

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

---

**Residual current operated circuit-breakers with integral overcurrent protection  
for household and similar uses (RCBOs) -**

**Part 2-2: RCBOs according to classification 4.1.2, 4.1.3, 4.1.4, 4.1.5 and 4.1.6**

**Interrupteurs automatiques à courant différentiel résiduel avec dispositif de  
protection contre les surintensités incorporé pour usages domestiques et  
analogues (DD) -**

**Partie 2-2: DD conformes à la classification en 4.1.2, 4.1.3, 4.1.4, 4.1.5 et 4.1.6**



## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2024 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Secretariat  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

### IEC publications search -

[webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

### IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

If you wish to give us your feedback on this publication, or need further assistance, please contact the Customer Service Centre: [sales@iec.ch](mailto:sales@iec.ch).

### IEC Products & Services Portal - [products.iec.ch](http://products.iec.ch)

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

### A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

### A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

### Recherche de publications IEC -

[webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, ...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

### Service Clients - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: [sales@iec.ch](mailto:sales@iec.ch).

### IEC Products & Services Portal - [products.iec.ch](http://products.iec.ch)

Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications, symboles graphiques et le glossaire. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

### Electropedia - [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 500 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 25 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

**Warning! Make sure that you obtained this publication from an authorized distributor.**

**Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references.....	6
3 Terms and definitions .....	7
4 Classification.....	7
4.1 According to the supply conditions.....	7
5 Characteristics of RCBOs .....	8
5.1 Summary of characteristics .....	8
5.2 Rated quantities and other characteristics .....	8
5.3 Standard and preferred values .....	8
6 Marking and other product information .....	8
6.200 Marking of RCBOs classified according to 4.1.3.....	8
6.201 Marking of RCBOs classified according to 4.1.5 and 4.1.6.....	9
7 Standard conditions for operation in service and for installation .....	9
8 Requirements for construction and operation.....	9
8.12 Requirements for RCBOs in the event of loss of supply.....	10
8.17 Resistance to temporary overvoltages (TOV).....	10
8.200 Standing current in the FE under normal conditions .....	11
8.201 Standing current in the FE in the case of RCBO supplied from just one phase and FE.....	11
9 Tests.....	11
9.1 General.....	11
9.7 Test of dielectric properties .....	11
9.8 Test of temperature-rise .....	12
9.9 Verification of the operating characteristics.....	13
9.10 Verification of mechanical and electrical endurance .....	17
9.11 Short-circuit tests .....	18
9.15 Verification of the trip free mechanism.....	18
9.17 Verification of the behaviour of RCBOs in the event of loss of the supply voltage.....	19
9.18 Void.....	20
9.19 Verification of the behaviour of RCBOs in the event of current surges caused by impulse voltages.....	20
9.20 Verification of reliability .....	21
9.21 Verification of withstand against ageing .....	21
9.22 Electromagnetic compatibility (EMC).....	21
9.24 Verification of the behaviour of the RCBO under temporary overvoltage (TOV) condition.....	21
9.200 Test of the maximum connecting capacity of FE terminal.....	22
9.201 Verification of the limitation of the standing current in the FE .....	22
Annex A (normative) Test sequence and number of samples to be submitted for certification purposes.....	32
A.1 Test sequences.....	32
A.2 Number of samples to be submitted for full test procedure .....	34
A.3 Number of samples to be submitted for simplified test procedures if submitting simultaneously a range of RCBOs of the same fundamental design.....	35

Annex D (normative) Routine tests .....	38
D.3 Dielectric strength test .....	38
Bibliography .....	39
Figure 22 – Example for test circuit for verification of ageing of electronic components .....	24
Figure 26 – Gauges of Form A and Form B.....	24
Figure 28 – Test circuit for the verification of operating characteristics and trip-free mechanism for RCBO classified according to 4.1.2 to 4.1.6 .....	25
Figure 29 – Test circuit for the verification of the correct operation in the event of residual pulsating direct currents.....	26
Figure 30 – Test circuit for the verification of the correct operation in the event of residual pulsating direct currents in the presence of a standing smooth direct current of 0,006 A.....	27
Figure 31 – Test circuit for verification of the standing current in the FE.....	28
Figure 33 – Typical diagram for all short circuit tests except for 9.11.11.1 for RCBOs according to 4.1.3.....	30
Figure 34 – Typical diagram for short circuit tests according to 9.11.11.1 for RCBOs according to 4.1.3.....	31
Table 33 – Requirements for RCBOs classified according to 4.1.2 to 4.1.6.....	23
Table 200 – Gauges for the verification of the rated connecting capacity of the FE terminal.....	23
Table 201 – Additional withstand values and duration of temporary overvoltages for RCBOs classified according to 4.1.3 .....	23
Table A.1 – Test sequences.....	32
Table A.2 – Number of samples for full test procedure.....	34
Table A.3 – Number of samples for simplified test procedure .....	36
Table A.4 – Test sequences for RCBOs having different instantaneous tripping currents.....	37
Table A.5 – Test sequences for RCBOs of different classification according to IEC 61009-1:2024, 4.3.....	37

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**RESIDUAL CURRENT OPERATED CIRCUIT-BREAKERS  
WITH INTEGRAL OVERCURRENT PROTECTION  
FOR HOUSEHOLD AND SIMILAR USES (RCBOs) –****Part 2-2: RCBOs according to classification  
4.1.2, 4.1.3, 4.1.4, 4.1.5 and 4.1.6**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, issue IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 61009-2-2 has been prepared by subcommittee 23E: Circuit-breakers and similar equipment for household use, of IEC technical committee 23: Electrical accessories. It is an International Standard.

This second edition cancels and replaces the first edition published in 1991. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) harmonization of all clauses between the IEC 61008, IEC 61009 and IEC 60755 series using blocks and modules approach;

- b) harmonization of all tables and figures between the IEC 61008, IEC 61009 and IEC 60755 series;
- c) terms and definitions are now referred to IEC 62873-2;
- d) modification of 4.1 for classification according to supply conditions;
- e) modification of Clause 6 for markings of RCBOs with a functional earth (FE);
- f) specific tests for operating characteristics of RCBO according to classifications 4.1.2, 4.1.3, 4.1.4, 4.1.5 and 4.1.6;
- g) specific test conditions for dielectric properties (9.7), temperature-rise (9.8), electrical and mechanical endurance (9.10), short-circuit tests (9.11), verification of trip-free (9.15) behaviour in the event of loss of the supply voltage (9.17), surge current tests (9.19), reliability (9.20), ageing (9.21) and temporary overvoltage TOV (9.24);
- h) additional tests for RCBOs with a terminal connected to the FE: Connecting capacity of FE terminal (9.200); Limitation of standing current in the FE (9.201).

The text of this International Standard is based on the following documents:

Draft	Report on voting
23E/1372/FDIS	23E/1390/RVD

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

The language used for the development of this International Standard is English.

This International Standard is to be used in conjunction with IEC 61009-1:2024.

Where this document states "addition", "deletion" or "replacement", the corresponding requirement, test specification or explanatory material in IEC 61009-1:2024 is adapted accordingly.

Where this document defines a new subclause, this subclause number starts at 200 (for example an additional definition in this part would read 3.200).

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://www.iec.ch/publications).

A list of all parts in the IEC 61009 series, published under the general title *Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs)*, can be found on the IEC website.

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

- reconfirmed,
- withdrawn, or
- revised.

# RESIDUAL CURRENT OPERATED CIRCUIT-BREAKERS WITH INTEGRAL OVERCURRENT PROTECTION FOR HOUSEHOLD AND SIMILAR USES (RCBOs) –

## Part 2-2: RCBOs according to classification 4.1.2, 4.1.3, 4.1.4, 4.1.5 and 4.1.6

### 1 Scope

IEC 61009-1:2024, Clause 1 is applicable except for the first paragraph, which is replaced by the first paragraph below, and the last paragraph, which is replaced by the second paragraph and note below:

This document applies to residual current operated circuit-breakers, with integral overcurrent protection, for household and similar uses (hereafter referred to as RCBOs), classified according to IEC 61009-1:2024, 4.1.2, 4.1.3, 4.1.4, 4.1.5 and 4.1.6. RCBOs according to this document are intended for voltages not exceeding 440 V AC with frequencies of 50 Hz, 60 Hz or 50/60 Hz and currents not exceeding 125 A and rated short-circuit capacities not exceeding 25 000 A for operation at 50 Hz or 60 Hz.

This document applies in conjunction with IEC 61009-1:2024. It specifies requirements, tests and test sequences to verify compliance and is used for certification purposes.

NOTE Devices according to this document are not permitted in DE.

### 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.

IEC 61009-1:2024, *Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) – Part 1: General rules*

IEC 61543:2022, *Residual current-operated protective devices (RCDs) for household and similar use – Electromagnetic compatibility*

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

IEC 62873-3-1, *Residual current operated circuit-breakers for household and similar use – Part 3-1: Particular requirements for devices with screwless-type terminals for external copper conductors*

IEC 62873-3-2, *Residual current operated circuit-breakers for household and similar use – Part 3-2: Particular requirements for devices with flat quick-connect terminations*