

Coaxial cable for wideband distribution systems —

Part 1: Specification for single unit, semi-airspaced cables for wideband distribution systems

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- British Plastics Federation
- British Telecommunications plc
- Crown Agents for Oversea Governments and Administrations
- Electric Cable Makers' Confederation
- Home Telephone Cable Makers' Association
- Ministry of Defence
- Society of British Aerospace Companies Limited

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

- British Broadcasting Corporation
- Cable Television Association of Great Britain
- Cable Television Cable Makers' Association
- Confederation of Aerial Industries
- Department of Trade and Industry (British Calibration Service)
- ERA Technology Ltd.
- Electronic Components Industry Federation
- Electronic Engineering Association
- Society of Cable Television Engineers
- United Kingdom Atomic Energy Authority

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Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
Section 1. General	
1 Scope	1
2 Definitions	1
Section 2. Constructional requirements	
3 Materials	2
4 Dimensions	3
Section 3. Electrical requirements	
5 Mean characteristic impedance (Z_m)	5
6 Attenuation	5
7 Uniformity of characteristic impedance	5
8 Screening effectiveness	5
9 Conductor d.c. resistance	5
10 Insulation resistance	5
11 Sheath spark test	5
Section 4. Mechanical requirements	
12 Bending	7
13 Longitudinal pull of conductors other than copper covered steel conductors	7
Section 5. Identification, labelling and packaging	
14 Identification	8
15 Labelling	8
16 Packaging	8
Appendix A Recommended schedule of testing	9
Appendix B Mechanical test methods	9
Appendix C Electrical test methods	11
Figure 1 — Attenuation measurement: substitution method	16
Figure 2 — Attenuation measurement: power ratio method	16
Figure 3 — Uniformity of characteristic impedance measurement: sweep frequency: return loss bridge method	16
Figure 4 — Surface transfer impedance apparatus for frequencies up to 30 MHz	17
Figure 5 — Surface transfer impedance apparatus for frequencies above 30 MHz	18
Table 1 — Resistance factor and minimum elongation for conductors	2
Table 2 — Overall diameter and diameter over dielectric	3
Table 3 — Minimum sheath thickness	4
Table 4 — Mean characteristic impedance	5
Table 5 — Maximum attenuation	5
Table 6 — Minimum return loss	6
Table 7 — Maximum surface transfer impedance	6
Table 8 — Maximum conductor d.c. resistance	6
Table 9 — Minimum pulling force for 3 % length extension at $20 \pm 5^\circ\text{C}$	7
Table 10 — Minimum barrel dimensions (coiling and drumming diameters)	8
Table 11 — Mandrel diameters for bending tests	10
Publications referred to	Inside back cover

Foreword

This revision of this British Standard has been prepared under the direction of the Electronic Components Standards Committee to take account of technical changes occurring since publication of the 1977 edition.

This British Standard caters particularly for the immediate requirements of expanding cable television networks, and its scope has been for that reason confined to the types of cable required urgently. It is recognized that other types of cable may be required in due course and it is planned for further Parts of BS 5425 or other standards to be prepared to cater for these.

Certain of the performance requirements of this standard may require early amendment following practical experience of use of these cables in cable television networks.

For the successful operation of wideband distribution systems, coaxial cables are required to comply strictly with the quality and performance requirements of the standard. For this reason, manufacturers of these products are advised to commission and maintain satisfactory systems in accordance with BS 5750, or advised to seek certification of their products and/or Quality Assurance systems (as required) from the British Approvals Service for Electric Cables (BASEC).

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 and ii, pages 1 to 18, 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.

Section 1. General

1 Scope

This Part of BS 5425 specifies the constructional, electrical and mechanical requirements for a series of single unit, semi-airspaced coaxial cables primarily intended for use in the frequency band 5 MHz to 1 000 MHz.

Cables with and without separate moisture barriers are included. This specification excludes designs having cellular foam dielectrics.

Appendix A gives a recommended schedule of testing.

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 5425 the definitions given in BS 2316-1 and BS 4727-3: Group 01 apply.

Section 2. Constructional requirements

3 Materials

3.1 Inner conductor

3.1.1 General. The inner conductor shall be one of the following:

- a single annealed copper conductor complying with BS 4109;
- a single copper covered steel conductor complying with 3.2 of BS 2316-1:1968 and BS 2316-2:1968;
- a single copper covered aluminium conductor complying with clause 5 of BS 6360:1981.

Completed cable shall not contain joints in the inner conductor which have been made subsequent to the final wire drawing operation.

3.1.2 Resistance factor. The maximum resistance of copper covered steel conductor or copper covered aluminium conductor shall be that given for copper conductors in BS 4109 multiplied by the appropriate resistance factor given in Table 1.

3.1.3 Elongation

3.1.3.1 Minimum elongation. The minimum percentage elongation of a sample of inner conductor removed from the finished cable shall be not less than the value given in Table 1 when tested in accordance with BS 4109 and BS 6360.

3.1.3.2 Measurement of elongation at break. Elongation due to the breaking of the wire in tension shall be measured by means of an extensometer or other device suitable for measuring elongation in samples up to 250 mm in length and having a vernier reading to 0.25 mm attached to the test specimen. A tension load of approximately 10 % of rated strength shall be applied to the specimen. The elongation shall be observed as the tension load is increased and the reading when fracture occurs shall be the elongation. Tests in which the elongation is less than that specified but in which the fracture occurs within 25 mm of the jaws or extensometer clamps shall be disregarded.

Table 1 — Resistance factor and minimum elongation for conductors

Material	Resistance factor	Minimum elongation
		%
Copper	1.0	8
Copper covered steel	3.5	1
Copper covered aluminium	1.8	10

3.2 Dielectric

The dielectric shall be of a plastics/air construction comprising an insulating tube at the centre of which the inner conductor is supported such that the cable complies with the electrical and mechanical requirements given in sections 3 and 4. Where polyethylene is used it shall be of type 03 or type 2 of BS 6234 without pigmentation.

3.3 Outer conductor

The outer conductor shall consist of either of the following alternatives.

- A metal tape or tapes, covered by a metal braid or helix.* This shall be a plain annealed copper tape or plain annealed copper tapes with properties complying with BS 4608, except for those parameters (e.g. sizes) specified otherwise in this standard. The inner tape shall be applied longitudinally with a minimum overlap of 2.5 mm and shall be of minimum thickness 0.022 mm. Additional tapes shall be applied either longitudinally or helically lapped.

An additional screen of copper wires, complying with BS 4109, except for those parameters (e.g. sizes) specified otherwise in this standard, shall be applied in contact with the outermost tape or tapes such that the completed cable complies with the electrical and mechanical requirements of this standard.

Where these wires are applied in the form of a braid, this shall have a filling factor of not less than 0.3, where the filling factor (k_f) is calculated as follows:

$$k_f = \frac{mn}{2\pi D} \cdot d_w \left(1 + \frac{\pi^2 D^2}{L^2} \right)^{\frac{1}{2}}$$

where

- m is the total number of spindles;
- n is the number of ends of wire per spindle;
- D is the mean diameter of braid = diameter over dielectric + $2.25 d_w$;
- d_w is the diameter of braid wire;
- L is the lay length of braid.

NOTE The relationship between filling factor and coverage factor is:

$$\text{Coverage factor} = 2 k_f - k_f^2$$

Where these wires are applied in the form of a single layer of helically applied wires, this shall have a coverage factor of not less than 0.5, where the coverage factor is calculated as follows:

$$\text{Coverage factor} = \frac{nd_w}{\pi D} \left(1 + \frac{\pi^2 D^2}{L^2} \right)^{\frac{1}{2}}$$

where

- n is the number of helically applied wires;
- D is the mean diameter of helically applied wires = the diameter over dielectric + d_w ;
- d_w is the diameter of helically applied wire;
- L is the lay length of helically applied wires.

b) *A metal tape or tapes, not covered by a metal braid or helix.* This shall be a plain annealed copper tape or plain annealed copper tapes with properties complying with BS 4608 except for those parameters (e.g. sizes) specified otherwise in this standard, of minimum thickness 0.15 mm, applied longitudinally with a minimum overlap of 3.5 mm such that the completed cable complies with the electrical and mechanical requirements of this standard.

3.4 Outer sheath

The outer sheath of the cable shall be of plastics material. Where polyethylene is used it shall be of types 03C or 2C of BS 6234. Where PVC is used it shall comply with the requirements of BS 6746, type TM 1 or type 6.

3.5 Moisture barrier

Where a moisture barrier is required a further metallic layer shall be incorporated under the sheath.

Initially an insulating layer of non-hygroscopic tapes shall be applied either longitudinally or helically over the outer conductor. This shall act as a bedding for a longitudinally-applied laminated tape of aluminium foil coated with a polymer, with the latter towards the outside. The aluminium foil shall have a minimum thickness of 0.075 mm for cables with a maximum specified overall diameter of 12 mm or less and a nominal thickness of 0.15 mm for diameters above 12 mm. The sheath shall be bonded to the polymer coating of the laminated tape.

NOTE For additional protection, additional layers of either metal or plastics may be applied if requested by the user.

4 Dimensions

4.1 Diameter over the dielectric

When measured in accordance with B.1, the mean diameter over the dielectric shall comply with the appropriate value and tolerances given in Table 2.

4.2 Overall diameter

When measured in accordance with B.2, any single measurement of overall diameter shall be less than the maximum overall diameter given for the appropriate cable in Table 2.

4.3 Sheath thickness

When measured in accordance with B.3, the sheath, including the moisture barrier where applicable, shall have a minimum thickness at any point in accordance with Table 3.

4.4 Ovality

When measured in accordance with B.4, the ovality of both the dielectric and the sheath shall be not greater than 5 %.

Table 2 — Overall diameter and diameter over dielectric

Cable designation (without moisture barrier)	Maximum overall diameter	Cable designation (with moisture barrier)	Maximum overall diameter of cables with moisture barrier incorporated in the sheath	Diameter over dielectric
	mm		mm	mm
2 900	34.5	2 900 MB	35.0	29.00 ± 0.30
1 800	23.0	1 800 MB	24.5	18.00 ± 0.25
1 300	17.5	1 300 MB	19.0	13.00 ± 0.20
1 150	16.0	1 150 MB	17.5	11.50 ± 0.20
1 000	14.0	1 000 MB	16.0	10.00 ± 0.20
725	11.0	725 MB	13.5	7.25 ± 0.15
550	9.0	550 MB	11.5	5.50 ± 0.15
445	7.5	445 MB	10.0	4.45 ± 0.15
370	6.5	370 MB	9.0	3.70 ± 0.15
295	6.0	295 MB	8.0	2.95 ± 0.10

4.5 Inner conductor diameter

The inner conductor diameter shall be adjusted to accommodate the velocity ratio of the particular design so as to comply with the mean characteristic impedance requirements of clause 5.

Table 3 — Minimum sheath thickness

Without moisture barrier		With moisture barrier	
Cable designation	Minimum sheath thickness	Cable designation	Minimum sheath thickness
	mm		mm
2 900	1.7	2 900 MB	2.0
1 800	1.1	1 800 MB	1.7
1 300	0.9	1 300 MB	1.6
1 150	0.9	1 150 MB	1.6
1 000	0.8	1 000 MB	1.6
725	0.8	725 MB	1.6
550	0.7	550 MB	1.6
445	0.7	445 MB	1.4
370	0.6	370 MB	1.4
295	0.5	295 MB	1.4