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

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650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
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Foreword

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

The present document is part 2, sub-part 2 of a multi-part deliverable. Full details of the entire series can be found in part 2, sub-part 0 [4].

National transposition dates	
Date of adoption of this EN:	16 January 2012
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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 the present document apply to transportation of equipment covering the environmental conditions stated in EN 300 019-1-2 [1].

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

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

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are necessary for the application of the present document.

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

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

[3] ISO 4180 (2009): "Packaging -- Complete, filled transport packages -- General rules for the compilation of performance test schedules".

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

2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ETSI EN 300 019-1-0: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-0: Classification of environmental conditions; Introduction".

3 Definitions

For the purposes of the present document, the terms and definitions given in EN 300 019-1-0 [i.1] apply.

4 Environmental test specifications

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

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

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

4.1 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 T 2.1: 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 [2]	Ab: Cold	1
	high	unventilated	(°C)	+70	+70	6 h	IEC 60068-2-2 [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 [2]	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 60068-2-78 [2]	Cb: Damp heat steady state	4
		rapid temperature change	(%) (°C)	95 -25/+30	90-100 +40	2 cycles	IEC 60068-2-30 [2]	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

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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**
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^{2}h))	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 clause 4.4.

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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/s^2) frequency range (Hz) axes of vibration	3,5 10 15 2-9 9-200 200-500	none				14
	random	ASD (m^2/s^3) (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 [2]	Fh: Vibration, broad-band random (digital control)	15

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**
Shocks	shocks	shock spectrum duration (ms) acceleration (m/s^2) 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/s^2)	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 clause 4.4.								

4.2 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 T 2.2: 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 [2]	Ab: Cold	1
	high	unventilated (°C)	+70	+70	72 h	IEC 60068-2-2 [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 [2]	Nb: Change of temperature	3a
		air/water (°C)	+40/+5	none				3b

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Environmental parameter			Environmental Class 2.2	Environmental test specification T 2.2: Careful transportation				
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Notes**
Humidity	relative	slow temperature (%) change (°C)	95 +40	93 +40	4 d	IEC 60068-2-78 [2]	Cb: Damp heat steady state	4
		rapid temperature (%) change (°C)	95 -25/+30	90-100 +40	2 cycles	IEC 60068-2-30 [2]	Db: Damp heat cyclic Variant 1	
	absolute	rapid temperature (°C) change (g/m^3)	+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/m^2)	1 120					10
	heat	(W/m^2)	600					10
Chemically active substances	sulphur	SO_2 (mg/m^3)	1,0	none				11
		H_2S (mg/m^3)	0,5	none				11
	chlorine	Salts	sea and road salt mist	none				11
		Cl_2 (mg/m^3)	no					
		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 clause 4.4.

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