ICS 19.040 SLOVENSKÁ TECHNICKÁ NORMA Júl 2024

STN	**Skúšanie vplyvu prostredia Časť 2-86: Skúšky Skúška Fx: Vibrácie Metóda s viacerými budičmi a viacerými osami**	**STN EN IEC 60068-2-86 34 5791**

Environmental testing - Part 2-86: Tests - Test Fx: Vibration - Multi-exciter and multi-axis method

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 06/24

Obsahuje: EN IEC 60068-2-86:2024, IEC 60068-2-86:2024

138722

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60068-2-86

March 2024

ICS 19.040

English Version

Environmental testing - Part 2-86: Tests - Test Fx: Vibration - Multi-exciter and multi-axis method (IEC 60068-2-86:2024)

Essais d'environnement - Partie 2-86: Essais - Essai Fx: Vibrations - Méthode par excitateurs multiples et axes multiples (IEC 60068-2-86:2024)

Umgebungseinflüsse - Teil 2-86: Prüfverfahren - Prüfung Fx: Vibration - Multi-Erreger- und Mehrachsenverfahren (IEC 60068-2-86:2024)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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

Ref. No. EN IEC 60068-2-86:2024 E

EN IEC 60068-2-86:2024 (E)

European foreword

The text of document 104/1035/FDIS, future edition 1 of IEC 60068-2-86, prepared by IEC/TC 104 "Environmental conditions, classification and methods of test" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60068-2-86:2024.

The following dates are fixed:

•	latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop) 2024-12-21
•	latest date by which the national standards conflicting with the document have to be withdrawn	(dow) 2027-03-21

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

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

Endorsement notice

The text of the International Standard IEC 60068-2-86:2024 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 60068-2-47 NOTE Approved as EN 60068-2-47

IEC 60721 (series) NOTE Approved as EN 60721 (series)

ISO/IEC 17025 NOTE Approved as EN ISO/IEC 17025

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cencenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60068-1	-	Environmental testing - Part 1: General and guidance	EN 60068-1	-
IEC 60068-2-6	-	Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)	EN 60068-2-6	-
IEC 60068-2-27	-	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock	EN 60068-2-27	-
IEC 60068-2-57	-	Environmental testing - Part 2-57: Tests - Test Ff: Vibration - Time-history and sine-beat method	EN 60068-2-57	-
IEC 60068-2-64	-	Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance	EN 60068-2-64	-
IEC 60068-2-80	-	Environmental testing - Part 2-80: Tests - Test Fi: Vibration - Mixed mode	EN 60068-2-80	-
IEC 60068-2-85	-	Environmental testing - Part 2-85: Tests - Test Fj: Vibration - Long time history replication	EN IEC 60068-2-85	-
ISO 2041	-	Mechanical vibration, shock and condition monitoring - Vocabulary	-	-

IEC 60068-2-86

Edition 1.0 2024-02

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Environmental testing – Part 2-86: Tests –Test Fx: Vibration – Multi-exciter and multi-axis method

Essais d'environnement – Partie 2-86: Essais – Essai Fx: Vibrations – Méthode par excitateurs multiples et axes multiples

IEC 60068-2-86:2024-02(en-fr)

IEC 60068-2-86

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 19.040

ISBN 978-2-8322-8242-7

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ENVIRONMENTAL TESTING –

Part 2-86: Tests – Test Fx: Vibration – Multi-exciter and multi-axis method

FOREWORD

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IEC 60068-2-86 has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test. It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
104/1035/FDIS	104/1043/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 60068 series, published under the general title *Environmental testing*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

ENVIRONMENTAL TESTING –

Part 2-86: Tests – Test Fx: Vibration – Multi-exciter and multi-axis method

1 Scope

This document provides a test procedure for use with multi-exciter and multi-axis vibration test systems. The vibration test is intended for general application to components, equipment, and other products, hereinafter referred to as "specimens", subjected to dynamic environments that could arise during an equipment life cycle. Although this document is mainly intended for vibration testing, the procedure is also applied to certain types of shock and transient tests.

The test procedure set out in this document is applicable where a specimen is required to demonstrate its adequacy to resist specified vibration, shock and transient conditions, without unacceptable degradation of functional or structural performance. The test procedure has significant similarity to test procedures of other IEC 60068-2 documents and encompasses the same range of vibration and shock excitation types.

This document is applicable to specimens subjected to vibration, shock and transient conditions resulting from transportation and/or operational environments, for example in aircraft, space vehicles and land vehicles. It is primarily intended for unpackaged specimens. It is applicable to specimens in their transportation container when the latter are considered as part of the specimen itself.

The test method and associated techniques addressed within this document are primarily intended for use with multiple electrodynamic or servo-hydraulic vibration generators along with an associated computer-based digital control system to control of the specimen excitations.

This document encompasses two testing approaches, commonly referred to as multi-exciter single-axis (MESA), and multi-exciter multi-axis (MEMA). These are:

a) Utilising fixed base shakers either in a single axis or a selected combination of fixed X, Y, Z configurations, also allowing for rotations dependent upon fixture coupling design.

b) Utilising multiple shakers attached directly to the specimen via flexible couplings or similar methods. Here the shakers are attached at any point and in any direction on the specimen. This approach is quite similar to that used for modal testing, but using environmental test severities.

It is emphasised that MESA and MEMA testing currently requires a high degree of engineering judgement and relevant experience, and both test specifier and tester are fully aware of this fact. Generally, MESA and MEMA testing requires greater resources to set up an appropriate test, but potentially provides a more accurate outcome.

For the purpose of this document, the creator of the relevant testing specification, the test specifier, is expected to select the procedure and the values of severity appropriate to the specimen and its use. Precursor testing is included within the procedure of this document, as an option, to permit the test specifier to establish the practicality of the test specification and severities with the specimen. A separate specimen is usually provisioned for such precursor testing.

The existing single axis, single vibrator test procedures within the IEC 60068-2 series can be used with a wide range of different excitations, such as broad band random, random on random, sine on random, swept sine, shock, and long-time history replication. Theoretically these different forms of excitations, can also be applied using multi-axis and multi-exciter methods. However, suitable techniques and commercially available test control software, for some of these types of testing, are not necessarily currently commonly available. For this reason, the procedure of this document is currently primarily intended for broad band random and time history replication as facilities to undertake these types of tests are commonly available. With that said, the procedure of this document may be adapted, by the user, for other forms of excitation and advice is provided.

Traditionally, vibration, shock and transient test severities are specified using acceleration as the control parameter. However, this is not an essential pre-requisite of the procedure within this document. For the purpose of this document, vibration, shock and transient test severities are specified by the user and may be in the form of acceleration, velocity, displacement, or force. The need to include different control parameters within this document arises because there is a greater likelihood when using multi-exciter testing to specify mixed parameters for control purposes. In which case the vibration, shock and transient waveforms applied to the specimen will be controlled based upon the feedback from transducers measuring the appropriate parameter.

Although primarily intended for electrotechnical specimens, this document is not restricted to them and may be used in other fields where desired.

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.

IEC 60068-1, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-6, *Environmental testing – Part 2-6: Tests –Test Fc: Vibration, (Sinusoidal)*

IEC 60068-2-27, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60068-2-57, *Environmental testing - Part 2-57: Tests – Test Ff: Vibration – Time-history and sine-beat method*

IEC 60068-2-64, *Environmental testing – Part 2-64: Tests –Test Fh: Vibration, broadband random and guidance*

IEC 60068-2-80, *Environmental testing – Part 2-80: Tests –Test Fi: Vibration – Mixed mode*

IEC 60068-2-85, *Environmental testing – Part 2-85: Tests –Test Fj: Vibration – Long time history replication*

ISO 2041, *Mechanical vibration, shock and condition monitoring – Vocabulary*