SLOVENSKI STANDARD
SIST EN 61643-11:2012

01-december-2012

Nadomešča:
SIST EN 61643-11:2002
SIST EN 61643-11:2002/A11:2008

Nizkonapetostne naprave za zaščito pred prenapetostnimi udari - 11. del: Naprave za zaščito pred prenapetostnimi udari za nizkonapetostne napajalne sisteme - Zahteve in preskusi (IEC 61643-11:2011, spremenjen)

Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods

Überspannungsschutzgeräte für Niederspannung - Teil 11: Überspannungsschutzgeräte für den Einsatz in Niederspannungsanlagen - Anforderungen und Prüfungen

Parafoudres basse-tension - Partie 11: Parafoudres connectés aux systèmes basse tension - Exigences et méthodes d'essai

Ta slovenski standard je istoveten z: **EN 61643-11:2012**

ICS:

29.240.10	Transformatorske postaje. Prenapetostni odvodniki	Substations. Surge arresters

SIST EN 61643-11:2012 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61643-11

October 2012

ICS 29.240; 29.240.10

Supersedes EN 61643-11:2002 + A11:2007

English version

Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods

(IEC 61643-11:2011, modified)

Parafoudres basse tension - Partie 11: Parafoudres connectés aux systèmes basse tension - Exigences et méthodes d'essai (CEI 61643-11:2011, modifiée)

Überspannungsschutzgeräte für Niederspannung - Teil 11: Überspannungsschutzgeräte für den Einsatz in Niederspannungsanlagen - Anforderungen und Prüfungen (IEC 61643-11:2011, modifiziert)

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 61643-11:2012 E

Foreword

This document (EN 61643-11:2012) consists of the text of IEC 61643-11:2011 prepared by IEC/SC 37A "Low-voltage surge protective devices", together with the common modifications prepared by CLC/TC 37A "Low voltage surge protective devices".

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2013-08-27
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2015-08-27

This document supersedes EN 61643-11:2002 + A11:2007.

The main changes with respect of EN 61643-11:2002 + A11:2007 are the complete restructuring and improvement of the test procedures and test sequences.

Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 61643-11:2011 are prefixed “Z”.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This standard covers the Principle Elements of the Safety Objectives for Electrical Equipment Designed for Use within Certain Voltage Limits (LVD - 2006/95/EC)

Endorsement notice

The text of the International Standard IEC 61643-11:2011 was approved by CENELEC as a European Standard with agreed common modifications.

COMMON MODIFICATIONS

Scope *Modify the Scope as follows:*

This part of EN 61643 is applicable to devices for surge protection against indirect and direct effects of lightning or other transient overvoltages. These devices are called Surge Protective Devices (SPD). These devices are designed to be connected to 50 Hz a.c. power circuits, and equipment rated up to 1 000 V r.m.s. Performance characteristics, safety requirements, standard methods for testing and ratings are established. These devices contain at least one nonlinear component and are intended to limit surge voltages and divert surge currents.

3.1.14 *Modify the note as follows:*

- the measured limiting voltage, determined for front-of-wave sparkover (if applicable) and the measured limiting voltage, determined from the residual voltage measurements up to I_n and/or I_{imp} respectively for test classes II and/or I
- the measured limiting voltage determined for the combination wave measurements up to U_{oc} for test class III.

3.1.28 *Modify the definition as follows:*

SPD disconnector (disconnector)
device for disconnecting an SPD, or part of an SPD, from the power system in the event of SPD failure

NOTE This disconnecting device is not required to have isolating capability for safety purposes. It is to prevent a persistent fault on the system and is used to give an indication of an SPD's failure. Disconnectors can be either internal (built in) or external (required by the manufacturer) or both. There may be more than one disconnector function, for example an over-current protection function and a thermal protection function. These functions may be in separate units.

3.1.36 *Modify the heading definition as follows:*

sparkover voltage or trigger voltage of a voltage switching SPD

3.1.39 *Add a note to the definition:*

NOTE According to installation standard HD 60364-5-534, I_{fi} shall be equal to I_{sccr}.

4.1 *Modify the subclause as follows:*

Frequency range is from 47 Hz to 53 Hz a.c.

5.3 *Replace 5.3 by the following*:

Types 1, 2 and 3 SPDs- Class I, II and III tests

Information required for class I, II and class III tests is given in Table 2.

Table 2 – Tests of types 1, 2 and 3 SPDs

Type of SPD	Tests	Required information	Test procedures (see subclauses)
Type 1	Class I	I_{imp}	8.1.1; 8.1.2; 8.1.3
Type 2	Class II	I_n	8.1.2; 8.1.3
Type 3	Class III	U_{oc}	8.1.4; 8.1.4.1

5.7.1.3 *Modify the title as follows:*

Both (one part internal and one part external)

5.8 *Delete text:*

According to IP code of IEC 60529.

5.10.1 *Modify the subclause as follows:*

AC between 47 Hz and 53 Hz.

5.10.2 *Modify the subclause as follows:*

AC other than the range of 47 Hz to 53 Hz.

6 *Replace complete clause by*: void

Table 1 *Delete row k dealing with k (trip current factor)*

7.1.1 *Modify a4) as follows:*

The SPD type and discharge parameters for each mode of protection declared by the manufacturer and printed next to each other:

- for Type 1: “Type 1” and “I_{imp}“ and the value in kA, and/or “T1“ (T1 in a square) and “I_{imp}“ and the value in kA (e.g. T1 I_{imp}: 10 kA);
- for Type 2: “Type 2” and “I_n “ and the value in kA, and/or “T2“(T2 in a square) and “I_n “ and the value in kA (e.g. T2 I_n: 10 kA);
- for Type 3: “Type 3” and “U_{oc}“ and the value in kV, and/or “T3“(T3 in a square) and “U_{oc}“ and the value in kV (e.g. T3 U_{oc}: 5 kV);

7.1.1 *Modify last paragraph of a8) as follows:*

An SPD may be classified according to more than one test class (e.g. Type 1 T1 and Type2 T2). In this case, the tests required for all declared test classes shall be performed. If in such case the manufacturer declares only one protection level, only the highest protection level shall appear in the marking.

7.1.1 *Modify b10) to read*

b10) void

7.1.1 *Modify b14) to read*

b14) I_{max}, (if declared by the manufacturer).

7.1.1 *Modify c7) to read*

c7) void

7.2.2 *Add a 3rd paragraph:*

This test is not performed on SPDs for connection N-PE only.

7.2.4 *Add after the first paragraph:*

The SPD shall be ……..changes in its characteristics.

"In addition voltage switching type SPDs or combination type SPDs shall be able to interrupt any follow current up to the short-circuit current rating (I_{sccr})."

7.2.5.3 *Modify the 2nd paragraph to read:*

Compliance is checked by the test in accordance with 8.3.5.3 and 8.3.5.3.2.

7.2.5.3 *Remove the 3rd paragraph*

7.2.5.4 *Replace the 2nd paragraph by:*

A status indicator may be composed of two parts (one of which is not replaced when e.g. a plug module is changed), linked by a coupling mechanism which can be mechanical, optical, audio, electromagnetic, etc. The part of the status indicator which is not replaced (e.g. base part of socket) shall be capable of operating at least 50 times

7.4.5.1 *Replace reference to* IEC 61000 series *by reference to* EN 61000-6-1.

7.4.5.2 *Replace reference to* IEC 61000 series *by reference to* EN 61000-6-3.

7.6.1.2 *Add new requirement:*

7.6.1.2 Maximum discharge current I_{max}

If the manufacturer declares I_{max} this parameter shall be tested in accordance with the test in 8.3.3.1.

7.6.1.3 *Add new requirement:*

7.6.1.3 Vibration and shock

Information on vibration and shock tests for transportation and special applications can be found in Annex ZB.

8 *Modify the note as follows:*

NOTE For some tests, special prepared samples are required.

8.1 *Add the following Note after the 11th paragraph (second bullet):*

NOTE Tissue paper: thin, soft and rather strong paper, generally used to wrap breakable objects and whose weight stands between 12 g/m² and 25 g/m².

8.1 *Correct miss spelling at the end of 2nd line of the 10th paragraph:*

... is required for **t**he L-PE ... *(the t of the word the is missing)*

Table 3 *Add footnote* [d] *to the line "Operating duty test" in Table 3.*

Table 3 *Add footnote* [d] *to read as follows (bottom of Table 3):*

[d] For the whole operating duty test (including the additional duty test, if applicable) one separate set of samples may be used.

Table 3 *Replace the test description in test sequence 7 "For SPDs classified outdoor" to read:*

Environmental tests for outdoor SPDs

Table 3 *Replace in the line of test sequence 7* "O" *by* "-"

Delete "O = optional" *in Table 3 (bottom)*

Table 3 *Add after Thermal stability* "c"

Table 4, E criteria *Modify second paragraph as follows:*

The SPD shall be connected as for normal use according to the manufacturer's instructions to a power supply at the reference test voltage (U_{REF}). The current that flows through each terminal is measured. Its resistive component (momentary value of current measured at the crest of the voltage sine wave) shall not exceed a value of 1 mA, or the total current shall not have changed by more than 20 % compared to the initial value determined at the beginning of the relevant test sequence.

Table 4, E criteria *Modify fourth paragraph as follows:*

In addition, for SPD modes connected N-PE only the current through the PE-terminal shall be measured, whereas the terminals are connected to a power supply at the maximum continuous operating voltage (U_c). Its resistive component (momentary value of current measured at the crest of the voltage sine wave) shall not exceed a value of 1 mA, or the total current shall not have changed by more than 20 % compared to the initial value determined at the beginning of the relevant test sequence.

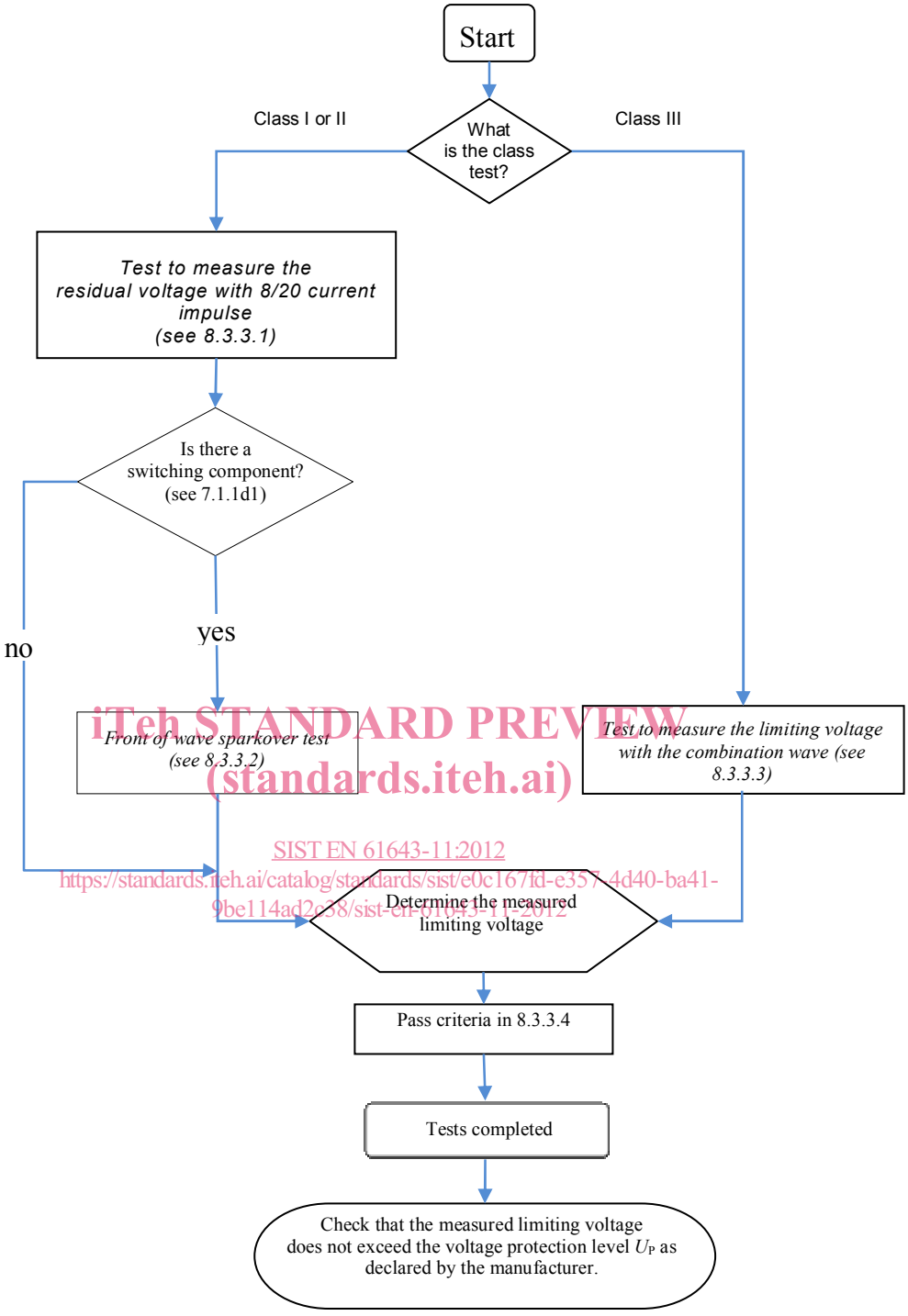
Table 5 *Delete line 8.3.5.3.1*

8.3.2 *Replace the 1st paragraph to read:*

All modes of protection of the SPD shall be connected as for normal use according to the manufacturer's instructions.

The line to PE voltage of the supply system shall be adjusted to the reference test voltage U_{REF}.

8.3.3 *Replace Figure 5 by:*



8.3.3.1 *Replace the whole clause by*

Residual voltage with 8/20 current impulses

a) When testing SPDs to class I, 8/20 current impulses with a sequence of crest values of approximately 0,1; 0,2; 0,5; 1,0 times the crest value of I_{imp} shall be applied.

When testing SPDs to class II, 8/20 current impulses with a sequence of crest values of approximately 0,1; 0,2; 0,5; 1,0 times I_n shall be applied.

If the SPD contains only voltage-limiting components, this test needs only to be performed at crest values of I_{imp} for test class I or I_n for test class II.

One sequence of positive polarity and one sequence of negative polarity are applied to the SPD.

b) When I_{max} is declared by the manufacturer an additional 8/20 current impulse with a crest value of I_{max} shall be applied at the polarity that showed higher residual voltages in the previous tests a).

c) The interval between individual impulses shall be long enough for the sample to cool down to ambient temperature.

d) A current and a voltage oscillogram shall be recorded for each impulse. If relevant, the (absolute) crest values shall be plotted into a discharge current versus residual voltage diagram to I_n or I_{imp}. A curve which best fits the data points shall be drawn. There shall be sufficient points on the curve to ensure that there are no significant deviations on the curve up to I_n or I_{imp}.

e) The residual voltage used for determining the measured limiting voltage is the highest voltage value corresponding to the range of currents for

- class I: up to I_{imp};
- class II: up to I_n.

NOTE The residual voltage is the highest crest value measured during surge current flow. Any high frequency disturbances and spikes before and during current flow caused by specific generator design, like crowbar generators, are disregarded.

f) The value for determining U_{max} is the highest residual voltage measured at surge currents up to I_n, I_{max} or I I_{imp}, as applicable depending on the SPD test class.

8.3.4.1 *Replace the 3rd and 4th paragraphs starting with "*The measured limiting…." and ending with "…negative surge applied." to read:

The measured limiting voltage shall be checked and shall be below or equal to U_P.

The measured limiting voltage shall be determined, using the tests described in 8.3.3, but the test of 8.3.3.1 is performed only with an 8/20-surge current with a crest value corresponding to I_{imp} for Test Class I or with I_n for Test Class II and the test of 8.3.3.3 is performed only at U_{oc} for Test class III.

8.3.4.2.2 *Replace the whole paragraph by:*

The test sample shall be connected to a power frequency voltage at U_c with a prospective short-circuit current equal to the short circuit current rating I_{sccr} declared by the manufacturer and with a power factor in accordance with Table 8, except for SPDs which are only connected between neutral and protective earth in TT- and/or TN-Systems, for which the prospective short-circuit current shall be at least 100 A.

8.3.5.2 *Add a note to the thermal stability test at the end of sample preparation:*

NOTE Separate prepared sets of samples may be needed for this test.

8.3.5.3 Test Procedure *Modify the text of 2nd paragraph of Test procedure in a) to read:*

The test is carried out twice with U_{REF} applied once at (45 ± 5) electrical degrees and once at (90 ± 5) electrical degrees after the zero crossing of the voltage

8.3.5.3.1 and Table 5 *Remove the entire part. And the relevant line in Table 5.*

8.3.5.3.2 *Add the sentence after the 2 bullets:*

For all types of SPDs with U_c up to 180 V, the conditioning voltage may be reduced to 600 V" if for voltage switching type SPDs and for combination type SPDs, any voltage switching components operate at this voltage.

8.3.5.3.2 Test Procedure *Replace the full last paragraph of Test procedure by:*

If all measurements of the tests on the first set of samples (100 A test set up):

- either show a disconnection within 5 s during the application of the conditioning voltage

or

- the current through the sample during the application of U_{REF} after conditioning does not exceed a value of 1 mA,

or

- the current through the sample during the application of U_{REF} after conditioning does not exceed the initial value determined at U_{REF} before the test by more than 20 %

no further test is performed.

8.3.5.3.2 Pass Criteria *Modify in the pass criteria the 2nd bullet of the exception as follows:*

SPDs where the current is interrupted or no significant current flows during the application of U_{REF}.

8.3.5.3.2 Pass criteria *Add the note after the text "where no disconnection occurs"*

NOTE Significant current means that the current through the sample during the application of U_{REF} after conditioning does not exceed a value of 1 mA or does not exceed the initial value determined at U_{REF} before the test by more than 20 %.

8.4.2.1.1 Table 11 *Remove column "American Wire Gauge"*

8.4.3 Pass criteria *Modify pass criteria to read:*

The air clearances and creepage distances shall not be smaller than the values indicated in Table 15 and Table 16, whereby Table 16 shall be applied to items 1), 2) and 3) according to Table 15.

8.4.3 Table 15 *Move footnote [a] from first column U_{max} to second column ≤ 2 000V*

8.6.1.1 Table 19 *Remove column AWG/MCM*

8.6.1.1 *Modify the pass criteria text to read:*

The pass criteria **C**, **F** and **G** according to Table 4 and the following additional pass criteria shall apply.

8.6.1.2 *Replace* "If a maximum overcurrent protection is specified by the manufacturer, the SPD shall be loaded for 1 h with a current equal to k times that maximum overcurrent protection. The factor k shall be selected from Table 20."

by

"If an external maximum overcurrent protection is specified by the manufacturer, the SPD shall be loaded for 1 h with a current equal to 1,6 times the rated current of that maximum overcurrent protection."

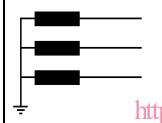
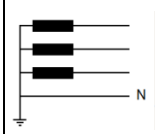
8.6.1.2 Table 20

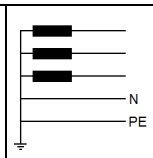
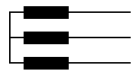
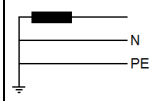
Delete Table 20 but *keep* the numbering (add void)

Annex A, Table A.1

Replace Table A.1 by

Table A.1 — Reference test voltage values

Power distribution system		Nominal AC system Voltage[V] L-PE(N) / L-L	Expected voltage regulation of the power distribution system max+(%)	Reference test voltage U_{REF} [V] (depending on the mode of protection)			
				L–N (PEN)	L-PE	L-L	N-PE
Three phase TT-system without PE and Neutral distribution	3 conductor 	U_{L-PE}/U_{L-L}	Tol	---	(1+Tol/100)• U_{L-PE}	(1+Tol/100)• U_{L-L}	---
	e.g.	230 / 400	10	---	255	440	---
Three phase TT-system with Neutral distribution	4 conductor 	U_{L-PE}/U_{L-L}	Tol	(1+Tol/100)• U_{L-PE}	(1+Tol/100)• U_{L-PE}	(1+Tol/100)• U_{L-L}	(1+Tol/100)• U_{L-PE}
	e.g.	230 / 400	10	255	255	440	255
Three phase TN-C-system with PEN-distribution	4 conductor 	U_{L-PE}/U_{L-L}	Tol	(1+Tol/100)• U_{L-PE}	(1+Tol/100)• U_{L-PE}	(1+Tol/100)• U_{L-L}	---
	e.g.	230 / 400	10	255	255	440	---
Three phase TN-S-system with PE and Neutral distribution	5 conductor	U_{L-PE}/U_{L-L}	Tol	(1+Tol/100)• U_{L-PE}	(1+Tol/100)• U_{L-PE}	(1+Tol/100)• U_{L-L}	(1+Tol/100)• U_{L-PE}

Power distribution system		Nominal AC system Voltage[V] L-PE(N) / L-L	Expected voltage regulation of the power distribution system max+(%)	Reference test voltage U_{REF} [V] (depending on the mode of protection)			
				L–N (PEN)	L-PE	L-L	N-PE
							
	e.g.	230 / 400	10	255	255	440	255
Three phase IT-system with Neutral distribution	4 conductor 	U_{L-N}/U_{L-L}	Tol	(1+Tol/100)• U_{L-N}	(1+Tol/100)• U_{L-L}	(1+Tol/100)• U_{L-L}	(1+Tol/100)• U_{L-N}
	e.g.	230 / 400	10	255	440	440	255
Three phase IT-system without Neutral distribution	3 conductor 	---/U_{L-L}	Tol	---	(1+Tol/100)• U_{L-L}	(1+Tol/100)• U_{L-L}	---
	e.g.	---/230	10	---	255	255	---
Single-phase TN-S-system	3 conductor 	U_{L-PE}/---	Tol	(1+Tol/100)• U_{L-PE}	(1+Tol/100)• U_{L-PE}	---	(1+Tol/100)• U_{L-PE}
	e.g.	230/---	10	255	255	---	255
NOTE: If higher voltage regulation is required for certain applications (for example + 15 %), subject to a special agreement between the manufacturer and the user.							

Annex B *Remove Table B.2 and Table B.3 and text related to B.2 and B.3.*

Annex B, B.1 *Modify as follows:*

For specific applications with conditions different from the ones given in Table B.1, the TOV test values U_T and the testing duration may be defined by agreement between the manufacturer and the user, depending on actual network configurations and conditions. The values of U_T and the corresponding duration(s) shall be declared on the SPDs data sheet according to 7.1.1 c1).

Annex D Table D.1 *Add in sequence 1 after thermal stability* : [c]

Annex D Table D.1

Replace the test description in test sequence 7 "For SPDs classified outdoor" to read:

Environmental tests for outdoor SPDs

Annex ZA

Add Annex ZA (See annexes)

Annex ZB

Add Annex ZB (See annexes)

Bibliography

Add the following references:

EN 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal) (IEC 60068-2-6)*

EN 60068-2-27, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock IEC 60068-2-27)*

EN 60068-2-64, *Environmental testing – Part 2-64: Tests – Test Fh: Vibration, broadband random and guidance (IEC 60068-2-64)*

EN 60721-3-3, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 3: Stationary use at weather protected locations (IEC 60721-3-3)*

EN 61373, *Railway applications – Rolling stock equipment – Shock and vibration tests (IEC 61373)*

HD 60364-5-534, *Low-voltage electrical installations – Part 5-53: Selection and erection of electrical equipment – Isolation, switching and control – Clause 534: Devices for protection against overvoltages (IEC 60364-5-53:2001/A1 (CLAUSE 534))*

Add the following annexes:

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60060-1 + corr. March + corr. March	1989 1990 1992	High-voltage test techniques - Part 1: General definitions and test requirements	HD 588.1 S1[1)]	1991
IEC 60112	-	Method for the determination of the proof and the comparative tracking indices of solid insulating materials	EN 60112	-
IEC 60529	-	Degrees of protection provided by enclosures (IP Code)	EN 60529	-
IEC 60664-1	2007	Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests	EN 60664-1	2007
IEC 60695-2-11 + corr. January	2000 2001	Fire hazard testing - Part 2-11: Glowing/hot-wire based test methods - Glow-wire flammability test method for end-products	EN 60695-2-11	2001
IEC 61000	series	Electromagnetic compatibility (EMC)	EN 61000	series
IEC 61180-1	-	High-voltage test techniques for low-voltage equipment - Part 1: Definitions, test and procedure requirements	EN 61180-1	-

1) HD 588.1 S1 is superseded by EN 60060-1:2010, which is based on IEC 60060-1:2010.