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Edition 1.0 2016-09

INTERNATIONAL STANDARD

Residual current operated circuit-breakers for household and similar use – Part 3-3: Specific requirements for RCDs with screw-type terminals for external untreated aluminium conductors and with aluminium screw-type terminals for use with copper or with aluminium conductors

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International Standard IEC 62873-3-3 has been prepared by subcommittee 23E: Circuit breakers and similar equipment for household use, of IEC technical committee 23: Electrical accessories.

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

FDIS	Report on voting
23E/966/FDIS	23E/984/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 62873 series published under the general title *Residual current operated circuit-breakers for household and similar use* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

This document is part of the series described in the outline document IEC 62873-1.

RESIDUAL CURRENT OPERATED CIRCUIT-BREAKERS FOR HOUSEHOLD AND SIMILAR USE –

Part 3-3: Specific requirements for RCDs with screw-type terminals for external untreated aluminium conductors and with aluminium screw-type terminals for use with copper or with aluminium conductors

1 Scope

This part of IEC 62873 applies to RCDs equipped with screw-type terminals of copper – or of alloys containing at least 58 % of copper (if worked cold) or at least 50 % of copper (if worked otherwise), or of other metal or suitably coated metal, no less resistant to corrosion than copper and having mechanical properties no less suitable – for use with untreated aluminium conductors, or with screw-type terminals of aluminium material for use with copper or aluminium conductors.

This part of IEC 62873 cannot be used alone but it is intended to be applied together with an RCD product standard (IEC 61008-1 or IEC 61009-1) if an RCD is equipped with screw-type terminals for external untreated aluminium conductors and with aluminium screw-type terminals for use with copper or with aluminium conductors.

In this part of IEC 62873, copper-clad and nickel-clad aluminium conductors are considered as aluminium conductors.

NOTE In AT, AU and DE, the use of aluminium screw-type terminals for use with copper conductors is not allowed.

- In AT and DE, terminals for aluminium conductors only are not allowed;
- In ES, the use of aluminium conductors is not allowed for final circuits in household and similar installations e.g. offices, shops;
- In DK, the minimum cross-sectional area for aluminium conductors is 16 mm^2.

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.

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

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

IEC 62873-2, *Residual current operated circuit-breakers for household and similar use – Part 2: Residual current devices (RCDs) – Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62873-2 and the following apply.

3.1
treated conductor
contact area of a conductor that has had its oxide layer on the outside strands scraped away and/or has had a compound added to improve connectability and/or prevent corrosion

3.2
untreated conductor
unprepared conductor
conductor which has been cut and the insulation of which has been removed for insertion into a terminal

Note 1 to entry: A conductor, the shape of which is arranged for introduction into a terminal or the strands of which are twisted to consolidate the end, is considered to be an unprepared conductor.

[SOURCE: IEC 60050-442:1998, 442-01-26]

3.3
equalizer
arrangement used in the test loop to ensure an equipotentiality point and uniform current density in a stranded conductor, without adversely affecting the temperature of the conductor(s)

3.4
reference conductor
continuous length of the same type and size conductor as that used in the terminal unit under test and connected in the same series circuit, which enables the reference temperature and, if required, reference resistance to be determined

3.5
stability factor
Sf
measure of temperature stability of a terminal unit during the current cycling test

4 Classification

Clause 4 of the RCD product standard applies.

5 Characteristics of RCDs

Clause 5 of the RCD product standard applies.

6 Marking and other product information

In addition to Clause 6 of the RCD product standard, the following requirements apply.

The terminal marking defined in Table 1 shall be marked on the RCD, near the terminals.

The other information concerning the number of conductors, the screw torque values (if different from Table 11 of the RCD product standard) and the cross-sections shall be indicated on the RCD.

NOTE Tables 6, 10, 11 (in IEC 61008-1:2010) and Tables 8, 13, 14 (in IEC 61009-1:2010) have been replaced by the harmonized new numbers: 9, 10 and 11.

Table 1 – Marking for terminals

Conductor types accepted	Marking
Copper only	None
Aluminium only	Al
Aluminium and copper	Al/Cu

The manufacturer shall state in his catalogue that, for the clamping of an aluminium conductor, the tightening torque shall be applied with appropriate means.

7 Standard conditions for operation in service and for installation

Clause 7 of the RCD product standard applies.

8 Requirements for construction and operation

Clause 8 of the RCD product standard applies, with the following exceptions:

The following text is added at the end of 8.1.5.2 of the RCD product standard:

For the connection of aluminium conductors, RCDs shall be provided with screw-type terminals allowing the connection of conductors having nominal cross-sections as shown in Table 2.

Terminals for the connection of aluminium conductors and terminals of aluminium for the connection of copper or aluminium conductors shall have mechanical strength adequate to withstand the tests of 9.4 of the RCD product standard, with the test conductors tightened with the torque indicated in Table 11 of the RCD product standard, or with the torque specified by the manufacturer, which shall never be lower than that specified in Table 11 of the RCD product standard.

Table 2 – Connectable cross-sections of aluminium conductors for screw-type terminals

Rated current [a] A	Range of nominal cross-sections [b] to be clamped mm^2
Up to and including 25	10
Above 25 up to and including 32	10 to 16
Above 32 up to and including 50	10 to 25
Above 50 up to and including 80	10 to 35
Above 80 up to and including 100	16 to 50
Above 100 up to and including 125	25 to 70

[a] It is required that, for current ratings up to and including 50 A, terminals be designed to clamp solid conductors as well as rigid stranded conductors; the use of flexible conductors is permitted. Nevertheless, it is permitted that terminals for conductors having cross-sections up to 10 mm^2 be designed to clamp solid conductors only.

[b] Maximum wire sizes of RCD product standard, increased according to Table D.2 of IEC 61545:1996.

Compliance is checked by inspection, by measurement and by fitting in turn one conductor of the smallest and one of the largest cross-section areas as specified.

8.1.5.4 of the RCD product standard is replaced by the following text:

8.1.5.4 Terminals shall allow the conductors to be connected without special preparation.

Compliance is checked by inspection and the tests of Clause 9.

9 Tests

9.1 General

Clause 9 of the RCD product standard applies, with the following modifications/additions:

For the tests which are influenced by the material of the terminal and the type of conductor that can be connected, the test conditions of Table 3 are applied.

Additionally, the test of 9.3 is carried out on terminals separated from the RCD.

Table 3 – List of tests according to the material of conductors and terminals

Material of terminals	**Material according to 8.1.4.4** [a]	**Al** [a]	
Material of conductor (Table 1)	Al	Cu	Al
9.4 Reliability of screws	Use Tables 2 and 5 of this standard	Use Tables 24 and 25 of the RCD product standard	Use Tables 2 and 5 of this standard
9.5.1 Pull-out test [b]	Use Table 2 of this standard and Table 26 of the RCD product standard	Use Tables 24, 25 and 26 of the RCD product standard	Use Table 2 of this standard and Table 26 of the RCD product standard
9.5.2 Damage of the conductor	Use Table 2 of this standard and Table 26 of the RCD product standard	Use Tables 24, 25 and 26 of the RCD product standard	Use Table 2 of this standard and Table 26 of the RCD product standard
9.5.3 Insertion of the conductor	Use Table 5 of this standard	Use Table 25 of the RCD product standard	Use Table 5 of this standard
9.8 Temperature rise	Use Table 5 of this standard	Use Table 25 of the RCD product standard	Use Table 5 of this standard
9.22 Verification of reliability	Use Table 5 of this standard	Use Table 25 of the RCD product standard	Use Table 5 of this standard
9.2 Cycling test	Use Table 26 of the RCD product standard	Use Table 26 of the RCD product standard	Use Table 26 of the RCD product standard

[a] Use test sequences A and B and number of samples defined in Annex A. For RCDs which are able to be connected to Al or Cu conductors, the test sequences and number of samples have to be doubled (one for the Cu conductor and one for the Al conductor).

[b] For the pull-out test in 9.5.1, the value for 70 mm^2 wire is under consideration.

The dimensions of connectable conductors are given in Table 4.