

Specification for

Tersil type electric cables (metric units)

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Foreword

This British Standard has been prepared to provide a range of cables based on the construction of Tersil cables as specified in BS G 189, but having dimensions and test measurements in metric units. With the exception of the conductors of Tersilal cables, the dimensions of which are arithmetic conversions of those specified in BS G 189, the metric conductors are in accordance with European Standard EN 2083¹⁾, and ISO 2635.

The cables are suitable for use at operating temperatures higher than those for which Nyvin cables, complying with the requirements of BS G 177, are suitable. At temperatures above 105 °C certain types of termination may be unsatisfactory for use with the cables. The cables with nickel-plated copper conductors will withstand one short period at 1 100 °C.

The cables are resistant to all liquids encountered on aircraft, including ester-based hydraulic fluids and ester-based lubricating oils and splash conditions from high-test peroxide. Owing to the exposure of the silicone rubber insulation at a cut end, there is a tendency for it to absorb kerosene, resulting in the swelling of the rubber and a tendency for it to burst open the protective covering. The ends of the cables should therefore, if possible, be kept away from areas where they will be exposed to kerosene. Where this cannot be done, special protection should be provided on installation.

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 15 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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¹⁾ In course of preparation.

Amendments issued since publication

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1 Scope

1.1 This British Standard specifies requirements for “Tersil” type cables for aircraft wiring, for circuits in which the potential between conductors, or between a conductor and metal braid or the aircraft structure, does not exceed 600 V (r.m.s.) and the frequency does not exceed 1 600 Hz and where any combination of ambient temperature and conductor current for continuous service does not produce a stabilized conductor temperature in excess of 190 °C.

The cables are suitable for fixed wiring in aircraft at temperatures down to – 75 °C, but are not suitable for severe flexing at temperatures below – 55 °C. The cables are intended for use in areas where circuit integrity is required for a limited period during a fire. The cables do not support combustion; they comply with the requirements of BS 3G 100-2.3.13, concerning fire resistance.

1.2 The generic name “Tersil” is applicable to cables covered by this British Standard and complying with all its requirements.

1.3 The standard includes the following ranges of cables.

- a) *Tersil*. Cables with a nickel-plated copper conductor and composite insulation of silicone rubber, glass and polyethylene terephthalate or other suitable materials.
- b) *Tersilal*. Similar to the Tersil range but with a conductor of aluminium instead of copper.
- c) *Tersilmet*. Similar to the Tersil range but with the addition of a metal braid.
- d) *Tersilmetsheath*. Similar to the Tersilmet range but with the addition of an external sheath of insulating materials.
- e) *Dutersil*, *Tritersil*, *Dutersilal* and *Tritersilal*. Two-core or three-core cables consisting of two or three Tersil or Tersilal cables twisted together.

1.4 The cables are classified and identified, not by current ratings, but by a series of numbers indicative of the conductor cross-sectional area. These numbers correspond to those used for equivalent American cables. The maximum current ratings for Tersil cables are given in Appendix A.

2 References

This standard makes reference to the following standards publications.

BS 3G 100, *General requirements for equipment for use in aircraft*.

BS G 177, *Nyvin type electrical cables for aircraft*²⁾.

BS G 189, *Tersil type electrical cables for aircraft*²⁾.

BS G 212, *General requirements for aircraft electrical cables*.

BS 872, *Abrasive papers and cloths (technical products)*.

BS 1154, *Specification for natural rubber compounds (high quality)*.

BS 2627, *Wrought aluminium for electrical purposes — wire*.

BS 5099, *Spark testing of electric cables*.

BS 6360, *Copper conductors in insulated cables and cords*.

BS 6746C, *Colour chart for PVC insulation and sheath of electric cables*.

Section 1. Requirements

3 Materials

3.1 Copper conductors and wires. Annealed copper wire shall be in accordance with the requirements of BS 6360 as far as they are applicable. The wire for the conductors shall be nickel-coated and shall comply with the requirements of clauses **31** and **33** of this standard. The wires for the metal braiding shall be tinned and in accordance with the tinning test specified in BS 6360, where applicable. The conductors only shall comply with the tensile and elongation requirements of clause **30** of this standard.

3.2 Aluminium conductors and wires. Aluminium wires, before stranding, shall comply with the requirements of BS 2627. Aluminium wires taken from the stranded or bunched conductor shall comply with the tensile test requirements of clause **30** of this standard.

3.3 Insulation. The insulation shall be of such a quality that the finished cable complies with all the requirements of this standard.

3.4 Glass braid. The free alkali content of the glass shall not exceed 1 %. The glass shall be of such quality that the finished cable complies with all the requirements of this standard.

²⁾ Referred to in the foreword only.

4 Construction

4.1 General

4.1.1 Conductor. The conductor shall be stranded, or rope-stranded as specified. It shall consist of nickel-plated copper wires, complying with the requirements of **3.1**, or of aluminium wire, complying with the requirements of **3.2**. Joints in single wires shall be brazed or hard soldered but the complete conductor shall not be joined, and joints in single wires shall not be within 300 mm of any other joint in the same layer. In aluminium conductors the wires shall not be jointed, but the ends of the wires may be tucked into the conductor.

There shall be no kinks or other irregularities in the conductor.

Table 3 and Table 4 state the number and diameter of individual wires and the formation to be used for the complete conductor. The resistance of the insulated conductor, measured as specified in clause **22**, shall be not greater than the values given in Table 3 and Table 4.

4.1.2 Insulation. The insulation adjacent to the conductor shall consist of silicone rubber of uniform circular cross section throughout the length of the cable and the conductor shall be evenly centred in this material.

If desired by the manufacturer, a roving or braid of glass may be placed between the conductor and the silicone rubber in Tersil cables of sizes 1 to 0000 and in Tersilal cables of sizes 2 to 0000.

An uncoloured glass fibre braid shall be applied over the silicone rubber insulation. The braid shall be closely woven and of uniform surface. The number of spindles and ends per spindle shall be such as to ensure that the filling factor is not less than 0.70. The formula to be used for calculating the filling factor is given in Appendix B.

The insulation shall not be loose, but it shall be possible to strip the complete insulation, leaving the conductor in a condition sufficiently clean to permit satisfactory connection to terminations. The outer protective coating shall consist of lapped polyethylene terephthalate tape and polyethylene terephthalate braid or glass fibre braid with other suitable material to give a finish such that the cable complies with the requirements of this standard.

4.1.3 Colour and identification. The exterior of the cable shall be coloured orange to match the “orange” shown in BS 6746C as closely as practicable. The cable shall be identified by the method stated in clause **6** of this standard.

4.2 Unisersil cables

4.2.1 The cables shall consist of single cores complying with the requirements of **3.1**, **3.3** and **4.1**.

4.2.2 When required by the purchaser, phase identification shall be provided on the cables by means of a helical stripe of left-hand lay, in the colours red, yellow or blue. The colours shall match reasonably those specified in BS 6746C. Such cables shall be ordered by the addition to the cable nomenclature of the word “red”, “yellow” or “blue” as appropriate.

The width of the stripe shall be as follows:

Unisersil 22 to 12	3.0 ± 1.5 mm
Unisersil 10 to 0000	5.0 ± 1.5 mm

The lay for all sizes shall be 25 mm (minimum) and 40 mm (maximum).

4.3 Unisersilal cables

4.3.1 The cables shall consist of single cores complying with the requirements of **3.2**, **3.3** and **4.1**.

4.3.2 When required by the purchaser, phase identification in accordance with **4.2.2** shall be provided on the cables, the width of the stripe being 5.0 ± 1.5 mm.

4.4 Unisersilmet cables. The cables shall consist of Tersil cables to which has been added a metal braid. Tinned copper wires, as specified in **3.1**, shall be used to form the metal braid. The braid shall be close fitting, but when the cable is cut it shall be possible to slide the metal braid back by hand a distance of 100 mm in a length of 600 mm, one end of the cable being clamped. The braid shall subsequently be capable of being returned to within 25 mm of the free end of the cable.

Where breaks in the individual wires occur, the ends shall be soldered or tucked out of the braid and there shall be not more than one such break in any 25 mm length of cable, or in each 10 m of individual wire.

When renewal of the spindles is necessary, the ends shall be tucked out of the braid and there shall be not more than one spindle renewal in any 300 mm length of cable.

There shall be no joints in the complete braid.

The diameter of the wire used shall be as detailed in Table 5. The number of spindles and ends per spindle shall be such as to ensure that the filling factor is not less than 0.70. The lay factor shall not exceed 3. The formulae to be used for the calculation of the above details are given in Appendix B.

4.5 Unisersilmetsheath cables. The cables shall consist of Tersilmet cables covered with a polyester tape followed by a glass fibre braid or polyester fibre braid, the whole being suitably finished to give a reasonably good abrasion resistance. The dimensions shall be as stated in Table 6.