EUROPEAN TELECOMMUNICATION STANDARD

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

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Foreword

This multi-part European Telecommunication Standard (ETS) has been produced by the Equipment Engineering (EE) Technical Committee of the European Telecommunications Standards Institute (ETSI).

ETS 300 019 is concerned with environmental conditions and environmental tests for telecommunications equipment and comprises two main parts, each with subdivisions:

- ETS 300 019-1: "Classification of environmental conditions".

  Part 1 specifies different standardised environmental classes covering climatic and biological conditions, chemically and mechanically active substances and mechanical conditions during storage, transportation and in-use.

- ETS 300 019-2: "Specification of environmental tests".

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

Part 2-0 forms a general overview of Part 2. This part (Part 1-0), forms a general overview of Part 1.

An associated ETSI Technical Report (ETR), ETR 035 [1], gives an introduction to the main concepts of environmental engineering, the purpose and use of environmental classes and the corresponding test philosophy.

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1 Scope

This European Telecommunication Standard (ETS) defines the classes of environmental conditions and their severities to which equipment may be exposed at specified locations. The severities specified are those which will have a low probability of being exceeded - generally less than 1 %.

The purpose of Part 1-0 is to form a general overview of Part 1.

2 Normative references

This ETS contains, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

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

[2] ETS 300 019-1-1 to 1-7: "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Classification of environmental conditions".

[3] ETS 300 019-2-1 to 2-7: "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Specification of environmental tests".

3 Definitions

3.1 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.

3.2 Transportation

Transportation is the phase during which the equipment is moved from one place to another after being made ready for dispatch. It includes loading, unloading and temporary storage. The equipment is not in-use under these conditions.

3.3 In-use

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

3.3.1 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.

3.3.2 Mobile use (including portable)

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

3.3.3 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.

3.4 Environmental condition

An environmental condition is a 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.

3.5 Environmental factor

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

3.6 Environmental parameter

One or more physical, chemical or biological properties characterising an environmental factor (e.g. temperature, acceleration).

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

3.7 Severity of environmental parameter

A value of each quantity, characterising the environmental parameter.

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

3.8 Environmental class

An environmental class is a systematic representation of the environment for a family of locations with "similar properties". 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.

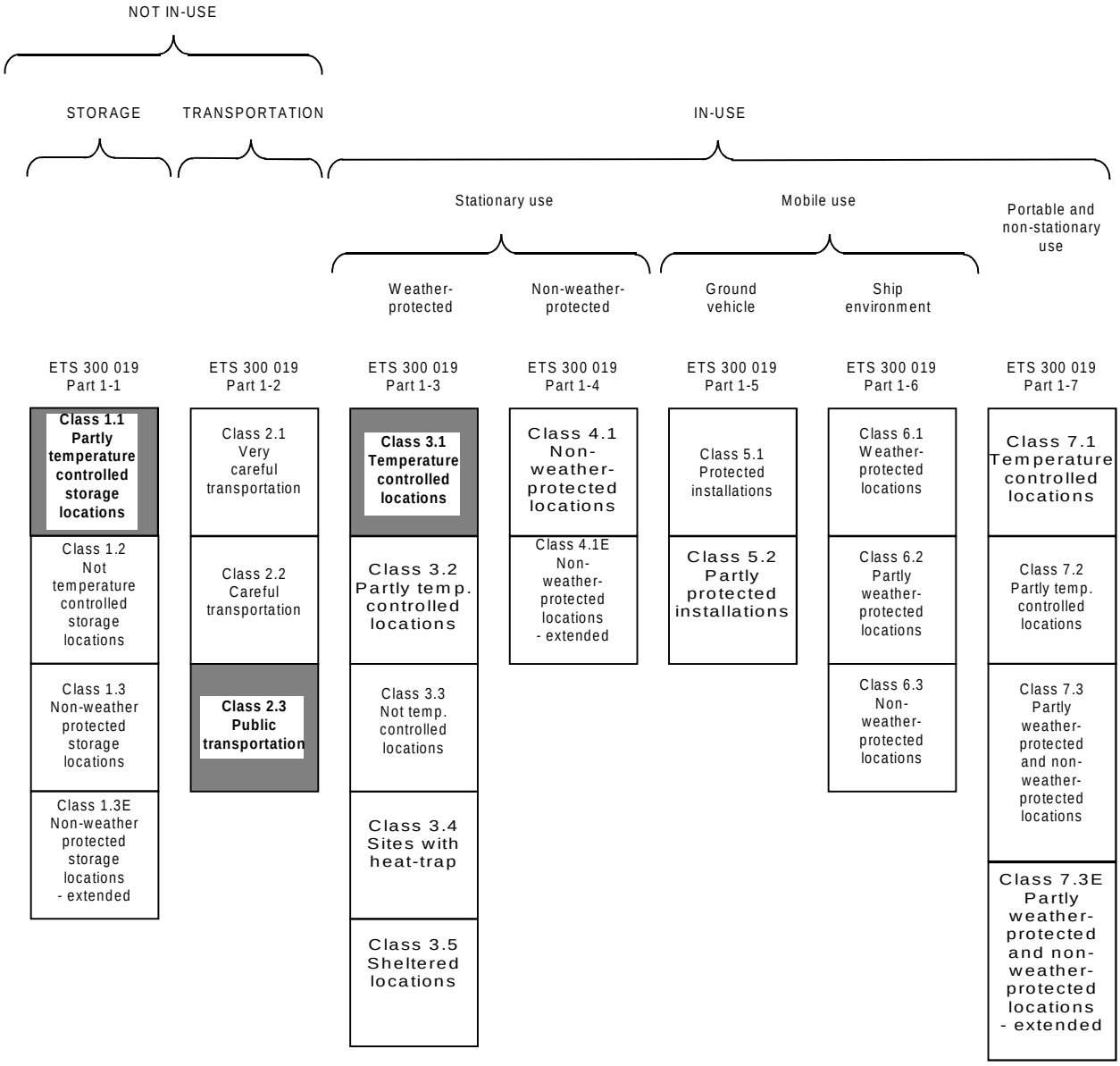
Full descriptions of each class are included in the appropriate parts of this ETS.

4 Environmental classes

4.1 Purpose of classification

The main purpose of environmental classification is to establish a number of "standardised" 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



NOTE 1: The need for further classes has been identified. 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 (shaded) 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 ETS 300 019-1-3 [2]). 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.

In order to simplify figure 2, a symmetrical distribution is shown.

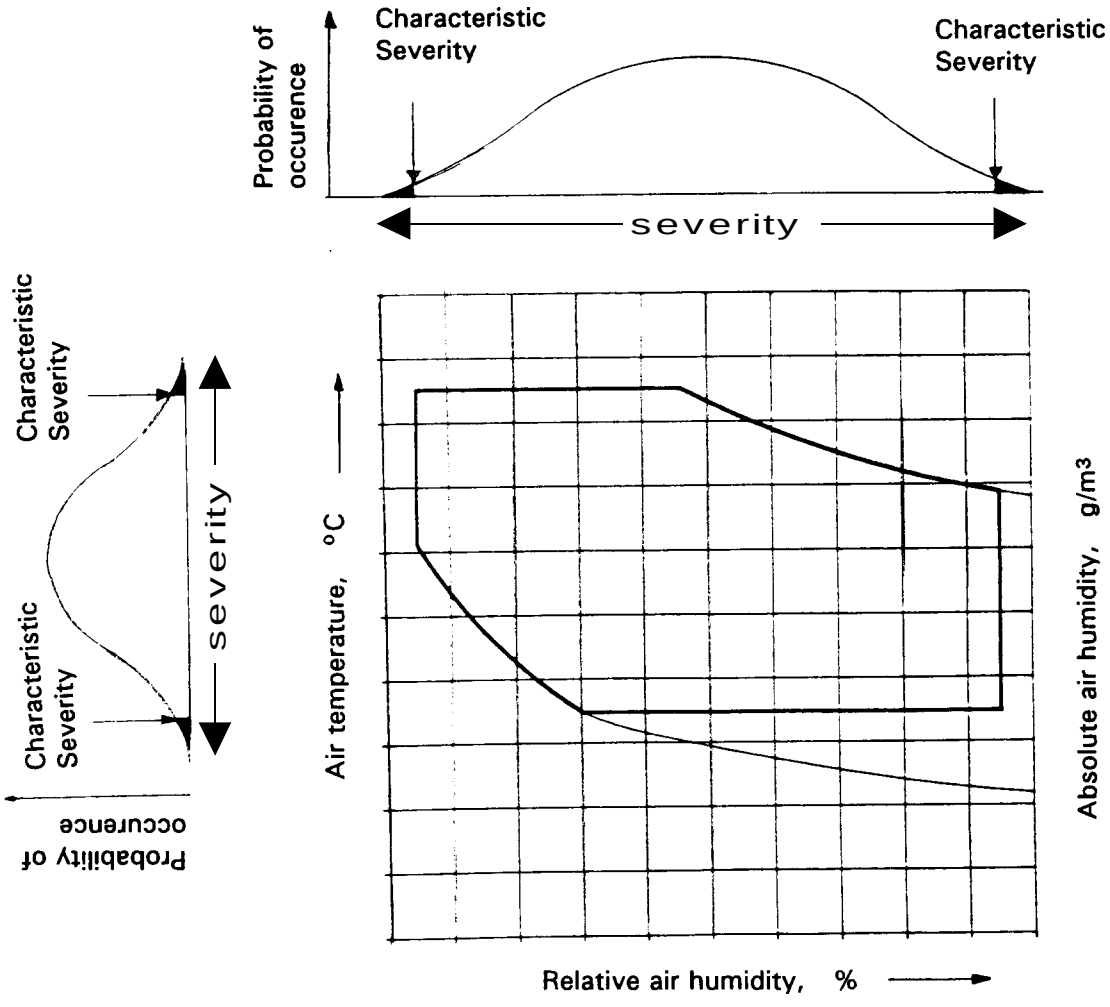


Figure 2: Climatogram showing symmetrical distribution of temperature and relative humidity

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 ETS 300 019-1-1 to 1-7 [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 ETS 300 019-2-1 to 2-7 [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 ETS 300 019-2-1 to 2-7 [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	
May 1994	First Edition
February 1996	Converted into Adobe Acrobat Portable Document Format (PDF)