



SLOVENSKI STANDARD
SIST HD 60364-5-534:2008
01-november-2008

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

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Errichten von Niederspannungsanlagen - Teil 5-53: Auswahl und Errichtung elektrischer
Betriebsmittel - Trennen, Schalten und Steuern - Abschnitt 534: Überspannung-
Schutzeinrichtungen (ÜSE)

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Installations électriques à basse tension - Partie 5-53: Choix et mise en oeuvre des
matériels électriques - Sectionnement, coupure et commande - Article 534: Dispositifs
pour la protection contre les surtensions

Ta slovenski standard je istoveten z: HD 60364-5-534:2008

ICS:

- 29.120.99 Öi` * æ^|\ dā } æā [åæ) æ Other electrical accessories
[] !^ { æ
- 91.140.50 Sistemi za oskrbo z elektriko Electricity supply systems

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HARMONIZATION DOCUMENT
DOCUMENT D'HARMONISATION
HARMONISIERUNGSDOKUMENT

HD 60364-5-534

August 2008

ICS 29.020; 91.140.50

English version

**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/A1:2002 (Clause 534), modified)**

Installations électriques à basse tension -
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
(Article 534), modifiée)

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

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This Harmonization Document was approved by CENELEC on 2008-05-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document at national level.

Up-to-date lists and bibliographical references concerning such national implementations may be obtained on application to the Central Secretariat or to any CENELEC member.

This Harmonization Document exists in three official versions (English, French, German).

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

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the International Standard IEC 60364-5-53:2001/A1:2002, Clause 534, prepared by IEC TC 64, Electrical installations and protection against electric shock, together with the common modifications prepared by SC 64A, Electrical installations and protection against electric shock – Protection against electric shock, of Technical Committee CENELEC TC 64, Electrical installations and protection against electric shock, was submitted to the formal vote and was approved by CENELEC as HD 60364-5-534 on 2008-05-01.

The following dates were fixed:

- latest date by which the existence of the HD has to be announced at national level (doa) 2008-11-01
- latest date by which the HD has to be implemented at national level by publication of a harmonized national standard or by endorsement (dop) 2009-05-01
- latest date by which the national standards conflicting with the HD have to be withdrawn (dow) 2011-05-01

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

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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 (mod)	-	Low voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock	HD 60364-4-41	-
IEC 60364-4-44	-	Electrical installations of buildings - Part 4-44: Protection for safety - Protection against voltage disturbances and electromagnetic disturbances	HD 60364-4-443	- ¹⁾
IEC 60364-6 (mod)	-	Low voltage electrical installations - Part 6: Verification	HD 60364-6	-
IEC 60664-1	-	Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests	EN 60664-1	-
IEC 62305-4	-	Protection against lightning - Part 4: Electrical and electronic systems within structures	EN 62305-4	-
IEC 61643-11 (mod)	-	Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and tests	EN 61643-11	-
IEC 61643-12 (mod)	-	Low-voltage surge protective devices - Part 12: Surge protective devices connected to low-voltage power distribution systems - Selection and application principles	CLC/TS 61643-12	-

¹⁾ HD 60364-4-443:2006 is based on IEC 60364-4-44:2001/A1:2003 (modified), Clause 443: Protection against overvoltages of atmospheric origin or due to switching.

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 HD 60364-4-443, EN 60664-1, EN 62305-4 and CLC/TS 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 also covers protection against overcurrent and consequences in case of SPD failure.

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 as specified in the relevant Part 7 of HD 60364.

534.2 Selection and erection of SPDs in building installations

534.2.1 Use of SPDs

HD 60364-4-443 deals with 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 HD 60364-4-443 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.

EN 62305-4 and CLC/TS 61643-12 deal with the protection against the effects of direct lightning strokes or strokes near to the supply system. Both documents describe the selection and the 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 (see Annex D).

When required in accordance with EN 62305-4 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) and they should be installed as close as practicable to the equipment to be protected.

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 in the relevant distribution board, indicating precisely their location as near as is reasonably possible to the origin of the circuit under consideration.

Special precautions should be taken in locations where the external influence BE2 exists. Appropriate information shall be provided by the SPD manufacturer.

An example how to install SPDs is shown in Annex D.

NOTE Where SPDs are required on the power system consideration should be given regarding the installation of SPDs on other incoming networks (such as telecommunication and signalling services).

534.2.2 Connection of SPDs

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

- a) in installations where there is a direct connection between the neutral conductor and the PE at or near the installation point of the SPDs or if there is no neutral conductor 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 installations 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

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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.

NOTE 3 For all connection types connection of the relevant SPD(s) to the main earthing terminal and to the main protective conductor may improve the protection level.

Where required according to 534.2.1, SPDs at or near the origin of the installation shall be connected according to Table 53B (typical examples are shown in Annexes A to C)

Additional SPDs at other locations should preferably be installed according to Table 53B, but other modes of protection may be used.

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

SPDs connected between	Connection Type A (Examples: see Annex A, Figure A.1 and Annex C, Figure C.1)	Connection Type B (Example: see Annex B, Figure B.1)	Connection Type C (Example: see Annex B, Figure B.2)
Each line conductor and neutral conductor	Not applicable	Not applicable	Required
Each line conductor and PEN conductor	Required	Not applicable	Not applicable
Each line conductor and PE conductor	Not applicable	Required	Not applicable
Neutral conductor and PE conductor	Not applicable	Required	Required
Line conductors	Optional	Optional	Optional

534.2.3 Selection of surge protective devices (SPDs)

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

NOTE Additional information regarding selection and application is given in CLC/TS 61643-12.

534.2.3.1 Selection with regard to protection level (U_p)

If HD 60364-4-443 requires SPDs, the protection level U_p of SPDs shall be selected in accordance with impulse withstand voltage category II of Table 1 in HD 60364-4-443.

If EN 62305-4 requires SPDs for the protection against overvoltages caused by direct lightning strokes, the protection level U_p of these SPDs shall also be selected in accordance with impulse withstand voltage category II of Table 1 in HD 60364-4-443.

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 protection level required shall be met by the serial combination of the two SPDs between line and neutral and between neutral and PE.

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

NOTE Additional SPDs selected in accordance with impulse withstand voltage category I of Table 1 in HD 60364-4-443 may be necessary to protect sensitive equipment.

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 system	TT system	IT with distributed neutral	IT without distributed neutral
Line conductor and neutral conductor	1,1 U_0	1,1 U_0	1,1 U_0	NA
Line conductor and PE conductor	1,1 U_0	1,1 U_0	U	1,1 $\times U$
Neutral conductor and PE conductor	U_0^a	U_0^a	U_0^a	NA
Line conductor and PEN conductor	1,1 U_0	NA	NA	NA
Line conductors	1,1 U	1,1 U	1,1 U	1,1 U

NA: not applicable.

NOTE 1 U_0 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 developed in accordance with EN 61643-11 and EN 61643-11/A11 and installed according to the manufacturers installation instructions are designed to behave in an acceptable manner when subject to the TOV stresses expected.

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

NOTE Any SPDs protective component 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 EN 62305-4 requires SPDs, the lightning impulse current I_{imp} according to EN 61643-11 shall be calculated according to EN 62305-4. Further information is given in CLC/TS 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 EN 62305-4 and HD 60364-4-443, 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 and the follow current interrupting rating

The short-circuit withstand of the combination SPD and overcurrent protective device (OCPD), as stated by the SPD manufacturer shall be equal to or higher than the maximum short-circuit current expected at the point of installation.

NOTE The OCPD may be either internal or external to the SPD (see EN 61643-11).

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 the same as for SPDs connected between phase and neutral.

534.2.3.6 Co-ordination of SPDs

According to EN 62305-4 and CLC/TS 61643-12 considerations shall be taken regarding the necessary co-ordination of SPDs in the installation. The SPD manufacturers shall provide sufficient information in their documentation about the way to achieve coordination between SPDs.

534.2.4 Protection against overcurrent and consequences of an SPD failure

Protection against SPD's short-circuits is provided by OCPD 2 (see figures in Annexes A to D) which are to be selected according to the recommended ratings for the overcurrent protective device given in the manufacturer's SPD instructions.

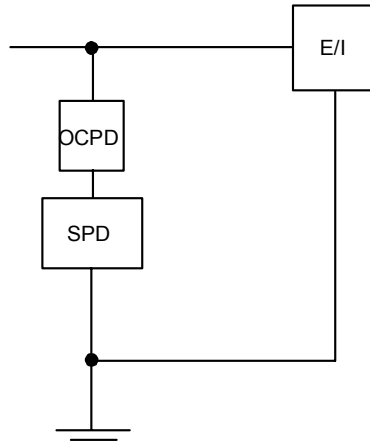
OCPD 2 can be omitted if the characteristics of OCPD 1 (which are part of the installation, see figures in Annexes A to D) permit the association of the SPD according to the manufacturer's instructions.

The cross-sectional area of conductors connecting the overcurrent protective devices to the line conductors shall be rated according to the maximum possible short-circuit current (OCPD 1, OCPD 2 and OCPD 3 are shown in Annexes A to D).

Depending on the location of protective devices used to disconnect the SPD in case of SPD failure, priority may be given either to the continuity of supply or to the continuity of protection.

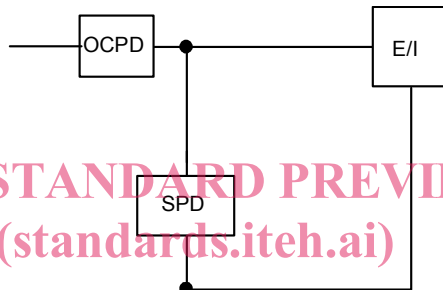
In all cases, the discrimination between protective devices shall be ensured.

- If protective devices are installed in the surge protective device circuit, the continuity of the supply is ensured, but neither the installation nor the equipment is protected against possible further overvoltages (see Figure 53A). These protective devices may be internal disconnectors.
- If protective devices are inserted in the installation upstream of the circuit where SPDs are installed, the failure of the surge protective device may cause interruption of supply: the circuit interruption will last until the surge protective device is replaced (see Figure 53B).



OCPD Overcurrent protective device required by the manufacturer of the SPD
 SPD Surge protective device
 E/I Equipment or installation to be protected against overvoltages

Figure 53A - Priority to the continuity of supply



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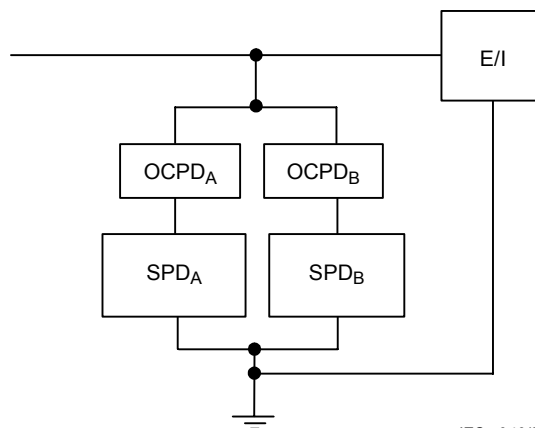
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OCPD Overcurrent protective device required by the manufacturer of the SPD
 SPD Surge protective device
 E/I Equipment or installation to be protected against overvoltages

Figure 53B - Priority to the continuity of protection

In order to increase the reliability and the probability of having at the same time continuity of supply and continuity of protection, it is permitted to use the scheme described in Figure 53C.



OCPD Overcurrent protective device required by the manufacturer of the SPD
 SPD Surge protective device
 E/I Equipment or installation to be protected against overvoltages

IEC 946/02

Figure 53C - Combination of continuity of supply and continuity of protection