



SLOVENSKI STANDARD
oSIST prEN 2591-403:2023
01-april-2023

Aeronavtika - Elementi električnih in optičnih povezav - Preskusne metode - 403.
del: Sinusna in naključna nihanja

Aerospace series - Elements of electrical and optical connection - Test methods - Part 403: Sinusoidal and random vibration

Luft- und Raumfahrt - Elektrische und optische Verbindungselemente - Prüfverfahren - Teil 403: Sinus- und rauschförmige Schwingungen

Série aérospatiale - Organes de connexion électrique et optique - Méthodes d'essais - Partie 403: Vibrations sinusoïdales et aléatoires

Ta slovenski standard je istoveten z: prEN 2591-403

ICS:

49.060	Letalska in vesoljska električna oprema in sistemi	Aerospace electric equipment and systems
49.090	Oprema in instrumenti v zračnih in vesoljskih plovilih	On-board equipment and instruments

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en,fr,de

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 2591-403

February 2023

ICS 49.060; 49.090

Will supersede EN 2591-403:2018

English Version

Aerospace series - Elements of electrical and optical connection - Test methods - Part 403: Sinusoidal and random vibration

Série aérospatiale - Organes de connexion électrique et optique - Méthodes d'essais - Partie 403: Vibrations sinusoïdales et aléatoires

Luft- und Raumfahrt - Elektrische und optische Verbindungselemente - Prüfverfahren - Teil 403: Sinus- und rauschförmige Schwingungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee ASD-STAN.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (prEN 2591-403:2023) has been prepared by the Aerospace and Defence Industries Association of Europe — Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this document has received the approval of the National Associations and the Official Services of the member countries of ASD-STAN, prior to its presentation to CEN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 2591-403:2018.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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prEN 2591-403:2023(E)**1 Scope**

This document specifies a method of determining the ability of elements of connection to withstand sinusoidal or random vibrations of specified severities.

It will be used together with EN 2591-100.

This test is based on EN 60068-2-6 and EN 60068-2-64.

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.

EN 2591-101, *Aerospace series - Elements of electrical and optical connection - Test methods - Part 101: Visual examination*

EN 2591-201, *Aerospace series - Elements of electrical and optical connection - Test methods - Part 201: Contact resistance - Low level*

EN 2591-202, *Aerospace series - Elements of electrical and optical connection - Test methods - Part 202: Contact resistance at rated current*

EN 2591-204, *Aerospace series - Elements of electrical and optical connection - Test methods - Part 204: Discontinuity of contacts in the microsecond range*

EN 2591-408, *Aerospace series - Elements of electrical and optical connection - Test methods - Part 408: Mating and unmating forces*

EN 60068-2-6:2008, *Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal) (IEC 60068-2-6:2007)*

EN 60068-2-64:2008, *Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance (IEC 60068-2-64:2008)*

EN 60068-2-64:2008/A1:2019, *Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance (IEC 60068-2-64:2008/A1:2019)*

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

4 Preparation of specimens

4.1 Preparation

Specimens shall be prepared according to the technical specification.

4.2 Technical details – Technical specification

Unless specified in the technical specification, the following details shall be stated:

- mounting method, type of cable and definition of specimen wiring;
- specimens mated or unmated and fitted with protective covers (if applicable);
- number of mating and unmating operations (if applicable);
- type of accessories to be fitted on specimens;
- initial measurements and requirements, (if applicable);
- fixing points of sensors on specimens (if applicable);
- test severity:
 - sinusoidal or random vibration curve (method A Figure 1 or method B Figure 2 or Figure 3);
 - temperature (maximum, minimum and ambient);
 - duration;
- mating and unmating forces;
- applicable contact resistance test (EN 2591-201 or EN 2591-202);
- final measurements (if applicable).

5 Method A – Sinusoidal vibration EN 60068-2-6

5.1 General

This test method shall be performed in accordance with the requirements of EN 60068-2-6.

5.2 Apparatus

The vibration apparatus shall meet the requirements EN 60068-2-6:2008, Clause 4.

5.3 Initial measurements

Initial measurements shall be carried out as specified in the technical specification.

5.4 Procedure

5.4.1 Endurance

The specimens shall be subjected to endurance by sweeping as detailed in EN 60068-2-6:2008, 8.3.1 at the levels specified in the product standard.

prEN 2591-403:2023(E)**5.4.2 Test duration**

The entire frequency range of 5 Hz to 3 000 Hz and return to 5 Hz shall be swept in 20 min. This cycle shall be performed 12 times in each of three axes so that test duration shall be approximately 12 h.

5.5 Preferred vibration levels**5.5.1 General**

The product standard should indicate one or more of the following severities.

5.5.2 Level 1

Over the frequency range 5 Hz to 3 000 Hz, constant amplitude of 0,7 mm, or constant acceleration of 10 g, (cross-over frequency 59,6 Hz) whichever is the lesser.

5.5.3 Level 2

Over the frequency range 5 Hz to 3 000 Hz, constant amplitude of 1,0 mm, or constant acceleration of 20 g, (cross-over frequency 70,5 Hz) whichever is the lesser.

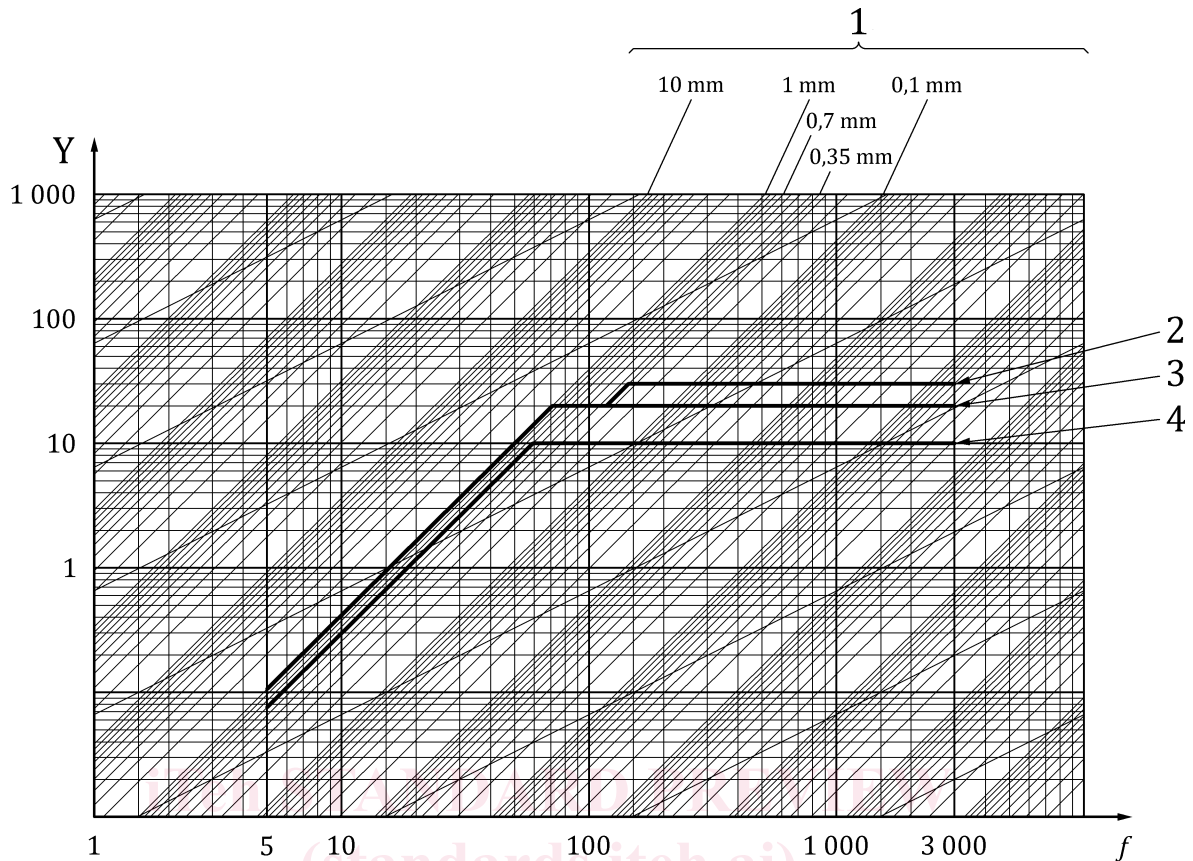
5.5.4 Level 3

Over the frequency range 5 Hz to 3 000 Hz, constant amplitude of 1,0 mm, or constant acceleration of 20 g, (cross-over frequency 70,5 Hz) whichever is the lesser up to a frequency of 119,1 Hz, followed by constant amplitude of 0,35 mm, or 30 g, (cross-over frequency 145,9 Hz) whichever is the lesser.

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**Key**

- 1 Amplitude (single)
- 2 Level 3
- 3 Level 2
- 4 Level 1
- f Frequency
- Y Acceleration

Figure 1 — Sinusoidal vibration (Nomograph)

6 Method B – Random vibration EN 60068-2-64

6.1 General

This test method shall be performed in accordance with the requirements of EN 60068-2-64.

6.2 Apparatus

The vibration apparatus shall satisfy the requirements for testing of EN 60068-2-64:2008, Clause 4 and EN 60068-2-64:2008/A1:2019.

6.3 Initial measurements

Initial measurements shall be carried out as specified in the technical specification.

6.4 Procedure

The vibration test shall be performed in accordance with of EN 60068-2-64:2008, 8.3 and 8.4 and EN 60068-2-64:2008/A1:2019. Initial and final response investigations are not required.

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6.5 Preferred vibration levels

6.5.1 Vibration monitoring

The vibration magnitude shall be monitored as near as possible to the specimen fixing points to confirm compliance with the specified vibration curve at all measuring points.

The specimens shall be vibrated in each of the three axes perpendicular between them, one axis being parallel to the coupling axis.

Unless otherwise specified measurements to EN 2591-204 (Method B) shall be carried out on contacts and (if applicable) the shielding connection.

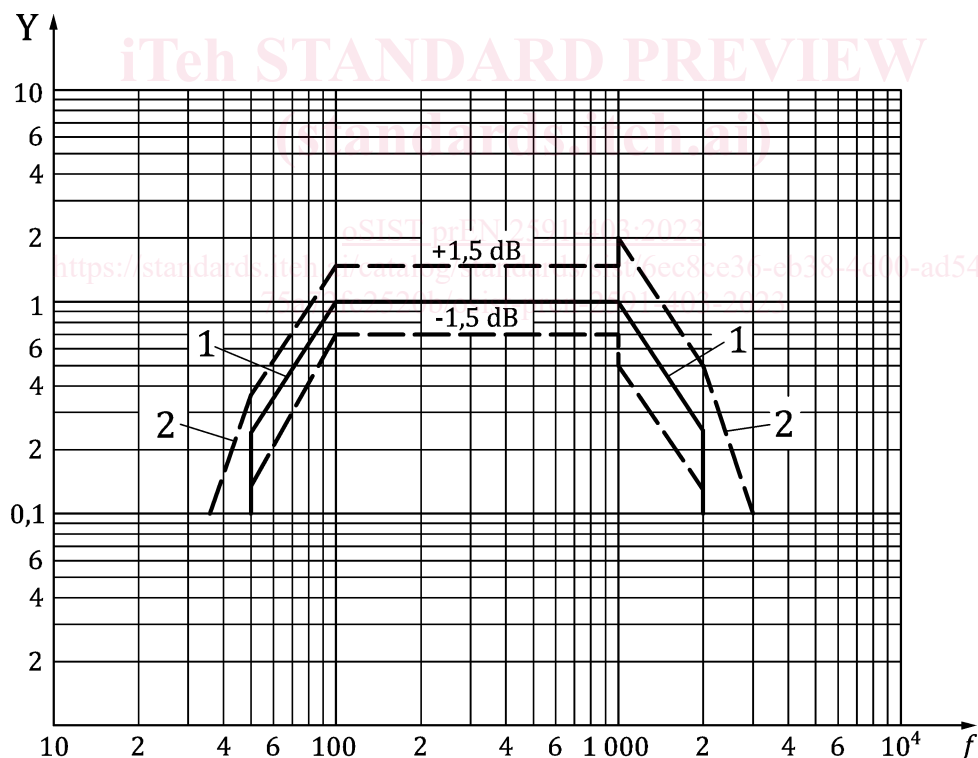
No discontinuity higher or equal to $1 \mu\text{s}$ shall be observed. Discontinuities lower than $1 \mu\text{s}$ are admissible provided their repetition rate does not exceed 1 Hz.

6.5.2 Random vibration severity

The test severity is given by a combination of spectral shape, spectral density, duration and temperature.

6.5.3 Spectral shape and density

See Figure 2 and Table 1 or Figure 3 and Table 2.



Key

- 1 6 dB/octave
- 2 24 dB/octave
- f Frequency
- Y Spectral shape

Figure 2 — Spectral shape (lower noise r.m.s. values)