Rikkevoolukaitselülitid sisseehitatud liigvoolukaitsega, kasutamiseks majapidamises ja muudel taolistel juhtudel. Osa 1: Üldreeglid

Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBO's) Part 1: General rules

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 61009-1:2004 sisaldab Euroopa standardi EN 61009-1:2004+AC:2006 ingliskeelset teksti.	This Estonian standard EVS-EN 61009-1:2004 consists of the English text of the European standard EN 61009-1:2004+AC:2006.
Standard on kinnitatud Eesti Standardikeskuse 16.11.2004 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.	This standard is ratified with the order of Estonian Centre for Standardisation dated 16.11.2004 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.
Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 30.09.2004.	Date of Availability of the European standard text 30.09.2004.
Standard on kättesaadav Eesti standardiorganisatsioonist.	The standard is available from Estonian standardisation organisation.

ICS 29.120.50

Võtmesõnad:

EUROPEAN STANDARD **EN 61009-1**

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Supersedes EN 61009-1:1994 + A1:1995 + A11:1995 + A2:1998 + A13:1998 + A14:1998 + A15:1998 + A17:1998 + A19:2000
Incorporates Corrigendum July 2006

English version

Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBO's) Part 1: General rules

(IEC 61009-1:1996 + corr. 2003 + A1:2002, modified)

Interrupteurs automatiques à courant différentiel résiduel avec protection contre les surintensités incorporée pour installations domestiques et analogues (DD) Partie 1: Règles générales (CEI 61009-1:1996 + corr. 2003 + A1:2002, modifiée)

Fehlerstrom-/Differenzstrom-Schutzschalter mit eingebautem Überstromschutz (RCBOs) für Hausinstallationen und für ähnliche Anwendungen Teil 1: Allgemeine Anforderungen (IEC 61009-1:1996 + Corr. 2003 + A1:2002, modifiziert)

This European Standard was approved by CENELEC on 2004-03-16. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Ref. No. EN 61009-1:2004 E

Foreword

The text of the International Standard IEC 61009-1:1996 and its amendment 1:2002, prepared by SC 23E, Circuit-breakers and similar equipment for household use, of IEC TC 23, Electrical accessories, together with common modifications prepared by the Technical Committee CENELEC TC 23E, Circuit breakers and similar devices for household and similar applications, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 61009-1 on 2004-03-16.

This European Standard supersedes EN 61009-1:1994 + corrigendum Dec. 1997 + A1:1995 + A1:1995/corrigendum Dec. 1997 + A11:1995 + A11:1995/corrigendum Dec. 1997 + A2:1998 + A13:1998 + A13:1998/corrigendum Apr. 1998 + A14:1998 + A15:1998 + A17:1998 + A19:2000.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2005-04-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2009-04-01

This European Standard was prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EC Directives. See Annex ZZ..

Annexes, clauses, subclauses, figures and tables that are additional to those in IEC 61009-1 are prefixed with the letter Z.

The contents of the corrigendum of July 2006 have been included in this copy.

Endorsement notice

The text of the International Standard IEC 61000-9-1:1996 + corrigendum May 2003 + A1:2002 *) was approved by CENELEC as a European Standard with agreed common modifications as given below.

Clause	Common modifications
Contents	Add: 3.Z1 Definitions related to insulation co-ordination Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions Annex ZC (informative) A-deviations Annex ZD (normative) Classification of RCBOs into energy limiting classes Annex ZZ (informative) Coverage of Essential Requirements of EC Directives Table ZD.1 – Permissible I^2t (let-through) values for RCBOs with rated current up to and including 16 A Table ZD.2 – Permissible I^2t (let-through) values for RCBOs with rated current exceeding 16 A up to and including 32 A
1	Replace the whole Clause 1 by: **1 Scope and object** 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 for fixed installation 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. These devices are intended for use in an environment with pollution degree 2. NOTE 1 For environment with higher pollution degree, enclosures giving the appropriate degree of protection should be used.

*) In view of some inconsistencies between the English and French versions of IEC 61009-1:1996, it is advisable to use the consolidated IEC text published in February 2003 for compiling the text of this European Standard.

Clause	Common modifications
	RCBOs within the scope of the present standard are suitable for isolation. Devices to this standard, are suitable for use in IT systems provided that the requirements of HD 384.4.473 are complied with. NOTE 2 The content of the present standard related to the operation under residual current conditions is based on EN 61008. The content of the present standard related to protection against overcurrents is based on EN 60898. NOTE 3 RCBOs are essentially intended to be operated by uninstructed persons and designed not to require maintenance. They may be submitted for certification purposes. NOTE 4 Installation and application rules of RCBOs are given in HD 384. NOTE 5 Recommendations for the dimensional coordination between enclosures and RCBOs for mounting on rail according to EN 60715 or equivalent means are given in CENELEC Report R023-001. 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. NOTE 6 For more severe overvoltage conditions, RCBOs complying with other standards (e.g. EN 60947-2) should be used. 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 HD 384.4.443). NOTE 7 For RCBOs having a degree of protection higher than IP20 special constructions may be required. 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. Supplementary requirements may be necessary for RCBOs of the plug-in type. Particular requirements are necessary for RCBOs integrated in one unit with a socket-outlet or designed exclusively for being associated locally with a socket-outlet in the same mounting box. NOTE 8 Until a specific EN for SRCDs is prepared and approved for RCBOs integrated in one unit with a socket-outlet or designed exclusively for being associated locally with a socket-outlet in the same mounting box the requirements of this standard in conjunction with those of IEC 60884-1 may be used as far as applicable. 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, – RCBOs having more than one rated current. 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 under short-circuit conditions between a RCBO and another short-circuit protective device (SCPDs) is given in Annex F.

Clause	Common modifications
	This standard contains all requirements necessary to ensure compliance with the operational characteristics required for these devices by type tests. It also contains the details relative to test requirements and methods of testing necessary to ensure reproducibility of test results. This standard states: a) the characteristics of RCBOs; b) the conditions with which RCBOs shall comply, with reference to: 1) their operation and behaviour in normal service, 2) their operation and behaviour in case of overload, 3) their operation and behaviour in case of short-circuits up to their rated short-circuit capacity, 4) their operation under residual current conditions, 5) EMC, 6) their dielectric properties; c) the tests intended for confirming that these conditions have been met and the methods to be adopted for the tests; d) the data to be marked on the devices; e) the test sequences to be carried out and the number of samples to be submitted for certification purposes (see Annex A); f) the co-ordination under short-circuit conditions with another short-circuit protective device (SCPD) associated in the same circuit (see Annex F); g) the routine tests to be carried out on each RCBO to reveal unacceptable variations in material or manufacture, likely to affect safety (see Annex D).
2	Replace the text of Clause 2 by: NOTE Normative references to international publications are listed in Annex ZA (normative).
3.3.16	Delete.
3.3.17	Replace "current paths" by "poles".
3.3.Z1	Add the following new definition: **3.3.Z1** **plug-in RCBO** RCBO having one or more plug-in terminals (see 3.6.Z1) and designed for use with appropriate means for the plug-in connection
3.4.9.1	Delete the reference to IEV.
3.4.15	Replace this subclause by: **3.4.15 Co-ordination between overcurrent protective devices in series** **3.4.15.1** **overcurrent protective co-ordination of overcurrent protective devices** co-ordination of two or more overcurrent protective devices in series to ensure overcurrent discrimination (selectivity) and/or back-up protection (2.5.22 of EN 60947-1) **3.4.15.2** **overcurrent discrimination** co-ordination of the operating characteristics of two or more overcurrent protective devices in series such that, on the incidence of overcurrents within stated limits, the device intended to operate within these limits does so, while the other(s) does (do) not (IEV 441-17-15)

Clause	Common modifications
	3.4.15.3 **back-up protection** overcurrent co-ordination of two overcurrent protective devices in series, where the protective device, generally but not necessarily on the supply side, effects the overcurrent protection with or without the assistance of the other protective device and prevents excessive stress on the latter (2.5.24 of EN 60947-1) **3.4.15.4** **total discrimination (total selectivity)** overcurrent discrimination where, in the presence of two overcurrent protective devices in series, the protective device on the load side effects the protection without causing the other protective device to operate (2.17.2 of EN 60947-2) **3.4.15.5** **partial discrimination (partial selectivity)** overcurrent discrimination where, in the presence of two overcurrent protective devices in series, the protective device on the load side effects the protection up to a given level of overcurrent, without causing the other protective device to operate (2.17.3 of EN 60947-2) **3.4.15.6** **selectivity limit current (I_s)** the current co-ordinate of the intersection between the total time-current characteristic of the protective device on the load side and the pre-arcing (for fuses), or tripping (for RCBOs) time-current characteristic of the other protective device The selectivity limit current (see Figure D.1 of EN 60898-1) is a limiting value of current - below which, in the presence of two overcurrent protective devices in series, the protective device on the load side completes its breaking operation in time to prevent the other protective device from starting its operation (i.e. selectivity is ensured); - above which, in the presence of two overcurrent protective devices in series, the protective device on the load side may not complete its breaking operation in time to prevent the other protective device from starting its operation (i.e. selectivity is not ensured) (2.17.4 of EN 60947-2) **3.4.15.7** **take-over current (I_B)** current co-ordinate of the intersection between the time-current characteristics of two overcurrent protective devices NOTE The take-over current is the current co-ordinate of the intersection between the maximum break-time / current characteristics of two overcurrent protective devices in series. (2.5.25 of EN 60947-1 and 2.17.6 of EN 60947-2) **3.4.15.8** **conditional short-circuit current** (of a circuit or a switching device) prospective current that a circuit or a switching device, protected by a specified short-circuit protective device, can satisfactorily withstand for the total operating time of that device under specified conditions of use and behaviour NOTE 1 For the purpose of this standard, the short-circuit protective device is generally a RCBO or a fuse. NOTE 2 This definition differs from IEV 441-17-20 by broadening the concept of current limiting device into a short-circuit protective device, the function of which is not only to limit the current. (2.5.29 of EN 60947-1) **3.4.15.9** **rated conditional short-circuit current I_{nc}** value of prospective current, stated by the manufacturer, which the equipment, protected by a short-circuit protective device specified by the manufacturer, can withstand satisfactorily for the operating time of this device under the test conditions in the relevant product standard (4.3.6.4 of EN 60947-1).

Clause	Common modifications
3.Z1	Add a new subclause: **3.Z1 Definitions related to insulation co-ordination** **3.Z1.1** **insulation co-ordination** the mutual correlation of insulation characteristics of electrical equipment taking into account the expected micro-environment and the influencing stresses (1.3.1 of IEC 60664-1) **3.Z1.2** **working voltage** the highest r.m.s. value of the a.c. or d.c. voltage across any particular insulation which can occur when the equipment is supplied at rated voltage (1.3.5 of IEC 60664-1) NOTE 1 Transients are disregarded. NOTE 2 Both open circuit conditions and normal operating conditions are taken into account. **3.Z1.3** **overvoltage** any voltage having a peak value exceeding the corresponding peak value of maximum steady-state voltage at normal operating conditions (1.3.7 of IEC 60664-1) **3.Z1.4** **impulse withstand voltage** the highest peak value of impulse voltage of prescribed form and polarity, which does not cause breakdown of the insulation under specific conditions (1.3.8.1 of IEC 60664-1) **3.Z1.5** **overvoltage category** a numeral defining a transient overvoltage condition (1.3.10 of IEC 60664-1) **3.Z1.6** **macro-environment** the environment of the room or other location, in which the equipment is installed or used **3.Z1.7** **micro-environment** the immediate environment of the insulation which particularly influences the dimensioning of the creepage distances (1.3.12.2 of IEC 60664-1) **3.Z1.8** **pollution** any addition of foreign matter, solid, liquid or gaseous that can result in a reduction of electric strength or surface resistivity of the insulation (1.3.11 of IEC 60664-1) **3.Z1.9** **pollution degree** a numeral characterising the expected pollution of the micro-environment (1.3.13 of IEC 60664-1) NOTE The pollution degree to which equipment is exposed may be different from that of the macro-environment where the equipment is located because of protection offered by means such as an enclosure or internal heating to prevent absorption or condensation of moisture.

Clause	Common modifications
	3.Z1.10 **isolation (isolating function)** function intended to cut off the supply from the whole installation or a discrete section of it by separating it from every source of electrical energy for reasons of safety (3.6.10 of EN 60898-1) **3.Z1.11** **isolating distance** the clearance between open contacts, meeting the safety requirements specified for isolation purposes (3.6.11 of EN 60898-1) **3.Z1.12** **clearance** (see Annex B) shortest distance in air between two conductive parts along a string stretched the shortest way between these conductive parts (IEV 441-17-31) NOTE For the purpose of determining a clearance to accessible parts, the accessible surface of an insulating enclosure shall be considered conductive as if it was covered by a metal foil wherever it can be touched by a hand or a standard test finger according to Figure 9. **3.Z1.13** **creepage distance** (see Annex B) shortest distance along the surface of an insulating material between two conductive parts. NOTE For the purpose of determining a creepage distance to accessible parts, the accessible surface of an insulating enclosure shall be considered conductive as if it was covered by a metal foil wherever it can be touched by a hand or a standard test finger according to Figure 9.
3.4.19	Delete
3.4.20	Delete
3.6.Z1	Add the following new definition: **3.6.Z1** **plug-in terminal** terminal the electrical connection and disconnection of which can be effected without displacing the conductors of the corresponding circuit. The connection is effected without the use of a tool and is provided by the resilience of the fixed and/or moving parts and/or by springs
4.1	Replace the note by the following specification: The selection of the various types is made according to HD 384 and non-conflicting national wiring rules. Table Z1 lists the types of RCBOs according to the various applications but does not exclude the use of RCBOs of any classification for protection over and above that required by the relevant wiring rules.
	Add the following table:

Table Z1 – Survey of the types of RCBOs according to their method of operation

Classification	4.1.1	4.1.2.2a)	4.1.2.1 b)	4.1.2.2b)
Marking of use	Without	E1	E2	E3
Protection	Indirect contact and additional protection [a]	Indirect contact and additional protection [a]	Additional protection [a]	Additional protection [a b]
Service continuity [c]	Yes	Yes	No	Yes

[a] Additional protection, provided only for RCBOs with $I_{\Delta n} \leq 0{,}03$ A .

[b] Only devices integrated in one unit with a socket-outlet or designed exclusively for being associated locally with a socket outlet in a same mounting box.

[c] This information is given for guidance only.

Clause	Common modifications
4.1.2.1	Replace item a) by: "Deleted". Add after b): RCBOs of type 4.1.2.1b) shall comply with the relevant requirements of 8.12.
4.1.2.2a)	Replace the final sentence in brackets by "(additional requirements are under consideration)".
4.1.2.2b)	Delete the note.
4.2	Replace the text by "Deleted".
4.3	Delete: – single-pole RCBO with one overcurrent protected pole and uninterrupted neutral (see 3.3.16) (two current paths) – three-pole RCBO with three overcurrent protected poles and uninterrupted neutral (four current paths).
4.4	Replace the text by 'Deleted'
4.12	Replace the text by: RCBOs of B-type and C-type, having rated current up to and including 40 A and having short-circuit breaking capacity of 3 000 A, 4 500 A, 6 000 A and 10 000 A, may be classified according to the limits within which their I^2t characteristics lie, measured according to 9.12.6 (see Annex ZD).
4.Z1	Add the following new subclause: **4.Z1 According to the range of ambient air temperature** – RCBOs for use at ambient air temperatures between -5 °C and +40 °C; – RCBOs for use at ambient air temperatures between -25 °C and +40 °C.
5.1	Delete the first dashed item.
	Add the following item to the list of common characteristics: – ranges of ambient air temperature (see 5.2.Z1)
5.2.1.Z1	Add: **5.2.1.Z1 Rated impulse withstand voltage (U_{imp})** The rated impulse withstand voltage of an RCBO shall be equal to or higher than the standard values of rated impulse withstand voltage given in 5.3.2.2.
5.2.3	Delete the note.
5.2.7	Replace the last line by: The conditions are those specified in 9.12.11.4d)
5.2.9.3	Delete.
5.3.1	Replace "preferred" by "standard" (twice).
	Replace the Table by:

RCBOs	Circuit supplying the RCBO	Rated voltage of RCBOs for use in systems 230 V, 230 V/400 V, 400 V
Two-pole	Single phase (phase to neutral or phase to phase)	230 V
	Single phase (phase to phase)	400 V
	Three phase (4-wire)	230 V
Three-pole	Three phase (3-wire)	400 V
Four-pole	Three phase (4-wire)	400 V

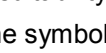
Clause	Common modifications
5.3.2	Delete in the second line the value 8 A.
5.3.3	Delete the value “0,006”.
5.3.5	Replace the title by "Values of rated frequency". Replace the text by: The preferred value of rated frequency is 50 Hz.
5.3.6	Replace the subclause title by: **5.3.6 Values of rated short-circuit capacity (I_{cn}) and of rated residual making and breaking capacity ($I_{\Delta m}$)** NOTE 1 For test voltages to check the insulation, see 9.20. NOTE 2 For test voltages to check the isolation distance across open contacts, see Table Z2.
5.3.6.1	Replace the first sentence by: Standard values of rated short-circuit capacity and of rated residual making and breaking capacity are given in Table 1. The values of I_{cn} and $I_{\Delta m}$ may be different on the same product.
	Replace Table 1 and the subsequent footnote by:

Table 1 – Standard values of rated short-circuit capacity and of the rated residual making and breaking capacity

1 500 A (*)
3 000 A
4 500 A
6 000 A
10 000 A

(*) Only for RCBOs integrated in one unit with a socket outlet or designed exclusively for being associated locally with a socket outlet in the same mounting box.

5.3.7	Delete.
5.3.9	Table 3: Replace “50 I_n” by “20 I_n”.
5.3.Z1	Add the following new subclause: **5.3.Z1 Standard ranges of ambient air temperature** The standard ranges of ambient air temperature are: – -5 °C to +40 °C – -25 °C to +40 °C
5.3.Z2	Add the following new subclause: **5.3.Z2 Standard values of rated impulse withstand voltage (U_{imp})** Standard value of the rated impulse voltage (U_{imp}) is 4 kV. NOTE For test voltages to check the isolation distance across open contacts, see Table Z2.
6	The text of Clause 6 become 6.Z1 with the following modifications: **6.Z1 Standard marking** c) Add "with the symbol ~" f) Add "($I_{\Delta n}$) in A or mA" g) Replace the text by "Deleted"

Clause	Common modifications
	Replace item h) by: h) rated short-circuit capacity, in amperes in a rectangle without symbol "A"; m) Add "($I_{\Delta m}$)" between "capacity" and ", if different from..." and add "(I_{cn})" at the end Replace item o) by: o) symbol of the method of operation according to Table Z1 of 4.1 if the RCBO is functionally dependent on the line voltage; r) Add "unless the correct mode of connection is evident" Add the following items: t) Energy limiting class in a square in accordance with Annex ZD, if applied. I_{cn} and the energy limiting class, when applicable, shall both be on the device and combined together; u) RCBO according to 4.Z1 shall be marked with the symbol  (the value -25 included in the snow flake symbol according to Figure 0027 of ISO 7000) if relevant
	In the second paragraph after u): Replace "under d), f), and n)" by "under d), f), n), q) and s) (for type A only)". Replace "under a), b), c) and h)" by "under a), b), c), h), l), o), r), s) (for type AC only), t) and u)". Replace "The information under r)" by: "Alternatively, information under o) and r)".
	Add between the second and third paragraph after u): If a degree of protection higher than IP20 is marked on the device, it shall comply with it, whichever the method of installation. If the higher degree of protection is obtained only by a specific method of installation and/or with the use of specific accessories (e.g. terminal covers, enclosures, etc.), this shall be specified in the manufacturer's literature.
	Add at the end: The suitability for isolation, which is provided by all RCBOs of this standard, may be indicated by the symbol  on the device. When affixed, this marking may be included in a wiring diagram, where it may be combined with symbols of other functions, (e.g. overload protection, or other symbols of IEC TC 3). When the symbol is used on its own (i.e. not in a wiring diagram), combination with symbols of other functions is not allowed. Specifications on appropriate recommendations to the user to regularly operate the test device are under consideration.
6.Z2	Add the following new subclause: **6.Z2 Additional marking** Additional marking to other standards (EN or IEC or other) is allowed under the following conditions: – the RCBO shall comply with all the requirements of the additional standard. – the relevant standard to which the additional marking refers shall be indicated adjacent to this marking and shall be clearly differentiated or separated from the standard marking according to 6.Z1. *Compliance is checked by inspection and by carrying out all the test sequences required by the relevant standard. Equivalent or less severe test sequences need not be repeated.*
6.Z3	Add the following new subclause:

6.Z3 Guidance table for marking

	Marking and other product information	Marking shall be on the RCBO itself			Product information in the catalogue
	Each RCBO shall be marked in a durable manner with all or, for small apparatus, part of the following data: The minimum requirements are indicated by the symbol "X"	*If, for small devices the space available does not allow all the above data to be marked, at least this information shall be marked and **visible** when the device is installed.*	*This information may be marked on the **side** or on the back of the device and be visible only before the device is installed.*	*Alternatively the information may be on the inside of any **cover** which has to be removed in order to connect the supply wires.*	*Any remaining information not marked shall be given in the manufacturer's **catalogues**.*
a)	the manufacturer's name or trademark;		X		
b)	type designation, catalogue number or serial number;		X		
c)	rated voltage(s) with the symbol ~;		X		
d)	rated current without symbol "A", preceded by the symbol of overcurrent instantaneous tripping (B, C or D),for example B16	X			
e)	rated frequency, if the RCBO is designed only for one frequency (see 5.3.5)				X
f)	rated residual operating current ($I_{\Delta n}$)in A or in mA	X			
h)	rated short circuit capacity, in amperes in a rectangle without symbol "A"		X(*)		
j)	reference calibration temperature, if different from 30 °C				X
k)	the degree of protection (only if different from IP20);				X
l)	the position of use (symbol according to IEC 60051), if necessary;		X		
m)	rated residual making and breaking capacity ($I_{\Delta m}$), if different from rated short-circuit capacity (I_{cn})				X
n)	the symbol [S] (S in a square) for type S devices;	X			
o)	indication that the RCBO is functionally dependent on line voltage, if applicable		X	X	
q)	operating means of the test device, by the letter T;	X			
r)	wiring diagram unless the correct mode of operation is evident		X	X	
s)	operating characteristic in presence of residual currents with d.c. components - RCBOs of type AC with the symbol ~ - RCBOs of type A with the symbol ≂	X	X		
t)	Energy limiting class (e.g. 3) in a square in accordance with Annex ZD if applied		X(*)		
u)	RCBOs according to 4.Z1 shall be marked with the symbol ❄ (snowflake enclosing -25) if relevant		X		
	Indication of the terminal for the neutral with "N"		X		
	Additional marking of performance to other standards		X		

(*) Icn and the energy limiting class shall be on the device and combined together

NOTE Specifications on appropriate recommendations to the user to regularly operate the test device are under consideration.

Clause	Common modifications
7.1	In Table 4, second column, add to "-5° C to +40 °C [2)]" in the same box, the range "-25 °C to +40 °C [2)]". Modify footnote 7) to read: 7) Extreme limits of -20 °C and 60°'C, for RCBOs for use in the range of –5 °C to +40 °C and of –35 °C and 60 °C, for RCBOs for use in the range of –25 °C to +40 °C, are admissible during storage and transportation. These conditions should be taken into account in the design of the device.
	In Table 4, second column, after "2 000 m", add a footnote reference "[8)]" Add footnote 8) as follows: 8) For installations at higher altitudes, it is necessary to take into account the reduction of the dielectric strength and of the cooling effect of the air. RCBOs intended to be so used shall be designed specially or used according to an agreement between manufacturer and user. Information given in the manufacturer's catalogue may take the place of such an agreement.
7.Z1	Add the following new subclause: **7.Z1 Pollution degree** RCBOs to this standard are intended for environment with pollution degree 2, i.e.: normally, only non-conductive pollution occurs; occasionally, however, a temporary conductivity caused by condensation may be expected.
8.1.2	Replace the first and the second paragraph by: The moving contacts of all poles of multipole RCBOs shall be so mechanically coupled that all poles, except the switched neutral, if any, make and break substantially together, whether operated manually or automatically, even if an overload occurs on one protected pole only. The switched neutral pole (see 6.3.15.3) of four-pole RCBOs shall not close after and shall not open before the protected poles. *Compliance is checked by inspection and by manual test, using any appropriate means (e.g. indicator lights, oscilloscope, etc.).*
	Add after the sixth paragraph: RCBOs shall provide in the open position (see 3.3.14) an isolation distance in accordance with the requirements necessary to satisfy the isolating function (see 8.3). Indication of the open and closed position of the main contacts shall be provided by one or both of the following means: – the position of the actuator (this being preferred), or – a separate mechanical indicator. If a separate mechanical indicator is used to indicate the position of the main contacts, this shall show the colour red for the closed position (ON) and the colour green for the open - position (OFF). The means of indication of the contact position shall be reliable. *Compliance is checked by inspection and by the tests of 9.9.2.2 a)* RCBOs shall be designed so that the actuator, front plate or cover can only be correctly fitted in a manner which ensures correct indication of the contact position. *Compliance is checked by inspection and by the tests of 9.12.12.1 and 9.12.12.2* When means are provided or specified by the manufacturer to lock the operating means in the open position, locking in that position shall only be possible when the main contacts are in the open position. NOTE Locking of the operating means in the ON position is permitted for particular applications. *Compliance is checked by inspection, taking into account the instructions of the manufacturer.*
	Delete the ninth paragraph and the relevant note.
	Delete the last note.

Clause	Common modifications
8.1.3	Replace 8.1.3 by: **8.1.3 Clearances and creepage distances** The minimum required clearances and creepage distances are given in Table 5 which is based on the RCBO being designed for operating in an environment with pollution degree 2. However, the clearances of item 2, 4 and 5 may be reduced provided that the tests at rated impulse voltage are withstood. The insulating materials are classified into Material Groups on the basis of their comparative tracking index (CTI) according to 2.7.1.1 and 2.7.1.3 of IEC 60664-1 and measured according to IEC 60112.
	Replace Table 5 by the following table:

Table 5 – Minimum clearances for U_{imp} 4 KV and creepage distances

	Minimum clearances mm	Minimum creepage distances [e), f)] mm											
		Group IIIa[h)] (175V ≤ CTI < 400 V)[d)]				Group II (400V ≤ CTI < 600V)[d)]				Group I (600V ≤ CTI) [d)]			
	Rated voltage V	Working voltage [e)] V											
Description	230 V/400 V 230 V 400 V	>25 ≤50 [i)]	120	250	400	>25 ≤50 [i)]	120	250	400	>25 ≤50 [i)]	120	250	400
1. between live parts which are separated when the main contacts are in the open position [a)]	4,0	1,2	2,0	4,0	4,0	0,9	2,0	4,0	4,0	0,6	2,0	4,0	4,0
2. between live parts of different polarity [a)]	3,0	1,2	1,5	3,0	4,0	0,9	1,5	3,0	3,0	0,6	1,5	3,0	3,0
3. between circuits supplied from different sources, one of which being PELV or SELV [g)]	8,0		3,0	6,0	8,0		3,0	6,0	8,0		3,0	6,0	8,0
		Rated voltage V											
		230 - 400				230 - 400				230 - 400			
4. between live parts and - accessible surfaces of operating means – screws or other means for fixing covers which have to be removed when mounting the RCBO – surface on which the RCBO is mounted [b)] – screws or other means for fixing the RCBO [b)] – metal covers or boxes [b)] – other accessible metal parts [c)] – metal frames supporting flush-type RCBOs	3,0	–	4,0			3,0				3,0			
5. between metal parts of the mechanism and: – accessible metal parts [c)] – screws or other means for fixing the RCBO – metal frames supporting flush-type RCBOs		–											

a) For auxiliary and control contacts the values are given in the relevant standard.

b) The values are doubled if clearances and creepage distances between live parts of the device and the metallic screen or the surface on which the RCBO is mounted are not dependent on the design of the RCBO only, so that they can be reduced when the RCBO is mounted in the most unfavourable condition.

c) Including a metal foil in contact with the surfaces of insulating material which are accessible after installation as for normal use. The foil is pushed into corners, grooves, etc., by means of a straight unjointed test finger according to 9.6 (see Figure 3).

d) See IEC 60112.

e) Interpolation is allowed in determining creepage distances corresponding to voltage values intermediate to those listed as working voltage. For determination of creepage distances see Annex B.

f) Creepage distances cannot be less than the associated clearances.

g) To cover all different voltages including ELV in an auxiliary contact.

h) For material group IIIb (100 V ≤ CTI < 175 V) the values for material group IIIa multiplied by 1,6 apply.

i) For working voltages up to and including 25 V reference may be made to IEC 60664-1.

NOTE 1 The values given for 400 V are also valid for 440 V.

NOTE 2 The parts of the neutral path, if any, are considered to be live parts.

NOTE 3 Care should be taken to provide adequate clearances and creepage distances between live parts of different polarity of RCBOs, e.g. of the plug-in type mounted close to one another.

Clause	Common modifications
8.1.5.2	Delete the note after Table 6.
8.1.Z1	Add the following new subclause: **8.1.Z1 Mechanical mounting of plug-in type RCBOs** The mechanical mounting of plug-in type RCBOs shall be reliable and have adequate stability. **8.1.Z1.1 Plug-in type RCBOs, the holding in position of which does not depend solely on their plug-in connection(s)** *Compliance of the mechanical mounting is checked by the relevant tests of 9.13.* Add the following new subclause: **8.1.Z1.2 Plug-in type RCBOs, the holding in position of which depends solely on their plug-in connection(s)** *Compliance of the mechanical mounting is checked by the relevant tests of 9.13.*
8.3	Replace 8.3 by: **8.3 Dielectric properties and isolating capability** RCBOs shall have adequate dielectric properties and shall ensure isolation. *Control circuits connected to the main circuit shall not be damaged by high d.c. voltage due to insulating measurements which are carried out after RCBOs are installed.* **8.3.Z1 Dielectric strength at power frequency** RCBOs shall have adequate dielectric properties at power frequency. *Compliance is checked by the tests of 9.7.1, 9.7.2, 9.7.3 and 9.7.4 (if applicable).* *Moreover, after the endurance tests of 9.10 and after the short-circuit tests of 9.12, the RCBOs shall withstand the test of 9.7.3 but at the reduced test voltage specified in 9.10.3 and 9.12.12.2 respectively and without the previous humidity treatment of 9.7.1.* **8.3.Z2 Isolating capability** RCBOs shall be suitable for isolation. *Compliance is checked by the verification of compliance with the minimum clearances and creepage distances of item 1 of Table 5 of 8.1.3 and by the tests of 9.7.Z1.1 and 9.7.Z1.2.* **8.3.Z3 Dielectric strength at rated impulse withstand voltage (U_{imp})** RCBOs shall adequately withstand impulse voltages. *Compliance is checked by the tests of 9.20.*
8.5.2.1	Table 8, replace test d by:

d	B	3 I_n	Cold*)	0,1 < t < 45 s ($I_n \leq$ 32 A) 0,1 < t < 90 s ($I_n >$ 32 A)	Tripping	Current established by closing an auxiliary switch
	C	5 I_n		0,1 < t < 15 s ($I_n \leq$ 32 A) 0,1 < t < 30 s ($I_n >$ 32 A)		
	D	10 I_n		0,1 < t < 4 s **($I_n \leq$ 32 A) 0,1 < t < 8 s ($I_n >$ 32 A)		

	Table 8, test e, replace “50 I_n” by “20 I_n”.
	Table 8, add a footnote: ** For $I_n \leq$ 10 A, t < 8 s is permitted.

Clause	Common modifications
8.11	Delete the third paragraph: "In the case of RCBOs having … shall be used."
8.12	Add at the end of the subclause: Specific requirements for RCBOs classified in 4.1.2.2a) are under consideration.
8.Z1	Add the following new subclause: **8.Z1 Behaviour of RCBOs at low ambient air temperatures** RCBOs for use in the range of –25 °C to +40 °C (see 4.Z1) shall operate reliably at low temperatures. *Compliance is checked by the tests of 9.Z1.*
9.1.1	Add the following note before Table 10: NOTE To verify compliance of additional marking to 6.Z2, if any, tests are carried out according to the relevant standard. In Table 10 replace the fifth dash by: – Dielectric properties and isolating capability In Table 10 add the following dashed item: – Behaviour at low ambient air temperatures of RCBOs classified for use in the range of -25 °C to +40 °C and add correspondingly "9.Z1" in the column named "Subclause".
9.2	Delete the note after Table 11.
9.5.3	Table 14, replace the two occurrences of “under consideration” respectively by “19” and “1,83”.
9.7	Amend the title to read: **9.7 Test of dielectric properties and isolating capability**
9.7.2	In the second line of Item b) replace “current paths” by poles”. Add after b): NOTE To this purpose samples specially prepared by the manufacturer should be submitted to the test sequences implying this test.
9.7.3	In the first paragraph, delete “*electronic components, if any, being disconnected for the test*.”. Replace the first dashed line by – *2 000 V for a) to d) of 9.7.2, electronic components, if any, having been disconnected for test b) (see relevant note on 9.7.2 b);*
9.7.Z1	Add a new subclause: **9.7.Z1 Verification of impulse withstand voltages (across clearances and across solid insulation) and of leakage current across open contacts** **9.7.Z1.1 Verification of impulse withstand voltage across the open contacts (suitability for isolation)** *The test is carried out on a RCBO fixed on a metal support.* *The impulses are given by a generator producing positive and negative impulses having a front time of 1,2 µs, and a time to half-value of 50 µs, the tolerances being* - *± 5 % for the peak value;* - *± 30 % for the front time;* - *± 20 % for the time to half-value*. *The surge impedance of the test apparatus shall have a nominal value of 500 Ω.* *The shape of the impulses is adjusted with the RCBO under test connected to the impulse generator. For this purpose appropriate voltage dividers and voltage sensors shall be used.*

<table>
<tr><th>Clause</th><th>Common modifications</th></tr>
<tr><td></td><td>
Small oscillations in the impulses are allowed provided that their amplitude near the peak of the impulse is less than 5 % of the peak value.

For oscillations on the first half of the front, amplitudes up to 10 % of the peak value are allowed.

The 1,2/50 µs impulse voltage according to Figure 6 of IEC 60060-1 is applied between the line terminals connected together and the load terminals connected together with the contacts in the open position.

Three positive impulses and three negative impulses are applied, the interval between consecutive impulses being at least 1 s for impulses of the same polarity and being at least 10 s for impulses of the opposite polarity.

The test impulse voltage values shall be chosen in Table Z2, in accordance with the rated impulse voltage of the RCBO as given in 5.3.Z2. These values are corrected for barometric pressure and/or altitude at which the tests are carried out, according to Table Z2.

There shall be no disruptive discharges during the test.

Table Z2 – Test voltage across the open contacts for verifying the suitability for isolation, referred to the rated impulse withstand voltage of the RCBO and to the altitude where the test is carried out
<table>
<tr><th rowspan="2">Rated impulse voltage withstand
U_{imp}
kV</th><th colspan="5">Test voltages at corresponding altitude
$U_{1,2/50}$ a.c. peak
kV</th></tr>
<tr><th>Sea level</th><th>200 m</th><th>500 m</th><th>1 000 m</th><th>2 000 m</th></tr>
<tr><td>4</td><td>6,2</td><td>6,0</td><td>5,8</td><td>5,6</td><td>5,0</td></tr>
</table>
9.7.Z1.2 Verification of leakage currents across open contacts (suitability for isolation)

Each pole of RCBO having been submitted to the tests of 9.12.11.2, or 9.12.11.3, or 9.12.11.4.b), or 9.12.11.4.c) or 9.12.11.4 d) is supplied at a voltage 1.1 times its rated operational voltage, the RCBO being in the open position.

The leakage current flowing across the open contacts is measured and shall not exceed 2 mA.
</td></tr>
<tr><td>9.9.1.2</td><td>Delete the second paragraph.</td></tr>
<tr><td>9.9.1.3</td><td>Add after the second paragraph:

NOTE Preheating may be carded out at reduced voltage but auxiliary circuits shall be connected to their normal operating voltage (particularly for components depending on U_n voltage).

Delete the third paragraph.</td></tr>
<tr><td>9.9.1.4</td><td>Delete the last paragraph before the note.</td></tr>
</table>

Clause	Common modifications
9.9.2.2	Amend the title to read: **9.9.2.2 Test of instantaneous tripping and of correct opening of the contacts**
	Renumber a), b) and c) respectively in b), c) and d).
9.9.2.2 a)	Add a new a): *a) General test conditions* *For the lower values of the test current of 9.9.2.2 b), 9.9.2.2 c) and 9.9.2.2 d) respectively the test is made once, at any convenient voltage.* *For the upper values of the test current the test is made at rated voltage U_n (phase to neutral) with a power factor between 0,95 and 1.* *The sequence of operation is* *O-t-CO-t-CO-t-CO* *the interval t being as defined in 9.12.11.1. The tripping time of the O operation is measured.* *After each operation the indicating means shall show the open position of the contacts.*
9.9.2.2 b)	Replace the third line by: *The opening time shall be not less than 0,1 s and not more than:* *- 45 s for rated currents up to and including 32 A,* *- 90 s for rated currents above 32 A.*
9.9.2.2 c)	Replace the third line by: *The opening time shall be not less than 0,1 s and not more than:* *- 15 s for rated currents up to and including 32 A,* *- 30 s for rated currents above 32 A.*
9.9.2.2 d)	Replace the third line by: *The opening time shall be not less than 0,1 s and not more than:* *- 4 s for rated currents above 10 A up to and including 32 A,* *- 8 s for rated currents up to an including 10 A and above 32 A.* Replace in the fourth line "*50 I_n*" by "*20 I_n*".
9.10.2	Delete the note.
9.10.3	Replace the last sentence of the second paragraph by: *One test only is made, on one pole taken at random, with measurement of break time: the latter shall not exceed the value specified in Table 2 at $I_{\Delta n}$.*
9.11.2	Delete note 2.

Clause	Common modifications
9.12.1	Replace, at the end of the first paragraph, "*9.12.13*" by "*9.12.11.4 d)*". Delete the note after the first paragraph. Replace, in the third dashed item of the third paragraph, "*9.12.13.1, 9.12.13.2 and 9.12.12.1*" by " *9.12.11.4 d), 9.12.12.2 and 9.12.12.Z1*".
	Replace Table 16 by:

Table 16 - Applicability of short-circuit tests

Kind of test	RCBOs to be tested	Verification after short-circuit tests according to subclause
Test at reduced short-circuit currents (9.12.11.2.Z1)	*All RCBOs*	*9.12.12.1*
Test to verify suitability for IT systems (9.12.11.2.Z2)	*All RCBOs*	*9.12.12.1*
Tests at 1500 A (9.12.11.3)	*All RCBOs*	*9.12.12.1*
Test at rated residual making and breaking capacity (9.12.11.4 d)	*All RCBOs*	*9.12.12.2, 9.12.12.Z1*
Tests at service short-circuit capacity (9.12.11.4 b)	*RCBOs with I_{cn} > 1 500 A*	*9.12.12.1*
Tests at rated short-circuit capacity (9.12. 11.4.c)		*9.12.12.2*

9.12.2	Replace: – in the first line '5, 6, 7, 8 and 9' by 'Z1, 6, Z2 and Z3'; – the first dashed line by "- a single-pole RCBO (Figure Z1)"; – in the third dashed line "(Figure 7)" by "(Figure Z2)"; – in the fifth dashed line "(Figure 9)" by "(Figure Z3)". Delete the fourth dashed line. In the first paragraph after the note, replace "*9.12.13*" by "*9.12.11.4 d)*". In the ninth paragraph, replace "in Figures 5 to 9" by "in Figures Z1, 6, Z2 and Z3".
9.12.3	Replace in the third paragraph "105 %" by "110 %". Replace in the note "105 % (± 5 %) by "110 % (0, - 5 %)".
9.12.4	Replace, in the last line, "± 5 %" by "0, - 5%".
9.12.7.1, 9.12.7.3 and 9.12.7.4	Replace "in Figures 5 to 9" by "in Figures Z1, 6, Z2 and Z3".
9.12.8	Renumber a) into 9.12.8.1 and b) into 9.12.8.2. Replace "Figure 10" by "Figure Z4" in both 9.12.8.1 and 9.12.8.2.
9.12.9.1	Replace in the fourth paragraph "Figures 5 to 9" by "Figures Z1, 6, Z2 and Z3".
9.12.9.2	Replace, in the note, "Figures 5 to 9" by "Figures Z1, 6, Z2 and Z3".

Clause	Common modifications
9.12.11.2	Insert the following subclause title for the existing text: **9.12.11.2.Z1 Test on all RCBOs**
	Replace the second paragraph by: *Each pole of the RCBO, except the switched neutral pole or the overcurrent unprotected pole, is subjected separately to a test in a circuit, the connections of which are shown in Figure Z1. Phases which do not carry the short circuit current during this test shall be connected to the supply voltage at the line terminals.* *The measurement of the breaking time shall be carried out at every test and the values shall comply with the values of Table 2.* Delete the note.
9.12.11.2.Z2	Add a new subclause: **9.12.11.2.Z2 Short-circuit test on RCBOs rated 230 V or 400 V for verifying their suitability for use in IT systems** *The additional impedances Z_1 (see 9.12.7.3) are adjusted so as to obtain a current of 500 A or 1,2 times the upper limit of the standard range of instantaneous tripping given in Table 3, whichever is the higher, but not exceeding 2 500 A, at a power factor between 0,93 and 0,98, at a voltage 105 % of 400 V.* *Each protected pole of RCBOs are subjected individually to a test in a circuit the connections of which are shown in Figure Z1, where the connection N shall be replaced by a connection to a phase.* *The sequence of operations shall be* *O - t - CO* *For the O operation on the first protected pole the auxiliary switch A is synchronised with respect to the voltage wave so that the circuit is closed on the point 0° on the wave for this operation .* *For the following O operations on the other protected poles to be tested (see C.2) this point is shifted each time by 30 ° with respect to the point on wave of the previous test, with a tolerance of ± 5 °.*
9.12.11.3	Delete the third paragraph. Replace, in the fifth paragraph "Figures 7, 8 and 9" by "Figures Z2 and Z3". Delete in the ninth paragraph “single-pole and".
9.12.11.4	Delete in b) 2) “single-pole and". Delete in the title of Table 19 "single- and".

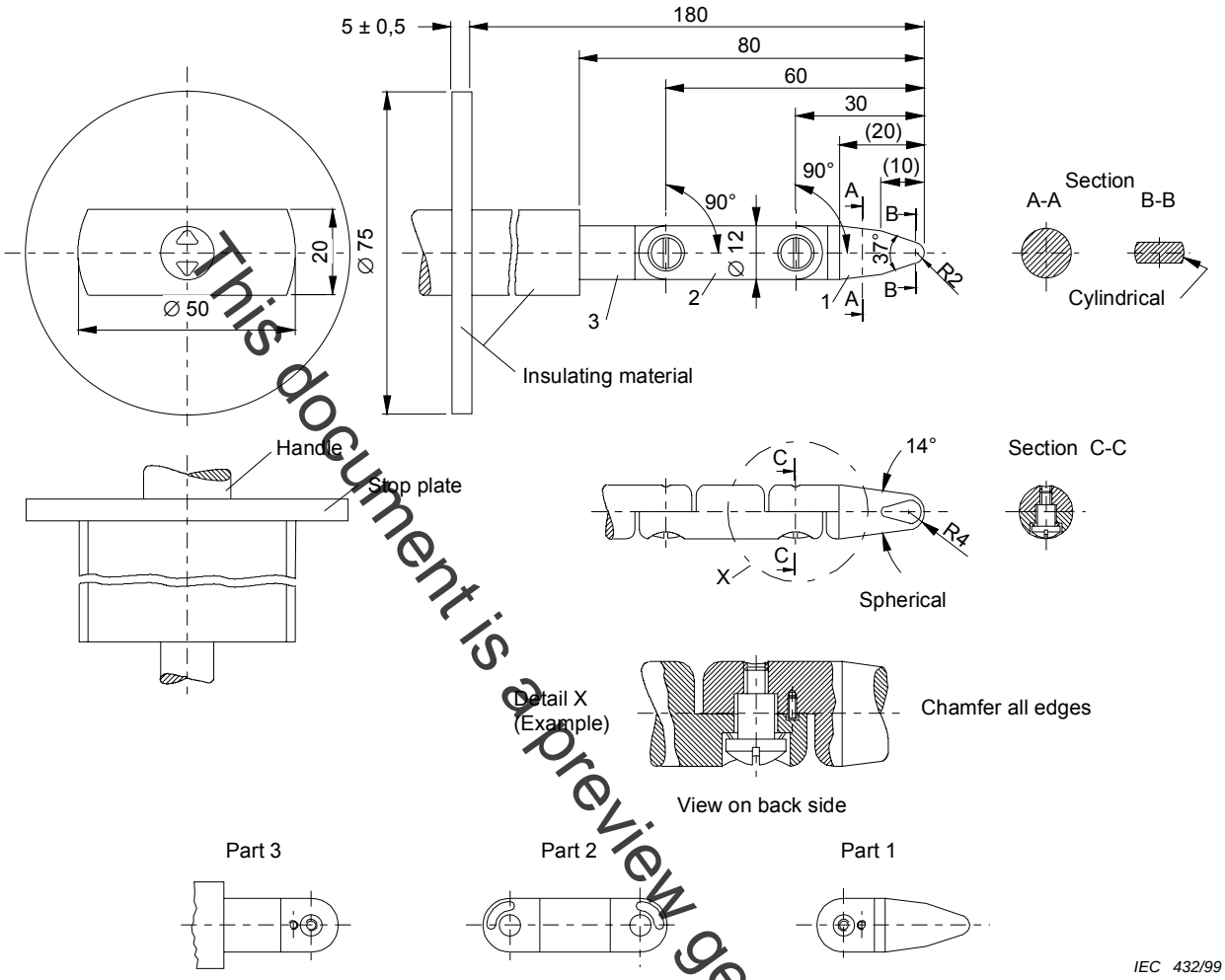
Clause	Common modifications
	Add a new 9.12.11.4 d): *d) Test at the residual making and breaking capacity $I_{\Delta m}$* *The test circuit is calibrated according to 9.12.7.* *The test is carried out on one pole taken at random which shall not be the switched neutral or the overcurrent unprotected pole. This pole is connected according to the diagram of Figure Z1.* *In addition phases which do not carry the short-circuit current during this test shall be connected to their supply voltage at the corresponding terminals.* *The sequence of operation is :* *O - t - CO* *For the "O" operations, the auxiliary switch A is synchronised with respect to the voltage wave so that the circuit is closed on the point 15° on the wave for the "O" operation on the first sample.* *This point is then shifted by 30° for the "O" operation on the second sample and by a further 30° for the "O" operation on the third sample.* *The synchronisation tolerance shall be ± 5°.* *For the three and four-pole RCBOs, the same pole shall be used as reference for the purpose of synchronisation.*
9.12.12.1	Replace 9.12.12.1 by: **9.12.12.1 Verifications after the tests at reduced short-circuit currents, at 1 500 A and at service short-circuit capacity** *After the tests according to 9.12.11.2, 9.12.11.3 or 9.12.11.4.b), the RCBOs shall show no damage impairing their further use and shall, without maintenance, withstand the following tests.* *a) Leakage current across open contacts, according to 9.7.Z1.2.* *b) Dielectric strength tests according to 9.7.3, carried out between 2 h and 24 h after the short-circuit tests at a voltage of 500 V less than the value prescribed in 9.7.5 and without previous humidity treatment.* *During these tests, after the test carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indicating means shall show the closed position.* *c) Moreover, after the test of 9.12.11.3 or 9.12.11.4.b), the RCBOs shall not trip when a current equal to 0,85 times the conventional non-tripping current is passed through all poles for the conventional time, starting from cold.* *At the end of this verification the current is steadily increased, within 5 s, to 1,1 times the conventional tripping current.* *The RCBOs shall trip within the conventional time.*

Clause	Common modifications
9.12.12.2	Replace 9.12.12.2 by: **9.12.12.2 Verifications after the short-circuit tests at rated short-circuit capacity and at rated residual making and breaking capacity** *After the tests according to 9.12.11.4.c) and 9.12.11.4 d), the polyethylene foil shall show no holes visible with normal or corrected vision without additional magnification and the RCBOs shall show no damage impairing their further use and shall, without maintenance, withstand the following tests.* *a) Leakage current across open contacts, according to 9.7.Z1.2.* *b) Dielectric strength tests according to 9.7.3, carried out between 2 h and 24 h after the short-circuit tests at a voltage of 900 V without previous humidity treatment.* *During these tests, after the test carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position, and during the test carried out under the conditions specified in 9.7.2 b) the indicating means shall show the closed position.* *c) Moreover the RCBOs shall trip within the time corresponding to the test c of Table 8 when a current equal to 2,8 I_n is passed through all poles, the lower time limit being 0,1 s instead of 1 s.*
9.12.12.Z1	Add the new subclause: **9.12.12.Z1 Condition of the RCBO after the tests** *After the test of 9.12.11.4 d), under the condition of 9.9.1.2 c), the RCBO shall trip with a test current of 1,25 $I_{\Delta n}$. One test only is made on one pole, taken at random, with measurement of break time. This shall not exceed the value specified in Table 2 for $I_{\Delta n}$.*
9.12.13	Delete.
9.13	Replace the title by: **9.13 Mechanical stresses**
9.13.2	Replace the title by: **9.13.2 Resistance to mechanical stresses and impact**
	Replace the two dashed items by: - *9.13.2.2 for RCBOs intended to be mounted on a rail and for all types of plug-in RCBOs designed for surface mounting;* - *9.13.2.3 for plug-in type RCBOs, the holding in position of which depends solely on their connections.*
9.13.2.2	Add after the first paragraph: *Plug-in RCBOs designed for surface mounting are mounted complete with the appropriate means for the plug-in connection but without cables being connected and without any cover-plate.*
9.13.2.3	Replace the note by: *Plug-in type RCBOs, the holding in position of which depends solely on their connections, are mounted, complete with the appropriate plug-in base but without cables being connected and without any cover-plate, on a vertical rigid wall.* *A force of 20 N is applied to the RCBO portion at a point equidistant between the plug-in connections, without jerks for 1 min (see Figure Z5).* *During this test the RCBO portion shall not become loose and shall not move from the base portion and after the test both portions shall show no damage impairing their further use.*

Clause	Common modifications
9.14.1	Replace the second sentence of the fourth paragraph by: *One test only is made on one pole taken at random, with measurement of break lime: the latter shall not exceed the value specified in Table 2 at $I_{\Delta n}$.*
9.15	Replace "clauses 4 to 10 of IEC 60695-2-1" by 'IEC 60695-2-10".
9.17.1	Replace the fourth, fifth and sixth paragraphs by: *All the values measured shall be less than 0,70 times the rated voltage (or, if relevant, 0,70 times the minimum value of the range of rated voltages).* *At the end of these measurements the RCBO is supplied with a voltage just above the highest measured value and it shall be verified that the RCBO operates in a period of lime corresponding to the value specified in Table 2 for $I_{\Delta n}$, when a current equal to 1,25 $I_{\Delta n}$ is applied.* *It shall also be verified that for any value of the line voltage less than the lowest measured value it shall not be possible to close the apparatus by the manual operating means.*
9.17.2	Replace in the title the words "automatic opening" by "behaviour". Add after item a): *No tripping shall occur if the voltage is switched off for a time not exceeding 0,03 s.* Add after item b): *RCBOs classified in 4.1.2.1 b) are additionally submitted to the following test.* *The RCBO, previously energized with the rated voltage and brought to the closed position, is opened by hand or by operating the test device. The rated voltage is then switched off at the line side of the RCBO and suddenly re-established: the RCBO shall not close automatically.* *The test is carried out five times*.
9.17.4	Replace, in the title and in the first line, "current paths" by “poles".
9.17.5	Replace by "Deleted".
9.18	Delete the first note.
9.20	Replace the third paragraph by: *A first series of tests is made at an impulse voltage of 6 kV peak, the impulses being applied between the phase pole(s), connected together, and the neutral pole of the RCBO or, in absence of the neutral pole, on one pole taken at random.*
	Delete, in the last line of the fourth paragraph, the words "(or path)".
9.22	Replace the second paragraph by: *Specifications on verification of reliability of electronic circuits are under consideration*.
9.22.1	Replace "IEC 60068-2-28" by "IEC 60068-3-4".
9.22.1.3	Replace in the first paragraph “IEC 60068-2-28” by “IEC 60068-3-4”.
9.22.1.5	Replace the second sentence by: *One test only is made on one pole taken at random, with measurement of the break time: the latter shall not exceed the value specified in Table 2 at $I_{\Delta n}$.*
9.22.2	Second paragraph, replace "Table 6" by “Table 11".
	Replace the last sentence by: *One test only is made on one pole taken at random, with measurement of the break time: the latter shall not exceed the value specified in Table 2 at $I_{\Delta n}$.*

Clause	Common modifications
9.23	Delete in the title "of electronic components".
	Replace the last sentence before note2 by: *One test only is made one pole taken at random, with measurement of the break time: the latter shall not exceed the value specified in Table 2 at $I_{\Delta n}$.*
9.Z1	Add the following new subclause:
	9.Z1 Verification of the correct operation at low ambient air temperatures for RCBOs for use at temperatures between –25 °C and +40 °C *Enclosed-type RCBOs are tested in their enclosure, unenclosed-type RCBOs are mounted in an individual enclosure with a degree of protection IP55, and are connected as for normal use (see Figure 4a).* NOTE 1 No drain hole in the enclosure shall be opened for this test. NOTE 2 RCBOs tested in enclosures IP55 may also be used in enclosures of a degree of protection other than IP55 within the temperature range of –25 °C to +40 °C. *The RCBO (including the enclosure) is brought into a suitable test chamber with an ambient air temperature of (23 ± 2) °C and a relative humidity of (93 ± 3) %. The volume ratio of the test chamber to the test samples (including enclosures) shall be greater than 50.* *The RCBO is in the ON position without load and shall be subjected to the following cycle (see Figure Z6).* *For the first 6 h (stabilization period) the temperature is kept at (23 ± 2) °C and the humidity at (93 ± 3) %. Within the next 6 h the ambient air temperature is decreased to (-25 ± 2) °C without any supply of humidity. This temperature of (-25 ± 2) °C is kept for 6 h. Within the next 6 h the temperature is increased to (+ 23 ± 2) °C and the relative humidity is increased to (93 ± 3) % (end of the first cycle). This cycle is performed five times.* *During these cycles the RCBO shall not trip.* *During the fifth cycle, at the end of the period at (-25 ± 2) °C, an a.c. residual current is passed through one pole of the RCBO (see Figure 4a)* — *for RCBOs of the general type, the residual current is calibrated to 1,25 $I_{\Delta n}$ and established by closing S_2. One test only is made on one pole taken at random. The break time measured shall not exceed the value specified in Table 2 for $I_{\Delta n}$;* – *for RCBOs of type S the residual current is calibrated to I,25 x 2I∆n and established by closing S_2 One test only is made on one pole taken at random. The break time measured shall not exceed the value specified in Table 2 for 2 $I_{\Delta n}$.* *In addition, RCBOs of type A are tested with pulsating d.c. residual currents immediately after the above test with a.c. residual current, the test circuit corresponding to Figure 4b* – *for RCBOs of the general type, the residual current is calibrated to 1,25 x 2 $I_{\Delta n}$ for RCBOs with $I_{\Delta n} \leq 0{,}01$ A, and to 1,25 x 1,4 $I_{\Delta n}$ for RCBOs with $I_{\Delta n} > 0{,}01$ A. The current delay angle shall be = 0°, the position of S_3 is set at random, and the current is established by closing S_2 One test only is made on one pole taken at random. The break time measured shall not exceed the value specified in Table 2 for $I_{\Delta n}$,* – *for RCBOs of type S the residual current is calibrated to 1,25 x 1,4 x 2 $I_{\Delta n}$ current delay angle shall be = 0°, the position of S3 is set at random, and the current is established by closing S_2 One test only is made on one pole taken at random. The break time measured shall not exceed the value specified in Table 2 for 2 $I_{\Delta n}$.* *After these tests a visual inspection shall show that the materials have not undergone deterioration impairing the further use of the RCBO and it shall be possible to switch on the RCBO, without the presence of any residual current, at the temperature of -25 °C.*

Clause	Common modifications
Figure 3	Replace the existing figure by the following:



Dimensions in millimetres

Tolerances on dimensions without specific tolerance

on angles $^{0}_{-10'}$

on linear dimensions:

up to 25 mm $^{0}_{-0,05}$

over 25 mm: ±0,2

Material of finger: e.g. heat-treated steel

Both joints of this finger may be bent through an angle of 90° $^{+10°}_{0}$, but in the one and same direction only.

Using the pin and groove solution is only one of the possible approaches in order to limit the bending angle to 90°. For this reason dimensions and tolerances of these details are not given in the drawing. The actual design must ensure a 90° bending angle with a 0 to +10° tolerance.

Figure 3 – Standard test finger

Clause	Common modifications
Figure 4a	Add the following dashed item in the title: **– correct operation at low ambient air temperature of RCBOs for use in the range of –25 °C to +40 °C (9.Z1)**
Key after Figure 4c	Replace the last line by: Explanation of letter symbols used in figures Z1, 6, Z2 and Z3.
Figure 5	Replace by Figure Z1.

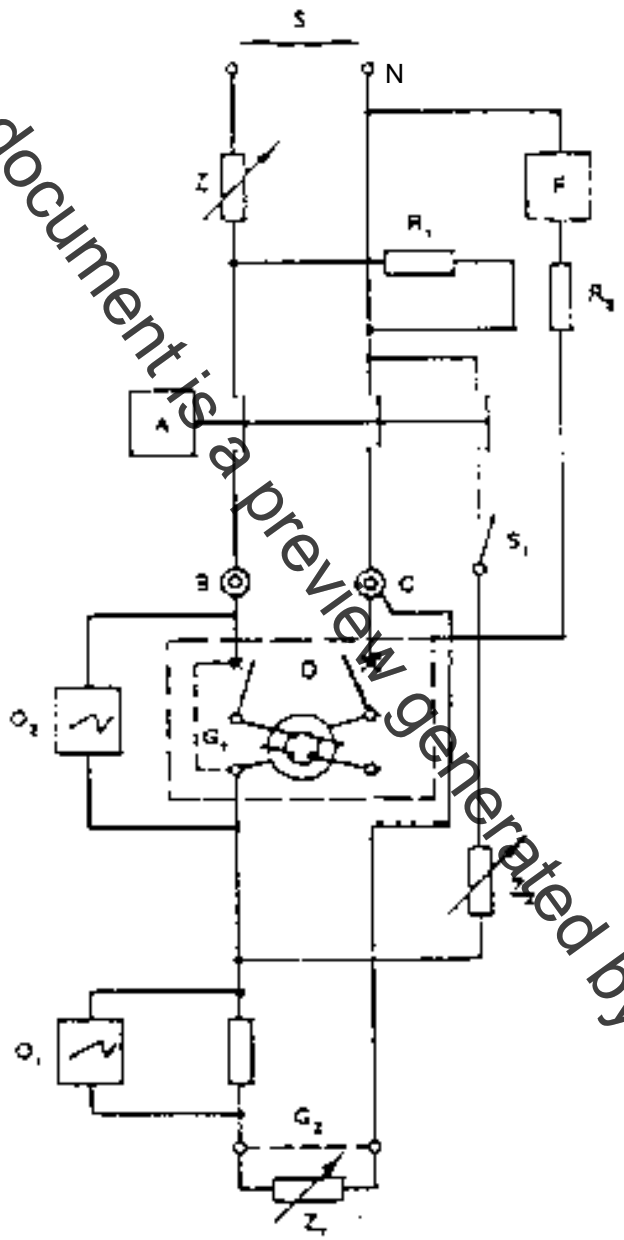


Figure Z1 – Test circuit for the test at reduced short-circuit currents and for the verification of the rated residual making and breaking capacity ($I_{\Delta m}$) of a RCBO

Clause	Common modifications
Figure 7	Replace by Figure Z2.

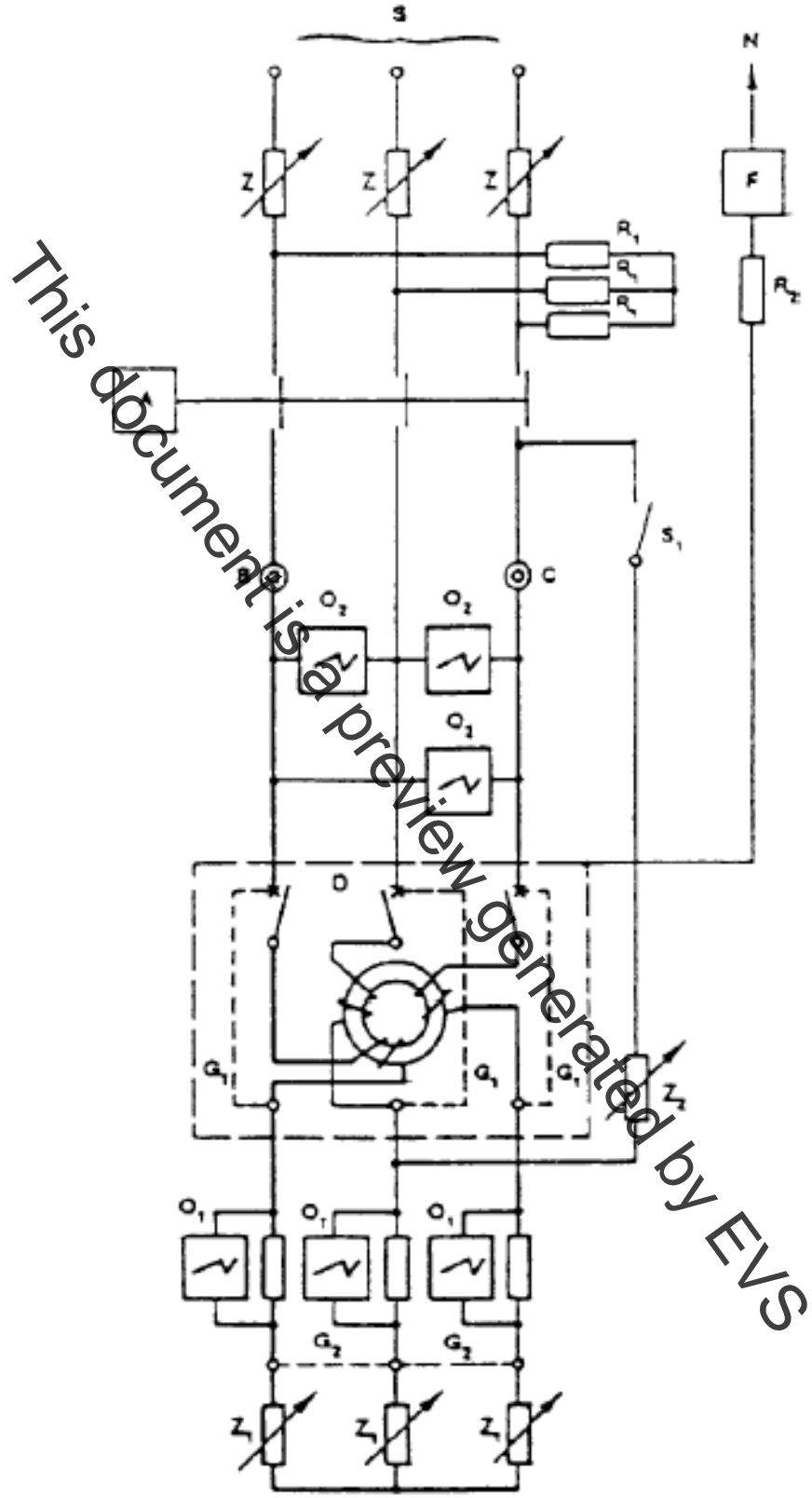


Figure Z2 – Test circuit for the verification of the rated making and breaking capacity and for the co-ordination with a SCPD of a three-pole RCBO on three phase circuit (9.11)

Clause	Common modifications
Figure 8	Delete.
Figure 9	Replace by Figure Z3.

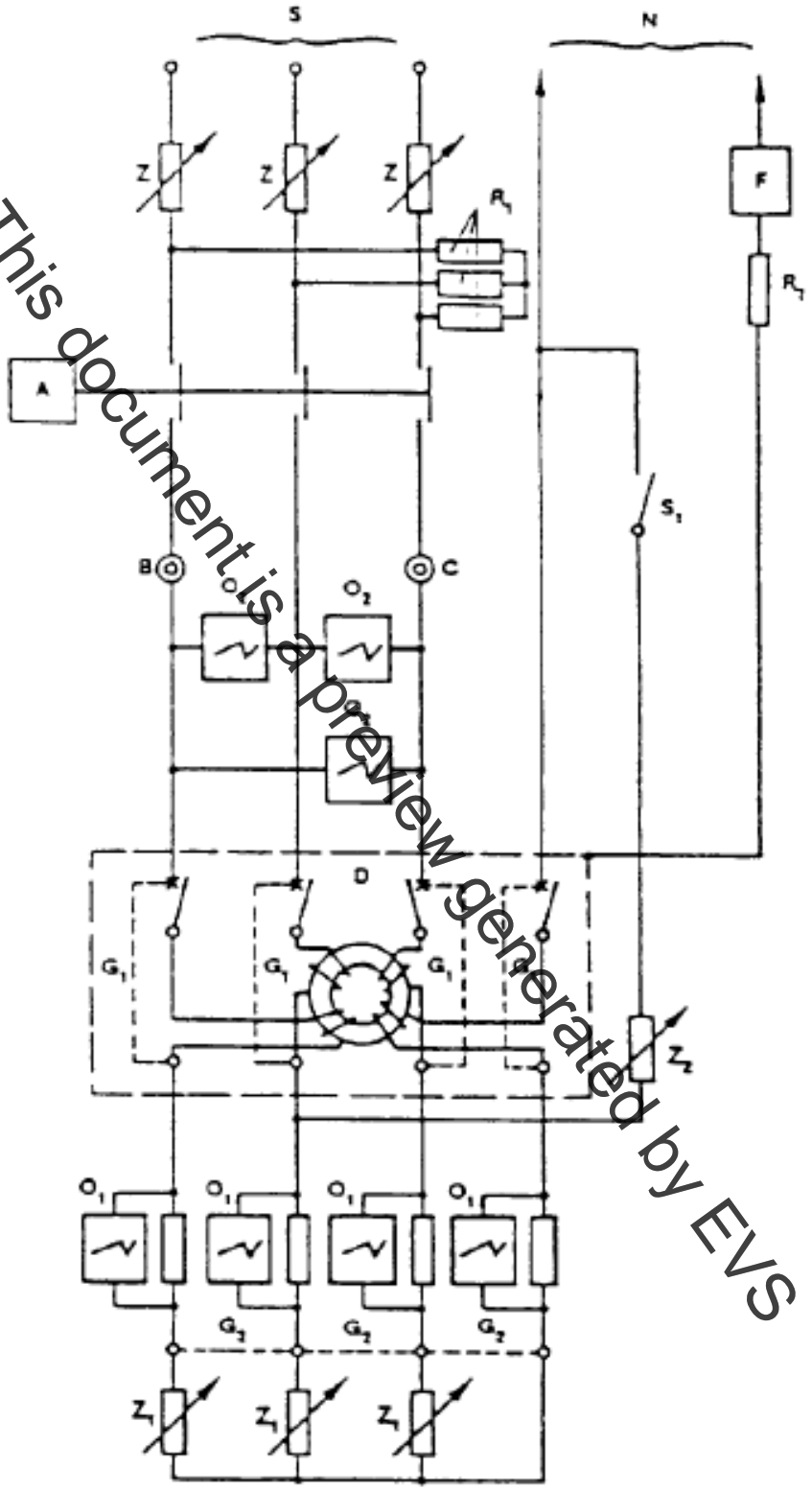


Figure Z3 – Test circuit for the verification of the rated making and breaking capacity and for the co-ordination with a SCPD of a four-pole RCBO on three phase circuit with neutral (9.11)

Clause	Common modifications
Figure 10	Replace by Figure Z4 (see Figure 7 of IEC 60898-1).

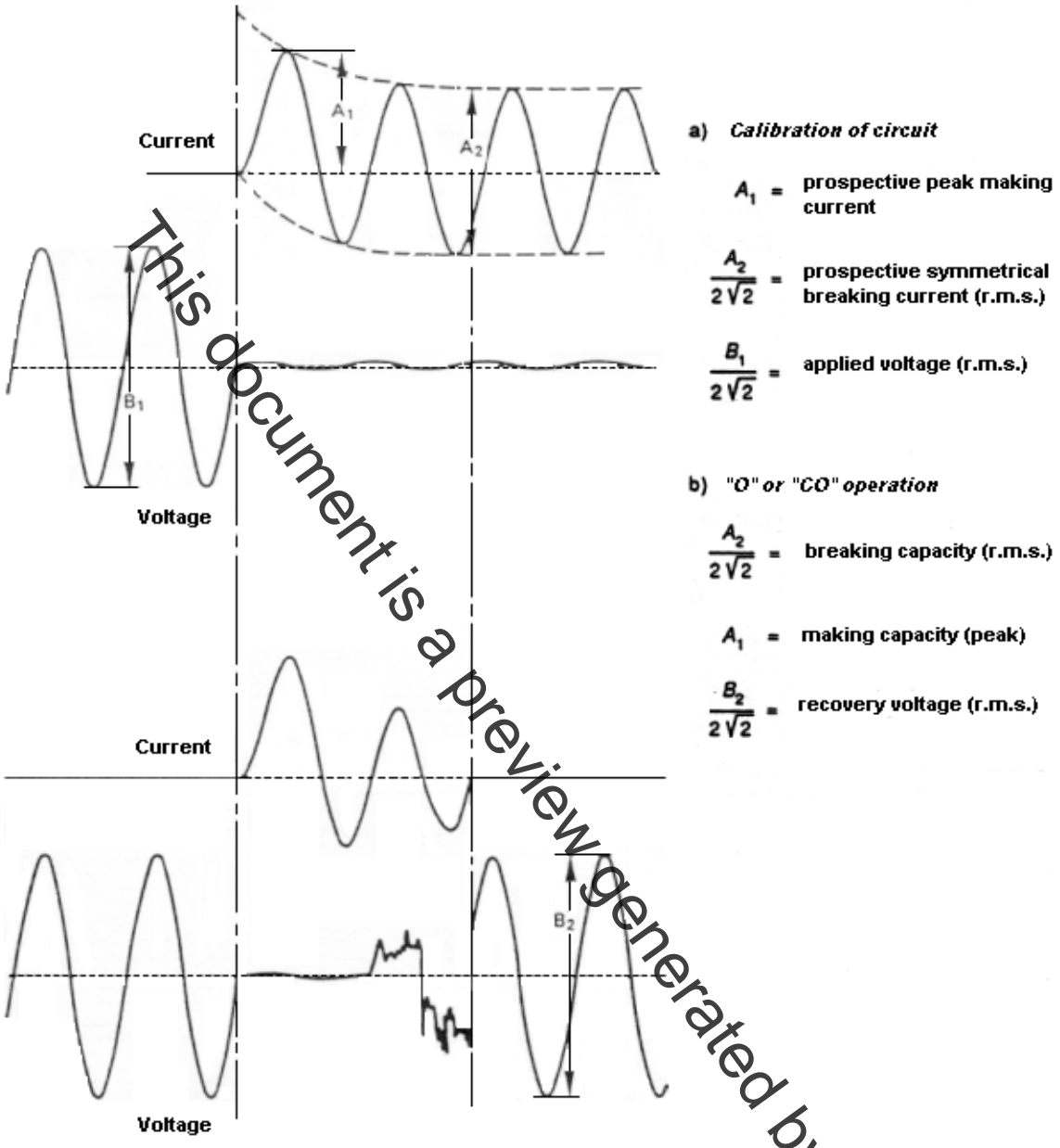


Figure Z4 – Example of short-circuit making or breaking test record in the case of a single-pole RCBO on single phase a.c.

Clause	Common modifications
Figure 22	Delete in the title "of electronic components".
Figure Z5	Add the following new figure:

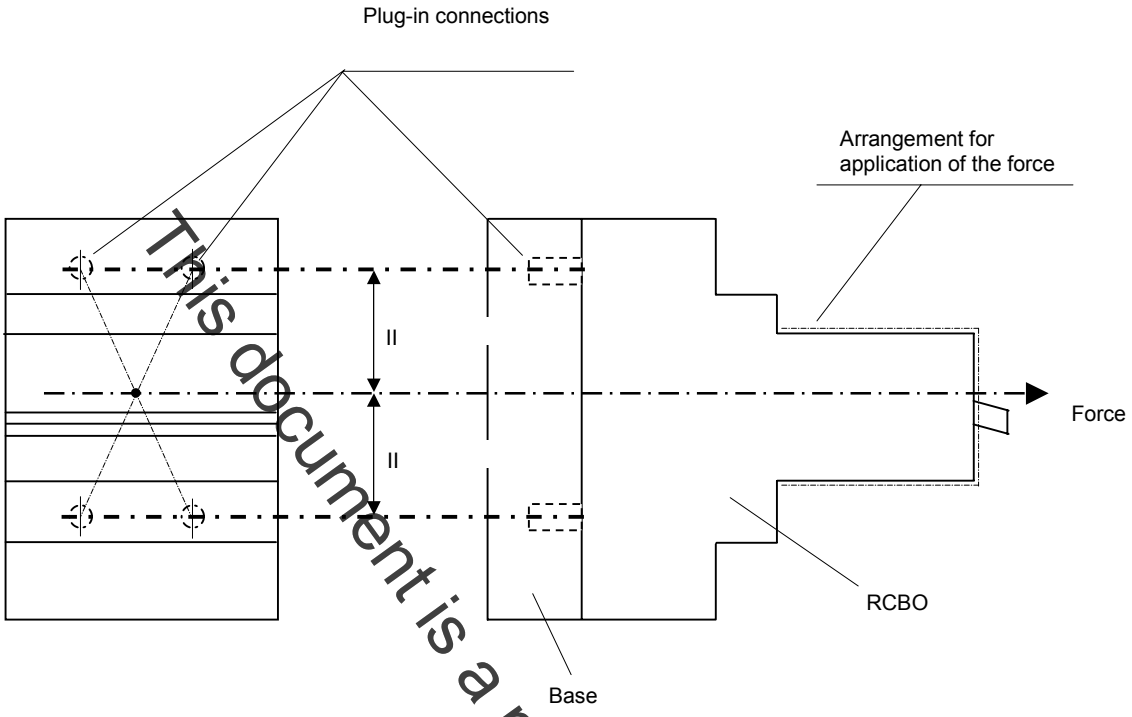


Figure Z5 – Example of application of force for mechanical test on two-pole plug-in RCBO, the holding in position of which depends solely on the plug-in connections (9.13.2.3)

Figure Z6	Add the following new figure:

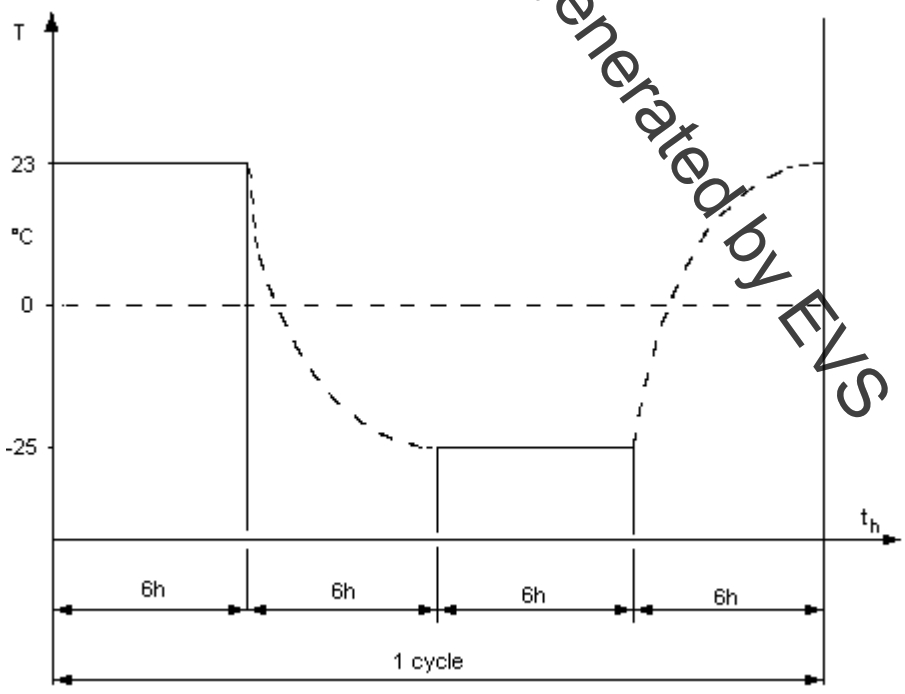


Figure Z6 – Test cycle for low temperature test (9.Z1)

Clause	Common modifications
Annex A	
Table A.1	Replace test sequences C, D, E and F by:

C	C_1	9.10 9.12.11.2.Z1 (and 9.12.12)	Mechanical and electrical endurance Performance at reduced short-circuit currents (Verification of the RCBO after short-circuit tests)
	C_2	9.12.11.2.Z2 (and 9.12.12)	Short-circuit test for verifying the suitability of RCBOs for use in IT systems (Verification of the RCBO after short-circuit tests)
D	D_0	9.9.1	Operating characteristics under residual current conditions
	D_1	9.17 9.19 9.21 9.16	Behaviour in case of failure of the line voltage Unwanted tripping D.C. components Test device
E	E_0	9.9.2 9.18	Overcurrent operating characteristics Limiting value of overcurrent in case of a single phase load through a 3-pole or 4-pole RCBO
	E_1	9.13 9.12.11.3 and 9.12.12	Resistance to mechanical shock and impact Short-circuit performance at 1500 A Verification of RCBO after short-circuit tests
F	F_0	9.12.11.4 b) (and 9.12.12)	Service short-circuit capacity (I_{cs}) (Verification of RCBO after short-circuit tests)
	F_1	9.12.11.4 c) (and 9.12.12.2)	Performance at rated short-circuit capacity (I_{cn}) Verification of RCBO after short-circuit tests
	F_2	9.12.11.4 d) (and 9.12.12.3)	Performance $I_{\Delta m}$ (Verification of RCBO after short-circuit tests)

Table A.1	Add test sequence H as follows:

H	9.Z1	Verification of correct operation at low ambient air temperature of RCBOs operating at temperatures between –25 °C and +40 °C

A.2	Delete the last paragraph.
Table A.2	Replace test sequences C to F1 by:

C1	3	2[d)]	3
C2	3	2[d)]	3
D0+D1	3	2[d)]	3
E0+E1	3	2[d)]	3
F0	3	2[d)]	3
F1	3	2[d)]	3
F2	3	2[d)]	3

Table A.2	Add test sequence H as follows:

H	3	2[d)]	3

Clause	Common modifications
Table A.2	In note d), delete "9.12.13".
Table A.3	Replace test sequence C by:

C	C_1	3 max. rating I_n min. rating $I_{\Delta n}$	3 max. rating I_n min. rating $I_{\Delta n}$	3 max. rating I_n min. rating $I_{\Delta n}$
	C_2	for 2 protected poles 2 max. rating I_n min. rating $I_{\Delta n}$ or for one protected pole 3 max. rating I_n min. rating $I_{\Delta n}$	1 max. rating I_n min. rating $I_{\Delta n}$	1 max. rating I_n min. rating $I_{\Delta n}$

Table A.3	Add new F2 and H test sequences as follows:

F	F2	3[h]) max. rating I_n min. rating $I_{\Delta n}$	3[h]) max. rating I_n min. rating $I_{\Delta n}$	3[h]) max. rating I_n min. rating $I_{\Delta n}$
H[h])		3 max. rating I_n min. rating $I_{\Delta n}$ 3 min. rating I_n max. rating $I_{\Delta n}$	3 max. rating I_n min. rating $I_{\Delta n}$ 3 min. rating I_n max. rating $I_{\Delta n}$	3 max. rating I_n min. rating $I_{\Delta n}$ 3 min. rating I_n max. rating $I_{\Delta n}$

Table A.3	Delete in note c) "to 1-pole RCBOs with uninterrupted neutral and". Delete note d. Delete in note e) "to 3-pole RCBOs with uninterrupted neutral and".
	Add the note: h) only on the maximum number of poles.
Table A.5	Delete in note c) "to 1-pole RCBOs with uninterrupted neutral and".
	Delete note d.
	Delete in note e) "to 3-pole RCBOs with uninterrupted neutral and".
Annex E	Add a note mark (*) to the title and add, immediately below, the following footnote: (*) For auxiliary contact units assembled or to be assembled separately to RCBO, see EN 62019.
Annex F	Replace the title by: **Annex F** (informative) **Co-ordination under short circuit conditions between a RCBO and another short circuit protective device (SCPD) associated in the same circuit** Replace "IEC 60898" by "EN 60898-1".
Annex G	
G 3.3	Delete the note and the first line after the note.
G 4.4	Add after the last paragraph: It shall not be possible to assemble an R.C. unit with a circuit-breaker having no provision for switching the associated neutral (e.g. single pole circuit-breaker, or a 3 pole circuit-breaker for use on a 4 wire system).

Clause	Common modifications
Annex H	Replace existing Table H.2 by the following:

Table H.2

Test sequence	Table of IEC 61543	Reference condition of IEC 61543	Phenomena	Number of samples	Minimum number of samples which shall pass the tests	Maximum number of samples for repeated tests
H.2.1 *	5	2.3	Conducted unidirectional transients of the ms and μs time scale	3 $I_{\Delta n}$ min any I_n	2	3
H.2.2	5 5	2.1 and 2.5 2.2	Conducted radio-frequency disturbances and radiated radio-frequency electromagnetic fields Conducted unidirectional transients of the ns time scale (burst)	3 $I_{\Delta n}$ min any I_n	2	3
H.2.3	6	3.1	Electrostatic discharges	3 $I_{\Delta n}$ min any I_n	2	3
* For devices containing a continuously operating oscillator, the test of CISPR 14 shall be carried out on the samples prior to the tests of this sequence.						
NOTE On request of the manufacturer the same set of samples may be subjected to more than one test sequence.						

Annex ID	Delete
Annexes	Add the following annexes ZA, ZB, ZC, ZD and ZE:

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

IEC publication	Date	Title	EN / EN	Date
IEC 60038	1983	IEC standard voltages	HD 472 S1	1989
IEC 60050-151	1978	International Electromechanical Vocabulary (IEV) – Chapter 151	–	–
IEC 60050-441	1984	International Electromechanical Vocabulary (IEV) – Chapter 441 Switchgear controlgear and fuses	–	–
IEC 60051	Series	Direct acting indicating analogue electrical measuring instruments and their accessories	EN 60051	Series
IEC 60060-2	1994	High-voltage test techniques -- Part 2: Measuring systems	EN 60060-2	1994
IEC 60068-2-30 + A1	1980 1985	Environmental testing -- Part 2: Tests - Test Db and guidance: Damp heat, cyclic (12 + 12 hour cycle)	EN 60068-2-30	1999
IEC 60068-3-4	2001	Environmental testing -- Part 3-4: Supporting documentation and guidance - Damp heat tests	EN 60068-3-4	2002
IEC 60112	2003	Method for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions	EN 60112	2003
IEC 60364, mod	Series	Electrical installations of buildings	HD 384	Series
IEC 60364-5-53	2001	Electrical installations of buildings – Part 5-53: Selection and erection of electrical equipment - Isolation, switching and control	–	–
IEC 60417	Data-base	Graphical symbols for use on equipment. Index survey and compilation of the single sheets	–	–
IEC 60529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529	1991
IEC 60664-1 + A1 + A2	1992 2000 2002	Insulation co-ordination for equipment within low-voltage systems – Part 1: Principles requirements and tests	EN 60664-1	2003
IEC 60695-2-10	2000	Fire Hazard testing - Part 2-10: Glowing/hot-wire based test methods - Glow-wire apparatus and common test procedure	EN 60695-2-10	2001
IEC 60715	1981	Dimensions of low-voltage switchgear and controlgear. Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations	EN 60715	2001
IEC 60755	1983	General requirements for residual current operated protective devices	–	–
IEC 60884-1	2002	Plugs and socket-outlets for household and similar purposes – Part 1: general requirements	–	–
IEC 60898-1	2002	Circuit-breakers for overcurrent protection for household and similar installations	EN 60898-1	2003
IEC 60947-1	1999 2004	Low-voltage switchgear and controlgear - Part 1: General rules	EN 60947-1	1999 2004
IEC 60947-2	1995 2003	Low-voltage switchgear and controlgear - Part 2: Circuit-breakers	EN 60947-2	1996 2003
IEC 61008	Series	Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses	EN 61008	Series

IEC publication	Date	Title	EN / EN	Date
IEC 61543	1995	Residual current-operated protective devices (RCDs) for household and similar use - Electromagnetic compatibility	EN 61543	1995
ISO 7000	1989	Graphical symbols, for use on equipment Index and synopsis	–	–
CISPR 14-1	2000	Electromagnetic compatibility - Requirements for household appliances , electric tools and similar apparatus - Part 1: Emission	EN 55014-1	2000

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.

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

Country	Special national condition
Germany	In Germany only the use of RCBOs of type A (sensitive to pulsating d.c. - see 3.1.3) is allowed.
Ireland and United Kingdom	In Ireland RCBOs with uninterrupted neutral path are used for many years. National Rules for Electrical Installations of ETCI continues to allow their use up to the 1st July 2010. In the United Kingdom, where neutrals are reliably at earth potential, RCBO's with unswitched neutral current paths are permitted for use over and above the requirements of the Wiring Regulations. The requirements for these types of devices are given in the original text of IEC 61009-1 (1991). Details of the particular clauses are listed below.
	3.3.16 The text remains as given in the original IEC text.
	3.3.17 The text remains as given in the original IEC text.
	4.3 The text remains as given in the original IEC text.
	5.3.1 Only the text referring to rated voltages of 120 V is deleted.
	9.7.2 The text remains as given in the original IEC text.
	9.12.2 The text remains as given in the original IEC text.
	9.12.7 The text remains as given in the original IEC text.
	9.12.9.1 The text remains as given in the original IEC text.
	9.12.11.3 The text remains as given in the original IEC text.
	9.12.11.4 The text remains as given in the original IEC text.
	9.17.4 The text remains as given in the original IEC text.
	9.20 In paragraph 4, the last line remains as given in the original IEC text.
	Figures 5 & 8 Retain as given in the original IEC text.
	Table A.3 The text remains as given in the original IEC text.
Netherlands	For all RCBOs, EN 61009-1 (referred to as Part 1) is applicable with the modifications as given in this amendment A11 . - For RCBOs functionally independent of line voltage EN 61009-2-1 applies in conjunction with Part 1 including these modifications. - For RCBOs functionally dependent of line voltage IEC 61009-2-2 applies in conjunction with Part 1 including these modifications.

Country Special national condition

Netherlands **Add** to clause 6:

Devices not in compliance with modified sub-clauses 9.12.11.2.Z2 and 9.21.1.1 as given below shall be marked with the symbol

(IT in circle and crossing lines as per IEC 60947-2, indicating not suitable for use in IT systems).

Furthermore, in the manufacturer's instruction sheet it shall be clearly indicated that the device provides protection against residual pulsating direct currents only, when used in a supply system with an earthed neutral conductor. For this purpose the following text shall appear in the instruction sheet:

"Waarschuwing:

Deze aardlekschakelaar biedt alleen bescherming tegen pulserende gelijkstromen naar aarde of naar gestel, indien de te beveiligen toestellen gevoed worden door een eenfase stroomketen waarvan de nul aardpotentiaal heeft."

(Translation: "Warning: This RCBO provides protection against pulsating residual direct currents only, where the appliance is fed by a single phase supply, the neutral being at earth potential".)

Netherlands **Modify** clause 9.12.11.2.Z2 as follows:

9.12.11.2.Z2 Short-circuit test on RCBOs rated 230 V, or 240 V or 400 V for verifying their suitability for use in IT systems

The additional impedances Z1 (see 9.12.7.3) are adjusted so as to obtain a current of 500 A or 1,2 times the upper limit of the standard range of instantaneous tripping given in Table 3, whichever is the higher, but not exceeding 2 500 A, at a power factor between 0,93 and 0,98, at a voltage 105 % of 230 V for the pole exclusively for the neutral, if any, and 400 V for the other poles.

For RCBOs having an instantaneous tripping value exceeding 20 In, the impedances are adjusted as to obtain a current 1,2 times the upper limit of instantaneous tripping declared by the manufacturer, the 2 500 A limitation being disregarded.

Each pole of RCBOs are subjected individually to a test in a circuit the connections of which are shown in Figure Z1.

The sequence of operations shall be

O - t - CO

For the O operation on the neutral pole the auxiliary switch A is synchronised with respect to the voltage wave so that the circuit is closed on the point 60° on the wave for this operation.

For the O operation on the first phase pole the auxiliary switch A is synchronised with respect to the voltage wave so that the circuit is closed on the point 0° on the wave for this operation. For the following O operations on the other phase poles to be tested (see C.2) this point is shifted each time by 30 ° with respect to the point on wave of the previous test, with a tolerance of ± 5 °.

Country Special national condition

Netherlands **Replace** the text of clause 9.21.1.1 by the following:

9.21.1.1 Verification of the correct operation of RCBO type A suitable for all earthing systems in the case of a steady increase of the residual pulsating current

The RCBO D is connected according to figure 4d and connected in turn to the following supply systems:

- *phase to earthed neutral ;*
- *phase to phase of a three phase supply, starpoint earthed;*
- *two phases midpoint earthed.*

When connected to each of the supply systems the following tests are carried out:

The auxiliary switches S1 and S2 and the RCBO D shall be closed. Each combination of two poles of the device shall be tested twice in position I as well as in position II of the auxiliary switch S3.

At every test the peak value of current shall be steadily increased starting from zero at an approximately rate of 2 $I_{\Delta n}$ /30 ampere per second for devices with $I_{\Delta n} > 0{,}01$ A and 2,8 $I_{\Delta n}$ /30 ampere per second for devices with $I_{\Delta n} = 0{,}01$ A.

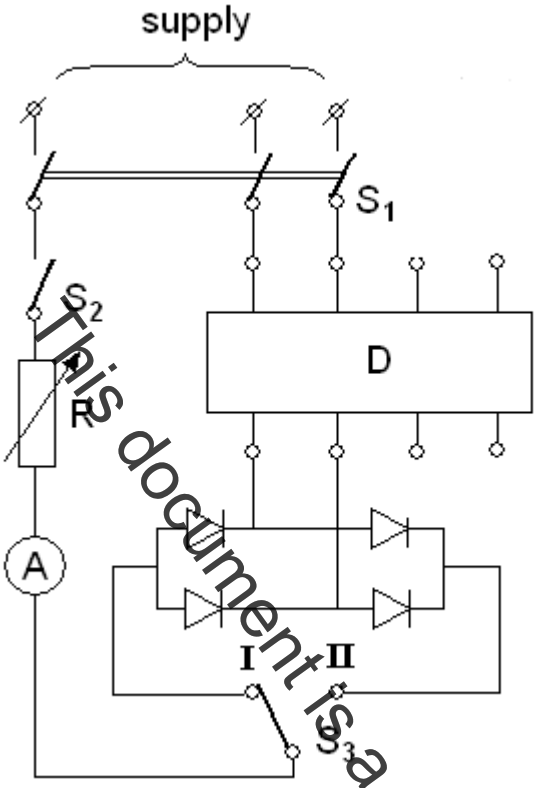
For each test the peak value of tripping current shall be between:

- *0,7 $I_{\Delta n}$ and 2,8 $I_{\Delta n}$ for devices rated $I_{\Delta n} > 0{,}01$ A and*
- *0,7 $I_{\Delta n}$ and 4 $I_{\Delta n}$ for devices rated $I_{\Delta n} \leq 0{,}01$ A.*

NOTE 1 In case of half pulse rectified current the peak value of the current is 2 x greater than the r.m.s. value of that current.

NOTE 2 According to IEC 60479-2 subclause 4.4.1 a d.c current with a peak value $2\sqrt{2}$ higher than the r.m.s value of a 50 Hz current constitutes the same risk with respect to the probability of ventricular fibrillation in event of shock durations longer than approximately 1,5 times the period of the cardiac cycle.

Country Special national condition



S = Supply in turn for each of the test series:
Phase neutral 230 V, between phases 230 V and 2 x 115 V
A = Ammeter (measuring peak value)
S_1 = All-pole switch
S_2 = Single pole switch
S_3 = Two-way switch
R = Variable resistor
D = RCBO under test
Di = Diode

Figure 4d – Test circuit for the verification of the correct operation of RCBOs for use in all earthing systems (TN, TT and IT), in case of residual pulsating direct currents

Annex ZC
(informative)

A-deviations

A-deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CENELEC national member.

This European Standard falls under Directive 73/23/EEC.

NOTE (from CEN/CENELEC IR Part 2:2002 , 2.17) Where standards fall under EC Directives, it is the view of the Commission of the European Communities (OJ No C 59, 1982-03-09) that the effect of the decision of the Court of Justice in case 815/79 Cremonini/Vrankovich (European Court Reports 1980, p. 3583) is that compliance with A-deviations is no longer mandatory and that the free movement of products complying with such a standard should not be restricted except under the safeguard procedure provided for in the relevant Directive.

A-deviations in an EFTA-country are valid instead of the relevant provisions of the European Standard in that country until they have been removed.

Clause Deviation

1, note 8 **Denmark**

(*Heavy Current Regulations Section 107-2-D1, 4 ed.*)

Replace “IEC 60884-1” by “the relevant national standard(s)”.

Add the following requirement after note 8:

Socket-outlets for household and similar use shall comply with DS/IEC 60884-1 and the Heavy Current Regulations Section 107-2-D1.

Spain

(*Reglamento Electrotécnico de Baja Tensión RD 842/2002.*)

Replace “IEC 60884-1” by “the relevant national standard(s)”

Add the following requirement after note 8:

Socket-outlets for household and similar use shall comply with Standard series UNE 20315.

United Kingdom

(*"The Plugs and Sockets etc. (Safety) Regulations 1994 (Statutory Instrument 1768)"*)

The UK Plug and Socket Safety Regulations, 1994, require that all plugs and socket-outlets comply with the requirements of BS 1363.

Note 8 of Clause 1 of this standard does not apply in the UK.

———————

Annex ZD
(normative)

Classification of RCBOs into energy limiting classes

RCBOs of B-type and C-type, when classified into energy limiting classes 1, 2, 3 in accordance with Table ZD.1 or Table ZD.2, as applicable, shall be marked with the number of the energy limiting class in a square adjoining the symbol given in t) of 6.Z1.

Table ZD.1 – Permissible I²t (let-through) values for RCBOs with rated current up to and including 16 A

Rated short-circuit capacity A	**Energy limiting classes**				
	1	**2**		**3**	
	I²t max. A²s	**I²t max.** A²s		**I²t max.** A²s	
	B type and C type	**B type**	**C type**	**B type**	**C type**
3 000	No limits specified	31 000	37 000	15 000	18 000
4 500		60 000	75 000	25 000	30 000
6 000		100 000	120 000	35 000	42 000
10 000		240 000	290 000	70 000	84 000

Table ZD.2 – Permissible I²t (let-through) values for RCBOs with rated current exceeding 16 A up to and including 32 A (*)

Rated short-circuit capacity A	**Energy limiting classes**				
	1	**2**		**3**	
	I²t max. A²s	**I²t max.** A²s		**I²t max.** A²s	
	B type and C type	**B type**	**C type**	**B type**	**C type**
3 000	No limits specified	40 000	50 000	18 000	22 000
4 500		80 000	100 000	32 000	39 000
6 000		130 000	160 000	45 000	55 000
10 000		310 000	370 000	90 000	110 000
(*) For RCBOs rated 40 A, i²t maximum values 120 % of those indicated in the Table are applicable and they may be marked with the symbol of the corresponding limiting class.					

The maximum I²t values measured in accordance with 9.12.11.4 serve as reference values for the classification.

Compliance with the requirements of Tables ZD.1 and ZD.2 is checked on the RCBOs with the highest rated current available within the range covered by each of these tables. If these current ratings are not included in the samples submitted to test sequence E.2 of Annex C, the appropriate number of samples of these ratings shall be additionally submitted to that test sequence.

None of the values measured shall exceed the permissible I²t value of the proposed energy limiting class in accordance with Tables ZD.1 and ZD.2.

NOTE 1 If RCBOs rated 40 A are submitted with the range of RCBOs with rating exceeding 16 A and their measured i²t values are lower than those indicated in Table ZD.2 for rating 32 A, no relevant test is necessary for the RCBOs rated 32 A.

Where only one sample exceeds the limit value of the proposed energy limiting class, even though otherwise it has passed all tests of the test sequence, this test sequence shall be repeated using a new set of samples during which all relevant requirements shall be met.

NOTE 2 The RCBOs are classified into energy limiting classes in order to help the project engineer and the installer to obtain discrimination with the fuse on the supply side and cable protection in case of short- circuit current.

Discrimination of a RCBO in relation to the fuse on the supply side exists up to the current value where i^2t value let through by the RCBO is less than the pre-arcing i^2t of the fuse.

Cable protection under short-circuit conditions exists up to the current value where the i^2t value let through by the RCBO is less than the permissible i^2t value for the cable.

———————

Annex ZZ
(informative)

Coverage of Essential Requirements of EC 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 4 of the EC Directive 89/336/EC.

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

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

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NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI
IEC
1009-1

Deuxième édition
Second edition
1996-12

Interrupteurs automatiques à courant différentiel résiduel avec protection contre les surintensités incorporée pour installations domestiques et analogues (DD)

Partie 1:
Règles générales

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

Part 1:
General rules

Numéro de référence
Reference number
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Validité de la présente publication

Le contenu technique des publications de la CEI est constamment revu par la CEI afin qu'il reflète l'état actuel de la technique.

Des renseignements relatifs à la date de reconfirmation de la publication sont disponibles auprès du Bureau Central de la CEI.

Les renseignements relatifs à ces révisions, à l'établissement des éditions révisées et aux amendements peuvent être obtenus auprès des Comités nationaux de la CEI et dans les documents ci-dessous:

- **Bulletin de la CEI**
- **Annuaire de la CEI**
  Publié annuellement
- **Catalogue des publications de la CEI**
  Publié annuellement et mis à jour régulièrement

Terminologie

En ce qui concerne la terminologie générale, le lecteur se reportera à la CEI 50: *Vocabulaire Electrotechnique International* (VEI), qui se présente sous forme de chapitres séparés traitant chacun d'un sujet défini. Des détails complets sur le VEI peuvent être obtenus sur demande. Voir également le dictionnaire multilingue de la CEI.

Les termes et définitions figurant dans la présente publication ont été soit tirés du VEI, soit spécifiquement approuvés aux fins de cette publication.

Symboles graphiques et littéraux

Pour les symboles graphiques, les symboles littéraux et les signes d'usage général approuvés par la CEI, le lecteur consultera:

– la CEI 27: *Symboles littéraux à utiliser en électro-technique;*

– la CEI 417: *Symboles graphiques utilisables sur le matériel. Index, relevé et compilation des feuilles individuelles;*

– la CEI 617: *Symboles graphiques pour schémas;*

et pour les appareils électromédicaux,

– la CEI 878: *Symboles graphiques pour équipements électriques en pratique médicale.*

Les symboles et signes contenus dans la présente publication ont été soit tirés de la CEI 27, de la CEI 417, de la CEI 617 et/ou de la CEI 878, soit spécifiquement approuvés aux fins de cette publication.

Publications de la CEI établies par le même comité d'études

L'attention du lecteur est attirée sur les listes figurant à la fin de cette publication, qui énumèrent les publications de la CEI préparées par le comité d'études qui a établi la présente publication.

Validity of this publication

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology.

Information relating to the date of the reconfirmation of the publication is available from the IEC Central Office.

Information on the revision work, the issue of revised editions and amendments may be obtained from IEC National Committees and from the following IEC sources:

- **IEC Bulletin**
- **IEC Yearbook**
  Published yearly
- **Catalogue of IEC publications**
  Published yearly with regular updates

Terminology

For general terminology, readers are referred to IEC 50: *International Electrotechnical Vocabulary* (IEV), which is issued in the form of separate chapters each dealing with a specific field. Full details of the IEV will be supplied on request. See also the IEC Multilingual Dictionary.

The terms and definitions contained in the present publication have either been taken from the IEV or have been specifically approved for the purpose of this publication.

Graphical and letter symbols

For graphical symbols, and letter symbols and signs approved by the IEC for general use, readers are referred to publications:

– IEC 27: *Letter symbols to be used in electrical technology;*

– IEC 417: *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets;*

– IEC 617: *Graphical symbols for diagrams;*

and for medical electrical equipment,

– IEC 878: *Graphical symbols for electromedical equipment in medical practice.*

The symbols and signs contained in the present publication have either been taken from IEC 27, IEC 417, IEC 617 and/or IEC 878, or have been specifically approved for the purpose of this publication.

IEC publications prepared by the same technical committee

The attention of readers is drawn to the end pages of this publication which list the IEC publications issued by the technical committee which has prepared the present publication.

NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI
IEC
1009-1

Deuxième édition
Second edition
1996-12

Interrupteurs automatiques à courant différentiel résiduel avec protection contre les surintensités incorporée pour installations domestiques et analogues (DD)

Partie 1: Règles générales

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

Part 1: General rules

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Partie 1: Règles générales

AVANT-PROPOS

1) La CEI (Commission Electrotechnique Internationale) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de la CEI). La CEI a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. A cet effet, la CEI, entre autres activités, publie des Normes Internationales. Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec la CEI, participent également aux travaux. La CEI collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
2) Les décisions ou accords officiels de la CEI concernant les questions techniques, représentent, dans la mesure du possible un accord international sur les sujets étudiés, étant donné que les Comités nationaux intéressés sont représentés dans chaque comité d'études.
3) Les documents produits se présentent sous la forme de recommandations internationales. Ils sont publiés comme normes, rapports techniques ou guides et agréés comme tels par les Comités nationaux.
4) Dans le but d'encourager l'unification internationale, les Comités nationaux de la CEI s'engagent à appliquer de façon transparente, dans toute la mesure possible, les Normes internationales de la CEI dans leurs normes nationales et régionales. Toute divergence entre la norme CEI et la norme nationale ou régionale correspondante doit être indiquée en termes clairs dans cette dernière.
5) La CEI n'a fixé aucune procédure concernant le marquage comme indication d'approbation et sa responsabilité n'est pas engagée quand un matériel est déclaré conforme à l'une de ses normes.
6) L'attention est attirée sur le fait que certains des éléments de la présente Norme internationale peuvent faire l'objet de droits de propriété intellectuelle ou de droits analogues. La CEI ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de propriété et de ne pas avoir signalé leur existence.

La Norme internationale CEI 1009-1 a été établie par le sous-comité 23E: Disjoncteurs et appareillage similaire pour usage domestique, du comité d'études 23 de la CEI: Petit appareillage.

Cette deuxième édition annule et remplace la première édition parue en 1991 et l'amendement 1 (1995); elle constitue une révision technique.

Le texte de cette norme est issu de la première édition, de l'amendement 1 et des documents suivants:

FDIS	Rapport de vote
23E/246+252/FDIS	23E/260+269/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette norme.

Dans la présente norme, les caractères d'imprimerie suivants sont employés:

– Prescriptions proprement dites: caractères romains.
– *Modalités d'essais: caractères italiques.*
– Commentaires: petits caractères romains.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 1 : General rules

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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 the 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 National Committees.
3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.
4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 1009-1 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 1991 and amendment 1 (1995); it constitutes a technical revision.

The text of this standard is based on the first edition, amendment 1 and the following documents:

FDIS	Report on voting
23E/246+252/FDIS	23E/260+269/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.

In this standard, the following print types are used.

– Requirements proper: in roman type.
– *Test specifications: in italic type.*
– Notes: in small roman type.

INTERRUPTEURS AUTOMATIQUES À COURANT DIFFÉRENTIEL RÉSIDUEL AVEC PROTECTION CONTRE LES SURINTENSITÉS INCORPORÉE POUR INSTALLATIONS DOMESTIQUES ET ANALOGUES (DD)

Partie 1: Règles générales

INTRODUCTION

Cette partie comprend les définitions, règles et essais couvrant tous les types de DD. Pour l'applicabilité à un type particulier, cette partie doit s'appliquer avec la partie correspondante comme suit:

Partie 2-1: Applicabilité des règles générales aux DD fonctionnellement indépendants de la tension d'alimentation.

Partie 2-2: Applicabilité des règles générales aux DD fonctionnellement dépendants de la tension d'alimentation.

1 Domaine d'application

Cette Norme internationale s'applique aux interrupteurs automatiques avec protection contre les surintensités incorporée, à courant différentiel résiduel, fonctionnellement indépendants ou fonctionnellement dépendants de la tension d'alimentation, pour installations domestiques et analogues (en abrégé «DD» dans la suite du texte), ayant une tension assignée ne dépassant pas 440 V alternatifs, d'un courant assigné ne dépassant pas 125 A et un pouvoir de coupure ne dépassant pas 25 000 A pour fonctionnement à 50 Hz ou 60 Hz.

Ces appareils sont destinés à la protection des personnes contre les contacts indirects, les parties métalliques accessibles de l'installation étant reliées à une prise de terre de valeur appropriée et à la protection des canalisations contre les surintensités dans les bâtiments et réalisations similaires. Ils peuvent être utilisés pour assurer la protection contre les dangers d'incendie résultant d'un courant de défaut persistant à la terre sans que le dispositif de protection contre les surcharges du circuit n'intervienne.

Les DD de courant différentiel assigné inférieur ou égal à 30 mA sont aussi utilisés comme moyen de protection complémentaire en cas de défaillance des autres moyens de protection contre les chocs électriques.

La présente norme s'applique aux appareils remplissant à la fois les fonctions de détection du courant résiduel, de comparaison de la valeur de ce courant à une valeur de fonctionnement différentiel et d'ouverture du circuit protégé quand le courant différentiel résiduel dépasse cette valeur et réalisant également les fonctions d'établissement, de maintien et de coupure de surintensités dans des conditions spécifiées.

NOTES

1 Le contenu de cette norme en relation avec le fonctionnement dans des conditions de courant différentiel résiduel est basé sur la CEI 1008.

Le contenu de cette norme en relation avec la protection contre les surintensités est basé sur la CEI 898.

2 Les DD sont essentiellement destinés à être mis en oeuvre par des personnes non averties et conçus pour ne pas être entretenus. Ils peuvent faire l'objet de certification.

3 Les règles d'installations et d'utilisation des DD sont indiquées dans la CEI 364.

Les DD du type général sont résistants aux déclenchements indésirables y compris les cas où des ondes de surtension (résultant de transitoires de manoeuvre ou induites par des coups de foudre) produisent des courants de charge dans l'installation sans qu'il se produise d'amorçage.

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

Part 1: General rules

INTRODUCTION

This part includes definitions, requirements and tests covering all types of RCBOs. For applicability to a specific type this part shall apply in conjunction with the relevant part, as follows:

Part 2-1: Applicability of the general rules to RCBOs functionally independent of line voltage.

Part 2-2: Applicability of the general rules to RCBOs functionally dependent on line voltage.

1 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.

NOTES

1 The content of the present standard related to the operation under residual current conditions is based on IEC 1008.

The content of the present standard related to protection against overcurrents is based on IEC 898.

2 RCBOs are essentially intended to be operated by uninstructed persons and designed not to require maintenance. They may be submitted for certification purposes.

3 Installation and application rules of RCBOs are given in IEC 364.

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.

Les DD du type S sont considérés comme suffisamment résistants aux déclenchements indésirables même si l'onde de surtension provoque un amorçage et qu'un courant de suite se produit.

NOTES

4 Les parafoudres installés en aval d'un DD de type général et connectés en mode commun peuvent provoquer des déclenchements indésirables.

5 Les DD du domaine d'application de la présente norme sont considérés comme appropriés pour le sectionnement (voir 8.1.3.).

Des précautions spéciales (par exemple parasurtenseurs) peuvent être nécessaires lorsque des surtensions excessives sont susceptibles de se produire en amont (par exemple dans le cas d'une alimentation par lignes aériennes) (voir CEI 364-4-443).

NOTE 6 – Une construction spéciale peut être nécessaire pour les DD d'un indice de protection supérieur à IP20.

Cette norme s'applique également aux DD obtenus par l'assemblage d'un dispositif différentiel adaptable et d'un disjoncteur. L'assemblage mécanique doit être effectué en usine par le constructeur ou sur place, les prescriptions de l'annexe G devant s'appliquer dans ce dernier cas. Elle s'applique également aux DD ayant plus d'un courant assigné à condition que l'organe de réglage pour le passage d'une valeur discrète à une autre ne soit pas accessible en service normal et que le réglage ne puisse être modifié sans l'aide d'un outil.

Des prescriptions supplémentaires peuvent être nécessaires pour les DD de type enfichable.

Des prescriptions particulières sont nécessaires pour les DD incorporés dans ou destinés seulement à l'association avec des fiches et socles de prises de courant ou des connecteurs à usages domestiques et analogues.

NOTE 7 – Pour le moment, pour les DD incorporés dans ou destinés seulement aux fiches ou socles de prises de courant, les prescriptions de cette norme en conjonction avec celles de la CEI 884-1 peuvent être utilisées pour autant qu'elles sont applicables.

La présente norme ne s'applique pas:

– aux DD destinés à la protection des moteurs,

– aux DD dont le réglage du courant peut être obtenu par des organes accessibles à l'utilisateur en service normal.

Les présentes spécifications s'appliquent pour des conditions normales d'environnement (voir 7.1). Des prescriptions complémentaires peuvent être nécessaires pour des DD utilisés dans des locaux présentant de sévères conditions d'environnement.

Les DD comportant des batteries ne sont pas couverts par cette norme.

Un guide pour la coordination des DD avec des coupe-circuit à fusibles est donné dans l'annexe F.

2 Références normatives

Les documents normatifs suivants contiennent des dispositions qui, par suite de la référence qui y est faite, constituent des dispositions valables pour la présente Norme internationale. Au moment de la publication, les éditions indiquées étaient en vigueur. Tout document normatif est sujet à révision et les parties prenantes aux accords fondés sur la présente Norme intrnationale sont invitées à rechercher la possibilité d'appliquer les éditions les plus récentes des documents normatifs indiqués ci-après. Les membres de la CEI et de l'ISO possèdent le registre des Normes internationales en vigueur.

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.

NOTES

4 Surge arresters installed downstream of the general type of RCBOs and connected in common mode may cause unwanted tripping.

5 RCBOs within the scope of the present standard are considered as suitable for isolation (see 8.1.3).

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 364-4-443).

NOTE 6 – For RCBOs having a degree of protection higher than IP20 special constructions may be required.

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.

NOTE 7 – For the time being, for RCBOs incorporated in, or intended only for plugs and socket-outlets, the requirements of this standard in conjunction with the requirements of IEC 884-1 may be used, as far as applicable.

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.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

CEI 38: 1983, *Tensions normales de la CEI*

CEI 50(151): 1978, *Vocabulaire Electrotechnique International (VEI): Chapitre 151: Dispositifs électriques et magnétiques*

CEI 50 (441): 1984, *Chapitre 441: Appareillage et fusibles*

CEI 51: *Appareils mesureurs électriques indicateurs analogiques à action directe et leurs accessoires*

CEI 60-2: 1994, *Technique des essais à haute tension – Partie 2: Systèmes de Mesure*

CEI 68-2-28: 1990, *Essais d'environnement – Deuxième partie: Essais – Guide pour les essais de chaleur humide*

CEI 68-2-30: 1980, *Essais d'environnement - Deuxième partie: Essai Db et guide – Essai cyclique de chaleur humide (cycle de 12 + 12 heures)*
Amendement 1 (1985)

CEI 364: *Installations électriques des bâtiments*

CEI 364-4-443: 1995, *Partie 4: Protection pour assurer la sécurité – Chapitre 44: Protection contre les surtensions – Section 443 – Protection contre les surtensions d'origine atmosphérique ou dues à des manoeuvres*

CEI 364-5-53: 1994, *Partie 5: Choix et mise en oeuvre des matériels électriques – Chapitre 53: Appareillage*

CEI 417: 1973, *Symboles graphiques utilisables sur le matériel. Index, relevé et compilation des feuilles individuelles*

CEI 529: 1989, *Degrés de protection procurés par les enveloppes (Code IP)*

CEI 695-2-1/0: 1994, *Essais relatifs aux risques du feu – Partie 2: Méthodes d'essai – Section 1/feuille 0: Méthodes d'essai au fil incandescent – Généralités*

CEI 755: 1983, *Règles générales pour les dispositifs de protection à courant différentiel résiduel*

CEI 884-1: 1994, *Prises de courant pour usages domestiques et analogues – Partie 1: Règles générales*

CEI 898: 1995, *Petit appareillage électrique – Disjoncteurs pour la protection contre les surintensités pour installations domestiques et analogues*

CEI 1008-1: 1990, *Interrupteurs automatiques à courant différentiel résiduel pour usages domestiques et analogues sans dispositif de protection contre les surintensités incorporé (ID) – Partie 1: Règles générales*
Amendement 1 (1992), Amendement 2 (1995)

CEI 1543: 1995, *Dispositifs différentiels résiduels (DDR) pour usages domestique et analogues – Compatibilité électromagnétique*

IEC 38: 1983, *IEC standard voltages*

IEC 50 (151): 1978, *International Electrotechnical Vocabulary (IEV). Chapter 151: Electrical and magnetic devices*

IEC 50 (441): 1984, *Chapter 441: Switchgear, controlgear and fuses*

IEC 51: *Direct acting indicating analogue electrical measuring instruments and their accessories*

IEC 60-2: 1994, *High-voltage test techniques – Part 2: Measuring Systems*

IEC 68-2-28: 1990, *Environmental testing – Part 2: Tests – Guidance for damp heat tests*

IEC 68-2-30: 1980, *Environmental testing – Part 2: Test Db and guidance: Damp heat, cyclic (12 + 12 hour cycle)*
Amendment 1 (1985)

IEC 364: *Electrical installations of buildings*

IEC 364-4-443: 1995, *Part 4: Protection for safety – Chapter 44: Protection against overvoltages – Section 443: Protection against overvoltages of atmospheric origin or due to switching*

IEC 364-5-53: 1994, *Part 5: Selection and erection of electrical equipment – Chapter 53: Switchgear and controlgear*

IEC 417: 1973, *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets*

IEC 529: 1989, *Degrees of protection provided by enclosures (IP Codes)*

IEC 695-2-1/0: 1994, *Fire hazard testing – Part 2: Test methods – Section 1/sheet 0: Glow-wire test methods – General*

IEC 755: 1983, *General requirements for residual current operated protective devices*

IEC 884-1: 1994, *Plugs and socket-outlets for household and similar purposes – Part 1: General requirements*

IEC 898: 1995, *Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations*

IEC 1008-1: 1990, *Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs) – Part 1: General rules*
Amendment 1 (1992), Amendment 2 (1995)

IEC 1543: 1995, *Residual current-operated protective devices (RCDs) for household and similar use – Electromagnetic compatibility*