



BSI Standards Publication

Space systems — Acoustic testing

National foreword

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 14, *Space systems and operations*.

Space systems — Acoustic testing

1 Scope

This document provides guidance for test providers and interested parties to implement acoustic tests of aerospace systems, subsystems, modules and units for applicable spacecraft programs. This document specifies a framework to meet test and process requirements and acts as a supplement to ISO 15864.

The acoustic test system, the technical requirements and the procedures for acoustic tests in reverberant chambers are described. Furthermore, the criteria for the manual test interruption and evaluation are also described.

The technical requirements in this document can be tailored to fulfil the objectives of tests.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 15864:2004, *Space systems — General test methods for space craft, subsystems and units*

ISO 14620, *Space systems — Safety requirements*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

acoustic reverberation chamber

acoustic chamber built in hard and highly reflective surface walls such that the sound field therein becomes diffused

3.2

diffuse sound field

sound field that has uniform energy density in a given region so that all directions of energy flux at all parts of the region are equally probable

3.3

sound pressure

p

root mean square value of instantaneous sound pressure over a given time interval, unless specified otherwise

Note 1 to entry: Normally given in Pa.

3.4 sound pressure level SPL

L_p
expressed by

$$L_p = 20 \lg(p / p_0)$$

where

p is root mean square value of instantaneous *sound pressure* (3.3) over a given time interval (Pa);

p_0 is reference pressure at threshold (Pa), $p_0 = 20 \mu\text{Pa}$.

3.5 overall sound pressure level OASPL

value computed from *one-third-octave* (3.13) or octave band sound pressure levels, L_i

$$L_g = 10 \lg \sum_{i=1}^m 10^{L_i/10}$$

where

L_g is the overall sound pressure level in dB;

L_i is the *sound pressure level* (3.5) in one-third-octave or octave band;

m is the number of one-third-octave or octave bands.

3.6 bandwidth

difference between the nominal upper and lower cut-off frequencies

3.7 centre frequency

geometric mean of the nominal cut-off frequencies of a pass-band

Note 1 to entry: The definition of *octave* (3.12) and third-octave bands preferred centre frequency values refers to ISO 266.

3.8 cut-off frequency of acoustic horn

frequency below which an acoustic horn becomes increasingly ineffective

3.9 measurement point

specific points spatially distributed in the sound field at which *sound pressure levels* (3.4) are measured during test

3.10 control point

measurement points (3.9), spatially distributed inside the reverberant chamber, whose signals are used for the sound pressure level test control

3.11 multipoint control

control achieved by using the average of the signals at the *control points* (3.10)