

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Type F and type B residual current operated circuit-breakers with and without integral overcurrent protection for household and similar uses**

**Interrupteurs automatiques à courant différentiel résiduel de type B et de type F avec et sans protection contre les surintensités incorporée pour usages domestiques et analogues**



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INTERNATIONAL  
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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**TYPE F AND TYPE B RESIDUAL CURRENT OPERATED  
CIRCUIT-BREAKERS WITH AND WITHOUT INTEGRAL OVERCURRENT  
PROTECTION FOR HOUSEHOLD AND SIMILAR USES**

## FOREWORD

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International Standard IEC 62423 has been prepared by subcommittee 23E: Circuit-breakers and similar equipment for household use, of IEC technical committee 23: Electrical accessories.

This second edition cancels and replaces the first edition published in 2007 and constitutes a technical revision. The main changes from the first edition are as follows:

- requirements and tests for Type F RCD have been introduced;
- requirements and tests for two-pole Type B RCD have been introduced;
- new additional requirements and tests for Type B RCDs have been introduced to cover requirements and tests for Type F too.

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

|              |                  |
|--------------|------------------|
| FDIS         | Report on voting |
| 23E/679/FDIS | 23E/684/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.

This International Standard is to be read in conjunction with the following standards:

IEC 61008-1:1996, *Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs) – Part 1: General rules*

IEC 61009-1:1996, *Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) – Part 1: General rules*

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site 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.

## INTRODUCTION

RCCBs and RCBOs designed according to IEC 61008-1 and IEC 61009-1 are suitable in most of the applications. IEC 61008-1 and 61009-1 provide appropriate requirements and tests for general use in household and similar uses. However, the use of new electronic technology in equipment may result in particular residual currents not covered in IEC 61008-1 or IEC 61009-1. This standard covers specific applications where additional requirements and testing are needed.

This standard includes definitions, additional requirements and tests for Type F and Type B RCCBs and/or RCBOs to cover particular situations.

The tests shall first be applied according to IEC 61008-1 for Type F or Type B RCCBs and according to IEC 61009-1 for Type F or Type B RCBOs.

After completion of the tests given either in IEC 61008-1 or IEC 61009-1 the additional tests given in this standard shall be applied in order to show conformity to this standard (see Annex A, Annex B for Type F or Annex C, Annex D for Type B respectively).

The number of samples to be submitted and test sequences to be applied for verification of conformity for Type F RCCBs and Type F RCBOs are given in Annex A and Annex B respectively.

The number of samples to be submitted and test sequences to be applied for verification of conformity for Type B RCCBs and Type B RCBOs are given in Annex C and Annex D respectively.

This standard introduces Type F RCDs (F for Frequency) with rated frequency 50 Hz or 60 Hz intended for protection of circuits with frequency inverters supplied between phase and neutral or phase and earthed middle conductor taking into account the necessary features for these particular situations in addition to the cases covered by type A RCDs. Type F RCDs cannot be used where electronic equipment with double bridge rectifiers supplied from two phases is found or if a smooth d.c. residual current can occur.

In case of a frequency inverter, e.g. used for motor speed control, supplied between phase and neutral, a composite residual current including the power frequency, the motor frequency and the chopper clock frequency of the frequency inverter may occur in addition to alternating or pulsating d.c. residual currents.

This standard introduces Type B RCDs to be used in case of residual pulsating rectified direct current which results from one or more phases, and smooth d.c. residual current in addition to the cases covered by Type F RCDs. For these applications, two, three or four pole Type B RCDs can be used.

# TYPE F AND TYPE B RESIDUAL CURRENT OPERATED CIRCUIT-BREAKERS WITH AND WITHOUT INTEGRAL OVERCURRENT PROTECTION FOR HOUSEHOLD AND SIMILAR USES

## 1 Scope

The scope of IEC 61008-1 and IEC 61009-1 applies with the following additions.

This standard specifies requirements and tests for Type F and Type B RCDs (Residual Current Devices). Requirements and tests given in this standard are in addition to the requirements of Type A residual current devices. This standard can only be used together with IEC 61008-1 and IEC 61009-1.

Type F RCCBs (Residual Current Circuit Breaker) and Type F RCBOs (Residual current Circuit Breaker with Overcurrent protection) with rated frequency 50 Hz or 60 Hz are intended for installations when frequency inverters are supplied between phase and neutral or phase and earthed middle conductor and are able to provide protection in case of alternating residual sinusoidal at the rated frequency, pulsating direct residual currents and composite residual currents that may occur.

Type B RCCBs and Type B RCBOs are able to provide protection in case of alternating residual sinusoidal currents up to 1 000 Hz, pulsating direct residual currents and smooth direct residual currents.

RCDs according to this standard are not intended to be used in d.c. supply systems.

Further requirements and tests for products to be used in situations where the residual current was not intended to be covered in IEC 61008-1 or IEC 61009-1 are under consideration.

For the purpose of manufacturer's declaration or verification of conformity, type tests should be carried out in test sequences in compliance with Annex A, Annex B, Annex C or Annex D of this standard.

The complete test sequence for type test of Type F RCCBs and Type F RCBOs is given in Tables A.1 and B.1 respectively. The complete test sequence for type test of Type B RCCBs and Type B RCBOs is given in Tables C.1 or D.1 respectively.

NOTE 1 Throughout the document, the term RCD refers to RCCBs and RCBOs.

NOTE 2 Requirements for 1 pole with solid neutral are under consideration.

## 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.

IEC 61008-1:1996, *Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs) – Part 1: General rules*<sup>1</sup>

<sup>1</sup> A consolidated edition (2.2) exists including IEC 61008-1 (1996), its Amendment 1 (2002) and Amendment 2 (2006).

Amendment 1 (2002)

Amendment 2 (2006)

IEC 61009-1:1996, *Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) – Part 1: General rules*<sup>2</sup>

Amendment 1 (2002)

Amendment 2 (2006)

IEC/TS 60479-1, *Effects of current on human beings and livestock – Part 1: General aspects*

IEC/TS 60479-2, *Effects of current on human beings and livestock – Part 2: Special aspects*

### 3 Terms and definitions

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

#### 3.1

##### **smooth direct current**

a direct current which is ripple free

#### 3.2

##### **Type B residual current device**

residual current device for which tripping is ensured as for Type F according to this standard and in addition:

- for residual sinusoidal alternating currents up to 1 000 Hz,
- for residual alternating currents superimposed on a smooth direct current
- for residual pulsating direct currents superimposed on a smooth direct current
- for residual pulsating rectified direct current which results from two or more phases
- for residual smooth direct currents whether suddenly applied or slowly increased independent of polarity

#### 3.3

##### **Type F residual current device**

residual current device for which tripping is ensured as for Type A according to IEC 61008-1 or IEC 61009-1, as applicable, and in addition:

- for composite residual currents, whether suddenly applied or slowly rising intended for circuit supplied between phase and neutral or phase and earthed middle conductor
- for residual pulsating direct currents superimposed on smooth direct current

### 4 Classification

According to IEC 61008-1 or IEC 61009-1, as applicable with the following addition:

#### 4.1 According to behaviour in presence of d.c. components

- Type F RCDs
- Type B RCDs

<sup>2</sup> A consolidated edition (2.2) exists including IEC 61009-1 (1996), its Amendment 1 (2002) and Amendment 2 (2006).