

Specification for

# General requirements for equipment in aircraft —

Part 2: All equipment —

Section 3: Environmental conditions —

Subsection 3.5: Explosion-proofness

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## Foreword

This British Standard is part of a composite standard in the Aerospace Series of British Standards that specifies general requirements for equipment in aircraft. An introduction to the complete British Standard is given in BS 3G 100-0.

This subsection of BS 3G 100 replaces the explosion-proofness requirements specified in Clauses 221 and 222 of BS 2G 100-2. It details explosion-proofness requirements and in Appendix A the relevant installation recommendations, against which aircraft equipment should be designed for use in various environments. It also defines tests to demonstrate that the equipment complies with these explosion-proofness requirements.

This standard makes reference to the following British Standards:

BS 2G 100, *General requirements for electrical equipment and indicating instruments for aircraft — Part 2: Environmental and operating conditions*.

BS 3G.100, *General requirements for equipment in aircraft — Part 0: Introduction — Part 1: Identification, declaration and construction — Part 2.3X: Sealing requirements*<sup>1)</sup>.

BS 1259, *Intrinsically safe electrical apparatus for use in explosive atmospheres*.

BS 4683, *Electrical apparatus for explosive atmospheres — Part: The construction and test of intrinsically safe electrical apparatus*<sup>1)</sup>.

NOTE Information concerning metric (SI) units is given in BS 350, “*Conversion factors and tables*”, and BS 3763, “*The International System of units (SI)*”.

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### Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8 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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<sup>1)</sup> In course of preparation.

## 1 Scope

This British Standard specifies design requirements for aircraft equipment that may come into contact with flammable fluids and vapours. It also specifies test requirements to demonstrate that the equipment meets these requirements.

The standard does not relate to potentially dangerous environments occurring as a result of leakage from goods carried on board by passengers or as part of their baggage, or cargo, which may be the subject of separate regulations.

It refers to normal and fault conditions occurring in categories of equipment in five types of environment.

The standard should also be read in conjunction with BS 3G 100-0.

## 2 Definitions and terms

For the purposes of this British Standard the following apply:

### 2.1

#### explosion proof

equipment is explosion proof when there is negligible risk that it will cause an explosion of a flammable gas or vapour within the declared environment

### 2.2

#### enclosure

a box or casing, including any ducting, which is part of the equipment and not an aircraft compartment

### 2.3

#### intrinsically safe

equipment is intrinsically safe when any spark or thermal effect produced normally (e.g. by making or breaking a circuit) or accidentally (e.g. by a short circuit or earth fault) is incapable, under prescribed test conditions, of causing ignition of a prescribed gas or vapour

## 3 Equipment design

### 3.1 Equipment design and construction.

Equipment that may come into contact with flammable fluids or vapours and which

- 1) in *normal operation*<sup>2)</sup> may produce arcs, sparks or hot surfaces, shall be so designed, having regard to its likely manner of installation, as to be explosion proof;

- 2) under *fault conditions*<sup>2)</sup> may produce arcs, electrical sparks, friction sparks or hot surfaces, shall be so designed and installed as to reduce to an acceptable minimum the overall risk of a fault occurring such as to ignite the flammable vapours.

**3.2 Integrity of protection.** The required degree of protection under any condition of operation shall be achieved by means that are not dangerously affected by wear of the equipment and are not unduly dependent upon dimensional tolerances or accuracy of assembly.

NOTE Appendix A gives recommendations for the installation of electrical wiring and connections, and the ventilation of equipment in areas that may be contaminated with flammable vapours.

## 4 Categories of equipment and enclosure for various environments

**4.1 General.** This clause details the basic requirements for explosion-proof equipment, discusses the risk of explosion in different environments and provides for various categories of enclosure (see Table 1).

**4.2 Environments.** The five environments recognized by this standard are as follows:

- 1) *Environment I.* An atmosphere in a space in, which uncovered flammable fluids or vapours exist, or can exist either continuously or intermittently by intention: e.g. in fuel tanks or within fuel systems.
- 2) *Environment IIa.* An atmosphere in which flammable mixtures can be expected to occur only as a result of spillage or leakage, and where an explosive environment is likely to occur at a rate greater than one hour per hundred thousand flying hours; e.g. in the vicinity, of fuel systems.
- 3) *Environment IIb.* An atmosphere in which flammable mixtures can be expected to occur as a result of spillage or leakage, and when an explosive environment is likely to occur at a rate less than one hour per hundred thousand flying hours; e.g. where the use of flammable fluids is limited and well contained.
- 4) *Environment III.* An atmosphere where the probability of flammable mixtures arising from aircraft systems is sufficiently low to be disregarded; e.g. within passenger cabins and well ventilated areas not containing flammable fluids.
- 5) *Environment IV.* An atmosphere within a designated fire zone.

<sup>2)</sup> The risk of explosion occurring under normal and fault conditions is referred to in clause 4.