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Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment Part 2-4: Specification of environmental tests Stationary use at non-weatherprotected locations

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Foreword

This multi-part European Telecommunication Standard (ETS) has been produced by the Equipment Engineering (EE) Technical Committee of the European Telecommunications Standards Institute (ETSI).

ETS 300 019 is concerned with environmental conditions and environmental tests for telecommunications equipment and comprises two main parts, each with subdivisions:

- ETS 300 019-1: "Classification of environmental conditions".

  Part 1 specifies different standardised environmental classes covering climatic and biological conditions, chemically and mechanically active substances and mechanical conditions during storage, transportation and in use.

- ETS 300 019-2: "Specification of environmental tests".

  Part 2 specifies the recommended test severities and test methods for the different environmental classes.

Part 2-0 forms a general overview of Part 2. This part, (Part 2-4), deals with stationary use at non-weatherprotected locations.

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1 Scope

This European Telecommunication Standard (ETS) specifies test methods and severities for verification of the required resistibility of equipment according to the relevant environmental class.

The tests defined in Part 2-4 of this multi-part standard apply to stationary use of equipment at non-weatherprotected locations covering the environmental conditions stated in ETS 300 0191-4 [1].

2 Normative references

This ETS incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] ETS 300 0191-4: "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment Part 1-4: Classification of environmental conditions; Stationary use at non-weatherprotected locations".

[2] IEC 68-2: "Environmental testing: Part 2: Tests".

[3] ETS 300 0192-0: "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 0191- 4 [1].

ETS 300 0192-0 [3] forms a general overview of Part 2 of this ETS.

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 need to be specified in the product specification. Input and load conditions of the equipment shall be chosen to obtain full utilisation of the equipment under test. The heat dissipation shall be maximised, except for the steady state, low temperature test, where it shall be minimised.

3.1 Specification T 4.1: Non-weatherprotected locations

This specification applies to many member countries of ETSI. See tables 1 and 3.

Table 1: Test specification T 4.1: Stationary use at non-weatherprotected locations-climatic tests

Environmental parameter			Environmental Class 4.1	Environmental test specification T 4.1: Stationary use, Non-weatherprotected locations			
Type	Parameter	Detail parameter	Characteristic severity	Test severity	Duration	Reference	Method
Air temperature	low	(°C)	-33	-33 (18) or -45 (1)	16 h	IEC 682-1	Ab/Ad: Cold (10) (11)
	high	(°C)	+40	+40 (2) or +55 (18)	16 h	IEC 682-2	Bb/Bd: Dry heat
	change	(°C) (°C/min)	 0,5	-10/+40 (12) 0,5 (9)	2 cycles t_1 = 3 h	IEC 682-14	Nb: Change of temperature
Humidity	relative	low (%)	15	none (4)			
		high (%) (°C)	100	93 +30	21 d	IEC 682-56	Cb: Damp heat steady state
		condensation (%) (°C)	yes	 90-100 +30	6 cycles	IEC 682-30	Db: Damp heat, cyclic Variant 1
	absolute	low (g/m^3)	0,26	none (4) (13)			
		high (g/m^3)	25	(14)			
Air	pressure	low (kPa) high (kPa)	70 106	none none			
	speed	(m/s)	50	none			
Water	rain	intensity low temperature (°C)	6 mm/min +5	0,01 m^3/min 90 kPa none (4)	3 min/m^2 or 15 min (19)	IEC 682-18	Rb: Impacting water Method 2.2
	other sources		splashing water	(5)			
	icing & frosting		yes	none			
Radiation	solar	(W/m^2)	1120	(6)			
	heat	(W/m^2)	negligible				

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Table 1 (concluded): Test specification T 4.1: Stationary use at non-weatherprotected locations-climatic tests

Environmental parameter			Environmental Class 4.1	Environmental test specification T 4.1: Stationary use, Non-weatherprotected locations			
Type	Parameter	Detail parameter	Characteristic severity	Test severity	Duration	Reference	Method
Chemically active sub-stances	sulphur	SO_2 (mg/m^3)	0,3/1,0 (7)	none (8)			
		H_2S (mg/m^3)	0,1/0,5 (7)	none (8)			
	chlorine	salt mist	sea and road salt	none (8)			
		Cl_2 (mg/m^3)	0,1/0,3 (7)	none (8)			
		HCl (mg/m^3)	0,1/0,5 (7)	none (8)			
	nitrogen	NO_x (mg/m^3)	0,5/1,0 (7)	none (8)			
		NH_3 (mg/m^3)	1,0/3,0 (7)	none (8)			
	hydrogen fluoride HF	(mg/m^3)	0,01/0,03 (7)	none (8)			
	ozone O_3	(mg/m^3)	0,05/0,1 (7)	none (8)			
Mechanically active substances	dust	sedimentation (mg/(m^{2}h))	20	(4)			
		suspension (mg/m^3)	5	(4)			
	sand	(mg/m^3)	300	(4)			
Flora and	micro organisms		mould, fungus, etc.	none (8)			
Fauna	rodents, insects		rodents, etc.	none (8)			

no = this condition does not occur in this class.
none = verification is required only in special cases.
(n) = NOTE (n = number of note), see subclause 3.3.

3.2 Specification T 4.1E: Non-weatherprotected locations - extended

This specification applies to all member countries of ETSI. See tables 2 and 3.

Table 2: Test specification T 4.1E: Stationary use at non-weatherprotected locations, extended - climatic tests

Environmental parameter			Environmental Class 4.1E	Environmental test specification T 4.1E: Stationary use, Non-weatherprotected locations - extended.			
Type	Parameter	Detail parameter	Characteristic severity	Test severity	Duration	Reference	Method
Air temperature	low	(°C)	-45 (18)	-45 or -55 (1)	16 h	IEC 682-1	Ab/Ad: Cold(10) (11)
	high	(°C)	+45	+45 (2) (18) or +60 (18)	16 h	IEC 682-2	Bb/Bd: Dry heat
	change	(°C) (°C/min)	 0,5	-10/+45 (12) 0,5 (9)	2 cycles t1 = 3 h	IEC 682-14	Nb: Change of temperature
Humidity	relative	low (%)	8	none (4)			
		high (%) (°C)	100	93 +30	21 d	IEC 682-56	Cb: Damp heat steady state
		condensation	yes	+30°C/90-100%	6 cycles	IEC 682-30	Db: Damp heat, cyclic Variant 1
	absolute	low (g/m^3) high (g/m^3)	0,03 30	none (4) (13) (14)			
Air	pressure	low (kPa) high (kPa)	70 106	none none			
	speed	(m/s)	50	none			
Water	rain	intensity low temperature (°C)	15 mm/min +5	0,01 m^3/min 90 kPa none (4)	6 min/m^2 or 30 min (19)	IEC 682-18	Rb: Impacting water Method 2.2
	other sources		splashing water	(5)			
	icing & frosting		yes	none			
Radiation	solar	(W/m^2)	1120	(6)			
	heat	(W/m^2)	negligible				

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Table 2 (concluded): Test specification T 4.1E: Stationary use at non-weatherprotected locations, extended - climatic tests

Environmental parameter			Environmental Class 4.1E	Environmental test specification T 4.1E: Stationary use, Non-weatherprotected locations - extended.			
Type	Parameter	Detail parameter	Characteristic severity	Test severity	Duration	Reference	Method
Chemically active sub-stances	sulphur	SO_2 (mg/m^3) H_2S (mg/m^3)	0,3/1,0 (7) 0,1/0,5 (7)	none (8) none (8)			
	chlorine	salt mist	sea and road salt	none (8)			
		Cl_2 (mg/m^3)	0,1/0,3 (7)	none (8)			
		HCl (mg/m^3)	0,1/0,5 (7)	none (8)			
	nitrogen	NO_x (mg/m^3) NH_3 (mg/m^3)	0,5/1,0 (7) 1,0/3,0 (7)	none (8) none (8)			
	hydrogen fluoride HF	(mg/m^3)	0,01/0,03 (7)	none (8)			
	ozone O_3	(mg/m^3)	0,05/0,1 (7)	none (8)			
/Mechanically active substances		(mg/(m^{2}h)) suspension (mg/m^3)	20 5	(4) (4)			
	sand	(mg/m^3)	300	(4)			
Flora and Fauna	micro organisms rodents, insects		mould, fungus, etc. rodents, etc.	none (8) none (8)			

no = this condition does not occur in this class. (n) = NOTE (n = number of note), see subclause 3.3.
none = verification is required only in special cases.

Table 3: Test specification T 4.1: Non-weatherprotected locations - mechanical tests
Test specification T 4.1E: Non-weatherprotected locations, extended - mechanical tests

Environmental parameter			Environmental Class 4.1 & 4.1E	Environmental test specification T 4.1 & 4.1E: Stationary use, Non-weatherprotected locations			
Type	Parameter	Detail parameter	Characteristic severity	Test severity	Duration	Reference	Method
Vibration **IEC Class 4M5** (17)	sinusoidal	displacement (15) (mm) acceleration (15) (m/s^2) frequency range (Hz) axes of vibration	3,0 10 2-9 9-200	3,5 10 5-9 9-200 3 axes (16)	3 x 5 sweep cycles	IEC 682-6	Fc: Vibration (sinusoidal)
Shocks **IEC Class 4M5** (17)	shocks	shock spectrum duration (ms) acceleration (15) (m/s^2) mass (kg) number of shocks directions of shocks	Type II 6 250	6 6 250 100 ≤100 >100 6 (16)	500 bumps in each direction (3)	IEC 682-29	Eb: Bump
Vibration **IEC Class 4M3** (17)	sinusoidal	velocity (15) (mm/s) displacement (15) (mm) acceleration (15) (m/s^2) frequency range (Hz) axes of vibration	1,5 5 2-9 9-200	5 2 5-62 62-200 3 axes (16)	3 x 5 sweep cycles	IEC 682-6 (18)	Fc: Vibration (sinusoidal)
Shocks **IEC Class 4M3** (17)	shocks	shock spectrum duration (ms) acceleration (15) (m/s^2) mass (kg) number of shocks directions of shocks	Type L 22 70	half sine 11 6 100 50 ≤100 >100 6 (16)	3 in each direction	IEC 682-27	Ea: Shock

no = this condition does not occur in this class. (n) = NOTE (n = number of note), see subclause 3.3.
none = verification is required only in special cases.

3.3 Notes to tables 1 to 3

NOTE 1: Includes heat irradiation emitted from the equipment.

NOTE 2: If protected against solar and heat radiation or if the equipment is ventilated (natural or forced).

NOTE 3: If the shocks in some directions are known to be insignificant, then tests need not be performed in those directions.

NOTE 4: No suitable tests exist in IEC 68-2 [2].

NOTE 5: This effect is included in test Rb.

NOTE 6: The heating effect on equipment is covered by test Bb/Bd. Photochemical tests for materials can be made separately.

NOTE 7: Mean/maximum value.

NOTE 8: The characteristic severities should be considered when choosing components and materials. Therefore no tests are required at the equipment level.

NOTE 9: Intended for items with a large thermal time constant. For equipment where the rapid change of temperature of the surface has a significant effect on internal components values up to 5°C/min can be applied (e.g. heat sinks).

NOTE 10: The equipment under test shall remain operational throughout this test except for the cold start-up test which shall commence once low temperature stability is achieved.

NOTE 11: The cold start-up temperature may be modified by the product specification. The cold start-up temperature shall be declared whenever reference is made to conformance with any class from ETS 300 019.

NOTE 12: The equipment function shall be monitored throughout this test.

NOTE 13: Relevant parameter. Equipment should be designed with this requirement in mind.

NOTE 14: This is covered by test Cb: Damp heat, steady state.

NOTE 15: Peak value.

NOTE 16: Equipment under test mounted in the "in-use" position.

NOTE 17: Where the consequences of mechanical failure are small, or the probability of high mechanical stresses are rare (e.g. when not for public use) the conditions of 4M3 may be chosen.

NOTE 18: Value not specified in IEC 68 [2].

NOTE 19: Whichever is greater.

Annex A (informative): Bibliography

The following references are used for informative purposes within this ETS.

ETS 300 019-2: "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment".

ETR 035: "Equipment Engineering (EE); Environmental engineering; Guidance and terminology".

IEC 68-1: "Environmental testing Part 1: General and guidance".

History

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May 1994	First Edition
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