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Okoljski inženiring (EE) - Okoljski pogoji in preskusi vplivov okolja na telekomunikacijsko opremo - 2-3. del: Specifikacija preskusov vplivov okolja - Stacionarna uporaba na lokacijah, zaščitenih pred vremenskimi vplivi

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	
Date of adoption of this EN:	21 December 2015
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Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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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 ETSI EN 300 019-1-3 [1].

2 References

2.1 Normative 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.

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 (10-2012): "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 (04-2013): "Environmental testing - Part 2-57: Tests - Test Ff: Vibration - Time-history and sine-beat method".

[14] IEC 60068-2-68 (08-1994): "Environmental testing - Part 2-68: Tests - Test L: Dust and sand".

2.2 Informative 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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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 ETSI EN 300 019-1-3 [1].

ETSI EN 300 019-2-0 [3] forms a general overview of part 2 of this multi-part deliverable.

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.

The specification in table 1 and table 2 shall apply to permanently temperature-controlled enclosed locations where humidity is usually not controlled.

Table 1: Test specification T 3.1: Temperature-controlled locations - climatic 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**
Air temperature	Low		(°C)	+5	+5	16 h	IEC 60068-2-1 [2]	Ab/Ad/Ae: Cold	1
	High		(°C)	+40	+40 or +50	16 h	IEC 60068-2-2 [6]	Bb/Bd/Be: 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 T 3.1: In-use, Temperature-controlled locations				
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Notes**
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^{2}h))	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: (Air temperature, low).
The equipment under test shall remain operational throughout this test (without any damage or deterioration of performance, according to product specification). If a cold start up test is performed, the characteristic severity should be used as a cold start up temperature, but it may be modified (within the class characteristic severity range) by the product specification. In this case, the cold start up test shall commence once low temperature stability is achieved.

NOTE 2: (Air temperature, high).
The equipment under test shall remain operational throughout this test (without any damage or deterioration of performance, according to product specification). If two test temperatures are given, the lower test temperature applies if the equipment is protected against solar and heat radiation or the equipment is ventilated (natural or forced). The higher test temperature includes the heating effects of solar and/or heat radiation. If a high temperature start up test is performed, the characteristic severity should be used as a high start up temperature, but it may be modified (within the class characteristic severity range) by the product specification. In this case, the high temperature start up test shall commence once high temperature stability is achieved.

NOTE 3: (Air temperature, change).
The change of temperature test is normally used to check design tolerance. IEC 60068-2-14 [7] Test Nb shall be used. For change of temperature of 0,5 °C/min, the cooling gradient may be reduced to 0,2 °C/min where test chamber restrictions preclude a gradient of 0,5 °C/min.

NOTE 4: (Relative humidity, low).
There is no IEC 60068-2 series test method for this parameter.

NOTE 5: (Humidity, relative, high).
IEC 60068-2-78 [8] Test Cab shall be used with test values not higher than climatogram limits for this class.

NOTE 6: (Condensation).
IEC 60068-2-30 [9] Test Db shall be used with test values not higher than climatogram limits for this class.

NOTE 7: (Humidity, absolute, high).
This effect is considered to be partly included in the damp heat test IEC 60068-2-78 [8] Test Cab.

NOTE 8: (Air pressure, low and high).
No test is recommended for normal applications, because the effect of air pressure is evaluated at the component level.

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**
NOTE 9: (Water, rain). The effect of wind driven rain outside to the equipment in the weatherprotected or partly weatherprotected locations is included in IEC 60068-2-30 [9] Test Db. No test is recommended. NOTE 10: (Radiation, solar). The higher test temperature as described in note 2 includes the heating effect of solar radiation. Photochemical tests can be made separately for components and materials. NOTE 11: (Radiation, heat). The higher test temperature as described in note 2 includes the heating effect. NOTE 12: (Chemically active substances). The characteristic severities are given as mean/maximum values. These severities should be considered when designing the equipment and when choosing components and materials. No test is recommended in the present document. NOTE 13: (Mechanically active substances). The characteristic severities are much lower than lowest test severity in IEC 60068-2-68 [14] Test L and therefore no test is recommended. This condition should be considered when designing the equipment and when choosing components and materials.								

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				1
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	2
NOTE 1: (Vibration, sinusoidal). No test is recommended as the characteristic severities represent insignificant levels of vibration. The severities are given as peak values. NOTE 2: (Shocks). The values for test severity are not specified in IEC 60068-2 series. The severities are given as peak values. The energy content and the SRS of the shock given as test severity have been considered more appropriate than that given by the characteristic severity. Equipment under test shall be mounted in the "in use" position. The equipment function shall be monitored throughout the test.								

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

The specification in table 3 shall apply 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.

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/Ae: Cold	1
	High	(°C)	+45	+45 or +55	16 h	IEC 60068-2-2 [6]	Bb/Bd/Be: 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					6
Radiation	Solar	(W/m^2)	700					7
	Heat	(W/m^2)	600					8

NOTE 1: (Air temperature, low).
The equipment under test shall remain operational throughout this test (without any damage or deterioration of performance, according to product specification). If a cold start up test is performed, the characteristic severity should be used as a cold start up temperature, but it may be modified (within the class characteristic severity range) by the product specification. In this case, the cold start up test shall commence once low temperature stability is achieved.

NOTE 2: (Air temperature, high).
The equipment under test shall remain operational throughout this test (without any damage or deterioration of performance, according to product specification). If two test temperatures are given, the lower test temperature applies if the equipment is protected against solar and heat radiation or the equipment is ventilated (natural or forced). The higher test temperature includes the heating effects of solar and/or heat radiation. If a high temperature start up test is performed, the characteristic severity should be used as a high start up temperature, but it may be modified (within the class characteristic severity range) by the product specification. In this case, the high temperature start up test shall commence once high temperature stability is achieved.

NOTE 3: (Air temperature, change).
The change of temperature test is normally used to check design tolerance. IEC 60068-2-14 [7] Test Nb shall be used. For change of temperature of 0,5 °C/min, the cooling gradient may be reduced to 0,2 °C/min where test chamber restrictions preclude a gradient of 0,5 °C/min.

NOTE 4: (Relative humidity, low).
There is no IEC 60068-2 series test method for this parameter.

NOTE 5: (Humidity, relative, high).
IEC 60068-2-78 [8] Test Cab shall be used with test values not higher than climatogram limits for this class.

NOTE 6: (Humidity, absolute, high).
This effect is considered to be partly included in the damp heat test IEC 60068-2-78 [8] Test Cab.

NOTE 7: (Radiation, solar).
The higher test temperature as described in note 2 includes the heating effect of solar radiation. Photochemical tests can be made separately for components and materials.

NOTE 8: (Radiation, heat).
The higher test temperature as described in note 2 includes the heating effect.