



SLOVENSKI STANDARD SIST HD 60364-5-51:2009

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Electrical installations of buildings -- Part 5-51: Selection and erection of electrical equipment - Common rules

Errichten von Niederspannungsanlagen -- Teil 5-51: Auswahl und Errichtung elektrischer Betriebsmittel - Allgemeine Bestimmungen

Installations électriques des bâtiments -- Partie 5-51: Choix et mise en oeuvre des matériels électriques - Règles communes

Ta slovenski standard je istoveten z: HD 60364-5-51:2009

ICS:

91.140.50 Sistemi za oskrbo z elektriko Electricity supply systems

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HARMONIZATION DOCUMENT
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HD 60364-5-51

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Supersedes HD 60364-5-51:2006

English version

**Electrical installations of buildings -
Part 5-51: Selection and erection of electrical equipment -
Common rules**
(IEC 60364-5-51:2005, modified)

Installations électriques des bâtiments -
Partie 5-51: Choix et mise en oeuvre
CTdes matériels électriques -
Règles communes
(CEI 60364-5-51:2005, modifiée)

Errichten von Niederspannungsanlagen -
Teil 5-51: Auswahl und Errichtung
elektrischer Betriebsmittel -
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(IEC 60364-5-51:2005, modifiziert)

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This Harmonization Document was approved by CENELEC on 2009-04-01. 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. <https://standards.iteh.ai/catalog/standards/sist/64562451-9a45-46cc-ae9e-3a44a160375a/iec-60364-5-51-2009>

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: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of the International Standard IEC 60364-5-51:2005, prepared by IEC TC 64, Electrical installations and protection against electric shock, together with common modifications prepared by SC 64B, Protection against thermal effects, 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 60364-5-51 on 2009-04-01.

This Harmonization Document supersedes HD 60364-5-51:2006.

The main changes with respect to HD 60364-5-51:2006 are listed below:

- corrections of misprints in Table 51 based on Table 321 derived from the old Part 3;
- introduction of a new Clause 516 dealing with measures for mitigation of protective conductor currents.

In this document the common modifications to the International Standard are indicated by a vertical line in the left margin of the text.

The following dates were fixed:

- latest date by which the existence of the HD has to be announced at national level (doa) 2009-10-01
- latest date by which the HD has to be implemented at national level by publication of a harmonized national standard or by endorsement (dop) 2010-04-01
- latest date by which the national standards conflicting with the HD have to be withdrawn (dow) 2012-04-01

Annexes ZA, ZB, ZC, ZD and ZE have been added by CENELEC.

Clauses, subclauses, notes, tables and figures which are additional to those in IEC 60364-5-51:2005 are prefixed "Z".

510 Introduction

510.1 Scope

This part of HD 60364 deals with the selection of equipment and its erection. It provides common rules for compliance with measures of protection for safety, requirements for proper functioning for intended use of the installation, and requirements appropriate to the external influences foreseen.

510.2 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.

EN 60073, *Basic and safety principles for man-machine interface, marking and identification – Coding principles for indication devices and actuators* (IEC 60073)

HD 60364-4-41:2007, *Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock* (IEC 60364-4-41:2005, mod.)

HD 60364-4-443:2006, *Electrical installations of buildings – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances – Clause 443: Protection against overvoltages of atmospheric origin or due to switching* (IEC 60364-4-44:2001/A1:2003, mod.)

HD 384.5.52 S1:1995, *Electrical installations of buildings – Part 5: Selection and erection of electrical equipment – Chapter 52: Wiring systems* (IEC 60364-5-52:1993, mod.)

HD 60364-5-54:2007, *Low-voltage electrical installations – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements, protective conductors and protective bonding conductors* (IEC 60364-5-54:2002, mod.)

EN 60446, *Basic and safety principles for man-machine interface, marking and identification – Identification of conductors by colours or numerals* (IEC 60446)

EN 60447, *Basic and safety principles for man-machine interface, marking and identification – Actuating principles* (IEC 60447)

IEC 60617 database, *Graphical symbols for diagrams*.

EN 60695 series, *Fire hazard testing* (IEC 60695 series)

EN 61082 series, *Preparation of documents used in electrotechnology* (IEC 61082 series)

EN 61140:2002, *Protection against electric shock – Common aspects for installation and equipment* (IEC 61140:2001)

EN 61346-1, *Industrial systems, installations and equipment and industrial products – Structuring principles and reference designations – Part 1: Basic rules* (IEC 61346-1)

HD 308 S2, *Identification of cores in cables and flexible cords*

510.3 General

Every item of equipment shall be selected and erected so as to allow compliance with the rules stated in the following clauses of this part of HD 60364 and the relevant rules in other parts of the HD 384/60364 series.

511 Compliance with standards

511.1 General

Every item of equipment shall comply with the appropriate European Standards (EN) or Harmonization Documents (HD) or national standard implementing the HD. In absence of an appropriate EN or HD, the equipment shall comply with the appropriate national standard. In other cases, based on the decisions of the National Committee, reference may be made either to IEC standards which are not approved in CENELEC or to national standards of another country. Where there are no applicable standards the item of equipment concerned shall be selected by special agreement between the person specifying the installation and the installer.

511.2 Additional requirement on manufacturer's declaration

Where there are no applicable standards to the item of equipment concerned (e.g. new developed product), the manufacturer shall provide to the person specifying the installation or to the installer full documentation and necessary test reports according to the applicable legislation.

512 Operational conditions and external influences

512.1 Operational conditions

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512.1.1 Voltage

Equipment shall be suitable for the nominal voltage (r.m.s. value for a.c.) of the part of the installation concerned.

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If, in IT installations, the neutral conductor is distributed, equipment connected between line and neutral shall be insulated for the voltage between lines.

NOTE For certain equipment, it may be necessary to take account of the highest and/or lowest voltage likely to occur in normal service.

512.1.2 Current

Equipment shall be selected for the design current (r.m.s. value for a.c.) which it has to carry in normal service.

Equipment shall also be capable of carrying the currents likely to flow in abnormal conditions for such periods of time as are determined by the characteristics of the protective devices.

512.1.3 Frequency

If frequency has an influence on the characteristics of equipment, the rated frequency of the equipment shall correspond to the frequency of the current in the circuit concerned.

512.1.4 Power

Every item of equipment selected on the basis of its power characteristics shall be suitable for the normal operational conditions taking account of the coincidence factor.

NOTE The coincidence factor (IEV 691-10-03) is the ratio, expressed as a numerical value or as a percentage, of the simultaneous maximum demand of a group of electrical appliances or consumers within a specified period, to the sum of their individual maximum demands within the same period.

512.1.5 Compatibility

Unless other suitable precautions are taken during erection, all equipment shall be selected so that it will not cause harmful effects on other equipment nor impair the supply during normal service, including switching operations.

NOTE Information on the parameters to be considered is given in HD 60364-4-444.

512.1.Z1 Rated impulse withstand voltage

Equipment shall be selected so that its impulse withstand voltage is at least equal to the prospective overvoltage at the point of installation as defined in HD 60364-4-443.

512.2 External influences

See Annex A and Annex ZA.

513 Accessibility

All equipment, including wiring, shall be arranged so as to facilitate its operation, inspection and maintenance and access to its connections. Such facilities shall not be significantly impaired by mounting equipment in enclosures or compartments. Exceptions are given in HD 384.5.52:1995, 526.3.

514 Identification **iTeh STANDARD PREVIEW** (standards.iteh.ai)

514.1 General

Labels or other suitable means of identification shall be provided to indicate the purpose of switchgear and controlgear, unless there is no possibility of confusion.

Where the functioning of switchgear and controlgear cannot be observed by the operator and where this might cause a danger, a suitable indicator, complying where applicable with EN 60073 and EN 60447, shall be fixed in a position visible to the operator.

514.2 Wiring systems

Wiring shall be so arranged or marked that it can be identified for inspection, testing, repairs or alteration of the installation.

514.3 Identification of conductors

514.3.1 General

Unless otherwise stated in 514.3.1.Z1 to 514.3.Z3, the identification of conductors shall comply with EN 60446.

514.3.1.Z1 Neutral or mid-point conductor

Neutral or mid-point conductors shall be identified by the colour blue throughout their length.

NOTE For certain type of wiring, see 514.3.Z2 up to 514.3.Z5.

514.3.1.Z2 Protective conductor

Protective conductors shall be identified by the bi-colour combination green-and-yellow and this combination shall be used for no other purposes.

Insulated protective earthing conductors and insulated protective bonding conductors shall be marked as protective conductors.

NOTE For certain type of wiring, see 514.3.Z2, 514.3.Z3 and 514.3.Z5.

514.3.2 PEN, PEL and PEM conductors

PEN conductors shall, when insulated, be marked by one of the following methods:

- green-and-yellow throughout their length with, in addition, blue markings at the terminations; or
- blue throughout their length with, in addition, green-and-yellow markings at the terminations.

PEL and PEM conductors shall, when insulated, be marked green-and-yellow throughout their length with, in addition, blue markings at the termination.

NOTE The choice of method, or methods, for identifying PEN conductors is intended to be made by National Committees, see Annex ZB.

514.3.Z1 Other conductors

Other conductors shall be identified by colours or numerals taking into account the requirements of 514.3.Z2 to 514.3.Z5.

514.3.Z2 Identification of cores in multi-core cables and cords

The identification of insulated conductors in rigid and flexible cables and cords with 2 to 5 conductors shall comply with HD 308, see Annex ZC. The line conductors shall be identified, throughout their length, by the colours brown or black or grey, the neutral conductor by the colour blue and the protective conductor by the bi-colour combination green-and-yellow.

For cables and cords with 2 to 5 cores which are used for auxiliary or control circuits, each conductor shall be identified by colours or by inscription.

For cables and cords having more than 5 conductors, each conductor shall be identified by colours or by numerals according to EN 60446. Conductors identified by numerals and used as a protective conductor or neutral conductor shall be marked green-and-yellow or blue, respectively, at each termination. Conductors identified by numerals and used as PEN, PEL or PEM conductor shall be marked green-and-yellow and blue at each termination.

For cables and cords with 2 to 5 conductors which are used for auxiliary or control circuits, not having a blue conductor, it is allowed to use one of the conductors as neutral.

514.3.Z3 Identification of single-core cables and insulated conductors

Line conductors shall be identified throughout their length by the colours brown or black or grey. The use of one of these colours for all of the line conductors in a circuit is permitted.

The single colours green or yellow shall not be used.

Sheathed single-core cables and insulated conductors in compliance with their relevant standard which are not available with green-and-yellow or blue insulation, e.g. in case of large cross sectional areas, larger than 16 mm², may be used as:

- protective conductor if a green-and-yellow marking is provided at each termination;
- PEN, PEL and PEM conductors if a green-and-yellow marking and a blue marking is provided at each termination;
- neutral conductor if a blue marking is provided at each termination.

NOTE The marking should be permanent and not expected to be removed or damaged during installation.

514.3.Z4 Use of a blue conductor for certain applications

For certain applications, provided that confusion is not possible and there is no neutral conductor, a blue conductor may be used as a line conductor or for any other purpose, except as a protective conductor.

514.3.Z5 Omission of identification

Identification by colour or marking is not required

- for concentric conductors of cables,
- for metal sheath or armour, of cables, that is used as a protective conductor,
- for bare conductors in cases where a permanent identification is not possible due to the external influences, e.g. aggressive atmosphere and pollution,
- for metal structural parts of the structure or extraneous conductive parts used as protective conductors,
- for exposed conductive parts used as a protective conductor,
- for bare overhead wiring.

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Identification by colour is not required for the conductors of flat flexible cables without a sheath or cables having insulation materials which cannot be identified by colour, for example mineral insulated cables. For these cables the cores used as protective conductors or PEN, PEL and PEM or neutral conductors shall be provided with markings of the relevant colour (see 514.3.Z3, last paragraph) at their termination.

514.4 Protective devices

The protective devices shall be arranged and identified so that the circuits protected may be easily recognized; for this purpose, it may be convenient to group them in distribution boards.

514.5 Diagrams and documentation

514.5.1 Where appropriate, diagrams, charts or tables in accordance with EN 61346-1 and the EN 61082 series shall be provided, indicating in particular:

- the type and composition of circuits (points of utilization served, number and size of conductors, type of wiring);
- the characteristics necessary for the identification of the devices performing the functions of protection, isolation and switching and their locations.

For simple installations the foregoing information may be given in a schedule.

NOTE Diagrams and documents should include the following detailed information:

- type and cross sectional areas of conductors;
- length of circuits;
- nature and type of protective devices;
- rated current or adjustment of the protective devices;
- prospective short-circuit currents and breaking capacities of the protective devices.

This information should be provided for each circuit of the installation.

It is recommended that this information is updated after each modification to the installation. Drawings and documents should indicate the location of any concealed devices.

514.5.2 The symbols used shall be chosen from the IEC 60617 database.

515 Prevention of mutual detrimental influence

515.1 Equipment shall be so selected and erected as to avoid any harmful influence between the electrical installation and any non-electrical installations.

Equipment not provided with a backplate shall not be mounted on a mounting surface unless the following requirements are satisfied:

- a voltage transfer to the mounting surface is prevented,
- fire segregation is provided between the equipment and a combustible mounting surface.

If the mounting surface is non-metallic and non-combustible, no additional measures are required. If not, these requirements may be satisfied by one of the following measures:

- if the mounting surface is metallic, it shall be bonded to the protective conductor (PE) or to the protective equipotential bonding conductor of the installation, in accordance with HD 60364-4-41 and HD 60364-5-54;
- if the mounting surface is combustible, the equipment shall be separated from it by a suitable intermediate layer of insulating material having a flammability rating of FH1 according to EN 60695.

515.2 Where equipment carrying currents of different types or at different voltages is grouped on a common assembly (such as a switchboard, a cubicle or a control desk or box), all the equipment belonging to any one type of current or any one voltage shall be effectively segregated from other equipment wherever necessary to avoid mutual detrimental influence.

515.3 Electromagnetic compatibility

515.3.1 Choice of the immunity and emission levels

515.3.1.1 The immunity levels of equipment shall be selected according to the electromagnetic influences (see Table ZA.1) that can occur when connected and erected for normal use, and taking into account the intended level of continuity of service necessary for the application.

515.3.1.2 Equipment shall be chosen with sufficiently low emission levels so that it cannot cause electromagnetic interference by electrical conduction or propagation in the air with other electrical equipment inside or outside the building. If necessary, means of mitigation shall be installed to minimize the emission (see HD 60364-4-44 under consideration).

NOTE Appliances or equipment should comply with EN 55011, EN 55012, EN 55013, EN 55014-1, EN 55014-2, EN 55015, EN 55022 and IEC Technical Committee 77 standards (EN 61000 series), as relevant.

516 Measures related to protective conductor currents

The protective conductor current generated by electrical equipment under normal conditions of operation and the design of electrical installations shall be compatible, in order to provide safety and to assure normal use.

The permissible protective conductor currents for equipment are specified in EN 61140:2002, 7.5.2 and shall be taken into consideration when information is not available from the manufacturer.

NOTE 1 For the purposes of Clause 516, a protective conductor current is a current which flows in the protective conductor when the equipment is fault-free and operating normally.

NOTE 2 For prevention of unwanted tripping of residual current devices due to protective conductor currents, see IEC 60364-5-53 Clause 531.2.1.3.

NOTE 3 The installer should inform the owner of the installation that preferably such equipment should be selected for which the manufacturer has provide information concerning the value of protective conductor current. Equipment with low values should be chosen to avoid unwanted tripping.

NOTE 4 For reinforced protective conductors, see 543.7.

516.1 Transformer

Measures may be taken in the electrical installation to restrict protective conductor currents by supplying limited areas with transformers with separate windings.

516.2 Signalling systems

The use of any live conductor together with the protective conductor as a return path for signalling is not allowed.

NOTE For the use of DC return conductors, see the requirements of HD 60364-5-54:2007, 543.5.1.

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Annex A (informative)

Concise list of external influences

A	<i>Temperature</i>			<i>Impact</i>		<i>Conducted unidirectional transients of the microsecond to the millisecond time scale</i>			
Environment	AA1	-60 °C	+5 °C	AG1	Low				
	AA2	-40 °C	+5 °C	AG2	Medium				
	AA3	-25 °C	+5 °C	AG3	High				
	AA4	-5 °C	+40 °C	<i>Vibrations</i>		AM-23-1	Controlled level		
	AA5	+5 °C	+40 °C	AH1	Low	AM-23-2	Medium level		
	AA6	+5 °C	+60 °C	AH2	Medium	AM-23-3	High Level		
	AA7	-25 °C	+55 °C	AH3	High	<i>Conducted oscillatory transients</i>			
	AA8	-50 °C	+40 °C	AJ	<i>Other mechanical stresses</i>		AM-24-1	Medium level	
					<i>Presence of flora</i>			AM-24-2	High level
	<i>Atmospheric humidity</i>				AK1	No hazard	<i>Radiated high-frequency phenomena</i>		
	<i>Temperature:</i>		<i>Relative humidity:</i>		AK2	Hazard			
					<i>Presence of fauna</i>				
	AB1	-60 °C	+5 °C	3 %	100 %	AL1	No hazard	AM-25-1	Negligible level
	AB2	-40 °C	+5 °C	10 %	100 %	AL2	Hazard	AM-25-2	Medium level
	AB3	-25 °C	+5 °C	10 %	100 %	<i>Electromagnetic, electrostatic or ionizing influences</i>		AM-25-3	High level
	AB4	-5 °C	+40 °C	5 %	95 %				
	AB5	+5 °C	+40 °C	5 %	85 %	<i>Harmonics, interharmonics</i>		AM-31-1	Small level
	AB6	+5 °C	+60 °C	10 %	100 %	AM-1-1	Controlled level	AM-31-2	Medium level
	AB7	-25 °C	+55 °C	10 %	100 %	AM-1-2	Normal level	AM-31-3	High level
	AB8	-50 °C	+40 °C	10 %	100 %	AM-1-3	High level	AM-31-4	Very high level
	<i>Altitude</i>				<i>Signalling voltages</i>		AM-4-1	<i>Ionization</i>	
	AC1	≤ 2 000 m			AM-2-1	Controlled level	<i>Solar radiation</i>		
	AC2	> 2 000 m			AM-2-2	Normal level			
					AM-2-3	High level			
	AD	<i>Presence of water</i>			<i>Voltage amplitude variations</i>		AN1	Low	
	AD1	Negligible			AM-3-1	Controlled level	AN2	Medium	
	AD2	Drops			AM-3-2	Normal level	AN3	High	
	AD3	Spray			AM-4	<i>Voltage unbalance</i>	<i>Seismic effects</i>		
AD4	Splashes			AM-5	<i>Power frequency variations</i>				
AD5	Jets			AM-6	<i>Induced low-frequency voltage</i>				
AD6	Waves			AM-7	<i>Direct current in a.c. voltage</i>				
AD7	Immersion			<i>Radiated magnetic field</i>		AQ1	Negligible		
AD8	Submersion			AM-8-1	Medium level	AQ2	Indirect exposure		
<i>Presence of foreign solid bodies</i>				AM-8-2	High level	AQ3	Direct exposure		
AE1	Negligible			<i>Electric fields</i>		<i>Movement of air</i>			
AE2	Small			AM-9-1	Negligible level				
AE3	Very small			AM-9-2	Medium level				
AE4	Light dust			AM-9-3	High level				
AE5	Moderate dust			AM-9-4	Very high level	<i>Wind</i>			
AE6	Heavy dust			AM-21	<i>Induced oscillatory voltage</i>				
<i>Corrosion</i>				<i>Conducted unidirectional transients of the nanosecond time scale</i>		AS1	Low		
AF1	Negligible					AS2	Medium		
AF2	Atmospheric								
AF3	Intermittent								
AF4	Continuous								
				AM-22-1	Negligible level	AS3	High		
				AM-22-2	Medium level				
				AM-22-3	High level				
				AM-22-4	Very high level				