# Classification of environmental conditions - Part 2-6: Environmental conditions appearing in nature - Earthquake vibration and shock

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

| | |
|---|---|
| See Eesti standard EVS-EN IEC 60721-2-6:2023 sisaldab Euroopa standardi EN IEC 60721-2-6:2023 ingliskeelset teksti. | This Estonian standard EVS-EN IEC 60721-2-6:2023 consists of the English text of the European standard EN IEC 60721-2-6:2023. |
| Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas. | This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation. |
| Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 27.01.2023. | Date of Availability of the European standard is 27.01.2023. |
| Standard on kättesaadav Eesti Standardimis-ja Akrediteerimiskeskusest. | The standard is available from the Estonian Centre for Standardisation and Accreditation. |



Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 19.040

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN IEC 60721-2-6

January 2023

ICS 19.040

Supersedes HD 478.2.6 S1:1993

English Version

# Classification of environmental conditions - Part 2-6: Environmental conditions appearing in nature - Earthquake vibration and shock (IEC 60721-2-6:2022)

Classification des conditions d'environnement. Partie 2-6: Conditions d'environnement présentes dans la nature - Vibrations et chocs sismiques (IEC 60721-2-6:2022)

Klassifizierung von Umgebungsbedingungen - Teil 2-6: Natürliche Einflüsse - Seismische Einflüsse (IEC 60721-2-6:2022)

This European Standard was approved by CENELEC on 2023-01-19. CENELEC 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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

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 60721-2-6:2023 E

# European foreword

The text of document 104/946/FDIS, future edition 2 of IEC 60721-2-6, 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 60721-2-6:2023.

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) 2023-10-19 |
| • | latest date by which the national standards conflicting with the document have to be withdrawn | (dow) 2026-01-19 |

This document supersedes HD 478.2.6 S1:1993 and all of its amendments and corrigenda (if any).

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 60721-2-6:2022 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60721-1 NOTE Approved as EN 60721-1

# Annex A
(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.cenelec.eu.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 60068-3-3 | 2019 | Environmental testing - Part 3-3: Supporting documentation and guidance - Seismic test methods for equipment | EN IEC 60068-3-3 | 2019 |
| ISO 2041 | - | Mechanical vibration, shock and condition monitoring - Vocabulary | - | - |

# IEC 60721-2-6

Edition 2.0 2022-12

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



## Classification of environmental conditions – Part 2-6: Environmental conditions appearing in nature – Earthquake vibration and shock

## Classification des conditions d'environnement – Partie 2-6: Conditions d'environnement présentes dans la nature – Vibrations et chocs sismiques

IEC 60721-2-6:2022-12(en-fr)

IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

**About the IEC**
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

**About IEC publications**
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

**IEC publications search - webstore.iec.ch/advsearchform**
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, …). It also gives information on projects, replaced and withdrawn publications.

**IEC Just Published - webstore.iec.ch/justpublished**
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

**IEC Customer Service Centre - webstore.iec.ch/csc**
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

**IEC Products & Services Portal - products.iec.ch**
Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

**Electropedia - www.electropedia.org**
The world's leading online dictionary on electrotechnology, containing more than 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

---

**A propos de l'IEC**
La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

**A propos des publications IEC**
Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

**Recherche de publications IEC - webstore.iec.ch/advsearchform**
La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, …). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

**IEC Just Published - webstore.iec.ch/justpublished**
Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

**Service Clients - webstore.iec.ch/csc**
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

**IEC Products & Services Portal - products.iec.ch**
Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

**Electropedia - www.electropedia.org**
Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 300 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 19 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

IEC 60721-2-6

Edition 2.0 2022-12

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



## Classification of environmental conditions – Part 2-6: Environmental conditions appearing in nature – Earthquake vibration and shock

## Classification des conditions d'environnement – Partie 2-6: Conditions d'environnement présentes dans la nature – Vibrations et chocs sismiques

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 19.040

ISBN 978-2-8322-6272-6

# CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

# CLASSIFICATION OF ENVIRONMENTAL CONDITIONS –

# Part 2-6: Environmental conditions appearing in nature – Earthquake vibration and shock

## FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60721-2-6 has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test. It is an International Standard.

This second edition cancels and replaces the first edition published in 1990. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) the main aim of this revision is to classify in a limited number of classes the seismic activity level of the zone where the equipment could be installed;
b) the correlation between intensity scales, magnitude scales and peak ground acceleration is deleted due to the scientific uncertainty to define such a correlation in a rigorous way;
c) updated scales are given both for intensity and for magnitude;

d) the earthquake zone map, which was not usable in practice, is replaced by an annex giving information about how to retrieve consistent peak ground acceleration distribution all over the world;

e) with regard to identification of the peak ground seismic acceleration of the zone, where the equipment could be installed, the user is made aware that national standards and laws can apply.

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

| Draft | Report on voting |
|---|---|
| 104/946/FDIS | 104/952/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.

A list of all parts in the IEC 60721 series, published under the general title *Classification of environmental conditions*, can be found on the IEC website.

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/standardsdev/publications.

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,
- replaced by a revised edition, or
- amended.

# INTRODUCTION

This part of IEC 60721 is one of a series dealing with the following subjects:

– environmental parameters and their severities (IEC 60721-1);
– environmental conditions appearing in nature (IEC 60721-2);
– classification of groups of environmental parameters and their severities (IEC 60721-3).

This part of IEC 60721 is intended to be used as background material when selecting appropriate severities of parameters relating to earthquakes for product application. Severities given in IEC 60721-1 [1][1] should be applied.

More detailed information can be obtained from specialist documentation and from technical literature, some of which is given in the bibliography.



1 Numbers in square brackets refer to the Bibliography.

# CLASSIFICATION OF ENVIRONMENTAL CONDITIONS –

# Part 2-6: Environmental conditions appearing in nature – Earthquake vibration and shock



## 1 Scope

This part of IEC 60721 deals with environmental conditions appearing in nature related to earthquake vibrations and shocks.

Its object is to define some fundamental properties and quantities for characterization of earthquakes as background material for the severities to which products are liable to be exposed during storage and use. The accelerations given are for ground surface conditions only. Conditions related to structures are referred to but restricted to general case descriptions.

## 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 60068-3-3:2019, *Environmental testing – Part 3-3: Supporting documentation and guidance – Seismic test methods for equipment*.

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

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60068-3-3 and ISO 2041 apply.

ISO and IEC maintain terminology 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

## 4 General description of earthquake

### 4.1 General

Influences from earthquakes are vibrations which can be modelled as stochastic processes and can affect products and provide stress in many ways.

This Clause 4 is intended to provide information on earthquake behaviour, and on the dynamic performance of products during earthquakes. Numerical values given are typical and illustrative but should not be considered as standard.