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

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Contents

Intellectual Property Rights	4
Foreword.....	4
1 Scope	5
2 References	5
2.1 Normative references	5
2.2 Informative references.....	6
3 Definitions.....	6
4 Environmental test specifications.....	7
4.1 Specification T 2.1: Very careful transportation	7
4.2 Specification T 2.2: Careful transportation	9
4.3 Specification T 2.3: Public transportation	12
4.4 Notes to tables	16
4.4.1 General note.....	16
4.4.2 Notes to tables 1 to 6.....	16
Annex A (informative): Bibliography.....	19
History	20

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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].

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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.

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2.1 Normative references

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

- [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 60068-2-1 (03/2007): "Environmental testing, Part 2-1: Tests - Test A: Cold".
- [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".
- [5] IEC 60068-2-2 (07/2007): "Environmental testing, Part 2-2: Tests - Test B: Dry heat".
- [6] IEC 60068-2-14 (01/2009): "Environmental testing - Part 2-14: Tests - Test N: Change of temperature".
- [7] IEC 60068-2-78 (08/2001): "Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state".
- [8] IEC 60068-2-30 (08/2005): "Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)".
- [9] IEC 60068-2-64 (04/2008): "Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance".
- [10] IEC 60068-2-27 (02/2008): "Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock".
- [11] IEC 60068-2-31 (05/2008): "Environmental testing - Part 2-31: Tests - Test Ec: Rough handling shocks, primarily for equipment-type specimens".
- [12] IEC 60068-2-18 (10/2000): "Environmental testing - Part 2-18: Tests - Test R and guidance: Water".

- [13] IEC 60068-2-68 (8/1994): "Environmental testing - Part 2: Tests - Test L: Dust and sand".

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.

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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 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 [5]	Bb: Dry heat	
		ventilated or outdoors (°C)	+40	None				
	change	air/air (°C)	-25/+30	-25/+30	5 cycles	t1 = 3h	IEC 60068-2-14 [6]	Nb: Change of temperature
air/water (°C)		+40/+5	None		3b			
Humidity	relative	slow temperature change (%)	95	93	4 d	IEC 60068-2-78 [7]	Cab: Damp heat steady state	4
		rapid temperature change (°C)	+40	+30				
	absolute	rapid temperature change (%)	95	90-100	2 cycles	IEC 60068-2-30 [8]	Db: Damp heat cyclic Variant 1	5
		rapid temperature change (°C)	-25/+30	+40				
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 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 ₂ S (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.

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)	3,5	none				14
		acceleration (m/s ²)	10 15					
		frequency range (Hz)	2-9 9-200 200-500					
		axes of vibration						
	random	ASD (m ² /s ³)	1	0,3	1,0	3 x 30 minutes	IEC 60068-2-64 [9]	Fh: Vibration, broad-band random (digital control)
		frequency range (Hz)	10-200	200-2 000	5-20 20-200			
		axes of vibration			3			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	no					
		duration (ms)						
		acceleration (m/s ²)						
		mass (kg)						
		number of shocks						
		direction of shocks						
Fall	free fall	height (mm)	no					
		mass (kg)						
	toppling around	mass (kg)	no					
		edges						
Acceleration	steady state	(m/s ²)	20	none				19
Load	static load	(kPa)	5	none				20
Miscellaneous	rolling and pitching	angle (deg)	no					
		period (s)						

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 [5]	Bb: Dry heat	
		ventilated or outdoors	(°C)	+40	none				
	change	air/air	(°C)	-25/+30	-25/+30	5 cycles t1 = 3h	IEC 60068-2-14 [6]	Nb: Change of temperature	3a
air/water		(°C)	+40/+5	none					