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Classification of environmental conditions -
Part 3-7: Classification of groups of environmental parameters and their severities - Portable and non-stationary use

Classification des conditions d'environnement -
Partie 3-7: Classification des groupements des agents d'environnement et de leurs sévérités - Utilisation en déplacement

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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Classification of environmental conditions - Part 3-7: Classification of groups of environmental parameters and their severities - Portable and non-stationary use

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IEC 60721-3-7 has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test. It is an International Standard.

This third edition cancels and replaces the second edition published in 1995 and Amendment 1:1996. This edition constitutes a technical revision.

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

a) most classes have been replaced by completely new classes based on the use of new information obtained from referenced Technical Reports;
b) Table 1 through to Table 5 have been updated;
c) the content of the five informative annexes has either been incorporated into the main body of the document or deleted.

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

Draft	Report on voting
104/1139/FDIS	104/1155/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 60721 series, published under the general title *Classification of environmental conditions*, 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.

1 Scope

This part of IEC 60721 classifies the groups of environmental parameters and their severities to which products are subject to during portable and non-stationary use. This includes periods of transfer, down time, maintenance and repair.

The environmental conditions encompassed by these groups include the environmental conditions occurring

– at locations where the product can be placed or used temporarily, and

– during the transfer of products between different locations.

The conditions of portable and non-stationary use to which products can be exposed include land-based and offshore, weatherprotected, and non-weatherprotected locations. The conditions also include those occurring during transfer between locations.

The environmental conditions specified in this document are applicable to products which are frequently moved from place to place, particularly when the transfer time can be a significant proportion of the product's lifetime. During such transfer, the product is unlikely to have any special packaging.

The environmental conditions specified in this document do not consider the use profile of the product, i.e., whether the product is used only during a temporary stationary state, during the state of transfer or arbitrary.

Accidental incidents such as fire, explosion and other unforeseen incidents are not included. However, it can be important to take their occurrence into account in special cases.

Micro-climates occurring within a product are not included.

Classification for stationary use, storage and transportation environmental conditions are given in other subparts of the IEC 60721-3 series.

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 60721-1, *Classification of environmental conditions - Part 1: Environmental parameters and their severities*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60721-1 and the following apply.

ISO and IEC maintain terminology 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

3.1
portable and non-stationary use
not permanently mounted on any one structure or placed at a fixed site and which may be operated either when stationary or been transferred between locations

3.2
weatherprotected
protected from the influences of meteorological conditions

3.3
non-weatherprotected
not protected from the influences of meteorological conditions

4 General

A product can be subjected to a range of environmental conditions during its lifetime. These conditions have been separated into classes described in IEC 60721-3-0. The classes given can be used for defining the maximum short-term environmental stresses on a product. However, they do not provide information regarding the long-term or total lifetime environmental stresses a product can experience. This means that no reliability or lifetime assessment is possible based on these classes alone. Refer to IEC 60721-2-1, IEC 60721-2-2, IEC 60721-2-3, IEC 60721-2-4 and IEC 60721-2-5 and applicable technical reports (IEC TR 62130 as well as IEC TR 62131-3, IEC TR 62131-4, IEC TR 62131-5 and IEC TR 62131-8) for further information on actual environmental conditions.

A product can be simultaneously exposed to a number of environmental parameters. For example, solar radiation and temperature, temperature and humidity, as well as vibration and temperature change. Combinations of the environmental parameters given can increase the stress effect on a product. Therefore, combined conditions should be considered in the design and evaluation of a product.

Products should be designed to survive and operate in different environments. Basically, they will be affected by environmental influences in two ways:

– by the effects of short-term extreme environmental conditions which can directly cause malfunction or destroy the product;
– by the effect of long-term subjection to non-extreme environmental stresses which can slowly degrade the product and finally cause malfunction or destruction of the product.

Short-term extreme environmental conditions can occur at any time in a product's life. A product can be unaffected by an extreme condition when it is new but fail when it is subjected to the same condition after being used for a long period of time due to the effect of ageing. The order in which the environmental conditions are applied can affect the results of an evaluation.

It is important for the product specification, when referring to a certain class in the IEC 60721-3 series, to define whether the product is required to be capable of operating or only to survive without permanent damage when being exposed to the conditions described by the class.

The environmental classes can be used as a basis for the selection of design and test severities with respect to the consequence of failure. Information contained in the IEC 60721-3 series can be used as a means to help establish expected requirements for use, storage, transportation, etc., and in the development of relevant specifications. The selected severities used for testing should attempt to produce the effects of the actual environment.

EXAMPLE 1 A high temperature test on a heat dissipating product is designed to simulate the thermal effect of subjecting a product to conditions of high air temperature, solar radiation and other possible heat sources dependent on the application.

EXAMPLE 2 In a mechanical shock test, the product can be subjected to mechanical shocks of simple pulse shapes (e.g., half-sine), while the actual conditions cannot be described by such simple pulses.

It is recognized that extreme or special environmental conditions can exist which require consideration of severities that are not addressed by this document.

5 Classification of groups of environmental parameters and their severities

5.1 General

A number of classes for climatic conditions (K), special climatic conditions (Z), biological conditions (B), chemically active substances (C), mechanically active substances (S), and mechanical conditions (M) are specified.

This classification allows for a number of possible combinations of environmental conditions which bear upon products during their cycle. It represents the real situation concerning world-wide conditions of usage due to local influences. For certain environmental parameters, it has not yet been possible to specify quantitative severities.

For a given location or product, reference should be made to the total set of classes as defined in 5.2 through 5.7, for example:

7K13/7Z2/7B2/7C8/7S2/7M5

5.2 Climatic conditions (K)

NOTE The classes defined in IEC 60721-3-7:1987 [1] and IEC 60721-3-7:1995 have been replaced with new classes as a result of recent efforts at collecting information regarding climatic conditions. Those results are contained in Technical Reports referenced in this document.

When selecting appropriate classes, attention should be paid to the fact that the climatic conditions in weatherprotected locations can depend on the open-air (non-weatherprotected) conditions, especially air temperature and solar radiation, and the type of transportation enclosure.

[1] This publication has been withdrawn.

The following conditions are specified in Table 1.

7K8 applies to use at, and direct transfer between, temperature-controlled enclosed locations, but with not humidity control. Heating or cooling is used to maintain the required conditions, especially when there is a large difference with the open-air climate. The conditions of this class can be found in, and during transfer between, normal living and working areas. Products can experience movement of surrounding air and heat radiation from adjacent sources, condensed water and other forms of wetting other than rain. The product will not be subject to precipitation and formation of ice.

7K9 applies to use at, and direct transfer between, enclosed locations having neither temperature nor humidity control. However, heating can be used to raise low temperatures, especially when there is a large difference between the conditions of this class and open-air conditions. The conditions of this class can be found in, and during transfer between, entrances or staircases of building, garages, cellars, certain workshops, building in factories and industrial process plant, unattended equipment stations, certain telecommunication buildings, ordinary storage rooms for frost resistant products, farm buildings etc. The product can be subject to the formation of ice.

7K10 applies to use at, and direct transfer between, totally or partly weatherprotected locations, situated in geographical areas classified as warm temperature, warm dry, mild warm, extremely warm dry, mild warm dry, warm damp and warm damp equable. It also applies to non-weatherprotected locations when the open-air environment is covered by the restricted group open-air climates. Polar climates are excluded.

7K11 applies to use at, and direct transfer between, totally or partly weatherprotected locations in buildings of any construction situated in geographical areas classified as cold temperature, warm temperature, warm dry, mild warm dry, extremely warm dry, warm damp and warm damp equable. The class additionally encompasses use at non-weatherprotected locations which are directly exposed to the open-air climate covered by moderate group of open-air climate.

7K12 applies to use at, and direct transfer between, locations situated in geographical areas with open-air environment covered by the worldwide group of open-air climates. The class also encompasses totally or partly weatherprotected locations in buildings of any construction as well as non-weatherprotected locations directly exposed to open-air climates. This class also encompasses transportation in unpressurized aircraft.

7K13 applies to use at, and direct transfer between, warm damp and warm damp equable types of open-air climate (tropical damp type of climate, in areas with tropical rain forests).

7K14 applies to use at, and direct transfer between, warm dry, mild warm dry and extremely warm dry types of open-air climate (tropical dry type of climate, in areas near the tropics such as deserts).