



**EUROPEAN STANDARD**

**Environmental Engineering (EE);  
Environmental conditions and environmental tests  
for telecommunications equipment;  
Part 1: Classification of environmental conditions;  
Sub-part 2: Transportation**

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**Reference**

REN/EE-017018

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**Keywords**

environment, equipment practice, testing

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# Foreword

This draft European Standard (EN) has been produced by ETSI Technical Committee Environmental Engineering (EE), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI EN Approval Procedure (ENAP).

The present document is part 1, sub-part 2 of a multi-part deliverable covering the classification of environmental conditions and environmental tests for telecommunications equipment, as identified below:

**Part 1: "Classification of environmental conditions": (see note 1)**

- Sub-part 0: "Introduction";
- Sub-part 1: "Storage";
- Sub-part 2: "Transportation";**
- Sub-part 3: "Stationary use at weatherprotected locations";
- Sub-part 4: "Stationary use at non-weatherprotected locations";
- Sub-part 5: "Ground vehicle installations";
- Sub-part 6: "Ship environments";
- Sub-part 7: "Portable and non-stationary use";
- Sub-part 8: "Stationary use at underground locations";

Part 2: "Specification of environmental tests" (see note 2).

NOTE 1: Specifies different standardized environmental classes covering climatic and biological conditions, chemically and mechanically active substances and mechanical conditions during storage, transportation and in use. Sub-part 1-0 forms a general overview of part 1.

NOTE 2: Specifies the recommended test severities and test methods for the different environmental classes.

<b>Proposed national transposition dates</b>	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

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## Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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# 1 Scope

The present document defines classes of environmental conditions and their severities to which telecommunication equipment may be exposed. The severities specified are those which will have a low probability of being exceeded; generally less than 1 % of the time of a transport.

The present document applies to equipment being transported from one place to another after being made ready for dispatch from the manufacturer's works. The most commonly used methods of transportation have been taken into account, i.e. ground, water and air transport. Loading and unloading as well as temporary storage, have been included. Where the equipment is packaged the environmental conditions apply to the packaged equipment.

NOTE: Normal transportation time is considered to be 30 days or less. Where the total transportation time exceeds 30 days then additional storage or packaging precautions should be considered.

The tests applicable to verify the compliance with the transportation and handling environmental classes of the present document, are defined in ETSI EN 300 019-2-2 [i.5].

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## 2 References

### 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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- |       |   |
|-------|---|
| [i.1] | Void.   |
| [i.2] | IEC 60721-3-2: 2018: "Classification of environmental conditions - Part 3-2: Classification of groups of environmental parameters and their severities - Section 2: Transportation and handling".         |
| [i.3] | Void.   |
| [i.4] | Void.   |
| [i.5] | ETSI EN 300 019-2-2: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-2: Specification of environmental tests; Transportation". |

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## 3 Definition of terms, symbols and abbreviations

### 3.1 Terms

For the purposes of the present document, the following terms apply:

**absolute humidity:** mass of water vapour in grammes which is associated with one cubic metre of dry air in an air/water vapour mixture

**non-weatherprotected location:** equipment, packaged or unpackaged, is not protected in any way from the environment

**relative humidity:** ratio of the partial pressure of the water vapour in moist air at a given temperature, to the partial pressure of the water vapour in saturated air at the same temperature

**weatherprotected location:** location at which the equipment is protected from direct weather influences

NOTE: Totally weatherprotected location: the equipment, packaged or unpackaged, 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 equipment. Ventilation ranges from controlled air flow to the raising of part of a waterproof cover to allow for natural air flow.

### 3.2 Symbols

Void.

### 3.3 Abbreviations

Void.

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## 4 Environmental classes

### 4.0 Introduction

Three different environmental classes have been defined. Classes 2.10 and 2.11 are classes for weather-protected transportation with less severe mechanical conditions. Class 2.12 is the class for non-weather protected transportation.

NOTE: The classes defined in previous versions of the present document have been replaced with new classes as a result of recent efforts at collecting information regarding climatic conditions performed in IEC.

### 4.1 Class 2.10: Weather protected transportation with temperature control and no humidity control

Class 2.10 is a combination of classes 2K11/2B2/2C2/2S5/2M4 in IEC 60721-3-2 [i.2].

This class shall apply to weather-protected transportation with limited temperature control and no humidity control and where special care has been taken (e.g. in respect to handling).

### 4.2 Class 2.11: Weather protected transportation with no temperature control and humidity control

Class 2.11 is a combination of classes 2K12/2B2/2C2/2S5/2M4 in IEC 60721-3-2 [i.2].

This class shall apply to weather-protected transportation without temperature and humidity controls in unventilated enclosures in arid, temperate, tropical and cold climates. Polar climate is excluded. The product may be transported in heated, pressurized aircraft holds.

## 4.3 Class 2.12: Non-weather protected transportation

Class 2.12 is a combination of classes 2K13/2B2/2C2/2S5/2M5 in IEC 60721-3-2 [i.2].

This class shall apply to non-weather-protected transportation in temperate, tropical, and cold climates. Arid and polar climates are excluded.

# 5 Environmental conditions

## 5.1 Climatic conditions

**Table 1: Climate parameters for environmental classes 2.10, 2.11 and 2.12**

	Environmental parameter	Unit	Classes		
			2.10	2.11	2.12
a)	Low temperature air	°C	-5	-45	-45
b)	High temperature, air	°C	+40	+70	+45 (see note 8)
c)	Low relative humidity (see note 1)	%	5	4	4
d)	High relative humidity (see note 1)	%	85	100	100
e)	Low absolute humidity (see note 1)	g/m <sup>3</sup>	1	0,5	0,02
f)	High absolute humidity (see note 1)	g/m <sup>3</sup>	25	29	35
g)	Rate of change temperature (see note 2)	°C/min	0,5	1	1
h)	Low air pressure (see note 3)	kPa	70	70	70
i)	High air pressure (see note 3)	kPa	106	106	106
j)	Solar radiation	W/m <sup>2</sup>	No	See note 7	1 090
k)	Heat radiation	Not specified	None	None	None
l)	Movement of surrounding air (see note 4)	m/s	1,0	1,0	See note 6
m)	Condensation	Not specified	No	Yes	Yes
n)	Precipitation (rain, snow, hail, etc.)	Not specified	None	None	Yes
o)	Rain intensity	mm/min	None	None	3,3
p)	Driving rain	m/s	None	None	See note 6
q)	Snow load	Kg/m <sup>2</sup>	None	None	100
r)	Low rain temperature (see note 5)	°C	None	None	+5
s)	Water from sources other than rain	Not specified	No	Dripping water	See note 9
t)	Formation of ice and frost (including freeze-thaw)	Not specified	No	Yes	Yes
u)	Temperature shock	Not specified	No	Yes	Yes

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

NOTE 2: Averaged over a period of time of 5 min.

NOTE 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.

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

NOTE 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.

NOTE 6: If applicable, a special value should be selected based on expected transportation mode (e.g. lorry, open decks of ships).

NOTE 7: Thermal effect of solar radiation is included in the temperature.

NOTE 8: Thermal effect of solar radiation is not included in the temperature.

NOTE 9: Sources of water other than rain are encompassed by driving rain.

## 5.2 Biological conditions

**Table 2: Biological conditions for environmental classes 2.10, 2.11 and 2.12**

	Environmental parameter	Unit	Classes 2.10 to 2.12
a)	Flora	none	Presence of mould, fungus, etc.
b)	Fauna	none	Presence of rodents or other animals harmful to products but excluding termites

## 5.3 Chemically active substances

**Table 3: Chemically active substances for environmental classes 2.10, 2.11 and 2.12**

	Environmental parameter	Unit (see note 1)	Classes 2.10, 2.11 and 2.12 (see note 2)
a)	Salt mist (including sea and road salt)	none	sea and road salt mist
b)	Saltwater	none	No
c)	Sulphur dioxide (SO <sub>2</sub> )	mg/m <sup>3</sup> cm <sup>3</sup> /m <sup>3</sup>	1,0 0,37
d)	Hydrogen sulphide (H <sub>2</sub> S)	mg/m <sup>3</sup> cm <sup>3</sup> /m <sup>3</sup>	0,5 0,36
e)	Hydrogen chloride (HCl)	mg/m <sup>3</sup> cm <sup>3</sup> /m <sup>3</sup>	0,5 0,33
f)	Hydrogen fluoride (HF)	mg/m <sup>3</sup> cm <sup>3</sup> /m <sup>3</sup>	0,03 0,036
g)	Ammonia (NH <sub>3</sub> )	mg/m <sup>3</sup> cm <sup>3</sup> /m <sup>3</sup>	3,0 4,2
h)	Ozone (O <sub>3</sub> )	mg/m <sup>3</sup> cm <sup>3</sup> /m <sup>3</sup>	0,1 0,05
i)	Nitrogen oxides (expressed as equivalent values of nitrogen dioxides) (NO <sub>x</sub> )	mg/m <sup>3</sup> cm <sup>3</sup> /m <sup>3</sup>	1,0 0,52
NOTE 1: The values given in cm <sup>3</sup> /m <sup>3</sup> have been calculated from the values given in mg/m <sup>3</sup> and refer to 20 °C and 101,3 kPa. The table uses rounded values.			
NOTE 2: The figures given are limit or peak values, occurring over a period of time of not more than 30 minutes per day.			

## 5.4 Mechanically active substances

**Table 4: Mechanically active substances for environmental classes 2.10 2.11 and 2.12**

	Environmental parameter	Unit	Classes 2.10, 2.11 and 2.12
a)	Sand in air	mg/m <sup>3</sup>	30
b)	Dust in air	mg/m <sup>3</sup>	0,2
c)	Dust sedimentation	mg/(m <sup>2</sup> h)	15

## 5.5 Mechanical conditions

**Table 5: Mechanical conditions for the environmental classes 2.10, 2.11 and 2.12**

	Environmental parameter	Unit	Class								
			2.10			2.11			2.12		
a)	Stationary vibration, random  acceleration power spectral density  frequency range (see note 1)	  $m^2/s^3$  Hz	 10 (see note 2)  2 to 10	 1  10 to 20	 0,5  20 to 2 000	 10 (see note 2)  2 to 10	 1  10 to 2 0	 0,5  20 to 2 000	 30 (see note 2)  2 to 10	 3  10 to 20	 1  20 to 2 000
b)	Non-stationary vibration, including shock (see note 3)  Shock 1 (see note 4)  Peak acceleration Duration    Shock 2 (see note 4)  Peak acceleration Duration	  $m/s^2$ ms    $m/s^2$ ms	Figure 2, curve 4 of IEC 60721-3-2 [i.2]  100 11			Figure 2, curve 4 of IEC 60721-3-2 [i.2]  100 11			Figure 2, curve 3 of IEC 60721-3-2 [i.2]  300 11		
			Figure 2, curve 2 of IEC 60721-3-2 [i.2]  300 6			Figure 2, curve 1 of IEC 60721-3-2 [i.2]  1 000 6			Figure 2, curve 3 of IEC 60721-3-2 [i.2]  300 11		
c)	Free fall:  mass < 20 kg  mass 20 kg to 100 kg  mass > 100 kg	  m  m  m	see note 8  0,25  0,25  0,1			  0,25  0,25  0,1			  1,2  1,0  0,25		
d)	Toppling  mass < 20 kg  mass 20 kg to 100 kg  mass > 100 kg	  none  none  none	Toppling around any of the edges  No  No			Toppling around any of the edges  No  No			Toppling around any of the edges  Toppling around any of the edges  No		
e)	Rolling, pitching: Angle (see note 5) Period	  Degree s	No No			No No			$\pm 35$ 8		
f)	Steady state acceleration	$m/s^2$	20			20			20		
g)	Static load	kPa	5			5			10		
<p>NOTE 1: When transport only occurs by rail, river, sea and road, the upper frequency considered may be reduced to 500 Hz for products that are not sensitive to vibration excitations above 500 Hz.</p> <p>NOTE 2: The low frequency stationary vibration random component arises from the influence of land vehicle suspension systems. The component is included for design purposes but is not always included in vibration test specifications.</p> <p>NOTE 3: For land vehicles, these shocks can occur simultaneously with the stationary vibration random conditions.</p> <p>NOTE 4: Both shocks would normally be used to encompass different aspects of the shock environment.</p> <p>NOTE 5: An angle of 35° may only occur temporarily. An angle of up to 22,5° can be reached for long periods of time.</p>											

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## Annex A (informative): Bibliography

- ETSI TR 100 035 (2004): "Equipment Engineering (EE); Environmental engineering; Guidance and terminology".

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## Annex B (informative): Change history

Version	Information about changes
3.1.1	The environmental classes have been revised based on the classification given in IEC 60 721-3-2: 2018. As the new classes are not comparable with the previous classes taken from IEC 60721-3-2: 1997, the new environmental classes have been defined with new numbers.

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## History

<b>Version</b>	<b>Date</b>	<b>Status</b>
Edition 1	February 1992	Publication as ETS 300 019-1-2
V2.1.2	April 2002	Publication
V2.1.4	April 2003	Publication
V2.2.1	April 2014	Publication
V3.1.0	June 2026	ENAP Process AP 20260920: 2026-06-22 to 2026-09-21