

ETSI EN 300 019-2-4 V2.5.1 (2018-07)



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

https://standards.iteh.ai/catalog/standards/si/8a1e8d1-1d33-473b-ae3e-497baae0c495/etsi-en-300-019-2-4-v2-5-1-2018-07

---

**Reference**REN/EE-017002

---

---

**Keywords**environment, testing

---

**ETSI**

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

---

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

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

---

**Important notice**

---

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

---

**Copyright Notification**

---

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2018.

All rights reserved.

**DECT™**, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members.

**3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

**oneM2M** logo is protected for the benefit of its Members.

**GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

# Contents

Intellectual Property Rights .....	4
Foreword.....	4
Modal verbs terminology.....	4
1 Scope .....	5
2 References .....	5
2.1 Normative references .....	5
2.2 Informative references.....	6
3 Definitions .....	6
4 Environmental test specifications.....	6
4.0 General .....	6
4.1 Equipment setup and configuration.....	6
4.2 Performance criteria .....	7
4.3 Specification T 4.1: non-weatherprotected locations, climatic tests.....	8
4.4 Specification T 4.1E: non-weatherprotected locations - extended, climatic tests.....	10
4.5 Specification T 4.2L: non-weatherprotected locations - extremely cold, climatic tests .....	12
4.6 Specification T 4.2H: non-weatherprotected locations - extremely warm dry, climatic tests .....	14
4.7 Specification T 4.1, 4.1E, 4.2L and 4.2H: non-weatherprotected locations - mechanical tests.....	16
5 Earthquake test specification.....	18
5.0 General .....	18
5.1 Vibration response investigation .....	18
5.2 Test conditioning.....	18
<b>Annex A (informative): Bibliography.....</b>	<b>21</b>
History .....	22

---

## Intellectual Property Rights

### Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

### Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

---

## Foreword

This European Standard (EN) has been produced by ETSI Technical Committee Environmental Engineering (EE).

The present document is part 2, sub-part 4 of a multi-part deliverable. Full details of the entire series can be found in part 2, sub-part 0 [i.1].

### National transposition dates

Date of adoption of this EN:	28 June 2018
Date of latest announcement of this EN (doa):	30 September 2018
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 March 2019
Date of withdrawal of any conflicting National Standard (dow):	31 March 2019

---

## 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).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

# 1 Scope

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

The tests defined in the present document apply to stationary use of equipment at non-weatherprotected locations covering the environmental conditions stated in ETSI EN 300 019-1-4 [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 referenced 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 300 019-1-4 (04-2014): "Environmental 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 60068-2-1 (03-2007): "Environmental testing - Part 2-1: Tests - Test A: Cold".
- [3] Void.
- [4] Void.
- [5] ATIS T1.0600329 (2014): "Network Equipment - Earthquake Resistance".
- [6] Void.
- [7] IEC 60068-2-2 (07-2007): "Environmental testing - Part 2-2: Tests - Test B: Dry heat".
- [8] IEC 60068-2-14 (01-2009): "Environmental testing - Part 2-14: Tests - Test N: Change of temperature".
- [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] Void.
- [15] IEC 60068-2-18 (03-2017): "Environmental testing - Part 2-18: Tests - Test R and guidance: Water".

- [16] IEC 60068-2-78 (10-2012): "Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state".
- [17] IEC 60068-2-11 (01-1981): "Basic environmental testing procedures - Part 2-11: Tests - Test Ka: Salt mist".

## 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 referenced document (including any amendments) applies.

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 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 300 019-2-0: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-0: Specification of environmental tests; Introduction".
- [i.2] IEC 60068-2-68 (08-1994): "Environmental testing - Part 2-68: Tests - Test L: Dust and sand".
- [i.3] IEC 60068-2 (all parts): "Environmental testing - Part 2: Tests".
- [i.4] 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 ETSI EN 300 019-1-0 [i.4] apply.

---

## 4 Environmental test specifications

### 4.0 General

The equipment shall be tested in its operational state throughout the test conditions described in the present document. The detailed descriptions of the environmental conditions are given in clauses 4 and 5 of ETSI EN 300 019-1-4 [1].

ETSI EN 300 019-2-0 [i.1] forms a general overview of part 2 of this multi-part deliverable.

### 4.1 Equipment setup and configuration

The equipment shall be tested in its operational state throughout the test conditions described in the present document unless otherwise stated. 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.

## 4.2 Performance criteria

The following performance criteria shall apply in the tests defined by the present document.

### **Performance criterion A:**

The equipment shall function according to the manufacturer specifications before, during and after the tests. No degradation of performance or loss of function is allowed below the performance level specified by the manufacturer when the apparatus is used as intended. If the minimum performance level is not specified by the manufacturer, then this may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

### **Performance criterion B:**

The equipment shall function according to the manufacturer specifications before and after the tests. During the test it is not required to monitor the equipment functionality. No degradation of performance or loss of function is allowed below the performance level specified by the manufacturer when the apparatus is used as intended. If the minimum performance level is not specified by the manufacturer, then this may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

### **Performance criterion C:**

The equipment shall function according to the manufacturer specifications before and after the tests. No degradation of performance or loss of function is allowed below the performance level specified by the manufacturer when the apparatus is used as intended. If the minimum performance level is not specified by the manufacturer, then this may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

During the application of the test, temporary loss of function is allowed but after the test the equipment shall restore to the normal functionality without replacement of components, manual rebooting or human intervention.

The equipment shall sustain the test without permanent structural or mechanical damage.

### **Performance criterion D:**

This performance criterion applies to the enclosure of the equipment. No corrosion traces (e.g. rust) or deterioration of the enclosure shall occur at the end of the test.

### 4.3 Specification T 4.1: non-weatherprotected locations, climatic tests

The specification in table 1 shall apply to non-weatherprotected locations described in ETSI EN 300 019-1-4 [1].

**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	Performance criterion	Notes	
Air temperature	Low	(°C)	-33	-33 or -45	16 h	IEC 60068-2-1 [2]	Ab/Ad/Ae: Cold	A	1	
	High	(°C)	+40	+40 or +55	16 h	IEC 60068-2-2 [7]	Bb/Bd/Be: Dry heat	A	2	
	Change	(°C) (°C/min)	0,5	-10 to +40 0,5	2 cycles t <sub>1</sub> = 3 h	IEC 60068-2-14 [8]	Nb: Change of temperature	A	3	
Humidity	Relative	Low (%)	15	None					8	
		High (%)	100	93	10 d	IEC 60068-2-78 [16]	Cab: Damp heat steady state	A	4	
		Condensation (°C)	Yes							5
	Absolute	Low (g/m <sup>3</sup> )	0,26	None						
		High (g/m <sup>3</sup> )	25	None						6
Air	Pressure	Low (kPa)	70	None					7	
		High (kPa)	106	None					7	
	Speed (m/s)	50	None						8	
Water	Rain	Intensity	6 mm/min	0,01 m <sup>3</sup> /min 90 kPa	3 min/m <sup>2</sup> or 15 min	IEC 60068-2-18 [15]	Rb: Impacting water, method 1.2 "spray nozzle"	B	9	
		Low temperature (°C)	+5	None						
	Other sources		Splashing water	None					10	
	Icing & frosting		Yes	None					8	
Radiation	Solar (W/m <sup>2</sup> )	1 120	None						11	
	Heat (W/m <sup>2</sup> )	Negligible	None							
Chemically active substances	Sulphur	SO <sub>2</sub> (mg/m <sup>3</sup> )	0,3 to 1,0	None					12	
		H <sub>2</sub> S (mg/m <sup>3</sup> )	0,1 to 0,5	None					12	
	Chlorine	Salt mist	Sea and road salt	35 °C, 5 % NaCl solution	10 d	IEC 60068-2-11 [17]	Ka: Salt mist	D	12	
		Cl (mg/m <sup>3</sup> )	0,1 to 0,3	None					12	
		HCl (mg/m <sup>3</sup> )	0,1 to 0,5	None					12	
	Nitrogen	NO <sub>x</sub> (mg/m <sup>3</sup> )	0,5 to 1,0	None					12	



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	Performance criterion	Notes
		NH <sub>3</sub> (mg/m <sup>3</sup> )	1,0 to 3,0	None					12
	Hydrogen fluoride HF	(mg/m <sup>3</sup> )	0,01 to 0,03	None					12
	Ozone O <sub>3</sub>	(mg/m <sup>3</sup> )	0,05 to 0,1	None					12
Mechanically active substances	Dust	Sedimentation (mg/(m <sup>2</sup> h))	20	None					13
		Suspension (mg/m <sup>3</sup> )	5	None					13
	Sand	(mg/m <sup>3</sup> )	300	None					13
Flora and fauna	Micro organisms		Mould, fungus, etc.	None					14
	Rodents, insects		Rodents, etc.	None					14
<p>NOTE 1: (Air temperature, low). Two test temperatures are given, the lower test temperature shall apply if the equipment is protected against solar irradiation. The higher test temperature includes heat irradiation emitted from the equipment. The temperature cold start up test shall be performed according to the characteristic severity 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.</p> <p>NOTE 2: (Air temperature, high). Two test temperatures are given, the lower test temperature shall apply if the equipment is protected against solar radiation or the equipment is ventilated (natural or forced). The higher test temperature includes the heating effects of solar radiation. The temperature start up test shall be performed according to the characteristic severity 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.</p> <p>NOTE 3: (Air temperature, change). This test is intended for specimen with large thermal time constant. For equipment where the rapid change of temperature of the surface has a significant effect on internal components, the values of the change of temperature up to 5 °C/min can be applied.</p> <p>NOTE 4: (Humidity, relative high). IEC 60068-2-78 [16] Test Cab shall be used with test severities not higher than climatogram limits for this class.</p> <p>NOTE 5: (Condensation). IEC 60068-2-30 [9] Test Db shall be used with test severities not higher than climatogram limits for this class.</p> <p>NOTE 6: (Humidity, absolute, high). This effect is considered to be partly included in the damp heat test IEC 60068-2-78 [16] Test Cab.</p> <p>NOTE 7: (Air pressure, low and high). No test is required for normal applications, because the effect of air pressure is evaluated at the component level.</p> <p>NOTE 8: There is no IEC 60068-2 [i.3] series test for this parameter.</p> <p>NOTE 9: (Water, rain). IEC 60068-2-18 [15] Test Rb method 1.2 "Spay nozzle" has been chosen even if it does not imitate normal rain. It is a simple hand held shower test, easy to perform and can demonstrate that the specimen design is adequately tolerated to survive this condition. The cooling effect of the low temperature of the rain is included in IEC 60068-2-14 [8] Test Nb. Two durations are given, whichever is the greatest should be chosen.</p> <p>NOTE 10: (Water, other sources). No test is required because the effect is already included in IEC 60068-2-18 [15] Test Rb.</p> <p>NOTE 11: (Radiation). The heating effect of solar radiation is included in the higher test temperature in IEC 60068-2-2 [7] Test Bb as described in note 2. Photochemical tests can be performed separately for component and materials.</p> <p>NOTE 12: (Chemically active substances). Characteristic severities are mean maximum values. The characteristic severities should be considered when designing the equipment and when choosing components and materials. No test is required in the present document, except for the mechanical enclosures, where the salt mist test is required to be performed. The execution of this test can be performed on the entire enclosure or subparts of the enclosure if the results are not affected.</p> <p>NOTE 13: (Mechanically active substances). The characteristic severities are much lower than the lowest test severity in IEC 60068-2-68 [i.2] Test L and therefore no test is required. This condition should be considered when designing the equipment and choosing components and materials.</p> <p>NOTE 14: (Flora and fauna). The characteristic severities should be considered when choosing components and materials.</p>									

## 4.4 Specification T 4.1E: non-weatherprotected locations - extended, climatic tests

The specification in table 2 shall apply to non-weatherprotected locations - extended as described in ETSI EN 300 019-1-4 [1].

**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	Performance criterion	Notes	
Air temperature	Low	(°C)	-45	-45 or -55	16 h	IEC 60068-2-1 [2]	Ab/Ad/Ae: Cold	A	1	
	High	(°C)	+45	+45 or +60	16 h	IEC 60068-2-2 [7]	Bb/Bd/Be: Dry heat	A	2	
	Change	(°C) (°C/min)	0,5	-10 to +45 0,5	2 cycles t1 = 3 h	IEC 60068-2-14 [8]	Nb: Change of temperature	A	3	
Humidity	Relative	Low	(%)	8	None				8	
		High	(%)	100	93	10 d	IEC 60068-2-78 [16]	Cab: Damp heat steady state	A	4
		Condensation	(°C)	Yes	+30	2 cycles	IEC 60068-2-30 [9]	Db: Damp heat cyclic Variant 1	A	5
	Absolute	Low	(g/m <sup>3</sup> )	0,03	90 to 100 +30					6
High		(g/m <sup>3</sup> )	30	None						
Air	Pressure	Low	(kPa)	70	None				7	
		High	(kPa)	106	None				7	
	Speed	(m/s)	50	None					8	
Water	Rain	Intensity		15 mm/min	0,01 m <sup>3</sup> /min 90 kPa	6 min/m <sup>2</sup> or 30 min	IEC 60068-2-18 [15]	Rb: Impacting water, method 1.2 "spray nozzle"	B	9
		Low temperature	(°C)	+5	None					
	Other sources Icing & frosting		Splashing water	None						10
Radiation	Solar		(W/m <sup>2</sup> )	1 120	None				8	
			(W/m <sup>2</sup> )	Negligible	None				11	
	Heat									
Chemically active substances	Sulphur	SO <sub>2</sub>	(mg/m <sup>3</sup> )	0,3 to 1,0	None				12	
		H <sub>2</sub> S	(mg/m <sup>3</sup> )	0,1 to 0,5	None				12	
	Chlorine	Salt mist		Sea and road salt	35 °C, 5 % NaCl solution	10 d	IEC 60068-2-11 [17]	Ka: Salt mist	D	12
		Cl	(mg/m <sup>3</sup> )	0,1 to 0,3	None					12
		HCl	(mg/m <sup>3</sup> )	0,1 to 0,5	None					12
	Nitrogen	NO <sub>x</sub>	(mg/m <sup>3</sup> )	0,5 to 1,0	None					12
NH <sub>3</sub>		(mg/m <sup>3</sup> )	1,0 to 3,0	None					12	