

Electric cables — Flexible cords rated up to 300/500 V, for use with appliances and equipment intended for domestic, office and similar environments

ICS 29.060.20

Committees responsible for this British Standard

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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 Service Engineers
 Department of Trade and Industry (Consumer Safety Unit, CA Division)
 Electrical Installation Equipment Manufacturers Association
 Electricity Association
 Energy Industries Council
 Engineering Industries Association
 ERA Technology Ltd.
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Foreword

This British Standard has been prepared by Subcommittee GEL/20/1. It supersedes BS 6500:1994 which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** **A1**. Tags indicating changes to text carry the number of the amendment. For example, text altered by amendment No. 1 is indicated by **A1** **A1**.

This revision of BS 6500 specifies requirements for flexible cords for domestic, office and similar environments. In addition to the cords specified in BS 6500:1994, it incorporates cords specified in HD 21.12 and HD 22.12 having conductor sizes up to 2.5 mm².

Amendment No. 1:2002 to BS 6500:2000 deletes cable type H03VH-H following the publication by CENELEC of amendment A2:2001 to HD 21.5, which withdrew this cable type on safety grounds.

Amendment No. 2:2004 implements the changes to the identification of cores by colours, in accordance with HD 308 S2. The principal identification colours are now:

Single phase — Green-and-yellow (Earth); blue (Neutral); brown (Live).

Three phase — Green-and-yellow (Earth); blue (Neutral); brown, black, grey (Live).

Users should ensure that any interconnection between cables with these new colours and those with the pre-existing ones is carried out safely. BS 7671, as amended in parallel with this standard, gives some guidance in this respect, but does not cover all installation conditions or cable uses.

The provisions introduced by amendment No. 2:2004 are effective from 1st April 2004. The version of this standard incorporating only amendment No. 1:2002 remains current until 31st March 2006.

BS 6500 complements BS 7919:2001 which specifies requirements for flexible cables for industrial and similar environments.

The following cords which were in BS 6500:1994 have been transferred to other standards.

H07RN-F types (in BS 6500:1994, Table 8) have been transferred to BS 7919.

H05SJ-K types (in BS 6500:1994, Table 10) have been transferred to BS 6007.

H05VV-F types having conductor sizes larger than 2.5 mm² (in BS 6500:1994, Table 16) have been transferred to BS 7919.

H05V-K and H05V2-K types (in BS 6500:1994, Table 19) have been transferred to BS 6004.

The following national types have been deleted from BS 6500 as being obsolete:

300/300 V and 300/500 V screened PVC cords (in BS 6500:1994, Table 17 and Table 18).

300/300 V varnished glass-fibre insulated cables (in BS 6500:1994, Table 22 and Table 23).

The following national type has been superseded by the H05BN4-F harmonized type:

300/500 V rubber insulated, HOFR sheathed flexible cord (in BS 6500:1994, Table 9).

Annex C, Annex D, Annex E, Annex F, Annex G, Annex H, Annex I, Annex J and Annex K are normative. Annex A and Annex B are informative.

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

Warning. 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.

A3 *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. **A3**

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 does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 53 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 insulated flexible cords for operation at voltages up to and including 300 V a.c. to earth and 500 V a.c. between conductors, intended for use with appliances and equipment in domestic or similar environments for light or ordinary duty.

The types of cord included in this standard are as follows:

A₂ Text deleted **A₂**

Table 11	Light duty rubber insulated, braided flexible UDF cord, circular twin and 3-core. (National type)	300/300 V;
Table 12	Ordinary duty rubber insulated and sheathed flexible cord, circular twin, 3-core, 4-core and 5-core. (H05RR-F)	300/500 V;
Table 13	Ordinary duty rubber insulated, PCP or equivalent synthetic elastomer sheathed flexible cord, circular twin and 3-core. (H05RN-F)	300/500 V;
Table 14	Ordinary duty rubber insulated, sheathed, screened and sheathed flexible cord, circular twin, 3-core and 4-core. (National type)	300/500 V;
Table 15	Ordinary duty heat resisting 90 °C EPR or equivalent synthetic elastomer insulated and sheathed flexible cord, circular twin, 3-core, 4-core and 5-core. (H05BB-F)	300/500 V;
Table 16	Ordinary duty heat resisting 90 °C EPR or equivalent synthetic elastomer insulated and CSP or equivalent synthetic elastomer sheathed flexible cord, circular twin, 3-core and 4-core. (H05BN4-F)	300/500 V;

A₂ Text deleted **A₂**

Table 24	PVC insulated (tinsel conductors) flexible cord, parallel twin. (H03VH-Y)	300/300 V;
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A₁ Text deleted **A₁**

Table 26	Light duty PVC insulated and sheathed flexible cord, parallel twin, circular twin, 3-core and 4-core. (H03VV-F and H03VVH2-F)	300/300 V;
Table 27	Ordinary duty PVC insulated and sheathed flexible cord, parallel twin, circular twin, 3-core, 4-core and 5-core. (H05VV-F and H05VVH2-F)	300/500 V;
Table 28	Light duty 90 °C PVC insulated and sheathed flexible cord, parallel twin, circular twin, 3-core and 4-core. (H03V2V2-F and H03V2V2H2-F)	300/300 V;
Table 29	Ordinary duty 90 °C PVC insulated and sheathed flexible cord, parallel twin, circular twin, 3-core, 4-core and 5-core. (H05V2V2-F and H05V2V2H2-F)	300/500 V.

In addition, this standard specifies the requirements for PVC insulated extensible leads. Coil profiles of these leads are given in Table 7.

A guide to the use of the cords 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 Annex C to Annex K.

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: Elastomeric insulating compounds — Section 1.1: Harmonized types.*

BS 7655-2.1, *Specification for insulating and sheathing materials for cables — Part 2: Cross-linked elastomeric sheathing compounds — Section 2.1: Harmonized types.*

BS 7655-3.1, *Specification for insulating and sheathing materials for cables — Part 3: PVC insulating compounds — Section 3.1: Harmonized types.*

BS 7655-4.1, *Specification for insulating and sheathing materials for cables — Part 4: PVC sheathing compounds — Section 4.1: Harmonized types.*

 Text deleted 

BS EN 50265-2-1, *Common test methods for cables under fire conditions — Test for resistance to vertical flame propagation for a single insulated conductor or cable — Part 2-1: Procedures — 1 kW pre-mixed flame.*

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.*

BS EN 60811-1-2:1995, *Insulating and sheathing materials of electric cables — Common test methods — Part 1: General application — Section 1.2: Thermal ageing methods.*

BS EN 60811-4-1, *Insulating and sheathing materials of electric cables — Common test methods — Part 4: Methods specific to polyethylene and polypropylene compounds — Section 4.1: Resistance to environmental stress cracking — Wrapping test after thermal ageing in air — Measurement of the flow index — Carbon black and/or mineral content measurement in PE.*

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 cord is suitable

3.2

rated voltage U

nominal power-frequency voltage between phase conductors for which the cord 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 cord 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 cord 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 cord, or components taken from a completed cord, adequate to verify that the finished product meets the design specifications

3.7

routine tests (symbol R)

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

4 Voltage designation

Cords 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 cord 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 cord and the nominal voltage between any conductor and earth shall be not higher than 1.5 times the rated voltage U_0 of the cord.

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

NOTE The operating voltage of a system may permanently exceed the nominal voltage of such a system by 10 %. A cord 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 cords shall be as specified in the appropriate construction table (Table 11 to Table 16, Table 24 or Table 26 to Table 29).

Conformity shall be checked by examination.

5.2 Core identification

5.2.1 General

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

5.2.2 Core colours

The colour shall be either throughout the whole of the insulation or on its surface. Alternatively, for cords having an optional proof tape, that tape shall be coloured.

The colours of the cores according to the number of cores in the cord and also the sequence of the colours shall be as given in the appropriate construction table.

On the core with the bi-colour combination green-and-yellow, the distribution of these colours shall be such that for every 15 mm length of core, one of these colours shall cover at least 30 % and not more than 70 % of the surface of the core, 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-and-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 core intended for use as an earth connection or similar protection. The colour blue is for the identification of the core intended to be connected to the neutral but, if there is no neutral, blue may be used to identify any core except for the earthing or protective conductor.

5.2.3 Clarity and durability of colour

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.

5.3 Cord markings

5.3.1 General

Designated harmonized codes for cords are given in the appropriate construction tables and, except where explicitly shown as national types, these cords shall be permitted to bear the CENELEC Common Marking in accordance with 5.3.3.

5.3.2 Indication of origin

All cords shall be provided with an indication of origin consisting of either 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 cord;
- b) printing, indenting or embossing on the insulation of at least the blue core;
- c) printing, indenting or embossing on the sheath, if any.

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 the following:

- 1) 550 mm if the marking is on the outer sheath of the cord; or
- 2) 275 mm if the marking is:
 - i) on the insulation of an unsheathed cord;
 - ii) on the insulation of a sheathed cord;
 - iii) on a tape within a sheathed cord.

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 5.3.3.

5.3.3 CENELEC "Common Marking"

It shall be permitted for a cord 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 cords. 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 <HAR> applied by one of the three methods specified in 5.3.2.
- b) An identification thread extending throughout the length of the cord 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 cord shown in the construction tables as a national type,  national size or Special National Condition .

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

5.3.4 Identification mark

 Harmonized cables shall be marked with the CENELEC harmonized code designation, as given in the applicable construction table. For unsheathed cables the marking shall be on the insulation. For sheathed cables to Table 13, Table 15 and Table 16 the marking shall be on the sheath. For all other sheathed cables it shall be on the sheath or on the insulation of one core.

The marking shall be continuous as specified in 5.3.2.

Conformity shall be checked by measurement. 

5.3.5 Durability of marking

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.

5.4 Cord testing

5.4.1 Schedule of tests

The tests to be performed on cords specified in this standard shall be as specified in Table 2 and Table 5, which refer 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 and Table 5 also indicate which tests relate to the completed cords, and which relate to components.

5.4.2 Test conditions

5.4.2.1 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.

5.4.2.2 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 of 49 Hz to 61 Hz. The waveform shall be substantially sinusoidal.

6 Flexible cords with thermosetting insulation

6.1 Conductors

The conductors shall be tinned or plain annealed copper conforming to BS 6360.

The class of conductor shall be as given in the appropriate construction table.

The d.c. resistance of the conductors shall be as specified in 6.8.2.

A2 Plain conductors shall conform to the solderability requirements specified in 6.9.9. **A2**

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

6.2 Insulation

6.2.1 Type of insulation

The insulation shall be one of the following types as specified in the appropriate construction table:

A2 type EI 4, EI 6 or EI 7 conforming to BS 7655-1.1 **A2**;

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 K.1, 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 $10\% + 0.1\text{ mm}$.

6.2.4 Additional tape

Where specified in the appropriate construction table, it shall be permissible for a proofed tape to be applied over the insulation. Where tapes are used, it shall be possible to remove this tape without damage to the insulation.

6.3 Core identification

Each core shall be identified by its colour in accordance with 5.2 and the specific requirements specified in the appropriate construction table.

6.4 Fillers and binders

The use of fillers and binders shall be in accordance with the appropriate construction table.

NOTE Where applicable, the construction tables indicate whether:

- a centre filler is permitted;
- the sheath is required to fill the outer interstices;
- separate fillers are permitted to fill the interstices;
- a binder tape is permitted over the assembly of cores, and fillers if any.

Where separate fillers are used, they shall be of elastomeric compound, natural textiles, synthetic textiles or similar material.

It shall be possible to remove the sheath, fillers and binder tape without damage to the cores.

6.5 Textile braid

The yarns forming the braid shall be based on natural material (cotton, treated cotton or silk) or on synthetic material (e.g. rayon, polyamide).

The braid shall have a uniform texture without knots or gaps.

6.6 Sheath

6.6.1 Type of sheath

The sheath shall be one of the following types as specified in the appropriate construction table:

Ⓐ type EM 2, EM 3, EM 6 or EM 7 conforming to BS 7655-2.1 Ⓐ;

6.6.2 Application

The sheath shall be extruded in a single homogeneous layer, and shall be capable of being removed without damage to the cores. Where taped cores are employed, some transfer of proofing from the tapes shall be permissible.

6.6.3 Thickness

The radial thickness of the sheath, when determined by taking the average of a number of measurements in accordance with **K.2**, 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 15 % + 0.1 mm.

6.6.4 Colour

6.6.4.1 General

The colour of the sheath shall be as specified in the appropriate construction table.

6.6.4.2 Black sheaths

Where the appropriate construction table specifies that the cord shall have a black sheath, or where a black sheath is applied to a cord where colour is not specified, the colour shall be throughout the whole of the sheath.

6.6.4.3 Non-black sheaths

For all non-black sheaths, the colour shall be throughout the whole of the sheath or on its surface. Where surface colouring is applied, the surface colour shall be of essentially the same material as the underlying material and shall be applied as part of the extrusion process. The surface colour shall not be separable from the underlying material and shall be durable.

6.7 Screen

The wire braid screen of screened cords shall consist of tinned annealed copper wires as specified in the appropriate construction table. The number of spindles and the number of ends per spindle shall be sufficient to ensure that the filling factor is not less than 0.6. The filling factor, F , shall be calculated from the following formula:

$$F = \frac{mnd_w}{2\pi D} \left(1 + \frac{\pi^2 D^2}{L^2} \right)^{1/2}$$

where

- D is the mean diameter of the braid in millimetres (mm);
- d_w is the diameter of the braiding wire in millimetres (mm);
- L is the lay length of the braiding wire in millimetres (mm);
- m is the total number of spindles;
- n is the total number of ends per spindle.

6.8 Electrical tests

6.8.1 General

The electrical tests to be performed on flexible cords with thermosetting insulation shall be as specified in Table 1.

These tests shall be performed in accordance with the test schedule given in Table 2.

Table 1 — List of tests applicable to the flexible cords specified in Clause 6

Clause number	Test	Cord specified in table					
		11	12	13	14	15	16
	Electrical tests						
6.8.2	Conductor resistance	X	X	X	X	X	X
6.8.3	Voltage test on completed cord at 2 000 V	X	X	X	X	X	X
6.8.4	Voltage test on cores at 1 500 V ^a	—	X	X	X	X	X
6.8.4	Voltage test on cores at 2 000 V ^b	—	X	X	X	X	X
6.8.5	Absence of faults in the insulation	X	X	X	X	X	X
6.8.6	Surface resistance of sheath	—	X	X	X	X	X
	Constructional and dimensional tests						
5.1	Check on construction	X	X	X	X	X	X
6.2.3	Measurement of insulation thickness	X	X	X	X	X	X
6.6.3	Measurement of sheath thickness	—	X	X	X	X	X
6.9.2	Measurement of overall diameter	X	X	X	X	X	X
6.9.3	Measurement of ovality	—	X	X	X	X	X
	Mechanical strength of completed cords						
6.9.5	Two pulley flexing test	X	X	X	X ^c	X	X
6.9.8	Wear resistance test	X	—	—	—	—	—
	Other tests						
6.9.9	Solderability test	X	X	X	X	X	X
6.9.10	Compatibility test	—	—	—	—	—	X
6.10	Flame propagation of a single cord	—	—	X	X	—	X
^a For insulation thicknesses up to and including 0.6 mm. ^b For insulation thicknesses exceeding 0.6 mm. ^c To be performed on cord before application of screen and outer sheath.							

A₂

Table 2 — Schedule of tests applicable to the flexible cords specified in Clause 6

Test	Requirement given in clause	Test method	Test category
<i>Tests on components</i>			
Conductor construction	6.1	BS 6360	S
Insulation:			
material	6.2.1	BS 7655-1.1 or -11.1	T
application	6.2.2	Visual examination	S
thickness	6.2.3	K.1	S
Core identification:			
colour	6.3	Visual examination	S
clarity and durability of colour	5.2.3	5.2.3	S
Fillers and binders	6.4	Visual examination	S
Textile braid	6.5	Visual examination	T
Screen	6.7	Visual examination and measurement	S
Sheath:			
physical properties	6.6.1	BS 7655-2.1 and -12.2	T
application	6.6.2	Visual examination	S
thickness	6.6.3	K.2	S
<i>Tests on completed cords</i>			
Cord markings	5.3	Visual examination and measurement	R
Durability of marking	5.3.5	5.3.5	S
Conductor resistance test	6.8.2	BS 6360	S
Voltage test on completed cord	6.8.3	C.2	S
Voltage test on cores	6.8.4	C.3	T
Absence of faults in the insulation	6.8.5	C.6	R
Surface resistance of sheath	6.8.6	C.7	T
Mean overall diameter	6.9.2	BS EN 60811-1-1:1995, 8.3	S
Ovality	6.9.3	BS EN 60811-1-1:1995, 8.3	S
Two pulley flexing test	6.9.5	D.1	T
Wear resistance test	6.9.8	D.4	T
Solderability test	6.9.9	Annex F	T
Compatibility test	6.9.10	Annex G	T
Flame propagation of a single cord	6.10	BS EN 50265-2-1	T
NOTE Tests classified as sample (S) or routine (R) may be required as part of a type approval scheme.			

A2

6.8.2 Conductor resistance

The d.c. resistance of each conductor shall be measured in accordance with BS 6360 on a sample of completed cord not less than 1 m in length. ^{A2} The resistance of each conductor of all cords shall not exceed the relevant value specified in BS 6360. ^{A2}

6.8.3 Voltage test on completed cord

When the cord is tested in accordance with C.2, no breakdown of the insulation shall occur.

6.8.4 Voltage test on cores

When the cores are tested in accordance with C.3, no breakdown of the insulation shall occur.

6.8.5 Absence of faults in the insulation

When the cord is tested in accordance with C.6, no breakdown of the insulation shall occur.

6.8.6 Surface resistance of sheath

This test shall be carried out on cords with sheaths made of compounds EM 2, EM 3 ^{A2} Table deleted ^{A2}, EM 6 and EM 7.

The surface resistance, when tested in accordance with C.7, shall be not less than $1 \times 10^9 \Omega$.

6.9 Non-electrical tests

6.9.1 General

The non-electrical tests to be performed on flexible cords with thermosetting insulation shall be as specified in Table 1.

These tests shall be performed in accordance with the test schedule given in Table 2.

NOTE In some tests the preparation and presentation of the test sample can have a critical effect on the results of the tests, so it is essential that test samples are always prepared carefully.

Test samples shall be examined for damage before testing. Test samples which have been damaged during preparation shall not be tested.

6.9.2 Mean overall diameter

The mean overall diameter of the cord shall be within the limits specified in the appropriate construction table, with the exception of national types and sizes for which the lower limit given in the construction tables shall be taken as an indicative value and not a requirement for conformity to this standard.

Conformity shall be checked by the method described in BS EN 60811-1-1:1995, 8.3.

One sample of cord shall be taken from each of three places, separated by at least 1 m, and the mean of the six values obtained shall be taken as the mean overall diameter.

6.9.3 Ovality

Except for the cords specified in ^{A2} Table 11 ^{A2}, the difference between any two values of the overall diameter of sheathed cords at the same cross-section shall not exceed 15 % of the upper limit for the mean overall diameter given in the appropriate construction table.

Conformity shall be checked by the method described in BS EN 60811-1-1:1995, 8.3.

One sample shall be taken from each of three places separated by at least 1 m.

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

6.9.4 ^{A2} Spare ^{A2}

6.9.5 *Two pulley flexing test*

Cords specified in A_2 Table 11, Table 12, Table 13, Table 15 and Table 16 A_2 shall be tested in accordance with D.1 and shall conform to the following requirements.

During the test with 30 000 cycles, i.e. 60 000 single movements, there shall be:

- no interruption of the current;
- no short circuit between the conductors;
- no short circuit between the cord and the pulley wheels (the flexing apparatus).

After the required number of cycles the sheath of the cord, if any, shall be removed. The cores shall then be subjected to the voltage test specified in C.3. No breakdown of the insulation shall occur.

For screened cords specified in Table 14, the tests shall be carried out before the application of the screen and sheath.

6.9.6 A_2 Spare A_2

6.9.7 A_2 Spare A_2

6.9.8 *Wear resistance test*

For cords specified in A_2 Table 11 A_2 , when the cord is tested as described in D.4, no insulation shall be visible in any of the fixed cord samples over a total length of more than 10 mm. After the test, no breakdown of the insulation shall occur in any of the cores from the fixed cord samples when subjected to the voltage test specified in C.2.

6.9.9 *Solderability test*

For the cords specified in A_2 Table 11 to Table 16 A_2 , to assess any possible interaction between the insulation and any plain conductor, the cord shall be subjected to the solderability test specified in Annex F.

After testing in accordance with F.2, those conductors which are not blackened shall be considered to have passed the test. When cords which failed the test described in F.2 are subjected to the test procedure described in F.3, F.4 and F.5, the part of the plain conductor which has been immersed in the solder bath shall be adequately tinned.

6.9.10 *Compatibility*

For cords specified in A_2 Table 16 A_2 , after a sample of completed cord has been aged in accordance with G.2, the insulation and sheath shall conform to the requirements given in Table 3. In addition, at the end of the test period in the oven, the blotting paper shall be free of stains.

6.9.11 A_2 Spare A_2

6.10 *Flame propagation of a single cord*

Cords specified in A_2 Table 13, Table 14 and Table 16 A_2 shall be tested in accordance with BS EN 50265-2-1. The test shall be carried out on a sample of the completed cord.

A_2 After the test, the cord shall conform to the performance recommendations given in BS EN 50265-2-1:1999, Annex A. A_2

Table 3 — Compatibility requirements for the flexible cords specified in Clause 6

Component	Parameter	Requirement for material type		
		EI 7	EI 4	EM 7
Insulation	Minimum tensile strength (N/mm ²)	5.0	4.2	—
	Minimum percentage elongation at break	—	200	—
	Maximum percentage variation ^a of tensile strength	±30	±25	—
	Maximum percentage variation ^a of elongation at break	±30	±25	—
Sheath	Minimum tensile strength (N/mm ²)	—	—	—
	Minimum percentage elongation at break	—	—	—
	Maximum percentage variation ^a of tensile strength	—	—	±30
	Maximum percentage variation ^a of elongation at break	—	—	±40

^a The variation is the difference between the respective values obtained prior to and after heat treatment, expressed as a percentage of the former.

A2

7 Flexible cords with thermoplastic insulation

7.1 Conductors

The conductors shall be tinned or plain annealed copper conforming to BS 6360.

The class of the conductor shall be as given in the appropriate construction table.

The d.c. resistance of the conductors shall be as specified in 7.8.2.

Tinsel conductors shall conform to the requirements specified in Table 24.

7.2 Insulation

7.2.1 Type of insulation

The insulation shall be either type TI 2 or type TI 3 conforming to BS 7655-3.1, as specified in the appropriate construction table.

7.2.2 Application

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

For cores other than those of tinsel cords specified in Table 24, it shall be possible to remove the insulation easily, without damage to the insulation itself or to the conductor or to the tin coating, if any.

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

7.2.3 Thickness

The radial thickness of the insulation, when determined by taking the average of a number of measurements in accordance with K.1, 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.

7.3 Core identification

Each core shall be identified by its colour in accordance with 5.2 and the specific requirements specified in the appropriate construction table.

NOTE It is not necessary to identify the cores of non-sheathed parallel twin flexible cords.