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European Standard (Telecommunications series)

**Environmental Engineering (EE);
Environmental conditions and environmental tests for
telecommunications equipment;
Part 1-0: Classification of environmental conditions;
Introduction**



Reference

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Keywords

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Environmental Engineering (EE), and is now submitted for the ETSI standards One-step Approval Procedure.

The present document is part 1, sub-part 0 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 2 specifies the recommended test severities and test methods for the different environmental classes.

Proposed national transposition dates	
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

1 Scope

The purpose of the present document is to select class(es) of environmental conditions and their severities to which equipment may be exposed. Only severe conditions, which may be harmful to the equipment, are included. The severities specified are those which will have a low probability of being exceeded; generally less than 1 %.

The purpose of the present document is to form a general overview of Part 1.

ETR 035 [1] should be used in conjunction with all parts of EN 300 019 series. It gives an introduction to the main concepts of environmental engineering, the purpose and use of environmental classes and the corresponding test philosophy.

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.

[1] ETSI ETR 035: "Equipment Engineering (EE); Environmental engineering; Guidance and terminology".

[2] ETSI EN 300 019-1 (all subparts): "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Classification of environmental conditions".

[3] ETSI EN 300 019-2 (all subparts): "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Specification of environmental tests".

3 Definitions

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

environmental class: systematic representation of the environment for a family of locations with "similar properties"

NOTE: This means that the detailed description of the class may be envisaged as an envelope around a group of related environmental conditions. The class itself may not be considered directly as a typical example.

A class is composed of the most significant single factors, termed environmental parameters, selected from those factors which are assumed to influence equipment performance.

Full descriptions of each class are included in the appropriate parts of EN 300 019-1 [2].

environmental condition: physical, chemical or biological condition, external to an equipment, to which it is subjected at a certain time.

NOTE: Environmental conditions are generally composed of environmental conditions appearing in nature and environmental conditions generated by the equipment itself or by external sources.

environmental factor: physical, chemical or biological influence which, either singly or in combination with other influences, produces an environmental condition (e.g. heat, vibration)

environmental parameter: one or more physical, chemical or biological properties characterizing an environmental factor (e.g. temperature, acceleration)

EXAMPLE: The environmental factor vibration is characterized by the parameters: type of vibration (sinusoidal, random), acceleration and frequency.

in-use: An equipment is in-use when it is directly operational.

mobile use: An equipment is in mobile use when it is primarily intended to be installed or fixed and operated in or on, a vehicle or a ship.

portable and non-stationary use: The equipment is frequently moved from place to place. During transfer there is no special packaging for the equipment. The total transfer time may amount to a significant portion of the equipment's lifetime. The equipment is not permanently mounted on any structure or placed at a fixed site. The equipment may be operated while being either in a non-stationary or in a transfer state.

severity of environmental parameter: value of each quantity, characterizing the environmental parameter

EXAMPLE: The severity of sinusoidal vibration is defined by values of the acceleration (m/s^2) and frequency (Hz).

stationary use: An equipment 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.

storage: The equipment is placed at a certain site for a long period, but is not intended for use during this period. If the equipment is packaged, the environmental conditions apply to the packaging protecting the equipment.

transportation: phase during which the equipment is moved from one place to another after being made ready for dispatch

NOTE: It includes loading, unloading and temporary storage. The equipment is not in-use under these conditions.

4 Environmental classes

4.1 Purpose of classification

The main purpose of environmental classification is to establish a number of "standardized" and operational frames of reference for a wide range of applications of (telecommunications) equipment. These classes cover storage, transportation, and in-use, in typical environmental conditions.

4.2 Environmental classes covered in Part 1

NOT IN-USE		IN-USE					
Storage	Transportation	Stationary use			Mobile use		Portable and non-stationary use
		Weather-protected locations	Non-weather-protected locations	Underground locations	Ground vehicle installations	Ship environment	
ETSI EN 300 019 Part 1-1	ETSI EN 300 019 Part 1-2	ETSI EN 300 019 Part 1-3	ETSI EN 300 019 Part 1-4	ETSI EN 300 019 Part 1-8	ETSI EN 300 019 Part 1-5	ETSI EN 300 019 Part 1-6	ETSI EN 300 019 Part 1-7
Class 1.1 Weather-protected, partly temperature-controlled storage locations	Class 2.1 Very careful transportation	Class 3.1 Temperature-controlled locations	Class 4.1 Non-weather-protected locations	Class 8.1 Partly weather-protected underground locations	Class 5.1 Protected installation	Class 6.1 Totally weather-protected locations	Class 7.1 Temperature controlled locations
Class 1.2 Weather-protected, not temperature-controlled storage locations	Class 2.2 Careful transportation	Class 3.2 Partly temperature-controlled locations	Class 4.1E Non-weather-protected locations - extended		Class 5.2 Partly protected installation	Class 6.2 Partly weather-protected locations	Class 7.2 Partly temperature-controlled locations
Class 1.3 Non-weather-protected storage locations	Class 2.3 Public transportation	Class 3.3 Not temperature-controlled locations	Class 4.2L Non-weather-protected locations – extremely cold			Class 6.3 Non-weather-protected locations	Class 7.3 Partly weather-protected and non-weather-protected locations
Class 1.3E Non-weather-protected storage locations - extended		Class 3.4 Sites with heat-trap	Class 4.2H Non-weather-protected locations – extremely warm dry				Class 7.3E Partly weather-protected and non-weather-protected locations - extended
		Class 3.5 Sheltered locations					
		Class 3.6 Telecommunications control room locations					

NOTE 1: For each item of equipment, classes need to be selected for:

- storage;
- transportation;
- in-use (one or more classes can be selected).

NOTE 2: The example (**in bold**) shows possible class selections for equipment, i.e. class 1.1, class 2.3 and class 3.1.

NOTE 3: Class 3.1 includes exceptional operating conditions (shown as 3.1E in table 1 of EN 300 019-1-3 [2]) where reduced performance requirements are allowed. There shall be no irreversible failures when normal operating conditions has been restored. There is no separate class 3.1E.

Figure 1

5 Explanation of climatograms

A climatogram is an envelope of climatic conditions defined by the characteristic severities of these conditions. A characteristic severity is a severity which has a low probability of being exceeded (generally less than 1 %).

Equipment conforming to a particular class shall function at all values within the boundary of the climatogram for that class. However, the points inside the climatogram will have different probabilities of occurrence depending on the shape of the statistical distributions of temperature and humidity. There will be an area inside the climatogram whose points will have a high probability of occurrence. This implies that the environment can remain for long periods in that area, but shall not remain near the boundary of the climatogram for long periods.

The distribution of climatic conditions for some classes will be a natural phenomenon, while for other classes, with climate controlling systems, distribution will be partly controllable. The distribution will vary for each class and each location.

Figure 2 shows a simplified symmetrical distribution.

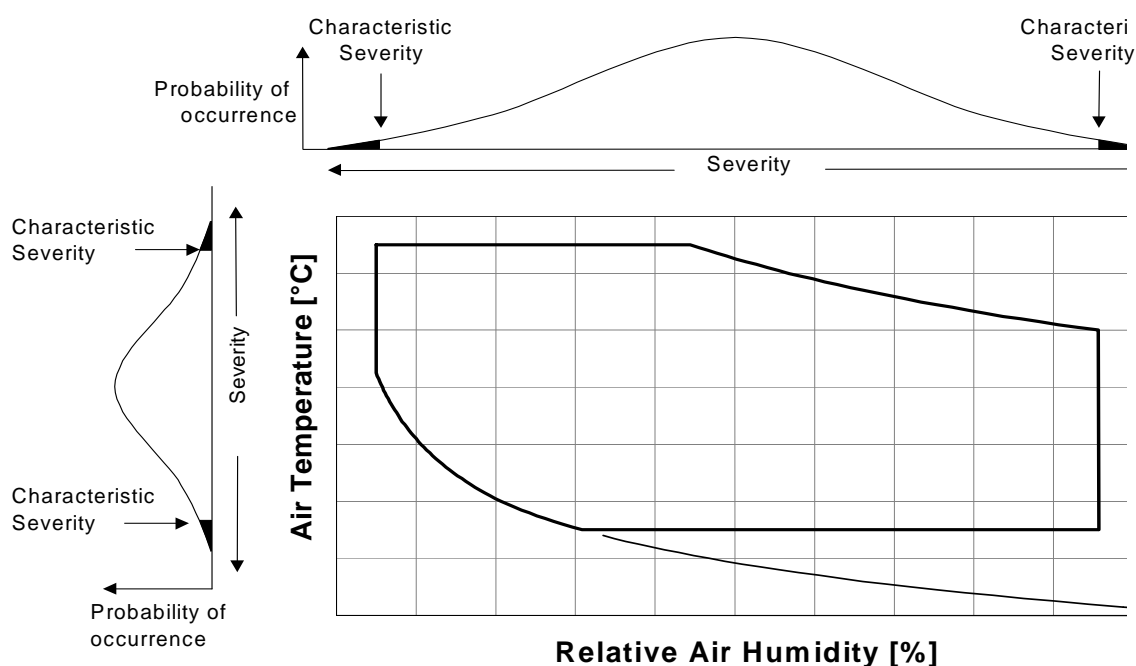


Figure 2: Climatogram showing symmetrical distribution of temperature and relative humidity

6 Environmental contents of equipment documentation

6.1 Environmental considerations to be included in the design process for producing equipment

- a) Suppliers, in assessing customer requirements for an item of equipment, will choose appropriate environmental classes from EN 300 019-1-1 to 1-8 [2] for storage, transportation and in-use conditions for designs at the conceptual stage.
- b) The chosen environmental classes will be included in the equipment design specification.
- c) A test programme will be drawn up using the chosen environmental classes to select appropriate tests from EN 300 019-2-1 to 2-8 [3].
- d) The equipment will be tested for resistibility to the chosen environmental classes in accordance with the test programme. These environmental classes will then be quoted in the product specification.

By using the above process, if the original application changes during the equipment's life, then the need for further development and testing can be readily identified.

Product or production changes may influence the equipment's environmental performance and may consequently lead to the need for a retest of the equipment.

6.2 Environmental contents of a product specification

The product specification should include:

- a) a statement of the environmental class(es) to which the equipment has been designed;
- b) any precautions which should be taken during storage, transportation and in-use;
- c) any limitations of use including, where applicable, degrees of reduced performance which may be expected during exceptional conditions.

6.3 Contents of an environmental test programme

The contents of an environmental test programme should include:

- a) details of an equipment to be tested, including its build status (this includes hardware, software, firmware, revisions and serial numbers etc.);
- b) the tests selected from EN 300 019-2-1 to 2-8 [3] which are applicable to the equipment and which demonstrate its ability to meet the resistibility requirements of its intended environment;
- c) test values if a choice of severity or duration is offered;
- d) details of the functional tests which are to be performed before, during and after testing including the failure criteria to be used;
- e) if applicable, the test sequence to be used;
- f) test requirements from related specifications if these tests are to be performed in conjunction with the environmental tests, e.g. maximum touchable surface temperature, maximum air exhaust temperature, current consumption, voltage variation and heat dissipation measurements.

NOTE: For a more detailed explanation of the contents of a test programme see Part 2-0 [3] and ETR 035 [1].

History

Document history		
Edition 1	May 1994	Publication as ETS 300 019-1-0
V2.1.2	May 2003	One-step Approval Procedure OAP 20030905: 2003-05-07 to 2003-09-05