BRITISH STANDARD

BS 6469 :
Section 1.4 :
1992

Insulating and sheathing materials of electric cables

Part 1. Methods of test for general application

Section 1.4 Tests at low temperature

(Implementation of HD 505.1.4 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

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 BS 6469 : Parts 1 to 5 and Part 99 supersede BS 6469 : 1990 which is withdrawn.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 505.1.4 S1 : 1988, which is identical with IEC 811-1-4 : 1985 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 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 505.1.4 S1

March 1988

UDC 621.315.6 : 621.315.2 : 620.193.94

Descriptors: Electric cable, insulated cable, electrical insulation, sheath, test at low temperature

English version

Common test methods for insulating and sheathing materials of electric cables

Part 1. Methods for general application
Section four — Tests at low temperature

(IEC 811-1-4 : 1985)

Méthodes d'essais communes pour les matériaux d'isolation et de gainage des câbles électriques
Première partie: Méthodes d'application générale
Section quatre: Essais à basse température
(CEI 811-1-4 : 1985)

Allgemeine Prüfungen für Isolier- und Mantelwerkstoffe für Kabel und isolierte Leitungen
Teil 1: Allgemeine Prüfverfahren
Hauptabschnitt 4: Prüfungen bei tiefer Temperatur
(IEC 811-1-4 : 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.

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 1: Methods for general application

SECTION FOUR — TESTS AT LOW TEMPERATURE

1. Scope

This standard specifies the test method 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 Four of Part 1 gives the methods for tests at low temperature which apply to PVC and PE 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, wire 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

Tests shall be carried out at the temperature specified in the relevant cable standard.

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. Tests at low temperature

8.1 *Bending test at low temperature for insulations*

8.1.1 *General*

This test is intended in general for cores of circular cross-section having an external diameter up to and including 12.5 mm and for sector-shaped cores when it is not possible to prepare dumb-bells.

If required by the standard for the type of cable, the test shall be carried out on larger cores. Otherwise, the insulation of larger cores shall be subjected to the elongation test described in Sub-clause 8.3.

8.1.2 *Sampling and preparation of test pieces*

Each core to be tested shall be represented by two samples of suitable length. After removal of the coverings, if any, the samples shall be used as test pieces.

8.1.3 *Apparatus*

The apparatus recommended for this test is represented in Figure 1, page 20, with explanations. It consists essentially of one revolving mandrel and guiding devices for the test pieces.

Other single-mandrel apparatus, substantially equivalent to the one represented in Figure 1, may also be used.

The apparatus shall be held in a refrigerator before and during the test.

8.1.4 *Procedure*

The test piece shall be fixed in the apparatus, as shown in Figure 1.

The apparatus with the test piece in position shall be maintained in the refrigerator at the specified temperature for a period of not less than 16 h. The cooling period of 16 h includes the time necessary for cooling down the apparatus.

If the apparatus has been pre-cooled, a shorter cooling period is permissible, but not less than 4 h provided that the samples have attained the prescribed test temperature. If the apparatus and test specimens have been pre-cooled, a cooling time of 1 h after each test piece has been fixed to the apparatus is sufficient.

At the end of the prescribed time, the mandrel shall be rotated, complying with the conditions specified in Sub-clause 8.1.5, the test piece being guided so that it is bent tautly round the mandrel in a close helix. In the case of sector-shaped test pieces, the circular "back" part of the test piece shall be in contact with the mandrel.

Afterwards, the test piece, still on the mandrel, shall be allowed to attain approximately ambient temperature.

8.1.5 *Test conditions*

The cooling and test temperature shall be as specified for the type of compound in the relevant standard for the type of cable.

The diameter of the mandrel shall be between 4 and 5 times the diameter of the test piece (see below).

The mandrel shall be uniformly rotated at a rate of one revolution in about 5 s and the number of turns shall be as specified in the following table:

Overall diameter (d) of the test piece (mm)	Number of turns
$d \leq 2.5$	10
$2.5 < d \leq 4.5$	6
$4.5 < d \leq 6.5$	4
$6.5 < d \leq 8.5$	3
$8.5 < d$	2

The actual diameter of each test piece shall be measured by either a vernier calliper or a measuring tape. For sector-shaped test pieces, the minor axis is taken as the parameter equivalent to the diameter for determining the mandrel diameter and the number of turns.

For flat cords, the mandrel diameter shall be based on the minor axis dimension of the test piece, which is wound on with its minor axis perpendicular to the mandrel.

8.1.6 *Evaluation of results*

At the end of the procedure described in Sub-clause 8.1.4, the test pieces shall be examined while still on the mandrel. The insulation of both test pieces shall not show any crack when examined with normal or corrected vision without magnification.

8.2 *Bending test at low temperature for sheaths*

8.2.1 *General*

This test is intended in general for cables with an overall diameter up to and including 12.5 mm, or, for flat cables, a major axis dimension up to and including 20 mm.

If required by the standard for the type of cable, the test shall also be carried out on larger cables. Otherwise, the sheath of larger cables shall be subjected to the elongation test described in Sub-clause 8.4.

8.2.2 *Sampling and preparation of test pieces*

For each sheath to be tested, two pieces of cable of suitable length shall be taken.

Before starting the test, any covering shall be removed from the sheath.

8.3.2 *Apparatus, procedure and test conditions*

In accordance with Sub-clauses 8.1.3, 8.1.4 and 8.1.5.

For cables having an armour or a concentric conductor under the outer sheath, the diameter of the mandrel shall be as specified in the cable standard for the type of cable.

8.2.4 *Evaluation of results*

At the end of the procedure described in Sub-clause 8.1.4, the test pieces shall be examined while still on the mandrel. The sheath of both test pieces shall not show any crack when examined with normal or corrected vision without magnification.

8.3 *Elongation test at low temperature for insulations*

8.3.1 *General*

This test is intended for the insulation of cores not subjected to the bend test, as specified in Sub-clause 8.1.1.

8.3.2 *Sampling*

Each core to be tested shall be represented by two samples of suitable length.

8.3.3 *Preparation of test pieces*

After all covering (including outer semi-conducting layer, if any) has been removed, the insulation shall be cut open in the direction of the axis, after which the conductor and the internal semi-conducting layer, if any, shall be removed.

The insulation need not be ground or cut if its mean specified thickness does not exceed 2.0 mm. Samples having a thickness exceeding this limit shall be ground or cut to obtain a regular thickness of the sample, care being taken to avoid undue heating. After grinding or cutting, the thickness shall be not less than 0.8 mm.

All samples shall be conditioned at ambient temperature for at least 16 h.

After this preparation, two dumb-bells from each sample in accordance with Figure 3, page 22, or if necessary Figure 4, page 22, shall be punched in the direction of the axis of each sample; if possible, two dumb-bells shall be punched side by side.

For sector shaped cores, the dumb-bells shall be punched out of the "back" of the core.

The dumb-bells shall be marked in accordance with the last paragraph of Item *a)* in Sub-clause 9.1.3 of IEC Publication 811-1-1: Common Tests 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 (in preparation), if an apparatus is used which allows the direct measurement of the distance between the marker lines during the test.

8.3.4 *Apparatus*

The test may be carried out on a normal tensile machine provided with a cooling device or on a tensile machine installed in a cooling chamber.

Using a liquid as the refrigerant, the conditioning time shall be not less than 10 min at the specified test temperature.

When cooling in air, the conditioning time for cooling the apparatus and test piece together shall be at least 4 h. If the apparatus has been pre-cooled, this period may be reduced to 2 h, and if the apparatus and test piece have been pre-cooled, the conditioning time after the test piece has been fixed in the apparatus shall be not less than 30 min.

If a liquid mixture is used for cooling, it shall not impair the insulating or sheathing material.

An apparatus which allows direct measurement of the distance between the marker lines during the elongation test is preferred; but it is also permissible to use an apparatus with which the displacement between the grips can be measured.

Note. — A suitable refrigerant is a mixture of ethyl-alcohol or methyl-alcohol with solid CO_2.

8.3.5 *Procedure and test conditions*

The grips of the tensile apparatus shall be of a non-self-tightening type.

In both pre-cooled grips, the dumb-bell shall be clamped over the same length.

The free length between the grips shall be about 30 mm for both types of dumb-bells if the direct measurement of the distance between the marker lines is to be made during the test.

If the displacement of the grips is to be measured, the free length between the grips shall be 30 ± 0.5 mm for the dumb-bell in accordance with Figure 3, page 22, and 22 ± 0.5 mm for the dumb-bell in accordance with Figure 4, page 22.

The speed of separation of the grips of the tensile machine shall be 25 ± 5 mm/min.

The test temperature shall be as specified for the type of compound in the standard for the type of cable.

The elongation shall be determined by measuring the distance between the marker lines, if possible, or between the grips at the moment of the rupture.

8.3.6 *Evaluation of results*

For calculating the elongation, the increase of the distance between the marker lines shall be related to the initial distance of 20 mm (or 10 mm if the dumb-bell in accordance with Figure 4, is used), and expressed as a percentage of this distance.

If the alternative method of measuring the distance between the grips is used, the increase of this distance shall be related to the original distance, being 30 mm for the dumb-bell in accordance with Figure 3 and 22 mm for the dumb-bell according to Figure 4. When this method is used, the test piece shall be examined before being removed from the apparatus; if the test piece has partly slipped out of the grips, the result shall be ignored. At least three valid results are required for calculating the elongation, otherwise the test shall be repeated.

Unless otherwise specified, none of the valid results shall be less than 20%.

In case of dispute, the method employing marker lines shall be used.

8.4 *Elongation test at low temperature for sheaths*

8.4.1 *General*

This test is intended for the sheaths of cables not subjected to the bend test as specified in Sub-clause 8.2.1.

8.4.2 *Sampling*

Each sheath to be tested shall be represented by two samples of suitable length.

8.4.3 *Preparation of test pieces*

After any covering has been removed, the sheath shall be cut open in the direction of the axis, after which the cores and fillers and others internal parts (if any) shall be removed.

For cables with concentric conductor or armour, a strip of sheath shall be cut following the imprints caused by the metal elements.

The sheath need not be ground or cut if its mean specified thickness does not exceed 2.0 mm. Samples having a thickness exceeding this limit shall be ground or cut to obtain a regular thickness of the sample, care being taken to avoid undue heating.

After grinding or cutting, the thickness shall be not less than 0.8 mm. All strips shall be conditioned at ambient temperature for at least 16 h.

After this preparation, two dumb-bells from each sample in accordance with Figure 3, or if necessary Figure 4, shall be punched in the direction of the axis of each sample; if possible, two dumb-bells shall be punched side by side.

The dumb-bells shall be marked in accordance with the last paragraph of Item *a)* in Sub-clause 9.1.3 of IEC Publication 811-1-1 (in preparation) if an apparatus is used which allows the direct measurement of the distance between the marker lines during the test.

8.4.4 *Apparatus*

In accordance with Sub-clause 8.3.4.

8.4.5 *Procedure and test conditions*

In accordance with Sub-clause 8.3.5.

8.4.6 *Evaluation of results*

In accordance with Sub-clause 8.3.6.

8.5 *Impact test at low temperature for PVC insulations and sheaths*

8.5.1 *General*

This cold impact is intended for PVC sheathed cables of any type, irrespective of the type of insulation of the cores, and for the insulation of wires, cords and flat cords without PCV sheath if required by the relevant cable standard.

The PVC insulation of sheathed cables is not subjected directly to the cold impact test.

8.5.2 *Sampling and preparation of the test pieces*

Three pieces of complete cable each having a length at least five times the diameter of the cable with a minimum of 150 mm, shall be taken. All covering external to the component shall be removed.

8.5.3 *Apparatus*

The apparatus to be used for this test is represented in Figure 2, page 21, with explanations.

The apparatus shall be placed on a pad of sponge rubber about 40 mm thick and held in a refrigerator before and during the test.

8.5.4 *Test conditions*

The test temperature shall be as specified for the type of PVC compound in the relevant cable standard.

For power cables for fixed installation, the mass of the hammer for testing the samples shall be as given in the following table:

Overall diameter (mm)		Mass of the hammer
Above	Up to and including	(g)
—	4.0	100
4.0	6.0	200
6.0	9.0	300
9.0	12.5	400
12.5	20.0	500
20.0	30.0	750
30.0	50.0	1 000
50.0	75.0	1 250
75.0	—	1 500

For flexible cables and cords and telecommunication cables, the mass of the hammer for testing the sample shall be as follows:

Overall diameter (mm)		Mass of the hammer
Above	Up to and including	(g)
For flat cords		100
–	6.0	100
6.0	10.0	200
10.0	15.0	300
15.0	25.0	400
25.0	35.0	500
35.0	–	600

The overall diameter referred to in the tables shall be measured on each test piece by a vernier calliper or a measuring tape.

Flat cords shall be tested with their minor axis perpendicular to the steel base.

8.5.5 *Procedure*

The apparatus and the pieces of cable to be tested shall be placed side by side in a refrigerator and maintained at the specified temperature. The contents of the refrigerator shall then be allowed to cool for a period not less than 16 h, which includes the time for the apparatus to cool down. If the apparatus has been pre-cooled, a shorter cooling period is permissible, but not less than 1 h provided that the test pieces have attained the prescribed test temperature.

At the end of the prescribed periods, each piece in turn shall be placed in position as shown in Figure 2, page 21, and the hammer shall be allowed to fall from a height of 100 mm.

Before examining the insulation of cables or cords without a sheath, the test pieces shall be allowed to attain approximately ambient temperature after the test.

The insulation shall then be examined after the test pieces have been twisted, while held straight, through an angle equal to 360° for each 100 mm length. If, however, it is not possible to twist the samples in this way, they shall be examined as specified for the sheath.

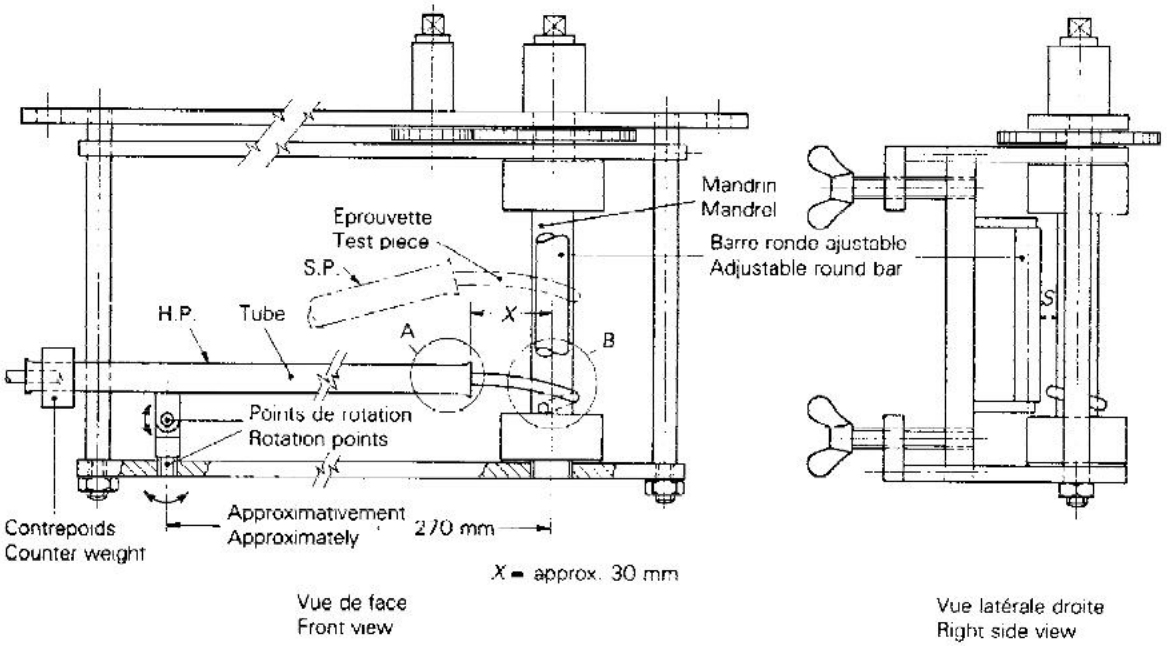
Before examining the sheath of cables and cords, if any, the test pieces shall be allowed to attain approximately room temperature and then be immersed in hot water; the sheath shall then be cut open in the direction of the axis of the cables.

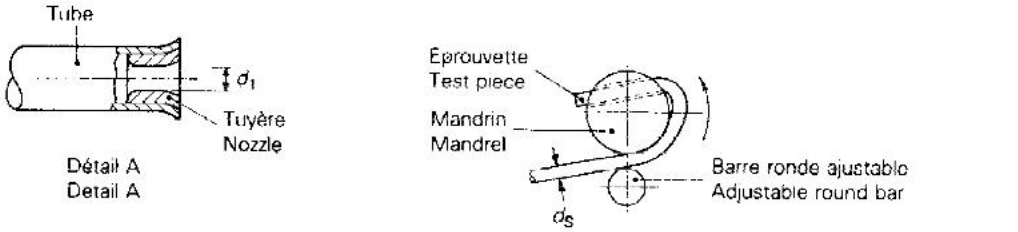
The inside and outside of the sheath and the insulation shall then be examined. The insulation of cables and cords with sheath shall be examined on the outside only.

8.5.6 *Expression of results*

The three pieces shall show no cracks when examined with normal or corrected vision without magnification.

If only one sample of the three shows cracks, then the test may be repeated on three further samples and, if none of these shows cracks the requirements of the test are met, but if any one of the three samples shows cracks, then the cable or sheath does not comply with the test requirements.





Notes 1. — $d_S < S < 1{,}5\ d_S$
2. — d_1 = 1,2 à 1,5 × d_S
3. — En position horizontale (H.P.), le tube ne doit pas trop appuyer sur l'éprouvette vers le bas.
4. — En position en pente (S.P.), le tube ne doit pas trop appuyer sur l'éprouvette vers le haut.

Notes 1. — $d_S < S < 1.5\ d_S$
2. — d_1 = 1.2 to 1.5 × d_S
3. — In horizontal position (H.P.), the tube should not press the test piece down too much.
4. — In slope position (S.P.), the tube should not press the test piece upwards too much.

FIG. 1.— Appareil pour l'essai d'enroulement à froid.
Cold bend test apparatus.

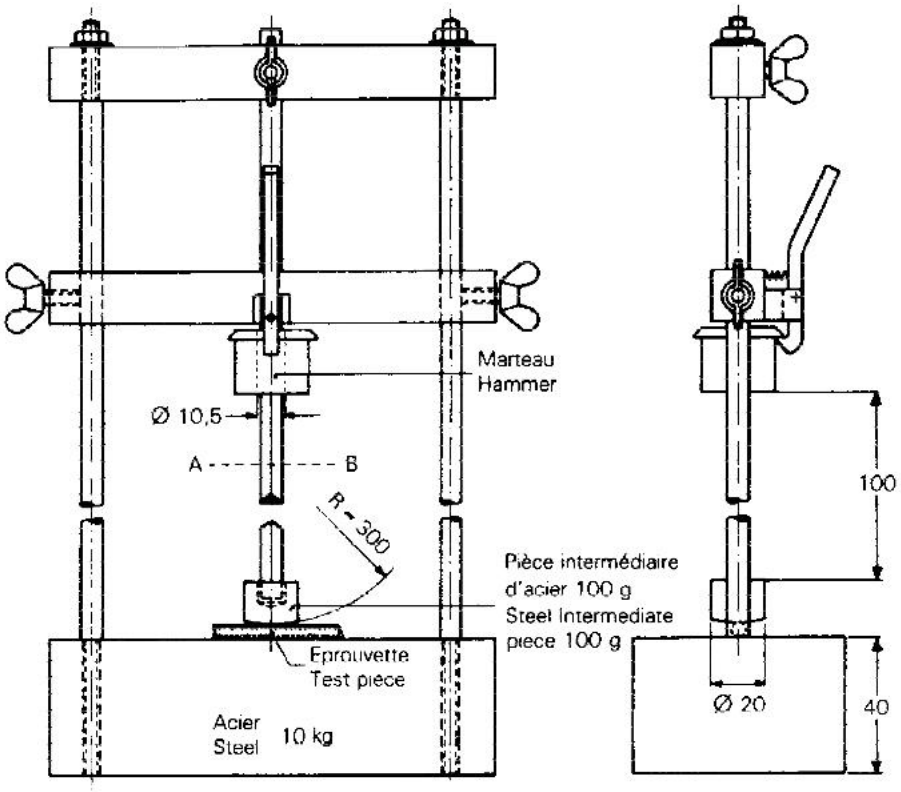
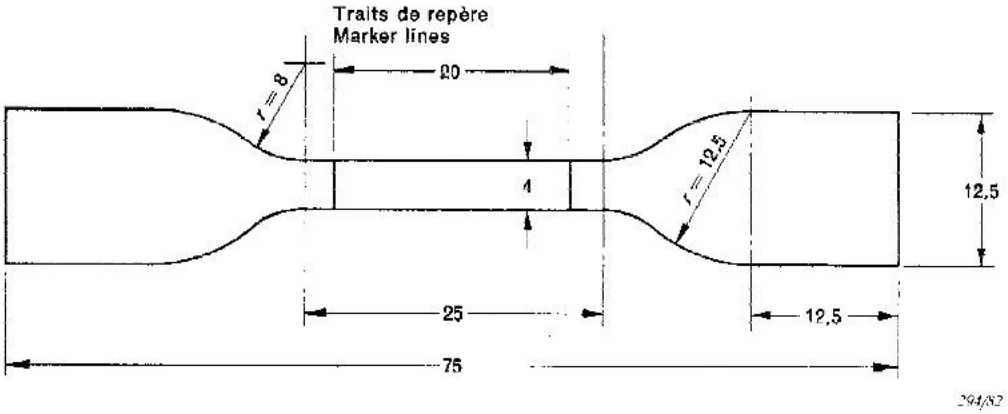
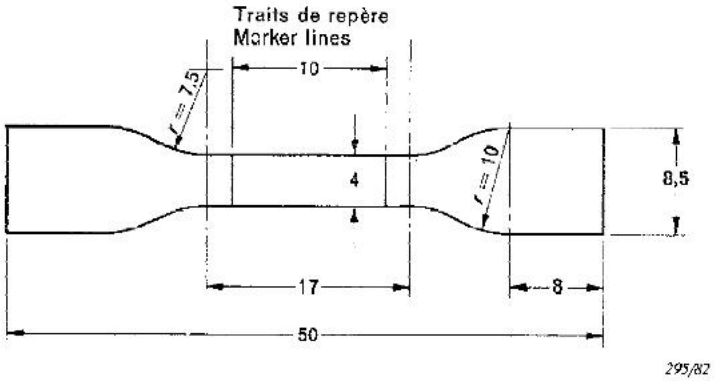


FIG. 2.— Appareil d'essai de choc.
Impact test apparatus.



Dimension en millimètres *Dimensions in millimetres*

FIG. 3.— Eprouvette en forme d'haltère.
Dumb-bell test piece.



Dimension en millimètres *Dimensions in millimetres*

FIG. 4.— Petite éprouvette en forme d'haltère.
Small dumb-bell test piece.

APPENDIX A

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

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

Heading of clause in Publication 538*	538	811		
	Clause or sub-clause	Part	Section	Clause of 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	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 for 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.

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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