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**Classification of environmental
conditions—Part 3 : Classification
of groups of environmental
parameters and their severities
Section 2 : Transportation**

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal of establishing a Japanese Industrial Standard from Reliability Center for Electronic Components of Japan (RCJ)/the Japanese Standards Association (JSA), with a draft of Industrial Standard based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

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In the event of any doubts arising as to the contents,
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Classification of environmental conditions—Part 3 : Classification of groups of environmental parameters and their severities

Section 2 : Transportation

Introduction This Japanese Industrial Standard has been prepared based on the second edition of **IEC 60721-3-2** *Classification of environmental conditions—Part 3 : Classification of groups of environmental parameters and their severities—Section 2 : Transportation* published in 1997 without modifying the technical contents. The portions underlined with dots in this Standard are the matters not included in the original International Standard.

1 Scope and object This Standard classifies the groups of environmental parameters and their severities to which a product is subjected while being transported from one place to another after being made ready for dispatch from the manufacturing factory.

The most commonly used methods of transportation have been taken into account, including the following:

- road transport: cars, lorries, trucks, animals, conveyors;
- rail transport: trains, trams, conveyors;
- water transport, inland and maritime: ships, hovercraft, conveyors;
- air transport: aircraft, conveyors;
- vertical transport: cranes, transport lifts, cableways.

The environmental conditions specified in this Standard are those met by the product being transported. If the product is packed, the environmental conditions apply to the package containing the product. Only severe conditions, which may be harmful to products, are included.

Conditions for storage and use are given in other sections of **IEC 60721-3**.

Information : **IEC 60721-3** consists of several sections.

The object of this Standard is to classify groups of environmental parameters and their severities to which a product will be exposed when being transported on ground, water and in air, including loading and unloading.

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 classes necessary covering each of the conditions of the intended transportation. Some guidance for this is given in annex A.

Remarks : The International Standard corresponding to this Standard is as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

IEC 60721-3-2 : 1997 *Classification of environmental conditions—Part 3 : Classification of groups of environmental parameters and their severities—Section 2 : Transportation (IDT)*

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS C 0110 *Classification of environmental conditions Part 1 : Classification of environmental parameters and their severities*

Remarks : IEC 60721-1 : 1990 Classification of environmental conditions—Part 1 : Environmental parameters and their severities and Amendment 1 (1992) are identical with the said standard.

Amendment 2 (1995) is not included in JIS.

JIS C 0111 *Classification of environmental conditions Part 2 : Environmental conditions appearing in nature—Temperature and humidity*

Remarks : **IEC 60721-2-1 : 1982 Classification of environmental conditions—Part 2 : Environmental conditions appearing in nature—Temperature and humidity** and Amendment 1 (1987) are identical with the said standard.

JIS C 0112 *Classification of environmental conditions Part 3 : Classification of groups of environmental parameters and their severities—Introduction*

Remarks : **IEC 60721-3-0 : 1984 Classification of environmental conditions—Part 3 : Classification of groups of environmental parameters and their severities—Introduction** and Amendment 1 (1987) are identical with the said standard.

3 Definitions For the purposes of this Standard, the definitions given in **JIS C 0110** and the following definitions apply.

3.1 weatherprotected: The product, packed or unpacked, is contained within an enclosure which affords some protection from the environment, ranging from a temperature controlled container to a waterproof cover placed over the product. Ventilation ranges from controlled air flow to the raising of part of a waterproof cover to allow for natural air flow.

3.2 non-weatherprotected: The product, packed or unpacked, is not protected in any way from the environment.

4 General Reference to **JIS C 0112** is strongly recommended in order to avoid misuse of the classes defined in other sections of **IEC 60721-3**.

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 **JIS C 0112**.

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), biological conditions (B), chemically active substances (C), mechanically active substances (S) and mechanical conditions (M) are given in tables 1, 2, 3, 4 and 5. For a given product, reference should be made to the total set of classes, for example 2K2/2B1/2C2/2S2/2M3. See also clause 6.

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

Climatic conditions in tropical areas as specified in classes 2K6 and 2K7 are explained in annex C.

The combination of the lowest classes 2K1/2B1/2C1/2S1/2M1 forms the conditions to which a product will be subjected when being transported under very restricted conditions. The combination of the highest classes 2K5/2B3/2C3/2S3/2M3 covers transportation under a very wide variety of conditions including very severe conditions.

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 values of severities.

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

6 Sets of environmental condition class combinations As indicated in clause 5, the classification allows a number of possible combinations of environmental conditions bearing on products wherever used. The number of possibilities, and thus the flexibility, is therefore very great. In practice, however, this flexibility is not always an advantage when, for instance, environmental condition specifications for a certain location are drawn up by different parties, invariably producing small but disturbing divergencies.

In order to limit the possibilities to general cases, standard sets of class combinations may be selected from table 6. For a given location or product, reference may then be made to this standard, for example IE22. Only when conditions are not considered to be covered by this specification, is reference made to each class as indicated in clause 5. Alternatively, if some severities of parameters deviate from that or those of the class combination, this should be expressed by the addition to the set designation of the following phrase: "but ... (parameter) ... (severity and unit)", for example IE22 but sand 10 g/m³.

Annex B gives a summary of conditions covered by the sets of class combinations.

Table 1 Classification of climatic conditions

Environmental parameter	Unit	Class								
		2K1	2K2	2K3	2K4	2K5	2K5H	2K5L	2K6 ⁽⁶⁾	2K7 ⁽⁶⁾
a) Low air temperature	°C	+5	-25	-25	-40	-65	-25	-65	+5	-20
b) High air temperature, air in unventilated enclosures ⁽¹⁾	°C	No	+60	+70	+70	+85	+85	+70	+70	+85
c) High air temperature, air in ventilated enclosures or outdoor air ⁽²⁾	°C	+40	+40	+40	+40	+55	+55	+40	+40	+55
d) Change of temperature, air/air ⁽³⁾	°C	No	-25/+25	-25/+30	-40/+30	-65/+30	-25/+30	-65/+30	+5/+30	-20/+30
e) Change of temperature, air/water ⁽³⁾	°C	No	No	+40/+5	+40/+5	+55/+5	+55/+5	+40/+5	+40/+5	+55/+5
f) Relative humidity, not combined with rapid temperature changes	%	75	75	95	95	95	95	95	95	95
	°C	+30	+30	+40	+45	+50	+50	+45	+45	+50
g) Relative humidity, combined with rapid temperature changes: air/air at high relative humidity ⁽³⁾	%	No	No	95	95	95	95	95	95	95
	°C			-25/+30	-40/+30	-65/+30	-25/+30	-65/+30	+5/+30	-20/+30
h) Absolute humidity, combined with rapid temperature changes: air/air at high water content ⁽⁴⁾	g/m ³	No	No	60	60	80	80	60	60	80
	°C			+70/+15	+70/+15	+85/+15	+85/+15	+70/+15	+70/+15	+85/+15
i) Low air pressure	kPa	70	70	70	70	30	30	30	30	30
j) Change of air pressure	kPa/min	No	No	No	No	6	6	6	6	6
k) Movement of surrounding medium, air	m/s	No	No	20	20	30	30	30	30	30
l) Precipitation, rain	mm/min	No	No	6	6	15	15	6	15	15
m) Radiation, solar	W/m ²	700	700	1 120	1 120	1 120	1 120	1 120	1 120	1 120
n) Radiation, heat	W/m ²	No	No	600	600	600	600	600	600	600
o) Water from sources other than rain ⁽⁵⁾	m/s	No	No	1	1	3	3	3	3	3
p) Wetness	None	No	No	Conditions of wet surfaces						

(1) The high temperature of the surface of a product may be influenced by both the surrounding air temperature given here and the solar radiation through a window or other opening.

(2) The high temperature of the surface of a product is influenced by the surrounding air temperature given here and the solar radiation defined below.

(3) A direct transfer of the product between the two temperatures given is presumed.

(4) 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 %.

(5) The figure indicates the velocity of water and not the height of water accumulated.

(6) Further information on classes 2K6 (tropical damp) and 2K7 (tropical dry) is given in annex C.

Table 2 Classification of biological conditions

Environmental parameter	Unit	Class		
		2B1	2B2	2B3
a) Flora	None	No	Presence of mould, fungus, etc.	
b) Fauna	None	No	Presence of rodents or other animals harmful to products: excluding termites including termites	

Table 3 Classification of chemically active substances

Environmental parameter	Unit	Class		
		2C1	2C2	2C3
a) Sea salts	None	No	Conditions of salt mist	Conditions of salt water
b) Sulphur dioxide	mg/m ³	0.1	1.0 (0.3)	10 (5.0)
	cm ³ /m ³	0.037	0.37 (0.11)	3.7 (1.85)
c) Hydrogen sulphide	mg/m ³	0.01	0.5 (0.1)	10 (3.0)
	cm ³ /m ³	0.007 1	0.36 (0.071)	7.1 (2.1)
d) Nitrogen oxides (expressed in the equivalent values of nitrogen dioxides)	mg/m ³	0.1	1.0 (0.5)	10 (3.0)
	cm ³ /m ³	0.052	0.52 (0.26)	5.2 (1.56)
e) Ozone	mg/m ³	0.01	0.1 (0.05)	0.3 (0.1)
	cm ³ /m ³	0.005	0.05 (0.025)	0.15 (0.05)
f) Hydrogen chloride	mg/m ³	0.1	0.5 (0.1)	5.0 (1.0)
	cm ³ /m ³	0.066	0.33 (0.066)	3.3 (0.66)
g) Hydrogen fluoride	mg/m ³	0.003	0.03 (0.01)	2.0 (0.1)
	cm ³ /m ³	0.003 6	0.036 (0.012)	2.4 (0.12)
h) Ammonia	mg/m ³	0.3	3.0 (1.0)	35 (10)
	cm ³ /m ³	0.42	4.2 (1.4)	49 (14)

NOTES

- 1 The figures given are maximum values, occurring over a 30 min period per day.
- 2 The figures within brackets are the expected long-term mean values.
- 3 The values given in cm³/m³ have been calculated from the values given in mg/m³ and refer to 20 °C and 101.3 kPa.
- 4 The table uses rounded values.