

Classification of environmental conditions —

Part 3: Classification of groups of environmental parameters and their severities —

Section 5: Ground vehicle installations

The European Standard EN 60721-3-5:1997 has the status of a
British Standard

ICS 19.040

National foreword

This British Standard is the English language version of EN 60721-3-5:1997. It is identical with IEC 60721-3-5:1997. It supersedes BS EN 60721-3-5:1993 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/50, Environmental testing of electrotechnical products, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

Attention is drawn to the fact that CEN and CENELEC Standards normally include an annex which lists normative references to international publications with their corresponding European publications. The British Standards which implement these international or European publications may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or using the “Find” facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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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 26 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.

This British Standard, having been prepared under the direction of the Electrotechnical Sector Board, was published under the authority of the Standards Board and comes into effect on 15 August 1997

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ISBN 0 580 27814 X

Amendments issued since publication

Amd. No.	Date	Comments

Contents

	Page
National foreword	Inside front cover
Foreword	2
Text of EN 60721-3-5	3

Descriptors: Electronic components, electrical equipment, electronical equipment, electrotechnical components, climatic conditions, environment, choice, ground vehicles

English version

Classification of environmental conditions
Part 3: Classification of groups of environmental
parameters and their severities
Section 5: Ground vehicle installations

(IEC 60721-3-5:1997)

Classification des conditions d'environnement
Partie 3: Classification des groupements des
agents d'environnement et de leurs sévérités
Section 5: Installations des véhicules terrestres
(CEI 60721-3-5:1997)

Klassifizierung von Umweltbedingungen
Teil 3: Klassen von Umwelteinflußgrößen und
deren Grenzwerte
Hauptabschnitt 5: Einsatz an und in
Landfahrzeugen
(IEC 60721-3-5:1997)

This European Standard was approved by CENELEC on 1996-12-09. 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.

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CENELEC

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

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Foreword

The text of document 75/281/FDIS, future edition 2 of IEC 60721-3-5, prepared by IEC TC 76 “*Optical radiation safety and laser equipment*”, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60721-3-5 on 1996-12-09.

This European Standard supersedes EN 60721-3-5:1993 and its amendment A2:1994.

The following dates were 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) 1997-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1997-12-01

Annexes designated “normative” are part of the body of the standard.

Annexes designated “informative” are given for information only.

In this standard, Annex ZA is normative and Annex A and Annex B are informative. Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60721-3-5:1997 was approved by CENELEC as a European Standard without any modification.

Contents

	Page
Foreword	2
1 Scope and object	3
2 Normative references	3
3 Definitions	3
4 General	4
5 Classification of groups of environmental parameters and their severities	4
Annex A (informative) Survey of conditions affecting the choice of environmental parameters and their severities	10
Annex B (informative) Explanation of the environmental conditions in tropical areas as specified in classes 5K5 and 5K6	23
Annex ZA (normative) Normative references to international publications with their corresponding European publications	26
Figure 1 — Model shock response spectra (first order maximax shock response spectra)	9
Figure B.1 — Climatograms for tropical damp type of climate and tropical dry type of climate	25
Table 1 — Classification of climatic conditions	5
Table 1A — Classification of special climatic conditions	6
Table 2 — Classification of biological conditions	6
Table 3 — Classification of chemically active substances	7
Table 4 — Classification of mechanically active substances	7
Table 5 — Classification of contaminating fluids	7
Table 6 — Classification of mechanical conditions	8

1 Scope and object

This standard classifies the environmental conditions to which a product not forming part of the vehicle is subjected when installed in a ground vehicle. Such products are for example radios, communication systems, fare meters, flow meters for liquids transported by the vehicle, for example milk, petroleum products, etc. Vehicles where products may be permanently or temporarily installed include

- *road vehicles*: passenger cars, commercial vehicles, special vehicles, towing vehicles, trailers, mopeds, motor cycles, etc.;
- *rail vehicles*: trains, trams, cranes, etc.;
- *overland vehicles*: four wheel drive cars, tractors, snow scooters, etc.;
- *handling and storage vehicles*: fork-lift trucks (manual and robot), luggage transporters, etc.;
- *self-propelled machinery*: diggers, harvesters, etc.

Although this standard is not designed for products forming part of the vehicles, the environmental condition classification may also be used for some exchangeable parts, installed in a similar way and in the same locations of the vehicle as products which do not form part of the vehicle. Only severe conditions which may be harmful to products are included.

Conditions of storage and transportation are given in IEC 721-3-1 and IEC 721-3-2.

The object of this standard is to classify the environmental parameters and their severities to which a product will be exposed under its conditions of use when installed in ground vehicles.

A limited number of classes of environmental conditions are given, covering a broad field of application. The user of this standard should select the lowest class necessary covering each of the conditions of the intended use. Some guidance for this is given in Annex A.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this section of IEC 721-3. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this section of IEC 721-3 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below.

Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 721-1:1990, *Classification of environmental conditions — Part 1: Environmental parameters and their severities*.

Amendment 1 (1992)

Amendment 2 (1995)

IEC 721-2-1:1982, *Classification of environmental conditions — Part 2: Environmental conditions appearing in nature — Temperature and humidity*.

Amendment 1 (1987)

IEC 721-3-0:1984, *Classification of environmental conditions — Part 3: Classification of groups of environmental parameters and their severities — Introduction*.

Amendment 1 (1987)

IEC 721-3-1:1997, *Classification of environmental conditions — Part 3: Classification of groups of environmental parameters and their severities — Section 1: Storage*.

IEC 721-3-2:1997, *Classification of environmental conditions — Part 3: Classification of groups of environmental parameters and their severities — Section 2: Transportation*.

3 Definitions

For the purpose of the present section of IEC 721-3, the following definitions apply, in addition to the definitions in clause 3 of IEC 721-1.

3.1

internally mounted

the product is mounted internally in the vehicle, in a compartment which affords some protection from the environment, ranging from complete isolation from external influences to protection only from precipitation when the vehicle is not moving

3.2

externally mounted

the product is mounted on the outside of the vehicle. It is not protected from any external influences

3.3 weatherprotected location

a location in which the vehicle is protected from direct weather influences. The locality is assumed to be reasonably ventilated (at least natural air flow)

4 General

Reference to IEC 721-3-0 is strongly recommended in order to avoid misuse of the classes defined in the other sections of IEC 721-3.

The severities specified are those which will have a low probability of being exceeded. All specified values are maximum or limit values. These values may be reached, but do not occur permanently. Depending on the situation there may be different frequencies of occurrence related to a certain period of time. Such frequencies of occurrence have not yet been included in this standard, but should be considered for any environmental parameter. They should additionally be specified, if applicable.

Information on the duration and frequency of occurrence is given, as clause 6, in amendment 1 to IEC 721-3-0.

Attention is drawn to the fact that combinations of the environmental parameters given may increase the effect on a product. This applies especially to the presence of high relative humidity in addition to biological conditions, or to conditions of chemically or mechanically active substances.

5 Classification of groups of environmental parameters and their severities

A limited number of classes for climatic conditions (K), special climatic conditions (Z), biological conditions (B), chemically active substances (C), mechanically active substances (S), contaminating fluids (F) and mechanical conditions (M) are given in Table 1, Table 1A, Table 2, Table 3, Table 4, Table 5 and Table 6. For a given product reference should be made to the total set of classes, for example 5K2/5B1/5C3/5S2/5F1/5M2.

The basis of these classes is explained in clause A.2 of Annex A.

Climatic conditions in tropical areas as specified in classes 5K5 and 5K6 are explained in Annex B.

The combination of the lowest classes 5K1/5B1/5C1/5S1/5F1/5M1 forms the condition to which a product will be subjected when being installed in, for example, smooth running vehicles used only in very restricted conditions (indoors).

The combination of the highest classes 5K4/5B3/5C3/5S3/5F3/5M3 covers installations in a wide number of types of vehicles, including locations with very severe conditions. For a number of environmental parameters and classes special severities are given for products installed in engine compartments.

A class with higher digit conditions normally includes all classes with lower digits. For certain parameters it has not yet been possible to give quantitative severities.

A summary of the conditions covered by the classes is given in clause A.3 of Annex A.

Table 1 — Classification of climatic conditions

Environmental parameter	Unit	Class							
		5K1	5K2	5K3	5K4	5K4H	5K4L	5K5 ^h	5K6 ^h
a) Low air temperature	°C	+ 5	– 25	– 40	– 65	– 25	– 65	+ 5	– 20
b) High air temperature in ventilated compartments (except engine compartments) or outdoor air ^a	°C	+ 40	+ 40	+ 40	+ 55	+ 55	+ 40	+ 40	+ 55
c) High air temperature, air in unventilated compartments, except engine compartments ^b	°C	No	+ 70	+ 70	+ 85	+ 85	+ 70	+ 70	+ 85
d) High air temperature, air in engine compartments	°C	+ 60	+ 70	+ 70	+ 85	+ 85	+ 70	+ 70	+ 85
e) Change of temperature, air/air ^c	°C	No	– 25/+ 30	– 40/+ 30	– 65/+ 30	– 25/+ 30	– 65/+ 30	+ 5/+ 30	– 20/+ 30
f) Gradual change of temperature, air/air, except in engine compartments	°C °C/min	No No	– 25/+ 30 5	– 40/+ 30 5	– 65/+ 30 5	– 25/+ 30 5	– 65/+ 30 5	+ 5/+ 30 5	– 20/+ 30 5
g) Gradual change of temperature, air/air, in engine compartments	°C °C/min	No No	– 25/+ 60 10	– 40/+ 70 10	– 65/+ 70 10	– 25/+ 70 10	– 65/+ 70 10	+ 5/+ 70 10	– 20/+ 70 10
h) Change of temperature, air/water, except in engine compartments ^d	°C	No	No	+ 40/+ 5	+ 55/+ 5	+ 55/+ 5	+ 40/+ 5	+ 40/+ 5	+ 55/+ 5
i) Change of temperature, air/water, in engine compartments ^d	°C	No	+ 60/+ 5	+ 70/+ 5	+ 85/+ 5	+ 85/+ 5	+ 70/+ 5	+ 70/+ 5	+ 85/– 5
j) Change of temperature, air/snow, in engine compartments only	°C	No	+ 60/– 5	+ 70/– 5	+ 70/– 5	+ 70/– 5	+ 70/– 5	+ 70/– 5	+ 70/– 5
k) Relative humidity, not combined with rapid temperature changes, except in engine compartments of vehicles powered by internal combustion engines	% °C	75 + 30	95 + 40	95 + 45	95 + 50	95 + 50	95 + 45	95 + 45	95 + 50
l) Relative humidity, not combined with rapid temperature changes, in engine compartments of vehicles powered by internal combustion engines	% °C	No No	No No	95 + 70	95 + 85	95 + 85	95 + 70	95 + 85	95 + 85
m) Relative humidity, combined with rapid temperature changes, air/air at high relative humidities. Not in close proximity to refrigerated air conditioning systems	% °C	No No	95 – 25/+ 30	95 – 40/+ 30	95 – 65/+ 30	95 – 25/+ 30	95 – 65/+ 30	95 + 5/+ 30	95 – 20/+ 30
n) Relative humidity combined with rapid temperature changes, air/air, at high relative humidities. In close proximity to refrigerated air conditioning systems	% °C	No No	95 + 10/+ 70	95 + 10/+ 70	95 + 10/+ 85	95 + 10/+ 85	95 + 10/+ 70	95 + 10/+ 85	95 + 10/+ 85
o) Absolute humidity combined with rapid temperature changes, air/air at high water content ^e	g/m ³ of air °C	No No	60 + 70/+ 15	60 + 70/+ 15	80 + 85/+ 15	80 + 85/+ 15	60 + 70/+ 15	60 + 70/+ 15	60 + 85/+ 15

(For the notes, see end of table)

Table 1 — Classification of climatic conditions (ended)

Environmental parameter	Unit	Class							
		5K1	5K2	5K3	5K4	5K4H	5K4L	5K5 ^h	5K6 ^h
<i>p) Low relative humidity</i>	% °C	10 + 30	10 + 30	10 + 30	10 + 30	10 + 30	10 + 30	10 + 30	10 + 30
<i>q) Low air pressure^f</i>	kPa	70	70	70	70	70	70	70	70
<i>r) Movement of surrounding medium, air</i>	m/s	No	20	20	30	30	30	30	30
<i>s) Precipitation, rain</i>	mm/min	No	No	6	15	15	6	15	15
<i>t) Solar radiation</i>	W/m ²	No	700	1 120	1 120	1 120	1 120	1 120	1 120
<i>u) Radiation, heat, not in engine compartments</i>	W/m ²	No	600	600	600	600	600	600	600
<i>v) Radiation, heat, in engine compartments</i>	W/m ²	600	600	1 200	1 200	1 200	1 200	1 200	1 200
<i>w) Water from sources other than rain^g</i>	m/s	No	0,3	1	3	3	3	3	3
<i>x) Wetness</i>	None	No	Conditions of wet surfaces						
^a The high temperature of the surface of a product may be influenced by the surrounding air temperature given here and the solar radiation defined below.									
^b The high temperature of the surface of a product may be influenced by the surrounding air temperature given here and the solar radiation through a window or other opening.									
^c A direct transfer of the product between the two temperatures given is presumed.									
^d The lower temperature is equivalent to the temperature of tap water.									
^e The product is assumed to be subjected to a rapid decrease of temperature only (no rapid increase). The figures of water content apply to temperatures down to the dew-point; at lower temperatures the relative humidity is assumed to be approximately 100 %.									
^f Severity value of 70 kPa covers worldwide application (altitudes up to 3 000 m). For some restricted applications, a value may be selected from Table 1A.									
^g The figure indicates the velocity of water and not the height of water accumulation.									
^h Further information on classes 5K5 (tropical damp) and 5K6 (tropical dry) is given in Annex B.									

Table 1A — Classification of special climatic conditions

Environmental parameter	Class	Unit	Special condition Z
<i>q) Low air pressure^a</i>	5Z1	kPa	84
^a Class 5Z1 corresponds to an altitude of approximately 1 400 m.			

Table 2 — Classification of biological conditions

Environmental parameter	Unit	Class		
		5B1	5B2	5B3
<i>a) Flora</i>	None	No	Presence of mould, fungus, etc.	
<i>b) Fauna</i>	None	No	Presence of rodents or other animals harmful to products	
			excluding termites	including termites