



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

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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

BS 7629-1:2015 superseded [BS 7629-1:2008](#), which was withdrawn on 31 August 2016.

BS 7629-1:2015+A1:2019 supersedes BS 7629-1:2015, which is withdrawn.

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.

Text introduced or altered by Amendment No. 1 is indicated in the text by tags A1 A1. Minor editorial changes are not tagged.

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.

Test laboratory accreditation. Users of this British Standard are advised to consider the desirability of selecting test laboratories that are accredited to BS EN ISO/IEC 17025 by a national or international accreditation body.

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.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. “organization” rather than “organisation”).

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.

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 (CPC), and 7-core, 12-core and 19-core circular multicore auxiliary cables with an uninsulated drain wire of not less than 0.5 mm². 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.

 Text deleted 

[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 cables 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 on 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 [11.1a\)](#) 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](#); and
- 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 multicore 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 mm ²	Radial thickness of insulation mm	CPC nominal cross-sectional area mm ²	Nominal thickness of sheath mm	Approximate overall diameter 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 multicore auxiliary cables

Number of cores	Nominal cross-sectional area of conductor mm ²	Radial thickness of insulation mm	Drain wire nominal cross-sectional area mm ²	Nominal thickness of sheath mm	Approximate overall diameter 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 $\times 30$. 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 mm² and shall conform to the resistance requirements of a 0.5 mm² 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 system

6.1 Type of insulation

[A1] The insulation system shall meet the requirements of EI 2 as specified in BS EN 50363-1 or EI 5 as specified in BS EN 50363-5. **[A1]** 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

[A1] The insulation system shall be applied by an extrusion process, either in a single layer or in a number of layers. The layer, or layers, shall be cross-linked.

NOTE 1 It is permitted to use different materials for each layer. There are no requirements for individual layers, just for the whole system.