British Standard

BRITISH STANDARD

BS 5308-2: 1986

Incorporating Amendment No. 1

Instrumentation cables —

Part 2: Specification for PVC insulated cables

UDC 621.315.2:621.315.6:678.743.22

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Electronic Components Standards Committee (ECL/-) to Technical Committee ECL/6, upon which the following bodies were represented:

British Plastics Federation
British Telecommunications plc
Crown Agents for Oversea Governments and Administrations
Electric Cable Makers Confederation
Home Telephone Cable Makers Association (1960)
Ministry of Defence
Society of British Aerospace Companies Ltd

The following bodies were represented in the drafting of the standard, through sub-committees and panels:

British Broadcasting Corporation
British Railways Board
Electronic Components Industry Federation
Switchboard Cables Association (1960)
Telecommunication Engineering and Manufacturing Association (TEMA)

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Contents

Foreword

BS 5308 has been prepared under the direction of the Electronic Components Standards Committee to cover the requirements for a range of instrument signal cables.

This Part of BS 5308 is a revision of BS 5308-2:1978, which is withdrawn, and updates the standard in line with current technology. Attention is drawn to the increased operating voltage given in the scope.

These cables are not intended for use in coal mining (Group I) applications but may be suitable for Group II intrinsically safe systems (but see warning note).

This Part of BS 5308 covers PVC insulated cables, used mainly by the chemical and petrochemical industries. Part 1 covers polyethylene insulated cables, used mainly by the petroleum industry.

Notes on the installation of thermoplastic cables are given in appendix C.

Further information relating to intrinsic safety may be obtained from the following British Standards:

BS 5345, *Code of practice for the selection, installation and maintenance of electrical apparatus for use in potentially explosive atmospheres (other than mining applications or explosive processing and manufacture).*

BS 5345-1:1976, *Basic requirements for all Parts of the code.*

BS 5345-4:1983, *Installation and maintenance requirements for electrical apparatus with type of protection "i". Intrinsically safe electrical apparatus and systems.*

BS 5501, *Electrical apparatus for potentially explosive atmospheres.*

BS 5501-1:1977, *General requirements.*

BS 5501-7:1977, *Intrinsic safety "i".*

BS 5501-9:1982, *Specification for intrinsically safe electrical systems "i".*

WARNING NOTE. Cables used when installing an intrinsically safe system are required to conform to any relevant requirement in the certification documents, either for the system or for the intrinsically safe and associated apparatus forming parts of the system. Cables should also be suitable for the environment in which they are to be used (see, for example, **19.3** of BS 5345-1:1989). *This means that for some applications the cables specified in this British Standard may not be suitable*. The use in intrinsically safe systems of cables not covered by this standard is not precluded.

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 10, 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.

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Section 1. General

1 Scope

This Part of BS 5308 specifies requirements for and dimensions of PVC insulated cables, in multicore and multipair construction, with or without screens and optionally incorporating single wire armour.

The insulation of these instrumentation cables is suitable for operation at voltages up to and including 300 V r.m.s. core to earth and 500 V r.m.s, core to core. However, instrumentation cables are not for direct connection to a low impedance source, e.g. the public mains electricity supply.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 5308 the definitions given in BS 4727 apply.

3 Categories of cable

Cables are categorized into two types as follows.

Type 1: PVC insulated and PVC sheathed (these cables are not recommended for underground burial).

Type 2: PVC insulated, PVC bedded, single wire armoured and PVC oversheathed.

Section 2. Constructional requirements

4 Conductor material

Conductors shall be plain annealed copper wire in accordance with BS 6360 and Table 1 of this standard.

The d.c. resistance of each copper conductor in the completed cable shall not exceed the values given in Table 1.

5 Dimensions

The dimensions of PVC insulated cables shall be in accordance with Table 2 to Table 10 inclusive as appropriate.

6 Insulation

The insulation shall be PVC type TI1 as specified in BS 6746, of thickness as specified in Table 1 of this standard.

7 Pairs

Two insulated conductors shall be uniformly twisted together to form a pair. The lengths of lay used shall be such that the two wires forming each pair are not dissociated by normal handling. Two-pair cables without individual pair screens shall have four cores laid in quad formation round a central dummy.

The length of lay of any pair shall not exceed 100 mm.

8 Pair identification

Unscreened pairs shall be identified by means of coloured insulation in the sequence specified in appendix A, starting at centre.

Screened pairs shall be identified either:

a) by means of coloured insulation in the sequence specified in appendix A, starting at centre; or

b) by a numbered polyester film which shall also serve as part of the screen insulation, in which case each pair in the cable shall have one white and one blue core.

9 Pair screens

When individual pair screening is required, each pair shall have a laminated screening tape applied with the metallic side down, in electrical contact with one or more tinned annealed copper wires (drain wire) of a total cross section of not less than 0.5 mm^2. The minimum overlap shall be 25 %.

The laminated tape shall be aluminium bonded to polyester having a minimum thickness of aluminium of 0,008 mm and a minimum thickness of polyester of 0.010 mm.

Over the screening tape, either two laps of polyester tape shall be applied with a minimum overlap of 25 %, or one tape with a minimum overlap of 50 % shall be applied.

10 Cabling

The required number of pairs shall be assembled together using the reverse layer or reciprocating lay technique. The cable shall be so constructed that the pairs are in concentric layers.

NOTE 1 Non-hygroscopic fillers may be used to maintain a circular formation.
NOTE 2 The number of pairs should preferably be 1, 2, 5, 10, 15, 20, 30 or 50.

11 Binder tape

11.1 General

Where specified in **11.2** and **11.3**, binder tape shall be applied over the final layer of pairs.

NOTE Open spiral interlayer tape may also be applied.

11.2 Cables without a collective screen

11.2.1 *Cables of up to and including six cores (or three pairs).* Either:

a) a non-hygroscopic tape shall be applied as specified in **11.2.2**; or

b) no non-hygroscopic tape shall be applied.

11.2.2 *Cables of more than six cores (or three pairs).* A non-hygroscopic tape of minimum thickness 0.023 mm shall be applied with a minimum overlap of 25 %.

11.3 Collectively screened cables

11.3.1 *Collectively screened cables other than one-pair cables.* Either:

a) a non-hygroscopic tape of minimum thickness 0.023 mm shall be applied with an overlap of 50 %; or

b) two non-hygroscopic tapes each of minimum thickness 0.023 mm shall be applied each with a minimum overlap of 25 %.

11.3.2 *Collectively screened one-pair cables.* Either:

a) binder tape or tapes shall be applied as specified in **11.3.1**; or

b) no binder tape shall be applied (see **12.3.2**).

12 Collective screen and drain wire

12.1 General

Where specified in **12.2** and **12.3**:

a) laminated screening tape shall comprise aluminium bonded to polyester, the tape having a minimum thickness of aluminium of 0.008 mm and a minimum thickness of polyester of 0.010 mm; and

b) a drain wire shall comprise one or more tinned annealed copper wires with a total cross-section not less than 0.5 mm^2.

12.2 Cables other than one-pair cables

A laminated screening tape shall be applied with a minimum overlap of 25 % and with the metallic side down in contact with a drain wire run longitudinally over the non-hygroscopic binder tape or tapes.

12.3 One-pair cables

12.3.1 *Cables where binder tape has been applied.* Laminated screening tape shall be applied as specified in **12.2**.

12.3.2 *Cables where in accordance with* **11.3.2** b) *no binder tape has been applied.* A laminated screening tape shall be applied with a minimum overlap of 25 % and with the metallic side down in electrical contact with a drain wire laid in one interstice.

13 Outer protection

13.1 Type 1 cables

An extruded sheath of type TM1 or type 6 PVC compound in accordance with BS 6746 shall be applied over the binder tape (see clause **11**) or the collective screen (see clause **12**) to the dimensions specified in Table 2 to Table 7. Compliance shall be verified by carrying out the appropriate tests listed in appendix B.

NOTE The sheath should be black unless the purchaser specifies that another colour is required.

13.2 Type 2 cables

13.2.1 An extruded bedding of type TM1 black PVC compound in accordance with BS 6746 shall be applied over the binder tape (see clause **11**) or the collective screen (see clause **12**) to the dimensions specified in Table 2 to Table 7. Compliance shall be verified by carrying out the appropriate tests listed in appendix B.

13.2.2 A single layer of galvanized steel wire armour of the size indicated in the appropriate table shall be applied spirally over the PVC. The galvanized steel wire shall comply with BS 1442.

13.2.3 An extruded oversheath of type TM1 PVC compound in accordance with BS 6746 shall be applied over the galvanized steel wire armour to the dimensions given in Table 2 to Table 7. Compliance shall be verified by carrying out the appropriate tests listed in appendix B.

NOTE The sheath should be black unless the purchaser specifies that another colour is required.

13.3 Thickness of bedding

The minimum thickness of extruded bedding measured in accordance with clause **19** of BS 6346:1969 shall not fall below the value given in the appropriate table by an amount more than (15 % + 0.1 mm).

13.4 Thickness of sheath

13.4.1 *Type 1 cables*. The thickness of the PVC sheath, determined by taking the average of a number of measurements as described in clause **19** of BS 6346:1969, shall not fall below the nominal value given in the appropriate table by an amount more than (15 % + 0.1 mm).

13.4.2 *Type 2 cable*. The minimum thickness of the PVC oversheath, measured in accordance with clause **19** of BS 6346:1969, shall not fall below the nominal values given in the appropriate table by an amount more than (20 % + 0.2 mm).

Section 3. Electrical requirements

14 Spark

14.1 Cores

When tested at 4 kV a.c. (r.m.s.) minimum and otherwise in accordance with BS 5099, no failure of the insulation shall occur.

14.2 Sheath

When tested in accordance with BS 5099 the outer PVC sheath on cables with collective screen and/or armour shall withstand the specified test voltage without failure.

15 Voltage

When tested in accordance with appendix D, there shall be no breakdown of the insulation.

16 Insulation resistance

16.1 Individual conductor

When a steady voltage of 500 V d.c. is applied for 1 min, the insulation resistance of each conductor measured against the remaining bunched conductors/screens and/or armour shall not be less than 25 MΩ for 1 km at 20 °C.

16.2 Individual screens

For cables with individually screened pairs, when a steady voltage of 500 V d.c. is applied for 1 min, the insulation resistance measured between screens shall be not less than 1 MΩ for 1 km at 20 ± 5 °C.

17 Conductor resistance

The d.c. resistance of each conductor in the completed cable at 20 °C shall not exceed the values given in Table 1.

18 Capacitance

18.1 Mutual capacitance

The mutual capacitance of the pairs or adjacent cores shall not exceed a maximum of 250 pF/m at a frequency of 1 kHz.

18.2 Capacitance between any core or screen

The capacitance between any core and all the other cores connected to any other metallic elements present (e.g. screens and armour) and earth shall not exceed 450 pF/m at a frequency of 1 kHz.

19 L/R ratio

The L/R ratio for adjacent cores shall not exceed the following maximum values:

Conductor	Maximum *L/R* ratio
0.5 mm^2	25 μH/Ω
0.75 mm^2	25 μH/Ω
1.5 mm^2	40 μH/Ω

Section 4. Identification and sealing

20 Manufacturer identification

A means of identifying the manufacturer shall be provided throughout the length of all cables. If coloured threads are used, the colours shall be in accordance with PD 2379, the register maintained by the British Standards Institution.

21 Cable identification

21.1 General

The cable shall be identified by one of the methods specified in **21.2** and **21.3**.

21.2 Embossing of oversheath

The external surface of the oversheath shall be embossed with the number of this British Standard (i.e. BS 5308/2[1)]) as follows.

a) Tabulated overall diameters above 15 mm: at least two lines of embossing approximately equally spaced around the circumference.

b) Tabulated overall diameters 15 mm and smaller: at least one line of embossing.

In both cases the letters and figures shall be raised and shall consist of upright block characters. The maximum size of the characters shall be 13 mm and the minimum size shall be 15 % of the approximate overall diameter of the cable or 3 mm, whichever is the greater. The gap between the end of one set of embossed characters and the beginning of the next shall not be greater than 0.3 m.

21.3 Printed tape

A printed tape bearing the number of this British Standard (i.e. BS 5308/2[1)]) at intervals of not more than 100 mm shall be applied immediately under the outer protection.

22 End sealing

After completion of the electrical tests the ends of the cable shall be sealed to prevent the ingress of moisture.

Table 1 — Details of conductors and insulation thickness

Conductor					Insulation thickness		Core diameter maximum
Nominal area	Conductor class (BS 6360)	Conductor details	Resistance at 20 °C maximum		Nominal	Minimum	
			Multicore	Multipair			
mm^2		mm	Ω/km	Ω/km	mm	mm	mm
0.50	5	16/0.2	39.0	39.7	0.60	0.50	2.35
0.75	5	24/0.2	26.0	26.5	0.60	0.50	2.55
1.50	2	7/0.53	12.1	12.3	0.60	0.50	3.00

NOTE As BS 6360 resistance values only allow for multicore cables, an additional 2 % of the maximum resistance has been allowed for cables of multipair construction.

[1)] Marking BS 5308/2 on or in relation to a product is a claim by the manufacturer that the product has been manufactured to the requirements of the standard. The accuracy of such a claim is therefore solely the manufacturer's responsibility. Enquiries as to the availability of third party certification should be addressed to the appropriate certification body.

Table 2 — Dimensions of 0.5 mm^2 class 5 conductor (16/0.2 mm) multicore PVC insulated cables

Number of cores	2		3		4		6		10		20		40		80	
Cable type	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Thickness of sheath/bedding (nominal)	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	1.1	1.1	1.2	1.2	1.3	1.3	1.5	1.5
Diameter over sheath/bedding	6.0	6.0	6.3	6.3	6.9	6.9	8.3	8.3	10.9	10.9	13.9	13.9	19.1	19.1	25.3	25.3
Size of armour wire		0.9		0.9		0.9		0.9		0.9		1.25		1.6		1.6
Diameter over armour		7.8		8.1		8.7		10.1		12.7		16.4		22.3		28.5
Thickness of oversheath (nominal)		1.3		1.3		1.3		1.4		1.5		1.6		1.7		1.9
Nominal overall diameter (for information only)	6.0	10.4	6.3	10.7	6.9	11.3	8.3	12.9	10.9	15.7	13.9	19.6	19.1	25.7	25.3	32.3
NOTE To obtain the diameter of these cables with a collective screen add 1.0 mm to the diameter quoted.																

Table 3 — Dimensions of 0.75 mm^2 class 5 conductor (24/0.2 mm) multicore PVC insulated cables

Number of cores	2		3		4		6		10		20		40		80	
Cable type	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Thickness of sheath/bedding (nominal)	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	1.1	1.1	1.2	1.2	1.3	1.3	1.5	1.5
Diameter over sheath/bedding	6.3	6.3	6.7	6.7	7.3	7.3	8.9	8.9	11.7	11.7	15.0	15.0	20.7	20.7	27.5	27.5
Size of armour wire		0.9		0.9		0.9		0.9		0.9		1.25		1.6		1.6
Diameter over armour		8.1		8.5		9.1		10.7		13.5		17.5		23.9		30.7
Thickness of oversheath (nominal)		1.3		1.3		1.4		1.4		1.5		1.6		1.8		2.0
Nominal overall diameter (for information only)	6.3	10.7	6.7	11.1	7.3	11.9	8.9	13.5	11.7	16.5	15.0	20.7	20.7	27.5	27.5	34.7
NOTE To obtain the diameter of these cables with a collective screen add 1.0 mm to diameter quoted.																

Table 4 — Dimensions of 0.5 mm^2 class 5 conductor (16/0.20 mm) multipair PVC insulated cables

Number of pairs	1		(2 quad)		5		10		15		20		30		50	
Cable type	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Thickness of sheath/bedding (nominal)	0.8	0.8	0.8	0.8	1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.3	1.5	1.5	1.7	1.7
Diameter over sheath/bedding	6.0	6.0	6.9	6.9	12.1	12.1	16.2	16.2	18.8	18.8	21.3	21.3	25.9	25.9	32.9	32.9
Size of armour wire		0.9		0.9		0.9		1.25		1.6		1.6		1.6		2.0
Diameter over armour		7.8		8.7		13.9		18.7		22.0		24.5		29.1		36.9
Thickness of oversheath (nominal)		1.3		1.3		1.5		1.6		1.7		1.8		1.9		2.1
Nominal overall diameter (for information only)	6.0	10.4	6.9	11.3	12.1	16.9	16.2	21.9	18.8	25.4	21.3	28.1	25.9	32.9	32.9	41.1
NOTE To obtain the diameter of these cables with a collective screen and 1.0 mm to the diameter quoted.																

Table 5 — Dimensions of 0.75 mm^2 class 5 conductor (24/0.20 mm) multipair PVC insulated cables

Number of pairs	1		(2 quad)		5		10		15		20		30		50	
Cable type	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Thickness of sheath/bedding (nominal)	0.8	0.8	0.8	0.8	1.2	1.2	1.3	1.3	1.3	1.3	1.5	1.5	1.7	1.7	2.0	2.0
Diameter over sheath/bedding	6.3	6.3	7.3	7.3	13.3	13.3	17.7	17.7	20.4	20.4	23.5	23.5	28.5	28.5	36.4	36.4
Size of armour wire		0.9		0.9		1.25		1.6		1.6		1.6		2.0		2.0
Diameter over armour		8.1		9.1		15.8		20.9		23.6		26.7		32.5		40.4
Thickness of oversheath (nominal)		1.3		1.4		1.5		1.7		1.8		1.8		2.0		2.2
Nominal overall diameter (for information only)	6.3	10.7	7.3	11.9	13.3	18.8	17.7	24.3	20.4	27.2	23.5	30.3	28.5	36.5	36.4	44.8

NOTE To obtain the diameter of these cables with a collective screen and 1.0 mm to the diameter quoted.

Table 6 — Dimensions of 1.5 mm^2 class 2 conductor (7/0.53 mm) multicore PVC insulated cables

Number of cores	2		3		4		6		10		20		40		80	
Cable type	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Thickness of sheath/bedding (nominal)	0.8	0.8	0.9	0.9	0.9	0.9	1.1	1.1	1.2	1.2	1.3	1.3	1.5	1.5	1.7	1.7
Diameter over sheath/bedding (nominal)	7.3	7.3	7.9	7.9	8.7	8.7	10.7	10.7	13.7	13.7	17.7	17.7	23.6	23.6	32.6	32.6
Size of armour wire		0.9		0.9		0.9		0.9		1.25		1.6		1.6		2.0
Diameter over armour		9.1		9.7		10.5		12.5		16.2		20.9		26.8		36.6
Thickness of oversheath (nominal)		1.4		1.4		1.4		1.4		1.6		1.7		1.9		2.1
Nominal overall diameter (for information only)	7.3	11.9	7.9	12.5	8.7	13.3	10.7	15.7	13.7	19.4	17.7	24.3	23.6	30.6	32.6	40.8

NOTE To obtain the diameter of these cables with a collective screen add 1.0 mm to the diameter quoted.

Table 7 — Dimensions of 1.5 mm^2 class 2 conductor (7/0.53 mm) multipair PVC insulated cables

Number of pairs	1		2(quad)		5		10		15		20		30		50	
Cable type	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Thickness of sheath/bedding (nominal)	0.8	0.8	0.9	0.9	1.2	1.2	1.3	1.3	1.5	1.5	1.5	1.5	1.7	1.7	2.0	2.0
Diameter over sheath/bedding	7.3	7.3	8.7	8.7	15.4	15.4	20.6	20.6	24.2	24.2	27.5	27.5	33.3	33.3	42.6	42.6
Size of armour wire		0.9		0.9		1.25		1.6		1.6		1.6		2.0		2.5
Diameter over armour		9.1		10.5		17.9		23.8		27.4		30.7		37.3		47.6
Thickness of oversheath (nominal)		1.4		1.4		1.6		1.8		1.9		2.0		2.1		2.4
Nominal overall diameter (for information only)	7.3	11.9	8.7	13.3	15.4	21.1	20.6	27.4	24.2	31.2	27.5	34.7	33.3	41.5	42.6	52.4

NOTE To obtain the diameter of these cables of with a collective screen add 1.0 mm to the diameter quoted.

Table 8 — Dimensions of 0.5 mm^2 class 5 conductor (16/0.20 mm) multipair PVC insulated cables with individual pair screens

Number of pairs	2		5		10		15		20		30		50	
Cable type	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Thickness of sheath/bedding (nominal)	1.1	1.1	1.2	1.2	1.3	1.3	1.5	1.5	1.5	1.5	1.7	1.7	2.2	2.2
Diameter over sheath/bedding	11.0	11.0	14.2	14.2	20.1	20.1	23.5	23.5	26.3	26.3	31.3	31.3	40.7	40.7
Size of armour wire		0.9		1.25		1.6		1.6		1.6		2.0		2.5
Diameter over armour		12.8		16.7		23.3		26.7		29.5		35.3		45.7
Thickness of oversheath (nominal)		1.5		1.6		1.8		1.8		1.9		2.1		2.4
Nominal overall diameter (for information only)	11.0	15.8	14.2	19.9	20.1	26.9	23.5	30.3	26.3	33.3	31.3	39.5	40.7	50.5
NOTE To obtain the diameter of these cables with a collective screen add 1.0 mm to the diameter quoted.														

Table 9 — Dimensions of 0.75 mm^2 class 5 conductor (24/0.20 mm) multipair PVC insulated cables with individual pair screens

Number of pairs	2		5		10		15		20		30		50	
Cable type	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Thickness of sheath/bedding (nominal)	1.1	1.1	1.2	1.2	1.3	1.3	1.5	1.5	1.7	1.7	2.0	2.0	2.2	2.2
Diameter over sheath/bedding	11.8	11.8	15.3	15.3	21.7	21.7	25.4	25.4	28.8	28.8	34.5	34.5	44.0	44.0
Size of armour wire		0.9		1.25		1.6		1.6		2.0		2.0		2.5
Diameter over armour		13.6		17.8		24.9		28.6		32.8		38.5		49.0
Thickness of oversheath (nominal)		1.5		1.6		1.8		1.9		2.0		2.2		2.5
Nominal overall diameter (for information only)	11.8	16.6	15.3	21.0	21.7	28.5	25.4	32.4	28.8	36.8	34.5	42.9	44.0	54.0
NOTE To obtain the diameter of these cables with a collective screen add 1.0 mm to the diameter quoted.														

Table 10 — Dimensions of 1.5 mm^2 class 2 conductor (7/0.53 mm) multipair PVC insulated cables with individual pair screens

Number of pairs	2		5		10		15		20		30		50	
Cable type	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Thickness of sheath/bedding (nominal)	1.2	1.2	1.3	1.3	1.5	1.5	1.7	1.7	1.7	1.7	2.0	2.0	2.2	2.2
Diameter over sheath/bedding	13.7	13.7	17.8	17.8	25.5	25.5	29.8	29.8	33.4	33.4	40.0	40.0	51.2	51.2
Size of wire		1.25		1.6		1.6		2.0		2.0		2.5		2.5
Diameter over armour		16.2		21.0		28.7		33.8		37.4		45.0		56.2
Thickness of oversheath (nominal)		1.6		1.7		1.9		2.0		2.1		2.4		2.7
Nominal overall diameter (for information only)	13.7	19.4	17.8	24.4	25.5	32.5	29.8	37.8	33.4	41.6	40.0	49.8	51.2	61.6
NOTE To obtain the diameter of these cables with a collective screen add 1.0 mm to the diameter quoted.														

Appendix A Identification

A.1 Identification of cores

Cores shall be numbered for identification as follows.

Up to 40 cores: All cores yellow and identified 1 to 40 with both printed numbers and written word, in black, e.g. Core 10 would be coloured yellow and identified by number "10, TEN" in black.

41 to 80 cores: All cores black and identified 1 to 40 with both printed numbers and written word, in yellow, e.g. Core 50 would be coloured black and identified by number "10, TEN" in yellow.

A.2 Identification of pairs

Two-pair unscreened or collectively screened cables shall be cabled in quad formation and colour coded in clockwise order of rotation: blue, green, orange, brown.

All other cables up to 50 pairs shall conform to the coding in Table 11.

Table 11 — Identification of cable pairs other than two-pair unscreened cables

Pair reference number	a-wire	b-wire		Pair reference number	a-wire	b-wire
1	White	Blue		26	RED-Blue	Blue
2	White	Orange		27	RED-Blue	Orange
3	White	Green		28	RED-Blue	Green
4	White	Brown		29	RED-Blue	Brown
5	White	Grey		30	RED-Blue	Grey
6	Red	Blue		31	Blue-Black	Blue
7	Red	Orange		32	Blue-Black	Orange
8	Red	Green		33	Blue-Black	Green
9	Red	Brown		34	Blue-Black	Brown
10	Red	Grey		35	Blue-Black	Grey
11	Black	Blue		36	YELLOW-Blue	Blue
12	Black	Orange		37	YELLOW-Blue	Orange
13	Black	Green		38	YELLOW-Blue	Green
14	Black	Brown		39	YELLOW-Blue	Brown
15	Black	Grey		40	YELLOW-Black	Grey
16	Yellow	Blue		41	WHITE-Orange	Blue
17	Yellow	Orange		42	WHITE-Orange	Orange
18	Yellow	Green		43	WHITE-Orange	Green
19	Yellow	Brown		44	WHITE-Orange	Brown
20	Yellow	Grey		45	WHITE-Orange	Grey
21	WHITE-Blue	Blue		46	ORANGE-Red	Blue
22	WHITE-Blue	Orange		47	ORANGE-Red	Orange
23	WHITE-Blue	Green		48	ORANGE-Red	Green
24	WHITE-Blue	Brown		49	ORANGE-Red	Brown
25	WHITE-Blue	Grey		50	ORANGE-Red	Grey

NOTE Except in the case of bi-colour extrusion the colour indicated by block letters is known as the base colour, and is:
a) the extruded colour; and
b) the colour with the greater area of exposure on the finished wire.

Appendix B Mechanical characteristics

The tests applicable to the insulation and sheaths of cables are listed in Table 12 and Table 13.

Table 12 — Tests applicable to the insulation of cables

Test (as prescribed in BS 6746)	Mechanical properties of insulation
Tensile strength	x
Elongation at break	x
Loss of mass test	x
Cold bend test	x
Heat shock test	x
Hot pressure test	x

NOTE x indicates that the test is applicable.

Table 13 — Tests applicable to the sheaths of cables

Test (as prescribed in BS 6746)	Mechanical properties of sheath	
	Type TM1	Type 6
Tensile strength	x	x
Elongation at break	x	x
Cold bend test	x	x
Cold elongation test	x	
Cold impact test	x	
Loss of mass	x	x
Hot pressure or hot deformation	x	x
Heat shock test	x	x

NOTE x indicates that the test is applicable.

Appendix C Handling and usage at various temperatures

Attention is drawn to the fact that as the temperature decreases PVC compounds become increasingly stiff and brittle, with the result that if the cable is bent too quickly to too small a radius or is struck sharply at temperatures in the region of 0 °C or lower, there is a risk of shattering the PVC components.

To avoid the risk of damage during handling, therefore, it is desirable that the cables specified in this standard should be installed only when both the cable and the ambient temperatures are above 0 °C and have been so for the previous 24 h, or where special precautions have been taken to maintain the cable above this temperature. However, after installation, they will operate satisfactorily at temperatures between – 40 °C and + 65 °C providing that at temperatures below 0 °C they are not subject to movement and/or impact.

The manufacturer should be consulted for precise instructions if the cable is to be stored and/or used outside these temperature limits.

Appendix D Voltage test

The applied voltage is 1 000 V approximately of sine-wave form having a frequency in the range 40 Hz to 62 Hz.

The voltage is applied to the completed cable at room temperature without immersion in water.

For cables without lead sheath, screen or armour, apply the voltage between conductors. For cables with lead sheath, screen or armour, apply the voltage between conductors, and between conductors and lead sheath, screen and armour which is earthed.

Increase the applied voltage gradually and maintain at full value for 1 min.

Publications referred to

BS 1442, *Galvanized mild steel wire for armouring cables.*

BS 4727, *Glossary of electrotechnical, power, telecommunication, electronics, lighting and colour terms.*

BS 5099, *Spark testing of electric cables.*

BS 5345, *Code of practice for the selection, installation and maintenance of electrical apparatus for use in potentially explosive atmospheres (other than mining applications or explosive processing and manufacture)*[2)].

BS 5345-1, *Basic requirements for all Parts of the code.*

BS 5345-4, *Installation and maintenance requirements for electrical apparatus with type of protection "i". Intrinsically safe electrical apparatus and systems.*

BS 5501, *Electrical apparatus for potentially explosive atmospheres*[2)].

BS 5501-1, *General requirements.*

BS 5501-7, *Intrinsic safety "i".*

BS 5501-9, *Specification for intrinsically safe electrical systems "i".*

BS 6346, *PVC-insulated cables for electricity supply.*

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

BS 6746, *PVC insulation and sheath of electric cables.*

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

[2)] Referred to in the foreword only.

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