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Environmental Engineering (EE) - Environmental conditions and environmental tests for telecommunications equipment - Part 2-3: Specification of environmental tests - Stationary use at weatherprotected locations

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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 3 of a multi-part deliverable. Full details of the entire series can be found in part 2, sub-part 0 [3].

National transposition dates	
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1 Scope

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

The tests in the present document apply to stationary use of equipment at weatherprotected locations covering the environmental conditions stated in EN 300 019-1-3 [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.

[1] ETSI EN 300 019-1-3: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-3: Classification of environmental conditions; Stationary use at weatherprotected locations".

[2] IEC 60068-2-1 (03/2007): "Environmental testing, Part 2-1: Tests - Test A: Cold".

[3] 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".

[4] IEC 60721-3-3: "Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 3: Stationary use at weatherprotected locations".

[5] Void.

[6] IEC 60068-2-2 (07/2007): "Environmental testing, Part 2-2: Tests - Test B: Dry heat".

[7] IEC 60068-2-14 (01/2009): "Environmental testing - Part 2-14: Tests - Test N: Change of temperature".

[8] IEC 60068-2-78 (08/2001): "Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state".

[9] IEC 60068-2-30 (08/2005): "Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)".

[10] IEC 60068-2-64 (04/2008): "Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance".

[11] IEC 60068-2-27 (02/2008): "Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock".

[12] IEC 60068-2-6 (12/2007): "Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)".

[13] IEC 60068-2-57 (11/1999): "Environmental testing - Part 2-57: Tests - Test Ff: Vibration - Time-history method".

[14] 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.

Not applicable.

3 Environmental test specifications

The detailed descriptions of the environmental conditions are in clauses 4 and 5 of EN 300 019-1-3 [1].

EN 300 019-2-0 [3] forms a general overview of part 2 of the present document.

The equipment under test is assumed to be in its operational state throughout the test conditions described in this part unless otherwise stated. The required performance before, during and after the test needs to be specified in the product specification. Input and load conditions of the equipment shall be chosen to obtain full utilization of the equipment under test. The heat dissipation shall be maximized, except for the steady state, low temperature test, where it shall be minimized.

3.1 Specifications T 3.1 and T 3.1E: Temperature-controlled locations

Specification T 3.1: Temperature-controlled locations - normal operating conditions.

This specification applies to permanently temperature-controlled enclosed locations where humidity is usually not controlled. See tables 1 and 2.

Table 1: Test specification T 3.1: Temperature-controlled locations - climatic tests

Environmental parameter			Environmental Class 3.1	Environmental test specification T3.1: In-use, Temperature-controlled locations				
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Notes**
Air temperature	Low	(°C)	+5	+5	16 h	IEC 60068-2-1 [2]	Ab/Ad: Cold	1
	High	(°C)	+40	+40 or +50	16 h	IEC 60068-2-2 [6]	Bb/Bd: Dry heat	2
	Change	(°C) (°C/min)	 0,5	+25/+40 0,5	half cycle t_1 = 3 h	IEC 60068-2-14 [7]	Nb: Change of temperature	3
Humidity	Relative	low (%)	5	none				4
		high (%) (°C)	85	85 +30	4 d	IEC 60068-2-78 [8]	Cab: Damp heat steady state	5
		condensation	no					
	Absolute	low (g/m^2)	1	none				4
		high (g/m^2)	25					7
Air	Pressure	low (kPa)	70	none				8
		high (kPa)	106	none				8
	Speed	(m/s)	5,0	none				4
Water	Rain	intensity	no					
		low temperature	no					
	Other sources		no					
	Icing & frosting		no					
Radiation	Solar	(W/m^2)	700					10
	Heat	(W/m^2)	600					11

Environmental parameter			**Environmental Class 3.1**	**Environmental test specification T3.1: In-use, Temperature-controlled locations**				
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Notes (see clause 5)**
Chemically active substances	Sulphur	SO_2 (mg/m^3)	0,3/1,0	none				12
		H_2S (mg/m^3)	0,1/0,5	none				12
	Chlorine	salt mist	sea and road salt	none				12
		Cl (mg/m^3)	0,1/0,3	none				12
		HCl (mg/m^3)	0,1/0,5	none				12
	Nitrogen	NO_x (mg/m^3)	0,5/1,0	none				12
		NH_3 (mg/m^3)	1,0/3,0	none				12
	Hydrogen fluoride HF	(mg/m^3)	0,01/0,03	none				12
	Ozone O_3	(mg/m^3)	0,05/0,1	none				12
Mechanically active substances	Dust	sedimentation ($mg/(m^2h)$)	1,5	none				12
		suspension (mg/m^3)	0,2	none				13
	Sand	(mg/m^3)	30	none				13
Flora and fauna	Micro organisms		negligible					
	Rodents, insects		negligible					

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 5.

Table 2: Test specification T 3.1: Temperature-controlled locations - mechanical tests

Environmental parameter			**Environmental Class 3.1**	**Environmental test specification T 3.1: In-use, Temperature-controlled locations**				
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	0,3 1,0 2-9 9-200	none				15
Shocks	Shocks	shock spectrum duration (ms) acceleration (m/s^2) number of shocks direction of shocks	Type L 22 40	half sine 11 30 6	3 in each direction	IEC 60068-2-27 [11]	Ea: Shock	18

NOTE 1: none = verification is required only in special cases.
NOTE 2: n = number of note, see clause 5.

Specification T 3.1E: Temperature-controlled locations - exceptional operating conditions.

This specification applies to permanently temperature-controlled locations where humidity is usually not controlled. The reference class is the same as for T 3.1, but the test specification relates to reduced performance requirements. See table 3.

Table 3: Test specification T 3.1E: Temperature-controlled locations, exceptional operating conditions - climatic tests

Environmental parameter			Environmental Condition 3.1E	Environmental test specification T 3.1E: In-use, Temperature-controlled locations - Exceptional.				
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Notes**
Air temperature	Low	(°C)	-5	-5	16 h	IEC 60068-2-1 [2]	Ab/Ad: Cold	1
	High	(°C)	+45	+45 or +55	16 h	IEC 60068-2-2 [6]	Bb/Bd: Dry heat	2
	Change	(°C) (°C/min)	0,5	+25/+45 0,5	half cycle t_1 = 3 h	IEC 60068-2-14 [7]	Nb: Change of temperature	3
Humidity	Relative	low (%)	5	none				4
		high (%) (°C)	90	93 +30	4 d	IEC 60068-2-78 [8]	Cab: Damp heat steady state	5
		condensation	no					
	Absolute	low (g/m^3)	1	none				4
		high (g/m^3)	25					7
Radiation	Solar	(W/m^2)	700					10
	Heat	(W/m^2)	600					11

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 5.

3.2 Specification T 3.2: Partly temperature-controlled locations

This specification applies to enclosed locations having neither temperature nor humidity control, but where heating may be used to avoid low temperatures. The building construction avoids extremely high temperatures. See tables 4 and 5.

Table 4: Test specification T 3.2: Partly temperature-controlled locations - climatic tests

Environmental parameter			Environmental Class 3.2	Environmental test specification T3.2: In-use, Partly temperature-controlled locations				
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Notes**
Air temperature	Low	(°C)	-5	-5	16 h	IEC 60068-2-1 [2]	Ab/Ad: Cold	1
	High	(°C)	+45	+45 or +55	16 h	IEC 60068-2-2 [6]	Bb/Bd: Dry heat	2
	Change	(°C) (°C/min)	0,5	+25/+55 or +25/+45 0,5	half cycle t_1 = 3 h	IEC 60068-2-14 [7]	Nb: Change of temperature	3
Humidity	Relative	low (%)	5	none				4
		high (%) (°C)	95	93 +30	4 d steady state	IEC 60068-2-78 [8]	Cab: Damp heat	5
		condensation (°C) (%)	yes	+30° 90-100	1 cycle	IEC 60068-2-30 [9]	Db: Damp heat cyclic Variant 1	6
	Absolute	low (g/m^3)	1	none				4
		high (g/m^3)	29					7
Air	Pressure	low (kPa)	70	none				8
		high (kPa)	106	none				8
	Speed	(m/s)	5,0	none				4
Water	Rain	intensity	no					
		low temperature	no					
	Other sources		no					
	Icing & frosting		yes					4
Radiation	Solar	(W/m^2)	700					10
	Heat	(W/m^2)	600					11