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Inženiring opreme (EE) – Okoljski pogoji in preskusi vplivov okolja na telekomunikacijsko opremo – 2-2. del: Specifikacija preskusov vplivov okolja – Prevoz

Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-2: Specification of environmental tests; Transportation

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Foreword

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

The present document consists of 2 parts as follows:

Part 1: "Classification of environmental conditions";

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.

Part 2: "Specification of environmental tests".

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

Each part of the standard is divided into sub-parts. Sub-part 2-0 forms a general overview of Part 2.

This sub-part 2-2 deals with transportation.

National transposition dates	
Date of adoption of this EN:	3 September 1999
Date of latest announcement of this EN (doa):	31 December 1999
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 June 2000
Date of withdrawal of any conflicting National Standard (dow):	30 June 2000

1 Scope

The present document specifies test severities and methods for verification of the required resistibility of equipment according to the relevant environmental class.

The tests defined in Part 2-2 of this multi-part EN apply to transportation of equipment covering the environmental conditions stated in ETS 300 019-1-2 [1].

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, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

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

[2] IEC 60068-2: "Environmental testing - Part 2: Tests".

[3] ISO 4180-2 (1980): "Complete, filled transport packages - General rules for the compilation of performance test schedules - Part 2: Quantitative data".

[4] ETS 300 019-2-0: "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-0: Specification of environmental tests; Introduction".

3 Environmental test specifications

The detailed descriptions of the environmental conditions are given in clauses 4 and 5 of ETS 300 019-1-2 [1].

ETS 300 019-2-0 [4] forms a general overview of Part 2 of the present document.

If the equipment is normally transported in a packed state then it shall be tested in its packaging.

3.1 Specification T 2.1: Very careful transportation

Specification T 2.1 applies to transportation by air and by road on good quality road surfaces where special care has been taken with respect to low temperatures, handling and type of vehicle. See tables 1 and 2.

Table 1: Test specification T 2.1: Very careful transportation - climatic tests

Environmental parameter				Environmental Class 2.1	Environmental test specification T2.1: Very careful transportation				
Type	**Parameter**	**Detail parameter**		**Characteristic Severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Notes**
Air temperature	low		(°C)	-25	-25	6 h	IEC 60068-2-1	Ab: Cold	1
	high	unventilated	(°C)	+70	+70	6 h	IEC 60068-2-2	Bb: Dry heat	
		ventilated or outdoors	(°C)	+40	none				
	change	air/air	(°C) (°C/min)	-25/+30	-25/+30 1,0	5 cycles t1 = 3h	IEC 60068-2-14	Nb: Change of temperature	3a
		air/water	(°C)	+40/+5	none				**3b**
Humidity	relative	slow temperature change	(%) (°C)	95 +40	93 +30	4 d	IEC 60068-2-56	Cb: Damp heat steady state	4
		rapid temperature change	(%) (°C)	95 -25/+30	90-100 +40	2 cycles	IEC 60068-2-30	Db: Damp heat cyclic Variant 1	5
	absolute	rapid temperature change	(°C) (g/m^3)	+70/+15 60	none				
Air	pressure	low	(kPa)	70	none				6
		change		no					
	speed		(m/s)	20	none				7
Water	rain	intensity	(mm/min)	6	none				8
		low temperature	(°C)	no					
	other sources		(m/s)	1					7
	wetness			wet surfaces					9
Radiation	solar		(W/m^2)	1 120					10
	heat		(W/m^2)	600					10

Environmental parameter			Environmental Class 2.1	Environmental test specification T2.1: Very careful transportation				
Type	**Parameter**	**Detail parameter**	**Characteristic Severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Notes**
Chemically active substances	sulphur	SO_2 (mg/m^3)	1,0	none				11
		H_2S (mg/m^3)	0,5	none				11
	chlorine	salt	sea and road salt mist	none				11
		Cl_2 (mg/m^3)	no					11
		HCl (mg/m^3)	0,5	none				11
	nitrogen	NO_x (mg/m^3)	1,0	none				11
		NH_3 (mg/m^3)	3,0	none				11
	hydrogen fluoride HF	(mg/m^3)	0,03	none				11
	ozone O_3	(mg/m^3)	0,1	none				11
Mechanically active substances	dust	sedimentation ($mg/(m^2h)$)	3,0	none				12
		suspension (mg/m^3)	no					
	sand	(mg/m^3)	100	none				12
Flora and fauna	micro organisms		mould, fungus, etc.	none				13
	rodents, insects		rodents, etc.	none				13

NOTE 1: no = this condition does not occur in this class.
NOTE 2: none = verification is required only in special cases.
NOTE 3: n = number of note, see subclause 3.4.

Table 2: Test specification T 2.1: Very careful transportation - mechanical tests

Environmental parameter			**Environmental Class 2.1**	**Environmental test specification T 2.1 Very careful transportation**				
Type	**Parameter**	**Detail parameter**	**Characteristic Severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Notes**
Vibration	sinusoidal	displacement (mm) acceleration (m/s²) frequency range (Hz) axes of vibration	3,5 10 15 2-9 9-200 200-500	none				14
	random	ASD (m²/s³) (dB/oct) frequency range (Hz) axes of vibration	1 0,3 10-200 200-2 000	1,0 -3 5-20 20-200 3	3 x 30 minutes	IEC 60068-2-64	Fh: Vibration, broad-band random (digital control)	15
Shocks	shocks	shock spectrum duration (ms) acceleration (m/s²) mass (kg) number of bumps direction of bumps	no					
Fall	free fall	height (mm) mass (kg) attitude	no					
	toppling around	mass (kg) edges	no					
Acceleration	steady state	(m/s²)	20	none				19
Load	static load	(kPa)	5	none				20
Miscellaneous	rolling and pitching	angle (deg) period (s)	no					
NOTE 1: no = this condition does not occur in this class. NOTE 2: none = verification is required only in special cases. NOTE 3: n = number of note, see subclause 3.4.								

3.2 Specification T 2.2: Careful transportation

Specification T 2.2 applies to transportation by air, by road on good quality road surfaces, by ship and by train with specially designed shock-reducing buffers and where special care has been taken with respect to low temperatures and handling. See tables 3, 4 and 7.

Table 3: Test specification T 2.2: Careful transportation - climatic tests

Environmental parameter			Environmental Class 2.2	Environmental test specification T2.2: Careful transportation				
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Notes**
Air temperature	low	(°C)	-25	-25	72 h	IEC 60068-2-1	Ab: Cold	1
	high	unventilated (°C)	+70	+70	72 h	IEC 60068-2-2	Bb: Dry heat	
		ventilated or outdoors (°C)	+40	none				
	change	air/air (°C) (°C/min)	-25/+30	-25/+30 1,0	5 cycles t1 = 3h	IEC 60068-2-14	Nb: Change of temperature	3a
		air/water (°C)	+40/+5	none				3b
Humidity	relative	slow temperature (%) change (°C)	95 +40	93 +40	4 d	IEC 60068-2-56	Cb: Damp heat steady state	4
		rapid temperature (%) change (°C)	95 -25/+30	90-100 +40	2 cycles	IEC 60068-2-30	Db: Damp heat cyclic Variant 1	
	absolute	rapid temperature (°C) change (g/m³)	+70/+15 60	none				5
Air	pressure	low (kPa)	70	none				6
		change	no					
	speed	(m/s)	20	none				7
Water	rain	intensity (mm/min)	6	none				8
		low temperature (°C)	no					
	other sources	(m/s)	1					7
	wetness		wet surfaces					9
Radiation	solar	(W/m²)	1 120					10
	heat	(W/m²)	600					10