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REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Classification of environmental conditions – Part 3-1: Classification of groups of environmental parameters and their severities – Storage

IEC 60721-3-1:2018-02 RLV(en)

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CLASSIFICATION OF ENVIRONMENTAL CONDITIONS –

Part 3-1: Classification of groups of environmental parameters and their severities – Storage

FOREWORD

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International Standard IEC 60721-3-1 has been prepared by IEC technical committee 104: Environmental conditions, classification, and methods of test.

This third edition cancels and replaces the second edition, published in 1997, and constitutes a technical revision.

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

a) Clause 3: reworded and simplified.
b) Clause 4: reworded and simplified.
c) Clause 5: Annex C has been incorporated in Clause 5.
d) 5.2: all existing climate classes have been replaced by completely new classes. The new classes are divided into 3 groups. The reason for the new classes is the latest revision of IEC 60721-2-1 which incorporated new climate types.
e) 5.3: new classes for solar radiation and snow load.
f) 5.6: all existing classes for mechanically active substances have been replaced by completely new classes.
g) 5.7: all existing classes for mechanical conditions have been replaced by completely new classes.
h) Table 1: new climatic classes with new severities.
i) Table 2: new classes for solar radiation and snow load.
j) Table 5 new mechanically active substances classes.
k) Table 6: new mechanical conditions classes.

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

FDIS	Report on voting
104/772/FDIS	104/782/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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 "http://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.

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CLASSIFICATION OF ENVIRONMENTAL CONDITIONS –

Part 3-1: Classification of groups of environmental parameters and their severities – Storage

1 Scope and object

This part of IEC 60721 classifies the groups of environmental parameters and their severities to which products together with their packaging, if any, are subjected when stored.

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

~~Transfer during storage is not included in the classification.~~

Environmental conditions directly related to fire or explosions ~~and conditions related to ionizing radiation are excluded~~ are not included. ~~Any other unforeseen incidents are also excluded. The possibility of their occurrence should be taken into account in special cases. Offshore locations are not included.~~

Conditions of stationary use, portable and non-stationary use, use in vehicles and ships, and conditions of transportation are given in other subparts of the IEC 60721-3 series.

The object of this document is to classify environmental parameters and their severities to which a product ~~may~~ can be exposed during storage. Transfer and handling during storage and transport are addressed in IEC 60721-3-2.

~~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 intended storage.~~

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*

~~IEC 721-1: 1990, *Classification of environmental conditions – Part 1: Environmental parameters and their severities*~~
~~Amendment 1 (1992)~~

~~IEC 721-2-1: 1982, *Classification of environmental conditions – Part 2: Environmental conditions appearing in nature – Temperature and humidity*~~
~~Amendment 1 (1987)~~

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~~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 60721-3-2: 1997, *Classification of environmental conditions – Part 3: Classification of environmental parameters and their severities – Section 2: Transportation*~~

~~IEC 721-3-3: 1994, *Classification of environmental conditions – Part 3: Classification of environmental parameters and their severities – Section 3: Stationary use at weatherprotected locations*~~

~~IEC 721-3-4: 1995, *Classification of environmental conditions – Part 3: Classification of environmental parameters and their severities – Section 4: Stationary use at non-weatherprotected locations*~~

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 terminological 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

3.1
enclosed location
location or structure that is covered on all sides in such a manner as to provide a degree of protection

3.2
non-weather-protected location
location at which the product is not protected from direct ~~weather influences~~ meteorological conditions

3.3
open-air location
location that is unenclosed that provides no protection from meteorological conditions

3.4
storage
~~The product is placed at a certain site for long periods, but not intended for use during these periods~~
a product kept in a place when not being operated

3.5
sheltered location
location or structure that provides limited protection from direct meteorological conditions such as rain and wind

3.6
weather-protected location
location at which the product is protected from ~~weather influences~~ meteorological conditions

~~– **totally weatherprotected location**: direct weather influences are totally excluded; (enclosed location)~~

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~~**partially weatherprotected location** (sheltered location): direct weather influences are not completely excluded.~~

4 General

~~For further general guidance, see IEC 721-3-0.~~

~~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 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 the presence of chemically or mechanically active substances.~~

A product may 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 may be used for defining the maximum short-term environmental stresses of a product. However, they do not provide information regarding the long-term or total lifetime environmental stresses a product may experience. This means that no reliability or lifetime assessment is possible based on these classes alone. Refer to IEC 60721-2 (all parts) and applicable technical reports (IEC TR 62130 and IEC TR 62131-5) for further information on actual environmental conditions.

A product will 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 may increase the 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 the environmental influences in two ways:

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

Short-term extreme environmental conditions may occur at any time in the product's life. A product may 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 may affect the results of an evaluation.

It is important for the product specification, when referring to a certain class in IEC 60721-3 (all parts), 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 may be used as a basis for the selection of design and test severities with respect to the consequence of failure. Information contained in IEC 60721-3 (all parts) may be used as a means to help establish expected requirements for use, storage, transportation, etc., and in the development of relevant specifications. The

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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 may exist which require consideration of severities that are not addressed by this document. ~~Specifications for products to be stored under such special conditions are a matter of negotiation between supplier and user.~~

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 a number of possible combinations of environmental conditions which bear upon products wherever stored. It represents the real situation concerning worldwide conditions of storage, for example, due to local influences of open-air climate~~, etc~~.

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, for example:

~~1K2/1Z1/1B1/1C2/1S1/1M3~~

1K21/1Z1/1B1/1C2/1S10/1M10

~~See also clause 6.~~

~~Annex A contains a summary of the conditions covered by each class.~~

5.2 Climatic conditions (K)

NOTE All old classes have been replaced with new classes. The new classes were chosen to reflect 3 different storage condition: enclosed, sheltered and open-air locations.

The climatic conditions specified for classes ~~1K1 to 1K11~~ 1K20 to 1K29 refer to the conditions of storage of products. These conditions have been experienced worldwide over a long period of time taking into account all the parameters that can influence them such as ~~external (~~open-air~~)~~ climatic conditions, type of building construction, temperature/humidity controlling systems, and internal conditions, for example heat dissipation from other equipment and presence of humans~~, etc~~. The conditions should cover all normal cases, but not exceptional events.

~~Climatic conditions in tropical areas, as specified in classes 1K10 and 1K11, are explained in annex C.~~

When selecting appropriate classes, attention should be paid to the fact that the climatic conditions inside buildings may depend on the outside (open-air) conditions, especially air temperature and solar radiation, and the type of building construction. Walls with good thermal

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insulation or high thermal capacity can consistently smooth the peaks of outside air temperature variations between day and night, or, exceptionally, those produced over a longer period of time. Walls with poor thermal insulation or low thermal capacity cannot have this effect, and peaks can be magnified due to the effect of solar radiation during the day, and to the effect of building radiation at night. The effect of solar radiation can be increased by either heat-trap or greenhouse effects.

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

The severity of these effects may be influenced, for example by constructional details (type and thickness of material, colour of surfaces, sealing or breathing of casings, etc.), and by storage details (selection of storage site, consideration of degrees of exposure to prevailing wind and weather, etc.).

Enclosed storage

1K20 applies to fully air conditioned enclosed storage locations. Air temperature and humidity control is used continuously to maintain the required conditions.

1K21 applies to enclosed storage locations with limited temperature control and no humidity control.

1K22 applies to enclosed storage locations having no temperature or humidity control.

Sheltered storage

1K23 applies to sheltered storage locations in tropical, arid, temperate, and cold climatic classification with the thermal effects from solar radiation encompassed in the temperature.

1K24 applies to sheltered storage locations in the polar climate type with the thermal effects from solar radiation encompassed in the temperature.

Open-air storage

1K25 applies to open-air storage in the tropical climatic classification.

1K26 applies to open-air storage in the arid and temperate climatic classifications.

1K27 applies to open-air storage in the cold and polar climatic classifications.

These conditions are specified in Table 1.

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Table 1 – Classification of climatic conditions

Environmental parameter	Unit	Class [10]										
		1K1	1K2	1K3	1K4	1K5	1K6	1K7	1K8	1K9	1K10 [11]	1K11 [11]
a) Low air temperature	°C	+20 [6]	+5	–5	–25	–40	–55	–20	–33	–65	+5	–20
b) High air temperature	°C	+25 [6]	+40	+45	+55	+70	+70	+35	+40	+55	+40	+55
c) Low relative humidity [1]	%	20	5	5	10	10	10	20	15	4	30	4
d) High relative humidity [1]	%	75	85	95	100	100	100	100	100	100	100	100
e) Low absolute humidity [1]	g/m^3	4	1	1	0,5	0,1	0,02	0,9	0,26	0,003	6	0,9
f) High absolute humidity [1]	g/m^3	15	25	29	29	35	35	22	25	36	36	27
g) Rate of change of temperature [2]	°C/min	0,1	0,5	0,5	0,5	1,0	1,0	0,5	0,5	0,5	0,5	0,5
h) Low air pressure [3]	kPa	70	70	70	70	70	70	70	70	70	70	70
i) High air pressure [3]	kPa	106	106	106	106	106	106	106	106	106	106	106
j) Solar radiation	W/m^2	500	700	700	1120	1120	1120	1120	1120	1120	1120	1120
k) Heat radiation	None	No	[7]	[7]	[7]	[7]	[7]	[7]	[7]	[7]	[7]	[7]
l) Movement of surrounding air [4]	m/s	0,5	1,0 [8]	1,0 [8]	1,0 [8]	5,0 [8]	5,0 [8]	[8]	[8]	[8]	50 [8]	50
m) Condensation	None	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
n) Precipitation (rain, snow, hail, etc.)	None	No	No	No	Yes [9]	Yes [9]	Yes [9]	Yes	Yes	Yes	Yes	Yes
o) Rain intensity	mm/min	None	None	None	None [9]	None [9]	None [9]	6	6	15	15	15
p) Low rain temperature [5]	°C	None	None	None	None [9]	None [9]	None [9]	+5	+5	+5	+5	+5
q) Water from sources other than rain	None	No	No	[7]	[7]	[7]	[7]	[7]	[7]	[7]	[7]	[7]
r) Formation of ice and frost	None	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes

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		Enclosed			Sheltered		Open-air		
Environmental Parameter	Unit	1K20	1K21	1K22	1K23	1K24	1K25	1K26	1K27
a) Low air temperature	°C	+20 [6]	+5	−25	−45	−50	+5	−20	-50
b) High air temperature	°C	+25 [6]	+40	+55	+70	+70	+45 [11]	+50 [11]	+45 [11]
c) Low relative humidity [1]	%	20	5	10	4	4	30	4	10
d) High relative humidity [1]	%	75	85	100	100	100	100	100	100
e) Low absolute humidity [1]	g/m^3	4	1	0,5	0,2	0,003	6	0,1	0,003
f) High absolute humidity [1]	g/m^3	15	25	29	35	20	35	30	25
g) Rate of change of temperature [2]	°C/min	0,1	0,5	0,5	1,0	1,0	1,0	1,0	1,0
h) Low air pressure [3]	kPa	70	70	70	70	70	70	70	70
i) High air pressure [3]	kPa	106	106	106	106	106	106	106	106
j) Solar radiation	W/m^2	7)	7)	10)	10)	10)	1090	1090	1090
k) Heat radiation	Not specified	No	7)	7)	7)	7)	No	No	No
l) Movement of surrounding air [4]	m/s	0,5	1,0	1,0	5,0 [8]	5,0 [8]	8)	8)	8)
m) Condensation	Not specified	No	No	Yes	Yes	Yes	Yes	Yes	Yes
n) Precipitation (rain, snow, hail, etc.)	Not specified	No	No	No	Yes [9]	Yes [9]	Yes	Yes	Yes
o) Rain intensity	mm/min	None	None	None	None [9]	None [9]	15	15	15
p) Driving rain	m/s	None	None	None	None	None	18	18	18
q Snow load	kg/m^2	None	None	None	None	None	None	8)	8)
r) Low rain temperature [5]	°C	None	None	None	None [9]	None [9]	+5	+5	+5
s) Water from sources other than rain	L/m²/min	No	No	Dripping Water	Dripping Water	Dripping Water	12)	12)	12)
t) Formation of ice and frost (including freeze-thaw)	Not specified	No	No	Yes	Yes	Yes	No	Yes	Yes

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Notes to Table 1

1) The low and high relative ~~humidities~~ humidity levels are limited by the low and high absolute humidities, so that, for example, for environmental parameters a) and c), or b) and d), the severities given in Table 1 do not occur simultaneously.

2) Averaged over a period of time of 5 min.

3) The value of 70 kPa represents a limit for open-air conditions, normally at an altitude of 3 000 m. In some geographical areas, open-air conditions may occur at higher altitudes. Conditions in mines are not considered.

4) A cooling system based on non-assisted convection may be disturbed by adverse movement of surrounding air.

5) This rain temperature should be considered together with high air temperature b) and solar radiation j). The cooling effect of the rain has to be considered in connection with the surface temperature of the product.

6) These are air-conditioned locations with a tolerance of ±2 °C on stated temperature value.

7) Conditions occurring at the location concerned to be selected from Table 2.

8) If applicable, a special value may be selected from Table 2.

9) Applies only to wind-driven precipitation at ~~partially weather protected~~ sheltered locations.

~~10) The classes of climatic conditions of this standard include the classes of IEC 721-3-3 and IEC 721-3-4 as follows:~~

~~1K1 covers 3K1 1K3 covers 3K5 1K5 covers 3K7 1K7 covers 4K1 1K9 covers 4K4 1K11 covers 4K6~~
~~1K2 covers 3K3 1K4 covers 3K6 1K6 covers 3K8 1K8 covers 4K2 1K10 covers 4K5~~

10) Thermal effect of solar radiation is included in the temperature.

11) Thermal effect of solar radiation is not included in the temperature.

12) Sources of water other than rain are encompassed by driving rain.

5.3 Special climatic conditions (Z)

~~As, in practice,~~ Parameters such as heat radiation, movement of the surrounding air, solar radiation, snow load, and water from sources other than rain may occur with any severity in combination with any of the other climatic conditions. These ~~special~~ conditions are specified in Table 2. ~~In those cases, an assumption of the coincidence of events of increasing severity would lead to unnecessary overdesign.~~

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Table 2 – Classification of special climatic conditions

Environmental parameter	Class[3]	Unit	Special condition Z
k) Heat radiation	1Z1	None	Negligible
	1Z2	None	Conditions of heat radiation, e.g. in the vicinity of room heating systems
l) Movement of surrounding air[1]	1Z3	m/s	30
	1Z4	m/s	50
qs) Water from sources other than rain[2]	1Z5	None	Dripping water
	1Z6	None	Water jets
	1Z7	None	Water waves
j) Solar radiation	1Z8	W/m^2	500
	1Z9	W/m^2	700
q) Snow load	1Z10	kg/m^2	100 (single snow storm)
	1Z11	kg/m^2	240 (whole season)

[1] A cooling system based on non-assisted convection may be disturbed by adverse movement of surrounding air.

[2] Underwater conditions are not considered.

[3] The classes of special climatic conditions of this standard include the classes of IEC 721-3-3 and IEC 721-3-4 as follows:

1Z1 covers 3Z1 1Z3 covers 3Z6 and 4Z4 1Z5 covers 3Z7 1Z7 covers 4Z9
1Z2 covers 3Z2 1Z4 covers 4Z5 1Z6 covers 3Z10 and 4Z8

5.4 Biological conditions (B)

No quantitative severity has been specified for these conditions. The specified parameters of Table 3 are typical, but may not be complete.

1B1 applies to storage locations with environmental controls in place to prevent the growth of mould and physical controls to prevent attack by animals.

1B2 applies to storage locations without environmental or physical controls in place to prevent mould growth or attacks by animals, except termites.

1B3 applies to locations where attacks by termites may occur.

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Table 3 – Classification of biological conditions

Environmental parameter	Unit	Class [1]		
		1B1	1B2	1B3
a) *Flora*	None	Negligible	Presence of mould, fungus, etc.	
b) *Fauna*	None	Negligible	Presence of rodents and other animals harmful to products	
			excluding termites	including termites

[1] The classes of biological conditions of this standard include the classes of IEC 721-3-3 and IEC 721-3-4 as follows:

1B1 covers 3B1 1B2 covers 3B2 and 4B1 1B3 covers 3B3 and 4B2

Units	Class		
	1B1	1B2	1B3
None	Negligible	Presence of mould, fungus, etc.	
		Presence of rodents and other animals harmful to products	
		excluding termites	including termites

5.5 Chemically active substances (C)

The contamination of the 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 sea and road salts. Contamination may affect the function and materials of products. These conditions are specified in Table 4.

The values given in this classification have been taken from surveys over several years. Maximum values are given, because direct influence of higher concentrations over a short period of time normally causes more damage to material, which cannot regenerate. Mean 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 situation, there are often higher values of one contaminant only. The values specified for class 1C1 will normally be experienced in rural areas and areas with low industrial activity. The values specified for class 1C2 are experienced in urban areas. Therefore the severity of each of these two classes shall be considered as the requirements for the combined effect of all parameters stated. The severities of class 1C3, however, cannot be combined as the requirement for the combined effect of all parameters stated in order to avoid any uneconomical overdesign. For that class, it is possible to select only the severities of those single parameters which might be relevant in the case of application. If single parameters of class 1C3 are selected for the description of the chemically active substances present at a location, the severities of class 1C2 are valid for all other parameters which are not specially named.

NOTE Chemically active liquids and chemically active solids other than sea salts or road salts are not considered in this standard.

See Annex A for additional information.

1C1 applies to locations in rural and some urban areas, with low industrial activity and moderate traffic. In winter, heating methods in concentrated urban areas may cause increased contamination.

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1C2 applies to locations with normal levels of contaminants as experienced in urban areas with industrial activity scattered over the whole area, or with heavy traffic. Salt mist is present in coastal areas.

1C3 applies to locations in the immediate vicinity of industrial sources, with chemical emissions. Salt mist is present in coastal areas.

Table 4 – Classification of chemically active substances

Environmental parameter	Unit ~~1)~~	Class ~~5)~~					
		~~1C1L~~	1C1	1C2		1C3 ~~3)~~	
		~~Maximum value~~	Maximum value	Mean value	Maximum value ~~2)~~	Mean value	Maximum value ~~2)~~
a) Salt mist to include Sea and road salts	None	~~No~~	No ~~4)~~	~~Salt mist~~ Yes		~~Salt mist~~ Yes	
b) Sulphur dioxide	mg/m^3	~~0,1~~	0,1	0,3	1,0	5,0	10
	cm^3/m^3	~~0,037~~	0,037	0,11	0,37	1,85	3,7
c) Hydrogen sulphide	mg/m^3	~~0,01~~	0,01	0,1	0,5	3,0	10
	cm^3/m^3	~~0,0071~~	0,0071	0,071	0,36	2,1	7,1
d) Chlorine	mg/m^3	~~0,01~~	0,1	0,1	0,3	0,3	1
	cm^3/m^3	~~0,0034~~	0,034	0,034	0,1	0,1	0,34
e) Hydrogen chloride	mg/m^3	~~0,01~~	0,1	0,1	0,5	1,0	5,0
	cm^3/m^3	~~0,0066~~	0,066	0,066	0,33	0,66	3,3
f) Hydrogen fluoride	mg/m^3	~~0,003~~	0,003	0,01	0,03	0,1	2,0
	cm^3/m^3	~~0,0036~~	0,0036	0,012	0,036	0,12	2,4
g) Ammonia	mg/m^3	~~0,3~~	0,3	1,0	3,0	10	35
	cm^3/m^3	~~0,42~~	0,42	1,4	4,2	14	49
h) Ozone	mg/m^3	~~0,01~~	0,01	0,05	0,1	0,1	0,3
	cm^3/m^3	~~0,005~~	0,005	0,025	0,05	0,05	0,15
i) Nitrogen oxides (expressed in equivalent values of nitrogen dioxide)	mg/m^3	~~0,1~~	0,1	0,5	1,0	3,0	9,0
	cm^3/m^3	~~0,052~~	0,052	0,26	0,52	1,56	4,68

~~1) The values given in cm^3/m^3 have been calculated from the values given in mg/m^3, and refer to a temperature of 20 °C and a pressure of 101,3 kPa. The table uses round values.~~

~~2) Mean values are expected long-term values. Maximum values are limit or peak values, occurring over a period of time of not more than 30 min per day.~~

~~3) It is not mandatory to consider class 1C3 as a requirement for the combined effect of all parameters stated. If applicable, the values of single parameters may be selected from this class. In that case, the severities of class 1C2 are valid for all parameters not especially named.~~

~~4) Salt mist may be present in sheltered locations of coastal areas.~~

~~5) The classes of chemically active substances of this standard include the classes of IEC 721-3-3 and IEC 721-3-4 as follows:~~

~~1C1L covers 3C1L 1C1 covers 3C1 and 4C1 1C2 covers 3C2 and 4C2 1C3 covers 3C3 and 4C3~~

5.6 Mechanically active substances (S)

NOTE All old classes have been replaced with new classes. The new classes were chosen to reflect 3 different storage conditions; enclosed, sheltered and open-air locations.

Dust and sand are classified together, as the effects caused by these environmental conditions are similar.

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1S10 applies to enclosed storage locations where precautions have been taken to minimize the presence of dust and sand.

1S11 applies to enclosed storage locations not situated in proximity to dust or sand sources and with no precautions to minimize the ingress of dust or sand. Such enclosed storage locations could include shipping containers.

1S12 applies to enclosed storage locations in close proximity to sand or dust sources, including urban area and with no precautions to minimize the ingress of dust or sand. It also applies to exposed storage locations situated in areas not subject to natural dust storms or significant industrial activity.

1S13 applies to exposed storage locations which may be exposed to wind-driven dust and sand either due to natural conditions or due to industrial activity producing blown sand or dust.

These conditions are specified in Table 5.

Table 5 – Classification of mechanically active substances

~~Environmental parameter~~	~~Unit~~	~~Class 1)~~			
		~~1S1~~	~~1S2~~	~~1S3~~	~~1S4~~
~~*a) Sand*~~	~~mg/m^3~~	~~None~~	~~30~~	~~300~~	~~1000~~
~~*b) Dust (suspension)*~~	~~mg/m^3~~	~~0,01~~	~~0,2~~	~~5,0~~	~~15~~
~~*c) Dust (sedimentation)*~~	~~mg/(m^2·h)~~	~~0,4~~	~~1,5~~	~~20~~	~~40~~
~~1) The classes of mechanically active substances of this standard include the classes of IEC 721-3-3 and IEC 721-3-4 as follows:~~ ~~1S1 covers 3S1 1S1 covers 3S2 1S3 covers 4S2 1S4 covers 4S3~~					

Environmental parameter	**Unit**	**Class**			
		1S10	**1S11**	**1S12**	**1S13**
Setting (sedimentary) dust	mg/(m^2·d)	None	6	Note 1	Note 2
Turbulent (suspended) dust	mg/(m^2·h)	None	None	600	Note 2
Windblown dust	mg/m^3	None	None	None	18
	m/s				13
NOTE 1 Encompassed within turbulent (suspended) dust.					
NOTE 2 Encompassed within windblown dust.					

5.7 Mechanical conditions (M)

~~The conditions of vibration (sinusoidal) are classified by severity levels of acceleration, and displacement amplitudes in high and low frequency range, respectively.~~

~~Random vibration is not considered in this standard. It may be included when sufficient information is available.~~

~~Non-stationary vibration including shock is classified by using the first order undamped maximax shock response spectrum (see figure 1).~~

NOTE All old classes have been replaced with new classes. The new classes based on IEC TR 62131-5.

Mechanical conditions relate to the levels of vibration and shock that may exist at a storage location, for example as a result of normal operations, nearby vehicular movement, etc. These conditions are specified in Table 6.

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