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Part 2-8: Specification of environmental tests  
Stationary use at underground locations**

**ETSI**

European Telecommunications Standards Institute

**ETSI Secretariat**

**Postal address:** F-06921 Sophia Antipolis CEDEX - FRANCE

**Office address:** 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE

**X.400:** c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

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

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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).

This ETS consists of 2 parts as follows:

Part 1: "Classification of environmental conditions";

**Part 2: "Specification of environmental tests".**

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

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

Each part of the standard is divided into sub-parts. Sub-part 2-0 forms a general overview of part 2. This sub-part 2-8 deals with stationary use at underground locations.

Transposition dates	
Date of adoption:	5 September 1997
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## 1 Scope

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

The tests in sub-part 2-8 of this multi-part standard apply to stationary use of equipment at underground locations covering the environmental conditions stated in ETS 300 019-1-8 [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 300 019-1-8: "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-8: Classification of environmental conditions Stationary use at underground locations".
- [2] IEC 68-2: "Basic environmental testing procedures; Part 2: Tests".
- IEC 68-2-1: "Tests A: Cold".
- IEC 68-2-2: "Tests B: Dry Heat".
- IEC 68-2-6: "Test FC: Vibration (Sinusoidal)".
- IEC 68-2-14: "Test N: Change of Temperature".
- IEC 68-2-17: "Test Q: Sealing".
- IEC 68-2-27: "Test Ea and Guidance: Shock".
- IEC 68-2-29: "Tests Eb and Guidance: Bump".
- IEC 68-2-30: "Test Db and Guidance: Damp Heat, Cyclic (12 + 12-Hour Cycle)".
- IEC 68-2-56: "Test Cb: Damp Heat, Steady State, Primarily for Equipment".
- [3] ETS 300 019-2-0: "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 in clauses 4 and 5 of ETS 300 019-1-8 [1].

ETS 300 019-2-0 [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 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 Specification T 8.1: Partly weatherprotected underground locations

This specification applies to underground enclosures in footway boxes, manholes and some tunnels etc. which are protected from direct weather influences. The location has no temperature or humidity control, but the variations in the temperature are limited due to the stabilizing influence of the surroundings. The equipment may be immersed in water during exceptional conditions.



**Table 1: Test specification T 8.1: Partly weatherprotected underground locations - climatic tests**

Environmental parameter			Environmental Class 8.1	Environmental test specification T 8.1: In-use, partly weatherprotected underground locations			
Type	Parameter	Detail parameter	Characteristic severity	Test severity	Duration	Reference	Method
Air temperature	low	(°C)	-10	-10	16 h	IEC 68-2-1	Ab/Ad: Cold
	high	(°C)	+40	+40	16 h	IEC 68-2-2	Bb/Bd: Dry heat
	change	(°C/min) (°C)	5	-10/+40 (11)	2 cycles (1) t1 = 3 h	IEC 68-2-14	Na: Rapid change of temperature (2)
Humidity	relative	low (%)	5	(3)			
		high (%)	100				
		(%) (°C)		93 +30	21 d	IEC 68-2-56	Cb: Damp heat steady state
	condensation (%) (°C)	yes	90-100 +40	2 cycles	IEC 68-2-30	Db: Damp heat cyclic Variant 1	
	absolute	low (g/m <sup>3</sup> )	0,5	(3)			
	high (g/m <sup>3</sup> )	23	(4)				
Air	pressure	low (kPa)	70	none			
		high (kPa)	106	none			
	speed	(m/s)	1	none			
	rain	intensity	no	-			
		low temperature	no	-			
Water	other sources		dripping water	(5)			
		(m)	condensed wtr	(5)			
	(kPa)	immersion to soil water	2 19,6	1 h	IEC 68-2-17	Qf: Immersion	
	icing & frosting		yes	(3)			
Radiation	solar	(W/m <sup>2</sup> )	no	-			
	heat	(W/m <sup>2</sup> )	yes	(6)			

(continued)

Table 1 (concluded): Test specification T 8.1: Partly weatherprotected underground locations - climatic tests

Environmental parameter			Environmental Class 8.1	Environmental test specification T 8.1: In-use, partly weatherprotected underground locations			
Type	Parameter	Detail parameter	Characteristic severity	Test severity	Duration	Reference	Method
Chemically active substances	sulphur	SO <sub>2</sub> (mg/m <sup>3</sup> )	0,3/1,0 (7)	none (8)			
		H <sub>2</sub> S (mg/m <sup>3</sup> )	0,1/0,5 (7)	none (8)			
	chlorine	salt mist	sea and road salts	none (8)			
		Cl <sub>2</sub> (mg/m <sup>3</sup> )		0,1/0,3 (7)	none (8)		
		HCl (mg/m <sup>3</sup> )		0,1/0,5 (7)	none (8)		
	nitrogen	NO <sub>x</sub> (mg/m <sup>3</sup> )		0,5/1,0 (7)	none (8)		
		NH <sub>3</sub> (mg/m <sup>3</sup> )		1,0/3,0 (7)	none (8)		
	hydrogen fluoride	HF (mg/m <sup>3</sup> )		0,01/0,03 (7)	none (8)		
ozone	O <sub>3</sub> (mg/m <sup>3</sup> )		0,05/0,1 (7)	none (8)			
Mechanically active substances	dust	sedimentation (mg/(m <sup>2</sup> h))	15	none (9)			
		suspension (mg/m <sup>3</sup> )	0,4	none (9)			
	sand	(mg/m <sup>3</sup> )	300	none (9)			
Flora and Fauna	micro organisms	mould, fungus, etc.		none (9)			
	rodents, insects			none (10)			

no = this condition does not occur in this class.

(n) = NOTE (n = number of note), see page 11.

none = verification is required only in special cases.

**Table 2: Test specification T 8.1: Partly weatherprotected underground locations - mechanical tests**

Environmental parameter			Environmental Class 8.1	Environmental test specification T 8.1: In-use, Partly weatherprotected underground locations			
Type	Parameter	Detail parameter	Characteristic severity	Test severity	Duration	Reference	Method
Vibration <b>IEC class 3M3</b> (13)	sinusoidal	velocity (mm/s) displacement (10) (mm) acceleration (10) (m/s <sup>2</sup> ) frequency range (Hz) axes of vibration	1,5 5 2-9 9-200	5 2 5-62 62-200 3 axes (11)		IEC 68-2-6 (1)	Fc: Vibration (sinusoidal)
Shocks <b>IEC class 3M3</b> (13)	shocks	shock spectrum duration (ms) acceleration (10) (m/s <sup>2</sup> ) mass (kg) number of shocks directions of shocks	Type L 22 70	half-sine 11 6 100 50 ≤100 >100 6 (11)	3 in each dir.	IEC 68-2-27	Ea: Shock
Vibration <b>IEC class 3M5</b> (13)	sinusoidal	displacement (10) (mm) acceleration (10) (m/s <sup>2</sup> ) frequency range (Hz) axes of vibration	3 10 2-9 9-200	3,5 10 5-9 9-200 3 axes (11)	3 x 5 sweep cycles	IEC 68-2-6	Fc: Vibration (sinusoidal)
Shocks <b>IEC class 3M5</b> (13)	shocks	shock spectrum duration (ms) acceleration (10) (m/s <sup>2</sup> ) mass (kg) number of shocks directions of shocks	Type II 6 250	half-sine 6 6 250 100 ≤100 >100 6 (11)	500 bumps in each direction	IEC 68-2-29	Eb: Bump
no = this condition does not occur in this class. none = verification is required only in special cases.			(n) = NOTE (n = number of note), see page 11.				

Notes to tables 1 and 2:

- NOTE 1: Value not specified in IEC 68-2 [2].
- NOTE 2: The equipment function shall be monitored throughout the test.
- NOTE 3: No suitable tests exist in IEC 68-2 [2].
- NOTE 4: This is covered by test Db: Damp heat cyclic.
- NOTE 5: The wetting effect is included in test Qf: Immersion.
- NOTE 6: The heating effect on equipment of heat radiation from all sources is included in high temperature.
- NOTE 7: Mean/Maximum value.
- NOTE 8: The characteristic severities should be considered when choosing components and materials.
- NOTE 9: The immersion test will normally ensure compliance with the dust and sand requirement.
- NOTE 10: Peak value.
- NOTE 11: Equipment under test shall be mounted as for "in-use" (with any fixtures).
- NOTE 12: If preferred two tests may be carried out as follows: -10/+5 °C and +5/+40 °C.
- NOTE 13: At locations where the level of shock is high, e.g. in close vicinity of road traffic or adjacent to heavy machines, etc. special mechanical class 3M5 shall be chosen.

#### **4 Earthquake test specification**

Earthquake tests are under consideration.

**Annex A (informative): Bibliography**

- ETR 035: "Equipment Engineering (EE); Environmental engineering; Guidance and terminology".
- IEC 68-1: "Environmental testing part 1: General and Guidance".

## History

Document history			
July 1996	Public Enquiry	PE 109:	1996-07-08 to 1996-11-01
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