telecommunication equipment and in devices employing similar techniques	–	–
540	1982	Test methods for insulations and sheaths of electric cables and cords (elastomeric thermoplastic compounds)	HD 385 S2	1986

National annex NA (informative)

Table NA.1. Corresponding clauses or sub-clauses in BS 6469 : 1990 and BS 6469 : 1992

Clause in BS 6469 : 1990	BS 6469 : 1990	BS 6469 : 1992		
	Clause or sub-clause	Part	Section	Clause or sub-clause
General	1.1 to 1.3	1 to 4 and 99 5	All 5.1	1 to 7 1 to 3
Measurement of thickness and diameters	2.1	1	1.1	8
Determination of tensile strength and elongation at break	2.2	1	1.1	9
Thermal ageing methods	2.3	1	1.2	8
Methods for determining density	2.4	1	1.3	8
Shrinkage test	2.5	1	1.3	10
Gravimetric water absorption test	2.6	1	1.3	9.2
Green/yellow proportions	2.7	99	99.1	8
Mineral oil immersion test	3.1	2	2.1	10
Ozone resistance test	3.2	2	2.1	8
Hot set test	3.3	2	2.1	9
Tear resistance	3.4	99	99.1	9
Loss of mass tests	4.1	3	3.2	8
Pressure tests at high temperature	4.2	3	3.1	8
Tests at low temperature	4.3	1	1.4	8
Tests for resistance to cracking	4.4	3	3.1	9
Hot deformation test	4.5	99	99.1	10
Thermal stability test for insulations and sheaths	4.6	3	3.2	9
Determination of melt flow index (MFI)	5.1	4	4.1	10
Test for resistance to environmental stress cracking: Original granules	5.2.2	4	4.1	8
Test for resistance to environmental stress cracking: Complete cable	5.2.3	99	99.1	11
Carbon black content	5.3.2	4	4.1	11
Carbon black dispersion[1)]	5.3.3	–	–	–
Wrapping test after thermal ageing[2)]	5.4	4 4	4.1 4.2	9 10

[1)] Methods given in BS 2782 : Methods 823A or 823B.

[2)] It is intended that a formal proposal to IEC will result in the test in clause 9 of Section 4.1 being withdrawn.

National annex NB (informative)

Table NB.1. Tests included in BS 6469 : 1992 not previously covered

Test	Part	Section	Clause
Water absorption test: electrical	1	1.3	9.1
Tests specific to filling compounds:			
Drop-point	5	5.1	4
Separation of oil	5	5.1	5
Low temperature brittleness	5	5.1	6
Total acid number	5	5.1	7
Absence of corrosive components	5	5.1	8
Permittivity at 23 °C	5	5.1	9
D.C. resistivity at 23 °C and 100 °C	5	5.1	10
Determination of linear swell after ageing in oil	99	99.1	12
Alternative ozone resistance test method (low concentration)	99	99.1	13
Method of test for insulation resistance constant (K value)	99	99.2	8
Method of test for power factor and permittivity	99	99.2	9
Water absorption determined by the capacitance method	99	99.2	10

BS 6469 : Section 1.3 : 1992

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