

**SLOVENSKI**  
**STANDARD**

**SIST IEC 60364-5-  
53:2006/A1:2006**

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**Električne inštalacije zgradb – 5-53. del: Izbira in namestitvev električne opreme – Ločevanje, stikanje in krmiljenje – Dopolnilo A1**

Electrical installations of buildings - Part 5-53: Selection and erection of electrical equipment - Isolation, switching and control - Amendment A1

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ICS 29.130.01; 91.140.50

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NORME  
INTERNATIONALE  
INTERNATIONAL  
STANDARD

CEI  
IEC

60364-5-53

2001

AMENDEMENT 1  
AMENDMENT 1  
2002-04

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Amendement 1

**Installations électriques des bâtiments –**

**Partie 5-53:**

**Choix et mise en oeuvre des matériels  
électriques – Sectionnement, coupure  
et commande**

[SIST IEC 60364-5-53:2006/A1:2006](https://standards.iteh.ai/catalog/standards/sist/1b611936-8167-46a4-bde7-46c5a21501e9/sist-iec-60364-5-53-2006-a1-2006)

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Amendment 1

**Electrical installations of buildings –**

**Part 5-53:**

**Selection and erection of electrical  
equipment – Isolation, switching and control**

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## FOREWORD

This amendment has been prepared by IEC technical committee 64: Electrical installations and protection against electric shock.

The text of this amendment is based on the following documents:

FDIS	Report on voting
64/1226/FDIS	64/1243/RVD

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until 2003. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

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### 530.2 Normative references

Add the following references to the existing list:  
[SIST IEC 60364-5-53:2006/A1:2006](https://standards.iteh.ai/catalog/standards/sist/1b611936-8167-46a4-bde7-46e5a2150f9/sist-iec-60364-5-53-2006-a1-2006)  
<https://standards.iteh.ai/catalog/standards/sist/1b611936-8167-46a4-bde7-46e5a2150f9/sist-iec-60364-5-53-2006-a1-2006>

IEC/TS 61312-2:1999, *Protection against lightning electromagnetic impulse (LEMP) – Part 2: Shielding of structures, bonding inside structures and earthing*

IEC/TS 61312-3:2000, *Protection against lightning electromagnetic impulse – Part 3: Requirements of surge protective devices (SPDs)*

IEC 61643-1, amendment 1 (2001)

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*Replace the existing clause 534 by the following new clause 534.*

## **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 61312-2 and IEC 61643-12.

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 test class II SPDs and if necessary test class III 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 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 test class I, test class II and test class III 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.

### 534.2.2 Connection of SPDs

Surge protective devices at or near the origin of the installation shall be connected at least between the following points (see annexes A, B and C):

- a) if there is a direct connection between the neutral conductor and the PE at or near the origin of the installation 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;

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

- b) if there is no direct connection between the neutral conductor and the PE at or near the origin of the installation, 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 1;

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 2 .

NOTE 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 – Connection of surge protective devices dependent on system configuration**

SPDs connected between	System configuration at the installation point of SPD							
	TT		TN-C	TN-S		IT with distributed neutral		IT without distributed neutral
	Installation according to			Installation according to		Installation according to		
	Connection type 1	Connection type 2	Connection type 1	Connection type 2	Connection type 1	Connection type 2		
each line conductor and neutral conductor	+	•	NA	+	•	+	•	NA
each line conductor and PE conductor	•	NA	NA	•	NA	•	NA	•
neutral conductor and PE conductor	•	•	NA	•	•	•	•	NA
each line conductor and PEN conductor	NA	NA	•	NA	NA	NA	NA	NA
line conductors	+	+	+	+	+	+	+	+

• : mandatory  
 NA: not applicable  
 +: optional, in addition

### 534.2.3 Selection of surge protective devices (SPDs)

The SPDs shall comply with IEC 61643-1. 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 (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 2 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.

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

SPDs connected between	System configuration of distribution network				
	TT	TN-C	TN-S	IT with distributed neutral	IT without distributed neutral
line conductor and neutral conductor	1,1 $U_0$	NA	1,1 $U_0$	1,1 $U_0$	NA
each line conductor and PE conductor	1,1 $U_0$	NA	1,1 $U_0$	$\sqrt{3} U_0^a$	Line-to-line voltage <sup>a</sup>
neutral conductor and PE conductor	$U_0^a$	NA	$U_0^a$	$U_0^a$	NA
each line conductor and PEN conductor	NA	1,1 $U_0$	NA	NA	NA
NA: not applicable					
NOTE 1 $U_0$ is the line-to-neutral voltage of the low-voltage system.					
NOTE 2 This table is based on IEC 61643-1 amendment 1.					
<sup>a</sup> 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)

The SPDs selected according to 534.2.3 shall withstand the temporary overvoltages due to faults within low-voltage systems (see clause 442 of IEC 60364-4-44).

This is confirmed by the selection of SPDs which comply with the relevant test requirements of 7.7.6 of IEC 61643-1.

To fail safely in case of TOVs due to earth faults within the high-voltage system (see IEC 60364-4-44, clause 442), the SPDs connected to the PE shall pass the test of IEC 61643-1 subclause 7.7.4.

In addition, SPDs installed in location 4a according to figure B.2 shall withstand such TOVs as defined in test of IEC 61643-1 subclause 7.7.4.

NOTE 1 Appropriate pass criteria are under consideration to define the meaning of withstand.

NOTE 2 The loss of neutral is not covered by these requirements. Though there is currently no specific test in IEC 61643-1, 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.

In case of installation according to 534.2.2 connection type 2, 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 IEC 61643-1 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 2, 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 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 IEC 61312-3 and 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 the overcurrent protective devices F2 (see figures in the annexes A to D) which are to be selected according to the maximum recommended rating for the overcurrent protective device given in the manufacturer's SPD instructions.

If the overcurrent protective devices F1 (which are part of the installation, see figures in the annexes A to D) have a rating smaller than or equal to the maximum recommended rating for the overcurrent protective devices F2, then F2 can be omitted.

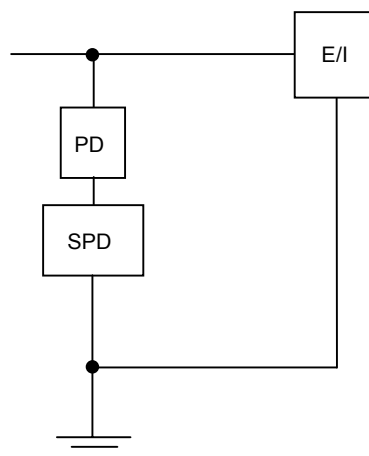
The cross-sectional area of conductors connecting the overcurrent protective devices to the line conductors shall be rated according to the maximum possible short-circuit current (F1, F2 and F3 are shown in annexes A to D).

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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).



PD: protective device 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**