SLOVENSKI STANDARD

SIST EN 50557:2012

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Naprave za avtomatski ponovni vklop odklopnikov - Odklopniki na diferenčni tok z nadtokovno zaščito (RCBOs) - Odklopniki na diferenčni tok (RCCBs) za gospodinjsko in podobno uporabo (ARDs)

Automatic reclosing devices for circuit breakers-RCBOs-RCCBs for household and similar uses (ARDs)

Automatisch wiedereinschaltende Einrichtungen für Leitungsschutzschalter sowie Fehlerstrom-Schutzschalter mit und ohne eingebautem Überstromschutz (RCBOs und RCCBs) für Hausinstallationen und für ähnliche Anwendungen (ARDs)

Prescriptions pour les dispositifs à refermeture automatique (DRA) pour disjoncteurs, ID et DD, pour usages domestiques et analogues

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Requirements for automatic reclosing devices (ARDs) for circuit breakers-RCBOs-RCCBs for household and similar uses

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CENELEC

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Foreword

This document (EN 50557:2011) has been prepared by CLC/TC 23E "Circuit breakers and similar devices for household and similar applications".

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)	2012-07-19
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For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

Introduction

Automatic Reclosing Devices are intended to reclose circuit-breakers-RCBOs-RCCBs after tripping in order to re-establish continuity of service.

1 Scope

This European Standard applies to Automatic Reclosing Devices (hereinafter referred to as “ARD”) for household and similar uses, for rated voltage not exceeding 440 V a.c. intended to be used in combination with circuit-breakers and/or RCCBs and/or RCBOs, and designed either for factory assembly or for assembly on site.

These devices are intended to reclose main protective devices (hereinafter referred to as “MPD”) such as circuit-breakers complying to EN 60898-1 and/or EN 60898-2, RCCBs complying to EN 61008-1 and RCBOs complying to EN 61009-1 after tripping of those devices in order to re-establish continuity of service.

In detail, this European Standard applies to the following types of ARD:

– ARD with assessment means, reclosing only if both the prospective line current and the prospective earth-fault current do not exceed given values;

– ARD with assessment means, reclosing only if the prospective line current does not exceed a given value;

– ARD with assessment means, reclosing only if the prospective earth-fault current does not exceed a given value;

– ARD that reclose without any assessment.

NOTE 1 The assessment cannot substitute the verifications required by HD 60364-6:2007.

NOTE 2 The requirements and tests for the assessment function in IT systems are under consideration.

This European Standard does not apply to ARDs with multiple settings adjustable by means accessible to the user in normal service.

This European Standard states:

– the terms and definitions used for ARD (Clause 3);

– the classification of ARD (Clause 4);

– the characteristics of ARD (Clause 5);

– the preferred values of the operating and influencing quantities (Clause 5);

– the marking and information to be provided for ARD (Clause 6);

– the standard conditions for installation and operation in service (Clause 7);

– the requirements for construction and operation (Clause 8);

– the list of minimum requirements to be tested (Clause 9).

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 55014-1:2006 + A1:2009, *Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission* (CISPR 14-1:2005 + A1:2008)

EN 60065:2002 + A1:2006 + corr. Aug. 2007 + A11:2008 + A2:2010, *Audio, video and similar electronic apparatus – Safety requirements* (IEC 60065:2001, mod. + A1:2005, mod. + A2:2010, mod.)

EN 60112:2003 + A1:2009, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials* (IEC 60112:2003 + A1:2009)

EN 60384-14 series, *Fixed capacitors for use in electronic equipment* (IEC 60384 series)

EN 60384-14:2005*, Fixed capacitors for use in electronic equipment – Part 14: Sectional specification – Fixed capacitors for electromagnetic interference suppression and connection to the supply mains* (IEC 60384-14:2005)

EN 60664-1:2007, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles requirements and tests* (IEC 60664-1:2007)

EN 60664-3:2003 + A1:2010, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coating, potting or moulding for protection against pollution* (IEC 60664-3:2003 + A1:2010 + corr. Nov. 2010)

EN 60898-1:2003 + corr. Feb. 2004 + A1:2004 + A11:2005 + A12:2008, *Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations – Part 1: Circuit-breakers for a.c. operation* (IEC 60898-1:2002, mod. + A1:2002, mod.)

EN 60898-2:2006, *Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations – Part 2: Circuit-breakers for a.c. and d.c. operation* (IEC 60898-2:2000, mod. + A1:2003, mod.)

EN 60947-5-1:2004 + corr. Jul. 2005 + A1:2009, *Low-voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices* (IEC 60947-5-1:2003 + A1:2009)

EN 60950-1:2006 + A11:2009 + A1:2010, *Information technology equipment – Safety – Part 1: General requirements* (IEC 60950-1:2005, mod. + A1:2009, mod.)

EN 61008-1:2004 + A11:2007 + A12:2009, *Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs) – Part 1: General rules* (IEC 61008-1:1996, mod. + A1:2002, mod.)

EN 61009-1:2004 + A11:2008 + A12:2009 + A13:2009, *Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) – Part 1: General rules* (IEC 61009-1:1996, mod. + A1:2002, mod. + corr. May 2003)

EN 61000-4-2:2009, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test* (IEC 61000-4-2:2008)

EN 61000-4-3:2006 + A1:2008 + A2:2010, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test* (IEC 61000-4-3:2006 + A1:2007 + A2:2010)

EN 61000-4-4:2004 + A1:2010, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test* (IEC 61000-4-4:2004 + A1:2010)

EN 61000-4-5:2006, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test* (IEC 61000-4-5:2005)

EN 61000-4-6:2009, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields* (IEC 61000-4-6:2008)

EN 61000-4-16:1998 + A1:2004 + A2:2011, *Electromagnetic compatibility (EMC) – Part 4-16: Testing and measurement techniques – Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz* (IEC 61000-4-16:1998 + A1:2001 + A2:2009)

EN 61189-2, *Test methods for electrical materials, printed boards and other interconnection structures and assemblies – Part 2: Test methods for materials for interconnection structures* (IEC 61189-2)

EN 61543:1995 + corr. Dec. 1997 + A11:2003 + A12:2005, *Residual current-operated protective devices (RCDs) for household and similar use Electromagnetic compatibility* (IEC 61543:1995 + A2:2005)

EN 61558 series, *Safety of power transformers, power supply units and similar products* (IEC 61558 series)

EN 62019, *Electrical accessories – Circuit-breakers and similar equipment for household use – Auxiliary contact units* (IEC 62019)

EN ISO 306:2004, *Plastics – Thermoplastic materials – Determination of Vicat softening temperature (VST)* (ISO 306:2004)

ISO 7000:2004, *Graphical symbols for use on equipment – Index and synopsis*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 60898-1:2003, EN 61008-1:2004, EN 61009-1:2004 and the following apply.

3.1
actuator
part of the actuating system to which an external force is applied when the ARD is installed as in normal use

[IEV 441-15-22, mod.]

NOTE The actuator may take the form of a handle, knob, push-button, roller, plunger, etc.

3.2
assessment using a method based on the limitation of the test current
type of assessment that is designed in such a way that, under normal operating in tripped and blocked conditions, the assessment is carried out by means of a non hazardous current flowing in the installation

NOTE The limit values of currents are specified in 8.12.3.

3.3
assessment using a method based on the limitation of the test voltage
type of assessment that is designed in such a way that, under normal operating in tripped and blocked conditions, the assessment is carried out by means of a non hazardous voltage applied at the installation by means of a transformer with a reinforced insulation between the primary and the secondary circuit

NOTE The limit values of voltage are specified in 8.12.2.

3.4
automatic reclosing
function intended to reclose, under specified conditions, the MPD after tripping

3.5
automatic reclosing device
ARD
electromechanical device intended to produce the automatic reclosing of the MPD to which is intended to be associated with

3.6
blocked condition
condition of the ARD for which the MPD is tripped and the ARD shall not reclose it automatically

NOTE This condition can be removed only by manual reset operation according to the manufacturer's instructions.

3.7
consecutive reclosing operations
number of consecutive reclosing operations that leads the ARD in blocked condition within a period of time

3.8
disabled (condition)
condition of the ARD for which automatic reclosing function is de-activated and MPD can never be automatically reclosed

3.9
earth fault current
current flowing from the live parts of the installation to earth due to an insulation fault

3.10
enabled (condition)
condition of the ARD for which automatic reclosing function is activated and MPD may be automatically reclosed (under specific condition)

3.11
functional earth
FE
wire or terminal intended to be connected to the PE so as to provide a reference point to the ARD for assessment means

3.12
main protective device
MPD
device to which the ARD is intended to be associated with and that recloses under specified conditions

NOTE The MPD is a circuit-breaker (EN 60898-1 and/or EN 60898-2) or a RCCB (EN 61008-1) or a RCBO (EN 61009-1).

3.13
non operating resistance between live parts
maximum value of resistance between live parts, below which the automatic reclosing of the MPD is not permitted under specified conditions

3.14
non operating resistance to earth
maximum value of resistance between live parts and earth, below which the automatic reclosing of the MPD is not permitted under specified conditions

3.15
operating resistance between live parts
minimum value of resistance between live parts, for which the automatic reclosing of the MPD is ensured under specified conditions

3.16
operating resistance to earth
minimum value of resistance between live parts and earth, for which the automatic reclosing of the MPD is ensured under specified conditions

3.17
prospective line current
current likely to flow through live parts in case of reclosing of the MPD

3.18
prospective line current assessment
assessment of the current likely to flow through

– each phase and neutral and

– each phase and each other phase and

– each phase and earth

after reclosing the MPD

NOTE This is generally achieved by evaluating the resistance.

3.19
prospective residual current
current likely to flow from the live parts of the installation to earth in case of reclosing of the MPD

3.20
prospective residual current assessments
assessment of the residual current likely to flow through:

– phase and earth and

– neutral and earth.

after reclosing the MPD

NOTE This is generally achieved by evaluating the resistance.

3.21
reset time
period of time over that the ARD reset the counting of the consecutive reclosing operations

3.22
tripped condition
condition of ARD's for which the MPD has tripped and may reclose automatically under specified conditions

4 Classification

4.1 According to the method of construction

4.1.1 ARD assembled in factory by the manufacturer

NOTE This also includes built-in devices.

4.1.2 ARD assembled on site.

4.2 According to the MPD

4.2.1 ARD for circuit-breakers;

4.2.2 ARD for RCCBs;

4.2.3 ARD for RCBOs.

NOTE The same ARD may be designed for more than one MPD.

4.3 According to the type of assessment means

4.3.1 ARD without assessment means (see Annex A);

4.3.2 ARD with assessment means;

4.3.2.1 ARD with means of assessment of the prospective residual current.

a) operation blocked after assessment of an excessive residual current in the installation (see Annex B);

b) remains in tripped condition after the assessment of an excessive residual current in the installation (see Annex C).

4.3.2.2 ARD with means of assessment of the prospective line current

a) operation blocked after assessment of an overcurrent in the installation (see Annex B);

b) remains in tripped condition after the assessment of an overcurrent in the installation (see Annex C).

NOTE 1 The behaviour according to 4.3.2.1 b) and 4.3.2.2 b) is defined in the manufacturer's instructions.

NOTE 2 The same ARD may be designed with means for assessing both the prospective current according to 4.3.2.1 and 4.3.2.2.

4.4 According to the safety means during the assessment

4.4.1 ARD with assessment means operating by using a method based on the limitation of the test voltage;

4.4.2 ARD with assessment means operating by using a method based on the limitation of the test current.

4.5 According to the range of ambient air temperature (only for ARD according to 4.2.2 and 4.2.3)

4.5.1 ARD for use at ambient air temperatures between -5 °C and + 40 °C;

4.5.2 ARD for use at ambient air temperatures between -25 °C and + 40 °C.

4.6 According to the connection to FE

4.6.1 ARD with FE connection for assessment means;

4.6.2 ARD without FE connection.

4.7 According to maximum number of reclosing operations

4.7.1 ARD with maximum number of reclosing operations declared by manufacturer and lower than or equal to 3;

4.7.2 ARD with maximum number of reclosing operations declared by manufacturer and higher than 3.

4.8 According to mechanical interlock between MPD operating means and ARD enabling/disabling system

4.8.1 ARD with mechanical interlock between MPD operating means and ARD enabling/disabling system;

4.8.2 ARD without interlock between MPD operating means and ARD enabling/disabling system.

5 Characteristics

5.1 Summary of characteristics

The characteristics of the MPD standards and the following apply:

– protection against external influences;

– method of mounting;

– method of connection;

– value of rated operational voltage;

– value of rated frequency;

– values of operating and non operating rated resistance to earth, if applicable;

– values of operating and non operating rated resistance between live parts, if applicable;

– range of ambient air temperature.

5.2 Rated quantities

5.2.1 Rated voltage

Preferred values of rated voltage are: 230 V, 400 V.

5.2.2 Rated operational voltage (U_e)

The rated operational voltage (hereafter referred to as rated voltage) of an ARD is the value of voltage assigned by the manufacturer to which its performance is referred.

5.2.3 Rated frequency

The rated frequency of an ARD is the power frequency for which the ARD is designed and to which the values of the other characteristics correspond.

5.2.4 Rated non operating resistance to earth (R_{d0})

The R_{d0} value is stated by the manufacturer under the test conditions in this product standard.

5.2.5 Rated operating resistance to earth (R_d)

The R_d value is stated by the manufacturer under the test conditions in this product standard.

The R_d shall be rounded up to the last two more significant digits.

The minimum R_d value shall be not less than the values specified in Table 1.

Table 1 – Minimum admissible R_d values

I_{dn} A	R_d Ω
0,01	25 000
0,03	8 000
0,1	2 500
0,3	800
0,5	500
1	250

where I_{dn} is

– the value of the rated residual operating current I_{dn} of the associated RCD in case of ARDs classified according to 4.1.1, or

– the minimum rated residual operating current I_{dn} amongst all the associable RCDs in case of ARDs classified according to 4.1.2.

5.2.6 Rated operating resistance between live parts (R_{cc})

The R_{cc} value is stated by the manufacturer under the test conditions in this product standard.

The R_{cc} shall be rounded up to the last two more significant digits.

The minimum R_{cc} value shall be not less than:

$$R_{cc} \geq \frac{U_n}{I_{m\,max}}$$

where

– U_n is the rated voltage;

– $I_{m\,max}$ is the instantaneous tripping value of the associated MPD.

6 Marking and other product information

6.1 Standard marking

Each ARD shall be marked in a durable manner with all the following data:

a) manufacturer's name or trade mark;

b) type designation, catalogue number or serial number;

c) wiring diagram, except if the connection mode is self evident;

d) rated voltage(s) with the symbol ~;

e) ARD or EN 50557;

f) protection degree (only if different from IP20);

g) for ARD classified according to 4.5.2, ambient air temperature with the symbol (the value - 25 included in the snow flake symbol according to ISO 7000:2004, Figure 0027).

For devices according to 4.1.2, the information of the ambient air temperature shall not be visible after assembly.

Moreover, the following markings shall be placed on the products or in the instruction sheets accompanying the product:

h) the rated frequency (f_n) if different from 50 Hz;

i) the rated non operating resistance between live parts and earth R_{d0}, if applicable;

j) the rated operating resistance between live parts and earth R_d, if applicable;

k) the rated non operating resistance between live parts R_{cc0}, if applicable;

l) the rated operating resistance between live parts R_{cc}, if applicable;

m) assembling method if applicable;

n) earthing system in which the devices may be used;

o) "Warning: before accessing active parts, disable the automatic reclosing function and switch off the main protective device" or other warning having the same meaning;

NOTE It is recommended that text shall be written in appropriated language(s).

p) instructions about the reset of the ARD and the need for checking the MPD and the installation in case of blocked condition.

Information on how to reach the isolation of the installation shall be given in the instruction sheet accompanying the product.

The information under a) and b) shall be visible when the ARD is installed.