

Specification for

**PTFE insulated
equipment wires and
cables, single- and
multi-core, with silver
plated copper
conductors (190 °C) or
nickel plated copper
conductors (260 °C)**

ICS 49.060

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Committees responsible for this British Standard

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- British Airways
- British Cable Makers Confederation
- British Rubber Manufacturers' Association
- Civil Aviation Authority (Airworthiness Division)
- Federation of the Electronics Industry
- Ministry of Defence
- Society of British Aerospace Companies

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Foreword

This British Standard has been prepared by Technical Committee ACE/6. It specifies requirements and current ratings for a range of PTFE insulated equipment wires and cables that are intended for use in electrical instruments and equipment. It is a revision of BS 2G 210 which is withdrawn.

This revision introduces corrections to Table 17, Table 18 and Table 21 and incorporates AMD 7223, July 1992.

The PTFE insulation is applied either by extrusion or by spiral lapping.

Cables manufactured to this standard are not required to meet the fire resistance requirements of BS 3G 100-3.13, but are required to satisfy the flammability requirements of BS G 230.

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.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 22, 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 Scope

This British Standard specifies the construction and performance requirements for a range of PTFE insulated cables and wires with either silver plated or nickel plated copper conductors which are suitable for use in electrical instruments and equipment. The continuous current ratings for the cables are given in Annex A.

The following types of cables are specified:

types A and NA	300 V (r.m.s.)	single- or multi-core
types B and NB	600 V (r.m.s.)	
types C and NC	1 000 V (r.m.s.)	
types AS and NAS	300 V (r.m.s.)	single- or multi-core with overall screen
types BS and NBS	600 V (r.m.s.)	
types CS and NCS	1 000 V (r.m.s.)	
types AM and NAM	300 V (r.m.s.)	multi-core with outer jacket
types BM and NBM	600 V (r.m.s.)	
types CM and NCM	1 000 V (r.m.s.)	
types BSM and NBSM	600 V (r.m.s.)	single- or multi-core with overall screen
type CSM and NCSM	1 000 V (r.m.s.)	and outer jacket

NOTE 1 Cables with nickel plated conductors are prefixed N.

NOTE 2 The cables are suitable for use where the potential between conductors, or between a conductor and screen, or between a conductor and the equipment structure does not exceed the voltage specified above for each type.

NOTE 3 The cables are suitable for continuous use where the maximum stabilized conductor temperature does not exceed 190 °C (cables having silver plated conductors) or 260 °C (cables having nickel plated conductors). They are suitable for applications not involving continuous flexing at temperatures down to – 75 °C, or, where continuous flexibility is involved, at temperatures down to – 50 °C.

NOTE 4 Although cables having silver plated conductors are suitable for use up to 190 °C, it should be noted that after prolonged use at this temperature the conductor may tarnish, with consequent difficulty in soldering.

NOTE 5 The latest revision of an Aerospace Series standard is indicated by a prefix number.

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 inside back cover. For dated references, only the edition cited applies; any subsequent amendments to or revisions of the cited publications apply to this British Standard only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited reference 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 edition.

3 Classification

Cables shall be classified according to the number of cores as follows:

- class 1: single-core;
- class 2: two-core;
- class 3: three-core;
- class 4: four-core.

4 Definitions

For the purposes of this standard the definitions given in BS G 230 and BS G 258 apply, together with the following.

4.1

wire

a cable having a solid conductor

5 Construction

5.1 General

The materials and method of construction used for the formation of cables shall be defined and controlled by the manufacturer to the satisfaction of the Approving Authority¹⁾. No change shall be made to such materials or processes unless it can be shown to the satisfaction of the Approving Authority that the performance and handling properties of cables have not been degraded.

5.2 Materials

Cables shall be manufactured from unused materials that have been exposed only to processes essential to their manufacture and application.

5.3 Conductors

5.3.1 Copper conductors shall conform to the appropriate requirements of BS G 231 together with **5.3.2** and **5.3.3**, except for tensile strength and elongation at break of conductors after insulation which shall conform to Table 22.

5.3.2 Copper strands shall be either silver plated or nickel plated.

5.3.3 Joints in single strands shall be brazed or hard soldered and there shall be not more than one such joint in any 50 m of strand. Joints in single strands shall not be within 300 mm of any other joint in the same layer.

5.4 Insulation

The insulation shall be PTFE, either extruded or spirally lapped. If spirally lapped, the layers shall be sintered together to give a consolidated dielectric.

5.5 Screen

The screen shall consist of a braid having a coverage of 85 % minimum, and a lay factor of less than 3 when calculated in accordance with Appendix A of BS 2G 230:1991. Braid strands shall be 0.1 mm diameter. There shall be no joints in the complete screen. Where breaks in individual strands occur, the ends shall be brazed or tucked into the weave ensuring that the cut end is on the outside of the screen. There shall be not more than one such break in any 300 mm length of cable or in any 10 m length of individual strand. Strands from which the braid is constructed shall be either silver plated or nickel plated and shall conform to the appropriate requirements of BS G 231 before braiding.

5.6 Jacket

The jacket shall be manufactured from PTFE and shall have a minimum thickness of 0.25 mm. It shall be applied by either extrusion or spiral lapping. If spirally lapped the layers shall be sintered.

NOTE The type of jacket required should be stated by the purchaser in his enquiry or order.

¹⁾ Approving Authorities are as follows:

- a) for UK civil aviation products, the Civil Aviation Authority (or their accredited representatives); or
- b) for UK military products, information is available from the Procurement Executive, Ministry of Defence, Directorate General of Defence Quality Assurance, Directorate of Standardisation.

5.7 Mass and dimensions

NOTE Cables are available in the following sizes.

Types A and NA	Sizes 32 to 20	single- and multi-core. Multi-core only available with stranded conductors
Types B and NB	Sizes 32 to 18	
Types C and NC	Sizes 32 to 10	
Types AS and NAS	Sizes 32 to 20	single- and multi-core. Available only with stranded conductors
Types BS and NBS	Sizes 32 to 18	
Types CS and NCS	Sizes 32 to 10	
Types AM and NAM	Sizes 32 to 20	multi-core only. Available only with stranded conductors
Types BM and NBM	Sizes 32 to 18	
Types CM and NCM	Sizes 32 to 18	
Types BSM and NBSM	Sizes 32 to 18	single- and multi-core. Available only with stranded conductors
Types CSM and NCSM	Sizes 32 to 10	
Types CSM and NCSM	Sizes 32 to 18	multi-core only. Available only with stranded conductors

5.7.1 General

The mass and dimensions of the cables shall conform to Table 1 to Table 14, as appropriate.

5.7.2 Single-core cables

Single-core cable types AS, BS and CS shall consist of single-core cable type A, B or C with screen. Single-core cable types BSM and CSM shall consist of single-core cable type B or C with screen and outer jacket.

5.7.3 Multi-core cables

The cables shall consist of two or more single-core cables conforming to 5.7.1 and 5.7.2, twisted together with a lay of approximately 12 times the diameter over the laid up core. Multi-core cable types A, B and C shall consist of twisted assemblies of single-core cable types A, B or C with no further finish. Types AS, BS and CS shall consist of twisted assemblies of single-core cable type A, B or C with overall screen. Types AM, BM and CM shall consist of twisted assemblies of single-core cable type A, B or C with outer jacket. Types BSM and CSM shall consist of twisted assemblies of single-core cable type B or C with overall screen and outer jacket.

5.8 Colour

5.8.1 Single-core cable

5.8.1.1 Single colour

For class 1 cables of all types, the colour of the PTFE insulation shall conform to Table 15. The colours shall match those shown in BS 6746C, and shall not be changed by any of the tests to which the cable is subjected.

NOTE Cables may be coloured by the use of an appropriately coloured extrusion compound or tape, or by the application of a coloured PTFE finishing coat over natural PTFE insulation.

5.8.1.2 Bi-colour

Bi-colouring shall conform to Table 16 and shall be in the form of non-conductive spiral marking obtained by the use of differently coloured tapes, or by dual extrusion, or by the application of stripes in PTFE printing ink on the base colour. The first colour in each pair listed in Table 16 shall be the base colour and shall occupy not less than 70 % of the surface area. The cable shall be readily identifiable by viewing any 12 mm length from any direction.