

© Copyright SEK. Reproduction in any form without permission is prohibited.

Överspänningsskydd för lågspänning – Del 311: Prestanda och provningsmetoder för gasurladdningsrör (GDT)

Components for low-voltage surge protective devices –

Part 311: Performance requirements and test circuits for gas discharge tubes (GDT)

Som svensk standard gäller europastandarden EN 61643-311:2013. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61643-311:2013.

Nationellt förord

Europastandarden EN 61643-311:2013

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 61643-311, Second edition, 2013 - Components for low-voltage surge protective devices - Part 311: Performance requirements and test circuits for gas discharge tubes (GDT)**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61643-311, utgåva 1, 2002, gäller ej fr o m 2016-05-16.

Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a säkerhet, prestanda, dokumentation, utförande och skötsel av elprodukter, elanläggningar och metoder. Genom att utforma sådana standarder blir säkerhetskraven tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringsarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

SEK Svensk Elstandard

Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

**Components for low-voltage surge protective devices -
Part 311: Performance requirements and test circuits for gas discharge
tubes (GDT)
(IEC 61643-311:2013)**

Composants pour parafoudres basse
tension -
Partie 311: Exigences de performance et
circuits d'essai pour tubes à décharge de
gaz (TDG)
(CEI 61643-311:2013)

Bauelemente für
Überspannungsschutzgeräte für
Niederspannung -
Teil 311: Leistungsanforderungen sowie
Prüfschaltungen und -verfahren für
Gasentladungsableiter (ÜsAG)
(IEC 61643-311:2013)

This European Standard was approved by CENELEC on 2013-05-16. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 37B/113/FDIS, future edition 2 of IEC 61643-311, prepared by SC 37B, "Specific components for surge arresters and surge protective devices", of IEC TC 37, "Surge arresters" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61643-311:2013.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2014-02-16
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2016-05-16

This document partially supersedes EN 61643-311:2001.

EN 61643-311:2013 includes the following significant technical changes with respect to EN 61643-311:2001:

- addition of performance values.

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.

Endorsement notice

The text of the International Standard IEC 61643-311:2013 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60364-5-51:2005	NOTE	Harmonised as HD 60364-5-51:2009 (modified).
IEC 61180-1:1992	NOTE	Harmonised as EN 61180-1:1994 (not modified).
IEC 61643-312	NOTE	Harmonised as EN 61643-312.
IEC 61643-11:2011	NOTE	Harmonised as EN 61643-11:2012 (modified).
IEC 61643-21:2000 + A1:2008	NOTE	Harmonised as EN 61643-21:2001 (not modified) + A1:2009 (modified)

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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60068-2-1	2007	Environmental testing - Part 2-1: Tests - Test A: Cold	EN 60068-2-1	2007
IEC 60068-2-20	2008	Environmental testing - Part 2-20: Tests - Test T: Test methods for solderability and resistance to soldering heat of devices with leads	EN 60068-2-20	2008
IEC 60068-2-21 + corr. January	2006 2012	Environmental testing - Part 2-21: Tests - Test U: Robustness of terminations and integral mounting devices	EN 60068-2-21	2006
IEC 61000-4-5 + corr. October	2005 2009	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	EN 61000-4-5	2006
ITU-T Recommendation K.20	2011	Resistibility of telecommunication equipment - installed in a telecommunications centre to overvoltages and overcurrents	-	-

CONTENTS

1	Scope.....	6
2	Normative references	6
3	Terms, definitions and symbols	7
3.1	Terms and definitions	7
3.2	Symbols	10
4	Service conditions	10
4.1	Low temperature	10
4.2	Air pressure and altitude	10
4.3	Ambient temperature	10
4.4	Relative humidity.....	11
5	Mechanical requirements and materials.....	11
5.1	Robustness of terminations	11
5.2	Solderability	11
5.3	Radiation.....	11
5.4	Marking	11
6	General	11
6.1	Failure rates	11
6.2	Standard atmospheric conditions.....	11
7	Electrical requirements	12
7.1	General	12
7.2	Initial values	12
7.2.1	Sparkover voltages	12
7.2.2	Insulation resistance	13
7.2.3	Capacitance	13
7.2.4	Transverse voltage	13
7.2.5	DC holdover	13
7.3	Requirements after application of load.....	13
7.3.1	General	13
7.3.2	Sparkover voltages	14
7.3.3	Insulation resistance	14
7.3.4	AC follow current	14
7.3.5	Fail-short (Failsafe)	15
8	Test and measurement procedures and circuits	15
8.1	DC sparkover voltage	15
8.2	Impulse sparkover voltage	16
8.3	Insulation resistance	16
8.4	Capacitance	16
8.5	Glow-to-arc transition current, glow voltage, arc voltage.....	16
8.6	Transverse voltage.....	18
8.7	DC holdover voltage	19
8.7.1	General	19
8.7.2	DC holdover voltage values	21
8.8	Requirements for current-carrying capacity	22
8.8.1	General	22

8.8.2	Nominal alternating discharge current.....	22
8.8.3	Nominal impulse discharge current, waveshape 8/20	23
8.8.4	Life test with impulse currents, waveshape 10/1 000	24
8.8.5	AC follow current	24
8.9	Fail-short (failsafe)	25
	Bibliography.....	27
	Figure 1 – Voltage and current characteristics of a GDT	8
	Figure 2 – Symbol for a two-electrode GDT	10
	Figure 3 – Symbol for a three-electrode GDT	10
	Figure 4 – Circuit for d.c. sparkover voltage test at 100 V/s	15
	Figure 5 – Circuit for impulse sparkover voltage at 1 000 V/ μ s	16
	Figure 6 – Test circuit for glow-to-arc transition current, glow voltage and arc voltage	17
	Figure 7 – Voltage-current characteristic of a typical GDT, suitable for measuring for example the glow-to-arc transition current, glow voltage, and arc voltage	18
	Figure 8 – Test circuit for transverse voltage	19
	Figure 9 – Test circuit for dc holdover voltage, two-electrode GDTs	20
	Figure 10 – Test circuit for dc holdover voltage, three-electrode GDTs	20
	Figure 11 – Circuit for nominal alternating discharge current, two-electrode GDTs	23
	Figure 12 – Circuit for nominal alternating discharge current, three-electrode GDTs	23
	Figure 13 – Circuit for nominal impulse discharge current, two-electrode GDTs	23
	Figure 14 – Circuit for nominal impulse discharge current, three-electrode GDTs	23
	Figure 15 – Circuit for life test with impulse current, two-electrode GDTs	24
	Figure 16 – Circuit for life test with impulse current, three-electrode GDTs	24
	Figure 17 – Test circuit for alternating follow current	25
	Figure 18 – Test circuit for fail-short (failsafe), two-electrode GDTs	26
	Figure 19 – Test circuit for fail-short (failsafe), three-electrode GDTs	26
	Table 1 – DC and impulse sparkover voltage requirements, initial	12
	Table 2 – Values of sparkover voltages after the tests of Table 5	14
	Table 3 – Values for different d.c. holdover voltage tests for two-electrode GDTs	21
	Table 4 – Values for different d.c. holdover voltage tests for three-electrode GDTs	21
	Table 5 – Different classes of current-carrying capacity	22

COMPONENTS FOR LOW-VOLTAGE SURGE PROTECTIVE DEVICES –

Part 311: Performance requirements and test circuits for gas discharge tubes (GDT)

1 Scope

This part of IEC 61643 is applicable to gas discharge tubes (GDT) used for overvoltage protection in telecommunications, signalling and low-voltage power distribution networks with nominal system voltages up to 1 000 V (r.m.s.) a.c. and 1 500 V d.c.. They are defined as a gap, or several gaps with two or three metal electrodes hermetically sealed so that gas mixture and pressure are under control. They are designed to protect apparatus or personnel, or both, from high transient voltages. This standard contains a series of test criteria, test methods and test circuits for determining the electrical characteristics of GDTs having two or three electrodes. This standard does not specify requirements applicable to complete surge protective devices, nor does it specify total requirements for GDTs employed within electronic devices, where precise coordination between GDT performance and surge protective device withstand capability is highly critical.

This part of IEC 61643

- does not deal with mountings and their effect on GDT characteristics. Characteristics given apply solely to GDTs mounted in the ways described for the tests;
- does not deal with mechanical dimensions;
- does not deal with quality assurance requirements;
- may not be sufficient for GDTs used on high-frequency (>30 MHz);
- does not deal with electrostatic voltages;
- does not deal with hybrid overvoltage protection components or composite GDT devices.

2 Normative references

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.

IEC 60068-2-1:2007, *Environmental testing – Part 2: Tests. Tests A: Cold*

IEC 60068-2-20:2008, *Environmental testing – Part 2: Tests. Test T: Test methods for solderability and resistance to soldering heat of devices with leads*

IEC 60068-2-21:2006, *Environmental testing – Part 2-21: Tests – Test U: Robustness of terminations and integral mounting devices*

IEC 61000-4-5:2005, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 5: Surge immunity test*

ITU-T Recommendation K.20:2011, *Resistibility of telecommunication equipment installed in a telecommunications centre to overvoltages and overcurrents*