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European Standard (Telecommunications series)

**Environmental Engineering (EE);
Environmental conditions and environmental tests
for telecommunications equipment;
Part 1-8: Classification of environmental conditions;
Stationary use at underground locations**

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Environmental Engineering (EE).

The present document is part 1, sub-part 8 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";

- 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".

Part 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.

Part 1-0 forms a general overview of part 1.

Part 2 specifies the recommended test severities and test methods for the different environmental classes.

National transposition dates	
Date of latest announcement of this EN (doa):	31 July 2003
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 January 2004
Date of withdrawal of any conflicting National Standard (dow):	31 January 2004

1 Scope

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

The present document applies to equipment installed for stationary use at underground locations during:

- normal operation;
- on site installation and lining up;
- repair, maintenance and restoration of functions failed.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

- [1] ETSI ETR 035: "Equipment Engineering (EE); Environmental engineering Guidance and terminology".
- [2] IEC 60721-3-3: "Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 3: Stationary use at weatherprotected locations".
- [3] IEC 60068-2-27: "Environmental testing. Part 2: Tests. Test Ea and guidance: Shock".
- [4] IEC 60721-2-6: "Classification of environmental conditions. Part 2: Environmental conditions appearing in nature. Earthquake vibration and shock".
- [5] IEC 60068-3-3: "Environmental testing. Part 3: Guidance. Seismic test methods for equipment".

3 Definitions

For the purposes of the present document, the following terms and definitions 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

NOTE: It is not intended for portable use but short periods of handling during erection work, down time, maintenance and repair at the location are accepted.

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

stationary use: equipment permanently placed at a certain site

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

NOTE 1: Totally weatherprotected location: direct weather influences are totally excluded.

NOTE 2: Partly weatherprotected location: direct weather influences are not completely excluded.

4 Environmental class

4.1 Class 8.1: partly weatherprotected underground locations

At present no underground classes in IEC 60721 Publication series exist.

This class is a combination of classes 3Z7/3B2/3C2(3C3)/3S3/3M3(3M5) in IEC 60721-3-3 [2].

As no IEC 60721-3-3 [2] climatic class is applicable, climatic conditions are described in clause 4 based on measurements conducted at typical underground telecommunications locations.

Seismic environment: zone 4 as defined in IEC 60721-2-6 [4].

Option zone 4 (modified Mercalli scale ≥ 9): if earthquake conditions are specified by the customer, the conditions stated in clause 5.6 apply.

This class applies to partly weatherprotected underground locations. The location has no temperature or humidity control, but the variations in the temperature are limited due to the stabilizing influence of the surroundings.

The climatogram is shown in figure 1.

This class applies to locations:

- where the installed equipment is normally protected from direct weather influences;
- where the surrounding medium is normally air, but the equipment may be immersed in water during exceptional conditions;
- where mould growth or attacks by animals, except termites, may occur;
- with normal levels of contaminants experienced in urban areas with industrial activities scattered over the whole area and/or with heavy traffic;

NOTE 1: At locations in the immediate neighbourhood of industrial sources with chemical emissions either special precautions shall be taken or the special chemical class 3C3 shall be chosen.

- in close proximity to sources of sand and dust;
- with vibration and shock of low significance.

NOTE 2: At locations where the level of shock is high, e.g. in close vicinity of road traffic or adjacent to heavy machines, etc., either special precautions shall be taken or the special mechanical class 3M5 shall be chosen.

The conditions of this class may be found in:

- footway boxes;
- manholes;
- some tunnels;
- etc.

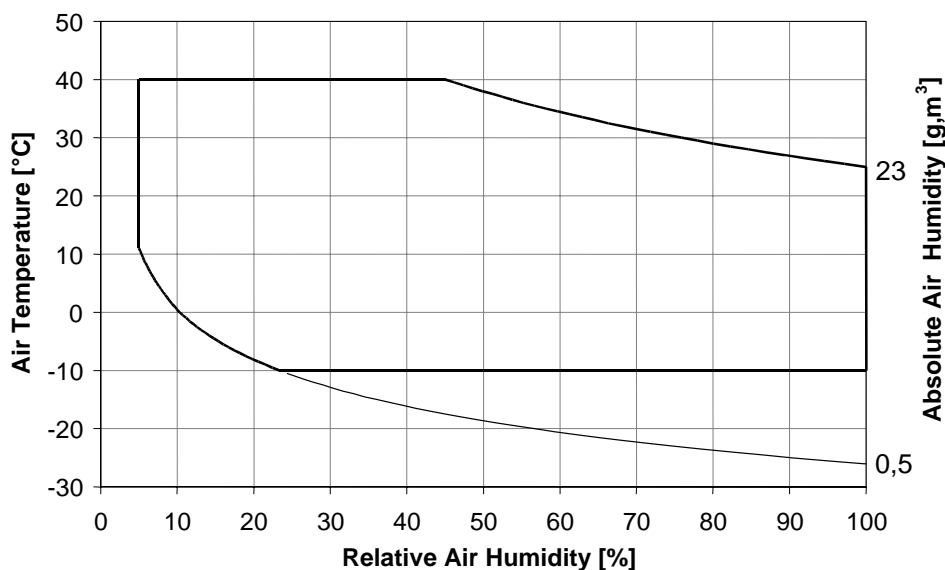


Figure 1: Climatogram for class 8.1: partly weatherprotected underground locations

5 Environmental conditions

5.1 Climatic conditions

Table 1: Climate parameters for environmental class 8.1

Environmental parameter	Unit	Class 8.1
a) Low air temperature	°C	-10
b) High air temperature	°C	+40 (see note 1)
c) Low relative humidity	%	5
d) High relative humidity	%	100
e) Low absolute humidity	g/m ³	0,5
f) High absolute humidity	g/m ³	23
g) Rate of change of temperature (see note 2)	°C/min	5 (see note 3)
h) Low air pressure	kPa	70
i) High air pressure (see note 4)	kPa	106
j) Solar radiation	W/m ²	no
k) Heat radiation	W/m ²	yes (see note 5)
l) Movement of surrounding air	m/s	1
m) Conditions of condensation	none	yes
n) Conditions of wind-driven rain, snow, hail, etc.	none	no
o) Conditions of water from sources other than rain	none	dripping water, condensed water soil water
p) Conditions of icing	none	yes

NOTE 1: Includes any temperature rise due to heat dissipation of equipment and any secondary effect of the solar radiation to the cover.
NOTE 2: Averaged over a period of 5 minutes.
NOTE 3: This change of temperature may be experienced temporarily during maintenance or due to the immersion of water.
NOTE 4: Conditions in mines are not considered.
NOTE 5: Some radiation from the cover.