
Električne inštalacije zgradb – 5-53. del: Izbira in namestitvev električne opreme – Ločevanje, stikanje in krmiljenje – 534. točka: Naprave za prenapetostno zaščito

Electrical installations of buildings – Part 5-53: Selection and erection of electrical equipment – Isolation, switching and control – Clause 534: Devices for protection against overvoltages

Electrical installations of buildings
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/A1:2002, modified)

Installations électriques des bâtiments
Partie 5-53: Choix et mise en oeuvre des
matériels électriques -
Sectionnement, coupure et commande
Article 534: Dispositifs pour la protection
contre les surtensions
(CEI 60364-5-53:2001/A1:2002, modifiée)

Elektrische Anlagen von Gebäuden
Teil 5-53: Auswahl und Errichtung
elektrischer Betriebsmittel -
Trennen, Schalten und Steuern -
Abschnitt 534: Überspannung-
Schutzeinrichtungen (ÜSE)
(IEC 60364-5-53:2001/A1:2002,
modifiziert)

This draft Harmonization Document is submitted to CENELEC members for CENELEC enquiry.
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The text of this draft consists of the text of IEC 60364-5-53:2001/A1:2002 with common modifications prepared by SC 64A of Technical Committee CENELEC TC 64.

If this draft becomes a Harmonization Document, CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document on a national level.

This draft Harmonization Document was established by CENELEC in three official versions (English, French, German).

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CENELEC

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Foreword

The text of International Standard IEC 60364-5-53:2001/A1:2002 prepared by IEC TC 64, Electrical installations and protection against electric shock, together with the common modifications prepared by CENELEC SC 64A, Protection against electric shock, of Technical Committee CENELEC TC 64, Electrical installations of buildings, is submitted to the CENELEC enquiry.

In this document, the common modifications are indicated by a vertical line at the left margin of the text.

Draft for Enquiry

Text of prHD 60364-5-534

530.2 Normative references

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

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

IEC 60364-4-41	2001	Electrical installations of buildings Part 4-41: Protection for safety - Protection against electric shock	-	-
IEC 60364-4-44	2001	Part 4-44: Protection for safety - Protection against voltage disturbances and electromagnetic disturbances	-	-
IEC 60364-6-61	2001	Part 6-61: Verification - Initial verification	-	-
IEC 60664-1	1992	Insulation coordination for equipment within low-voltage systems Part 1: Principles, requirements and tests	EN 60664-1 1)	2003
IEC 61312-1	1995	Protection against lightning electromagnetic impulse Part 1: General principles	-	-
IEC/TS 61312-2	1999	Part 2: Shielding of structures, bonding inside structures and earthing	-	-
IEC/TS 61312-3	2000	Part 3: Requirements of surge protective devices (SPDs)	-	-
IEC 61643-1 (mod) + corr. November A1	1998 1998 2001	Low-voltage surge protective devices Part 11: Surge protective devices connected to low-voltage power systems - Requirements and tests	EN 61643-11 - + A11	2002 - 2005
IEC 61643-12	2002	Part 12: Surge protective devices connected to low-voltage power distribution systems - Selection and application principles	-	-

1) EN 60664-1:2003 includes A1:2000 + A2:2002 to IEC 60664-1:1992.

534 Devices for protection against overvoltages

534.1 General

This clause contains provisions for the application of voltage limitation to obtain an insulation coordination in the cases described in IEC 60364-4-44, IEC 60664-1, IEC/TS 61312-2 and IEC 61643-12.

SPDs, specific isolating transformers, filters or a combination of these may be used for protection against overvoltages.

This clause gives the requirements for the selection and erection of

- surge protective devices (SPDs) for electrical installations of buildings to obtain a limitation of transient overvoltages of atmospheric origin transmitted via the supply distribution system and against switching overvoltages;
- SPDs for the protection against transient overvoltages caused by direct lightning strokes or lightning strokes in the vicinity of buildings, protected by a lightning protection system.

This clause does not take into account surge protective components which may be incorporated in the appliances connected to the installation. The presence of such components may modify the behaviour of the main surge protective device of the installation and may need an additional coordination.

This clause applies to a.c. power circuits.

For d.c. power circuits, the requirements in this clause may be applied as far as is useful.

For special applications, other or additional requirements may be necessary in the relevant Part 7 of IEC 60364.

534.2 Selection and erection of SPDs in building installations

534.2.1 Use of SPDs

IEC 60364-4-44, Clause 443, includes protection against overvoltages of atmospheric origin (caused by indirect, distant lightning strokes) and switching overvoltages. This protection is normally provided by the installation of type 2 SPDs and if necessary type 3 SPDs.

When required in accordance with IEC 60364-4-44 or otherwise specified, SPDs shall be installed near the origin of the installation or in the main distribution assembly, closest to the origin of the installation inside the building.

IEC 61312-1 includes protection against the effects of direct lightning strokes or strokes near to the supply system. IEC/TS 61312-3 describes the correct selection and application of SPDs according to the Lightning Protection Zones (LPZ) concept. The LPZ concept describes the installation of type 1, type 2 and type 3 SPDs.

When required in accordance with IEC 61312-1 or otherwise specified, SPDs shall be installed at the origin of the installation.

Additional SPDs may be necessary to protect sensitive equipment. Such SPDs shall be coordinated with the SPDs installed upstream (see 534.2.3.6).

In the case where SPDs are part of the fixed electrical installation, but not mounted inside a distribution board (e.g. in a socket outlet), their presence shall be indicated by a label on or as near as is reasonably possible to the origin of the circuit under consideration.

Special precautions should be taken in case of BE2 locations.

534.2.2 Connection of SPDs

Surge protective devices shall be connected at least between the following points (see Annexes A, B and C):

- PE at or near the installation point of the SPDs or if there is no neutral conductor:
- a) In TN- and TT-systems if there is a direct connection between the neutral conductor and the PE at or near the installation point of the SPDs, then either
 - between each line conductor and either the main earthing terminal or the main protective conductor, whichever is the shortest route – connection type A;
 - b) In TN- and TT- and IT-systems where there is no direct connection between the neutral conductor and the PE at or near the installation point of the SPDs, then either
 - between each line conductor and either the main earthing terminal or the main protective conductor, and between the neutral conductor and either the main earthing terminal or the protective conductor, whichever is the shortest route – connection type B;
 - or
 - between each line conductor and the neutral conductor and between the neutral conductor and either the main earthing terminal or the protective conductor, whichever route is shorter – connection type C .

NOTE 1 The impedance connecting the neutral to the PE in IT systems is not considered as a connection

NOTE 2 If a line conductor is earthed, it is considered to be equivalent to a neutral conductor for the application of this subclause.

SPDs at or near the origin of the installation are, in general, installed as shown in Annexes A to C and according to Table 53B:

Table 53B – Installation of surge protective devices dependent on connection type

SPDs connected between	Connection type A	Connection type B	Connection type C
Each line conductor and neutral conductor	NA	NA	•
Each line conductor and PE(N) conductor	•	•	NA
Neutral conductor and PE conductor	NA	•	•
Line conductors	+	+	+
• mandatory NA not applicable + optional, in addition			

In addition the connection type and the system (TN-, TT- and/or IT-system) as well as the correct connection between conductors (L-N, L-PE, N-PE, and/or L-L) shall comply with the manufacturers installation instructions.

534.2.3 Selection of surge protective devices (SPDs)

The SPDs shall comply with EN 61643-11 and EN 61643-11/A11. Additional information regarding selection and application is given in IEC 61643-12.

534.2.3.1 Selection with regard to protection level (U_p)

If Clause 443 of IEC 60364-4-44 requires SPDs, the protection level U_p of SPDs shall be selected in accordance with impulse withstand voltage category II of Table 44B in IEC 60364-4-44.

If IEC 61312-1 requires SPDs for the protection against overvoltages caused by direct lightning strokes, the protection level of these SPDs shall also be selected in accordance with impulse withstand voltage category II of Table 44B in IEC 60364-4-44.

For example in 230/400 V installations, the protection level U_p shall not exceed 2,5 kV.

When connection type C according to 534.2.2 is used, the above requirements also apply to the total protection level between line conductors and PE.

When the required protection level cannot be reached with a single set of SPDs, additional, coordinated SPDs shall be applied to ensure the required protection level.

534.2.3.2 Selection with regard to continuous operating voltage (U_c)

The maximum continuous operating voltage U_c of SPDs shall be equal to or higher than shown in the following Table 53C.

Table 53C – Minimum required U_c of the SPD dependent on system configuration

SPD connected between	System configuration of distribution network		
	TN- or TT-system	IT with distributed neutral	IT without distributed neutral
Line conductor and neutral conductor	$1,1 U_o$	$1,1 U_o$	NA
Line conductor and PE conductor	$1,1 U_o$	$\sqrt{3} U_o^a$	U^a
Neutral conductor and PE conductor	U_o^a	U_o^a	NA
Line conductor and PEN conductor	$1,1 U_o$	NA	NA
Line conductors	$1,1 U$	$1,1 U$	$1,1 U$
NA: not applicable			
NOTE 1 U_o is the line-to-neutral voltage of the low-voltage system.			
NOTE 2 U is the line-to-line voltage of the low-voltage system.			
NOTE 3 This table is based on EN 61643-11.			
^a These values are related to worst case fault conditions, therefore the tolerance of 10 % is not taken into account.			

534.2.3.3 Selection with regard to temporary overvoltages (TOVs)

SPDs shall comply with EN 61643-11 and EN 61643-11/A11.

NOTE 1 SPDs developed in accordance with the above standard and installed according to the manufacturers installation instructions are designed to behave in an acceptable manner when subject to the TOV stresses expected.

NOTE 2 The loss of neutral is not covered by these requirements. Though there is currently no specific test in EN 61643-11, SPDs are expected to fail safely.

534.2.3.4 Selection with regard to discharge current (I_n) and impulse current (I_{imp})

If IEC 60364-4-44 Clause 443 requires SPDs, the nominal discharge current I_n shall not be less than 5 kA 8/20 for each mode of protection.

NOTE An SPDs protective components may be connected line-to-line or line-to-earth or line-to neutral or neutral-to-earth and combinations thereof. These paths are referred to as modes of protection (EN 61643-11).

In case of installation according to 534.2.2 connection type C, the nominal discharge current I_n for the surge protective device connected between the neutral conductor and the PE shall not be less than 20 kA 8/20 for three-phase systems and 10 kA 8/20 for single-phase systems.

If IEC 61312-1 requires SPDs, the lightning impulse current I_{imp} according to EN 61643-11 shall be calculated according to IEC 61312-1. Further information is given in IEC 61643-12. If the current value cannot be established, the value of I_{imp} shall not be less than 12,5 kA for each mode of protection.

In case of an installation according to 534.2.2 connection type C, the lightning impulse current I_{imp} for the surge protective device connected between the neutral conductor and the PE shall be calculated similarly to the above mentioned standards. If the current value cannot be established the value of I_{imp} shall not be less than 50 kA for three-phase systems and 25 kA for single-phase systems.

When a single SPD is used for protection according to both IEC 61312-1 and Clause 443 of IEC 60364-4-44, the rating of I_n and of I_{imp} shall be in agreement with the above values.

534.2.3.5 Selection with regard to the expected short-circuit current

The short-circuit withstand of the SPDs (in case of SPD failure) together with the specified associated (internal or external) overcurrent protective device shall be equal to or higher than the maximum short-circuit current expected at the point of installation taking into account the maximum overcurrent protective devices specified by the SPD manufacturer.

In addition, when a follow current interrupting rating is declared by the manufacturer, it shall be equal to or higher than the expected line to neutral short-circuit current at the point of installation.

SPDs connected between the neutral conductor and the PE in TT- or TN-systems, which allow a power frequency follow-up current after operation (e.g. spark gaps) shall have a follow current interrupting rating greater or equal to 100 A.

In IT systems, the follow current interrupting rating for SPDs connected between the neutral conductor and the PE shall be equal or higher than 1 500 A.