

Classification of environmental conditions —

Part 1: Environmental parameters and their severities

The European Standard EN 60721-1:1995 together with amendment A2 July 1995 has the status of a British Standard

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee GEL/50, Environmental testing, to panel GEL/50/-/1, Coordination of IEC/TC 75 work, upon which the following bodies were represented:

Federation of the Electronics Industry
Society of Motor Manufacturers and Traders Limited

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National foreword

This Part of BS EN 60721 has been prepared by Technical Committee GEL/50 and is the English language version of EN 60721-1:1995 *Classification of environmental conditions — Part 1: Environmental parameters and their severities*, and its amendment A2:1995. Text affected by amendment A2 is indicated by a double sideline in the left-hand margin. This Part of BS EN 60721 is identical with IEC 721-1:1990 including Amendment 1:1992 and Amendment 2:1995, published by the International Electrotechnical Commission (IEC).

This standard supersedes BS 7527-1:1991 which is withdrawn. References in the text to IEC page numbers should be ignored.

Cross-references

Publication referred to	Corresponding British Standard
EN 60068-2-27:1993 (IEC 68-2-27:1987)	BS EN 60068 <i>Environmental testing</i> Part 2 <i>Test methods</i> Section 27:1993 <i>Environmental testing procedures. Tests. Test Ea and guidance. Shock</i>
EN 50014:1992	BS EN 50014:1992 <i>Electrical apparatus for potentially explosive atmospheres. General requirements</i>
HD 478.2.2 S1 (IEC 721-2-2:1988)	BS 7527 <i>Classification of environmental conditions</i> Part 2 <i>Environmental conditions appearing in nature</i> Section 2.2:1991 <i>Precipitation and wind</i>
EN 60721-3-6:1993 (IEC 721-3-6:1987)	BS EN 60721 <i>Classification of environmental conditions</i> Part 3 <i>Classification of groups of environmental parameters and their severities</i> Section 6:1993 <i>Ship environment</i>
ISO 2041:1990	BS 3015:1991 <i>Glossary of terms relating to mechanical vibration and shock</i>

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

English version

Classification of environmental conditions Part 1: Environmental parameters and their severities

(IEC 721-1:1990 + A1:1992 + A2:1995)

Classification des conditions d'environnement
Partie 1: Agents d'environnement et leurs
sévérités
(CEI 721-1:1990 + A1:1992 + A2:1995)

Klassifizierung von Umweltbedingungen
Teil 1: Vorzugswerte für Einflußgrößen
(IEC 721-1:1990 + A1:1992 + A2:1995)

This European Standard was approved by CENELEC on 1995-03-06. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

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Foreword

The text of the International Standard IEC 721-1:1990 and its amendment 1:1992, prepared by IEC TC 75, Classification of environmental conditions, was approved by CENELEC as HD 478.1 S2 on 1994-03-08.

This Harmonization Document was submitted to the formal vote for conversion into a European Standard and was approved by CENELEC as EN 60721-1 on 1995-03-06.

The following date was fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1996-03-01

Annexes designated “normative” are part of the body of the standard. In this standard, Annex ZA is normative. Annex ZA has been added by CENELEC.

Foreword to amendment A2

The text of document 75/223/DIS, future amendment 2 to IEC 721-1:1990, prepared by IEC TC 75, Classification of environmental conditions, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A2 to EN 60721-1:1995 on 1995-07-04.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1996-04-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 1996-04-01

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Introduction

This part of IEC 721 contains a list of environmental parameters and their severities. It replaces the first edition of IEC 721-1, which was issued as an IEC Report pending the results of work in IEC Technical Committee No. 75 and other IEC Technical Committees on defining the environmental conditions to which products will be subjected while being transported, stored, installed and used.

The modifications made have been mainly concerned with the list of severities.

The severities in this part are given without reference to their application. Sufficient guidance on application is available in IEC 721-2 and IEC 721-3.

Technical Committees preparing environmental condition specifications for products should apply IEC 721-3 but if, in exceptional cases, severity values of IEC 721-3 are not appropriate, the list in this part should be considered for the selection of values.

1 Scope

This part of IEC 721 lists environmental parameters and a limited number of their severities within the range of conditions met by electrotechnical products when being transported, stored, installed and used.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of IEC 721. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of IEC 721 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 68-2-27:1987, *Environmental testing — Part 2: Tests — Test Ea and Guidance: Shock*.

IEC 79-0:1983, *Electrical apparatus for explosive gas atmospheres — Part 0: General requirements*.

IEC 721-2-2:1988, *Classification of environmental conditions — Part 2: Environmental conditions appearing in nature — Precipitation and wind*.

IEC 721-3-6:1987, *Classification of environmental conditions — Part 3: Classification of groups of environmental parameters and their severities — Ship environment*.

ISO 2041:1975, *Vibration and shock — Vocabulary*.

3 Definitions

For the purposes of this part of IEC 721, the following definitions apply:

3.1

environmental condition

physical, chemical or biological condition, external to a product, to which it is subjected at a certain time

NOTE Environmental conditions are generally composed of environmental conditions appearing in nature and environmental conditions generated by the product itself or by external sources.

3.2

environmental factor

a physical, chemical or biological influence which, either singly or in combination with other influences, produces an environmental condition (e.g. heat, vibration)

3.3

environmental parameter

one or more physical, chemical or biological properties characterizing an environmental factor (e.g. temperature, acceleration)

EXAMPLE — The environmental factor vibration is characterized by the parameters: type of vibration (sinusoidal, random), acceleration and frequency

3.4

severity of environmental parameter

a value of each quantity, characterizing the environmental parameter

EXAMPLE — The severity of sinusoidal vibration is defined by values of the acceleration (in m/s^2) and frequency (in Hz)

3.5

application, product application

a condition or a situation, met by a product

EXAMPLES of applications — Office working rooms, steelworks, ground transport. Applications *do not refer* to a class of products (e.g. computers)

3.6

group of environmental parameters and their severities

a set of environmental conditions characteristic for a specific use or purpose

4 Environmental factors and parameters

4.1 General

The actual environmental conditions to which a product is exposed are normally complex and composed of a number of environmental factors and corresponding parameters. When defining the environmental conditions for a certain product application, it is therefore necessary to:

- list the environmental factors involved;
- select appropriate severities for each parameter.

The environmental influences on a product in a certain application is a result of:

- conditions of the surrounding medium, normally air or water (in certain cases, soil);
- conditions of the structure to which the product is connected;
- influences from external sources or activities.

When selecting environmental factors and parameters for a certain product application it is therefore necessary to check these conditions and influences for single, combined and sequential environmental factors as they occur.

The terms for the environmental factors and parameters correspond in general to those used in IEC 68, as far as applicable.

4.2 List of single environmental factors and parameters and their severities.

The list of environmental factors and parameters given in Table 1 shall be used:

- as a check list to ensure that relevant factors and parameters have been considered;
- to achieve uniformity in the description of the environment.

The severities given in connection with each parameter in Table 1 shall be used for standardization purposes. These are restricted to the severities of the environmental conditions to which a product may be exposed.

It is not intended to cover the severities of the resulting stresses on the product. For example, the severities are intended to cover the temperatures of surrounding media (e.g. air, water, soil, water vapour, ice, oil, etc.) and the temperatures of the structure to which the product is connected, but are not intended to cover the temperatures of hot points on the product itself.

The severities are primarily related to limit environmental conditions, and do not include conditions for reference measurements, calibration, etc.

4.3 Combined environmental factors

A product is exposed simultaneously to a number of environmental factors and corresponding parameters. The effect of a combination of environmental factors is especially important when exposure to a combined environment affects the product differently from exposure to a sequence of environmental factors.

When selecting environmental factors for a certain product application it is therefore recommended to check the environmental factors, the combination of which may need to be taken into account.

4.4 Sequences of environmental factors

Certain effects of exposing a product to environmental conditions are a direct result of exposing it to two or more factors or parameters in a direct sequence. Two important examples are:

- thermal shock,
which may be the result of exposing the product to high temperature conditions immediately after it has been exposed to low temperature conditions or vice versa, or by subjecting the product to water (rain, water jets, sea waves, immersion) directly after being exposed to high temperature conditions;
- formation of ice,
which may be the result of exposing the product to conditions of temperatures below freezing point immediately before or after it has been exposed to humidity, rain or water from sources other than rain.

It is recommended that these possibilities be taken into account when defining the environmental conditions to which a certain product will be exposed.