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Koordinacija električnih naprav

Co-ordination of electrical equipment for protection, isolation, switching and control

Koordinierung elektrischer Einrichtungen

Coordination des dispositifs électriques

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

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CENELEC

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

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Contents

Figures

Tables

Foreword

This document (HD 50573-5-57:2014) has been prepared by CLC/TC64 "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)	2014-12-30
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2016-12-30

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

During the design of an electrical installation, HD 60364 applies.

In an electrical installation, each device is required to comply with its relevant product standard according to Clause 133.1 of HD 60364-1:2008 and to Clause 511 of HD 60364-5-51:2009.

It is also recognized that in an electrical installation, the combination of various device shall be selected carefully so as not to impair safety. In case of a fault, the combination of several protective devices (circuit-breakers, fuses, residual current devices…) may also affect the continuity of supply of the installation if the upstream devices open, whereas the fault could be cleared by the downstream device.

This Harmonization Document is intended to bring complementary requirements to part 5 of HD 60364 for selection and erection of electrical equipment, and cover aspects of co-ordination.

570 Co-ordination of electrical equipment for protection, isolation, switching and control

570.1 Scope

This Harmonization Document specifies the requirements for the selection and erection of electrical equipments for protection, isolation, switching and control (hereafter referred to as electrical devices and assemblies) with respect to co-ordination.

This Harmonization Document applies to electrical installations as detailed in HD 60364-1:2008, 11.1. The requirements of this document are additional to those specified in HD 60364.

This Harmonization Document is intended to provide requirements for the safety of humans, livestock and property against danger and damage which may arise in the reasonable use of electrical installations and to specify requirements for the proper functioning of those installations. The requirements also cover aspects of continuity of supply of the installation.

This part covers co-ordination in the case of a fault condition (e.g. short circuit, overload, residual currents) and also takes into consideration aspects of HD 60364-1:2008, 33.1 relevant to the co-ordination of electrical devices as follows :

– overcurrent protective device (OCPD);
– control and protective switching device (CPS);
– residual current device (RCD);
– contactor and starter;
– switch and disconnector.

NOTE 1 Co-ordination of monitoring devices is under consideration.

NOTE 2 Reference to the meaning of the acronyms used in this document may be found in Table 57.1.

This Harmonization Document does not provide requirements for the selection of an electrical device alone, but provides requirements for the selection of electrical devices to ensure electrical co-ordination between them.

570.2 Normative references

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

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

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

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

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

EN 60947-1, *Low-voltage switchgear and controlgear – Part 1: General rules (IEC 60947-1)*

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 60947-6-1, *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 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 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 (IEC 61008-2-1)*

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 the voltage (IEC 61009-2-1)*

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

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

570.3 Terms and definitions

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

570.3.1
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

570.3.2
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).

570.3.3
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

570.3.4
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.

570.3.5
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

570.3.6
combined short-circuit capability
maximum short-circuit current which can be handled by two short-circuit protective devices in series

570.3.7
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

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

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.

570.3.8
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

570.3.9
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

570.3.10
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

[SOURCE: IEV 826-14-14]

Note 1 to entry: Table 57.1 provides information regarding the different devices corresponding to the main generic function.

570.3.11
short-circuit protective device (SCPD)
device intended to protect a circuit or parts of a circuit against short-circuit currents by interrupting them

[SOURCE: EN 60947-1]

Note 1 to entry: Table 57.1 provides information regarding the different devices corresponding to the main generic function.

570.3.12
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

[SOURCE: IEV 441-14-20]

Note 1 to entry: Table 57.1 provides information regarding the different devices corresponding to the main generic function.

570.3.13
switch
device for changing the electric connections among its terminals

[SOURCE: IEV 151-12-22]

570.3.14
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 57.1 provides information regarding the different devices corresponding to the main generic function.

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

570.3.15
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]

570.3.16
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]

570.3.17
overload relay
overcurrent relay or release intended for protection against overloads

[SOURCE: EN 60947-1]

570.3.18
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]

570.3.19
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]

570.3.20
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

571 Electrical devices considered and function provided

Table 57.1 shows the function provided by the different electrical devices considered in this Harmonization Document.

Table 57.1 – Devices and associated functions

Devices					Functions			
Product	**OCPD**[2]	**SCPD**[2]	**RCD**[2]	**Standard**	**Overload Protection**	**Short-Circuit Protection**	**Residual Current Protection**	**Switching only**
Circuit-Breaker	X			EN 60947-2 EN 60898-1 EN 60898-2	X	X	-	-
RCCB Residual current operated circuit-breakers without integral overcurrent protection			X	EN 61008-2-1 EN 62423	-	-	X	-
RCBO Residual current operated circuit-breakers with integral overcurrent protection	X		X	EN 61009-2-1 EN 62423	X	X	X	-
CBR Circuit-breakers providing residual current protection	X		X	EN 60947-2:2006, Annex B	X	X	X	-
MRCD Modular Residual current device [3]	X		X	EN 60947-2:2006, Annex M	X	X	X	-
ICB Instantaneous trip circuit-breakers		X		EN 60947-2:2006, Annex O	-	X	-	-
Fuse with full range breaking capacity (e.g. gG, gM) [1]	X			EN 60269 series	X	X	-	-
Fuse with partial range breaking capacity (e.g. aM) [1]		X		EN 60269 series	-	X	-	-
CPS Control and Protective Switching Devices	X			EN 60947-6-2	X	X	-	-
Contactor				EN 60947-4-1 EN 61095	-	-	-	X
Overload relay				EN 60947-4-1	X	-	-	-
Switch or switch-disconnector				EN 60947-3 EN 60669-2-2 EN 60669-2-4	-	-	-	X
TSE Transfer Switching Equipment				EN 60947-6-1	-	-	-	X