BRITISH STANDARD AEROSPACE SERIES

BS 3G.100-2.3.0: 1972

Incorporating Amendment No. 1

Specification for

General requirements for equipment in aircraft —

Part 2: All equipment —

Section 3: Environmental conditions —

Subsection 3.0: Standard test requirements —

UDC 629.7.05/.06:620.193.21.001.4

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Contents

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 lays down standard requirements for the environmental tests detailed in the numerous subsections of BS 3G.100-2.3, and is reproduced from BS 3G.100-2.3.2.

The standard complies in part with draft International Standard ISO 2650, "Environmental and Operating Conditions for Aircraft Equipment: Part 1, Scope and Applicability".

This standard makes reference to the following:

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

BS 3G.100-0, *Introduction.*

BS 2011, *Basic environmental testing procedures.*

BS 2011-2.1A, *Tests A. Cold.*

BS 2011-2.1B, *Tests B. Dry heat.*

NOTE Information regarding 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 and 2 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 general requirements for the environmental tests comprising the numerous subsections of BS 3G.100-2.3, including the test chamber, mounting of equipment in the test chamber, supplies to the chamber and standard reference conditions. It should be read in conjunction with BS 3G.100-0, and the relevant subsections.

2 Standard atmospheric conditions

Unless otherwise stated, the following standard conditions shall apply to all tests stated in the various subsections of BS 3G.100-2.3.

2.1 Standard atmospheric conditions for testing. The following standard laboratory conditions shall apply.

1) Temperature	15 to 25 °C
2) Relative humidity	45 to 75 %
3) Air pressure	86 to 106 kN/m^2 (860 to 1060 mbar)

Any deviation from these conditions shall be noted and the actual conditions recorded in the test report.

2.2 Standard referee conditions. When the performance of the equipment is sensitive to temperature, pressure and/or humidity and measurements are required for referee purposes at intervals throughout a test programme, the appropriate recommended standard atmospheric conditions given below should be selected.

1) Temperature	25 ± 1 °C
2) Relative humidity	50 ± 2 %
3) Air pressure	86 to 106 kN/m^2 (860 to 1060 mbar)

2.3 Tolerances. The tolerances to be applied to the parameters in the tests should be as follows:

1) Temperature	< 100 °C	± 3 °C
	≥100 °C	± 5 °C
2) Humidity		see individual tests
3) Air pressure (not altitude)		± 5 %
4) Time		see individual tests

3 General requirements for test equipment

Unless otherwise stated, the following general requirements shall apply when conducting the tests stated in the various subsections of BS 3G.100-2.3.

3.1 Test chamber. The chambers used for the test shall be capable of providing the conditions specified.

When the temperature in the chambers is a parameter it shall be monitored by a temperature sensing device located in accordance with **3.4** and the conditions prevailing in any part of the working space of the chamber should, as nearly as is practicable, be identical to those registered by the sensing device. The air in the chamber shall therefore be continuously agitated, but not so vigorously as to cause undue cooling of heat dissipating equipment under test.

The heat source in the chambers shall not be capable of radiating heat directly onto the equipment under test.

The conditions created in the chambers shall be capable of being maintained within the tolerances specified in **2.3**.

3.2 Equipment temperature. Where practicable during high-temperature tests, temperature sensors should be fitted to all components and assemblies that are known to be near their limiting temperatures. The temperature at these locations should be monitored and recorded throughout each test.

3.3 Temperature stabilization. Stabilization will have been reached when the temperature (usually of the largest thermal mass) of the equipment is within 3 °C of its final temperature, or as otherwise prescribed by the relevant specification.

For non-heat-dissipating specimens the final temperature will be the mean (in time) temperature of the chamber in which the specimen is placed.

For heat-dissipating specimens it is necessary to make repeated measurements to ascertain the interval of time required for their temperature to change by 3 °C, or as otherwise prescribed by the relevant specification. Temperature stability has been reached when the ratio between two consecutive time intervals exceeds 1.7.

NOTE 1 Where the thermal time constant of the specimen is short compared with the duration of the exposure to a given temperature, no measurement is needed.

NOTE 2 Where the thermal time constant of the specimen is of the same order as the duration of exposure, checks should be made to ascertain:

1) that non-power-dissipating specimens are within the required limit from the mean (in time) temperature of the atmosphere in which the specimen is placed;

2) that for power-dissipating specimens the ratio between two consecutive time intervals exceeds 1.7 when repeated measurements are made to ascertain the interval of time required for the temperature to change by 3 °C, or as prescribed by the relevant specification.

NOTE 3 It may not be possible in practice to make direct measurements of the internal temperature of the specimen. A check may then be made by measuring some other parameter that is temperature dependent and of which the temperature dependence is known.

3.4 Ambient temperature. The ambient temperature specified in tests of power-dissipating equipment may be determined in either of the following ways, as agreed with the approving or inspecting authority[1]:

1) by measuring the test chamber temperature with a sensor located upstream of the equipment in an airflow having a velocity not exceeding 1 m/s (3.3 ft/s);

2) or for equipment required to operate under still air conditions, the test may need to be controlled by the determination of a temperature that is based on the surface temperature of a specified part of the equipment under test. For information on this method, refer to **29.1.2** of BS 2011-2.1A:1977 and **40.1.2** of BS 2011-2.1B:1977.

Further information on these methods is given in Appendix A[2].

3.5 Mounting of equipment in test chamber. The mounting of the equipment in the test chamber shall simulate as closely as is practicable the installation arrangement existing in normal use. Unnatural structural frames, abnormal orientation, unnatural thermal screening, etc. can all influence the behaviour of the equipment under test and these effects should be minimized.

Where equipment is supplied with cooling air, care should be taken to ensure that the chamber conditions are not adversely affected.

3.6 Supplies. In all tests, supplies and services (electrical power, air supplies, hydraulics, etc.) should, where possible, be derived from or simulated by sources representative of those provided in operational use. The relevant specification should state the supplies and services necessary. During each test, supply and input parameters should be adjusted as stated in the relevant specification (usually to the limits of their tolerances so that they put the equipment at its greatest operational disadvantage).

4 Performance checks

4.1 Initial performance checks. Prior to any test or sequence of tests, the equipment shall be operated under the standard atmospheric conditions specified in **2.1**, and shall be visually inspected and electrically and mechanically checked as required by the relevant specification. Where practicable these checks shall be made when the equipment has been set up in the chamber ready for test.

4.2 Performance checks. A performance check shall be conducted as specified in the relevant specification during and/or after each environmental procedure.

A performance check includes a functional check on the equipment and a visual inspection to assess structural condition, corrosion or the development of any potentially damaging influences.

[1] The approving authorities for aircraft equipment are the Civil Aviation Authority for civil aircraft and the Procurement Executive, Ministry of Defence for military aircraft, or a design authority approved by them.

[2] In course of preparation and will be inserted by amendment action.

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