AMENDMENT

ETS 300 019-1-3
A1

June 1997

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This amendment A1 modifies
the European Telecommunication Standard ETS 300 019-1-3 (1992)

Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-3: Classification of environmental conditions Stationary use at weatherprotected locations

ETSI

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Foreword

This amendment to ETS 300 019-1-3 (1992) has been produced by the Equipment Engineering (EE) Technical Committee of the European Telecommunications Standards Institute (ETSI).

Transposition dates	
Date of adoption of this amendment:	20 June 1997
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Amendments

Contents

Add:

5.6 Earthquake conditions

Clause 2

Add the following references:

[5] IEC 721-2-6: "Environmental conditions appearing in nature - Earthquake vibration and shock".

[6] IEC 68-3-3: "Environmental testing - Part 3: Background information - Subpart 3: Guidance. Seismic test methods for equipment".

Clause 4

In each subclause 4.1 to 4.5 after the first sentence, add:

Seismic environment: **zone 4** as defined in IEC 721-2-6 [5]. Option zone 4 (modified Mercalli scale ≥ 9): if earthquake conditions are specified by the customer, the conditions stated in subclause 5.6 apply.

Clause 5

After the end of subclause 5.5, add a new subclause:

5.6 Earthquake conditions

The dynamic environment which an equipment experiences during an earthquake depends on several parameters including the intensity of the ground motion, the structural characteristics of the building, the elevation of the equipment in the building and the characteristics of the structures used to support and house the equipment itself.

The most common method for specifying seismic conditions taking into account all these parameters is through the definition of a Response Spectrum (RS).

A RS is the graphical representation of the maximum response (i.e. acceleration) of an array of single degree-of-freedom oscillators as a function of oscillator frequency, in response to an applied transient base motion.

In other words the RS may be used to describe the motion that equipment is expected to experience at its mounting during a postulated seismic event.

To define an RS it is necessary to define the base motion and the characteristics of the array of the single degree-of-freedom oscillators, including their damping ratio.

The high frequency asymptotic value of the acceleration of the response spectrum is normally called *Zero Period Acceleration* (ZPA) and represents the largest peak value of acceleration of the base motion.

In the absence of a detailed knowledge of the possible seismic motion, the ZPA value can be obtained by the following formula (see IEC 68-3-3 [6]):

$$ZPA = a_f = a_g \times K \times D \times G$$

where:

a_f *floor acceleration;*

a_g *ground acceleration* that depends on the intensity of the earthquake;

K *superelevation factor* that takes into account the amplification of the ground acceleration resulting from the vibrational behaviour of buildings and structures;

D *direction factor* that takes into consideration possible intensity differences of the seismic motion between the horizontal and vertical axes;

G *geometric factor*, normally specified among testing parameters when single axis excitation is used for testing to take into account the interaction, due to installation location, along the different axes of the equipment of simultaneous multi-directional input vibrations.

The parameter severities that shall be used for classes 3.1 to 3.5 are shown in table 6.

The severities have been chosen from those stated in IEC Publication 68-3-3 [6].

Table 6: Earthquake parameters for classes 3.1 to 3.5

Parameter	Description	Severity
earthquake intensity	strong to very strong earthquakes (Richter scale magnitude > 7, Modified Mercalli intensity scale > IX)	$a_g = 5$ m/s^2
superelevation factor	installations on stiff structures connected rigidly to buildings	$K = 2$
direction factor	no intensity differences among axes	$D_{xyz} = 1$
geometric factor	single-axis excitation with interaction with the other axes	$G = 1,5$

The corresponding Response Spectrum, assuming a damping ratio of the single degree-of-freedom oscillators N = 2 %, is described in figure 7 and table 7.

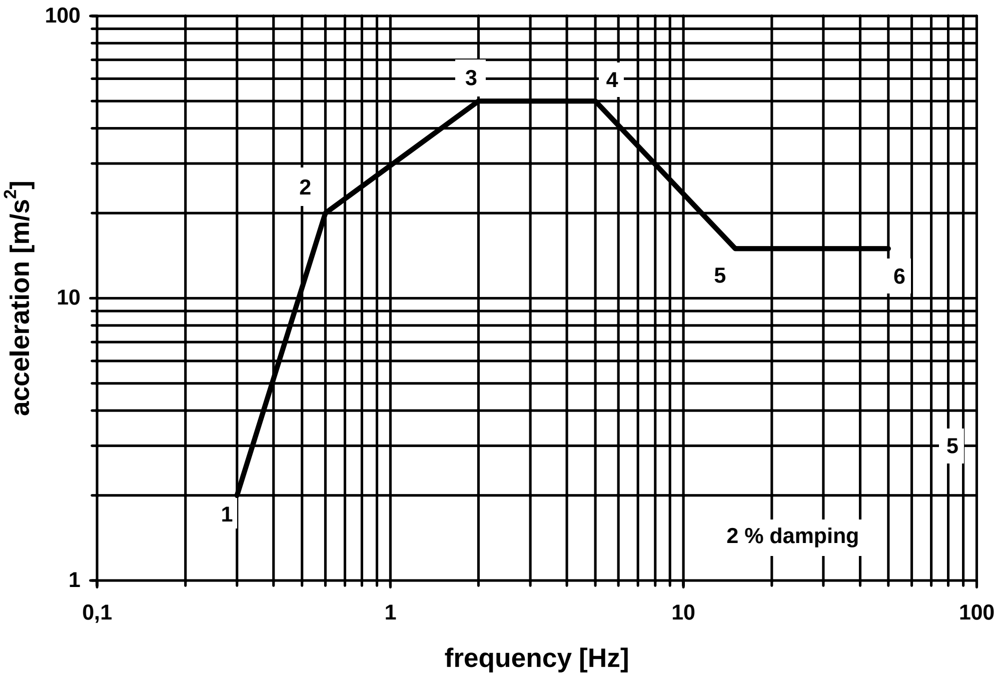

Figure 7: Earthquake Response Spectrum

Table 7: Acceleration co-ordinates for the Response Spectrum

Co-ordinate point	Frequency [Hz]	Values for upper floor acceleration [m/s^2]
1	0,3	2
2	0,6	20
3	2,0	50
4	5,0	50
5	15,0	15
6	50,0	15

History

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