

Majapidamises ja muuks taoliseks kasutamiseks ette nähtud, tüüpidesse F ja B kuuluvad rikkevoolukaitselülitid sisseehitatud liigvoolukaitsega või ilma selleta

Type F and type B residual current operated circuit-breakers with and without integral overcurrent protection for household and similar uses (IEC 62423:2009, modified + corrigendum Dec. 2011)

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 62423:2012 sisaldab Euroopa standardi EN 62423:2012 ingliskeelset teksti.

Standard on jõustunud sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 14.12.2012.

Standard on kättesaadav Eesti Standardikeskusest.

This Estonian standard EVS-EN 62423:2012 consists of the English text of the European standard EN 62423:2012.

This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.

Date of Availability of the European standard is 14.12.2012.

The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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Type F and type B residual current operated circuit-breakers with and without integral overcurrent protection for household and similar uses
(IEC 62423:2009, modified + corrigendum Dec. 2011)

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
(CEI 62423:2009, modifiée + corrigendum déc. 2011)

Fehlerstrom-/Differenzstrom-Schutzschalter Typ F und Typ B mit und ohne eingebautem Überstromschutz für Hausinstallationen und für ähnliche Anwendungen
(IEC 62423:2009, modifiziert + corrigendum Dez. 2011)

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

This document (EN 62423:2012) consists of the text of IEC 62423:2009 + corrigendum 2011 prepared by IEC/TC 23E "Circuit-breakers and similar equipment for household use", together with the common modifications 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 (dop) 2013-06-19
at national level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting (dow) 2017-06-19
with this document have to be withdrawn

This document supersedes EN 62423:2009.

EN 62423:2012 includes the following significant technical changes with respect to EN 62423:2009:

- 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.

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

EN 61008-1:2012, *Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs) – Part 1: General rules*

EN 61009-1:2012, *Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) – Part 1: General rules*

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

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

Endorsement notice

The text of the International Standard IEC 62423:2009 + corrigendum 2011 was approved by CENELEC as a European Standard with agreed common modifications.

COMMON MODIFICATIONS

Clause	Common modification
Introduction	Delete "with rated frequency 50 Hz or 60 Hz".
1 Scope	<p>Replace the first two paragraphs by :</p> <p>The scope of EN 61008-1 and EN 61008-2-1 or EN 61009-1 and EN 61009-2-1 applies with the following additions.</p> <p>"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 according to EN 61008-2-1 or EN 61009-2-1. This standard can only be used together with EN 61008-1 and EN 61009-1."</p>
1	In third paragraph, delete "with rated frequency 50 Hz or 60 Hz".
1	In sixth paragraph, replace "IEC" with "EN".
1	<p>Add a new paragraph after fourth paragraph:</p> <p>"Type F and type B RCDs have high resistance against unwanted tripping even if the surge voltage causes a flashover and a follow-on current occurs and in case of inrush residual currents with a maximum duration of 10 ms which can occur in case of switching ON electronic equipment or EMC-filters."</p>
1	Delete the seventh paragraph.
1	<p>Modify note 2 by:</p> <p>"Note 2 : deleted"</p>
2	Replace the contents of Clause 2 with: "Normative references to international publications are listed in Annex ZA."
5.2.3	Delete the value "60 Hz" three times: in the title of 5.2.3, in the title of Table 2 and in note 4 of Table 2.
9.2.1.1	Delete the third paragraph in 9.2.1.1.
9.2.1.2 b)	<p>Replace last paragraph by:</p> <p><i>The maximum break time shall not exceed 0,3 s for general type RCDs and for S-type RCDs the maximum break time shall not exceed 0,5 s.</i></p>
9.2.1.7.1	<p>Add a note after the first paragraph in 9.2.1.7.1 :</p> <p>Note: The open circuit voltage of the DC source should be high enough to guarantee stable smooth d.c. current (e.g. more than 24 V).</p>
9.2.2	Delete the paragraph before the note.
Figure 2	Delete "or 60 Hz".
Annexes A, B, C and D	See modified Annexes A to D at the end of the document (modifications in red).
Annex ZA	See new Annex ZA at the end of this document.

Annex A (normative)

Number of samples to be submitted and test sequences to be applied for verification of conformity for type F RCCBs

Verification of conformity may be made

- by the manufacturer for the purpose of suppliers declaration (13.5.1 of ISO/IEC Guide 2);
- by an independent body for certification (13.5.2 of ISO/IEC Guide 2).

According to the terminology of ISO/IEC Guide 2 the term "certification" can be used for the second case only.

The tests are made according to Table A.1 below, where the tests in each sequence are carried out in the order indicated.

The sampling procedure is given in A.2 and A.3 of EN 61008-1:2012 .

Table A.1 – Test sequences for Type F RCCBs

Test sequence	Tests according to EN 61008-1 and EN 61008-2-1	Additional tests according to this standard	Test (or Inspection)
A	6	6	Marking
	8.1.1	No	General
	8.1.2	No	Mechanism
	9.3	No	Indelibility of marking
	8.1.3	No	Clearance and creepage distances (external parts only)
	9.15	No	Trip-free mechanism
	9.4	No	Reliability of screws, current-carrying parts and connections
	9.5	No	Reliability of terminals for external conductors
	9.6	No	Protection against electric shock
	9.13.1	No	Resistance to heat
	9.13.2	No	
	9.13.3	No	
	8.1.3	No	Clearances and creepage distances (internal parts)
	9.14	No	Resistance to abnormal heat and to fire
B	9.7	No	Test of dielectric properties
	9.8	No	Temperature rise
	9.20	No	Resistance of insulation against impulse voltages
	9.22.2	No	Reliability at 40 °C
	9.23	No	Ageing of electronic components
C	9.10	No	Mechanical and electrical endurance
D	D ₀	9.9	Residual operating characteristics
		9.1.2	Verification of the correct operation in case of a steady increase of composite residual current
		9.1.3	Verification of the correct operation in case of sudden appearance of composite residual current
	D ₁	9.17	Behaviour in the case of failure of the line voltage
		9.19	Unwanted tripping Behaviour in the case of surge currents

	9.1.6	Behaviour in the case of inrush residual currents
		9.1.4	Correct operation for RCD powered on two poles only
	9.21.4	9.1.7	Type A residual current devices
	9.11.2.3 a) and b)	No	Performance at $I_{\Delta m}$
	9.16	No	Test device
	9.12	No	Resistance to mechanical shock and impact
	9.18	No	Non-operating current under overcurrent conditions
	D ₂ 9.11.2.3 c)	No	Verification of the suitability in IT system
E	9.11.2.4 a)	No	Coordination at I_{nc}
	9.11.2.2	No	Performance at I_m
F	9.11.2.4 b)	No	Coordination at I_m
	9.11.2.4 c)	No	Coordination at $I_{\Delta c}$
G ₀	9.22.1	No	Reliability (climatic tests)
G ₁	9.Z1	No	Verification of correct operation at low ambient air temperature of RCCBs for use in the range of -25 °C to +40 °C
H ^a	EN 61543:1995, Table 4 -T1.1 EN 61543:1995, Table 4 -T1.2 EN 61543:1995, Table 5 -T2.3	No	Harmonics, interharmonics Signalling voltage Conducted unidirectional transients of the ms and µs time scale
I	EN 61543:1995, Table 5 -T2.1 EN 61543:1995, Table 5 -T2.5 EN 61543:1995, Table 5 -T2.2	No	Conducted oscillatory voltages or currents Radiated high-frequency phenomena Conducted unidirectional transients of the ns time scale (burst)
J	EN 61543:1995, Table 5 -T2.6 EN 61543:1995, Table 6 -T3.1	No	Conducted common mode disturbances in the frequency range lower than 150 kHz Electrostatic discharges
^a For devices containing a continuously operating oscillator, the test of CISPR 14-1 shall be carried out on the samples prior to the tests of this sequence.			

Annex B (normative)

Number of samples to be submitted and test sequences to be applied for verification of conformity for Type F RCBOs

Verification of conformity may be made

- by the manufacturer for the purpose of suppliers declaration (13.5.1 of ISO/IEC Guide 2);
- by an independent body for certification (13.5.2 of ISO/IEC Guide 2).

According to the terminology of ISO/IEC Guide 2 the term "certification" can be used for the second case only.

The tests are made according to Table B.1 below, where the tests in each sequence are carried out in the order indicated.

The sampling procedure is given in A.2 and A.3 of EN 61009-1:2012.

Table B.1 – Test sequences for Type F RCBOs

Test sequence		Tests according to EN 61009-1 and EN 61009-2-1	Additional tests according to this standard	Test (or Inspection)
A		6	6	Marking
		8.1.1	No	General
		8.1.2	No	Mechanism
		9.3	No	Indelibility of marking
		8.1.3	No	Clearance and creepage distances (external parts only)
		8.1.6	No	Non-interchangeability
		9.11	No	Trip-free mechanism
		9.4	No	Reliability of screws, current-carrying parts and connections
		9.5	No	Reliability of terminals for external conductors
		9.6	No	Protection against electric shock
		9.14.1	No	Resistance to heat
		9.14.2	No	
		9.14.3		
		8.1.3	No	Clearances and creepage distances (internal parts)
		9.15	No	Resistance to abnormal heat and to fire
B		9.7	No	Dielectric properties
		9.8	No	Temperature rise
		9.20	No	Resistance of insulation against impulse voltages
		9.22.2	No	Reliability at 40 °C
		9.23	No	Ageing of electronic components
C	C ₁	9.10	No	Mechanical and electrical endurance
		9.12.11.2.1 (and 9.12.12)	No	Performance at reduced short-circuit currents (Verification of the RCBO after the short-circuit tests)
	C ₂	9.12.11.2.2 (and 9.12.12)	No	Short-circuit test for verifying the suitability of RCBOs for use in IT systems (Verification of the RCBO after the short-circuit tests)
D	D ₀	9.9.1		Operating characteristics under residual current conditions

			9.1.2	Verification of the correct operation in case of a steady increase of composite residual current
			9.1.3	Verification of the correct operation in case of sudden appearance of composite residual current
	D ₁	9.17	No	Behaviour in the case of failure of the line voltage
		9.19	9.1.5	Unwanted tripping Behaviour in the case of surge currents.
		...	9.1.6	Behaviour in the case of inrush residual currents
			9.1.4	Correct operation for RCD powered on two poles only
		9.21.4	9.1.7	Type A residual current devices
		9.12.13	No	Performance at I _{Am}
		9.16	No	Test device
E	E ₀	9.9.2	No	Overcurrent operating characteristics
		9.18	No	Limiting value of overcurrent in case of a single-phase load through a 3-pole or 4-pole RCBO
	E ₁	9.13	No	Resistance to mechanical shock and impact
F	F ₀	9.12.11.4 b) (and 9.12.12)	No	Short-circuit performance at 1 500 A
	F ₁	9.12.11.4 c) (and 9.12.12.2)	No	Performance at service short-circuit capacity
	F ₂	9.12.11.4 d) (and 9.12.12.2)	No	Performance at I _{Am} (Verification of RCBO after short-circuit test)
G	G ₀	9.22.1	No	Reliability (climatic tests)
	G ₁	9.21	No	Verification of correct operation at low ambient air temperature of RCBOs for use in the range of -25 °C to +40 °C
H ^a		IEC 61543:1995, Table 4 - T1.1 IEC 61543:1995, Table 4 - T1.2 IEC 61543:1995, Table 5 - T2.3	No	Harmonics, interharmonics Signalling voltage Conducted unidirectional transients of the ms and µs time scale
I		IEC 61543:1995, Table 5 - T2.1 IEC 61543:1995, Table 5 - T2.5 IEC 61543:1995, Table 5 - T2.2	No	Conducted sine-wave voltages or currents Radiated high-frequency phenomena Fast Conducted unidirectional transients of the ns time scale (burst)
J		IEC 61543:1995, Table 5 - T2.6 IEC 61543:1995, Table 6 - T3.1	No	Conducted common mode disturbances in the frequency range lower than 150 kHz Electrostatic discharges
a) For devices containing a continuously operating oscillator, the test of CISPR 14-1 shall be carried out on the samples prior to the tests of this sequence.				

Annex C (normative)

Number of samples to be submitted and test sequences to be applied for verification of conformity for Type B RCCBs

Verification of conformity may be made

- by the manufacturer for the purpose of suppliers declaration (13.5.1 of ISO/IEC Guide 2);
- by an independent body for certification (13.5.2 of ISO/IEC Guide 2).

According to the terminology of ISO/IEC Guide 2 the term "certification" can be used for the second case only.

The tests are made according to Table C.1 below, where the tests in each sequence are carried out in the order indicated.

The sampling procedure is given in A.2 and A.3 of EN 61008-1:2012.

Table C.1 – Test sequences for Type B RCCBs

Test sequence	Tests according to EN 61008-1 and EN 61008-2-1	Additional tests according to this standard	Test (or inspection)
A	6	6	Marking
	8.1.1	No	General
	8.1.2	No	Mechanism
	9.3	No	Indelibility of marking
	8.1.3	No	Clearance and creepage distances (external parts only)
	9.15	No	Trip-free mechanism
	9.4	No	Reliability of screws, current-carrying parts and connections
	9.5	No	Reliability of terminals for external conductors
	9.6	No	Protection against electric shock
	9.13.1	9.2.4	Verification of the RCD after test sequence
	9.13.2 9.13.3	No	Resistance to heat
	8.1.3	No	Clearances and creepage distances (internal parts)
	9.14	No	Resistance to abnormal heat and to fire
B	9.7	No	Test of dielectric properties
	9.8	No	Temperature rise
	9.20	No	Resistance of insulation against impulse voltages
	9.22.2	No	Reliability at 40 °C
	9.23	No	Ageing of electronic components
	--	9.2.4	Verification of the RCD after test sequence
C	9.10	No	Mechanical and electrical endurance
	--	9.2.4	Verification of the RCD after test sequence
D	D ₀	9.9	Residual operating characteristics
		9.1.2	Verification of the correct operation in case of a steady increase of composite residual current
		9.1.3	Verification of the correct operation in case of sudden appearance of composite residual current

			9.2.1.7.1	Verification of the correct operation in case of residual smooth direct current without load for ratings of $I_{\Delta n}$ not tested in D ₁
	D ₁	9.17	No	Behaviour in the case of failure of the line voltage
		9.19	9.1.5	Unwanted tripping Behaviour in the case of surge currents
			9.1.6	Behaviour in the case of inrush residual currents
			9.1.4	Correct operation for RCD powered on two poles only
			9.2.3	Correct operation for RCD powered on two poles only
		9.21.1 ^a	9.1.7	Type A residual current devices
			9.2.1	Type B residual current devices
			9.2.2	Tests at temperature limits
		9.11.2.3 a) and b)	No	Performance at $I_{\Delta m}$
		9.16	No	Test device
		9.12	No	Resistance to mechanical shock and impact
		9.18	No	Non-operating current under overcurrent conditions
		--	9.2.4	Verification of the RCD after test sequence
D2		9.11.2.3 c)	No	Verification of the suitability in IT system
		--	9.2.4	Verification of the RCD after test sequence
E		9.11.2.4 a)	No	Coordination at I_{nc}
		9.11.2.2	No	Performance at I_m
		--	9.2.4	Verification of the RCD after test sequence
F		9.11.2.4 b)	No	Coordination at I_m
		9.11.2.4 c)	No	Coordination at $I_{\Delta c}$
		--	9.2.4	Verification of the RCD after test sequence
G ₀		9.22.1	No	Reliability (climatic tests)
		--	9.2.4	Verification of the RCD after test sequence
G ₁		9.Z1	No	Verification of correct operation at low ambient air temperature of RCCBs for use in the range of -25 °C to +40 °C
			9.2.4	Verification of the RCD after test sequence
H ^b		EN 61543:1995, Table 4 -T1.1 EN 61543:1995, Table 4 -T1.2 EN 61543:1995, Table 5 -T2.3	No	Harmonics, interharmonics Signalling voltage Conducted unidirectional transients of the ms and µs time scale
I		EN 61543:1995, Table 5 -T2.1 EN 61543:1995, Table 5 -T2.5 EN 61543:1995, Table 5 -T2.2	No	Conducted oscillatory voltages or currents Radiated high-frequency phenomena Conducted unidirectional transients of the ns time scale (burst)
J		EN 61543:1995, Table 5 -T2.6 EN 61543:1995, Table 6 -T3.1	No	Conducted common mode disturbances in the frequency range lower than 150 kHz Electrostatic discharges
^a For devices having different residual current detection systems, for which the test according to 9.21.1 was made without supply voltage, an additional test according to 9.21.1.1 shall be made with a supply voltage of 1,1 U_n to verify that there is no interference between the different systems. Only the lower limits of the tripping currents are verified. ^b For devices containing a continuously operating oscillator, the test of CISPR 14-1 shall be carried out on the samples prior to the tests of this sequence.				

Annex D (normative)

Number of samples to be submitted and test sequences to be applied for verification of conformity for Type B RCBOs

Verification of conformity may be made

- by the manufacturer for the purpose of suppliers declaration (13.5.1 of ISO/IEC Guide 2);
- by an independent body for certification (13.5.2 of ISO/IEC Guide 2).

According to the terminology of ISO/IEC Guide 2 the term "certification" can be used for the second case only.

The tests are made according to Table D.1 below, where the tests in each sequence are carried out in the order indicated.

The sampling procedure is given in A.2 to A.5 of EN 61009-1:2012.

Table D.1 – Test sequences for Type B RCBOs

Test sequence		Tests according to EN 61009-1 and EN 61009-2-1	Additional tests according to this standard	Test (or Inspection)		
A		6	6	Marking		
		8.1.1	No	General		
		8.1.2	No	Mechanism		
		9.3	No	Indelibility of marking		
		8.1.3	No	Clearance and creepage distances (external parts only)		
		8.1.6	No	Non-interchangeability		
		9.11	No	Trip-free mechanism		
		9.4	No	Reliability of screws, current-carrying parts and connections		
		9.5	No	Reliability of terminals for external conductors		
		9.6	No	Protection against electric shock		
		9.14.1	9.2.4	Verification of the RCD after test sequence	Resistance to heat	
		9.14.2	No			
		9.14.3				
		8.1.3	No	Clearances and creepage distances (internal parts)		
		9.15	No	Resistance to abnormal heat and to fire		
B		9.7	No	Dielectric properties		
		9.8	No	Temperature rise		
		9.20	No	Resistance of insulation against impulse voltages		
		9.22.2	No	Reliability at 40 °C		
		9.23	No	Ageing of electronic components		
		--	9.2.4	Verification of the RCD after test sequence		
C	C ₁	9.10	No	Mechanical and electrical endurance		
		--	9.2.4	Verification of the RCD after test sequence		
		9.12.11.2.1 (and 9.12.12)	No	Performance at reduced short-circuit currents (Verification of the RCBO after the short-circuit tests)		

	C ₂	9.12.11.2.2 (and 9.12.12)	No	Short-circuit test for verifying the suitability of RCBOs for use in IT systems (Verification of the RCBO after the short-circuit tests)
D	D ₀	9.9.1	No	Operating characteristics under residual current conditions
			9.1.2	Verification of the correct operation in case of a steady increase of composite residual current
			9.1.3	Verification of the correct operation in case of sudden appearance of composite residual current
			9.2.1.7.1	Verification of the correct operation in case of residual smooth direct current without load for ratings of $I_{\Delta n}$ not tested in D ₁
	D ₁	9.17	No	Behaviour in the case of failure of the line voltage
		9.19	9.1.5	Behaviour in the case of surge currents
			9.1.6	Behaviour in the case of inrush residual currents
			9.1.4	Correct operation for RCD powered on two poles only
			9.2.3	Correct operation for RCD powered on two poles only
		9.21.4 ^a	9.1.7	Type A residual current devices
			9.2.1	Type B residual current devices
			9.2.2	Tests at temperature limits
		9.12.13	No	Performance at $I_{\Delta m}$
		9.16	No	Test device
		--	9.2.4	Verification of the RCD after test sequence
E ₀	9.9.2	No	Overcurrent operating characteristics	
	9.18	No	Limiting value of overcurrent in case of a single-phase load through a 3-pole or 4-pole RCBO	
E ₁	9.13	No	Resistance to mechanical shock and impact	
	9.12.11.3 (and 9.12.12)	No	Short-circuit performance at 1 500 A	
F ₀	9.12.11.4 b) (and 9.12.12)	No	Performance at service short-circuit capacity	
F ₁	9.12.11.4 c) (and 9.12.12.2)	No	Performance at rated short-circuit capacity	
F ₂	9.12.11.4 d) (and 9.12.12.2)	No	Performance at $I_{\Delta m}$ (Verification of RCBO after short-circuit test)	
G ₀	9.22.1	No	Reliability (climatic tests)	
	--	9.2.4	Verification of the RCD after test sequence	
G ₁	9.21	No	Verification of correct operation at low ambient air temperature of RCBOs for use in the range of -25 °C to +40 °C	
		9.2.4	Verification of the RCD after test sequence	
H ^b	EN 61543:1995, Table 4 -T1.1 EN 61543:1995, Table 4 -T1.2 EN 61543:1995 Table 5 -T2.3	No	Harmonics, interharmonics Signalling voltage Conducted unidirectional transients of the ms and μs time scale	
I	EN 61543:1995, Table 5 -T2.1 EN 61543:1995, Table 5 -T2.5 EN 61543:1995, Table 5 -T2.2	No	Conducted oscillatory voltages or currents Radiated high-frequency phenomena Conducted unidirectional transients of the ns time scale (burst)	
J	EN 61543:1995, Table 5 -T2.6 EN 61543:1995, Table 6 -T3.1	No	Conducted common mode disturbances in the frequency range lower than 150 kHz Electrostatic discharges	

^a For devices having different residual current detection systems, for which the test according to 9.21.1 was made without supply voltage, an additional test according to 9.21.1.1 shall be made with a supply voltage of $1,1 U_n$ to verify that there is no interference between the different systems. Only the lower limits of the tripping currents are verified.

^b For devices containing a continuously operating oscillator, the test of CISPR 14-1 shall be carried out on the samples prior to the tests of this sequence.

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Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
CISPR 14-1 + corr. January	2005 2009	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission	EN 55014-1	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	-	-
IEC 61008	Series	Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCB's)	EN 61008	Series
IEC 61009	Series	Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBO's)	EN 61009	Series
IEC 61543	1995	Residual current-operated protective devices (RCDs) for household and similar use - Electromagnetic compatibility	EN 61543 + corr. December + A12	1995 1997 2005

Annex ZB (normative)

Special national conditions

Special national condition: National characteristic or practice that cannot be changed even over a long period, e.g. climatic conditions, electrical earthing conditions.

NOTE If it affects harmonization, it forms part of the European Standard / Harmonization Document.

For the countries in which the relevant special national conditions apply these provisions are normative, for other countries they are informative.

Clause Special national condition

The Netherlands

Scope Add the following:

This standard together with these requirements apply for 2 pole type B RCD for use in TN and TT distribution systems for protection of line and neutral circuits (L-N).

Modify note 2 reading: additional requirements for 1 pole devices for use in TN-S or TN-C-S systems and 2 pole devices (L-L) for use between phases are under consideration

3.2 Modify as follows

3.2 residual current devices for which tripping is ensured as for type A according to EN 61008-1 or EN 61009-1, as applicable, and in addition for the following residual currents:

3.2.1 Type B residual current devices with 3 or 4 poles

Existing text

3.2.2 Type B residual current devices with 2 poles

Residual current devices for which tripping is ensured as for RCD type A according EN 61008-1 or EN 61009-1, as applicable , and in addition:

- for residual sinusoidal alternating currents up to 1 000 Hz,
- for residual pulsating direct currents,
- for residual alternating currents superimposed on a smooth direct current,
- for residual pulsating rectified d.c which results from 2 phases,
- for residual d.c currents that may result from inverter circuits.

NOTE The above 5th dash refers to fault conditions in micro generators, such as fuel cells or PV systems, being connected through an inverter to the electrical installation connected in turn to another supply source (in general the public supply system).

5.1 Add to the last dash:

- for 3 and 4 pole residual current devices only.

Add a following new dash:

- for residual direct currents originating from invertors connected to the supply system.

5.4 Add the following new subclause

5.4 Standard values of break time and non-actuating time for general type 2 pole B type RCDs in case of residual pulsating direct currents which may result from an inverter circuit connected to the supply system.

Table 3 – Standard values of non-operating current and break times for general type 2-pole B type RCDs in case of residual pulsating direct currents which may result from an inverter circuit connected to the supply system

	Standard values of break time (s) at a residual current composed by a smooth dc current and a half wave rectified sinusoidal current having opposite polarity			
	$I_{\Delta 1}$	$I_{\Delta 2}$	$I_{\Delta 3}$	$I_{\Delta 4}$
Smooth residual current	+ 1,5 $I_{\Delta n}$	+ 3 $I_{\Delta n}$	+ 6 $I_{\Delta n}$	+ 15 $I_{\Delta n}$
Half wave sinusoidal residual current (peak value) 1	- 1,125 $I_{\Delta n}$	- 2,25 $I_{\Delta n}$	- 4,5 $I_{\Delta n}$	- 11,25 $I_{\Delta n}$
Break time	Non-tripping	0,3	0,15	0,04

8.1.4 Add to this clause the following text (Not applicable for 2 pole devices L-N).

8.1.5 Add to this clause the following text (Not applicable for 2 pole devices).

8.1.6 Add to this clause the following text (Not applicable for 2 pole devices).

8.1.7 Add the following new subclause

8.1.7 Residual pulsating direct currents originating from a single phase inverter circuit connected to the supply system

2 pole type B RCDs shall operate in response to a steady increase of residual pulsating direct currents resulting from an inverter connected to the supply system within the limits of the composed residual current according to table 3 between the values $I_{\Delta 1}$ and $I_{\Delta 2}$.

2 pole type B RCDs shall operate in response to a sudden appearance of residual pulsating direct currents resulting from an inverter connected to the supply system within the time limits specified in table 3 for the currents $I_{\Delta 2}$, $I_{\Delta 3}$ and $\geq I_{\Delta 4}$.

Compliance is checked by the test of 9.1.7.1 and 9.1.7.2.

9.1.6 Modify the heading reading

9.1.6 Verification of the correct operation of 3 and 4 pole type B RCDs in case of residual smooth direct current

9.1.7 Add a following new clause

9.1.7 Verification of the correct operation of 2 pole type B RCDs in case of residual direct currents when protecting a single phase inverter circuit connected to the supply

The RCD is connected as shown in Figure 1 and supplied with rated voltage.

9.1.7.1 Slowly rising residual pulsating current

The test circuit being connected to line and neutral terminal or if applicable to the line terminals, the RCD and test switch S_1 being closed

The test currents I_1 and I_2 are set to 0,2 x the values as given for the tripping current $I_{\Delta 2}$.

Current I_1 is increased to the value 0,3 x the value of the smooth residual current applicable for $I_{\Delta 2}$ followed by increasing the half wave pulsating residual current I_2 to 0,3 times the value as given for $I_{\Delta 2}$

Subsequently the currents are further increased in steps to 0,4 times, 0,5 times, 0,6 times etc of the residual operating current $I_{\Delta 2}$.

The RCD shall not trip before the current reaches the value $I_{\Delta 1}$ and shall trip before this current exceeds the value $I_{\Delta 2}$.

9.1.7.2 Suddenly appearing residual pulsating current

The RCD is initially closed but bypassed by calibration links B_L . With switches S and S_1 closed the currents I_1 and I_2 are set in turn to the values as applicable for $I_{\Delta 2}$, $I_{\Delta 3}$ and $I_{\Delta 4}$, respectively, as given in Table 3.

Switches S and S_1 are then opened and the calibration links are removed.

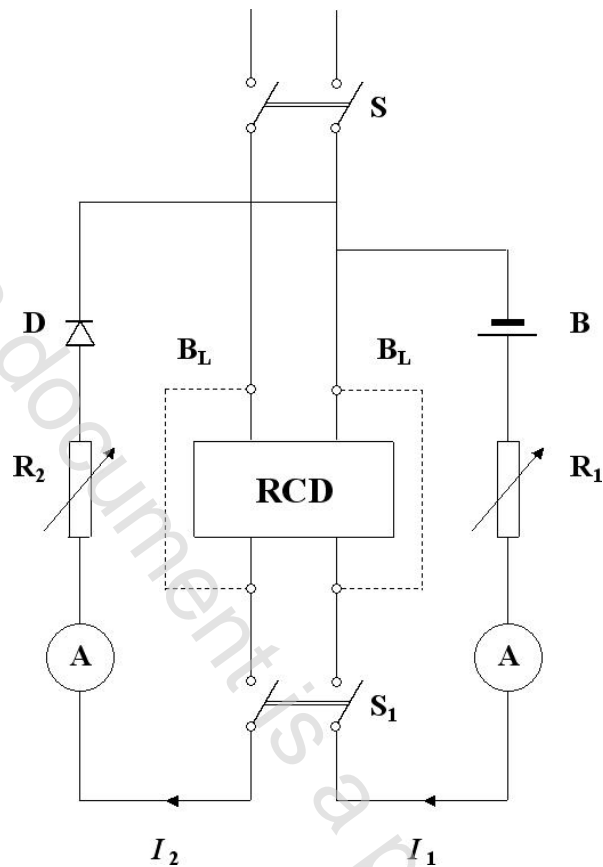
Switch S is first closed, then S_1 is closed and the residual currents start to flow.

The break time is measured for each value and shall not exceed the specified break times given in Table 3. This test is repeated 3 times for each of the residual current values.

9.3 *Modify this clause as follows:*

2 pole B type RCD shall trip within 0,3 s with the composite residual test current $I_{\Delta 2}$ as specified in Table 2.

3 and 4 pole type B RCD shall trip with a test current of 2,5 $I_{\Delta n}$ with smooth direct current.



Key

A	ammeters
S and S ₁	all-pole switch
R ₁ and R ₂	adjustable resistors
D	diode
B	d.c supply
RCD	2-pole RCD under test
B _L	bridging links for the RCD for calibration of the test currents of 9.1.7.2 and 9.3

Figure 1 – Test circuit for the verification of correct operation of 2 pole type B RCD for protection of single phase inverter circuit connected to a supply L-N.

Annex A Modify or add the following items in Table A1:

Test sequence		Test according to EN 61008-1	Additional test according to this standard	Test (or inspection)
<i>D</i>	<i>D</i> ₀		9.1.6.1	Verification of correct operation of 3 and 4 pole type B RCCB in case of residual smooth direct current without load for ratings of $I_{\Delta n}$ not tested in <i>D</i> ₁
			9.1.7	Verification of correct operation of 2 pole type B RCCB in case of residual currents when protecting a single phase inverter circuit connected to the supply

Annex B Modify or add the following items in Table B1:

Test sequence		Test according to EN 61009-1	Additional test according to this standard	Test (or inspection)
<i>D</i>	<i>D</i> ₀		9.1.6.1	Verification of correct operation of 3 and 4 pole type B RCBO in case of residual smooth direct current without load for ratings of $I_{\Delta n}$ not tested in <i>D</i> ₁
			9.1.7	Verification of correct operation of 2 pole type B RCBO in case of residual currents when protecting a single phase inverter circuit connected to the supply

Annex C Modify and add the following items in Annex C

Add to the beginning of the 3rd paragraph the wording: "In case of 3 or 4 pole RCD".

Introduce the following new 4th paragraph:

In case of 2 pole RCD a d.c residual current composed by a smooth d.c. current having the value I and a half wave pulsating residual current with power frequency and having the peak value of $-0,75 I$ is passed through one pole. The type B RCCB or type B RCBO, as applicable, shall not trip at a current less than or equal to the value specified for $I_{\Delta n1}$ and shall trip at the current $I_{\Delta n2}$ within the time specified in Table 3.

Annex ZZ (informative)

Coverage of Essential Requirements of EU Directives

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers all relevant essential requirements as given in Article 1 of Annex I of the EU Directive 2004/108/EC.

Compliance with this standard provides one means of conformity with the specified essential requirements of the Directive(s) concerned.

WARNING: Other requirements and other EU Directives may be applicable to the products falling within the scope of this standard.

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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*¹

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