



**BRITISH STANDARD**

**BS EN  
60721-3-4 : 1993  
IEC 721-3-4 :  
1987**

# **Classification of environmental conditions**

**Part 3. Classification of groups of environmental  
parameters and their severities**

**Section 3.4 Stationary use at  
non-weatherprotected locations**

The European Standard EN 60721-3-4 : 1993 has the status of a  
British Standard

Classification des conditions d'environnement  
Partie 3. Classification des groupements des  
agents d'environnement et leurs sévérités  
Section 3.4 Utilisation à poste fixe, non protégé  
contre les intempéries

Klassifizierung von Umweltbedingungen  
Teil 3. Klassen von Einflußgrößen  
Abschnitt 3.4 Ortsfester Einsatz, nicht  
wettergeschützt

UDC 621.3 : 620.193.2.001.33

NO COPYING IN ANY FORM WITHOUT WRITTEN PERMISSION FROM BSI



Document Sharing Hub

## Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the General Electrotechnical Standards Policy Committee (GEL/-) to Technical Committee GEL/15, upon which the following bodies were represented:

Directorate of Telecommunications  
EEA (the Association of Electronics, Telecommunications and Business Equipment Industries)  
Electronic Components Industry Federation  
Ministry of Defence  
National Supervising Inspectorate  
Society of Environmental Engineers  
Society of Motor Manufacturers and Traders Limited

This British Standard, having been prepared under the direction of the General Electrotechnical Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 29 November 1991

© BSI 1991

The following BSI references relate to the work on this standard:  
Committee reference GEL/15  
Special announcement in *BSI News* July 1991

ISBN 0 580 20177 5

### Amendments issued since publication

| Amd. No. | Date    |           |
|----------|---------|-----------|
| 7929     | 17.8.93 | 10. Hides |
|          |         |           |
|          |         |           |
|          |         |           |

# Contents

|                                                                                                                                         | Page               |
|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Committees responsible                                                                                                                  | Inside front cover |
| National foreword                                                                                                                       | ii                 |
| <b>Classification</b>                                                                                                                   |                    |
| 1 Scope                                                                                                                                 | 1                  |
| 2 Object                                                                                                                                | 1                  |
| 3 General                                                                                                                               | 1                  |
| 4 Definitions                                                                                                                           | 2                  |
| 5 Classification of groups of environmental parameters and their severities                                                             | 2                  |
| <b>Appendices</b>                                                                                                                       |                    |
| A Survey of conditions affecting the choice of environmental parameters and their severities                                            | 9                  |
| B Interdependence of air temperature, relative humidity and absolute humidity                                                           | 16                 |
| C Examples of practical application of the classification specified in this standard                                                    | 18                 |
| <b>Tables</b>                                                                                                                           |                    |
| I Classification of climatic conditions                                                                                                 | 5                  |
| II Classification of special climatic conditions                                                                                        | 6                  |
| III Classification of biological conditions                                                                                             | 6                  |
| IV Classification of chemically active substances                                                                                       | 7                  |
| V Classification of mechanically active substances                                                                                      | 7                  |
| VI Classification of mechanical conditions                                                                                              | 8                  |
| <b>Figures</b>                                                                                                                          |                    |
| 1 Model shock response spectra (first order maximax shock response spectra)                                                             | 8                  |
| B1 Climatogram. Interdependence of air temperature, relative air humidity and absolute air humidity                                     | 17                 |
| Annex ZA (normative) Other international publications quoted in this standard with the references of the relevant European publications |                    |



## National foreword

This Section of BS 7527 has been prepared under the direction of the General Electrotechnical Standards Policy Committee. It is identical with IEC Publication 721-3-4 : 1987 'Classification of environmental conditions Part 3 : Classification of groups of environmental parameters and their severities. Stationary use at non-weatherprotected locations', including Corrigenda September 1987 and March 1990, published by the International Electrotechnical Commission (IEC).

In 1993 the European Committee for Electrotechnical Standardization (CENELEC) accepted IEC 721-3-4 : 1987, together with Amendment 1 : 1991, as European Standard EN 60721-3-4 : 1993. As a consequence of implementing the European Standard this British Standard is renumbered as BS EN 60721-3-4 and any reference to BS 7527 : Section 3.4 should be read as a reference to BS EN 60721-3-4.

The changes added by Corrigenda September 1987 and March 1990 are indicated by a single vertical line in the margin.

This Section of BS 7527 implements CENELEC Harmonization Document (HD) 478.3.4 S1.

Other Parts of this British Standard are as follows.

- Part 1 Environmental parameters and their severities
- Part 2 Environmental conditions appearing in nature
  - Section 2.1 Temperature and humidity
  - Section 2.2 Precipitation and wind
  - Section 2.3 Air pressure
  - Section 2.4 Solar radiation and temperature
  - Section 2.5 Dust, sand, salt mist
  - Section 2.6 Earthquake vibration and shock
  - Section 2.7 Fauna and flora
- Part 3 Classification of groups of environmental parameters and their severities
  - Section 3.0 Introduction
  - Section 3.1 Storage
  - Section 3.2 Transportation
  - Section 3.3 Stationary use at weatherprotected locations
  - Section 3.5 Ground vehicle installations
  - Section 3.6 Ship environment
  - Section 3.7 Portable and non-stationary use

### Cross-references

| International standard | Corresponding British Standard                                                                                                   |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| IEC 721-1 : 1990       | BS 7527 Classification of environmental conditions<br>Part 1 : 1991 Environmental parameters and their severities<br>(Identical) |
| IEC 721-2-1 : 1982     | Section 2.1 : 1991 Temperature and humidity<br>(Identical)                                                                       |
| IEC 721-3-0 : 1984     | Section 3.0 : 1991 Introduction<br>(Identical)                                                                                   |

In table VI, the note includes the sentence 'For explanation, see IEC Publication 721-1, Sub-clause 5.3.' This should be read as 'For explanation see note 6 relating to table 1 of IEC 721-1 (1990).'

**Compliance with a British Standard does not of itself confer immunity from legal obligations.**

**EUROPEAN STANDARD**  
**NORME EUROPÉENNE**  
**EUROPÄISCHE NORM**

**EN 60721-3-4**

May 1993

UDC 621.3 : 620.193.2.001.33

Supersedes HD 478.3.4 S1 : 1989

Descriptors: Environmental conditions, stationary use at non-weather protected locations

English version

**Classification of environmental conditions**  
**Part 3: Classification of groups of environmental parameters and**  
**their severities**  
**Stationary use at non-weatherprotected locations**

(IEC 721-3-4 : 1987 + A1 : 1991)

**Classification des conditions d'environnement**  
**Troisième partie: Classification des groupements**  
**des agents d'environnement et de leurs sévérités**  
**Utilisation à poste fixe, non protégé contre les**  
**intempéries**  
(CEI 721-3-4 : 1987 + A1 : 1991)

**Klassifizierung von Umweltbedingungen**  
**Teil 3: Klassen von Umwelteinflußgrößen und**  
**deren Grenzwerte**  
**Ortsfester Einsatz, nicht wettergeschützt**  
(IEC 721-3-4 : 1987 + A1 : 1991)

This European Standard was approved by CENELEC on 1993-03-09. 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.

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

Central Secretariat: rue de Stassart 35, B-1050 Brussels

© 1993 Copyright reserved to CENELEC members

Ref. No. EN 60721-3-4:1993 E

**AVA** Documents  
Document Sharing Hub

## Foreword

At the request of the 72 Technical Board, the text of the International Standard IEC 721-3-4 : 1987 and its amendment 1 : 1991 was submitted to the CENELEC members for formal vote.

The text of the reference document was approved by CENELEC as EN 60721-3-4 on 9 March 1993.

This European Standard replaces HD 478.3.4 S1 : 1989.

The following dates were fixed:

- latest date of publication of  
an identical national standard (dop) 1994-03-01
- latest date of withdrawal of  
conflicting national standards (dow) 1994-03-01

Annexes designated 'normative' are part of the body of the standard. In this standard, annex ZA is normative.

## CLASSIFICATION OF ENVIRONMENTAL CONDITIONS

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

#### Stationary use at non-weatherprotected locations

---

##### 1. Scope

This part of the standard classifies groups of environmental parameters and their severities to which products are subjected when mounted for stationary use at locations which are non-weatherprotected.

Locations which are non-weatherprotected, where products may be mounted for stationary use permanently or temporarily, include land-based and offshore locations. Use in and on vehicles is excepted.

The environmental conditions specified in this standard are limited to those which may directly affect the performance of products. Only environmental conditions as such are considered. No special description of the effects of these conditions on the products is given.

Environmental conditions directly related to fire or explosion hazards and conditions related to ionizing radiation are excluded. Any other unforeseen incidents are also excluded. The possibility of their occurrence should be taken into account in special cases.

Microclimate within a product is not included.

Conditions of stationary use at weatherprotected locations, portable and non-stationary use, use in vehicles and ships, and conditions of storage and transportation are given in other parts of the standard.

##### 2. Object

To classify groups of environmental parameters and their severities to which a product may be exposed under its use conditions, including periods of erection work, downtime, maintenance and repair, when mounted for stationary use at locations which are non-weatherprotected.

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

##### 3. General

For further general guidance, see IEC Publication 721-3-0: Classification of Environmental Conditions, Part 3: Classification of Groups of Environmental Parameters and Their Severities – Introduction.

During periods of erection work, which are often connected with downtime, the user should be aware that conditions might differ from those during operation. Therefore, the selection of another class may be necessary for this period, unless special precautions have been taken.

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 local 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 be specified additionally if applicable.

Information on duration and frequency of occurrence is included in IEC Publication 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.

The environmental conditions present at a location may be affected by other influences, for example heat dissipation sources, special process conditions, etc.

Measurements of the environmental conditions present at a location shall be made at a representative point in the vicinity of the product.

It is recognized that extreme or special environmental conditions may exist. Specifications for products to operate under such special conditions are a matter for negotiation between supplier and user.

#### 4. Definitions

In addition to the definitions in Clause 3 of IEC Publication 721-1: Classification of Environmental Conditions, Part 1: Classification of Environmental Parameters and Their Severities, the following definitions apply to this standard:

##### 4.1 *stationary use*

The product is mounted firmly on the structure or on mounting devices, or it is permanently placed at a certain site. It is not intended for portable use, but short periods of handling during erection work, down time, maintenance and repair at the location are included.

##### 4.2 *location which is non-weatherprotected*

A location at which the product is not protected from direct weather influences.

#### 5. Classification of groups of environmental parameters and their severities

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 in Tables I to VI.

This classification allows a number of possible combinations of environmental conditions which bear upon products wherever used. It represents the real situation in respect of world-wide conditions of use, due to local influences of open-air climate, mounting, process conditions, etc.

A class indicated with higher digit conditions normally includes all classes with lower digits.

For certain 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, for example 4K2 / 4Z1 / 4Z4 / 4Z6 / 4B1 / 4C2 / 4S2 / 4M4.

Appendix A explains the basis of the classes. It contains a summary of the conditions covered by a class and gives a survey of conditions affecting the choice of environmental parameters and their severities.

Appendix B contains a climatogram showing the interdependence of air temperature, relative humidity and absolute humidity.

Appendix C gives examples for practical application of this classification.

### 5.1 *Climatic conditions*

The climatic conditions specified for classes 4K1 to 4K4 refer to the groups of open-air climates in Sub-clause 5.4 of IEC Publication 721-2-1: Classification of Environmental Conditions, Part 2: Environmental Conditions Appearing in Nature. Temperature and Humidity. Reference values are the mean values of the annual extreme values of temperature and humidity.

At locations which are non-weatherprotected, the influence of special climatic conditions constitutes a more significant share of the effects bearing upon a product and its functional parts than at weatherprotected locations. Particularly the effects of temperature change, solar radiation, precipitation, air velocity and wind-chill should be considered in this respect.

The severity of these effects may be influenced for instance by constructional details (sort and thickness of material, colour of surface, sealing or breathing of casings, product heating, etc.) and by mounting details (selection of mounting site, consideration of degree of exposure to prevailing wind and weather, etc.).

### 5.2 *Special climatic conditions*

In practice, the parameters heat radiation, movement of surrounding air and water from sources other than rain may occur with any of their severities in combination with any of the other climatic conditions. These parameters are therefore specified as special conditions in Table II. In this case, an assumption of the coincidence of events of increasing severity would lead to unnecessary overdesign.

### 5.3 *Biological conditions*

No quantitative severities have been specified for these conditions. The specified parameters are typical, but may not be complete.

### 5.4 *Chemically active substances*

Contamination of natural atmosphere is mainly caused by chemical emissions from industrial activities, motor-driven vehicles and heating systems. A further chemical influence is caused by aerosols of salts. The contamination may affect the function and the materials of products.

The values given in this classification have been encountered in surveys for several years. Maximum values are given because direct influence of higher concentrations over a short period normally causes more damage to materials which cannot regenerate. Average values are given additionally because their influence may be important for the long-term effect on internal parts of the products.

In practice, not all contaminants (parameters) classified in this standard are present simultaneously. Furthermore, the probability is low that the concentrations of those contaminants actually present increase simultaneously and homogeneously. Depending on the local