

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)**

Foreword

This British Standard, prepared under the direction of the Aerospace Standards Policy Committee, 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 It is a revision of British Standard G 210 : 1970 which is withdrawn.

This edition introduces multi-core cables and nickel plated conductors.

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 British Standard 3G 100 : Subsection 3.13, but are required to satisfy the flammability requirements of British Standard G 230.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

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(Aerospace Series)

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silver plated copper conductors (190 °C) or
nickel plated copper conductors (260 °C)**

Corrections

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Tables 1, 2 and 3

In column 7, delete the column heading, 'Installation radial thickness' and substitute
'Insulation radial thickness'.

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Specification

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 appendix A.

The following types of cable 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	1000 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	1000 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	1000 V (r.m.s.)	
types BSM and NBSM	600 V (r.m.s.)	Single- or multi-core with overall screen and outer jacket
types CSM and NCSM	1000 V (r.m.s.)	

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 titles of the publications referred to in this standard are listed on the inside back page.

NOTE 6. The latest revision of an Aerospace Series standard is indicated by a prefix number.

2 Definitions

For the purposes of this British Standard the definitions given in British Standard G 230 apply, together with the following.

2.1 Wire

A cable having a solid conductor.

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 Construction

4.1 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.

4.2 Materials

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

4.3 Conductors

4.3.1 Copper conductors shall comply with the appropriate requirements of British Standard G 231 together with **4.3.2** and **4.3.3**, except for tensile strength and elongation at break of conductors after insulation which shall comply with table 22.

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

4.3.3 Joints in single strands shall be brazed or hard soldered and there shall not be 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.

4.4 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.

4.5 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 British Standard 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 not be 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 comply with the appropriate requirements of British Standard G 231 before braiding.

4.6 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.

4.7 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	Single-core only. Available only with stranded conductors
Types CSM and NCSM	Sizes 32 to 18	Multi-core only. Available only with stranded conductors

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, Kentigern House, 65 Brown Street, Glasgow G2 8EX.

4.7.1 General

The mass and dimensions of the cables shall comply with tables 1 to 14, as appropriate.

4.7.2 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.

4.7.3 Multi-core cables

The cables shall consist of two or more single-core cables complying with 4.7.1 and 4.7.2, 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 type 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.

4.8 Colour

4.8.1 Single-core cable

4.8.1.1 Single colour

For Class 1 cables of all types the colour of the PTFE insulation shall comply with 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.

4.8.1.2 Bi-colour

Bi-colouring shall comply with 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.

NOTE. The purchaser should state in his enquiry or order whether bi-colouring is required.

4.8.2 Multi-core cable

4.8.2.1 For all types of multi-core cable of classes 2, 3 or 4 the insulation shall be colour coded as shown below using any of the methods listed in 4.8.1.1.

Two-core	: red, blue
Three-core	: red, blue, yellow
Four-core	: red, blue, yellow, green

4.8.2.2 Jackets of types AM, NAM, BM, NBM, CM, NCM, BSM, NBSM, CSM and NCSM shall be white or another colour listed in table 15, in accordance with 4.8.1.1.

NOTE. The purchaser should state in his enquiry or order if a colour other than white is required.

5 Designation

The designation of the cables for the purposes of drawing references and orders shall be as follows:

XGXXX	XXXXX	XX	X	XX	X
Specification number	Construction (type and class)	Size	Number of strands A = 1 B = 7 C = 19 D = 37	Colour code (see tables 15 and 16)	L or E for lapped or extruded insulation