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Environmental conditions and environmental tests for telecommunications equipment;
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Sub-part 7: Portable and non-stationary use

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Foreword

This draft European Standard (EN) has been produced by ETSI Technical Committee Environmental Engineering (EE), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI EN Approval Procedure.

The present document is part 2, sub-part 7 of a multi-part deliverable. Full details of the entire series can be found in part 2, sub-part 0 [i.1].

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

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 the verification of the required resistibility of telecommunication equipment according to the relevant environmental class.

The tests defined in the present document apply to portable and non-stationary use of equipment, covering the environments stated in ETSI EN 300 019-1-7 [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 https://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 300 019-1-7 (V2.1.4): "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-7: Classification of environmental conditions; Portable and non-stationary use".

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

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

[4] IEC 60068-2-14:2023: "Environmental testing - Part 2-14: Tests - Test N: Change of temperature".

[5] IEC 60068-2-78 (10-2012): "Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state".

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

[7] IEC 60068-2-18 (03-2017): "Environmental testing - Part 2-18: Tests - Test R and guidance: Water".

[8] IEC 60068-2-64 (2008+A1:2019): "Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance".

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

[10] IEC 60068-2-31 (05-2008): "Environmental testing - Part 2-31: Tests - Test Ec: Rough handling shocks, primarily for equipment-type specimens".

2.2 Informative references

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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.

[i.1] ETSI EN 300 019-2-0: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2: Specification of environmental tests; Sub-part 0: Introduction".

[i.2] 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".

[i.3] IEC 60068-2-68 (08-1994): "Environmental testing - Part 2-68: Tests - Test L: Dust and sand".

[i.4] IEC 60721-3-7 (10-2002): "Classification of environmental conditions - Part 3-7: Classification of groups of environmental parameters and their severities - Portable and non-stationary use".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI EN 300 019-1-0 [i.2] apply.

3.2 Symbols

For the purposes of the present document, the symbols given in ETSI EN 300 019-1-0 [i.2] apply.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI EN 300 019-1-0 [i.2] 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 300 019-1-7 [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 7.1: temperature-controlled locations

The tests specifications T 7.1 of the present document shall apply to equipment, depending on the selected IEC mechanical class, used at, and direct transfer between, permanently temperature-controlled and enclosed locations. Humidity is usually not controlled. See tables 1, 5 and 6.

4.4 Specification T 7.2: partly temperature-controlled locations

The tests specifications T 7.2 of the present document shall apply to equipment, depending on the selected IEC mechanical class, used at , and direct transfer between, enclosed locations having neither temperature nor humidity control. See tables 2, 5 and 6.

4.5 Specification T 7.3: partly weatherprotected and non-weatherprotected locations

The tests specifications T 7.3 of the present document shall apply to equipment, depending on the selected IEC mechanical class, used at partly weatherprotected locations in buildings of such a construction that extremely low temperatures are avoided. This class also applies to use at non-weatherprotected locations in a Warm Temperate climate

and to transfer between these locations. During cold seasons non-weatherprotected use and transfer is limited. See tables 3, 5 and 6.

4.6 Specification T 7.3E: partly weatherprotected and non-weatherprotected locations - extended

The tests specifications T 7.3E of the present document shall apply to equipment, depending on the selected IEC mechanical class, used at partly weatherprotected locations in buildings of any construction - except in extremely cold and cold climates - where extremely low temperatures shall be avoided. This class also applies at non-weatherprotected

locations in moderate open-air climates and to transfer between these conditions (during extremely cold days use and transfer is limited). See tables 4, 5 and 6.

4.7 Specification T 7.1: temperature-controlled locations - climatic test

This specification in table 1 shall apply to use at, and direct transfer between, permanently temperature-controlled enclosed locations where humidity is usually not controlled described in ETSI EN 300 019-1-7 [1]. See tables 1, 5 and 6.

Table 1: Test specification T 7.1: Temperature-controlled locations - climatic tests

Environmental parameter			Environmental Class 7.1	Environmental test specification T7.1: Portable, Temperature - controlled location					
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Performance criterion**	**Notes**
Air temperature	Low	(°C)	+5	+5	16 h	IEC 60068-2-1 [2]	Ab/Ad/Ae: Cold	A	1
	High	(°C)	+40	+40 or +50	16 h	IEC 60068-2-2 [3]	Bb/Bd/Be: Dry heat	A	2
	Change	(°C)	+5/+25	+5/+25	3 cycles t_1 = 3 h	IEC 60068-2-14 [4]	Na: Change of temperature	A	3
Humidity	Relative	low (%)	5	none					4
		high (%) (°C)	85 +30	93 +30	96 h	IEC 60068-2-78 [5]	Cab: Damp heat steady state	A	5
		condensation (%) (°C)	yes	90-100 +30	2 cycles	IEC 60068-2-30 [6]	Db: Damp heat Cyclic, variant 2	A	6
	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						9
	Heat	(W/m^2)	600						10
Chemically active substances	Sulphur	SO_2 (mg/m^3)	0,3/1,0	none					11
		H_2S (mg/m^3)	0,1/0,5	none					11
	Chlorine	salt mist	sea and road salt	none					11
		Cl_2 (mg/m^3)	0,1/0,3	none					11
		HCl (mg/m^3)	0,1/0,5	none					11
	Nitrogen	NO_x (mg/m^3)	0,5/1,0	none					11
		NH_3 (mg/m^3)	1,0/3,0	none					11
	Hydrogen fluoride HF	(mg/m^3)	0,01/0,03	none					11
	Ozone O_3	(mg/m^3)	0,05/0,1	none					11
	Dust	sedimentation ($mg/(m^2h)$)	1,5	none					12

Environmental parameter			Environmental Class 7.1	Environmental test specification T7.1: Portable, Temperature - controlled location					
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Performance criterion**	**Notes**
Mechanically active substances		suspension (mg/m^3)	0,2	none					12
	Sand	(mg/m^3)	30	none					12
Flora and fauna	Micro organisms		no						
	Rodents, insects		no						

no: This condition does not occur in this class.
none: See corresponding note for detail on why test severity is not required.

NOTE 1: (Air temperature, low).
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).
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 tolerancing. IEC test Na is recommended with severities equal to characteristic severities. Whenever possible, the equipment function shall be monitored throughout the test.

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 [5] Test Cab shall be used with test values not higher than climatogram limits for this class.

NOTE 6: (Condensation).
IEC 60068-2-30 [6] 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 [5] 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.

NOTE 9: (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 10: (Radiation, heat).
The higher test temperature as described in note 2 includes the heating effect.

NOTE 11: (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 12: (Mechanically active substances).
The characteristic severities are much lower than lowest test severity in IEC 60068-2-68 [i.3] Test Lb and therefore no test is recommended. This condition should be considered when designing the equipment and when choosing components and materials.

4.8 Specification T 7.2: partly temperature-controlled locations - climatic test

This specification applies to use at and direct transfer between, enclosed locations having neither temperature nor humidity control but where heating may be used to avoid low temperatures. Building construction avoids extremely high temperatures. See tables 2, 5 and 6.

Table 2: Test specification T 7.2: Partly temperature-controlled locations - climatic tests

Environmental parameter			Environmental Class 7.2	Environmental test specification T7.2: Portable, Partly temperature - controlled locations					
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Performance criterion**	**Notes**
Air temperature	Low	(°C)	-5	-5	16 h	IEC 60068-2-1 [2]	Ab/Ad: Cold	A	1
	High	(°C)	+45	+45 or +55	16 h	IEC 60068-2-2 [3]	Bb/Bd: Dry heat	A	2
	Change	(°C) (°C/min)	-5/+25	-5/+25	3 cycles t1 = 3 h	IEC 60068-2-14 [4]	Na: Change of temperature	A	3
Humidity	Relative	low (%)	5	none					4
		high (%) (°C)	95	93 +30	96 h	IEC 60068-2-78 [5]	Cab: Damp heat steady state	A	5
		condensation (°C) (%)	yes	90-100 +30	2 cycles	IEC 60068-2-30 [6]	Db: Damp heat Cyclic, variant 2	A	6
	Absolute	low (g/m^3)	1	none					4
		high (g/m^3)	29	none					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		dripping water	none					14
	Icing & frosting		yes	none					4
Radiation	Solar	(W/m^2)	700						9
	Heat	(W/m^2)	600						10
Chemically active substances	Sulphur	SO_2 (mg/m^3)	0,3/1,0	none					11
		H_2S (mg/m^3)	0,1/0,5	none					11
	Chlorine	salt mist	sea and road salt	none					11
		Cl (mg/m^3)	0,1/0,3	none					11
		HCl (mg/m^3)	0,1/0,5	none					11
	Nitrogen	NO_x (mg/m^3)	0,5/1,0	none					11
		NH_3 (mg/m^3)	1,0/3,0	none					11

Environmental parameter			Environmental Class 7.2	Environmental test specification T7.2: Portable, Partly temperature - controlled locations					
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Performance criterion**	**Notes**
	Hydrogen fluoride HF	(mg/m^3)	0,01/0,03	none					11
	Ozone O_3	(mg/m^3)	0,05/0,1	none					11
Mechanically active substances	Dust	sedimentation ($mg/(m^2h)$)	20	none					12
		suspension (mg/m^3)	5	none					12
	Sand	(mg/m^3)	300	none					12
Flora and fauna	Micro organisms		moulds, fungus, etc.	none					13
	Rodents, insects		rodents, etc.	none					13
no: This condition does not occur in this class. none: See corresponding note for detail on why test severity is not required.									

Environmental parameter			Environmental Class 7.2	Environmental test specification T7.2: Portable, Partly temperature - controlled locations					
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Performance criterion**	**Notes**

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 tolerancing. IEC test Na is recommended with severities equal to characteristic severities. Whenever possible, the equipment function shall be monitored throughout the test.

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 [5] Test Cab shall be used with test values not higher than climatogram limits for this class.

NOTE 6: (Condensation).
IEC 60068-2-30 [6] 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 [5] 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.

NOTE 9: (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 10: (Radiation, heat).
The higher test temperature as described in note 2 includes the heating effect.

NOTE 11: (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 12: (Mechanically active substances).
The characteristic severities are much lower than lowest test severity in IEC 60068-2-68 [i.3] Test L and therefore no test is recommended. This condition should be considered when designing the equipment and when choosing components and materials.

NOTE 13: (Flora, fauna).
The characteristic severity should be considered when choosing components and materials.

NOTE 14: (Water, other sources).).
No test is recommended because the effect is already included in IEC 60068-2-30 [6] test Db or IEC 60068-2-18 [7] Test Rb.

4.9 Specification T 7.3: partly weatherprotected and non-weatherprotected - climatic test

This specification applies to use at totally or partly weatherprotected locations of such construction that extremely low temperatures are avoided and to use at non-weatherprotected locations and to transfer between these locations. During cold seasons non-weatherprotected use and transfer is limited. See tables 3, 5 and 6.

Table 3: Test specification T 7.3: Partly weatherprotected and non-weatherprotected locations - climatic tests

Environmental parameter			Environmental Class 7.3	Environmental test specification T7.3 Portable, Partly weatherprotected and non-weatherprotected locations					
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Performance criterion**	**Notes**
Air temperature	low	(°C)	-25	-25	16 h	IEC 60068-2-1 [2]	Ab/Ad: Cold	A	1
	high	(°C)	+70	+70 or +85	16 h	IEC 60068-2-2 [3]	Bb/Bd: Dry heat	A	2
	change	(°C)	-25/+30	-25/+30	3 cycles t_1 = 3 h	IEC 60068-2-14 [4]	Na: Change of temperature	A	3
Humidity	relative	low (%)	5	none					4
		high (%) (°C)	100	93 +40	96 h	IEC 60068-2-78 [5]	Cab: Damp heat steady state	A	5
		condensation (%) (°C)	yes	90-100 +40	2 cycles	IEC 60068-2-30 [6]	Db: Damp heat Cyclic, variant 2	A	6
	absolute	low (g/m^3)	0,5	none					4
		high (g/m^3)	48	none					7
Air	pressure	low (kPa)	70	none					8
		high (kPa)	106	none					8
	speed	(m/s)	30	none					4
Water	rain	intensity (mm/min) volume (m^3/min) pressure (kPa)	6	 0,01 90	 1 min/m^2 or 5 min	IEC 60068-2-18 [7]	Rb: Impacting water method 1.2	A	15
		low temperature (°C)	+5	none					15
	other sources		dripping water	none					14
	icing & frosting		yes	none					4
Radiation	solar	(W/m^2)	1 120	none					9
	heat	(W/m^2)	600	none					10
	sulphur	SO_2 (mg/m^3)	0,3/1,0	none					11
		H_2S (mg/m^3)	0,1/0,5	none					11
Chemically active substances		salts	Sea and road salt mist	none					11
	chlorine	Cl_2 (mg/m^3)	0,1/0,3	none					11
		HCl (mg/m^3)	0,1/0,5	none					11
	nitrogen	NO_x (mg/m^3)	0,5/1,0	none					11
		NH_3 (mg/m^3)	1,0/3,0	none					11
	hydrogen fluoride	HF (mg/m^3)	0,01/0,03	none					11
	ozone	O_3 (mg/m^3)	0,05/0,1	none					11

Environmental parameter			Environmental Class 7.3	Environmental test specification T7.3 Portable, Partly weatherprotected and non-weatherprotected locations					
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Performance criterion**	**Notes**
Mechanically active substances	dust	sedimentation (mg/(m^2 h))	20	none					12
		suspension (mg/m^3)	5,0	none					12
	sand	(mg/m^3)	300	none					12
Flora and Fauna	micro organisms		moulds, fungus, etc.	none					13
	rodents, insects		rodents, etc.	None					13
no: This condition does not occur in this class. none: See corresponding note for detail on why test severity is not required.									

Environmental parameter			Environmental Class 7.3	Environmental test specification T7.3 Portable, Partly weatherprotected and non-weatherprotected locations					
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Performance criterion**	**Notes**

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 tolerancing. IEC test Na is recommended with severities equal to characteristic severities. Whenever possible, the equipment function shall be monitored throughout the test.

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 [5] Test Cab shall be used with test values not higher than climatogram limits for this class.

NOTE 6: (Condensation).
IEC 60068-2-30 [6] test Db is recommended with test severities 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 [5] 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.

NOTE 9: (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 10: (Radiation, heat).
The higher test temperature as described in note 2 includes the heating effect.

NOTE 11: (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 12: (Mechanically active substances).
The characteristic severities are much lower than lowest test severity in IEC 60068-2-68 [i.3] Test Lb and therefore no test is recommended. This condition should be considered when designing the equipment and when choosing components and materials.

NOTE 13: (Flora, fauna).
The characteristic severity should be considered when choosing components and materials.

NOTE 14: (Water, other sources).
No test is recommended because the effect is already included in IEC 60068-2-30 [6] test Db or IEC 60068-2-18 [7] Test Rb.

NOTE 15: (Water, rain).
IEC 60068-2-18 [7] test Rb method 1.2 has been chosen even though it does not imitate normal rain. It is a simple hand held shower test, which is easy to perform and can demonstrate that the specimen design is adequately toleranced to survive this condition. The greater of the two given durations should be used. The cooling effect of the low temperature of the rain is included in test Na.

4.10 Specification T 7.3E: partly weatherprotected and non-weatherprotected locations - extended - climatic test

This specification applies to use at totally or partly weatherprotected locations of any construction (except at Extremely Cold and Cold Climates where extremely low temperatures shall be avoided) and to use at non-weatherprotected locations and to transfer between these locations. During extremely cold seasons non-weatherprotected use and transfer is limited. See tables 4, 5 and 6.

Table 4: Test specification T 7.3E: Partly weatherprotected and non-weatherprotected locations - extended - climatic tests

Environmental parameter				Environmental Class 7.3E	Environmental test specification T7.3E Portable, Partly weatherprotected and non-weatherprotected locations - extended					
Type	**Parameter**	**Detail parameter**		**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Performance criterion**	**Notes**
Air temperature	low		(°C)	-40	-40	16 h	IEC 60068-2-1 [2]	Ab/Ad: Cold	A	1
	high		(°C)	+70	+70 or +85	16 h	IEC 60068-2-2 [3]	Bb/Bd: Dry heat	A	2
	change		(°C)	-40/+30	-40/+30	3 cycles t_1 = 3 h	IEC 60068-2-14 [4]	Na: Change of temperature	A	3
Humidity	relative	low	(%)	5	none					4
		high	(%) (°C)	100	93 +40	21 days	IEC 60068-2-78 [5]	Cab: Damp heat steady state	A	5
		condensation	(%) (°C)	yes	90-100 +40	6 cycles	IEC 60068-2-30 [6]	Db: Damp heat Cyclic, variant 2	A	6
	absolute	low	(g/m^3)	0,1	none					4
		high	(g/m^3)	62	none					7
Air	pressure	low	(kPa)	70	none					8
		high	(kPa)	106	none					8
	speed		(m/s)	30	none					4
Water	rain	intensity volume pressure	(mm/min) (m^3/min) (kPa)	6	0,01 90	1 min/m^2 or 5 min	IEC 60068-2-18 [7]	Rb: Impacting water method 1.2	A	15
		low temperature	(°C)	+5	none					15
	other sources			Dripping water	none					14
	icing & frosting			yes	none					4
Radiation	solar		(W/m^2)	1 120	none					9
	heat		(W/m^2)	600	none					10

Environmental parameter			Environmental Class 7.3E	Environmental test specification T7.3E Portable, Partly weatherprotected and non-weatherprotected locations - extended					
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Performance criterion**	**Notes**
	sulphur	SO_2 (mg/m^3)	0,3/1,0	none					11
		H_2S (mg/m^3)	0,1/0,5	none					11
Chemically active substances		salts	Sea and road salt mist	none					11
	chlorine	Cl_2 (mg/m^3)	0,1/0,3	none					11
		HCl (mg/m^3)	0,1/0,5	none					11
	nitrogen	NO_x (mg/m^3)	0,5/1,0	none					11
		NH_3 (mg/m^3)	1,0/3,0	none					11
	hydrogen fluoride	HF (mg/m^3)	0,01/0,03	none					11
	ozone	O_3 (mg/m^3)	0,05/0,1	none					11
Mechanically active substances	dust	Sedimentation ($mg/(m^2\,h)$)	20	none					12
		Suspension (mg/m^3)	5,0	none					12
	sand	(mg/m^3)	300	none					12
Flora and fauna	micro organisms		moulds, fungus, etc.	none					13
	rodents, insects		rodents, etc.	None					13
no: This condition does not occur in this class. none: See corresponding note for detail on why test severity is not required.									

Environmental parameter			Environmental Class 7.3E	Environmental test specification T7.3E Portable, Partly weatherprotected and non-weatherprotected locations - extended					
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Performance criterion**	**Notes**

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 tolerancing. IEC test Na is recommended with severities equal to characteristic severities. Whenever possible, the equipment function shall be monitored throughout the test.

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 [5] Test Cab shall be used with test values not higher than climatogram limits for this class.

NOTE 6: (Condensation).
IEC 60068-2-30 [6] test Db is recommended with test severities 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 [5] 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.

NOTE 9: (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 10: (Radiation, heat).
The higher test temperature as described in note 2 includes the heating effect.

NOTE 11: (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 12: (Mechanically active substances).
The characteristic severities are much lower than lowest test severity in IEC 60068-2-68 [i.3] Test Lb and therefore no test is recommended. This condition should be considered when designing the equipment and when choosing components and materials.

NOTE 13: (Flora, fauna).
The characteristic severity should be considered when choosing components and materials.

NOTE 14: (Water, other sources).
No test is recommended because the effect is already included in IEC 60068-2-30 [6] test Db or IEC 60068-2-18 [7] Test Rb.

NOTE 15: (Water, rain).
IEC 60068-2-18 [7] test Rb method 1.2 has been chosen even though it does not imitate normal rain. It is a simple hand held shower test, which is easy to perform and can demonstrate that the specimen design is adequately toleranced to survive this condition. The greater of the two given durations should be used. The cooling effect of the low temperature of the rain is included in test Na.

4.11 Specification T 7.1 to T 7.3E - mechanical tests

Table 5: Test specification T 7.1 to T 7.3E: Mechanical tests (Class 7M2 of IEC 60721-3-7 [i.4])

Environmental parameter			Environmental Class 7.1 to 7.3E	Environmental test specification T 7.1 to 7.3E: Portable					
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Performance criterion**	**Notes**
Vibration	sinusoidal	displacement (mm) acceleration (m/s^2) frequency range (Hz)	7,5 20 2-8 8-200 200-500	none					1
	Random	ASD (m^2/s^3) (dB/oct) Frequency range (Hz) Axes of vibration	3,0 1,0 10-200 200-2 000	2 -3 10-12 12-150 3	3 x 30 minutes	IEC 60068-2-64 [8]	Fdb: random Vibration, wide-band	A	2
Shocks	shocks	shock spectrum pulse shape acceleration (m/s^2) duration (ms) number of shocks/direction number of shock directions	Type I Type II 100 300 11 6	 half sine 300 6 6	 3	IEC 60068-2-27 [9]	Ea: Shock	A	3
Fall	free fall	height (m) mass (kg) number of falls/direction number of fall directions	0,25 0,1 0,05 ≤ 1 ≤ 10 ≤ 50	0,25 0,1 0,05 ≤ 1 ≤ 10 ≤ 50 6	 2	IEC 60068-2-31 [10]	Ec: Free fall procedure 1	A	
	drop and topple	height (m) number of drops/direction number of drop directions (bottom edges and corners)	no	0,1 4 edges+4 corners	 1	IEC 60068-2-31 [10]	Ec: Drop and topple	A	4
Acceleration, steady state Load, static load			no						

no: This condition does not occur in this class.
none: See corresponding note for detail on why test severity is not required.

NOTE 1: (Vibration, sinusoidal). Random vibration is considered to be a more realistic test for this condition, therefore no sinusoidal test is recommended. The severities are given as peak values.
NOTE 2: ASD = Acceleration Spectral Density
NOTE 3: (Shocks, shocks). IEC test Ea half sine test method has been chosen and a non-IEC recommended test severity has been defined in order to avoid exceeding the characteristic severity. The duration of shock pulses has been changed to 6 ms to facilitate the use of standard testing equipment. Three pulses in all six directions are considered sufficient to demonstrate that the specimen design is adequately toleranced to survive this condition. If the normal attitude is specified, then the number of directions is reduced to 3.
The severities are given as peak values.
NOTE 4: (Fall, drop and topple) - IEC 60068-2-31 [10] test Ec: Drop and topple test is recommended in addition to the free fall test as the exact attitude of falling equipment under test can not be specified.

Table 6: Test specifications T 7.1 to T 7.3E: Mechanical tests (Class 7M3 of IEC 60721-3-7 [i.4])

Environmental parameter			Environmental Class 7.1 to 7.3E	Environmental test specification T 7.1 to 7.3E: Portable					
Type	**Parameter**	**Detail parameter**	**Characteristic severity**	**Test severity**	**Duration**	**Reference**	**Method**	**Performance criterion**	**Notes**
Vibration	sinusoidal	displacement (mm) acceleration (m/s^2) frequency range (Hz)	7,5 20 2-8 8-200 200-500	none					1
	Random	ASD (m^2/s^3) (dB/oct) Frequency range (Hz) Axes of vibration	No	0,04 +12 -12 5-10 10-50 50-100 3	3 x 30 minutes	IEC 60068-2-64 [8]	Fdb: random Vibration, broad-wideband	A	2
Shocks	shocks	shock spectrum pulse shape duration (ms) acceleration (m/s^2) number of shocks/direction number of shock directions	Type I Type II 11 6 300 1 000	 half sine 6 1 000 6	 3	IEC 60068-2-27 [9]	Ea: Shock	A	3
Fall	free fall	height (m) mass (kg) number of falls/direction number of directions	1,0 0,5 0,25 ≤ 1 ≤ 10 ≤ 50	1,0 0,5 0,25 ≤ 1 ≤ 10 ≤ 50 6	 2	IEC 60068-2-31 [10]	Ec: Free fall procedure 1	A	
	drop and topple	height (m) number of drops/direction number of drop directions (bottom edges and corners)	no	0,1 4 edges + 4 corners	1	IEC 60068-2-31 [10]	Ec: Drop and topple	A	4
Acceleration, steady state Load, static load			no						

no: This condition does not occur in this class.
none: See corresponding note for details on why test severity is not required.

NOTE 1: (Vibration, sinusoidal). Random vibration is considered to be a more realistic test for this condition, therefore no sinusoidal test is recommended. The severities are given as peak values.

NOTE 2: ASD = Acceleration Spectral Density

NOTE 3: (Shocks, shocks). IEC test Ea half sine test method has been chosen and a non-IEC recommended test severity has been defined in order to avoid exceeding the characteristic severity. The duration of shock pulses has been changed to 6 ms to facilitate the use of standard testing equipment. Three pulses in all six directions are considered sufficient to demonstrate that the specimen design is adequately toleranced to survive this condition. If the normal attitude is specified, then the number of directions is reduced to 3.
The severities are given as peak values.

NOTE 4: (Fall, drop and topple) - IEC 60068-2-31 [10] test Ec: Drop and topple test is recommended in addition to the free fall test as the exact attitude of falling equipment under test can not be specified.

Annex A (informative): Bibliography

- IEC 60068-1: "Environmental testing. Part 1: General and guidance".
- ETSI TR 100 035: "Equipment Engineering (EE); Environmental engineering Guidance and terminology".

Annex B (informative): Change history

Date	Version	Information about changes
October 2023	3.0.13	EN revised at EE1#64 in order to align it with the latest ETSI drafting rules, update the reference standards, improve the definition of performance criteria, clarify the applicability of tests.

History

Document history		
Edition 1	May 1994	Publication as ETSI ETS 300 019-2-7
V2.1.2	September 2001	Publication
V3.0.0	December 2002	Publication
V3.0.1	April 2003	Publication
V3.0.17	June 2024	EN Approval Procedure AP 20240912: 2024-06-14 to 2024-09-12