

Specification for

Insulated flexible cords and cables

UDC 621.315.342 UDC

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The preparation of this British Standard was entrusted by the Cables and Insulation Standards Policy Committee (CIL/-) to Technical Committee CIL/20 upon which the following bodies were represented:

- Association of Consulting Engineers
- Association of Manufacturers of Domestic Electrical Appliances
- BEAMA Electrical Cable and Conductor Accessory Manufacturers' Association
- British Approvals Service for Cables
- British Cable Makers Confederation
- British Plastics Federation
- British Steel Industry
- Department of the Environment (Property Services Agency)
- Department of Trade and Industry (Consumer Safety Unit, CA Division)
- Electricity Association
- Engineering Equipment and Materials Users' Association
- Institution of Electrical Engineers
- London Regional Transport

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- Association of Manufacturers Allied to the Electrical and Electronic Industry (BEAMA Ltd.)
- British Electrical Systems Association (BEAMA Ltd.)
- British Non-ferrous Metals Federation
- British Steel plc
- Chartered Institution of Building Services Engineers
- ERA Technology Ltd.
- Electrical Installation Equipment Manufacturers' Association (BEAMA Ltd.)
- Engineering Industries Association
- GAMBICA (BEAMA Ltd.)
- Institution of Incorporated Executive Engineers
- Lighting Industry Federation Ltd.
- London Underground Ltd.
- National Association of Lift Makers
- Portable Electric Tool Manufacturers' Association
- Transmission and Distribution Association (BEAMA Ltd.)

This British Standard, having been prepared under the direction of the Cables and Insulation Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 15 March 1994

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First published August 1969
Second edition December 1975
Third edition August 1984
Fourth edition April 1990
Fifth edition March 1994

The following BSI references relate to the work on this standard:
Committee reference CIL/20
Draft for comment 93/32694 DC

ISBN 0 580 22339 6

Amendments issued since publication

Amd. No.	Date	Comments
8312	October 1994	
8345	March 1995	Indicated by a sideline in the margin

Contents

	Page
Committees responsible	Inside front cover
Foreword	iv
Section 1. General	
1 Scope	1
2 References	1
2.1 Normative references	1
2.2 Informative references	1
3 Definitions	2
4 Voltage designation	2
5 Core identification	2
6 Marking	3
7 Construction and overall dimensions of cords in sections 2 and 3	3
8 Electrical requirements for cords in sections 2 and 3	4
9 Mechanical strength requirements for cords in sections 2 and 3	4
10 Test under fire conditions	7
Section 2. Requirements for rubber-insulated flexible cords	
11 Conductors	8
12 Insulation	8
13 Core identification	8
14 Fillers	8
15 Braid	9
16 Sheath	9
17 Screen	9
18 Marking	9
Section 3. Requirements for PVC-insulated flexible cords	
19 Conductors	19
20 Insulation	19
21 Core identification	19
22 Fillers	19
23 Sheath	19
24 Screen	20
Section 4. Requirements for flexible cords insulated with varnished glass fibre: National type	
25 Conductors	28
26 Insulation	28
27 Core identification	28
28 Indication of origin	28
29 Construction and overall dimensions	29
30 Electrical and mechanical test requirements for completed cords	29
Section 5. Requirements for PVC-insulated extensible leads	
31 Type	30
32 Requirements prior to coiling	30
33 Coiling	30
34 Requirements after coiling	30
35 Mechanical test requirements for extensible leads	31
Appendix A Guide to the use of insulated flexible cords	32

	Page
Appendix B Guidance on procedure for routine tests on rubber and PVC-insulated flexible cords of rated voltage U_0/U up to 450/750 V in sections 2 and 3	35
Appendix C Electrical tests	36
Appendix D Mechanical strength tests	38
Appendix E Solderability test for plain conductors	41
Appendix F Test methods for flexible cords insulated with varnished glass fibre: National type	43
Appendix G Procedure for checking the efficacy of the method of spark testing	44
Appendix H Test methods for PVC-insulated extensible leads	44
Appendix J Non-contamination test	45
Appendix K Test for resistance to heat of textile braids	45
Figure 1 — Typical 2-core extensible lead	30
Figure 2 — Flexing apparatus	39
Figure 3 — Bending test apparatus	41
Figure 4 — Arrangement for wear resistance test	42
Figure 5 — Spark test check: removal of insulation	44
Figure 6 — Spark test check: covering with tape	44
Figure 7 — Apparatus for test for resistance to heat of textile braids	46
Table 1 — Load and diameter of pulleys for flexing test	6
Table 2 — Current for flexing test	7
Table 3 — Rubber-insulated, braided flexible cord, 300/300 V twisted twin	9
Table 4 — Rubber-insulated, braided flexible cord, 300/300 V circular twin and 3-core	10
Table 5 — Rubber-insulated, braided, UDF cord, 300/300 V circular twin and 3-core	11
Table 6 — Rubber-insulated, sheathed, ordinary flexible cord, 300/500 V circular twin, 3-core, 4-core and 5-core	12
Table 7 — Rubber-insulated, sheathed, screened, sheathed flexible cord, 300/500 V circular twin, 3-core and 4-core	13
Table 8 — Rubber-insulated, sheathed flexible cord, 450/750 V single-core, circular twin, 3-core, 4-core and 5-core	14
Table 9 — Rubber-insulated, HOFR-sheathed flexible cord, 300/500 V circular twin, 3-core and 4-core	15
Table 10 — Rubber-insulated, braided, heat resistant cord, 300/500 V single-core and twisted twin	16
Table 11 — Summary of the electrical tests on rubber-insulated cords in section 2	17
Table 12 — List of tests applicable to the flexible cords in section 2	18
Table 13 — PVC-insulated (tinsel conductors) flexible cord, 300/300 V parallel twin	20
Table 14 — PVC-insulated (wire conductors) flexible cord, 300/300 V parallel twin	20
Table 15 — PVC-insulated, PVC-sheathed light cord, 300/300 V parallel twin, circular twin, 3-core and 4-core	21
Table 16 — PVC-insulated, PVC-sheathed ordinary cord, 300/500 V parallel twin, circular twin, 3-core, 4-core and 5-core	22
Table 17 — PVC-insulated, sheathed, screened, sheathed light cord, 300/300 V circular twin and 3-core	23

	Page
Table 18 — PVC-insulated, sheathed, screened, sheathed ordinary cord, 300/500 V circular twin, 3-core and 4-core	24
Table 19 — PVC-insulated, non-sheathed, cord, 300/500 V single-core and twisted twin	25
Table 20 — Summary of the electrical tests on PVC-insulated cords in section 3	26
Table 21 — List of tests applicable to the flexible cords in section 3	27
Table 22 — Glass fibre insulated flexible cord, 300/300 V single-core, twisted twin and twisted 3-core	28
Table 23 — Glass fibre insulated, braided flexible cord, 300/300 V circular twin and 3-core	29
Table 24 — Minimum internal diameter of extensible leads	31
Table 25 — Guide to the use of insulated flexible cords	33
Table 26 — Spark test voltage	35
Table 27 — Insulation test voltage	35
Table 28 — Insulation resistance constant (<i>K</i> value) at 20 °C	36
Table 29 — Temperature correction factor	36
List of references	48

Foreword

This new edition of BS 6500 has been prepared under the direction of the Cable and Insulation Standards Policy Committee and it supersedes BS 6500:1990, which is withdrawn.

This edition includes alterations introduced by Amendment Nos. 1 and 2 to BS 6500:1990 (published in September 1991 and April 1992 respectively) together with some further technical changes to bring the standard up-to-date.

These technical changes are necessary to align with the following amendments to harmonized documents:

Amendment 6 to HD 21.2 S2;

Amendments 8, 9, 10 and 11 to HD 22.1 S2;

Amendments 3 and 5 to HD 22.2 S2;

Amendment 6 to HD 22.4 S2.

This edition does not reflect a full review of the standard, which will be undertaken in due course.

Differences in the text between this edition and BS 6500:1990 are indicated by a line in the margin.

This British Standard takes into account CENELEC¹⁾ Harmonization Documents HD 21 and HD 22.

Where harmonized code designations are given, the requirements are in conformity with those of other countries which accept the basic principles of harmonization in accordance with the requirements of CENELEC. Flexible cords shown as national types are not harmonized but are regarded as representing a particular requirement in the United Kingdom which is not reflected in other countries.

Colours for core identification as agreed within CENELEC have been included in the appropriate tables. A guide to the use of flexible cords is given in Appendix A and guidance to manufacturers on procedure for routine testing in Appendix B. This standard and the Harmonization Documents mentioned above are generally in agreement with the technical provisions of the appropriate recommendations issued by the International Electrotechnical Commission (IEC).

Certification. Attention is drawn to the certification services (see inside back cover) of the British Approvals Service for Cables (BASEC)²⁾. These services include licensing manufacturers to use BASEC certification trade marks as independent assurance that cables or cords have been designed and manufactured to appropriate British Standards. BASEC is a subscriber to an agreement in CENELEC whereby cables or cords coming within harmonized code designations and manufactured under a BASEC licence can carry marks acceptable to other signatory countries (CENELEC “Common Marking”).

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their 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 48, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

¹⁾ European Committee for Electrotechnical Standardization.

²⁾ British Approvals Service for Cables.

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Section 1. General

1 Scope

This British Standard specifies requirements and dimensions for insulated flexible cords and cables for operation at voltages up to and including 450 V to earth and 750 V between conductors.

The types of flexible cords and cables included in this standard are:

- | | | |
|--------------|---|------------|
| a) Table 3. | Rubber-insulated, braided cord, twisted twin | 300/300 V; |
| b) Table 4. | Rubber-insulated, braided cord, circular twin and 3-core | 300/300 V; |
| c) Table 5. | Rubber-insulated, braided, UDF cord, circular twin and 3-core | 300/300 V; |
| d) Table 6. | Rubber-insulated, sheathed, ordinary cord, circular twin, 3-core, 4-core and 5-core | 300/500 V; |
| e) Table 7. | Rubber-insulated, sheathed, screened, sheathed cord, circular twin, 3-core and 4-core | 300/500 V; |
| f) Table 8. | Rubber-insulated, sheathed cord, single-core, circular twin, 3-core, 4-core and 5-core | 450/750 V; |
| g) Table 9. | Rubber-insulated, HOFR-sheathed cord, circular twin, 3-core and 4-core | 300/500 V; |
| h) Table 10. | Rubber-insulated, braided, heat resistant cord, single-core and twisted twin | 300/500 V; |
| i) Table 13. | PVC-insulated (tinsel conductors) parallel twin cord | 300/300 V; |
| j) Table 14. | PVC-insulated (wire conductors) parallel twin cord | 300/300 V; |
| k) Table 15. | PVC-insulated, PVC-sheathed, light cord, parallel twin, circular twin, 3-core and 4-core | 300/300 V; |
| l) Table 16. | PVC-insulated, PVC-sheathed, ordinary cord, parallel twin, circular twin, 3-core, 4-core and 5-core | 300/500 V; |
| m) Table 17. | PVC-insulated, sheathed, screened, sheathed light cord, circular twin and 3-core | 300/300 V; |
| n) Table 18. | PVC-insulated, sheathed, screened, sheathed ordinary cord, circular twin, 3-core and 4-core | 300/500 V; |
| o) Table 19. | PVC-insulated, non-sheathed cord, single-core and twisted twin | 300/500 V; |
| p) Table 22. | Glass fibre insulated cord, single-core, twisted twin and twisted 3-core | 300/300 V; |
| q) Table 23. | Glass fibre insulated cord, braided, circular twin and 3-core | 300/300 V. |

In addition, the standard specifies the requirements for PVC-insulated extensible leads.

A guide to the use of insulated flexible cords is given in Appendix A.

Guidance to manufacturers on procedures for routine testing is given in Appendix B.

2 References

2.1 Normative references

This British Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are made at the appropriate places in the text and the cited publications are listed on the page 46. For dated references, only the edition cited applies; any subsequent amendments to or revisions of the cited publication apply to this British Standard only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

2.2 Informative references

This British Standard refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

3 Definitions

For the purposes of this British Standard, the definitions given in BS 4727 apply together with the following.

3.1

rated voltage U_0

the power-frequency voltage to earth for which the cord is designed

3.2

rated voltage U

the power-frequency voltage between conductors for which the cord is designed

4 Voltage designation

The rated voltage of a cord is the reference voltage for which the cord is designed, and which serves to define the electrical tests, and shall be expressed, in volts, by the following expression:

$$U_0/U$$

where

U_0 is the r.m.s. value between any insulated conductor and earth, i.e. the metal covering of the cord or the surrounding medium;

U is the r.m.s. value between any two phase-conductors of a multicore cord or of a system of single-core cords.

In an alternating current 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 direct current system, the nominal voltage of the system shall be not higher than 1.5 times the rated voltage of the cord.

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 a 10 % higher operating voltage than its rated voltage if the latter is at least equal to the nominal voltage of the system.

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

5 Core identification

5.1 General

Each core shall be identified by its colour. The colour shall be either throughout the whole of the insulation or on its surface. For the cords given in Table 6, Table 7 and Table 8, the colour shall be on the optional proofed tape, if used.

NOTE For the cords given in Table 3 and Table 10, the colour may also be either by coloured braid or applied over the braid.

5.2 Colours

The colours of the cores according to the number of cores in the cord and also the sequence of these colours shall be as given in Table 3 to Table 10, Table 15 to Table 19, Table 22 and Table 23, as appropriate.

5.3 Harmonized code designations

Harmonized code designations are given in Table 10 and Table 19 for single-core non-sheathed cords; the cords are harmonized types, except where explicitly shown as national types, and shall be permitted to bear the Common Marking in accordance with 6.2, provided the core colours comply with the following:

- the colours available shall include the combination green/yellow and the colour blue;
- combinations of colours other than green/yellow shall not be considered harmonized.

Single-core non-sheathed cords complying with the properties given in Table 10 and Table 19 where harmonized code designations are given, but having core colours not in accordance with the requirements of this subclause, are not harmonized types and shall not bear the Common Marking.

NOTE 1 In addition to the combination green/yellow, and the colour blue, the following other colours are recognized as harmonized: black, brown, grey, orange, pink, red, turquoise, violet and white.

NOTE 2 Attention is drawn to the fact that, according to the use to which the cords are put, it may be necessary to comply with core colour requirements specified in BS 7671, any British or other standard applicable, or any appropriate regulations or statutory requirements.

5.4 Bi-colour combination

On the core marked with the bi-colour combination green/yellow, the distribution of the colours shall be such that for every 15 mm length of core, one of these colours shall cover at least 30 % and at most 70 % of the surface of the core, while the other colour covers the remainder of the surface.

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

NOTE 2 *Information on the use of the colours green/yellow and blue.* It is understood that the colours green and yellow when they are combined as specified above are recognized exclusively as a means of identification of the core intended for use as earth connection or similar protection, and that the colour blue is intended for the identification of the core intended to be connected to neutral. If, however, there is no neutral, blue can be used to identify any core except for earthing or protective conductor.

5.5 Clarity and durability

The colours shall be clearly identifiable and durable.

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

6 Marking

6.1 Indication of origin

All cords 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 trade mark.

If coloured threads are used, the colours shall comply with 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 trade mark, if used, shall be by one of the three following alternative methods:

- a) printed tape within the cable or cord;
- b) printing, indenting or embossing on the insulation of at least one core (the core coloured blue, if any);
- c) printing, indenting or embossing on the sheath, if any.

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

550 mm if the marking is on the outer sheath of the cord;

275 mm if the marking is:

- i) on the insulation of an unsheathed cable or cord;
- ii) on the insulation of a sheathed cable or cord;
- iii) on a tape within a sheathed cable or cord.

NOTE A "specified mark" is any mandatory mark covered by this standard, or the optional CENELEC Common Marking as specified in 6.2.

6.2 CENELEC "Common Marking"

It shall be permitted for a cord for which a harmonized code designation is given in Table 3 to Table 10 and Table 13 to Table 19 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 alternative methods specified in 6.1.

- 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 comply with dimensions laid down by CENELEC for that Approvals Organization. (See PD 2379.)

Neither of these indications shall be used for a cord shown in Table 3 to Table 10, Table 13 to Table 19, Table 22 and Table 23 as a national type.

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

6.3 Core marking

Type TI 3 insulated cores, whose properties are given in Table 19 b), shall be distinguished by means of the marking "V2" (indicating the maximum admissible conductor temperature) by printing, indenting or embossing on the insulation.

The marking shall be continuous as specified in 6.1.

6.4 Outer marking

Type EM 2 sheathed cords, whose properties are given in Table 6 and Table 8, shall be distinguished from other rubber-sheathed cords having the same cross-sectional area and number of cores by means of the marking RN printed, or embossed on, or indented into the sheath.

The marking shall be continuous as specified in 6.1.

6.5 Durability

Any marking by printing shall be durable.

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

7 Construction and overall dimensions of cords in sections 2 and 3

7.1 Construction

The construction of the cords shall be as given in Table 3 to Table 10 and Table 13 to Table 19, as appropriate.

Compliance shall be checked by examination and measurement.

7.2 Mean overall dimensions

The mean overall dimensions of the cables shall not exceed the upper limits given in Table 3 to Table 10 and Table 13 to Table 19.

NOTE The lower limit is an indicative value only and not a requirement for compliance with this specification.

Compliance shall be checked by the method described in 8.3 of BS 6469-1.1:1992.

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

For flat cord the mean of three determinations of each of the major and minor axes shall be taken as the mean overall dimensions.

For other cord the mean of the six values obtained shall be taken as the mean overall diameter.

7.3 Ovality

The difference between any two values of the overall diameter of circular sheathed cords at the same cross section (ovality) shall not exceed 15 % of the upper limit given in Table 3 to Table 10 and Table 13 to Table 19, as appropriate, for the mean overall diameter.

Compliance shall be checked by the method described in 8.3 of BS 6469-1.1:1992.

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.

7.4 Pitch of laid-up cores

The pitch of laid-up cores, for the cords given in Table 4, shall be determined by measuring the length of 10 pitches of a sample and dividing this length by 10. The result is the pitch of the laid-up cores.

8 Electrical requirements for cords in sections 2 and 3

NOTE The electrical tests specified in clause 8 are summarized in Table 11 for cords in section 2 and Table 20 for cords in section 3.

8.1 Conductor resistance

The d.c. resistance of each conductor of cords in Table 3, Table 5 to Table 10, and Table 14 to Table 19 measured on a sample of completed cord not less than 1 m in length shall comply with the appropriate values given in BS 6360. The d.c. resistance of each conductor specified in Table 4 shall not exceed the appropriate values given in BS 6360 by more than 3 %. The d.c. resistance of each conductor in Table 13 shall not exceed the value given in that table.

8.2 Voltage test on complete cord

When the cord is tested as described in C.1 and C.2 no breakdown of the insulation shall occur.

8.3 Voltage test on cores

For cords in Table 6 to Table 9 and Table 14 to Table 18, no breakdown of the insulation shall occur when the cord is tested as described in C.1 and C.3

8.4 Insulation resistance

For cords having insulation made of PVC, the insulation resistance of the cord when tested as described in C.1 and C.4 shall be not less than the minimum value specified in Table 13 to Table 19, as appropriate.

8.5 Long term resistance of insulation to d.c.

For cords having insulation made of PVC, the exterior of the insulation shall show no damage when the cord is tested as described in C.1 and C.5.

NOTE Discoloration of the insulation should be ignored.

8.6 Test to check the absence of faults on insulation

When the cord is tested as described in C.1 and C.6 it shall withstand the applied voltage without failure of the insulation.

8.7 Surface resistance of sheath

For cords having a sheath made of EM 2 or EM 3 compounds, the surface resistance of the sheath when tested as described in C.1 and C.7 shall be not less than $1 \times 10^9 \Omega$.

9 Mechanical strength requirements for cords in sections 2 and 3

9.1 Preparation

In some tests, the preparation and presentation of the test sample can have a critical effect on the results of the tests. Test samples shall always be prepared carefully and shall be examined for damage before testing. Test samples which have been damaged during preparation shall not be tested.

9.2 Flexing test

For cords other than:

- a) tinsel conductor cords;
- b) twisted twin cords;
- c) single-core cords;
- d) PVC multicore flexible cables having cores of nominal cross-sectional area greater than 2.5 mm^2 ;
- e) cables complying with section 4;
- f) cables complying with section 5;

no open circuit of any conductor or short circuit between conductors shall occur during flexing when the cord is tested as described in D.1 using the load and diameter of pulleys given in Table 1 a) and Table 1 b) and the current given in Table 2. In addition, no breakdown of the insulation shall occur when the cord is subsequently subjected to the voltage test specified in D.1.

For screened cords in Table 7, Table 17 and Table 18, the requirements of this clause shall be applicable to the cord before application of the screen and outer sheath.

9.3 Bending test on tinsel cords

For parallel twin tinsel conductor cords, no open circuit shall occur in either core during flexing when the cord is tested as described in **D.2**, and no breakdown of the insulation shall occur when the cord is subsequently subjected to the voltage test specified in **D.2**.

Table 1 — Load and diameter of pulleys for flexing test

(a) Rubber types

Type of cord	Number of cores	Nominal cross-sectional area mm ²	Load kg	Diameter of pulleys ^a mm	
Braided (see Table 4 and Table 5)	2 or 3	0.5 ^c	1.0	80	
		0.75	1.0	80	
		1.0	1.0	80	
		1.25 ^c	1.0	80	
		1.5	1.0	80	
Ordinary tough rubber-sheathed cord and flexible cable (see Table 6) Ordinary polychloroprene or other equivalent synthetic elastomer-sheathed cord and flexible cable (see Table 6 and Table 9) Heavy polychloroprene or other equivalent synthetic rubber-sheathed flexible cable (see Table 8)	2 up to 5	0.5 ^c	1.0	80	
		0.75	1.0	80	
	2	1.0	1.0	120	
		1.5	1.0	120	
		2.5	1.5	120	
		4.0 ^b	2.0	160	
	3	1.0	1.0	120	
		1.25 ^c	1.5	120	
		1.5	1.5	120	
		2.5	2.0	160	
	4	4.0 ^b	3.0	160	
		4	1.0	1.5	120
			1.5	1.5	120
			2.5	2.5	160
	4.0 ^b		3.5	200	
	5	1.0	1.5	120	
		1.5	2.5	160	
		2.5	3.0	160	
		4.0 ^b	4.0	200	
(b) PVC types					
Flat non-sheathed (see Table 14)	2	0.5	0.5	60	
		0.75	1.0	60	
Light PVC-sheathed (see Table 15) Ordinary PVC-sheathed (see Table 16)	2	0.5	0.5	60	
		0.75	1.0	80	
		1.0	1.0	80	
		1.25 ^c	1.0	80	
		1.5	1.0	80	
		2.5	1.5	120	
	3	0.5	0.5	80	
		0.75	1.0	80	
		1.0	1.0	80	
		1.25 ^c	1.0	80	
		1.5	1.0	80	
		2.5	1.5	120	
	4	0.5	0.5	80	
		0.75	1.0	80	
		1.0	1.0	80	
		1.5	1.5	120	
		2.5	1.5	120	
	5	0.75	1.0	80	
		1.0	1.0	120	
		1.5	1.5	120	
		2.5	2.0	120	

^a Diameter measured at the lowest point of the groove.
^b For cables with this size of conductor, see Tables 3, 4 and 5 of BS 6007:1993.
^c National conditions.

^a Diameter measured at the lowest point of the groove.^b For cables with this size of conductor, see Tables 3, 4 and 5 of BS 6007:1993.^c National conditions.

Table 2 — Current for flexing test

Nominal cross-sectional area of conductors mm ²	Current for PVC-insulated cords A	Current for rubber-insulated cords A
0.5	1.5	3
0.75	3	6
1.0	5	10
1.25 ^a	6.5	13
1.5	8	16
2.5	12.5	25
4.0	—	32
^a National type.		

In the event that the first test sample of the cord does not comply with these requirements, two further test samples of the cord shall be taken, and both shall comply with the requirements of this clause.

9.4 Snatch test on tinsel cords

For tinsel conductor cords, no open circuit shall occur in either core when the cord is tested as described in **D.3**.

9.5 Wear resistance test

For braided circular cords and UDF cords, no insulation shall be visible in each of three fixed cord samples over a total length of more than 10 mm when the cord is tested as described in **D.4**, and no breakdown of the insulation shall occur in each of the three samples of the cord when subsequently subjected to the voltage test specified in **D.4**.

9.6 Separation test

For parallel twin unsheathed cords having wire conductors, the force required to separate the cores shall be not less than 3 N and not greater than 30 N when the cord is tested as described in **D.5**, and no breakdown of the insulation shall occur when the cord is subsequently subjected to the voltage test specified in **D.5**.

10 Test under fire conditions

Rubber-insulated, type EM 2 or type RS 3-sheathed cords whose properties are given in Table 6, Table 7, Table 8 and Table 9; PVC-insulated cords whose properties are given in Table 13 to Table 19; and glass fibre insulated cords whose properties are given in Table 22 and Table 23 shall comply with BS 4066-1.

The test shall be carried out on a sample of the complete cord.

Section 2. Requirements for rubber-insulated flexible cords

11 Conductors

11.1 The conductors shall be annealed copper conductors complying with BS 6360 except that the d.c. resistance of the conductor for the cords specified in Table 4 shall comply with **8.1**. Unless otherwise specified in Table 3 to Table 10, it shall be permissible for the wires of the conductor to be plain or tinned.

Except for cables specified in Table 10, a separator of suitable material shall be applied around each conductor if the conductors are plain. For tinned conductors and for cables specified in Table 10, the use of separators shall be permitted.

The solderability of plain conductors shall be tested as described in Appendix E. The part of the conductor which has been immersed in the solder bath shall be adequately tinned.

11.2 The class of the conductor shall be as given in Table 3 to Table 10 inclusive.

12 Insulation

12.1 Types of insulation

The insulation shall be one of the following types, as required by Table 3 to Table 10, as appropriate:

- a) type GP 1 rubber insulation complying with BS 6899;
- b) types EI 2 and EI 4 rubber insulation complying with BS 7655-1.1.

Compliance shall be checked by carrying out the appropriate tests which are specified in BS 6469 and which are listed in Table 12.

12.2 Application

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

For type GP 1, unless applied by the extrusion process, the insulation shall consist of at least two layers.

For type EI 4, the insulation shall be extruded in a single layer.

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.

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

12.3 Thickness

The mean value of the thickness of the insulation shall be not less than the value specified for each type of cross section of cords in Table 3 to Table 10. However, it shall be permissible for the thickness at any place to be less than the mean value specified provided that the difference does not exceed $0.1 \text{ mm} + 10\%$ of the mean value specified.

Compliance shall be checked by the method described in **8.1** of BS 6469-1.1:1992.

From each core to be tested, one sample of core shall be taken from each of three places separated by at least 1 m.

The mean of all the values obtained on the three pieces of insulation shall be calculated to two decimal places and then rounded off to obtain the mean value of insulation thickness. If the calculation gives 5 or more for the second decimal figure, the first figure shall be raised to the next number; for example 1.75 shall be rounded to 1.8, and 1.74 to 1.7.

The smallest of all the values obtained shall be taken as the minimum thickness of insulation at any place.

12.4 Addition of tape

Where stated in Table 3 to Table 10, it shall be permissible for a proofed textile tape to be applied over the insulation. The tape shall be applied helically with a minimum overlap of 1 mm. In the completed cable, it shall be possible to remove this proofed tape without damage to the insulation.

13 Core identification

Each core shall be identified by its colour in accordance with clause **5** and the specific requirements given in Table 3 to Table 10, as appropriate.

14 Fillers

When separate fillers are used they shall be composed of one of the following or any combination of them:

- a) a compound of rubber or equivalent synthetic elastomers, vulcanized or unvulcanized;
- b) natural or synthetic textiles;
- c) paper.

There shall be no harmful interactions between the constituents of the filler and the insulation and/or the sheath.

The description of the construction of the cord in Table 3 to Table 10, as appropriate, specifies whether the cord is permitted to include a filler or whether the outer sheath is permitted to penetrate between the cores thus forming the filler. The filler shall fill the core interstices, but shall be capable of being removed without damage to the cores. A centre filler complying with this clause shall be permitted in multicore cords where specified in Table 6 to Table 9.

It shall be permissible for the assembly of the cores and filler to be held together by a film or tape.

15 Braid

15.1 The yarns forming the braid shall be based on natural material (cotton, treated cotton, silk), or on synthetic material (e.g. rayon, polyamide) or, where stated in the construction given in Table 3 to Table 10, as appropriate, on fibres made of glass or equivalent material.

15.2 The braid shall have a uniform texture without knots or gaps. Braids made of glass fibre shall be treated with a suitable substance in order to resist fraying.

15.3 When a cord specified in Table 4 is tested as described in Appendix K, no melting or charring of the braid or component of the braid shall occur.

16 Sheath

16.1 Type

The sheath shall be one of the following types as specified in Table 6 to Table 9, as appropriate, complying with the requirements of BS 7655-2.1 or BS 7655-2.3:

- a) type EM 3 ordinary duty rubber sheath;
- b) type EM 2 ordinary duty oil-resisting and flame-retardant sheath;
- c) type RS 3 ordinary heat-resisting, oil-resisting and flame-retardant sheath.

Compliance shall be checked by carrying out the appropriate tests given in BS 6469 and listed in Table 12.

16.2 Application

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

16.3 Thickness

The mean value of the sheath thickness shall be not less than the value specified for each type and cross section of sheathed cord in Table 3 to Table 10, as appropriate. However, it shall be permissible for the thickness at any one place to be less than the specified value, provided the difference does not exceed 0.1 mm + 15 % of the mean value specified.

Compliance shall be checked by the method described in 8.2 of BS 6469-1.1:1992.

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

The mean of all the values obtained on the three pieces of sheath shall be calculated to two decimal places and rounded off in accordance with 12.3, to obtain the mean value of sheath thickness.

The smallest of all the values obtained shall be taken as the minimum thickness of sheath at any place.

16.4 Colour

The colour of the sheath shall be as specified in Table 6 to Table 9, as appropriate.

17 Screen

The wire braid screen of screened cords shall consist of tinned annealed copper wires as specified in

Table 7. The number of spindles and ends per spindle shall be sufficient to ensure that the filling factor is not less than 0.6. The filling factor shall be calculated from the following formula:

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

where

D is the mean diameter of braid (in mm);

d_w is the diameter of braiding wire (in mm);

L is the lay length of braiding wire (in mm);

m is the total number of spindles;

n is the total number of ends per spindle.

18 Marking

In addition to the marking required by clause 6, cords having GP 1 rubber insulation shall be identified throughout their length by the legend "HEAT RESISTING 85", either printed on a tape within the cord, or printed on the core, or printed, indented or embossed externally. The gap between the end of one complete legend and the beginning of the next shall be not greater than 300 mm.

Table 3 — Rubber-insulated, braided flexible cord, 300/300 V twisted twin

National type

Withdrawn

Table 4 — Rubber-insulated, braided flexible cord, 300/300 V circular twin and 3-core

Harmonized code designation. H03RT-F.

Construction

Annealed copper conductor. Class 5 flexible conductor.

NOTE 1 As specified in 8.1, the d.c. resistance of the conductor is not permitted to exceed the values given in BS 6360 by more than 3 %.

An optional separator may be applied over the conductor.

Rubber insulation type EI 4.

The cores and textile fillers shall be twisted together.

NOTE 2 A centre filler may be used.

The pitch of the laid-up cores shall not exceed 40 mm.

Optional tape.

Textile braid.

Colours for core identification

Twin: blue and brown.

3-core: green/yellow, blue and brown.

Nominal cross-sectional area of conductor mm ²	Radial thickness of insulation mm	Mean overall diameter			
		Twin		3-core	
		Lower limit ^a mm	Upper limit mm	Lower limit ^a mm	Upper limit mm
0.5 ^b	0.8	5.4	7.6	5.8	8.0
0.75	0.8	5.8	8.0	6.2	8.6
1	0.8	6.2	8.4	6.6	9.0
1.25 ^c	0.8	6.4	8.4	6.8	9.0
1.5	0.8	6.8	9.0	7.2	9.6

^a Indicative value (see note to 7.2).

^b National type.

^c This size is not a harmonized type, but is intended for use on appliances fitted with 13 A plugs complying with BS 1363.

Table 5 — Rubber-insulated, braided, UDF cord, 300/300 V circular twin and 3-core**National type****Construction**

Annealed copper conductor. Class 5 flexible conductor.

An optional separator may be applied over the conductor.

Rubber insulation type EI 4.

Two or three cores twisted together with natural or synthetic textile fibres forming an assembly of practically circular cross section.

Rubber layer.

Textile braid of continuous filament regenerated cellulose (semi-embedded).

Colours for core identification

Twin: blue and brown.

3-core: green/yellow, blue and brown.

Nominal cross-sectional area of conductor mm ²	Radial thickness of insulation mm	Mean overall diameter			
		Twin		3-core	
		Lower limit ^a mm	Upper limit mm	Lower limit ^a mm	Upper limit mm
0.5	0.6	5.2	6.4	5.6	6.8
0.75	0.6	5.6	6.8	6.0	7.2
1	0.6	6.0	7.2	6.4	7.6
1.5	0.8	7.4	8.6	7.8	9.2

^a Indicative value (see note to 7.2).