BRITISH STANDARD

BS 6469 :
Section 2.1 :
1992

Insulating and sheathing materials of electric cables

Part 2. Methods of test specific to elastomeric compounds

Section 2.1 Ozone resistance test — Hot set test — Mineral oil immersion test

(Implementation of HD 505.2.1 S1)

BSI
STANDARDS

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

The following BSI references relate to the work on this standard:
Committee reference CIL/20
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Amendments issued since publication

Amd. No.	Date	Text affected

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 BS 6469 : Parts 1 to 5 and Part 99 supersede BS 6469 : 1990 which is withdrawn.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 505.2.1 S1 : 1988, which is identical with IEC 811-2-1 : 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 NB.1. Tests included in BS 6469 : Sections 1.3 and 5.1 which were not given in BS 6469 : 1990 are listed in table NC.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 505.2.1 S1

March 1988

UDC 621.315.6 : 621.315.2 : 620.193.4

Descriptors: Electric cable, insulated cable, electrical insulation, sheath, insulation, test, chemical resistance, ozone, oil immersion test

English version

Common test methods for insulating and sheathing materials of electric cables

Part 2. Methods specific to elastomeric compounds

Section one — Ozone resistance test — Hot set test — Mineral oil immersion test

(IEC 811-2-1 : 1986)

Méthodes d'essais communes pour les matériaux d'isolation et de gainage des câbles électriques
Deuxième partie: Méthodes spécifiques pour les mélanges élastomères
Section un: Essai de résistance à l'ozone. Essai d'allongement à chaud. Essai de résistance à l'huile
(CEI 811-2-1 : 1986)

Allgemeine Prüfungen für Isolier- und Mantelwerkstoffe für Kabel und isolierte Leitungen
Teil 2: Besondere Methoden für Elastomere Compounds
Hauptabschnitt 1: Prüfung der Ozonbeständigkeit — Wärmedehnungsprüfung — Olbeständigkeitsprüfung
(IEC 811-2-1 : 1986)

This Harmonization Document was approved by CENELEC on 1988-03-01. 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 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 English and French versions of this Harmonization Document are provided by the text of the IEC publication and the German version is the official translation of the IEC text.

According to the CENELEC Internal Regulations the CENELEC member National Committees are bound:

to announce the existence of this Harmonization Document at national level by or before 1988-09-01

to publish their new harmonized national standard by or before 1989-03-01

to withdraw all conflicting national standards by or before 1989-03-01.

Harmonized national standards are listed on the HD information sheet, which is available from the CENELEC National Committees or from the CENELEC Central Secretariat.

CONTENTS

COMMON TEST METHODS FOR INSULATING AND SHEATHING MATERIALS OF ELECTRIC CABLES

Part 2: Methods specific to elastomeric compounds

SECTION ONE — OZONE RESISTANCE TEST
HOT SET TEST — MINERAL OIL IMMERSION TEST

1. Scope

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

This Section One of Part 2 gives the methods for the ozone resistance test, hot set test and mineral oil immersion test, which apply to elastomeric compounds.

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 made at ambient temperature.

Note. – In the UK ambient 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. Ozone resistance test

Warning: Attention is drawn to the toxicity of ozone. Precautions should be taken to minimize exposure of personnel to it at all times and the concentration in the workroom environment should not be allowed to exceed 0.1 ppm (parts ozone per million parts air by volume), or the value in the current industrial hygienic standard, whichever is the lower.

Note. – An alternative test method for ozone resistance is given in clause 13 of Section 99.1 of this Standard. The alternative method is recognized in CENELEC Harmonization Document HD 22.2 S2 as being of equal severity to that given in 8.1.

8.1 *Test method*

8.1.1 *Test apparatus*

a) A device for generating a controlled amount of ozone.

b) A means for circulating ozonized air under controlled conditions of humidity and temperature through a chamber containing the specimens to be tested.

c) A means for determining the percentage of ozone concentration.

8.1.2 *Sampling*

Whether the cable is single or multicore, only one core need be tested. Sufficient length of core shall be cut from a position not less than 1.5 m from the end of the length of cable to provide two test pieces, unless the core has an extruded semi-conductor layer on the outside, in which case sufficient for four test pieces shall be taken.

8.1.3 *Preparation of test pieces*

Any protective coverings present on the core shall be removed, unless they were applied directly to the insulation prior to vulcanization and are adherent to it, without damaging the insulation.

If the core has a semi-conducting layer in the form of tape on the outside, this shall be removed.

If the core has an extruded semi-conducting screen on the outside, this shall be removed from two test pieces and left in position on the other two.

8.1.4 *Bending of test pieces*

If the core does not have an extruded semi-conducting screen, one test piece shall be bent in the direction and plane of its existing curvature, without twisting, for one complete turn around a mandrel and bound with twine or tape where the ends cross, and a second test piece of the same core shall be bent similarly in the plane of its existing curvature but in the opposite direction.

If the core as manufactured has an extruded core screen, two test pieces, one with the semi-conducting layer removed and one with the semi-conducting layer left in position, shall be bent, as above, in each direction.

The bending shall be carried out at room temperature or 20 °C, whichever is higher, using a brass, aluminium or suitably treated wooden mandrel having the following diameter:

Outside diameter of insulated core d (mm)	Mandrel diameter (as a multiple of the outside diameter of insulated core)
$d \leqslant 12.5$	4
$12.5 < d \leqslant 20$	5
$20 < d \leqslant 30$	6
$30 < d \leqslant 45$	8
$45 < d$	10

If the test piece is too rigid to permit the ends to be crossed, it shall be bent and tied so that at least a 180° bend round a mandrel of the specified diameter is obtained.

8.1.5 *Conditioning of test pieces*

The surface of each test piece shall be wiped with a clean cloth to remove dirt or moisture. The bent test pieces on their mandrels shall be kept in air at ambient temperature without any further treatment for 30 min to 45 min before being tested.

8.1.6 *Exposure to ozone*

The conditioned test pieces shall be exposed in a chamber fitted with a test cock and maintained at a temperature of 25 ± 2 °C, to a circulating current of dry air having an ozone concentration as specified for the insulating compound in the standard for the type of cable for the period specified in the cable standard. The air flow shall be between 280 litres/h and 560 litres/h, and the air pressure shall be maintained slightly above atmospheric pressure.

8.1.7 *Evaluation of results*

After the specified test duration, the test pieces shall be removed from the test chamber and, when examined with normal or corrected vision without magnification, the insulation in the 180° section of the bent portion furthest from the tie shall be free from cracks.

8.2 *Determination of ozone concentration*

8.2.1 *Chemical analysis*

8.2.1.1 *Reagents*

The reagents shall be of a recognized analytical reagent quality.

Distilled water shall be used throughout the test.

a) Starch indicator solution: 1 g of soluble starch shall be stirred into 40 ml of cold water and heated to boiling point with constant stirring until the starch is completely dissolved. This solution shall be diluted with cold water to about 200 ml and 2 g of crystallized zinc chloride added. The solution shall be allowed to settle and the supernatant liquid poured off for use. In keeping for periodic use, the solution shall be renewed every two or three days.

Alternatively, a fresh solution of 1 g of soluble starch in 100 ml of boiling water may be prepared.

When either of these starch solutions is used as indicator, a few drops of 10% acetic acid shall be added to the solution being titrated.

b) Standard iodine solution: 2 g of potassium iodide (KI) and 10 ml of water shall be placed in a weighing tube, which shall then be weighed. Iodine shall be added directly to the solution in the tube on the balance pan until the total iodine in solution is about 0.1 g. The solution with the added iodine shall be accurately weighed and the amount of added iodine determined. The solution shall then be poured into a beaker; the weighing tube, held over the beaker, shall be washed with water. The solution shall be poured from the beaker into a flask calibrated at 1 000 ml, the beaker rinsed with water into the flask and the solution in the flask diluted to 1 000 ml.

Note. — This solution is fairly stable if kept in a cool dark place in a well-stoppered brown bottle.

c) Sodium thiosulphate solution: Sodium thiosulphate ($Na_2S_2O_3$) solution of approximately the same strength as the standard iodine solution shall be prepared by placing about 0.24 g of $Na_2S_2O_3$ in a 1 000 ml flask and diluting to 1 000 ml. Since it gradually loses its strength, the solution shall be standardized against the iodine solution on the day of the ozone test.

The strength E of the $Na_2S_2O_3$ solution, calculated as iodine equivalence and expressed as milligrams of iodine per millilitre of the solution, is:

$$\frac{F \times C}{S}$$

where:

F is the volume of the iodine solution in millilitres

C is the concentration of iodine in milligrams per millilitre

S is the volume of the $Na_2S_2O_3$ solution used to titrate the solution

Note. – The quantities of sodium thiosulphate given are related to use of the pentahydrate, $Na_2S_2O_3.5H_2O$. Use of the pentahydrate does not obviate the requirement for standardization against iodine solution.

d) Potassium iodide solution: about 20 g of pure KI shall be dissolved in 2 000 ml of water.

e) Acetic acid: a 10% solution (by volume) shall be prepared.

8.2.1.2 *Procedure*

A measured volume of the air containing ozone shall be bubbled from the test chamber through the KI solution, or a measured volume of the air containing ozone shall be collected and mixed with the KI solution by a suitable means.

Two alternative methods which may be employed are:

a) A sampling bottle containing 100 ml of KI solution is connected to the sampling cock of the test chamber on one side and to a 500 ml gas burette on the other. The glass tube connecting the sampling bottle to the sampling cock of the gas chamber reaches well below the level of the KI solution in the sampling bottle. The two-way stop-cock on the burette is opened to the atmosphere and the burette filled to its full mark with water by lifting the aspirator connected to the bottom of the burette. The stop-cock on the burette is then closed to the atmosphere and opened to the sampling bottle and the sampling cock on the test chamber is opened to the sampling bottle. The aspirator is then lowered until the water is emptied from the burette. When this point is reached, 500 ml of the gas from the test chamber will have bubbled through the KI solution. The stop-cocks are then closed and the bottle withdrawn for titration.

b) A separating funnel of 400 ml capacity is filled with the KI solution and connected to the test cock of the test chamber. The test cock and the stop-cock on the bottom of the separating funnel are opened simultaneously until about 200 ml of the KI solution have drained into a graduated cylinder placed below it. The test cock and stop-cock are quickly closed and the separating funnel, which then contains a volume of gas equal to the difference between 400 ml and the volume of KI solution in the measuring cylinder, is removed and stoppered. The separating funnel shall be shaken to produce complete reaction with the KI solution. The solution in the graduated cylinder shall be tested with a starch indicator for the presence of free iodine and if any is detected, the gas sample shall be rejected and another collected.

The KI solution which has reacted with a known volume of gas from the test chamber, by whatever method adopted, shall be titrated with the standardized $Na_2S_2O_3$ solution using the starch indicator.

8.2.1.3 *Calculation*

Since 1 mg of iodine is equivalent to 0.1 ml of ozone at room temperature and pressure (within the accuracy of this method of analysis at average room temperature and pressure), the ozone concentration can be calculated as follows:

$$\text{ozone \% by volume} = \frac{10.S.E}{V}$$

where:

S is the volume of the $Na_2S_2O_3$ solution used to titrate the solution in millilitres
E is the iodine equivalent of the $Na_2S_2O_3$ solution in milligrams of iodine per millilitres of $Na_2S_2O_3$
V is the volume of the gas sample collected in millilitres

8.2.2 *Direct measurement with an ozonometer*

As an alternative to the chemical analysis, the ozone concentration may be measured directly with an ozonometer, which has been calibrated by comparison with results obtained by the chemical method.

9. Hot set test

9.1 *Sampling and preparation of test pieces and determination of their cross-sectional area*

Two test pieces of sheath and of insulation from each core, after they have been prepared and their cross-sectional areas measured, as specified in the test method in Clause 3 of IEC Publication 811-1-1: Common Test Methods for Insulating and Sheathing Materials of Electric Cables, Part 1: Methods for General Application. Section One — Measurement of Thickness and Overall Dimensions — Tests for Determining the Mechanical Properties, shall be used for the test. When these test pieces are dumb-bell test pieces, not less than 0.8 mm and not more than 2.0 mm thick, they shall be prepared from the inner part of the sheathing and of the insulating wall after any ridges and/or semi-conducting layers have been removed.

9.2 *Test apparatus*

a) The test shall be carried out in an oven, as specified in Sub-clause 8.1 of IEC Publication 811-1-2: Common Test Methods for Insulation and Sheathing Materials of Electric Cables. Part 1: Methods for General Application. Section Two — Thermal Ageing Methods, maintained at the temperature specified for the material in the cable standard.

b) Grips shall be provided, such that each test piece can be suspended from an upper grip in the oven and weights attached to a lower grip attached to the test piece.

Note. — Testing tubular test pieces, fixing of the grips should not cause an air-tight sealing of both ends. This can be achieved by any appropriate means, for instance by inserting at least on one end a short piece of metal pin, having slightly smaller dimensions than those of the innerside of the test piece.

9.3 *Procedure*

a) The test piece shall be suspended in the oven and weights attached to the bottom jaws to exert a force of the value specified for the material in the standard for the type of cable.

b) After 15 min in the oven at the temperature specified for the material in the cable standard, the distance between the marker lines shall be measured and the percentage elongation calculated. If the oven does not have a window and the oven door has to be opened to make the measurement, the measurement shall be made not more than 30 s after opening the door.

In case of dispute the test shall be carried out in an oven with a window and the measurement made without opening the door.

c) The tensile force shall then be removed from the test piece (by cutting the test piece at the lower grip), and the test piece left to recover for 5 min at the specified temperature.

The test pieces shall then be removed from the oven and allowed to cool slowly to ambient temperature, after which the distance between the marker lines shall be measured again.

9.4 *Evaluation of results*

a) The median value of the elongation, after 15 min at the specified temperature, with the weight attached, shall not exceed the value specified in the standard for the type of cable.

b) The median value of the distance between the marker lines after removing the test piece from the oven and allowing it to cool shall not have increased from the value before inserting the test piece in the oven by more than the percentage specified in the standard for the type of cable.

Note. – The results of this test may be adversely affected by surface imperfections of the test piece caused by inadequate care in preparation. The quality and sharpness of the edges and dimensional accuracy of the dumb-bell cutter should be regularly checked. In the case of tubular samples, extreme care should be exercised in the removal of conductors.

10. Mineral oil immersion test for sheaths

10.1 *Sampling and preparation of the test pieces*

Five test pieces shall be prepared in accordance with the procedures described in Sub-clauses 9.2.2 and 9.2.3 of IEC Publication 811-1-1.

10.2 *Determination of the cross-sectional area of the test piece*

See test method in Sub-clause 9.2.4 of IEC Publication 811-1-1.

10.3 *Oil to be used*

Unless otherwise agreed, the mineral oil to be used shall be ASTM No. 2 oil having the following characteristics:

- aniline point 93 ± 3 °C
- kinematic viscosity at 100 °C 20 ± 1 centistokes*
- flash-point 245 ± 6 °C

10.4 *Procedure*

The test pieces shall be immersed in the oil bath, previously heated to the specified test temperature, and shall be maintained in the oil at that temperature for the specified time (see standard for the type of cable).

At the end of the specific duration, the test pieces shall be removed from the oil, blotted lightly to remove excess oil and suspended in air at ambient temperature for at least 16 h.

10.5 *Determination of mechanical properties*

See test method in Sub-clauses 9.1.6 and 9.1.7 of IEC Publication 811-1-1.

10.6 *Expression of results*

The calculation of tensile strength shall be based on the area of the test piece measured before immersion (see Sub-clause 10.2).

The difference between the median value obtained of the five test pieces immersed in oil and the median value of the values obtained for the untreated test pieces (see IEC Publication 811-1-1, Sub-clause 9.1.2), expressed as a percentage of the latter, shall not exceed the percentage specified in the standard for the type of cable.

* Or 100 ± 5 s (Saybold Universal).

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	Appendix A	1	1	8
Melt flow index	Appendix B	4	1	10
Heading of clause in Publication 538A**	**538A**	**811**		
	Clause or Sub-clause	Part	Section	Clause or Sub-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 IEC Publications 540 and 811

Heading of clause in Publication 540*	540	811		
	Clause	Part	Section	Clause
Partial discharge tests	3	—	—	—
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	9
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	—	—	—
Thermal stability of PVC insulations and sheaths	17	3	2	9
Carbon black and/or mineral filler content measurement 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).

** Technically not identical.

National annex NA (informative)

Cross-references

Publication referred to	Corresponding British Standard
	BS 6469 Insulating and sheathing materials of electric cables
IEC 811-1-1 : 1985	Section 1.1 : 1992 Measurement of thickness and overall dimensions — Tests for determining the mechanical properties
IEC 811-1-2 : 1985	Section 1.2 : 1992 Thermal ageing methods

The Technical Committee has reviewed the provisions of IEC 538, 538A and 540, to which reference is made in the text, and has decided that they are acceptable for use in conjuction with this standard.

National annex NB (informative)

Table NB.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 NC (informative)

Table NC.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

BSI — British Standards Institution

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A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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