

Electric cables —

Single core unsheathed heat resisting cables for voltages up to and including 450/750 V, for internal wiring

ICS 29.060.20

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- Association of Manufacturers Allied to the Electrical and Electronic Industry (BEAMA Ltd.)
- British Approvals Service for Cables
- British Cables Association
- British Plastics Federation
- British Retail Consortium
- Chartered Institution of Building Services Engineers
- Department of Trade and Industry (Consumer Safety Unit, CA Division)
- Electrical Installation, Equipment, Manufacturers Association
- Electricity Association
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- ERA Technology Ltd.
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Foreword

This British Standard has been prepared by Subcommittee GEL/20/1. It supersedes BS 6007:1993 which is withdrawn. This revision of BS 6007 specifies requirements for single core, unsheathed, rubber insulated 110 °C and 180 °C cables for internal wiring. It is aligned with HD 22.3 S3 and HD 22.7 S2.

The following cables which were in BS 6007:1993 have been transferred to other standards:

H05RR-F types (in BS 6007:1993, Table 3) have been transferred to BS 7919; H07RN-F types (in BS 6007:1993, Tables 4 and 4A) have been transferred to BS 7919. The following national types have been deleted from BS 6007 as being obsolete:

450/750 V single core, braided, rubber insulated cables (in BS 6007:1993, Table 1); 300/500 V flat twin rubber insulated cables (in BS 6007:1993, Table 2). The following national type has been superseded by the H07BN4-F harmonized type in BS 7919:

450/750V rubber insulated, HOFR sheathed cables (in BS 6007:1993, Table 5).

The following harmonized type has been transferred from BS 6500:

H05SJ-K type smaller than 4 mm².

It has been assumed in the preparation of this standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people for whose use it has been produced.

Annexes C, D, E and F are normative. Annexes A and B are informative.

WARNING. This British Standard calls for the use of substances and/or procedures that may 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.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 18, an inside back cover and a back cover.

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1 Scope

This British Standard specifies requirements for the construction, dimensions and mechanical and electrical properties of single core unsheathed rubber insulated cables for operation at voltages up to and including 450 V a.c. to earth and 750 V a.c. between conductors, intended for use as internal wiring.

The types of cable included in the standard are as follows:

Table 3	110 °C heat resisting rubber insulated cable, single core unsheathed (H07G-U)	450/750 V;
Table 4	110 °C heat resisting rubber insulated cable, single core unsheathed (H07G-R)	450/750 V;
Table 5	110 °C heat resisting rubber insulated cable, single core unsheathed (H07G-K)	450/750 V;
Table 6	110 °C heat resisting rubber insulated cable, single core unsheathed (H05G-U)	300/500 V;
Table 7	110 °C heat resisting rubber insulated cable, single core unsheathed (H05G-K)	300/500 V;
Table 8	Braided, 180 °C silicone rubber insulated cable, single core unsheathed and twisted twin (H05SJ-K)	300/500 V;
Table 9	180 °C silicone rubber insulated cable, single core unsheathed (H05S-U)	300/500 V;
Table 10	180 °C silicone rubber insulated cable, single core unsheathed (H05S-K)	300/500 V.

A guide to the use of the cables specified in this standard is given in annex A. Guidance to manufacturers on procedures for routine testing is given in annex B. Test methods are given in annexes C, D, E and F.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 4727-2:Group 08, *Glossary of electrotechnical, power, telecommunication, electronics, lighting and colour terms — Part 2: Terms particular to power engineering — Group 08: Electric cables.*

BS 6360, *Specification for conductors in insulated cables and cords.*

BS 7655-1.1, *Specification for insulating and sheathing materials for cables — Part 1: Cross-linked elastomeric insulating compounds — Section 1.1: Harmonized types.*

BS EN 60811-1-1:1995, *Insulating and sheathing materials of electric cables — Common test methods — Part 1: General application — Section 1.1: Measurement of thickness and overall dimensions — Tests for determining the mechanical properties.*

PD 2379, *Register of colours of manufacturers' identification threads for electric cables and cords.*

3 Terms and definitions

For the purposes of this British Standard the terms and definitions given in BS 4727-2:Group 08 and the following apply.

3.1

rated voltage U_0

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

3.2

rated voltage U

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

3.3

nominal value

value by which a quantity is designated and which is often used in tables

NOTE In this standard, nominal values usually give rise to values to be checked by measurement taking into account specified tolerances.

3.4

approximate value

value which is only indicative

NOTE In this standard, values described as "approximate" do not constitute requirements to be checked by measurement.

3.5

type tests (symbol T)

tests required to be made before supplying a type of cable covered by this standard on a general commercial basis, in order to demonstrate satisfactory performance characteristics to meet the intended application

NOTE These 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.

3.6

sample tests (symbol S)

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

3.7

routine tests (symbol R)

tests made on all production lengths of cable to demonstrate their integrity

4 Voltage designation

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

In an a.c. system, the rated voltage of a cable shall be at least equal to the nominal voltage of the system for which it is intended and this applies both to the value U_0 and to the value U .

In a d.c. system, the nominal voltage between the conductors shall be not higher than 1.5 times the rated voltage U of the cable and the nominal voltage between any conductor and earth shall be not higher than 1.5 times the rated voltage U_0 of the cable.

The rated voltages recognized for the purposes of this standard shall be 300/500 V and 450/750 V.

NOTE The operating voltage of a system may permanently exceed the nominal voltage of such a system by 10 %. A cable can be used at 10 % higher voltage than its rated voltage if the latter is at least equal to the nominal voltage of the system.

5 General

5.1 Construction

The construction of the cables shall be as specified in the appropriate construction table (Tables 3 to 10).

Conformity shall be checked by examination.

5.2 Identification and marking

5.2.1 General

Each cable shall be identified by its colour as indicated in the appropriate construction table.

Designated harmonized codes for cables are given in the appropriate construction tables and, except where explicitly shown as national types, these cables shall be permitted to bear the CENELEC Common Marking in accordance with 5.2.4.

5.2.2 Colours

The colour shall be either throughout the whole of the insulation or on its surface.

On the cable with the bi-colour combination green/yellow, the distribution of these colours shall be such that for every 15 mm length of cable, one of these colours shall cover at least 30 % and not more than 70 % of the surface of the cable, while the other colour covers the remainder of the surface.

Conformity shall be checked by measurement.

NOTE 1 In cases of dispute regarding the green/yellow combination and where appropriate to the method of colour marking of the insulation, a suitable test method for checking conformity is given in BS 6469-99.1:1992, clause 8.

NOTE 2 It is understood that the colours green and yellow when they are combined as specified are recognized as identifying exclusively the cable intended for use as an earth connection or similar protection. The colour blue is for the identification of the cable intended to be connected to the neutral but, if there is no neutral, blue may be used to identify any cable except for the earthing or protective conductor.

NOTE 3 Attention is drawn to the fact that, according to the use to which the cables are to be put, they could be subject to core colour requirements specified in BS 7671, in other British Standards or in other standards, or in regulations or statutory requirements.

NOTE 4 In addition to the combination green/yellow, and the mono-colour blue, the following other mono-colours are recognized as harmonized: black, brown, grey, orange, pink, red, turquoise, violet and white.

5.2.3 Indication of origin

All cables shall be provided with an indication of origin consisting either of an identification thread or threads or the continuous marking of the manufacturer's name or trademark.

If coloured threads are used, the colours shall conform to those registered in PD 2379, where applicable. The colours shall be easy to recognize or shall become recognizable by cleaning with petrol or other suitable solvent, if necessary.

The marking of the manufacturer's name or trademark, if used, shall be by one of the following alternative methods:

- a) printed tape within the cable;
- b) printing, indenting or embossing on the insulation.

Each specified mark shall be legible and shall be regarded as continuous if the distance between the end of one mark and the beginning of the next identical mark does not exceed 275 mm.

Conformity shall be checked by measurement.

NOTE A "specified mark" is a mandatory mark covered by this standard, or the optional CENELEC Common Marking as specified in 5.2.4.

5.2.4 CENELEC "Common Marking"

It shall be permitted for a cable for which a harmonized code designation is given in the appropriate construction table, to carry an indication that it has been manufactured under a licence issued by one of the approvals organizations subscribing to the CENELEC agreement on the use of a commonly agreed marking for cables. If it does carry such an indication, this shall be one of the following.

- a) The mark of the approvals organization, followed by the Common Marking applied by one of the alternative methods specified in 5.2.3.
- b) An identification thread extending throughout the length of the cable indicating the approvals organization. The base colour shall be yellow and this shall be serially dyed or printed red and black. The lengths of the coloured sections shall conform to the dimensions laid down by CENELEC for that approvals organization (see PD 2379).

Neither of these indications shall be used for a cable shown in the construction tables as a national type or national size.

The name CENELEC, in full or abbreviated, shall not be directly marked on, or in, the cable.

5.2.5 Identification mark

Where cables are to be distinguished from cables in other standards by additional marking, the marking shall be as given in the applicable construction table.

The marking shall be continuous as specified in 5.2.3.

Conformity shall be checked by measurement.

5.2.6 Clarity and durability of colour and marking

The colours shall be clearly identifiable and durable.

Conformity shall be checked by trying to remove the colour of the cores by rubbing the core lightly 10 times with a piece of cotton wool or cloth soaked in water.

Any marking by printing shall be durable.

Conformity shall be checked by rubbing the marking lightly 10 times with a piece of cotton wool or cloth soaked in water.

5.3 Cable testing

5.3.1 Schedule of tests

Tests to be performed on cables specified in this standard shall be as specified in Table 2, which refers to the relevant clauses of the 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).

NOTE Table 2 also indicates which tests relate to the completed cables and which relate to components.

5.3.2 Test conditions

5.3.2.1 Ambient temperature

Tests shall be performed at an ambient temperature of $(20 \pm 15)^\circ\text{C}$ unless otherwise specified in the details for a particular test.

5.3.2.2 Frequency and waveform of power frequency test voltages

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

6 Constructional details

6.1 Conductors

The conductors shall be annealed copper conforming to BS 6360. The class of conductor and whether the individual wires are to be plain or coated, for example with nickel, tin or silver shall be as given in the appropriate construction table.

The d.c. resistance of the conductors shall be as specified in 7.2.

Plain conductors in cables specified in Tables 8 to 10 shall conform to the solderability requirements specified in 8.4.

A separator tape shall be applied over the conductor where specified in the appropriate construction table.

NOTE The construction tables also indicate those cables with which the use of a separator is optional.

6.2 Insulation

6.2.1 Type of insulation

The insulation shall be either type EI 2 or type EI 3 conforming to BS 7655-1.1 as specified in the appropriate construction table.

6.2.2 Application

The insulation shall be applied closely by extrusion to the conductor or separator.

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

Conformity shall be checked by examination and by a manual test.

6.2.3 Thickness

The radial thickness of the insulation, when determined by taking the average of a number of measurements in accordance with annex D, shall be not less than the value given in the appropriate construction table and the smallest of the measured values shall not fall below the value by more than 10 % + 0.1 mm.

6.3 Overall braid

For cables specified in Table 8, a braid covering the insulation shall be applied. The yarns forming the braid shall be glass fibre, treated with a suitable substance in order to resist fraying. The braid shall have a uniform texture, without knots or gaps.

Table 1 — List of tests applicable to cables specified in Tables 3 to 10

Clause number	Test	Cable specified in table							
		3	4	5	6	7	8	9	10
	<i>Electrical tests</i>								
7.2	Conductor resistance	X	X	X	X	X	X	X	X
7.3	Voltage test on cable at 2 000 V	—	—	—	X	X	X	X	X
7.3	Voltage test on cable at 2 500 V	X	X	X	—	—	—	—	—
7.4	Absence of faults in the insulation	X	X	X	X	X	X	X	X
7.5	Insulation resistance at 110 °C	X	X	X	X	X	—	—	—
	<i>Constructional and dimensional tests</i>								
5.1	Check on construction	X	X	X	X	X	X	X	X
6.2.3	Measurement of insulation thickness	X	X	X	X	X	X	X	X
8.2	Measurement of overall diameter	X	X	X	X	X	X	X	X
8.3	Measurement of ovality	—	—	—	—	—	X	X	X
8.4	Solderability test (plain conductors)	—	—	—	—	—	X	X	X