BRITISH STANDARD

BS 6469 :
Section 3.1 :
1992

Insulating and sheathing materials of electric cables

Part 3. Methods of test specific to PVC compounds

Section 3.1 Pressure test at high temperature — Tests for resistance to cracking

(Implementation of HD 505.3.1 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
Draft announced in *BSI News* December 1991

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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 BS 6469 : Parts 1 to 5 and Part 99 supersede BS 6469 : 1990 which is withdrawn.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 505.3.1 S1 : 1988, which is identical with IEC 811-3-1 : 1985 plus Corrigendum 1986.

National recommendations have been added to clause 8.1.5, in order to preclude the effects of vibration on the pressure test at high temperature for insulations and sheaths.

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 505.3.1 S1

March 1988

UDC 621.315.61 : 621.315 : 620.193.94

Descriptors: Electric cable, insulated cable, electrical insulation, sheath, pressure test, high temperature test, resistance to cracking

English version

Common test methods for insulating and sheathing materials of electric cables

Part 3. Methods specific to PVC compounds

Section one — Pressure test at high temperature — Tests for resistance to cracking

(IEC 811-3-1 : 1985)

Méthodes d'essais communes pour les matériaux d'isolation et de gainage des câbles électriques
Troisième partie: Méthodes spécifiques pour les mélanges PVC
Section un: Essai de pression à température élevée — Essais de résistance à la fissuration
(CEI 811-3-1 : 1985)

Allgemeine Prüfungen für Isolier- und Mantelwerkstoffe für Kabel und isolierte Leitungen
Teil 3: Methoden für PVC-Compounds
Hauptabschnitt 1: Wärmedruckprüfung. Prüfung der Rißbeständigkeit
(IEC 811-3-1 : 1985)

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. The German translation is available.

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 3: Methods specific to PVC compounds
Section One — Pressure test at high temperature
Tests for resistance to cracking

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 One of Part 3 gives the methods for pressure test at high temperature and for tests for resistance to cracking, which apply to PVC 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 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. Pressure test at high temperature for insulations and sheaths

Note. — This test is not recommended for thicknesses of insulations and sheaths less than 0.4 mm.

8.1 *Test for insulations*

8.1.1 *Sampling*

For each core to be tested, three adjacent pieces shall be taken from a sample having a length of 250 mm to 500 mm. The length of each piece shall be 50 mm to 100 mm.

The cores of flat cords without sheaths shall not be separated.

8.1.2 *Preparation of test pieces*

From each core piece taken in accordance with Sub-clause 8.1.1, any covering including semi-conducting layer, if any, shall be removed mechanically. According to the type of cable, the test piece may have a circular or sector-shaped cross-section.

8.1.3 *Position of each test piece in the test apparatus*

The indentation device is shown in Figure 1, page 20, and consists of a rectangular blade with an edge 0.70 ± 0.01 mm wide, which can be pressed against the test piece. Each test piece shall be placed in the position shown in Figure 1. Flat cords without sheaths shall be laid on their flat side. Test pieces having a small diameter shall be fixed on the support in such a manner that they do not curve under the pressure of the blade. Test pieces of sector-shaped cores shall be placed on a support provided with a fitting sector-shaped profile as shown in Figure 1. The force shall be applied in a direction perpendicular to the axis of the core; the blade shall also be perpendicular to the axis of the core.

8.1.4 *Calculation of the compressing force*

The force F, in newtons, which shall be exerted by the blade upon the test piece (of both round and sector-shaped cores) is given by the formula:

$$F = k \sqrt{2 D \delta - \delta^2}$$

where:

k is a coefficient which shall be specified in the standard for the type of cable if a value is given, or, if a value is not specified in the cable standard, shall be:

k = 0.6 for flexible cords and cores of flexible cables

k = 0.6 for cores, with $D \leqslant 15$ mm, for cables for fixed installations

k = 0.7 for cores, with $D > 15$ mm, and for sector-shaped cores for cables for fixed installations

δ = mean value of the thickness of the insulation of the test piece

D = mean value of the outer diameter of the test piece

δ and D are both expressed in millimetres, to one decimal place, and measured on a thin slice cut from the end of the test piece, as specified in the test method in I E C Publication 811-1-1: Common Test Methods for Insulating and Sheathing Materials of Electric Cables, Part 1: Methods for General Application. Section One — Measurements of Thickness and Overall Dimensions. Tests for Determining the Mechanical Properties.

For sector-shaped cores, D is the mean value of the diameter of the "back" or circular part of the sector, in millimetres, to one decimal place. This is determined from three measurements, by means of a tape measure, of the circumference of the core assembly (the measurements being made at three different places on the assembled cores).

The force applied upon the piece of flat cord without sheath shall be twice the value given by the above formula, where D is the mean value of the minor dimension of the test piece described in Sub-clause 8.1.1.

The calculated force may be rounded off down by not more than 3%.

8.1.5 *Heating of the loaded test pieces*

The test shall be carried out in air (i.e. in an air oven). The temperature of the air shall be maintained continuously at the value specified in the relevant cable standard.

The loaded, but not pre-heated, test piece shall be kept in the test position for the time specified in the standard for the type of cable, or, if the time is not specified in the cable standard, for the following time:

4 h for test pieces having a value of $D \leqslant 15$ mm
6 h for test pieces having a value of $D > 15$ mm

Note. – This test may be adversely affected by vibration. The test should be carried out in an oven, in which apparatus and test pieces should be placed in a position free from vibration or be mounted on an anti-vibration support. No apparatus likely to cause vibration such as an air-stirring mechanism should be directly attached to the oven. The temperature of the air should be maintained continuously at the value specified in the relevant cable standard.

8.1.6 *Chilling of the loaded test pieces*

At the end of the specified durations (see Sub-clause 8.1.5), the test piece shall be rapidly cooled under load. In the heating cabinet, this operation may be carried out by spraying the test piece with cold water on the spot where the blade is pressing.

The test piece shall be removed from the apparatus when it has cooled to a temperature where recovery of the insulation no longer occurs; the test piece shall then be cooled further by immersion in cold water.

8.1.7 *Measurement of the indentation*

Immediately after cooling, the test piece shall be prepared for determining the depth of indentation.

The conductor shall be withdrawn leaving the test piece in the form of a tube.

A narrow strip shall be cut from the test piece in the direction of the axis of the core, perpendicular to the indentation as shown in Figure 2, page 20.

The strip shall be laid flat under a measuring microscope or a measuring projector and the cross-wire shall be adjusted to the bottom of the indentation and the outside of the test piece as shown in the same figure.

Small test pieces, up to about 6 mm external diameter, shall be cut transversely at and adjacent to the indentation, as shown in Figure 3, page 21, and the depth of the indentation shall be determined as the difference between the microscope measurements on sectional views 1 and 2 as shown in the same figure.

All measurements shall be made in millimetres to two decimal places.

8.1.8 *Evaluation of results*

The median of the indentation values, measured on the three test pieces taken from each core, shall be not more than 50% of the mean value of the thickness of the insulation of the test piece (as measured in accordance with Sub-clause 8.1.4).

Note. — The value of 50% is inseparable from the underlying principle of the formula and is the same for all materials. The severity of the test can be changed by variation of the factor k only, without altering the value of 50%.

8.2 *Test for sheaths*

8.2.1 *Sampling*

For each sheath to be tested, three adjacent pieces shall be taken from a sample having a length of 250 mm to 500 mm from which the covering (if any) and all the internal parts (cores, fillers, inner covering, armour, etc., if any) have been removed.

The length of each piece of sheathing shall be 50 mm to 100 mm (the higher values for the larger diameters).

8.2.2 *Preparation of test pieces*

From each piece of sheathing (see Sub-clause 8.2.1), a strip, of width equal to about one-third of the circumference, shall be cut parallel to the direction of the axis of the cable if the sheath does not have ridges.

If the sheath has ridges caused by more than five cores, the strip shall be cut in the same manner and these ridges shall be removed by grinding.

If the sheath shows ridges caused by five or less cores, the strip shall be cut in the direction of the ridges so that it contains at least one groove which lies approximately in the middle of the strip throughout its length.

If the sheath is directly applied on a concentric conductor, an armour or a metallic screen, and therefore has ridges which cannot be ground or cut away (unless the diameter is large), the sheath shall not be removed and the whole cable piece shall be used as a test piece.

8.2.3 *Position of the test piece in the test apparatus*

The indentation device shall be the same as specified in Sub-clause 8.1.3 and shown in Figure 1, page 20.

The strips shall be supported by a metal pin or tube, which may be halved in the direction of its axis to make a more stable support.

The radius of the pin or tube shall be approximately equal to half the inner diameter of the test piece.

The apparatus, the strip and the supporting pin (tube) shall be arranged so that the pin supports the strip and the blade is pressed against the outer surface of the test piece.

The force shall be applied in a direction perpendicular to the axis of the pin (or of the cable when a whole cable piece is used) and the blade shall also be perpendicular to the axis of the pin or tube (or of the cable when a whole cable is used).

8.2.4 *Calculation of the compressing force*

Unless otherwise specified, the force F, in newtons, which shall be exerted by the blade upon each test piece of sheath, shall be as given by the formula:

$$F = k\sqrt{2D\delta - \delta^2}$$

where:

k is a coefficient which shall be as specified in the standard for the type of cable if a value is given, or, if no value is specified in the cable standard, shall be:

k = 0.6 for flexible cords and cables

k = 0.6 for cables for fixed installation having a value $D \leq 15$ mm

k = 0.7 for cables for fixed installation having a value $D > 15$ mm and where

δ = mean value of the thickness of the test piece of the sheath

D = mean value of the outer diameter of the test piece of the sheath or for the sheath of a flat cable or cord, the minor outer dimension of the test piece of the sheath

δ and D are both expressed in millimetres, to one decimal place, and measured as specified in the test method of I E C Publication 811-1-1, Sub-clause 8 (D is the diameter of the cable from which the piece was cut).

The calculated force may be rounded off downwards by not more than 3%.

8.2.5 *Heating of the loaded test pieces*

The test pieces shall be heated as described in Sub-clause 8.1.5, for the time specified in the standard for the type of cable, or, if the time is not specified in the cable standard, for the following times:

4 h for test pieces having an outer diameter not exceeding 15 mm
6 h for test pieces with an outer diameter exceeding 15 mm

8.2.6 *Chilling of the load test pieces*

The test pieces shall be chilled by the method described in Sub-clause 8.1.6.

8.2.7 *Measurement of the indentation*

The indentation shall be measured on a narrow strip cut from the test piece, as described in Sub-clause 8.1.7 and shown in Figure 2, page 20.

8.2.8 *Evaluation of results*

The median of the indentation values measured on the three test pieces taken from the sheath under test shall be not more than 50% of the mean value of the thickness of the sample when measured in accordance with Sub-clause 8.2.4.

Note. — The value of 50% is inseparable from the underlying principle of the formula and is the same for all materials. The severity of the test can be changed by variation of the factor k only, without altering the value of 50%.

8.3 *Test method using a dial micrometer*

Under consideration.

9. Tests for resistance of insulations and sheaths to cracking

9.1 *Heat shock test for insulations*

9.1.1 *Sampling*

Each core to be tested shall be represented by two samples of suitable length taken from two places separated by at least 1 m.

External coverings, if any, shall be removed from the insulation.

9.1.2 *Preparation of test pieces*

The test pieces shall be prepared in one of the three following ways:

a) for cores with an overall diameter not exceeding 12.5 mm, each test piece shall consist of a piece of core;

b) for cores with an overall diameter exceeding 12.5 mm and having insulation thickness not exceeding 5 mm and for all sector-shaped cores, each test piece shall consist of a strip taken from the insulation whose width shall be at least 1.5 times its thickness, but not less than 4 mm;

The strip shall be cut in the direction of the axis of the conductor. In the case of sector-shaped cores, it shall be cut out of the "back" of the core;

c) for cores with an overall diameter exceeding 12.5 mm and a wall thickness exceeding 5.0 mm, each test piece shall consist of a strip cut in accordance with Item *b)* and then ground or cut (avoiding heating) on the outer surface, to a thickness between 4.0 mm and 5.0 mm. This thickness shall be measured on the thicker part of the strip, whose width shall be at least 1.5 times the thickness.

9.1.3 *Winding of test pieces on mandrels*

Each test piece shall be tautly wound and fixed, at ambient temperature, on a mandrel to form a close helix.

The diameter of the mandrel and the number of turns are given:

a) in the first of the tables below for test pieces prepared in accordance with Item *a)* of Sub-clause 9.1.2; for flat cables and cords, the mandrel diameter shall be based on the minor dimension of the core, which is wound on with its minor axis perpendicular to the mandrel;

b) in the second of the tables below for test pieces prepared in accordance with Items *b)* and *c)* of Sub-clause 9.1.2. In this case, the inner surface of the test piece shall be in contact with the mandrel.

External diameter of test piece (mm)	Mandrel diameter (mm)	Number of turns
Up to and including 2.5	5	6
Over 2.5 up to and including 4.5	9	6
Over 4.5 up to and including 6.5	13	6
Over 6.5 up to and including 9.5	19	4
Over 9.5 up to and including 12.5	40	2

Thickness of test piece (mm)	Mandrel diameter (mm)	Number of turns
Up to and including 1	2	6
Over 1 up to and including 2	4	6
Over 2 up to and including 3	6	6
Over 3 up to and including 4	8	4
Over 4 up to and including 5	10	2

For the application of these tables, the diameter or thickness of each test piece shall be measured by means of calipers or any other suitable measuring instrument.

9.1.4 *Heating and examination*

Each test piece, on its mandrel, shall be placed in an air oven pre-heated to the temperature specified in the standard for the type of cable, or, if no other temperature is specified in the cable standard, to 150 ± 3 °C. The test piece shall be maintained at the specified temperature for 1 h.

After the test pieces have been allowed to attain approximately ambient temperature, they shall be examined while still on the mandrel.

9.1.5 *Evaluation of results*

The test pieces shall show no crack when examined with normal or corrected vision without magnification.

9.2 *Heat shock test for sheaths*

9.2.1 *Sampling*

Each sheath to be tested shall be represented by two samples of cable of suitable length taken from two places, separated by at least 1 m.

Any external coverings shall be removed.

9.2.2 *Preparation of test pieces*

a) For sheaths with an overall diameter not exceeding 12.5 mm, each test piece shall consist of a piece of cable, except for polyethylene-insulated PVC sheathed cables.

b) For sheaths with an overall diameter exceeding 12.5 mm and with a wall thickness not exceeding 5.0 mm and for sheaths of polyethylene-insulated cables, each test piece shall consist of a strip taken from the sheath, whose width shall be at least 1.5 times its thickness but not less than 4 mm; the strip shall be cut in the direction of the axis of the cable.

c) For sheaths with an overall diameter exceeding 12.5 mm and a wall thickness exceeding 5.0 mm, each test piece shall consist of a strip cut in accordance with Item *b)* and then ground or cut (avoiding heating) on the outer surface, to a thickness between 4.0 mm and 5.0 mm. This thickness shall be measured on the thicker part of the strip, whose width shall be at least 1.5 times the thickness.

d) For flat cables, if the width of the cable does not exceed 12.5 mm, each test piece shall be a piece of complete cable. If the width of the cable exceeds 12.5 mm, each test piece shall consist of a strip taken from the sheath as specified in Item *b)*.

9.2.3 *Winding of the test pieces on mandrels*

Each test piece shall be tautly wound and fixed at ambient temperature on a mandrel to form a close helix. The diameter of the mandrel and the number of turns are given in Item *a)* of Sub-clause 9.1.3 for test pieces prepared in accordance with Item *b)* of Sub-clause 9.2.2, and in Item *a)* of Sub-clause 9.1.3 for test pieces prepared in accordance with Items *b)* and *c)* of Sub-clause 9.2.2

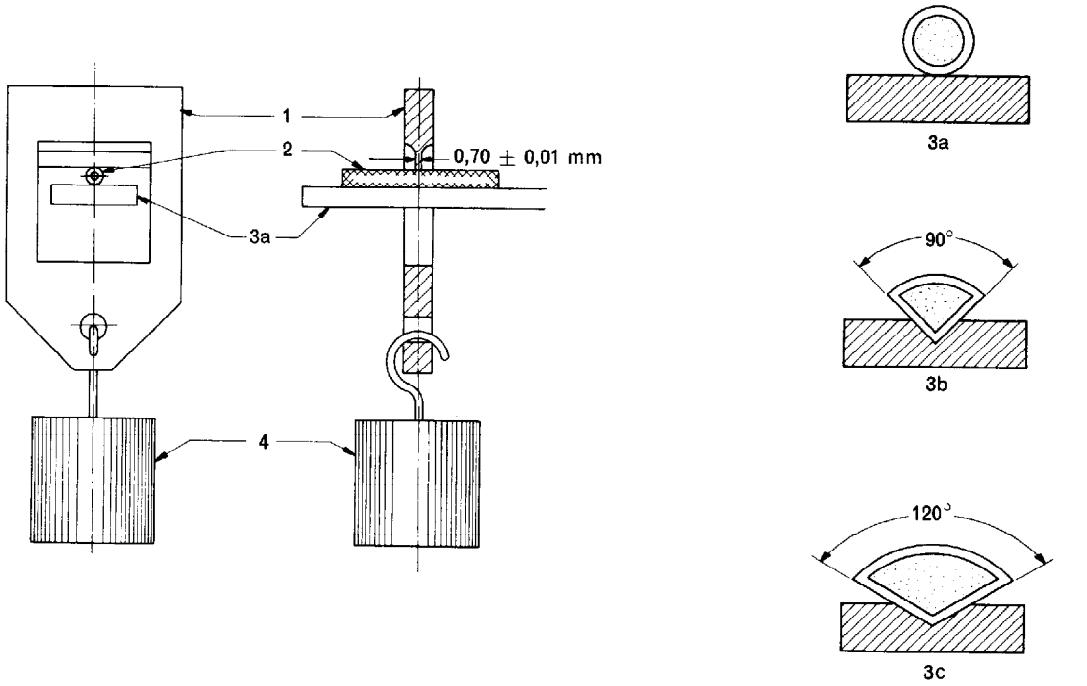
The diameter or thickness of each test piece shall be measured by means of calipers or any other suitable measuring instrument.

9.2.4 *Heating and examination*

In accordance with Sub-clause 9.1.4.

9.2.5 *Evaluation of results*

In accordance with Sub-clause 9.1.5.



Dimensions en millimètres — *Dimensions in millimetres*

1 = étrier d'essai — 1 = testing frame
2 = échantillon — 2 = sample
3a, 3b, 3c = supports — 3a, 3b, 3c = supports
4 = charge — 4 = load

FIG. 1. — Dispositifs d'empreintes.
Indentation device.

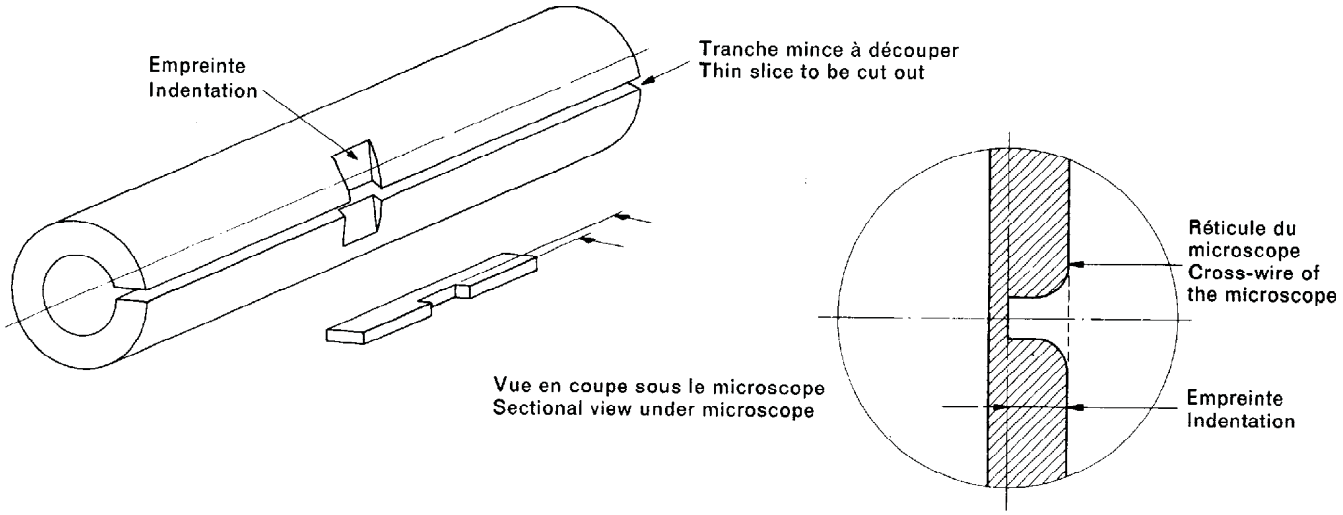


FIG. 2. — Mesure de l'empreinte.
Measurement of indentation.

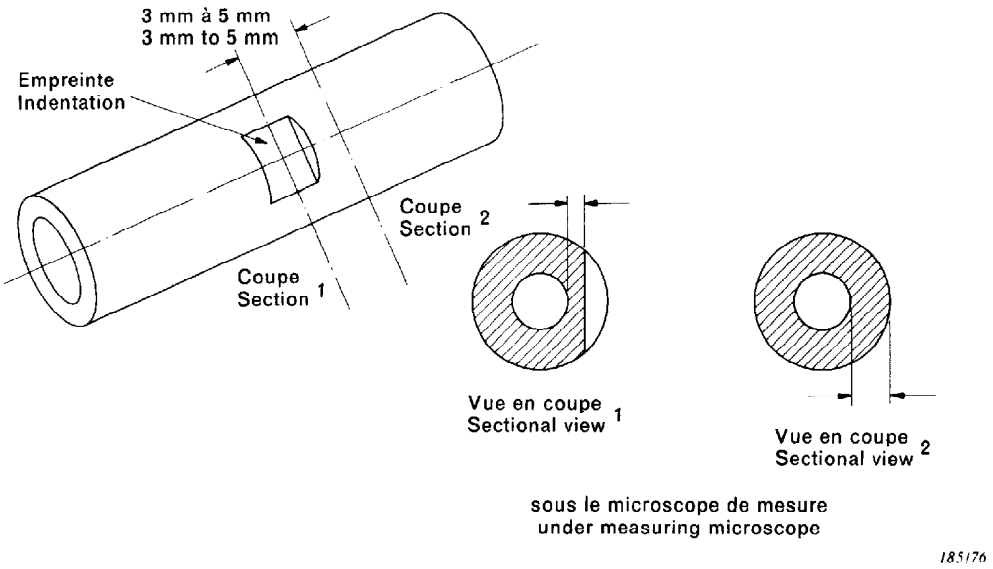


FIG. 3. — Mesure de l'empreinte pour les petites éprouvettes d'essais.
Measurement of indentation for small test pieces.

APPENDIX A

CORRESPONDING CLAUSES OR SUB-CLAUSES IN I E C PUBLICATIONS 538 AND 540 AND I E C PUBLICATION 811

A.1 Corresponding clauses and sub-clauses in I E C 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 1	2 2	9 8.1
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, 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.

National annex NA (informative)

Cross-references

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

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

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