

Specification for

Fire proof electric cables for engine fire zone and airframe use

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Committees responsible for this British Standard

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- British Airways
- BEAMA Ltd.
- British Cable Makers' Confederation
- British Rubber Manufacturers' Association
- Civil Aviation Authority
- Electronic Components Industry Federation
- Ministry of Defence
- National Supervising Inspectorate
- Society of British Aerospace Companies Limited

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Foreword

This British Standard, prepared under the direction of the Aerospace Standards Committee, specifies a range of fire proof cables that are suitable for engine fire zone and airframe use where resistance to failure in the fire conditions given in this standard is a prime requirement. Cables manufactured in accordance with this standard are required to comply with the fire proof requirements and therefore the fire resistance requirements of BS 3G 100-2.3.13, and to satisfy the flammability requirements of BS G 230.

The standard requires the application of the dielectric material so as to provide the minimum penalties of weight and space whilst offering reliable performance over a period of not less than 10 000 flying hours.

Cables with steel reinforcement wires are not included in this specification.

Attention is drawn to BS G 230 which specifies the general requirements for aircraft electric cables (second series).

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 14, 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 cables suitable for use in engine fire zones and other areas requiring circuit integrity in fire conditions. The size range is 22 to 16.

The following types of cable are specified.

- Type F single core, having nickel clad copper conductors
- Type FA single core, having nickel clad copper alloy conductors
- Type FSN single core or multi-core type F with a screen and outer jacket
- Type FASN single core or multi-core type FA with a screen and outer jacket

The cables are suitable for continuous use where the maximum stabilized conductor temperature does not exceed 260 °C. They are suitable for applications involving flexing at temperatures down to – 65 °C.

The cables are suitable for use where the potential between conductors or between a conductor and screen, or the aircraft structure does not exceed 600 V r.m.s. and the frequency does not exceed 2 000 Hz.

The continuous current ratings for the cables are defined in this standard.

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

2 Classification

Cables are classified according to the number of cores as follows.

- Class 1: Single core
- Class 2: Two core
- Class 3: Three core

3 Construction

3.1 General

The material and method of construction used for the formation of the cables shall be defined and controlled 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 the cable have not been degraded. The cable shall be made of materials such that the performance requirements of this standard are satisfied.

3.2 Conductors

3.2.1 Only 100 % new materials which have been through only those processes essential to their manufacture and application into strands shall be used.

3.2.2 Strands shall be clean, bright and free from surface irregularities.

3.2.3 Conductors shall comprise the number and diameter of strands given in Table 1. They shall be concentrically stranded. The conductor diameter shall be as given in Table 1.

3.2.4 There shall be no kinks, joints or other irregularities in the completed conductor.

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

3.2.6 The strands shall be made of copper or high strength copper alloy and shall be nickel clad.

3.3 Insulation

The insulating material shall be such that the performance requirements of this standard are satisfied. Only 100 % new materials that have been through only those processes essential to their manufacture and application shall be used.

¹⁾ The Approving Authority is either:

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

3.4 Screen

The screen shall be constructed of a nickel plated copper braid having a coverage of 85 % minimum and a lay factor of less than 3 when calculated in accordance with Appendix A of BS G 230. 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.

3.5 Jacket

The jacket shall be made of an insulating material, and shall be constructed such that the performance requirements of this standard are satisfied.

3.6 Single-core cables

The mass and dimensions of single-core cables shall be as given in Table 1 and Table 2 as appropriate.

3.7 Multi-core cables

The mass and dimensions of multi-core cables shall be as given in Table 2. The cables shall consist of two or more single cores complying with **3.6**, twisted together with a lay of between 20 and 25 times the pitch circle diameter, with a screen complying with **3.4** and outer jacket complying with **3.5**.

3.8 Colour

3.8.1 Types F and FA. The colour of the insulation for single-core cables shall be white with a helical red stripe to indicate it is a fire zone cable. The stripe shall be continuous and readily identifiable.

3.8.2 Types FSN and FASN class 1. The colour of the insulation shall be either white or white with a red stripe as specified in **3.8.1**.

The colour of the sheath shall be white with a helical red stripe to indicate it is a fire zone cable. The stripe shall be continuous and readily identifiable.

3.8.3 Types FSN and FASN classes 2 and 3. The colour of the insulation shall be red and blue for class 2 cables and red, blue and yellow for class 3 cables.

The colour of the outer sheath shall be white with a helical red stripe to indicate it is a fire zone cable. The stripe shall be continuous and readily identifiable.

4 Designation and marking

The designation and marking of the cables shall be in accordance with **4.1** and **4.2** of BS G 230.

NOTE The capability of the cable to accept circuit identification marking is not required.

5 Packaging and labelling

The cables shall be packed and labelled in accordance with BS G 230.

6 Tests

The following tests shall be carried out in accordance with BS G 230. Specific requirements of this standard are given against the appropriate test. The application of each test for qualification approval, production quality testing, inspection lot testing and production routine testing shall be as given in Table 3.