International Standard ISO 2671

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Environmental tests for aircraft equipment — Part 3.4 : Acoustic vibration

Essais en environnement pour les équipements aéronautiques — Partie 3.4 : Vibrations acoustiques

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2671 was developed by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, and was circulated to the member bodies in March 1979.

It has been approved by the member bodies of the following countries :

Austria	Italy	Spain
Belgium	Korea, Rep. of	United Kingdom
Canada	Libyan Arab Jamahiriya	USA
Czechoslovakia	Poland	USSR
France	Romania	
India	South Africa, Rep. of	

No member body expressed disapproval of the document.

This International Standard is part of a composite standard, specifying environmental tests for aircraft equipment, details of which are given in ISO 7137, *Aircraft — Environmental conditions and test procedures for airborne equipment*.

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Environmental tests for aircraft equipment — Part 3.4 : Acoustic vibration

1 Scope and field of application

1.1 This International Standard specifies laboratory conditions for testing the ability of equipment for subsonic and supersonic civil aircraft to withstand the effects of acoustic vibration. Two types of tests are specified : tests for the functioning of the equipment, and tests for its acoustic endurance. The tests for the functioning of the equipment are carried out both during equipment development and for certification. The tests for acoustic endurance are usually carried out in order to find structural defects during equipment development.

1.1.1 The tests for the functioning of the equipment may be carried out in accordance with one of the two alternative methods.

— wide band noise test

— harmonic sound test.

The tests for acoustic endurance are carried out using the wide band noise method.

1.1.2 The selection of the test severity grade is made by the user in accordance with one of the following two procedures :

a) If measurements of sound pressure levels at the location where the equipment is to be installed are available for in-flight conditions or can be calculated, they can be used to determine test sound pressure levels by a method proposed in this International Standard. This is referred to as procedure "A" (see 4.4.1, 5.2.1, and the annex).

b) If such measurements are not available or the user does not wish to use method A, the test levels may be obtained from this International Standard on the basis of the type of aircraft in which the equipment is to be installed and the location of the equipment in the aircraft with respect to the noise sources. In this method, which will be referred to as procedure "B", the test sound pressure level can be determined by means of the tables and formulae given in this International Standard (see 4.4.2; 5.2.2, and the annex).

1.2 The tests are intended to be applied to equipment sensitive to acoustic vibration. The necessity for functioning and endurance tests, the use of the wide band noise method or harmonic sound method, and the applicable test sound pressure level shall be specified in the relevant equipment specifications.

1.2.1 The equipment located in aircraft, regions where overall sound pressure levels are less than 125 dB will not normally require testing in acoustic vibration environments.

2 Definitions

For the purposes of this International Standard, the following definitions apply :

2.1 control points : Locations of microphones in the test chamber.

2.2 maximum non-uniformity of sound pressure field : The maximum difference between overall sound pressure levels at any two control points when testing in accordance with the wide band noise method.

2.3 mean value of sound pressure levels at the control points : The value determined from the formula :

$$L_m = \left(\left[10 \lg \sum_{j=i}^{k} 10^{Lj/10} \right] - \left[10 \lg k \right] \right), \text{ dB}$$

where

L_j is an overall sound pressure level at the j-th control point relative to 20 µPa, in decibels;

k is the number of control points;

or, when the sound pressure level difference does not exceed 5 dB, from the following formula :

$$L_m = \frac{1}{k} \sum_{j=i}^{k} L_j, \text{ dB}$$

2.4 maximum overall sound pressure level at the equipment location in the aircraft, L_{max} : The maximum r.m.s. level of sound pressure in areas of the equipment location in the aircraft during typical flight.

2.5 nominal sound pressure level : The constant overall sound pressure level specified in a frequency range of 250 to 2 000 Hz for each severity grade, when testing in accordance with the harmonic sound method.