BS 7629-1:2015

BSI Standards Publication

Electric cables – Specification for 300/500 V fire resistant, screened, fixed installation cables having low emission of smoke and corrosive gases when affected by fire

Part 1: Multicore cables

bsi.

...making excellence a habit.™

Publishing and copyright information

Published by BSI Standards Limited 2015

ISBN 978 0 580 85384 5

ICS 13.220.99; 29.060.20

The following BSI references relate to the work on this document:
Committee reference GEL/20/17
Draft for comment 14/30295204 DC

Publication history

First published April 1997
Second edition November 2008
Third (current) edition August 2015

Amendments issued since publication

Date	Text affected

Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 26, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 August 2015. It was prepared by Subcommittee GEL/20/17, *Low voltage cables,* under the authority of Technical Committee GEL/20, *Electric cables*. A list of organizations represented on these committees can be obtained on request to their secretary.

Supersession

This British Standard supersedes BS 7629-1:2008, which will be withdrawn on 31 August 2016.

Relationship with other publications

This new edition of BS 7629-1 takes account of the publication of BS 5266-1:2011 and BS 5839-1:2013 and their increased fire testing requirements.

Information about this document

This is a full revision of the standard and introduces the following principal changes.

a) The marking arrangements are updated and clarified.

b) Test methods are updated to reflect the latest CENELEC harmonization.

c) This new edition takes account of:

- BS EN 50395 (replacing Annex E of BS 7629-1:2008) on electrical tests;
- BS EN 50396 (replacing Annex B of BS 7629-1:2008) on thickness measurement;
- BS EN 60332-1-2 (replacing BS EN 50265-2-1) on flame propagation of a single cable;
- BS EN 62230 (replacing BS EN 50356 and BS 5099) on spark testing.

Product certification/inspection/testing. Users of this British Standard are advised to consider the desirability of third-party certification/inspection/testing of product conformity with this British Standard. Users seeking assistance in identifying appropriate conformity assessment bodies or schemes may ask BSI to forward their enquiries to the relevant association.

WARNING. This British Standard calls for the use of substances and/or procedures that can be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Use of this document

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.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

This page deliberately left blank

1 Scope

This British Standard specifies requirements and test methods for the construction and performance of cables which:

- have thermosetting insulation and a rated voltage of 300/500 V;
- provide resistance to fire (circuit integrity), including with mechanical shock and with water, as measured by performance in a standard test or tests;
- emit limited amounts of smoke and corrosive gases when burned as measured by a standard test; and
- are primarily intended for use in emergency lighting, fire detection and fire alarm system circuits.

The circuit integrity performance under fire conditions is assessed on the basis of tests which measure resistance to fire with mechanical impact and water spray (Categories: Standard 30, Standard 60 and Enhanced 120).

NOTE 1 BS 5266-1 and BS 5839-1 give recommendations and guidance on the factors to be taken into account in the planning, design, installation, commissioning and maintenance of emergency lighting, fire detection and fire alarm systems for buildings, respectively.

It is applicable to 2-core, 3-core and 4-core circular cables with an uninsulated full size circuit protective conductor, and 7-core, 12-core and 19-core circular multi-core auxiliary cables with an uninsulated drain wire of not less than 0.5 mm^2. All cables contain a metallic layer, which provides electrostatic screening.

The cables are suitable for operation at a maximum sustained conductor temperature of 70 °C and for a maximum short-circuit conductor temperature of 250 °C (for a maximum period of 5 s).

NOTE 2 Annex A gives recommendations for the selection, installation and operation of cables, Annex B gives the method of test for continuity of tinned coating of wires, Annex C gives the method of test for voltage withstand, Annex D gives the method of test for bending characteristics, Annex E gives the method of test for resistance to impact, Annex F gives the method of test for shrinkage of sheath and Annex G gives notes on type tests.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 7655-1.2, *Specification for insulating and sheathing materials for cables – Part 1: Cross-linked elastomeric insulating compounds – Section 1.2: General 90 °C application*

BS 7655-6.1, *Specification for insulating and sheathing materials for cables – Part 6: Thermoplastic sheathing compounds having low emission of corrosive gases, and suitable for use in cables having low emission of smoke when affected by fire – Section 6.1: General application thermoplastic types*

BS 7671, *Requirements for electrical installations – IET Wiring Regulations – Seventeenth edition*

BS 8434-2, *Methods of test for assessment of the fire integrity of electric cables – Part 2: Test for unprotected small cable for use in emergency circuits – BS EN 50200 with a 930 °C flame and with water spray*

BS EN 50200, *Method of test for resistance to fire of unprotected small cables for use in emergency circuits*

BS EN 50363-1, *Insulating, sheathing and covering materials for low voltage energy cables – Part 1: Cross-linked elastomeric insulating compounds*

BS EN 50363-5, *Insulating, sheathing and covering materials for low voltage energy cables – Part 5: Halogen-free, cross-linked insulating compounds*

BS EN 50395, *Electrical test methods for low voltage energy cables*

BS EN 50396, *Non electrical test methods for low voltage energy cables*

BS EN 60228, *Conductors of insulated cables*

BS EN 60332-1-2:2004, *Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame*

BS EN 60754-1, *Test of gases evolved during combustion of materials from cables – Part 1: Determination of the halogen acid gas content*

BS EN 60811-502, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 502: Mechanical tests – Shrinkage test for insulations*

BS EN 60811-506, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 506: Mechanical tests – Impact test at low temperature for insulations and sheaths*

BS EN 61034-1, *Measurement of smoke density of cables burning under defined conditions – Part 1: Test apparatus*

BS EN 61034-2, *Measurement of smoke density of cables burning under defined conditions – Part 2: Test procedure and requirements*

BS EN 62230, *Electric cables – Spark-test method*

IEC 60050-461, *International electrotechnical vocabulary – Part 461: Electric cables*

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in IEC 60050-461 and the following apply.

3.1 cable manufacturer
organization that has the capability to both produce and control the conformity of cable made to this British Standard

*NOTE See **11.1**a) for information on marking the cable with the cable manufacturer's name and identifier.*

3.2 fire resistance
ability of a cable to maintain circuit integrity under fire for a stated period of time and under defined conditions

NOTE The designation "fire resistant" given to a cable implies that it fulfils the requirements of the relevant fire resistance test.

3.3 length of lay
axial length of one complete turn of the helix formed by one cable component

3.4 routine tests, *R*
tests made on all production cable lengths to demonstrate their integrity

3.5 sample tests, *S*
tests made on samples of completed cable, or components taken from a completed cable, adequate to verify that the product meets the design specifications

3.6 type tests, *T*
tests made before supplying, on a general commercial basis, a type of cable covered by this British Standard, in order to demonstrate satisfactory performance characteristics to meet the intended application

NOTE Type tests are of such a nature that after they have been made, they need not be repeated unless changes are made in the cable materials, design or type of manufacturing process, which might change the performance characteristics.

3.7 values

3.7.1 approximate value
value which is only indicative

NOTE Values described as "approximate" do not constitute requirements to be checked by measurement.

3.7.2 nominal value
value by which a quantity is designated

NOTE Nominal values usually give rise to values to be checked by measurements taking into account specified tolerances.

3.8 voltages

3.8.1 maximum voltage, U_m
maximum sustained power-frequency voltage between phase conductors for which the cable is suitable

3.8.2 rated voltage, U_0
nominal power-frequency voltage between conductor(s) and earth for which the cable is suitable

3.8.3 rated voltage, *U*
nominal power-frequency voltage between phase conductors for which the cable is suitable

4 Voltage designation and fire resistance categories

4.1 Voltage designation

The cables shall be designated by the rated voltages U_0 and U, expressed in the form U_0/U. The rated voltage recognized for the purpose of this British Standard shall be 300/500 V.

NOTE 1 The maximum permitted operating voltages of the system are stated in Table 1.

In an alternating current system, the rated voltage of the cable shall be at least equal to the nominal voltage of the system for which it is intended.

*NOTE 2 Guidance on the selection of cables of appropriate voltage designations for particular systems is given in **A.4**.*

Table 1 **Maximum permitted voltages against rated voltage of cable**

Rated voltage of cable	Maximum permitted operating voltage of the system			
	a.c.	3-phase a.c.	d.c.	
U_0/U	Conductor-earth	Conductor-conductor	Conductor-earth	Conductor-conductor
V	U_0 max (V)	U max (V)	V	V
300/500	320	550	410	820

4.2 Fire resistance category

Cables shall be designated by category according to their special fire resistance characteristics as follows:

- Category STANDARD 30: resistance to fire with mechanical impact and water assessed in combination when tested in accordance with **15.6.2**;
- Category STANDARD 60: resistance to fire with mechanical impact and water assessed in combination when tested in accordance with **15.6.3**;
- Category ENHANCED 120: resistance to fire with mechanical impact and water assessed in combination when tested in accordance with **15.6.4**.

The 2-core, 3-core and 4-core cables given in Table 2 and the multi-core auxiliary cables given in Table 3 (7-core, 12-core and 19-core) shall conform to one of the following categories: STANDARD 30, STANDARD 60 or ENHANCED 120. The manufacturer shall declare which category a cable meets.

If a cable conforms to the requirements for category STANDARD 60 it shall also be deemed to conform to the requirements for category STANDARD 30 and the tests stated in **15.6.2** shall not be required to be carried out.

If a cable conforms to the requirements for category ENHANCED 120 it shall not be required to conform to other categories. If, in addition to ENHANCED 120, conformity to other categories is being claimed then the appropriate tests shall be carried out.

NOTE Attention is drawn to the fact that the level of performance achieved in a particular installation can be influenced by the actual installation conditions. Conformity of a given cable to the requirements for a particular category in this standard refers only to the test condition stated.

Table 2 **Dimensions of 2-core, 3-core and 4-core cables**

Number of cores	Nominal cross-sectional area of conductor	Radial thickness of insulation	CPC nominal cross-sectional area	Nominal thickness of sheath	Approximate overall diameter
	mm^2	mm	mm^2	mm	mm
2	1.0	0.6	1.0	0.9	8.0
	1.5	0.7	1.5	0.9	8.5
	2.5	0.8	2.5	1.0	10.5
	4.0	0.8	4.0	1.1	12.5
3	1.5	0.7	1.5	0.9	9.5
	2.5	0.8	2.5	1.0	11.5
	4.0	0.8	4.0	1.1	13.5
4	1.5	0.7	1.5	1.0	10.5
	2.5	0.8	2.5	1.1	12.0
	4.0	0.8	4.0	1.2	15.0

Table 3 **Dimensions of multi-core auxiliary cables**

Number of cores	Nominal cross-sectional area of conductor	Radial thickness of insulation	Drain wire nominal cross-sectional area	Nominal thickness of sheath	Approximate overall diameter
	mm^2	mm	mm^2	mm	mm
7	1.5	0.7	0.5	1.1	12.5
	2.5	0.8	0.5	1.2	15.0
12	1.5	0.7	0.5	1.2	16.0
	2.5	0.8	0.5	1.4	20.0
19	1.5	0.7	0.5	1.3	19.0

5 Conductors and drain wire

5.1 Conductors

The conductors shall conform to BS EN 60228, Class 1 or 2.

The insulated conductors shall be plain or tinned annealed copper. The uninsulated circuit protective conductor (CPC) shall be tinned annealed copper and shall be of the same nominal cross-sectional area as the insulated conductors.

Tinned coated wires shall be covered with a continuous layer of the coating. The continuity shall be assessed in accordance with Annex B. There shall be no adherent or distinct black spots in the continuous layer, when examined in accordance with Annex B at a magnification of at least × 30. Any blackening occurring less than 15 mm from each end shall be disregarded.

The class of conductor shall be the same for all conductors in any single cable. The uninsulated CPC shall be of the same class as the insulated conductors.

NOTE The category of test for this requirement, and for all others in this standard, is shown in Table 5.

5.2 Drain wire

The drain wire shall comprise one or more tinned annealed copper wires with a total nominal cross-sectional area of not less than 0.5 mm^2 and shall conform to the resistance requirements of a 0.5 mm^2 conductor, either for Class 1 or Class 2, as specified in BS EN 60228.

Tinned coated drain wires shall be covered with a continuous layer of the coating. The continuity shall be assessed in accordance with the method given in **5.1** for tinned wires of conductors.

6 Insulation

6.1 Type of insulation

The insulation shall be type EI 2 as specified in BS EN 50363-1 or type EI 5 as specified in BS EN 50363-5 or GP 6 as specified in BS 7655-1.2. The requirement for corrosive and acid gas emissions shall only be applied in accordance with **16.2**, and shall apply to all types of insulation.

6.2 Application

The insulation shall be applied by an extrusion process and cross-linked. The insulation shall be applied either in a single layer, or in a number of layers. Each individual layer shall be compact and homogeneous.

Where more than one layer is used, the complete insulation shall be tested as though it were a single layer of the declared insulation type (see **6.1**).

NOTE 1 The manufacturer should demonstrate that all insulated cores are, as a continuous and ongoing part of the manufacturing process, subject to spark testing in accordance with BS EN 62230, using only a.c. or d.c. methods.

NOTE 2 Insulation applied in more than one layer does not conform to the definition of "double insulation" given, for instance, in BS 7671.

The manufacturer shall have the option to apply a tape or tapes under and/or over the insulation. These tapes shall not be considered as part of the insulation for the purposes of testing or measurement.

It shall be possible to remove the insulation easily without damage to the insulation itself or to the conductor or the tin coating (if any).

6.3 Thickness of insulation

The mean value of the radial thickness of the insulation, when measured in accordance with BS EN 50396, **4.1**, shall be not less than the value given in Table 2 or Table 3. The smallest value measured, t_m, shall not fall below 90% of the value given in Table 2 or Table 3 by more than 0.1 mm, i.e.:

$$t_m \geq 0.9t_n - 0.1 \quad (1)$$

where:

t_m is the smallest value measured, in millimetres (mm);

t_n is the tabulated radial thickness, in millimetres (mm).

The thickness of any tape(s) over either the conductor or the insulation shall not be included in the measurement of thickness of insulation.

7 Identification of cores

7.1 General

The cores of all cables shall be identified either by colour or by numbers. Numbers shall be marked sequentially starting with the number 1. Standard colour coding shall be in accordance with the sequence in Table 4.

Table 4 **Identification of cores in multicore cables**

Number of cores	Identification
2-core + uninsulated CPC	Brown, blue or brown, brown
3-core + uninsulated CPC	Brown, black, grey
4-core + uninsulated CPC	Blue, brown, black, grey
7-, 12- and 19-core + uninsulated drain wire	Numbers 1, 2, 3, 4, 5, 6, 7 and upwards or, for identification by colour, an identical colour (excluding brown and black), except for two adjacent cores in each layer distinctively coloured brown and black (see Figure 1)

It shall be permitted to use other identification colours subject to agreement with the manufacturer, taking into account the core colour requirements specified in BS 7671 or other standards, or in statutory requirements.

*NOTE In this case the marking requirement as stated in **11.5** does not apply.*

The colour shall be applied:

a) throughout the insulation; or

b) throughout the outermost layer of any insulation that comprises more than one layer; or

c) via a dedicated colouring layer.

Conformity shall be checked by visual examination.

The complete coloured insulation, irrespective of the method of colouring, shall be tested as though it were single layer (see **6.2**), and no part of it shall separate during any of such testing.

7.2 Clarity and durability

The colour or the number used for core identification shall be clearly identifiable and durable such that it cannot be removed, when tested in accordance with BS EN 50396, **5.1**.

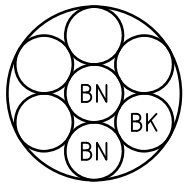
8 Laying-up

The cores of cables having 2, 3 or 4 cores shall be laid up with a uni-direction or right-hand-left-hand alternating direction of lay. Where standard colour coding of cores has been used, the cores shall be laid up in the sequence given in Table 4.

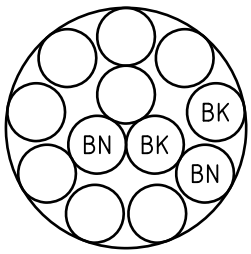
Conformity shall be checked by visual examination.

The cores of the 7-, 12- and 19-core multi-core auxiliary cables shall be laid up in number sequence or as shown in Figure 1.

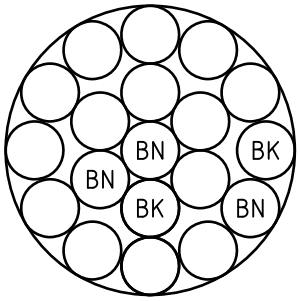
Figure 1 **Lay up diagram of multi-core auxiliary cables (7-core, 12-core and 19-core)**



a) 7-core



b) 12-core



c) 19-core

The manufacture shall have the option to apply a non-hygroscopic binder tape or tapes over the laid-up cores of all cables.

An uninsulated circuit protective conductor shall be incorporated in the 2-, 3- and 4-core cables such that they conform to Clause **9**.

An uninsulated drain wire shall be incorporated in the 7-, 12- and 19-core multi-core auxiliary cables such that they conform to Clause **9**.

The cores of 7-core cable shall be laid up with a uni-direction or right-hand-left-hand direction of lay. For the cores of the 12- and 19-core cables, the direction of lay shall alternate for each successive layer.

The maximum length of lay shall be not more than 60 times the diameter of the assembly of laid-up cores.

9 Screen

One or more metallic or laminated metallic tape(s) shall be applied, either longitudinally or helically or a combination of both, with the metallic element in contact with the uninsulated circuit protective conductor or drain wire.

If a tape is applied longitudinally, it shall have an overlap of not less than 1 mm. If a tape is applied helically, it shall have an overlap of not less than 20%.

The minimum thickness of the metallic element of a laminated tape shall be 0.008 mm. The minimum thickness of the metallic tape (non-laminated) shall be 0.075 mm.

10 Sheath

10.1 Type of sheath

The sheath shall be an extruded layer conforming to BS 7655-6.1, type LTS 3.

10.2 Application

The sheath shall be applied by an extrusion process.

The sheath shall be applied either in a single layer or in a number of layers. Each individual layer shall be compact and homogeneous.

Where more than one layer is used, the complete sheath shall be tested as though it were a single layer.

When the sheath is removed, there shall be no damage to the core. The absence of damage shall be verified by visual inspection of the core insulation.

10.3 Thickness of sheath

When measured in accordance with BS EN 50396, **4.2**, the smallest value, t_m, of the radial thickness of sheath shall not fall below 85% of the nominal value given in Table 2 or Table 3 as appropriate by more than 0.1 mm, i.e.:

$$t_m \geq 0.85\ t_n - 0.1 \qquad (2)$$

where:

t_m is the smallest value measured, in millimetres (mm);

t_n is the tabulated radial thickness, in millimetres (mm).

10.4 Spark testing of sheath

When tested in accordance with the a.c. or d.c. test methods and test voltages specified in BS EN 62230, there shall be no breakdown of the sheath.

11 Cable marking and additional information

11.1 External marking

The external surface of all cables within the scope of this British Standard shall be legibly marked with the following elements.

Element		Example of marking
a)	Cable manufacturer	Manufacturer's name (or variant as given in Note 1) and their unique factory identifier

NOTE 1 A simplified version of the manufacturer's name, or a trading name of the manufacturer, or the trademark word(s) (but not an image) owned and registered by the cable manufacturer, may be used in place of the full name.

NOTE 2 Other trademarks or equivalent not owned by the cable manufacturer may be added but these cannot be used instead of the cable manufacturer's name or identifier.

NOTE 3 Any suitable method may be used to unambiguously identify the manufacturer's factory.

b)	Electric cable	ELECTRIC CABLE
c)	Voltage designation	300/500 V
d)	British Standard number	BS 7629-1 [1)]
e)	Fire performance marking	STANDARD 30 or STANDARD 60 or ENHANCED 120
f)	Number of cores and nominal area of conductor	2 × 1.5
g)	Year of manufacture	ZZZZ

NOTE 4 The year of manufacture may take the form of the actual year (e.g. 2015) or a coded year identifier assigned by the manufacturer.

h)	Standard core colour identifier	H

The marking of all elements given in items a) to h) shall be done by embossing, indenting or printing on the sheath.

The marking of all elements given in items a) to h) inclusive shall appear, in any sequence that is deemed neither to confuse nor conflict, on one or more primary lines along the axis of the cables. Where more than one line is used, they shall be approximately equally spaced around the circumference of the cable.

NOTE 5 The order in which the elements of marking appear along the length of the external sheath is not prescribed, but it is preferred that they be in the order a) to h) as shown.

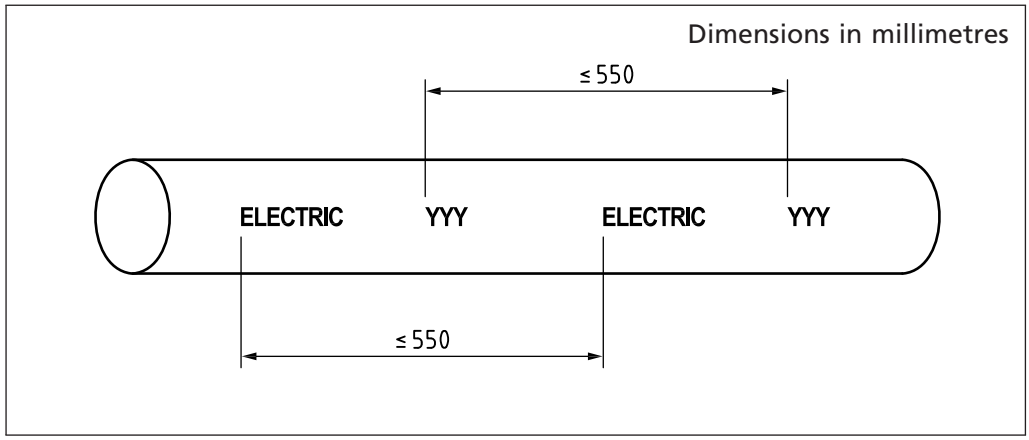
The letters and figures shall consist of upright block characters.

[1)] Marking BS 7629-1 or BS 7629-1:2015 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

The distance between the beginning of one complete group of mandatory markings, as given in items a) to h), and the beginning of the next identical complete group of the markings shall be not more than 550 mm in accordance with Figure 2.

Conformity of the marking shall be checked by visual examination and measurement of at least two sets of elements.

Figure 2 **Example of the marking as used on the outer sheath of the cable**



11.2 Fire performance marking

The fire performance of the cable shall be marked on the external sheath of the cable in accordance with **11.1**.

If the cable meets the fire test requirements specified in **15.6.2** and is declared as meeting fire test category STANDARD 30, it shall be marked "STANDARD 30".

If the cable meets the fire test requirements specified in **15.6.3** and is declared as meeting fire test category STANDARD 60, it shall be marked "STANDARD 60".

If the cable meets the fire test requirements specified in **15.6.4** and is declared as meeting fire test category ENHANCED 120, it shall be marked "ENHANCED 120".

11.3 Number of cores and cross-sectional area identifier

Cables shall be marked with the number of cores they contain and the nominal cross-sectional area of their conductors they contain, i.e.:

$$N \times A \qquad (3)$$

where:

N is the number of cores;

A is the nominal cross-sectional area of conductor.

11.4 Standard core colour identifier

When the standard core colour combinations are used for 2-, 3-, or 4-core cables in accordance with **7.1** the letter "H" shall be included in the marking on the external sheath of the cable in accordance with **11.1**.

11.5 The mark of an approval organization

If the mark of an approval organization is used, it shall be embossed, indented or printed throughout the length of the external sheath of the cable.

The mark shall be in the form of symbol(s) specified by the approval organization and the maximum distance between marks shall be not greater than 1 100 mm.

11.6 Additional information

11.6.1 General

Any additional information shall be embossed, indented or printed throughout the length of the external sheath of the cable.

The additional information shall be in one continuous string such that it does not render illegible the marking specified in **11.1**, **11.2, 11.3, 11.4** and **11.5**. The repeat interval shall not exceed 1 100 mm.

11.6.2 Conflict and confusion

Any additional information shall not conflict or cause confusion with the marking specified in **11.1**, **11.2, 11.3, 11.4** and **11.5**.

For the purposes of this British Standard the following markings shall not be used, as they are deemed to conflict or confuse:

a) marking of codes of practice;

NOTE 1 BS 5266-1, BS 5839-1 and BS 8519 are examples of codes of practice that are not allowed to be marked on the cable.

b) marking of a fire test standard that is already included in this British Standard including performance requirements;

NOTE 2 BS EN 50200 and BS 8434-2 are examples of fire test standards already included in this standard that are not allowed to be marked on the cable.

c) marking of any performance requirements that are included in standards referenced in this British Standard;

NOTE 3 PH15, PH30, PH60, PH90 and PH120 are examples of performance requirements from standards already included in this standard that are not allowed to be marked on the cable.

NOTE 4 Marking that is considered not to conflict or confuse includes but is not limited to:

a) marking of a fire test standard that is not included in this standard (for example, BS 6387 CWZ);

b) marking of the cables intended application (for example, EMERGENCY LIGHTING, EMERGENCY ESCAPE LIGHTING and FIRE ALARM).

11.7 Durability

Where the marking or additional information is applied by printing, it shall be durable such that it cannot be removed when tested in accordance with BS EN 50396, **5.1**.

12 Schedule of tests

The tests to be performed on cables specified in this British Standard shall be as scheduled in Table 5, which refers to the relevant clauses of this standard specifying the requirements and test methods as well as the category of each test which applies, i.e. T, S or R (as defined in Clause **3**).

Table 5 **Schedule of tests** (1 of 2)

Test	Require-ments given in Clause	Test method	Test category
Conductor:			
• Construction	**5.1**	BS EN 60228	S
• Continuity of tinning	**5.1**	Annex B	T
Drain wire:			
• Construction	**5.2**	BS EN 60228	S
• Continuity of tinning	**5.1**	Annex B	T
Insulation:			
• material	**6.1**	BS 7655-1.2 or BS EN 50363-1 or BS EN 50363-5	T
• application	**6.2**	Visual examination	S
• thickness	**6.3**	BS EN 50396, **4.1**	S
Core identification:			
• colours	**7.1**	Visual examination	S
• clarity and durability	**7.2**	BS EN 50396, **5.1**	S
Laying-up:			
• direction and sequence of lay	**8**	Visual examination	S
• length of lay of assembled cores	**8**	**15.3**	S
Screen			
• application	**9**	Visual examination and measurement	S
Sheath:			
• material	**10.1**	BS 7655-6.1	T
• application	**10.2**	Visual examination	S
• thickness	**10.3**	BS EN 50396, **4.2**	S
• spark test	**10.4**	BS EN 62230	R
Cable marking:	**11**	Visual examination and measurement	S
• durability of printed information	**11.7**	BS EN 50396, **5.1**	T
Conductor and drain wire resistance	**14.2**	BS EN 60228	R
Voltage test on complete cable	**14.3**	BS EN 50395, **10.3**	R
Voltage withstand	**15.2**	Annex C	S
Flame propagation on single cable	**15.4**	BS EN 60332-1-2	S
Smoke emission	**15.5**	BS EN 61034-2	S
Test to resistance to fire: category STANDARD 30	**15.6.2**	BS EN 50200 and BS EN 50200, Annex E	S
Test to resistance to fire: category STANDARD 60	**15.6.3**	BS EN 50200 and BS EN 50200, Annex E	S
Test to resistance to fire: category ENHANCED 120	**15.6.4**	BS EN 50200 and BS 8434-2	S

Table 5 **Schedule of tests** (2 of 2)

Test	Require-ments given in Clause	Test method	Test category
Ovality	**15.7**	BS EN 50396, **4.4**	S
Corrosive and acid gas	**16.2**	BS EN 60754-1	T
Shrinkage of insulation	**16.3**	BS EN 60811-502	T
Bending characteristics	**16.4**	Annex D	T
Resistance to impact	**16.5**	Annex E	T
Shrinkage test on sheath	**16.6**	Annex F	T

NOTE 1 Tests classified as sample (S) or routine (R) might be required as part of a type approval scheme.

NOTE 2 The order of the tests in this schedule does not imply a sequence of testing.

13 Test conditions

13.1 Temperature

Tests shall be performed at a temperature of (20 ±15) °C unless otherwise specified in the details for the particular test.

13.2 Frequency and waveform of power frequency test voltages

The frequency of the alternating test voltages shall be in the range of 49 Hz to 61 Hz, unless otherwise specified in the particular test. The waveform shall be substantially sinusoidal.

14 Routine tests

*COMMENTARY ON Clause **14***

In some tests, the preparation and presentation of the test sample can have a critical effect on the result of the tests, so test samples should always be prepared carefully.

14.1 General

Routine tests shall be performed in accordance with Table 5, as indicated by the symbol "R" in Column 4.

*NOTE The requirements for routine testing which are not fully covered by earlier clauses are detailed in **14.2** and **14.3**.*

14.2 Conductor and drain wire resistance

The d.c. resistance of each conductor shall conform to **5.1** when measured in accordance with BS EN 60228 and corrected to 20 °C. The measurement shall be made on a complete drum length or on a 1 m sample taken from the drum.

The d.c. resistance of each drain wire shall conform to **5.2** when measured in accordance with BS EN 60228 and corrected to 20 °C. The measurement shall be made on a complete drum length or on a 1 m sample taken from the drum.

14.3 Voltage test on completed cable

The completed cables given in Table 2 shall be tested in accordance with BS EN 50395, **10.3**, at a test voltage of 2 000 V a.c. r.m.s., or with direct current of 5 000 V, for 1 min between each insulated conductor and between each insulated conductor and the circuit protective conductor which shall be earthed. There shall be no breakdown of the insulation.

The completed cables given in Table 3 shall be tested in accordance with BS EN 50395, **10.3**, at a test voltage of 2 000 V a.c. r.m.s., or with direct current of 5 000 V, for 1 min between each insulated conductor and between each insulated conductor and the drain wire which shall be earthed. There shall be no breakdown of the insulation.

NOTE The cores may be suitably connected for successive application of the test voltage, provided that the sequence of connections ensures that the voltage is applied, for the time given, between each insulated conductor and each other insulated conductor, and between each insulated conductor and the drain wire, which should be earthed.

15 Sample tests

*COMMENTARY ON Clause **15***

In some tests, the preparation and presentation of the test sample can have a critical effect on the result of the tests, so test samples should always be prepared carefully.

15.1 General

Sample tests shall be performed in accordance with Table 5, as indicated by the symbol "S" in Column 4.

*NOTE The requirements for sample testing which are not fully covered by earlier clauses are detailed in **15.2** to **15.7**.*

15.2 Voltage withstand

When tested in accordance with Annex C, no breakdown of the insulation or sheath shall occur.

15.3 Length of lay of assembled cores

The length of lay of laid-up cores shall be determined by measuring the length of two pitches of a sample and dividing this length by 2. If the cores of the cable have been laid up using the right-hand-left-hand alternating direction method, only the right-hand or left-hand portion of the laid-up cores shall be used (i.e. not the transition between directions of lay). The result shall be taken as the length of lay of the laid-up cores.

15.4 Flame propagation on single cable

When tested in accordance with BS EN 60332-1-2, the sample of completed cable shall conform to BS EN 60332-1-2:2004, Annex A.

15.5 Smoke emission

When tested in accordance with BS EN 61034-2, using the apparatus specified in BS EN 61034-1, the smoke generated shall result in transmittance values of not less than 80%.

15.6 Test for resistance to fire

15.6.1 General

The cables shall conform to one of the following fire categories: STANDARD 30, STANDARD 60 or ENHANCED 120. Cables declared as meeting fire category STANDARD 30 shall conform to the requirements specified in **15.6.2**. Cables declared as meeting fire category STANDARD 60 shall conform to the requirements specified in **15.6.3**. Cables declared as meeting fire category ENHANCED 120 shall conform to the requirements specified in **15.6.4**.

NOTE 1 Fire categories, STANDARD 30 and ENHANCED 120 meet the fire test requirements for cables stated in BS 5839-1 for standard fire resisting cables and enhanced fire resisting cables respectively.

NOTE 2 Fire categories, STANDARD 60 and ENHANCED 120 meet the fire test requirements for cables stated in BS 5266-1 for emergency lighting cables and enhanced emergency lighting cables respectively.

15.6.2 Category STANDARD 30

The complete cable shall, as a minimum, have a duration of survival of 30 min when tested in accordance with BS EN 50200.

NOTE This corresponds to class PH 30 as detailed in BS EN 50200.

In addition it shall meet the 30 min survival time when tested in accordance with BS EN 50200, Annex E.

15.6.3 Category STANDARD 60

The complete cable shall, as a minimum, have a duration of survival of 60 min when tested in accordance with BS EN 50200.

NOTE This corresponds to class PH 60 as detailed in BS EN 50200.

In addition it shall meet the 30 min survival time when tested in accordance with BS EN 50200, Annex E.

15.6.4 Category ENHANCED 120

The complete cable shall, as a minimum, have a duration of survival of 120 min when tested in accordance with BS EN 50200.

NOTE This corresponds to class PH 120 as detailed in BS EN 50200.

In addition it shall meet the 120 min survival time when tested in accordance with BS 8434-2.

15.7 Ovality

The difference between any two values of the overall diameter of circular sheathed cables at the same cross-section shall not exceed 15% of the mean of the six diameter values obtained when tested in accordance with BS EN 50396, **4.4**.

A test sample shall be taken from a cable from three places, separated by at least 1 m.

Two measurements shall be taken at the same cross-section of the cable, covering the maximum and minimum values.

16 Type tests

*COMMENTARY ON Clause **16***

In some tests, the preparation and presentation of the test sample can have a critical effect on the result of the tests, so test samples should always be prepared carefully.

16.1 General

Type tests shall be performed in accordance with Table 5, as indicated by the symbol "T" in Column 4.

NOTE 1 See also Annex G.

*NOTE 2 The requirements for type testing which are not fully covered by earlier clauses are detailed in **16.2** to **16.6**.*

16.2 Corrosive and acid gas

Every non-metallic component shall be tested in accordance with BS EN 60754-1. The level of HCl in each component shall not exceed 0.5%.

16.3 Shrinkage of insulation

When a 200 mm sample of core is tested at (130 ±2) °C for 1 h in accordance with BS EN 60811-502, the shrinkage of the insulation shall not exceed 4%.

Every core in a cable shall be tested.

16.4 Bending characteristics

When tested in accordance with Annex D, the sheath shall be free from splits and there shall be no breakdown of the insulation.

16.5 Resistance to impact

When tested in accordance with Annex E, no breakdown of the insulation of any of the samples shall occur.

16.6 Shrinkage of sheath

When a sample of complete cable is tested at (80 ±2) °C for 4 h in accordance with Annex F, the shrinkage of the sheath shall not exceed 4%.

Annex A (informative) Guide to selection, installation and operation

*COMMENTARY ON ANNEX **A***

This annex gives details on general technical guidance and is not intended as an interpretation of any UK statutory requirements, where these apply.

A.1 Aim

The aim of this annex is to inform users of characteristics and limitations of electric cables and thereby to minimize their misuse.

It is assumed that the design of installations and the specification, purchase and installation of cables specified in this British Standard is entrusted to people who meet the definition of a skilled person or instructed person, as given in BS 7671.

NOTE The definitions (taken from BS 7671) are:

- *Skilled person (electrically) – Person who possesses, as appropriate to the nature of the electrical work to be undertaken, adequate education, training or practical skills, and who is able to perceive risks and avoid hazards which electricity can create.*
- *Instructed person (electrically) – Person adequately advised or supervised by a skilled person (as defined) to enable that person to perceive risks and to avoid hazards which electricity can create.*

In cases of doubt as to the suitability of cables for a particular use, further specific information should be obtained from the manufacturer.

A.2 General

Cables should be installed and used in association with other equipment in accordance with BS 7671.

NOTE 1 Attention is also drawn to any nationally applicable regulations, which in the UK are those referenced in BS 7671 and/or the Electricity Safety, Quality and Continuity Regulations 2002 [1], as appropriate.

In special environments, the appropriate regulations and codes of practice should be observed.

Cables supplied in accordance with this British Standard are primarily intended for use in emergency lighting, fire detection and fire alarm system circuits. In the UK, the codes of practice for these applications are BS 5266-1 and BS 5839-1.

Multi-core auxiliary cables are frequently used for interconnection of systems, control circuitry and small power circuits. Some codes of practice, dependent on the application and where it is being used, might limit the use of such cables and the relevant standards should be consulted.

NOTE 2 Attention is drawn to the fact that in countries outside the UK, corresponding national regulations might apply.

A.3 Maximum operating, short circuit and overload temperatures

The cables are suitable for use where the combination of ambient temperature and temperature rise due to load results in a conductor temperature not exceeding 70 °C and, in the case of a short circuit (maximum allowable time 5 s), the maximum conductor temperature does not exceed 250 °C. In the case of overload, the maximum allowable time is 4 h and the maximum conductor temperature should not exceed 156 °C. Repeated short circuits and overloads can potentially damage the cable and lead to premature failure.

However, when installed in an enclosure, subject to the sheath being terminated upon entry and the combination of ambient temperature and temperature rise due to load resulting in a conductor temperature not exceeding 70 °C outside the enclosure, the conductor temperature in the enclosure can be increased to a temperature not exceeding 90 °C.

The short-circuit temperature is based on the intrinsic properties of the insulating materials. It is essential that the accessories which are used in the cable system with mechanical and/or soldered connections are suitable for the temperature adopted for the cable. In case of doubt as to the temperature rating of the particular insulation, the manufacturer should be consulted.

A.4 Voltage ratings

The cables specified in this British Standard have a rated voltage (U_o/U) of 300/500 V.

The maximum sustained system voltage (U_m) is 550 V and is the highest voltage between phases which can be sustained under normal conditions at any time and at any point in the system. Transient voltage variations due, for example, to lightning impulses, fault conditions and rapid disconnection of loads are not taken into account.

The 300/500 V cables are suitable for d.c. systems up to 820 V between conductors. However, the peak value when determining the voltage of a d.c. system derived from rectifiers should be taken into account, bearing in mind that smoothing does not modify the peak value when the rectifiers are operating on an open circuit.

A.5 Cable selection and system design

A.5.1 The products specified in this British Standard are intended for fixed installations and to be used for the supply of electrical energy up to the rated voltage indicated on the cable. **A.4** classifies the voltage ratings of cables manufactured in accordance with this British Standard. These ratings should not be exceeded.

A.5.2 These cables are intended for use within a nominal power frequency range of 49 Hz to 61 Hz or direct current.

A.5.3 For current ratings of cables installed in and around buildings, reference should be made to BS 7671.

A.5.4 In addition to the current ratings, due regard should be given to:

a) the capability of the cable to withstand the worst anticipated fault and overload condition of the system;

b) the earth loop impedance;

c) the operating characteristics of the connected equipment; and

d) the voltage drop requirements during normal load or motor starting conditions.

A.5.5 The possible effects of transient over-voltages should be recognized as they can be detrimental to cables.

A.5.6 During installation, the cables should not be bent to a radius smaller than six times the overall diameter of the cable.

A.5.7 The cables are suitable for locations where low levels of emission of smoke and corrosive gases are required in the case of fire.

A.5.8 The cables are intended to provide circuit integrity when subject to fire conditions when appropriately selected and installed.

A.6 Environment and application

A.6.1 Reasonable protection against mechanical damage, appropriate to the choice of cable and the installation conditions, should be provided.

A.6.2 Cables could be harmed by exposure to corrosive products or solvent substances, especially petroleum-based chemicals or their vapours.

A.6.3 Special precautions are required when cables are to be installed in areas classified as hazardous, e.g. potentially explosive gas atmospheres. Reference should be made to BS EN 60079-14.

A.6.4 If cables conforming to this British Standard are exposed to localized heat, solar radiation or high temperature ambient conditions, the current carrying capacity is reduced.

A.7 Installation

A.7.1 General

Cables specified in this British Standard are designed for use in fixed installations in industrial areas, buildings and similar applications. The cables are intended for installation in air (which includes installation in trunking or other closed systems). The cables are not suitable for either direct burial in the ground or installation within cable ducts that are buried in the ground. When cables are installed in any other environment, reference should be made to the cable manufacturer.

As the cables are designed for fixed installations only, they are not to be used where they are subject to flexing.

A.7.2 Minimum temperature during installation

Cables should be installed only when both the cable and ambient temperatures are above 0 °C and have been so for at least the previous 24 h, or where special precautions have been taken to maintain the cable above this temperature.

A.7.3 Minimum installation radius

Cables should not be bent during installation to a radius smaller than 6 times the diameter of the cable.

Wherever possible, larger installation radii should be used.

A.7.4 Preventing damage to cables

Precautions should be taken to avoid mechanical damage to the cables before and during installation.

A.7.5 Selection of cable glands, accessories and associated tools

The selection of cable glands, accessories and any associated tools should take account of all aspects of intended use.

A.8 Waste and scrap cable

Information and guidance on the incineration of scrap cable should be obtained from the Environment Agency, or equivalent national or regional bodies.

Annex B (normative) Method of test for continuity of tinned coatings of wires

B.1 Sample preparation

From the completed cable which has previously been straightened by hand, carefully remove the following lengths of the uninsulated circuit protective conductor (CPC) or the drain wire:

- for a class 1 (solid) conductor, remove at least 450 mm;
- for a class 2 (stranded) conductor, remove at least 150 mm.

Take care to ensure that no damage is caused to the wire and its coating in any way.

From the CPC or drain wire, carefully take three individual lengths of wire of at least 150 mm each. De-grease the wires without causing damage, then wipe, using a clean dry cloth. Ensure that any wires cleaned in this manner are not touched by hand.

B.2 Test solution preparation

Prepare the test solution of sodium polysulfide by dissolving 480 g of $Na_2S.9H_20$ in 500 ml of water, adding 40 g of NaOH and 18 g of sulfur. Stir thoroughly and dilute to 1 L with water.

B.3 Test procedure

Immerse the wires in a solution of sodium polysulfide, prepared in accordance with **B.2**.

After 30 s of immersion, remove the wires and wash carefully in distilled water.

Examine the wires under a magnification of at least × 30.

Annex C (normative) Method of test for voltage withstand

C.1 Sample

The sample shall be of completed cable not less than 20 m long.

C.2 Procedure

Immerse the sample in water at a temperature of (20 ±5) °C for a period of not less than 24 h. Ensure that the ends of the cable protrude above the water by a distance sufficient to prevent excessive surface leakage when the test voltage is applied between the conductor and the water.

Take:

a) each conductor in turn; and

b) all other conductors, which are connected together and also connected to the water.

Gradually apply a test voltage of 2 000 V between a) and b) and maintain at full r.m.s. value for 15 min.

Repeat the test, but applying the voltage between all conductors connected together and the water.

In both cases, earth the circuit protective conductor or drain wire but do not include it in the conductors to be tested.

While the sample is still immersed, disconnect the circuit protective conductor or drain wire from the water and apply a voltage of 1 000 V a.c. for 5 min between this and the water.

Annex D (normative) Method of test for bending characteristics

D.1 Apparatus and sample

D.1.1 *Test mandrel*, having a diameter of 12 *D* ±5%, where *D* is the external diameter of the completed cable.

D.1.2 *Sample of completed cable*, of a length at least five times the diameter of the test mandrel (**D.1.1**) and not less than 1 500 mm.

D.2 Preparation

Cool the sample and test mandrel for 2 h at 0 °C. Then immediately test in accordance with **D.3**.

D.3 Procedure

Mount the test mandrel on a horizontal or vertical axis about which it is free to rotate. Lay out the cable sample straight on a level surface and secure one cable end to the test mandrel through a swivel connection. Draw a reference line along the top of the cable parallel to its longitudinal axis.

Rotate the mandrel steadily so that all the cable is wound on in a closely wrapped coil, preventing the cable from twisting during the operation. Then rotate the mandrel in the opposite direction so that the cable is unwound and again laid straight on the level surface.

Rotate the cable through 180° around its longitudinal axis and repeat the winding and unwinding processes.

Take:

a) each conductor in turn; and

b) all other conductors, which are connected together and also connected to the circuit protective conductor or drain wire and earth.

Gradually apply a test voltage of 2 000 V a.c. between a) and b) and maintain at the full r.m.s. value for 1 min.

Annex E (normative) Method of test for resistance to impact

E.1 Apparatus and samples

E.1.1 *Impact test apparatus* (in accordance with BS EN 60811-506, Figure 1), with a chisel-edged intermediate piece (see Figure E.1) placed with its longitudinal axis at a right angle to that of the cable, and with a radiused intermediate piece.

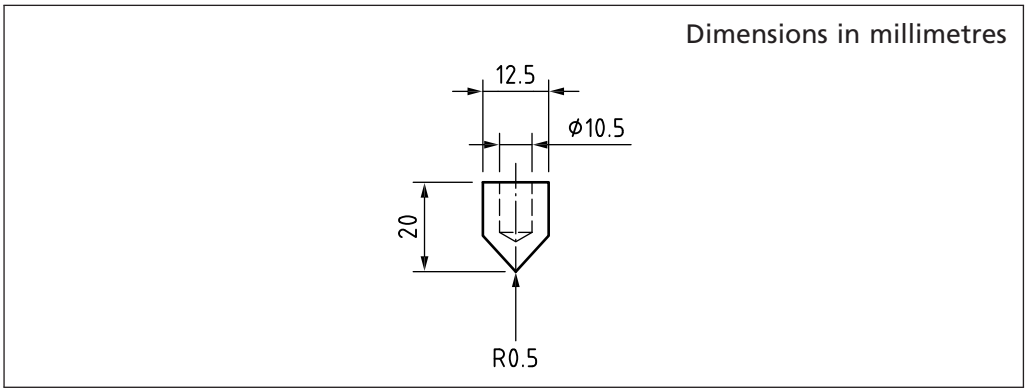
E.1.2 *Six samples of cable*, each approximately 500 mm.

E.2 Procedure

Carry out the test at a temperature of (20 ±5) °C.

Stand the impact test apparatus on a firm base. Draw a reference line along the top of the cable parallel to its longitudinal axis prior to cutting the samples.

Figure E.1 **Chisel-edged intermediate piece for test for resistance to impact**



Remove 100 mm of sheath from the end of each sample to allow the cores to be separated. Place the samples successively in position on the impact test apparatus and allow the 500 g hammer to fall from a height of 250 mm, three samples being tested with the chisel-edged intermediate piece and three with the radiused intermediate piece. For each set of three samples, fix the impact position on each successive sample approximately 120° from the previous position.

For each sample of cable, take:

a) each conductor in turn; and

b) all other conductors, which are connected together and also connected to the circuit protective conductor or drain wire and metallic layer.

Gradually apply a test voltage of 2 000 V a.c between a) and b) and maintain at the full r.m.s. value of 2 000 V for 1 min.

Annex F (normative) Method of test for shrinkage of sheath on cable during heat treatment

F.1 Selection of samples

Take one sample of each cable to be tested, about 300 mm in length, and at least 500 mm away from the end of the cable length.

F.2 Preparation of test piece

Within 5 min from the time of cutting the sample, mark a test length of (200 ±5) mm on the middle part of the test piece. Measure the distance between the marks to an accuracy of 0.5 mm.

Prepare the test piece by removing the sheath from both ends of the sample up to positions between 2 mm and 5 mm away from the marks.

F.3 Procedure

Perform the test in an electrically heated air oven capable of maintaining the test temperature. Support the test piece by means of a freshly prepared talc bath. The combined volume of test apparatus and test piece shall not exceed 10% of the volume of the oven. Preheat the oven with the test apparatus, including the talc bath, in place for a minimum of 2 h at (80 ±2) °C before the test piece is introduced.

Support the test piece horizontally on the surface of the talc bath. Ensure that there is sufficient depth of talc so that the test piece does not touch the bottom of the bath. Spread the talc evenly, without compacting it, at the start of the test, so as to permit free movement of the sheath.

Introduce the test piece into the test oven, and maintain it at a temperature of (80 ±2) °C for 4 h. At the end of this period, remove the apparatus with the test piece in place, and allow it to cool to room temperature.

Re-measure the distance between the two marks on the test piece to an accuracy of 0.5 mm.

F.4 Evaluation of results

Calculate the difference in the distance between the marks before the heat treatment and after the heating and cooling, and record the shrinkage as a percentage of the distance between the marks before treatment.

Annex G (informative) Notes on type tests

G.1 General

Type tests, after they have been completed, need not be repeated unless changes have been made that affect conformity to the test requirements. This means that type tests should not normally be required on cables for any individual contracts provided that such type tests have already been successfully performed by the manufacturer.

G.2, **G.3** and **G.4** give guidance as to the amount of type testing that might reasonably be required.

G.2 Sample selection for type tests

Type tests for components are permitted to be performed on any one cable sample.

NOTE The results of these type tests are not determined by the cable size or construction.

For the type tests on a finished cable, conformity to the requirements should be confirmed for the complete range of cables in this standard by selecting samples for test as follows:

- for cable conforming to Table 2, the smallest conductor size with smallest number of cores, and the largest conductor size with the largest number of cores should be tested;
- for cable conforming to Table 3, any one cable taken from the range stated should be tested;
- if more than one type of insulation is being used across a range of cables then additional samples should be selected to cover all types of insulation.

In addition, where manufacturers wish to demonstrate conformity to this standard, the cable samples should be subjected to full dimensional checks and to all other sample (S) and routine (R) tests given in Table 5.

G.3 Type tests

G.3.1 Insulation material test (see 6.1)

One test should be performed for each grade of insulation material on any one cable from the range of cables selected.

G.3.2 Sheath material test (see 10.1)

One test should be performed for each grade of sheath material on any one cable from the range of cables selected.

G.3.3 Durability of printing test (see 7.2)

One test should be performed on any one cable from the range of cables selected.

G.3.4 Corrosive and acid gas test (see 16.2)

As this is a test on a cable component and is therefore generally independent of size or number of cores, only one test should be carried out on each component and grade of material.

G.3.5 Smoke emission test (see 15.5)

*COMMENTARY ON **G.3.5***

This test is classified as a sample test. The guidance given below applies to type testing.

To cover a range of cables conforming to Table 2, the smallest conductor size with smallest number of cores, and the largest conductor size with the largest number of cores should be tested.

To cover a range of cables conforming to Table 3, any one cable taken from the range stated should be tested.

G.3.6 Fire resistance test (see 15.6)

*COMMENTARY ON **G.3.6***

These tests are classified as sample test. The following guidance applies to type testing.

It is at the discretion of the manufacturer for cables conforming to Table 2 and Table 3 which of the fire resistance categories STANDARD 30, STANDARD 60 or ENHANCED 120 is declared.

G.3.6.1 General

In accordance with **4.2,** if a cable conforms to the requirements for category STANDARD 60 it is deemed to conform to the requirements for categories STANDARD 30 and the tests stated in **G.3.6.2** are not required to be carried out.

G.3.6.2 Category STANDARD 30 (see 15.6.2)

When category STANDARD 30 is being claimed for cable conforming to Table 2, the smallest conductor size with smallest number of cores and the largest conductor size with the largest number of cores should be tested.

When category STANDARD 30 is being claimed for cable conforming to Table 3, any one cable with any conductor size and with any number of cores should be tested.

G.3.6.3 Category STANDARD 60 (see 15.6.3)

When category STANDARD 60 is being claimed for cable conforming to Table 2, the smallest conductor size with smallest number of cores and the largest conductor size with the largest number of cores should be tested.

When category STANDARD 60 is being claimed for cable conforming to Table 3 any one cable with any conductor size and with any number of cores should be tested.

G.3.6.4 Category ENHANCED 120 (see 15.6.4)

When category ENHANCED 120 is being claimed for cable conforming to Table 2, the smallest conductor size with smallest number of cores, and the largest conductor size with the largest number of cores should be tested.

When category ENHANCED 120 is being claimed for cable conforming to Table 3 any one cable with any conductor size and with any number of cores should be tested.

G.4 Change of material

The tests referred to in **G.3** assume that the materials are consistent throughout the range of cables for which conformity is to be confirmed. Where a change occurs, additional testing should be included to ensure that such changes are adequately examined.

G.5 Evidence of type testing

When evidence of type testing is required, this should be stated at the enquiry stage. Because of the possible variations in cable designs, it should not be assumed that full type test information will be available for the size and type of cable of a particular enquiry.

A certificate of type test signed by the representative of a competent witnessing body, or a properly authorized report by the manufacturer giving the test results, should be acceptable.

Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 5266-1, *Emergency lighting – Part 1: Code of practice for the emergency escape lighting of premises*

BS 5839-1, *Fire detection and fire alarm systems for buildings – Part 1: Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises*

BS 6387, *Test method for resistance to fire of cables required to maintain circuit integrity under fire conditions*

BS 8519, *Selection and installation of fire-resistant power and control cable systems for life safety and fire-fighting applications – Code of practice*

BS EN 60079-14, *Explosive atmospheres – Electrical installations design, selection and erection*

Other publications

[1] GREAT BRITAIN. The Electricity Safety, Quality and Continuity Regulations 2002. London: The Stationery Office.

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™