

Menu

- [Home Home](#)
- [About this portal](#)
- [Latest updates](#)

Print [Save](#) Email

[Resource detail](#)

[Citations](#)

AS/NZS 61009.1:2004 Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) - Part 1: General rules

Table of Contents

[View on Information Provider website](#) {{ linkText }}

Abbreviation

AS/NZS 61009.1:2004

Amendment

A1 - incorporated, published 30/07/2007.

Valid from

12/08/2004

Information provider

Standards New Zealand

Author

Standards New Zealand, Standards Australia

Information type

New Zealand Standard

Format

PDF

Cited By

[This resource is cited by 1 document \(show Citations\)](#)

Description

This Standard provides essential safety and associated requirements for residual current operated circuit-breakers with integral overcurrent protection for household and similar uses, for rated voltages not exceeding 440 V a.c. and rated currents not exceeding 125 A and short-circuit capacities not exceeding 25,000 A for operation of 50 Hz or 60 Hz. Annex ZZ lists variations for Australian and New Zealand conditions.

This Standard is a modified adoption of IEC 61009-1:2003.

Scope

This International Standard applies to residual current operated circuit-breakers with integral overcurrent protection functionally independent of, or functionally dependent on, line voltage for household and similar uses (hereafter referred to as RCBOs), for rated voltages not exceeding 440 V a.c., rated currents not exceeding 125 A and rated short-circuit capacities not exceeding 25 000 A for operation at 50 Hz or 60 Hz.

These devices are intended to protect people against indirect contact, the exposed conductive parts of the installation being

connected to an appropriate earth electrode and to protect against overcurrents the wiring installations of buildings and similar applications. They may be used to provide protection against fire hazards due to a persistent earth fault current, without the operation of the overcurrent protective device.

RCBOs having a rated residual operating current not exceeding 30 mA are also used as a means for additional protection in the case of failure of the protective means against electric shock.

This standard applies to devices performing simultaneously the function of detection of the residual current, of comparison of the value of this current with the residual operating value and of opening of the protected circuit when the residual current exceeds this value, and also of performing the function of making, carrying and breaking overcurrents under specified conditions.

RCBOs of the general type are resistant to unwanted tripping, including the case where surge voltages (as a result of switching transients or induced by lightning) cause loading currents in the installation without occurrence of flashover.

RCBOs of the S type are considered to be sufficiently proof against unwanted tripping even if the surge voltage causes a flashover and a follow-on current occurs.

Special precautions (e.g. lightning arresters) may be necessary when excessive overvoltages are likely to occur on the supply side (for example in the case of supply through overhead lines) (see IEC 60364-4-443).

This standard also applies to RCBOs obtained by the assembly of an adaptable residual current device with a circuit-breaker. The mechanical assembly shall be effected in the factory by the manufacturer, or on site, in which case the requirements of annex G shall apply. It also applies to RCBOs having more than one rated current, provided that the means for changing from one discrete rating to another is not accessible in normal service and that the rating cannot be changed without the use of a tool.

Supplementary requirements may be necessary for RCBOs of the plug-in type.

Particular requirements are necessary for RCBOs incorporated in or intended only for association with plugs and socket-outlets or with appliance couplers for household and similar general purposes.

This standard does not apply to:

- RCBOs intended to protect motors,
- RCBOs the current setting of which is adjustable by means accessible to the user in normal service.

The requirements of this standard apply for normal environmental conditions (see 7.1). Additional requirements may be necessary for RCBOs used in locations having severe environmental conditions.

RCBOs including batteries are not covered by this standard.

A guide for the co-ordination of RCBOs with fuses is given in annex F.

For assistance with locating previous versions, please contact the information provider.

[Table of Contents](#) [View on Information Provider website](#) [{{ linkText }}](#)

For assistance with locating previous versions, please contact the information provider.

This resource is cited by:

AS/NZS 61009.1:2004 Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) - Part 1: General rules

This document is CITED BY:

- [AS/NZS 3000:2007](#)

AS/NZS 61009.1:2004 is cited by AS/NZS 3000:2007 Electrical installations (known as the Australian/New Zealand Wiring Rules)

[Back](#)

AS/NZS 61009.1:2004 Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) - Part 1: General rules

Show what documents this resource is CITED BY

Show what documents this resource CITES

Description

This Standard provides essential safety and associated requirements for residual current operated circuit-breakers with integral overcurrent protection for household and similar uses, for rated voltages not exceeding 440 V a.c. and rated currents not exceeding 125 A and short-circuit capacities not exceeding 25,000 A for operation of 50 Hz or 60 Hz. Annex ZZ lists variations for Australian and New Zealand conditions.

This Standard is a modified adoption of IEC 61009-1:2003.

[View on Information Provider website](#)

[AS/NZS 61009.1:2004 Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses \(RCBOs\) - Part 1: General rules](#)

Description

This Standard provides essential safety and associated requirements for residual current operated circuit-breakers with integral overcurrent protection for household and similar uses, for rated voltages not exceeding 440 V a.c. and rated currents not exceeding 125 A and short-circuit capacities not exceeding 25,000 A for operation of 50 Hz or 60 Hz. Annex ZZ lists variations for Australian and New Zealand conditions.

This Standard is a modified adoption of IEC 61009-1:2003.

[View on Information Provider website](#)

This resource does not cite any other resources.

AS/NZS 61009.1:2004 Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) - Part 1: General rules

This resource does not CITE any other resources.

Back

Close

Table of Contents

1 Scope

2 Normative References

3 Definitions

4 Classification

4.1 According To The Method Of Operation

4.2 According To The Type Of Installation

4.3 According To The Number Of Poles And Current Paths

4.4 According To The Possibility Of Adjusting The Residual Operating Current

4.5 According To Resistance To Unwanted Tripping Due To Voltage Surges

4.6 According To Behaviour In Presence Of D.C. Components

4.7 According To Time-Delay (In Presence Of A Residual Current)

4.8 According To The Protection Against External Influences

4.9 According To The Method Of Mounting

4.10 According To The Method Of Connection

4.11 According To The Instantaneous Tripping Current (See 3.4.18)

4.12 According To The I²T Characteristic

5 Characteristics Of RCBOs

5.1 Summary Of Characteristics

5.2 Rated Quantities And Other Characteristics

5.3 Standard And Preferred Values

6 Marking And Other Product Information

7 Standard Conditions For Operation In Service And For Installation

7.1 Standard Conditions

7.2 Conditions Of Installation

8 Requirements For Construction And Operation

8.1 Mechanical Design

8.2 Protection Against Electric Shock

8.3 Dielectric Properties

8.4 Temperature-Rise

8.5 Operating Characteristics

8.6 Mechanical And Electrical Endurance

8.7 Performance At Short-Circuit Currents

8.8 Resistance To Mechanical Shock And Impact

8.9 Resistance To Heat

8.10 Resistance To Abnormal Heat And To Fire

8.11 Test Device

8.12 Requirements For RCBOs Functionally Dependent On Line Voltage

8.13 Behaviour Of RCBOs In Case Of A Single-Phase Overcurrent Through A Threepole Or Four-Pole RCBO

8.14 Behaviour Of RCBOs In Case Of Current Surges Caused By Impulse Voltages

8.15 Behaviour Of RCBOs In Case Of Earth Fault Currents Comprising A D.C. Component

8.16 Reliability

9 Tests

9.1 General

9.2 Test Conditions

9.3 Test Of Indelibility Of Marking

9.4 Test Of Reliability Of Screws, Current-Carrying Parts And Connections

9.5 Test Of Reliability Of Terminals For External Conductors

9.6 Verification Of Protection Against Electric Shock

9.7 Test Of Dielectric Properties

9.8 Test Of Temperature-Rise

9.9 Verification Of The Operating Characteristic

9.10 Verification Of Mechanical And Electrical Endurance

9.11 Verification Of The Trip-Free Mechanism

9.12 Short-Circuit Tests

9.13 Verification Of Resistance To Mechanical Shock And Impact

9.14 Test Of Resistance To Heat

9.15 Test Of Resistance To Abnormal Heat And To Fire

9.16 Verification Of The Operation Of The Test Device At The Limits Of Rated Voltage

9.17 Verification Of The Behaviour Of RCBOs Functionally Dependent On Line Voltage, Classified Under 4.1.2.1, In Case Of Failure Of The Line Voltage

9.18 Verification Of The Limiting Value Of Overcurrent In Case Of A Single-Phase Load Through A Three-Pole Or Four-Pole RCBO

9.19 Verification Of Behaviour Of RCBOs In Case Of Current Surges Caused By Impulse Voltages

9.20 Verification Of Resistance Of The Insulation Against An Impulse Voltage

9.21 Verification Of The Correct Operation At Residual Currents With D.C. Components

9.22 Verification Of Reliability

9.23 Verification Of Ageing Of Electronic Components

Annexes

Annex A (Normative) Test Sequence And Number Of Samples To Be Submitted For Certification Purposes

Annex B (Normative) Determination Of Clearances And Creepage Distances

Annex C (Normative) Arrangement For The Detection Of The Emission Of Ionized Gases During Short-Circuit Tests

Annex D (Normative) Routine Tests

Annex E (Normative) Special Requirements For Auxiliary Circuits For Safety Extra-Low Voltage

Annex F (Normative) Co-Ordination Between RCBOs And Separate Fuses Associated In The Same Circuit

Annex G (Normative) Additional Requirements And Tests For RCBOs Consisting Of A Circuit-Breaker And A Residual Current Unit Designed For Assembly On Site

Annex H (Normative) List Of Tests, Additional Test Sequences And Numbers

Of Samples For Verification Of Compliance Of RCBOs With The Requirements Of Electromagnetic Compatibility (EMC)

Annex IA (Informative) Methods Of Determination Of Short-Circuit Power-Factor

Annex IB (Informative) Glossary Of Symbols

Annex IC (Informative) Examples Of Terminals

Annex Id (Informative) Correspondence Between ISO And AWG Copper Conductors

Annex IE (Informative) Follow-Up Testing Programme For RCBOs

Figures

Figure 1 – Thread-Forming Tapping Screw (3.6.10)

Figure 2 – Thread-Cutting Tapping Screw (3.6.11)

Figure 3 – Jointed Test Finger (9.6)

Figure 4a – Test Circuit For The Verification Of – Operating Characteristic S (9.9.1), Trip-Free Mechanism (9.11), – Behaviour In Case Of Failure Of Line Voltage (9.17.3 And 9.17.4) For RCBOs, Functionally Dependent On Line Voltage

Figure 4b – Test Circuit For The Verification Of The Correct Operation Of RCBOs, In The Case Of Residual Pulsating Direct Currents

Figure 4c – Test Circuit For The Verification Of The Correct Operation Of RCBOs In The Case Of Residual Pulsating Direct Currents Superimposed By A Smooth Direct Residual Current

Figure 5 – Test Circuit For The Verification Of The Rated Short-Circuit Capacity Of A Singlepole RCBO With Two-Current Paths (9.12)

Figure 6 – Test Circuit For The Verification Of The Rated Short-Circuit Capacity Of A Twopole RCBO, In Case Of A Single-Phase Circuit (9.12)

Figure 7 – Test Circuit For The Verification Of The Rated Short-Circuit Capacity Of A Threepole RCBO On A Three-Phase Circuit (9.12)

Figure 8 – Test Circuit For The Verification Of The Rated Short-Circuit Capacity Of A Three-Pole RCBO With Four Current Paths On A Three-Phase Circuit With Neutral (9.12)

Figure 9 – Test Circuit For The Verification Of The Rated Short-Circuit Capacity Of A Fourpole RCBO On A Three-Phase Circuit With Neutral (9.12)

Figure 10 – Example Of Calibration Record For Short-Circuit Test

Figure 11 – Mechanical Shock Test Apparatus (9.13.1)

Figure 12 – Mechanical Impact Test Apparatus (9.13.2.1)

Figure 13 – Striking Element For Pendulum Impact Test Apparatus (9.13.2.1)

Figure 14 – Mounting Support For Sample For Mechanical Impact Test (9.13.2.1)

Figure 15 – Example Of Mounting An Unenclosed RCBO For Mechanical Impact Test (9.13.2.1)

Figure 16 – Example Of Mounting Of Panel Mounting Type RCBO For The Mechanical Impact Test (9.13.2.1)

Figure 17 – Application Of Force For Mechanical Impact Test Of Rail Mounted RCBO (9.13.2.2)

Figure 18 – Ball-Pressure Test Apparatus (9.14.2)

Figure 19 – Test Circuit For The Verification Of The Limiting Value Of Overcurrent In Case Of A Single-Phase Load Through A Three-Pole Or Four-Pole RCBO (9.18)

Figure 20 – Stabilizing Period For Reliability Test (9.22.1.3)

Figure 21 – Reliability Test Cycle (9.22.1.3)

Figure 22 – Example Of A Test Circuit For Verification Of Ageing Of Electronic Components (9.23)

Figure 23 – Damped Oscillator Current Wave, 0, 5 MS/100 KHz

Figure 24 – Test Circuit For The Ring Wave Test At RCBOs

Figure 25 – Surge Current Impulse 8/20 MS

Figure 26 – Test Circuit For The Surge Current Test At RCBOs

Figures B.1 To B.6 – Illustrations Of The Application Of Creepage Distances

Figures B.7 To B.10 – Illustrations Of The Application Of Creepage Distances

Figure C.1 – Test Arrangement

Figure C.2 – Grid

Figure C.3 – Grid Circuit

Figure Ic.1 – Examples Of Pillar Terminals

Figure Ic.2 – Example Of Screw Terminals And Stud Terminals

Figure Ic.3 – Example Of Saddle Terminals

Figure Ic.4 – Examples Of Lug Terminals

Tables

Table 1 – Standard Values Of Rated Short-Circuit Capacity

Table 2 – Standard Values Of Break Time And Non-Operating Time For Operating Under Residual Current Conditions

Table 3 – Ranges Of Overcurrent Instantaneous Tripping

Table 4 – Standard Conditions For Operation In Service

Table 5 – Clearances And Creepage Distances

Table 6 – Connectable Cross-Sections Of Copper Conductors For Screw-Type Terminals

Table 7 – Temperature-Rise Values

Table 8 – Time-Current Operating Characteristics

Table 9 – Requirements For RCBOs Functionally Dependent On Line Voltage

Table 10 – List Of Type Tests

Table 11 – Test Copper Conductors Corresponding To The Rated Currents

Table 12 – Screw Thread Diameters And Applied Torques

Table 13 – Pulling Forces

Table 14 – Conductor Dimensions

Table 15 – Test Voltage Of Auxiliary Circuits

Table 16 – List Of Short-Circuit Tests

Table 17 – Power Factor Ranges Of The Test Circuit

Table 18 – Ratio Between Service Short-Circuit Capacity (ICS) And Rated Short-Circuit Capacity (ICN) – (Factor K)

Table 19 – Test Procedure For ICS In The Case Of Single- And Two-Pole RCBOs

Table 20 – Test Procedure For ICS In The Case Of Three- And Four-Pole RCBOs

Table 21 – Test Procedure For ICN

Table 22 – Tripping Current Ranges For Type A RCBOs

Table A.1 – Test Sequences

Table A.2 – Number Of Samples For Full Test Procedure

Table A.3 – Number Of Samples For Simplified Test Procedure

Table A.4 – Test Sequences For RCBOs Having Different Instantaneous Tripping Currents

Table A.5 – Test Sequences For RCBOs Of Different Classification According To 4.6

Table H.1

Table H.2

Table Ie.1 – Test Sequences During Follow-Up Inspections

Table Ie.2 – Number Of Samples To Be Tested

[Feedback](#)

- [Contact us](#)
- [Privacy policy](#)
- [Disclaimer](#)
- [Copyright](#)

[Feedback](#)