



BSI Standards Publication

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

Part 1: Multicore and multipair cables

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## Contents

Foreword *iii*

|           |                                   |           |
|-----------|-----------------------------------|-----------|
| <b>1</b>  | Scope                             | <b>1</b>  |
| <b>2</b>  | Normative references              | <b>1</b>  |
| <b>3</b>  | Terms and definitions             | <b>2</b>  |
| <b>4</b>  | Voltage designation               | <b>3</b>  |
| <b>5</b>  | Conductors and drain wire         | <b>3</b>  |
| <b>6</b>  | Insulation                        | <b>4</b>  |
| <b>7</b>  | Identification of cores           | <b>6</b>  |
| <b>8</b>  | Laying up                         | <b>6</b>  |
| <b>9</b>  | Screen                            | <b>8</b>  |
| <b>10</b> | Sheath                            | <b>8</b>  |
| <b>11</b> | Marking                           | <b>9</b>  |
| <b>12</b> | Routine test for completed cables | <b>9</b>  |
| <b>13</b> | Sample tests for completed cables | <b>9</b>  |
| <b>14</b> | Type tests for completed cables   | <b>10</b> |

### Annexes

|                       |                                                                     |           |
|-----------------------|---------------------------------------------------------------------|-----------|
| Annex A (informative) | Recommendations for selection, operation and installation of cables | <b>12</b> |
| Annex B (informative) | Schedule of tests                                                   | <b>14</b> |
| Annex C (normative)   | Measurement of insulation and sheath thickness                      | <b>16</b> |
| Annex D (normative)   | Test conditions                                                     | <b>17</b> |
| Annex E (normative)   | Method of test for insulation faults                                | <b>18</b> |
| Annex F (normative)   | Method of test for voltage withstand                                | <b>19</b> |
| Annex G (normative)   | Method of test for bending characteristics                          | <b>20</b> |
| Annex H (normative)   | Method of test for resistance to impact                             | <b>21</b> |
| Bibliography          |                                                                     | <b>23</b> |

### List of figures

|            |                                                      |           |
|------------|------------------------------------------------------|-----------|
| Figure 1   | Lay up diagram of 7-core, 12-core and 19-core cables | <b>7</b>  |
| Figure H.1 | Apparatus for test for resistance to impact          | <b>22</b> |

### List of tables

|           |                                             |           |
|-----------|---------------------------------------------|-----------|
| Table 1   | Dimensions of multicore cables              | <b>5</b>  |
| Table 2   | Dimensions of multipair cables              | <b>5</b>  |
| Table 3   | Identification of cores in multicore cables | <b>6</b>  |
| Table B.1 | Schedule of tests                           | <b>15</b> |

### Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 24, an inside back cover and a back cover.



## Foreword

### Publishing information

This British Standard is published by BSI and came into effect on 30 November 2008. It was prepared by Subcommittee GEL/20/17, *Low voltage cables*, under the authority of Technical Committee GEL/20, *Electric cables*.

### Supersession

This British Standard supersedes BS 7629-1:1997 and BS 7629-2:1997, both of which are withdrawn.

### Relationship with other publications

This new edition of BS 7629-1 takes account of the publication of BS 5266-1:2005 and BS 5839-1:2002 incorporating Amendment No. 1, and introduces new requirements for resistance to fire of unprotected small cables, including those conforming to BS EN 50200:2006 with its optional water spray protocol.

BS 7629-2 is no longer market relevant. However, as a few multipair types originally covered by BS 7629-2 still have a limited market relevance, these have been brought into this new edition of BS 7629-1.

The new edition also takes account of:

- BS EN 60228 (replacing BS 6360) on conductors;
- BS EN 50363 (replacing certain parts of BS 7655) on materials;
- BS EN 60332-1-2 (replacing BS EN 50265-2-1) and BS EN 61034 (replacing BS EN 50268) on reaction to fire performance tests;
- BS EN 62230 (partially replacing 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.

### Presentational conventions

The provisions in 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.**

# 1 Scope

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

- have a thermosetting insulation of rated voltage 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 as measured by standard tests;
- are primarily intended for use in emergency lighting, fire detection and fire alarm system circuits.

*NOTE 1 BS 5266-1 and BS 5839-1 give recommendations and guidance on the factors that need to be considered 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, 19-core, 2-pair and 3-pair circular cables with an uninsulated drain conductor of not less than 0.5 mm<sup>2</sup>. All cables contain a metallic layer, which provides electrostatic screening.

*NOTE 2 A guide to the use of the cables specified in this British Standard is given in Annex A.*

*NOTE 3 The schedule of tests is specified in Annex B.*

# 2 Normative references

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

BS 5099, *Electric cables – Voltage levels for spark testing.*

BS 6387, *Specification for performance requirements for cables required to maintain circuit integrity under fire conditions*

BS 7655-1.2, *Specification for insulating and sheathing materials for cables – Part 1: 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 EN 13603:2002, *Copper and copper alloys – Test methods for assessing protective tin coatings on drawn round copper wire for electrical purposes*

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

BS EN 50267-2-1, *Common test methods for cables under fire conditions – Test on gases evolved during combustion of materials from cables – Part 2-1: Procedures – Determination of the amount of halogen acid gas*

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 60228:2005, *Conductors of insulated cables*

BS EN 60332-1-2, *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 60811-1-1, *Insulating and sheathing materials of electric and optical cables – Common test methods – Part 1-1: General application – Measurement of thickness and overall dimensions – Tests for determining the mechanical properties*

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

BS EN 61034-2:2005, *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 definitions given in IEC 60050-461 apply, together with the following.

#### 3.1 values

##### 3.1.1 approximate value

value which is only indicative

*NOTE* Values described as “approximate” do not constitute requirements to be checked by measurement.

##### 3.1.2 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.

#### 3.2 voltages

##### 3.2.1 maximum voltage $U_m$

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

### 3.2.2 rated voltage $U$

nominal power-frequency voltage between phase conductors for which the cable is suitable

### 3.2.3 rated voltage $U_0$

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

## 3.3 fire resistance

ability of a cable to maintain circuit integrity for a stated period of time and under conditions as defined in a standard test

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

## 4 Voltage designation

The cables shall be designated by the rated voltages  $U_0$  and  $U$ , expressed in the form  $U_0/U$ .

*NOTE The rated voltage recognized for the purpose of this British Standard is 300/500 V.*

## 5 Conductors and drain wire

### 5.1 Conductors

The conductors shall conform to:

- BS EN 60228:2005, class 1 or 2, for multicore cables, defined according to Table 1 of this Standard;
- BS EN 60228:2005, class 1, 2 or 5, for multipair cables, defined according to Table 2 of this Standard.

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

Tinned coated wires shall conform to BS EN 13603:2002, Clause 5.

The class of conductor shall be the same for all conductors in any single cable. Where an uninsulated circuit protective conductor is provided, it shall be of the same class as the insulated conductors.

### 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<sup>2</sup> and shall conform to the resistance requirements for class 1, 2 or 5, as relevant, specified in BS EN 60228:2005.

Tinned coated wires shall conform to BS EN 13603:2002, Clause 5.

*NOTE Drain wires that are of the same class and have the same nominal cross-sectional area as the insulated conductors can also serve the function of a circuit protective conductor.*

## 6 Insulation

### 6.1 Type

The insulation shall be one of the following types:

- type EI 2 or EI 3, as specified in BS EN 50363-1;
- type EI 5, as specified in BS EN 50363-5;
- type GP 4 or GP 6, as specified in BS 7655-1.2.

For the assessment of halogens on the insulation taken from a completed cable, only 6.5 shall apply.

*NOTE 1 Other tests for assessment of halogens, for instance to BS EN 50267-2-2 and BS EN 60684-2, are not required.*

*NOTE 2 A tape or tapes can be applied either over the conductor or over the insulation of the individual core.*

### 6.2 Application

The insulation shall be applied closely to the conductor or conductor taping by the extrusion process and cross-linked to form a compact and homogeneous layer. The insulation can be applied in a single layer, or in a number of cohesive layers. 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 Insulation applied in more than one layer does not conform to the definition of "double insulation" given, for instance, in BS 7671.*

When the application is tested by removing the insulation from the conductor, there shall be no damage to the insulation itself, the conductor, or the tin coating, if any.

### 6.3 Thickness

The thickness of the insulation, when determined by taking the average of a number of measurements in accordance with Annex C, shall be not less than the value specified in Table 1 or Table 2 as applicable, and the smallest of the measured values shall not fall below the value given in Table 1 or Table 2 by more than 0.1 mm + 10%.

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