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

Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs) - Part 1: General rules

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 61008-1:2012 sisaldab Euroopa standardi EN 61008-1:2012 ingliskeelset teksti.	This Estonian standard EVS-EN 61008-1:2012 consists of the English text of the European standard EN 61008-1:2012.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 14.12.2012.	Date of Availability of the European standard is 14.12.2012.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

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ICS 29.120.50

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61008-1

December 2012

ICS 29.120.50

Supersedes EN 61008-1:2004 + A11:2007 + A12:2009 + A13:2012 + AC:2012, EN 61008-1:2004/IS1:2007

English version

Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs) - Part 1: General rules

(IEC 61008-1:2010, modified)

Interrupteurs automatiques à courant différentiel résiduel sans dispositif de protection contre les surintensités incorporé pour usages domestiques et analogues (ID) -
Partie 1: Règles générales
(CEI 61008-1:2010, modifiée)

Fehlerstrom-/Differenzstrom-Schutzschalter ohne eingebauten Überstromschutz (RCCBs) für Hausinstallationen und für ähnliche Anwendungen -
Teil 1: Allgemeine Anforderungen
(IEC 61008-1:2010, modifiziert)

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CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

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Ref. No. EN 61008-1:2012 E

Foreword

This document (EN 61008-1:2012) consists of the text of IEC 61008-1:2010 prepared by IEC/TC 23E "Circuit-breakers and similar equipment for household use", together with the common modifications prepared by CLC/TC 23E "Circuit breakers and similar devices for household and similar applications".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2013-06-18
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2017-06-18

This document supersedes EN 61008-1:2004 + A11:2007 + A12:2009 + A13:2012 + AC:2012 + IS1:2007.

EN 61008-1:2012 includes the following significant technical changes with respect to EN 61008-1:2004:

– complete revision of EMC sequences, including the new test T.2.6 already approved in EN 61543;

– clarification of RCDs current/time characteristics reported in Tables 1 and 2;

– revision of test procedure for $I_{\Delta n}$ between 5 A and 200 A;

– testing procedure regarding the 6mA d.c. current superimposed to the fault current;

– improvement highlighting RCDs with multiple sensitivity;

– tests for the use of RCCBs in IT systems.

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

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

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

Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 61008-1:2010 are prefixed “Z”.

Endorsement notice

The text of the International Standard IEC 61008-1:2010 was approved by CENELEC as a European Standard with agreed common modifications.

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COMMON MODIFICATIONS

Clause	Common modification
1	Add in the first paragraph after “125 A” the words “for fixed installations”.
1	Delete in the first paragraph “with rated frequencies of 50 Hz, 60 Hz or 50/60 Hz”.
1	Add after "They are intended for use in an environment with pollution degree 2”, “and overvoltage category III”. Delete in the seventh paragraph “with the exception of those with an interrupted neutral”.
1	Replace the second dashed indent after note 4 by: “RCCBs integrated in one unit with a socket-outlet or designed exclusively for being associated locally with a socket-outlet in the same mounting box.”
1	Replace the third dashed indent after note 4 by: “RCCBs intended to be used at frequencies other than 50 Hz.”
1	Replace Note 5 by the following sentence in the core text of the scope: “For RCCBs incorporated in, or intended only for association with socket-outlets, the requirements of this standard may be used in conjunction with the requirements of IEC 60884-1 or national requirements of the country where the product is placed on the market”.
1	Delete notes 6 and 7.
2	Replace the text of Clause 2 by: Normative references to international publications are listed in Annex ZA.
3.3.16	Replace “current paths” by “poles”.
3.3.Z1	Add after 3.3.21 **3.3.Z1** **plug-in RCCB** a RCCB having one or more plug-in terminals (see 3.6.Z1) and designed for use with appropriate means for the plug-in connection
3.4.2.1	Modify “RCCB with two current paths” by “a two pole RCCB”
3.4.4	Modify “current path” by "pole"
3.6.Z1	Add after 3.6.11 **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 text: "The selection of the various types is made according to HD 60364 and non conflicting national wiring rules. Table Z1 lists the types of RCCBs according to the various applications but does not exclude the use of RCCBs of any classification for protection over and above that required by the relevant wiring rules."

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<table>
<tr><th>Clause</th><th>Common modification</th></tr>
<tr><td>4.1</td><td>Add at the end :
Table Z1 – Survey of the types of RCCBs according to their method of operation
<table>
<tr><td>Classification</td><td>4.1.1</td><td>4.1.2.2a)</td><td>4.1.2.1 b)</td><td>4.1.2.2b)</td></tr>
<tr><td>Marking of use</td><td>Without</td><td>E1</td><td>E2</td><td>E3</td></tr>
<tr><td>Protection</td><td>Fault protection and additional protection[a]</td><td>Fault protection and additional protection[a]</td><td>Additional protection[a]</td><td>Additional protection[a b]</td></tr>
<tr><td>Service continuity [c]</td><td>Yes</td><td>Yes</td><td>No</td><td>Yes</td></tr>
<tr><td colspan="5">[a] Additional protection, provided only by RCCBs with I∆n ≤ 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.</td></tr>
</table></td></tr>
<tr><td>4.1.2.1</td><td>Replace a) by “a) deleted”</td></tr>
<tr><td>4.1.2.2</td><td>Delete the note</td></tr>
<tr><td>4.1.2.2</td><td>Replace the final sentence in brackets by "(additional requirements are under consideration)"</td></tr>
<tr><td>4.2</td><td>Replace the title of 4.2 with “Void” and delete the text.</td></tr>
<tr><td>4.3</td><td>Delete in the title “and current paths”.
Delete first and fourth dashes.</td></tr>
<tr><td>4.4</td><td>Replace the title of 4.4 with “Void” and delete the text.</td></tr>
<tr><td>4.10</td><td>Add a third bullet after “bolt-on type”:
• screw-in type.</td></tr>
<tr><td>4.Z1</td><td>Add the following subclause:
4.Z1 According to the type of terminals:
– RCCBs with screw-type terminals for external copper conductors;
– RCCBs with screwless type terminals for external copper conductors;
NOTE The requirements for RCCBs equipped with this type of terminals are given in Annex J.</td></tr>
<tr><td>4.Z2</td><td>Add after 4.10
4.Z2 According to the range of ambient air temperature
– RCCBs for use at ambient air temperatures between -5 °C and +40 °C;
– RCCBs for use at ambient air temperatures between -25 °C and +40 °C.</td></tr>
<tr><td>5.1</td><td>Delete the first dashed item</td></tr>
<tr><td>5.1</td><td>Delete in second dash “and current paths”</td></tr>
<tr><td>5.1</td><td>Add the following item to the list:
– ranges of ambient air temperature (see 5.3.Z1)</td></tr>
<tr><td>5.2.1.3</td><td>Modify “Table 3” by “5.3.13”</td></tr>
<tr><td>5.2.3</td><td>Delete 2 last paragraphs.</td></tr>
<tr><td>5.3.1</td><td>Replace (twice) “preferred” by “standard”.</td></tr>
</table>

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<table>
<tr><th>Clause</th><th>Common modification</th></tr>
<tr><td>5.3.1</td><td>Replace the table by:

<table>
<tr><th>RCCB</th><th>Rated voltage of RCCBs for use in systems 230 V, 230 V/400 V, 400V</th></tr>
<tr><td rowspan="2">Two-pole</td><td>230 V</td></tr>
<tr><td>400 V</td></tr>
<tr><td>Three-pole</td><td>400 V</td></tr>
<tr><td>Four-pole</td><td>400 V</td></tr>
</table>
</td></tr>
<tr><td>5.3.3</td><td>Delete the value “0,006 A”.</td></tr>
<tr><td>5.3.3</td><td>Remove the note</td></tr>
<tr><td>5.3.3</td><td>Add 1A to the standard values.</td></tr>
<tr><td>5.3.7</td><td>Replace the title by:
“Preferred value of rated frequency”
(delete the “s” of values)</td></tr>
<tr><td>5.3.7</td><td>Replace the first line by:
The preferred value of rated frequency is 50 Hz.</td></tr>
<tr><td>5.3.7</td><td>Delete the second paragraph</td></tr>
<tr><td>5.3.10.1</td><td>Delete the note</td></tr>
<tr><td>5.3.12.1</td><td>Delete the note</td></tr>
<tr><td>5.3.Z1</td><td>Add the following 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</td></tr>
<tr><td>5.3.12.1</td><td>Modify in Table 1 “non operating” by “non-actuating”</td></tr>
<tr><td>5.3.13</td><td>Change contents of 5.3.13 to
Standard value of the rated impulse voltage (U_{imp}) is 4 kV.

Replace the title of table 3 by “Void” and delete the contents of Table 3.</td></tr>
<tr><td>6</td><td>Replace the text of Clause 6 by:
6.Z1 Standard marking
Each RCCB shall be marked in a durable manner according to the following Table Z3.

If a degree of protection higher than IP20 according to EN 60529 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.

The manufacturer shall state the Joule integral I2t and the peak current Ip withstand capabilities of the RCCB. Where these are not stated, minimum values as given in Table 15 apply.

The manufacturer shall give the reference of one or more suitable SCPDs in his catalogues and in a sheet accompanying each RCCB.

For RCCBs classified according to 4.1.2.1 and opening with delay in case of failure of the line voltage the manufacturer shall state the range of such delay.

For RCCBs other than those operated by means of push-buttons the open position shall be indicated by the symbol "O" and the closed position by the symbol "I" (a short straight line). Additional national symbols for this indication are allowed. Provisionally the use of national indications only is allowed. These indications shall be readily</td></tr>
</table>

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Clause	Common modification
	visible when the RCCB is installed. For RCCBs operated by means of two push-buttons, the push-button designed for the opening operation only shall be RED and/or be marked with the symbol "O". Red shall not be used for any other push-button of the RCCB. If a push-button is used for closing the contact and is evidently identified as such, its depressed position is sufficient to indicate the closed position. If a single push-button is used for closing and opening the contacts and is identified as such, the button remaining in its depressed position is sufficient to indicate the closed position. On the other hand, if the button does not remain depressed, an additional means indicating the position of the contacts shall be provided. If it is necessary to distinguish between the supply and the load terminals, they shall be clearly marked (e.g. by "line" and "load" placed near the corresponding terminals or by arrows indicating the direction of power flow). Terminals exclusively intended for the connection of the neutral circuit shall be indicated by the letter N. Terminals intended for the protective conductor, if any, shall be indicated by the symbol  (IEC 60417-5019 a)). NOTE The symbol  (IEC 60417-5017 a)), previously recommended, shall be progressively superseded by the preferred symbol IEC 60417-5019 a), given above. The suitability for isolation, which is provided by all RCCBs 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. 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. The base for plug-in RCCBs shall be marked with the following: - rated current or maximum rated current; - trade mark. The marking shall be indelible, easily legible and not be placed on screws, washers or other removable parts. *Compliance is checked by inspection and by the test of 9.3.*
6	Add the following subclause **6.Z2 Additional marking** Additional marking to other standards (EN or IEC or other) or additional requirements are allowed under the following conditions: - the RCCB 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*

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Clause	Common modification
	be repeated. **Table Z3 – Requirements for marking** NOTE see the table at the end of this document
6.Z2	In note (*), to replace twice "IΔn" by "IΔm"
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 RCCBs for use in the range of –5 °C to +40 °C and of –35 °C and + 60 °C, for RCCBs 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. 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. RCCBs 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.
8.1.1	Delete in the second paragraph: "other than those specifically intended for changing the setting of the residual operating current". Delete the first sentence in the third paragraph. Delete the note and the fourth paragraph.
8.1.2	Replace Note 1 by "Note 1: deleted" Add in 13th paragraph "9.9 and" before "9.11". Delete 17th paragraph ("In the case of…) Replace Note 3 by "Note 3: deleted". Replace Note 4 by "Note 4: deleted".
8.1.3	In second paragraph, add "in addition" after "and" and before "for item 1" In third paragraph, replace "2, 4 and 5" by "2 and 4" In fifth paragraph, replace "2.7.1.1" by "4.8.1.1" and "2.7.1.3" by "4.8.1.3".
8.1.3	Modify Table 5 in deleting columns 2 and 3 and deleting item 5 (in the first column). Modify table note 2 by: "The parts of the neutral pole, if any, are considered to be live parts." Replace Note 3 by "Note 3: deleted". Modify table note c by: "Including a metal foil in contact with the surfaces of insulating material which are accessible after installation for normal use. The foil is pushed into corners, grooves, etc., by means of a straight jointed test finger according to 9.6 (see Figure 3)."

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Clause	Common modification
8.1.3	Add in item 3 (in the first column) of Table 5 the reference to footnote j). Add the following footnote j) in Table 5 : j) This applies also to clearance and creepage distances between live parts of different polarity of the RCCB and equipments mounted close to it. Replace Note 4 by “Note 4: deleted”.
8.1.5.1	Delete the second paragraph
8.1.5.1	Delete the note
8.1.5.1	Replace last paragraph by: *Compliance is checked by inspection, by the tests of 9.5 for screw-type terminals, by specific tests for plug-in or bolt-on RCCBs included in the standard, or by the tests of annex, as relevant for the type of connection.*
8.1.5.2	Delete the last note in Table 6 which refers to AWG.
8.1.Z1	Add the following new subclause: **8.1.Z1 Non-interchangeability** For RCCBs intended to be mounted on bases forming a unit therewith (plug-in type or screw-in type) it shall not be possible, without the aid of a tool, to replace a RCCB when mounted and wired as for normal use by another of the same make having a higher rated current. *Compliance is checked by inspection.* NOTE The expression "as for normal use" implies that the RCCB is installed according to the manufacturer's instructions.
8.1.7	Add the following new subclause: **8.1.Z2 Mechanical mounting of plug-in type RCCBs** The mechanical mounting of plug-in type RCCBs, the holding in position of which does not depend solely on their plug-in connection(s), shall be reliable and have adequate stability.
8.1.7	Replace 8.1.7 by 8.1.Z2 Replace 8.1.7.1 by 8.1.Z2.1 Replace 8.1.7.2 by 8.1.Z2.2
8.1.7.1	Add the following new subclause: **8.1.Z2.1** Plug-in type RCCBs, 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 9.12.*
8.1.7.2	Add the following new subclause: **8.1.Z2.2** Plug-in type RCCBs, 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 9.12.*
8.11	Delete third paragraph (“In the case of RCCBs…”)

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Clause	Common modification
8.11	*Replace the 3rd paragraph by the following*: For RCCBs with rated residual current of 30 mA the ampere-turns produced when operating the test device of a RCCB, supplied at rated voltage or at the highest value of the voltage range, if applicable, shall not exceed 1,66 times the ampere-turns produced, when a residual current equal to $I_{\Delta n}$ is passed through one of the poles of the RCCB. For RCCBs with rated residual currents other than 30 mA the ampere-turns produced when operating the test device of a RCCB, supplied at rated voltage or at the highest value of the voltage range, if applicable, shall not exceed 2,5 times the ampere-turns produced, when a residual current equal to $I_{\Delta n}$ is passed through one of the poles of the RCCB.
8.12	Replace in the first paragraph “current paths” by “poles”.
8.Z1	Add the following subclause : **8.Z1 Behaviour of RCCBs at low ambient air temperatures** RCCBs 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 9 : NOTE To verify compliance of additional marking to 6.Z2, if any, additional tests according to the relevant standard may be necessary. In Table 9 replace the fifth dash by: – Dielectric properties and isolating capability In Table 9 add the following dashed item : – Behaviour at low ambient air temperatures of RCCBs classified for use in the range of –25 °C to +40 °C and add correspondingly "9.Z1" in the column named "Subclause".
9.1.2	Modify first paragraph by: “*For the purpose of verification of conformity with the standard, type tests are carried out in test sequences.”* Replace the note by: “NOTE Verification of the conformity to the standards may be made – by the manufacturer for the purpose of suppliers declaration (13.5.1 of ISO/IEC Guide 2); – by an independent body for certification (13.5.2 of ISO/IEC Guide 2). According to the terminology of ISO/IEC Guide 2 the term "certification" can be used for the second case only.”
9.2	Replace Note 2 by “Note 2: deleted”.
9.4	Add before Table 11 the two following paragraphs: "Plug-in connections are tested by plugging the RCCB in and pulling it out five times. After the test the connections shall not have become loose nor shall their electrical function be impaired."
9.7	Add at the end of the title “and isolating capability”
9.7.2	Modify “current paths” by “poles”
9.7.2	Add a note before c): NOTE To this purpose samples specially prepared by the manufacturer should be submitted to the test sequences implying this test.

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Clause	Common modification
9.7.2	Delete d) and its contents Rename "e)" with "d)"
9.7.2	Modify the beginning of the last but one paragraph as follows: "For the measurements according to b) to d), …"
9.7.3	Delete at the end of the first paragraph: "electronic components, if any, being disconnected for the test" Replace the two dashes in the fifth paragraph by: - 2 000 V for a) to c) of 9.7.2; electronic components, if any, having been disconnected for test b) (see relevant note for 9.7.2.b) - 2 500 V for d) of 9.7.2.
9.7.7.1	Modify in the ninth paragraph "Table 3" by "5.3.13"
9.7.7.1	Delete in the table 15 the line beginning with "2,5"
9.7.7.2	Modify in the tenth paragraph "Table 3" by "5.3.13"
9.7.7.2	Delete in the Table 16 the line beginning with "2,5"
9.7.7.3	Modify in the first paragraph of 9.7.7.3 "circuit-breaker" by "RCCB".
9.9.1	Delete in the third paragraph "*shall be at least of Class 0.5 and"*
9.9.2	Delete second paragraph ("For RCCBs…")
9.9.2.4	Add at the end of first paragraph "among the following list : 5A – 10A – 20A – 50A – 100A – 200A".
9.9.3	Add a note after the second paragraph : NOTE Preheating may be carried out at reduced voltage but auxiliary circuit shall be connected to their normal operating voltage (particularly for components depending on line voltage). Delete the last paragraph
9.9.4	Delete the last paragraph
9.10.2	Delete the note
9.10.3	Replace the second sentence of the last but one paragraph by: One test only is made with measurement of break time. The latter shall not exceed the value specified in Table 1 at $I_{\Delta n}$.
9.11.2.1	Modify Note 1 by "Note 1: deleted"
9.11.2.1 a)	Modify first paragraph of a) by "Figures 7 and 12 give diagrams of the circuits to be used for the tests concerning – a two-pole RCCB; – a three-pole RCCB; – a four-pole RCCB." Replace in the second paragraph "Z3" by "Z1" Delete in the fourth paragraph before item b): "– across the terminals of the pole, for single-pole RCCBs; Replace in the eighth paragraph "Z3" by "Z1"
9.11.2.1 a)	Replace in the 5th paragraph after Table 18 Resistor R_1 by R_2.
9.11.2.1 a)	Replace in the 6th paragraph after Table 18 current sensor O_1 by I_1, I_2, I_3, I_4
9.11.2.1 b)	Replace in the last line "± 5 %" by "0, - 5 %".
9.11.2.1 d)	Replace in the first paragraph and in the note "105 %" by "110 %".
9.11.2.1 e)	Replace in the 2th paragraph current sensor O_1 by I_1, I_2, I_3, I_4
9.11.2.1 e)	Replace in the last paragraph "Z3" by "Z1"
9.11.2.1 .f)	Modify (in item f) "i)" and "ii)" respectively by "f1)" and "f2)"

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Clause	Common modification
9.11.2.1 .i)	Modify first paragraph by: “After each of the tests applicable carried out in accordance with 9.11.2.2, 9.11.2.3 and 9.11.2.4 c), the indicator means shall show the open position of the contacts. If during the tests of 9.11.2.4 a) and 9.11.2.4 b) the RCCB does not trip, the open position of the indicator means shall be checked after the tripping test at 1,25 $I_{\Delta n}$. Furthermore, the RCCB shall show no damage impairing its further use and shall be capable, without maintenance, of complying with the following tests :”
9.11.2.1 .i)	Replace the second sentence of the last but two paragraphs of item i) 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 1 at $I_{\Delta n}$."
9.11.2.3	Modify in c) paragraph twice “105 %” by “110 %” Delete the third paragraph after the second dash in c): “*RCCBs with uninterrupted neutral are not subjected to this test.”*
9.11.2.3	Delete the third paragraph before the end (“RCCBs with uninterrupted…”)
9.12.2	Replace the first two dashes by: - *9.12.2.2 for RCCBs intended to be mounted on a rail and for all types of plug-in RCCBs designed for surface mounting;* - *9.12.2.3 for plug-in type RCCBs, the holding in position of which depends solely on their connections.*
9.12.2.2	Add after the first paragraph: *Plug-in RCCBs 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.*
9.12.2.3	Replace the existing subclause by: *Plug-in type RCCBs, 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 RCCB portion at a point equidistant between the plug-in connections, without jerks for 1 min (see Figure Z4).*
9.13.1	Replace the second sentence of the fourth paragraph by: *Only one test is made, on one pole taken at random, with measurement of break time: the latter shall not exceed the value specified in Table 1 at $I_{\Delta n}$.*
9.14	Add the requirements for small parts after the note: Small parts, where each surface lies completely within a circle of 15 mm diameter, or where any part of the surface lies outside a 15 mm diameter circle and it is not possible to fit a circle of 8 mm diameter on any of the surfaces, are not subjected to the test of this subclause (see Figure Z7 for diagrammatic representation).
9.15.2	Replace Note 2 by “Note 2: deleted”.
9.16	*Replace the 3rd paragraph by the following*: In order to verify that at rated voltage or the highest voltage of the voltage range, if applicable, the ampere-turns due to the operation of the test device are less than • 1,66 times the ampere turns produced at rated residual current for RCCB 30 mA and • 2,5 times the ampere turns produced at rated residual current for all other RCCB the impedance of the circuit is measured and the test ampere turns are calculated, taking into account the configuration of the circuit of the test device.

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Clause	Common modification
9.17.1	Starting from the seventh line, replace the text 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 RCCB is supplied with a voltage just above the highest measured value and it shall be verified that the RCCB operates in a period of time corresponding to the value specified in Table 1 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 "automatic opening" by "behaviour".
9.17.2	Add after item a): *No tripping shall occur if the voltage is switched off for a time not exceeding 0,03 s.*
9.17.2	Add after item b): RCCBs classified in 4.1 .2.1 b) are additionally submitted to the following test. *The RCCB, 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 RCCB and suddenly re-established: the RCCB shall not close automatically.* *The test is carried out five times.*
9.17.4	Replace the title by: **9.17.4 Verification of correct operation of RCCBs with three or four poles, in presence of a residual current, the neutral and one line terminal only being energized** Add in second line between "line" and "only" the word "terminal".
9.17.5	Delete 9.17.5
9.18	Delete the note.
9.18.1	In the title replace "current paths" by "poles".
9.19.1	Modify in the fourth dash “each successive peak” by “each successive reverse peak”
9.22	Add, after the first line: Specifications on verification of reliability of electronic circuits are under consideration. Delete the note.
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 1 at $I_{\Delta n}$.*
9.22.2	Replace the second sentence of the last paragraph 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 1 at $I_{\Delta n}$.*
9.23	Delete in the title "of electronic components". Replace the second sentence of the last paragraph 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 1 at $I_{\Delta n}$.*
9.Z1	Add the following new subclause: **9.Z1 Verification of the correct operation at low ambient air temperatures for RCCBs for use at temperatures between -25 °C and +40 °C** *Enclosed-type RCCBs are tested in their enclosure, unenclosed-type RCCBs 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.

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Clause	Common modification
	NOTE 2 RCCBs 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 RCCB (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 RCCB is in the ON-position without load and shall be subjected to the following cycle (see Figure Z3).* *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 RCCB 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 RCCB (see Figure 4a)* – *for RCCBs of the general type, the residual current is calibrated to 1,25 $I_{\Delta n}$ and established by closing S2. One test only is made on one pole taken at random. The break time measured shall not exceed the value specified in Table 1 for $I_{\Delta n}$;* – *for RCCBs of type S the residual current is calibrated to I,25 x 2$I_{\Delta n}$ and established by closing S2 One test only is made on one pole taken at random. The break time measured shall not exceed the value specified in Table 1 for 2 $I_{\Delta n}$.* *In addition, RCCBs 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 RCCBs of the general type, the residual current is calibrated to 1,25 x 2 $I_{\Delta n}$ for RCCBs with $I_{\Delta n} \leq 0{,}01$ A, and to 1,25 x 1,4 $I_{\Delta n}$ for RCCBs with $I_{\Delta n} > 0{,}01$ A. The current delay angle shall be = 0°, the position of S3 is set at random, and the current is established by closing S2 One test only is made on one pole taken at random. The break time measured shall not exceed the value specified in Table 1 for $I_{\Delta n}$.* – *for RCCBs 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 S2 One test only is made on one pole taken at random. The break time measured shall not exceed the value specified in Table 1 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 RCCB and it shall be possible to switch on the RCCB, without the presence of any residual current, at the temperature of -25 °C.*
Figure 4	Add the following dashed item in the title: **– behaviour at low ambient air temperature of RCCBs for use in the range of -25 °C to +40 °C** (9.Z1)

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Clause	Common modification
Between Figures 6 and 7	Replace the contents of “Explanations…” by:

N = Neutral conductor
S = Supply
R = Adjustable resistor(s)
Z = Impedance in each phase for the calibration of the rated conditional short-circuit current. The reactors shall preferably be air-cored and connected in series with resistors in order to obtain the required power factor.
Z1 = Adjustable impedance to obtain current below the rated conditional short-circuit current
Z2 = Adjustable impedance for the calibration of I_{Δ}
P = Short-circuit protective device (SCPD)
D = Device under test
frame = All conductive parts normally earthed in service, including FE, if any
G_1 = Temporary connection(s) for calibration
G_2 = Connection(s) for the test with rated conditional short-circuit current
T = Making switch for the short circuit

I_1, I_2, I_3, = Current sensor(s)
May be situated on the supply or on the load side of device under test, but always on the secondary side of the transformer.
I_4 = additional residual current sensor, if needed
Ur_1, Ur_2, Ur_3 = Voltage sensor(s)
F = Device for the detection of a fault current

R1 = Resistance drawing a current of approximately 10A

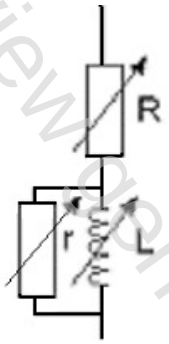
R2 = Resistor limiting the current in the device F
r = Resistor(s) taking approximately 0,6 % of the current (see 9.11.2.1)
S1 = Auxiliary switch
B and C = Points for the connections of the grid(s) shown in annex C
L = Adjustable air cored inductance(s)

Note 1 The closing device T may alternatively be situated between the load side terminals of the device under test and current sensors I_1, I_2 and I_3 as applicable

Note 2 The voltage sensors U_{r1}, U_{r2} and U_{r3} are connected between phase and neutral, as necessary.

Note 3 The adjustable load Z may be located at the high-voltage side of the supply circuit

Note 4 Resistances R1 may be omitted with agreement of the manufacturer



Detail of impedance Z, Z_1 and Z_2

Explanation of letter symbols used in Figures 7 and 12

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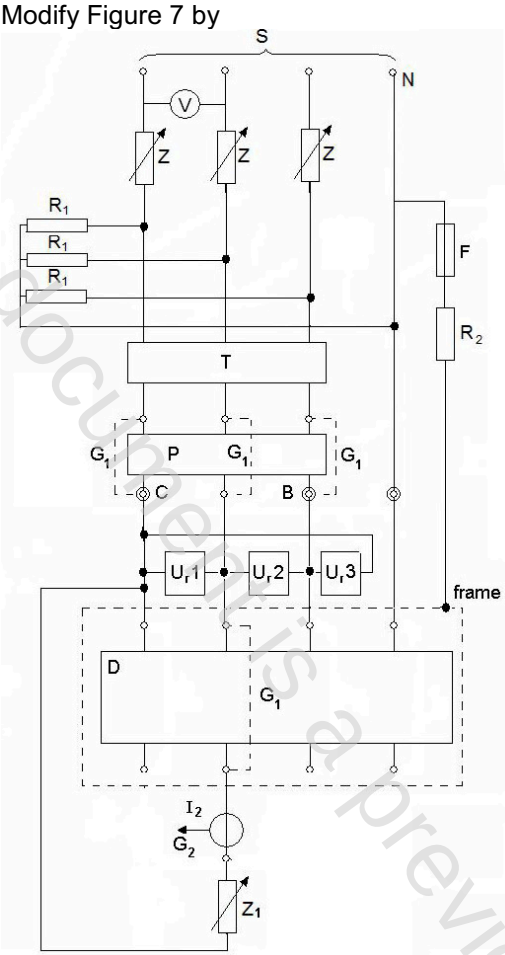
Clause	Common modification
Figure 7/10	Modify Figure 7 by 
Figure 8 / 11	Delete Figures 8 to 11

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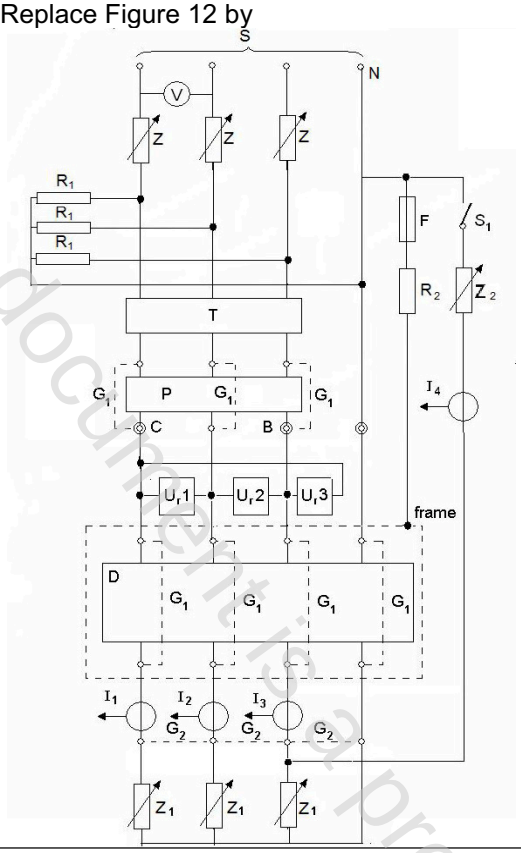
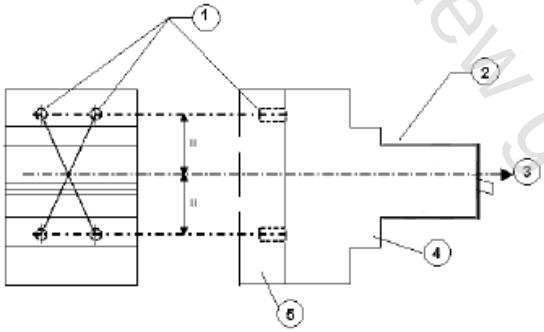
Clause	Common modification
Figure 12	Replace Figure 12 by 
Figure 27	Delete in the title of Figure 27 "of electronic components".
Figure Z1	Add the following new Figure Z1  1 Plug-in connection 2 Arrangement for application of the force 3 Force 4 RCCB 5 Base **Figure Z4 – Example of application of force for mechanical test on two-pole plug-in RCCB, the holding in position of which depends solely on the plug-in connections (9.13.2.4)**
Figure Z2	Add the following new figure: "Figure Z2 – Diagrammatic representation of a small part"

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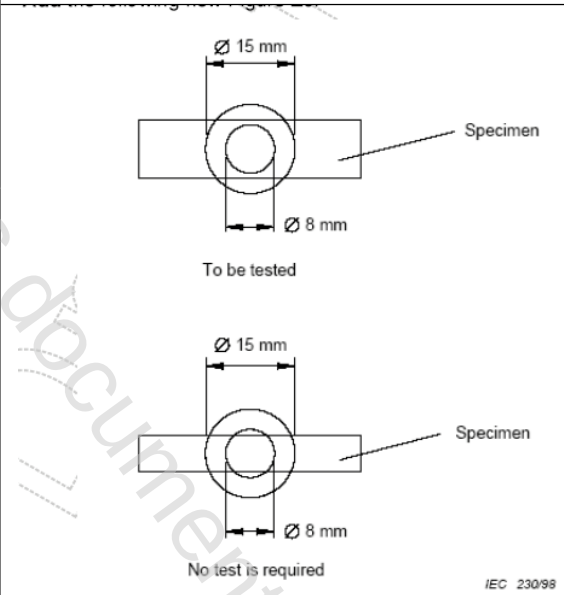
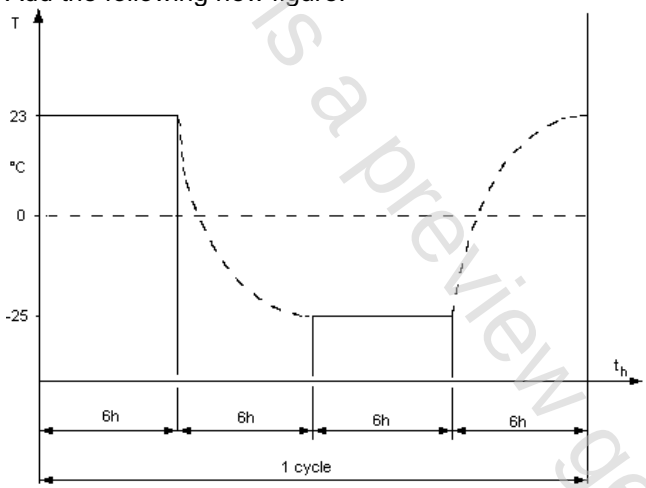
Clause	Common modification
	
Figure Z3	Add the following new figure:  **Figure Z3 – Test cycle for low temperature test (9.Z1)**
Annex A	Modify the title and the first paragraph by: **Annex A** **Test sequence and number of samples to be submitted for verification of conformity** NOTE Verification of conformity may be made – by the manufacturer for the purpose of suppliers declaration (13.5.1 of ISO/IEC Guide 2); – by an independent body for certification (13.5.2 of ISO/IEC Guide 2). According to the terminology of ISO/IEC Guide 2 the term "certification" can be used for the second case only.

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<table>
<tr><th>Clause</th><th>Common modification</th></tr>
<tr><td>Annex A
Table
A.1</td><td>Modify line G of Table A1 by:
<table>
<tr><td>G_0</td><td>9.22.1</td><td>Reliability (climatic tests)</td></tr>
<tr><td>G_1</td><td>9.Z1</td><td>Verification of correct operation at low ambient air temperature of RCCBs for use in the range of -25 °C to +40 °C</td></tr>
</table></td></tr>
<tr><td>A.2</td><td>Delete the last paragraph.</td></tr>
<tr><td>Table
A.2</td><td>Change “G” into “G_0”
Add the new test sequence G_1:
<table>
<tr><td>G_1</td><td>3</td><td>2</td><td>3</td></tr>
</table></td></tr>
<tr><td>Table
A.2</td><td>Change the table to read at the second line
A 1+3 f) 1+3 f) –
And add note f:
f) Test 9.14 shall be applied to 3 additional new samples.</td></tr>
<tr><td>Table
A.3</td><td>Replace “A” by “A j)”
Add a new note j:
“j) Three additional samples of the minimum number of poles, with ratings In and $I_{\Delta n}$ chosen at random, shall be used for the test 9.14.”</td></tr>
<tr><td>Table
A.3</td><td>Add the new test sequences D2 and G_1 as follows:
<table>
<tr><td>D_2</td><td>3 max. rating I_n
min. rating $I_{\Delta n}$</td><td>3 max. rating I_n
min. rating $I_{\Delta n}$</td><td>3 max. rating I_n
min. rating $I_{\Delta n}$</td></tr>
<tr><td>G_0</td><td>3 max. rating I_n
min. rating $I_{\Delta n}$</td><td>3 max. rating I_n
min. rating $I_{\Delta n}$</td><td>3 max. rating I_n
min. rating $I_{\Delta n}$</td></tr>
<tr><td>G_1 h)</td><td>3 max. rating I_n
min. rating $I_{\Delta n}$
3 min. rating I_n
max. rating $I_{\Delta n}$</td><td>3 max. rating I_n
min. rating $I_{\Delta n}$
3 min. rating I_n
max. rating $I_{\Delta n}$</td><td>3 max. rating I_n
min. rating $I_{\Delta n}$
3 min. rating I_n
max. rating $I_{\Delta n}$</td></tr>
</table></td></tr>
<tr><td>Table
A.3</td><td>Replace the contents of notes c), d) and e) by “deleted”.</td></tr>
<tr><td>Table
A.3</td><td>Modify in note h) “current paths” by “pole”
Delete note i)</td></tr>
<tr><td>Table
A.Z.1</td><td>Replace contents of notes c and d in table A.4 by “deleted”.</td></tr>
<tr><td>Annex
ID</td><td>Delete</td></tr>
<tr><td>Annex
J</td><td>Add a new Annex J (see below this table for the contents)</td></tr>
</table>

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Clause	Common modification
	Add a new annex **Annex ZXX** (Informative) **List of clauses that require retesting** Based on EN 61008-1:2004 + A11:2007 + A12:2009 + A13:2012, following tests and/or requirements have been technically modified and may require retesting or inspection as applicable: – 9.9.1 Verification of the operating characteristic under residual current conditions (only for RCCBs having more than one rated frequency) – 9.11.2.3 Short-circuit test on RCCBs for verifying their suitability for use in IT system – 9.21 Verification of the correct operation at residual currents with d.c. components (only for RCCBs having more than one rated frequency)
Biblio-graphy	Modify Bibliography by: **Bibliography** EN 60269-1:2007, *Low-voltage fuses – Part 1: General requirements (IEC 60269-1:2006)* EN 60947-1:2007, *Low-voltage switchgear and controlgear – Part 1: General rules (IEC 60947-1:2007)* EN 60998-1:2004, *Connecting devices for low voltage circuits for household and similar purposes – Part 1: General requirements, (IEC 60998-1:2002, modified)* EN 60998-2-2:2004, *Connecting devices for low-voltage circuits for household and similar purposes – Part 2-2: Particular requirements for connecting devices as separate entities with screwless-type clamping units (IEC 60998-2-2:2002, modified)* EN 60999 (series), *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units (IEC 60999, series)* IEC/TR 60755:2008, *General requirements for residual current operated protective devices* ASTM D785-08, *Standard Test method for Rockwell Hardness of Plastics and Electrical Insulating Materials* ASTM B172-01a, *Standard Specification for Rope-Lay-Stranded Copper Conductors Having Bunch-Stranded Members, for Electrical Conductors* ICEA S-19-81 / NEMA WC3, *Rubber-Insulated Wire and Cable* ICEA S-66-524 / NEMA WC7, *Cross-Linked-Thermosetting-Polyethylene Insulated Wire and Cable* ICEA S-68-516 / NEMA WC8, Ethylene-Propylene-Rubber Insulated Wire and Cable

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Table Z3 – Requirements for marking

Marking and other product information		Marking on the RCCB itself			Product information in the catalogue
	Each RCCB 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 data to be marked, at least the following information shall be marked and visible when the device is installed.**	**The following 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 following 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 frequency, if the RCCB is designed frequencies other than 50 Hz		X		
e)	rated current	X			
f)	rated residual operating current ($I_{\Delta n}$)in A or in mA	X			
g)	deleted				
h)	rated making and breaking capacity (I_m)				X (*)
j)	the degree of protection (only if different from IP20);				X
k)	the position of use (symbol according to EN 60051), if necessary;		X		
l)	rated residual making and breaking capacity ($I_{\Delta m}$), if different from rated short-circuit capacity (I_m)				X (*)
m)	the symbol S (S in a square) for type S devices;	X			
n)	symbol of the method of operation according to table Z1 of 4.1 if the RCCB is functionally dependent on the line voltage;		X	X	
o)	operating means of the test device, by the letter T(**);	X			
p)	wiring diagram unless the correct mode of operation is evident,		X	X	
r)	operating characteristic in presence of residual currents with d.c. components - RCCBs of type AC with the symbol 		X		
	- RCCBs of type A with the symbol 	X			

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s)	RCCBs according to 4.11 shall be marked with the symbol  (the value -25 included in the snow flake symbol according to Figure 0027 of ISO 7000) if relevant		X		
t)	Indication of the terminal for the neutral with "N"		X		
u)	Additional marking of performance to other standards or additional requirements according to 6.Z.2		X		
(*) $I_{\Delta n}$ and I_m (if different of $I_{\Delta n}$) may be anywhere on the device or in the catalogue but shall be together. (**) It is recommended to advise the user to test the device regularly.					

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Annex J
(normative)

Particular requirements for RCCBs with screwless type terminals for external copper conductors

J.1 Scope

This annex applies to RCCBs within the scope of Clause 1, equipped with screwless terminals, for current not exceeding 20 A primarily suitable for connecting unprepared (see J.3.6) copper conductors of cross-section up to 4 mm^2.

In this annex, screwless terminals are referred to as terminals and copper conductors are referred to as conductors.

J.2 Normative references

Clause 2 applies.

J.3 Definitions

As a complement to Clause 3, the following definitions apply:

J.3.1
clamping units
parts of the terminal necessary for mechanical clamping and the electrical connection of the conductors including the parts which are necessary to ensure correct contact pressure

J.3.2
screwless-type terminal
terminal for the connection and subsequent disconnection obtained directly or indirectly by means of springs, wedges or the like

NOTE 1 to entry: Examples are given in Figure J 2 .

J.3.3
universal terminal
terminal for the connection and disconnection of all types of conductors (rigid and flexible)

NOTE 1 to entry: In the following countries only universal screwless type terminals are accepted: AT, BE, CN, DK, DE, ES, FR, IT, PT, SE and CH.

J.3.4
non-universal terminal
terminal for the connection and disconnection of a certain kind of conductor only (e.g. rigid-solid conductors only or rigid-[solid or stranded] conductors only)

J.3.5
push-wire terminal
non-universal terminal in which the connection is made by pushing-in rigid (solid or stranded) conductors

J.3.6
unprepared conductor
conductor which has been cut and the insulation of which has been removed over a certain length for insertion into a terminal

NOTE 1 to entry: A conductor the shape of which is arranged for introduction into a terminal or of which the strands may be twisted to consolidate the end, is considered to be an unprepared conductor.

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