SLOVENSKI STANDARD
SIST HD 60364-5-53:2022

01-julij-2022

Nadomešča:
SIST HD 60364-5-53:2016
SIST HD 60364-5-53:2016/A11:2017
SIST HD 60364-5-534:2016
SIST HD 60364-5-537:2017
SIST HD 60364-5-537:2017/A11:2017

Nizkonapetostne električne inštalacije - 5-53. del: Izbira in namestitev električne opreme - Stikalne in krmilne naprave

Low-voltage electrical installations - Part 5-53: Selection and erection of electrical equipment - Switchgear and controlgear

Errichten von Niederspannungsanlagen - Teil 5-53: Auswahl und Errichtung elektrischer Betriebsmittel - Schalt- und Steuergeräte

Installations électriques basse tension - Partie 5-53: Choix et mise en oeuvre des matériels électriques - Appareillage

Ta slovenski standard je istoveten z: **HD 60364-5-53:2022**

ICS:

29.130.01	Stikalne in krmilne naprave na splošno	Switchgear and controlgear in general
91.140.50	Sistemi za oskrbo z elektriko	Electricity supply systems

SIST HD 60364-5-53:2022 **en**

HARMONIZATION DOCUMENT

DOCUMENT D'HARMONISATION

HARMONISIERUNGSDOKUMENT

HD 60364-5-53

May 2022

ICS 91.140.50; 29.120.50

Supersedes HD 60364-5-534:2016 HD 60364-5-537:2016
HD 60364-5-53:2015 HD 60364-5-537:2016 + A11:2017
HD 60364-5-53:2015 + A11:2017

English Version

Low-voltage electrical installations - Part 5-53: Selection and erection of electrical equipment - Switchgear and controlgear

Installations électriques basse tension - Partie 5-53: Choix et mise en oeuvre des matériels électriques - Appareillage

Errichten von Niederspannungsanlagen - Teil 5-53: Auswahl und Errichtung elektrischer Betriebsmittel - Schalt- und Steuergeräte

This Harmonization Document was approved by CENELEC on 2018-08-16. 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 CEN-CENELEC Management Centre 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, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. HD 60364-5-53:2022 E

European foreword

This document (HD 60364-5-53:2022) has been prepared by CLC/TC 64 “Electrical installations and protection against electric shock”.

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2022-11-13
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2025-05-13

This document supersedes HD 60364-5-53:2015, HD 60364-5-534:2016 and HD 60364-5-537:2016 and all of their amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users’ national committee. A complete listing of these bodies can be found on the CENELEC website.

1 Introduction

1.1 Scope

This part of HD 60364 deals with general requirements for isolation, switching, control and monitoring and with the requirements for selection and erection of the devices provided to fulfil such functions.

1.2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60038, *CENELEC standard voltages (IEC 60038)*

EN 60269 (series), Low-voltage fuses *(IEC 60269 series)*

EN 60309 (series), Plugs, socket-outlets and couplers for industrial purposes *(IEC 60309 series)*

HD 60364-1:2008, *Low-voltage electrical installations - Part 1: Fundamental principles, assessment of general characteristics, definitions (IEC 60364-1:2005)*

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

HD 60364-4-42, *Low voltage electrical installations - Part 4-42: Protection for safety - Protection against thermal effects (IEC 60364-4-42)*

HD 60364-4-43:2010, *Low-voltage electrical installations - Part 4-43: Protection for safety - Protection against overcurrent (IEC 60364-4-43:2008, mod. + corrigendum Oct. 2008)*

HD 60364-4-443:2016, *Low-voltage electrical installations - Part 4-44: Protection for safety - Protection against voltage disturbances and electromagnetic disturbances - Clause 443: Protection against transient overvoltages of atmospheric origin or due to switching (IEC 60364-4-44:2007/A1:2015, mod.)*

HD 60364-4-46:2016, *Low-voltage electrical installations - Part 4-46: Protection for safety - Isolation and switching*

HD 60364-5-51:2009, *Electrical installations of buildings - Part 5-51: Selection and erection of electrical equipment - Common rules (IEC 60364-5-51:2005, mod.)*

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

EN 60669-1, Switches for household and similar fixed-electrical installations - Part 1: General requirements *(IEC 60669-1)*

EN 60669-2-1, *Switches for household and similar fixed electrical installations – Part 2-1: Particular requirements – Electronic switches (IEC 60669-2-1)*

EN 60669-2-2, *Switches for household and similar fixed electrical installations - Part 2-2: Particular requirements - Electromagnetic remote-control switches (RCS) (IEC 60069-2-2)*

EN 60669-2-3, *Switches for household and similar fixed electrical installations - Part 2-3: Particular requirements - Time delay switches (TDS) (IEC 60669-2-3)*

EN 60669-2-4, *Switches for household and similar fixed electrical installations - Part 2-4: Particular requirements - Isolating switches (IEC 60669-2-4)*

EN 60669-2-5, *Switches for household and similar fixed electrical installations - Part 2-5: Particular requirements - Switches and related accessories for use in home and building electronic systems (HBES) (IEC 60669-2-5)*

EN 60669-2-6, *Switches for household and similar fixed electrical installations - Part 2-6: Particular requirements - Fireman's switches for exterior and interior signs and luminaires (IEC 60669-2-6)*

EN 60670 (all parts), *Boxes and enclosures for electrical accessories for household and similar fixed electrical installations (IEC 60670)*

EN 60898-1, *Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations - Part 1: Circuit-breakers for a.c. operation (IEC 60898-1)*

EN 60898-2, *Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations - Part 2: Circuit-breakers for a.c. and d.c. operation (IEC 60898-2)*

EN 60947-2:2006, *Low-voltage switchgear and controlgear - Part 2: Circuit-breakers (IEC 60947-2:2006)*

EN 60947-3, *Low-voltage switchgear and controlgear - Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units (IEC 60947-3)*

EN 60947-4-1, *Low-voltage switchgear and controlgear - Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters (IEC 60947-4-1)*

EN 60947-4-2, *Low-voltage switchgear and controlgear - Part 4-2: Contactors and motor-starters - AC semiconductor motor controllers and starters (IEC 60947-4-2)*

EN 60947-4-3, *Low-voltage switchgear and controlgear - Part 4-3: Contactors and motor-starters - AC semiconductor controllers and contactors for non-motor loads (IEC 60947-4-3)*

EN 60947-5-1, Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices *(IEC 60947-5-1)*

EN 60947-6-1, *Low-voltage switchgear and controlgear - Part 6-1: Multiple function equipment - Transfer switching equipment (IEC 60947-6-1)*

EN 60947-6-2, *Low-voltage switchgear and controlgear - Part 6-2: Multiple function equipment - Control and protective switching devices (or equipment) (CPS) (IEC 60947-6-2)*

EN 60947-7-1, *Low-voltage switchgear and controlgear - Part 7-1: Ancillary equipment - Terminal blocks for copper conductors (IEC 60947-7-1)*

EN 61008-1, *Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs) - Part 1: General rules (IEC 61008-1)*

EN 61008-2-1, *Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCB's) - Part 2-1: Applicability of the general rules to RCCB's functionally independent of line voltage (IEC 61008-2-1)*

EN 61009-1, *Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) - Part 1: General rules (IEC 61009-1)*

EN 61009-2-1, *Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBO's) - Part 2-1: Applicability of the general rules to RCBO's functionally independent of line voltage (IEC 61009-2-1)*

EN 61095, *Electromechanical contactors for household and similar purposes (IEC 61095)*

EN 61439 (all parts), *Low-voltage switchgear and controlgear assemblies (IEC 61439, all parts)*

EN 61557-8, *Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. - Equipment for testing, measuring or monitoring of protective measures - Part 8: Insulation monitoring devices for IT systems (IEC 61557-8)*

EN 61557-9, *Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. - Equipment for testing, measuring or monitoring of protective measures - Part 9: Equipment for insulation fault location in IT systems (IEC 61557-9)*

EN 61643-11:2012, *Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods (IEC 61643-11:2011, mod.)*

CLC/TS 61643-12, *Low-voltage surge protective devices - Part 12: Surge protective devices connected to low-voltage power distribution systems - Selection and application principles (IEC 61643-12)*

EN 61984:2009, *Connectors - Safety requirements and tests (IEC 61984:2008)*

EN 61995 (series), Devices for the connection of luminaires for household and similar purposes *(IEC 61995 series)*

EN 62020, *Electrical accessories - Residual current monitors for household and similar uses (RCMs) (IEC 62020)*

EN 62208, *Empty enclosures for low-voltage switchgear and controlgear assemblies - General requirements (IEC 62208)*

EN 62305-1, *Protection against lightning - Part 1: General principles (IEC 62305-1)*

EN 62305-2, *Protection against lightning - Part 2: Risk management (IEC 62305-2)*

EN 62305-4, *Protection against lightning - Part 4: Electrical and electronic systems within structures (IEC 62305-4)*

EN 62423, *Type F and type B residual current operated circuit-breakers with and without integral overcurrent protection for household and similar uses (IEC 62423)*

EN 62606, *General requirements for arc fault detection devices (IEC 62606)*

EN 62626-1, *Low-voltage switchgear and controlgear enclosed equipment - Part 1: Enclosed switch-disconnectors outside the scope of IEC 60947-3 to provide isolation during repair and maintenance work (IEC 62626-1)*

IEC 60417, *Graphical symbols for use on equipment*

IEC 60884 (series), *Plugs and socket-outlets for household and similar purposes*

IEC 60906 (series), *IEC system of plugs and socket-outlets for household and similar purposes*

1.3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

530.3.1
control
<verb> deliberate action resulting in the operation of an apparatus

[SOURCE: IEV 821-01-28, modified]

530.3.2
control
<noun> device which initiates the operation of an apparatus

[SOURCE: IEV 821-01-28, modified]

530.3.3
isolation
function intended to make dead for reasons of safety all or a discrete section of the electrical installation by separating the electrical installation, or section, from every source of electric energy

[SOURCE: IEV 826-17-01]

530.3.4
monitor
acquire a quantity value continuously or sequentially in order to check whether it is within normal operating limits and, where appropriate, to signal if it passes its tolerance boundaries

[SOURCE: IEV 351-43-03]

530.3.5
switching
function intended to make or break the current in one or more electric circuits

530.3.6
co-ordination of electrical equipment
correct way of selecting electrical devices in series to ensure safety and continuity of service of the installation taking into account short-circuit protection and/or overload protection and/or selectivity

530.3.7
safety of electrical installation
safety of human, livestock and property against danger and damage which may arise in the reasonable use of electrical installations and which is covered by measures for:

— protection against electric shock;

— protection against thermal effects;

— protection against overcurrent;

— protection against fault currents;

— protection against voltage disturbances and measures against o electromagnetic influences;

— protection against power supply interruption where danger or damage is expected

Note 1 to entry: Continuity of supply may be necessary for certain circuits (e.g. circuits in medical locations, circuits supplying emergency systems).

530.3.8
continuity of service
quality of an installation which is expressed by the extent to which the operation of an electrical system approaches the ideal state of freedom from interruption, or which the operation of electrical system minimizes supply interruption thanks to co-ordination of electrical devices

530.3.9
back-up protection
overcurrent co-ordination, in short-circuit conditions, of an OCPD in series with another electrical device where the OCPD, generally but not necessarily on the supply side, effects the overcurrent protection and prevents any excessive stress on the electrical device

Note 1 to entry: Back-up protection does not cover the combined short-circuit protection.

530.3.10
combined short-circuit protection
overcurrent co-ordination, in short-circuit conditions, of two OCPDs in series, resulting in a combined short-circuit current capability higher than one OCPD alone

530.3.11
combined short-circuit capability
maximum short-circuit current which can be handled by two short-circuit protective devices in series

530.3.12
selectivity
co-ordination of the operating characteristics of two or more protective devices such that, on the incidence of overcurrents or residual currents within stated limits, the device intended to operate within these limits does so, while the other(s) does (do) not

Note 1 to entry: Distinction is made between series selectivity involving different overcurrent protective devices passing substantially the same overcurrent and network selectivity involving protective devices passing different proportions of the overcurrent.

[SOURCE: IEV 441-17-15, modified]

530.3.13
total selectivity
selectivity where only the OCPD on the load side will operate up to the maximum prospective short-circuit current at its point of installation

530.3.14
partial selectivity
selectivity where the OCPD on the load side only will operate up to a fault current (the selectivity limit current) less than the maximum prospective short-circuit current at its point of installation

530.3.15
overcurrent protective device
OCPD
device provided to interrupt an electric circuit in case the conductor current in the electric circuit exceeds a predetermined value for a specified duration

Note 1 to entry: Table 536.2 provides information regarding the different devices corresponding to the main generic function.

[SOURCE: IEV 826-14-14]

530.3.16
short-circuit protective device
SCPD
device intended to protect a circuit or parts of a circuit against short-circuit currents by interrupting them

Note 1 to entry: Table 536.2 provides information regarding the different devices corresponding to the main generic function.

[SOURCE: EN 60947-1]

530.3.17
circuit-breaker
mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time and breaking currents under specified abnormal circuit conditions such as those of short circuit

Note 1 to entry: Table 536.2 provides information regarding the different devices corresponding to the main generic function.

[SOURCE: IEV 441-14-20]

530.3.18
switch
device for changing the electric connections among its terminals

[SOURCE: IEV 151-12-22]

530.3.19
residual current device
RCD
mechanical switching device designed to make, carry and break currents under normal service conditions and to cause the opening of the contacts when the residual current attains a given value under specified conditions

Note 1 to entry: A residual current device can be a combination of various separate elements designed to detect and evaluate the residual current and to make and break current.

Note 2 to entry: RCD includes devices such as RCCB, RCBO, CBR and MRCD. Table 536.2 provides information regarding the different devices corresponding to the main generic function.

[SOURCE: IEV 442-05-02, modified]

530.3.20
fuse
device that by the fusing of one or more of its specially designed and proportioned components, opens the circuit in which it is inserted by breaking the current when this exceeds a given value for a sufficient time. The fuse comprises all the parts that form the complete device

[SOURCE: IEV 441-18-01]

530.3.21
contactor
mechanical switching device having only one position of rest, operated otherwise than by hand, capable of making, carrying and breaking currents under normal circuit conditions including operating overload conditions

[SOURCE: IEV 441-14-33]

530.3.22
overload relay
overcurrent relay or release intended for protection against overloads

[SOURCE: EN 60947-1]

530.3.23
control and protective switching device
CPS
switching device (or equipment) capable of operation other than by hand, but with or without local manual operating means. A CPS device provides both functions of contactor and OCPD

[SOURCE: EN 60947-6-2 modified]

530.3.24
conditional short-circuit current
prospective current that a circuit or a switching device, protected by a specified short-circuit protective device, can satisfactorily withstand for the total operating time of that device under specified conditions of use and behaviour

[SOURCE: EN 60947-1]

530.3.25
desk study
assessment of behaviour of devices connected in series, taking into account all relevant parameters delivered by manufacturer such as:

— design current;

— prospective short-circuit or fault current;

— operating time of devices;

— system voltage;

— energy (let through I^2t values);

— peak let through current

530.3.26
SPD assembly
one SPD or a set of SPDs, in both cases including all SPD disconnectors required by the SPD manufacturer, providing the required overvoltage protection for a type of system earthing

530.3.27
SPD disconnector
disconnector
device for disconnecting an SPD, or part of an SPD, from the power system

Note 1 to entry: This disconnecting device is not required to have isolating capability for safety purposes. It is to prevent a persistent fault on the system and is used to give an indication of an SPD's failure. Disconnectors can be internal (built in) or external (required by the manufacturer). There may be more than one disconnector function, for example, an over-current protection function and a thermal protection function. These functions may be in separate units.

[SOURCE: EN 61643-11:2012, 3.1.28]

530.3.28
mode of protection of an SPD
intended current path, between terminals that contains protective components, e.g. line-to-line, line-to-earth, line-to-neutral, neutral-to-earth

[SOURCE: EN 61643-11:2012, 3.1.8]

530.3.29
follow current interrupt rating
I_{fi}
prospective short-circuit current that an SPD is able to interrupt without operation of a disconnector

[SOURCE: EN 61643-11:2012, 3.1.39]

530.3.30
short-circuit current rating
I_{SCCR}
maximum prospective short-circuit current from the power system for which the SPD, in conjunction with the disconnector specified, is rated

[SOURCE: EN 61643-11:2012, 3.1.27]

530.3.31
voltage protection level
U_P
maximum voltage to be expected at the SPD terminals due to an impulse stress with defined voltage steepness and an impulse stress with a discharge current with given amplitude and waveshape

Note 1 to entry: The voltage protection level is given by the manufacturer and may not be exceeded by:

— the measured limiting voltage determined for front-of-wave sparkover (if applicable) and the measured limiting voltage determined from the residual voltage measurements at amplitudes corresponding to In and/or Iimp respectively for test classes II and/or I;

— the measured limiting voltage at the open circuit voltage (UOC) of the combination wave generator, determined for the combination wave for test class III.

Note 2 to entry: Information on the correlation between SPD Types and test classes according to the product standard is provided in Annex A.

[SOURCE: EN 61643-11:2012, 3.1.14, mod. — Note 1 to entry is modified and Note 2 to entry is added.]

530.3.32
rated impulse voltage
U_W
impulse withstand voltage value assigned by the manufacturer to the equipment or to a part of it, characterizing the specified withstand capability of its insulation against transient overvoltages

[SOURCE: IEC 60664-1:2007, 3.9.2, mod. — The abbreviation 'U_W' is added.]

530.3.33
maximum continuous operating voltage
U_C
maximum r.m.s. voltage, which may be continuously applied to the SPD's mode of protection

Note 1 to entry: The U_C value covered by this standard may exceed 1 000 V.

[SOURCE: EN 61643-11:2012, 3.1.11]

530.3.34
nominal discharge current for class II test
I_n
crest value of the current through the SPD having a current waveshape of 8/20

Note 1 to entry: Information on the correlation between SPD Types and test classes according to the product standard is provided in Annex A.

[SOURCE: EN 61643-11:2012, 3.1.9, mod. — Note 1 to entry is added.]

530.3.35
impulse discharge current for class I test
I_{imp}
crest value of a discharge current through the SPD with specified charge transfer Q and specified energy W/R in the specified time

Note 1 to entry: Information on the correlation between SPD Types and test classes according to the product standard is provided in Annex A.

[SOURCE: EN 61643-11:2012, 3.1.10, mod. — Note 1 to entry is added.]

530.3.36
open circuit voltage
U_{OC}
open circuit voltage of the combination wave generator at the point of connection of the device under test

[SOURCE: EN 61643-11:2012, 3.1.23]

530.3.37
two-port SPD
SPD having a specific series impedance connected between separate input and output connections

[SOURCE: EN 61643-11:2012, 3.1.3]

1.4 General and common requirements

530.4.1 Every item of equipment shall be selected and erected so as to allow compliance with the requirements stated in the following clauses of this part as well as the fundamental principles of HD 60364-1 and the relevant rules in other parts of the HD 60364 series.

530.4.2 The moving contacts of all poles of multipole devices for isolation and switching shall be so coupled mechanically that they make and break substantially together.

The moving contacts of multipole switching devices marked for the connection of the neutral or mid-point may close before and open after the other contacts.

530.4.3 A switching device shall not be inserted in the neutral conductor alone.

530.4.4 Devices embodying more than one function, as defined in the following clauses, shall comply with the relevant requirements of this part appropriate to each separate function.

530.4.5 Equipment intended for protection only shall not be provided for functional switching of circuits.

NOTE Functional switching does not include disconnection and isolation of circuits for the purposes of testing servicing and maintenance.

1.5 Fixing of equipment

530.5.1 Equipment shall be erected according to the manufacturer's instructions in such a way that connections between wiring and equipment shall not be subject to undue stress or strain resulting from the foreseen use of the equipment.

530.5.2 Unenclosed type equipment shall be mounted in a suitable mounting box or enclosure in compliance with EN 60670 series, EN 62208 or other relevant standard like EN 61439 series.

530.5.3 Equipment such as circuit breakers, switches, socket outlets, control equipment, etc. may be installed in or on a cable trunking system in accordance with EN 50085 series.

2 Devices for protection against electric shock by automatic disconnection of supply

2.1 General

Devices for protection against electric shock by automatic disconnection of supply shall be suitable for isolation in accordance with HD 60364-4-46:2016 and Clause 537.

Automatic re-closing of devices for protection against electric shock by automatic disconnection of supply is permitted in installations where access is restricted to electrically instructed persons (BA4) or skilled persons (BA5) only.

Automatic re-closing of devices used for continuity of supply may also be used according to local or National wiring rules for installations were access is permitted to ordinary persons (BA1) or children (BA2) or handicapped persons (BA3) provided assessment means according to 4.3.2 of EN 50557:2011 are complied with.

Requirements for the selection of devices for protection against electric shock by automatic disconnection of supply are given in the following sections:

In TN, TT and IT systems the following protective devices may be used:

— overcurrent protective devices in accordance with 531.2;

— residual current devices (RCDs) in accordance with 531.3.

Devices according to EN 60947-2 marked with the voltage value followed by the symbol  shall not be used in IT systems for such voltage.

In addition, in IT-systems the following monitoring devices may be used to detect insulation fault conditions:

— Insulation monitoring devices (IMDs) in accordance with 538.1;

— equipment for insulation fault location in accordance with 538.2;

— residual current monitors (RCMs) in accordance with 538.4.

2.2 Overcurrent protective devices

2.2.1 General

Where overcurrent protective devices are used for the protection against electric shock by automatic disconnection of supply they shall be selected in accordance with 533.

2.2.2 TN systems

In TN systems overcurrent protective devices when used as devices for fault protection shall be selected and erected in order to comply with the requirements specified in Part 4-41 (see in particular subclause 411.4.4).

If for certain equipment or for certain parts of the installation, the maximum tripping time of the Table 41A cannot be fulfilled by the overcurrent protective devices, those parts shall be protected by a residual current device (RCD) in compliance with 531.3.5.2.

In TN-S systems, the neutral need not be disconnected if the supply conditions are such that the neutral conductor can be considered to be reliably at earth potential.

In TN-C systems, the PEN conductor shall not be disconnected.

2.2.3 TT systems

In TT systems, overcurrent protective devices may be used for fault protection provided that a suitably low value of Z_S is permanently and reliably ensured (see also 411.5.4 of Part 4-41) so that in case of a fault, tripping of the overcurrent protective device in compliance with the required disconnection times is ensured.

2.2.4 IT systems

Overcurrent protective devices when used as devices for fault protection, in the event of a second fault, shall comply with:

— 531.2.2, taking into account the requirements of 411.6.4.a) of Part 4-41, where exposed-conductive-parts are interconnected; or

— 531.2.3, taking into account the requirements of 411.6.4.b) of Part 4-41, where exposed-conductive-parts are earthed in groups or individually.

In IT systems, if disconnection required by part 4-41 in the event of the second fault to earth cannot be achieved by an overcurrent protective device, one or more residual current devices (RCDs) shall be used to provide the required fault protection within the installation.

NOTE Reference is also made to 411.3.2.6 where supplementary protective equipotential bonding is required in those cases where automatic disconnection according to 411.3.2.1 cannot be achieved.

Overcurrent protective devices used in IT systems shall have line poles suitable for line-to- line voltage applications and a neutral pole, if applicable, suitable for the line to neutral voltage for operation in case of a second insulation fault.

In IT systems, in the event of a second fault, the operation of the overcurrent protective device shall result in the disconnection of all corresponding live conductors, including the neutral conductor, if any (see also 431.2.2 of Part 4-43).

2.3 Residual current devices (RCDs)

2.3.1 General

A residual current device shall ensure the disconnection of all live conductors of the circuit protected.

The protective conductor shall not pass through the sensor of the residual current device (RCD) beside exceptional cases, where passing through the sensor is unavoidable, e.g. in case of armoured cables. In such exceptional cases the protective conductor alone has to be passed again through the sensor but in the reverse direction. The protective conductor shall be insulated and shall not be earthed neither at the first nor at the second passing through the sensor.

A protective conductor current shall not contribute to the measurement of the residual current.

2.3.2 Unwanted tripping

Residual current protective devices shall be so selected and erected to limit the risk of unwanted tripping. The following shall be considered:

— subdivision of circuits with individual associated residual current devices (RCDs). RCDs shall be selected and the electrical circuits shall be subdivided in such a way that any earth-leakage current likely to occur