



## **TEST REPORT** IEC 61008-1

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

Report Number....:: 130700023SHA-001

Date of issue.....: 2013-10-15

Total number of pages .....: 179

Applicant's name .....: ELMARK INDUSTRIES SC

Address...... 2 Dobrudzha blvd., Dobrich, Bulgaria

Test specification:

IEC 61008-1:2010 (Third Edition) +A1:2012 used in conjunction with Standard ....::

IEC 61008-2-1:1990 (First Edition) and

EN 61008-1:2012

Test procedure....:: CB and S

Non-standard test method.....:

N/A

Test Report Form No.....: IEC61008\_1F

Test Report Form(s) Originator ....: OVE

Master TRF .....: Dated 2012-12

Copyright © 2012 Worldwide System for Conformity Testing and Certification of Electrotechnical Equipment and Components (IECEE), Geneva, Switzerland. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the IECEE is acknowledged as copyright owner and source of the material. IECEE takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

**RCCBs** Test item description....::

Trade Mark....:: ELMARK

Same as applicant Manufacturer.....:

Model/Type reference.....:

Ratings.....: Ue= 240V~(1P+N), In= 10, 16, 20, 25, 32, 40, 63A;

IΔn= 0,03, 0,1, 0,3A, type AC & type A; Inc= IΔc= 6000A

| Testi                      | ng procedure and testing location: |  |   |  |
|----------------------------|------------------------------------|--|---|--|
| $\boxtimes$                | CB Testing Laboratory:             | Intertek Testing Service                           | es Shanghai   |  |
| Testing location/ address: |                                    | Building No.86, 1198 Qinzhou Road (North),         |   |  |
|                            |                                    | Shanghai 200233, Chir                              | na  |  |
|                            | Associated CB Testing Laboratory:  | Inspection Center of Pi<br>Electric Apparatus in Z | roducts' Quality of Low Voltage<br>hejiang Province |  |
| Testi                      | ng location/ address:              | West Zhonghuan Road<br>P.R.China                   | d, Jiaxing City, Zhejiang Province,                 |  |
| 7                          | Tested by (name + signature):      | Vincent Yang                                       | Vincent you   |  |
| ,                          | Approved by (name + signature):    | Jim Hua  | Dim Un  |  |
|                            |                                    |  |   |  |
| Ш                          | Testing procedure: TMP             |  |   |  |
| Testi                      | ng location/ address:              |  |   |  |
| 7                          | Tested by (name + signature):      |  |   |  |
| A                          | Approved by (name + signature):    |  |   |  |
|                            | Tanking and address to the T       |  |   |  |
| Ш                          | Testing procedure: WMT             |  |   |  |
| Testi                      | ng location/ address:              |  |   |  |
| ٦                          | Гested by (name + signature):      |  |   |  |
| ١                          | Witnessed by (name + signature):   |  |   |  |
|                            | Approved by (name + signature):    |  |   |  |
|                            | T                                  |  |   |  |
|                            | Testing procedure: SMT             |  |   |  |
| Testi                      | ng location/ address:              |  |   |  |
| ٦                          | Tested by (name + signature):      |  |   |  |
| A                          | Approved by (name + signature):    |  |   |  |
|                            | Supervised by (name + signature):  |  |   |  |
|                            |                                    |  |   |  |

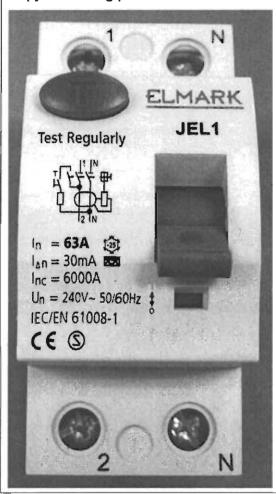
| Summary of  | Testing items  | Testing leastion |
|-------------|--|------------------|
| Clause      |  | Testing location |
| 6           | Marking and other product information  | CBTL             |
| 8.1.1<br>   | General  | CBTL             |
| 8.1.2       | Mechanism  | CBTL             |
| 8.1.3       | Clearances and creepage distances  | CBTL             |
| 8.1.6       | Non-interchangeability   | CBTL             |
| 9.3         | Test of Indelibility of marking  | CBTL             |
| 9.4         | Test of reliability of screws, current-carrying parts and connections.                     | CBTL             |
| 9.5         | Reliability of terminals for external conductors   | CBTL             |
| 9.6         | Test of protection against electric shock  | CBTL             |
| 9.7         | Test of dielectric properties  |                  |
| 9.7.1       | Resistance to humidity   | CBTL             |
| 9.7.2       | Insulation resistance of the main circuit  | CBTL             |
| 9.7.3~9.7.7 | Dielectric strength  | CBTL             |
| 9.8         | Test of temperature-rise   | CBTL             |
| 9.9         | Operating characteristic   | ACTL             |
| 9.10        | Mechanical and electrical endurance  | ACTL             |
| 9.11        | Behavior of the RCCBs under short circuit conditions                                       | ACTL             |
| 9.12        | Resistance to mechanical shock and impact  |                  |
| 9.12.1      | Mechanical shock   | CBTL             |
| 9.12.2      | Mechanical impact  | CBTL             |
| 9.13        | Resistance to heat   | CBTL             |
| 9.14        | Resistance to abnormal heat and to fire  | CBTL             |
| 9.15        | Trip-free mechanism  | CBTL             |
| 9.16        | Operation of the test device at the limits of rated voltage                                | CBTL             |
| 9.17        | Behaviour of RCCBs in case of failure of the line voltage, classified according to 4.1.2.1 | CBTL             |
| 9.18        | Limiting values of the non-operating current under over current conditions                 | ACTL             |
| 9.19        | Resistance against unwanted tripping due to current surges                                 | ACTL             |
| 9.20        | Resistance of the insulation against an impulse voltages                                   | ACTL             |
| 9.21        | Behaviour of RCCBs in case of an earth fault current comprising a d.c. components          | ACTL             |
| 9.22        | Reliability  |                  |
| 9.22.1      | Climatic test  | CBTL             |

| 9.22.2 | Test with temperature of 40℃        | ACTL |
|--------|-------------------------------------|------|
| 9.23   | Ageing of electronic components     | ACTL |
| 9.24   | Electromagnetic compatibility (EMC) | CBTL |

# Summary of compliance with National Differences

The test results obtained and the general performance is considered to comply with the group differences of EN 61008-1:2012.

## Copy of marking plate:



| Summary       | of testin | g:             |      |      |                |                | _ |        |                                |                |      |        |       |                 |        |
|---------------|-----------|----------------|------|------|----------------|----------------|---|--------|--------------------------------|----------------|------|--------|-------|-----------------|--------|
| Report        | No of     | l <sub>n</sub> | In   |      | 9188           | 799            | T | est se | quence ar                      | nd nur         | nber | of sar | nples |                 |        |
| ref.No        | poles     | (A)            | (A)  | Туре | A <sub>1</sub> | A <sub>2</sub> | В | С      | D <sub>0</sub> +D <sub>1</sub> | D <sub>2</sub> | Е    | F      | G     | H <sup>a)</sup> | EMC b) |
|               | 1P+N      | 63             | 0,03 | Α    | Х              | х              | Х | х      | х                              | Х              | Х    | Х      | -     | -               | -      |
|               | 1P+N      | 63             | 0,03 | AC   | -              | -              | - | _      | ×                              | -              | _    | -      | ×     | -               | -      |
| 1307000       | 1P+N      | 63             | 0,1  | Α    | -              | -              | - | -      | х -                            | -              | _    | _      | -     | -               | -      |
| 23SHA-<br>001 | 1P+N      | 63             | 0,1  | AC   | -              | -              | - | _      | x -                            | -              | _    | -      | -     | _               | -      |
|               | 1P+N      | 63             | 0,3  | Α    | -              | -              | - | -      | х -                            | _              | _    | _      | -     | _               | -      |
|               | 1P+N      | 63             | 0,3  | AC   | -              | -              | - | -      | x -                            | -              | _    | _      | -     | -               | -      |
|               | 1P+N      | 10             | 0,3  | AC   | _              | -              | - | _      |                                | -              | _    | х      | _     | -               | _      |
|               | 1P+N      | 10             | 0,3  | А    | _              | -              | - | -      |                                | -              | -    | -      | ×     | -               | -      |
|               | 3P+N      | 63             | 0,03 | Α    | x              | х              | X | x      | ×                              | ×              | ×    | ×      | _     | x               | ×      |
| 1307000       | 3P+N      | 63             | 0,03 | AC   | -              | -              | _ | _      | ×                              | _              | _    | _      | x     | _               | _      |
| 23SHA-<br>002 | 3P+N      | 10             | 0,3  | AC   | _              | - '            | - | _      | _                              | -              | _    | x      | -     | ×               | _      |
| <del>-</del>  | 3P+N      | 10             | 0,3  | Α    | _              | -              | - | -      | -                              | _              | _    | _      | х     | _               | _      |

#### Note:

- a). Test sequence in EN 61008-1.
- b). See EMC test report No. 130700024SHA.

| Test item particulars:   |                             |
|--|-----------------------------|
| Classification of RCCBs functionally dependent on the line voltage             | Yes / No                    |
| Opening automatically in case of failure of the line voltage                   | Yes / No                    |
| - reclosing automatically when the line voltage is restored                    | Yes / No                    |
| - not reclosing automatically when the line voltage is restored                | Yes / No                    |
| Not opening automatically in case of failure of the line voltage               | Yes / No                    |
| - able to trip in a hazardous situation arising on failure of line voltage     | Yes / No                    |
| - not able to trip in a hazardous situation arising on failure of line voltage | Yes / No                    |
| Type of RCCB   |                             |
| - type AC:   | Yes / No                    |
| - type A:  | Yes / No                    |
| - independent of the line voltage:   | Yes / No                    |
| - dependent on the line voltage:   | Yes / No                    |
| - without time delay   | Yes / No                    |
| - with time delay: type S  | Yes / No                    |
| - enclosed   | Yes / No                    |
| - unenclosed:  | Yes / No                    |
| - IP number  | 20 ( for built in use)      |
| - for fixed installation:  | Yes                         |
| - for mobile installation  | No                          |
| Number of poles  | 2(1+N)                      |
| Ambient air temperature (°C)   | -25 ~ +40                   |
| Method of mounting   | Din rail mounting           |
| Method of connection   |                             |
| Rated residual operating current (A)   | 0,03; 0,1; 0,3              |
| Rated current (A)  | 10, 16, 20, 25, 32, 40, 63A |
| Rated voltage (V)  | 240V~                       |
| Rated impulse withstand voltage (U <sub>imp</sub> )                            | 4kV                         |
| Nature of supply:  | ~                           |
| Rated frequency (Hz)   | 50/60                       |

| Rated making and breaking capacity (A)  | 630A(63A), 500A(10, 16, 20, 25, 32, 40A)  |
|---|---|
| Rated residual making and breaking capacity (A)   | Same as above   |
| Rated conditional short-circuit current (A)   | 6000  |
| Rated conditional residual short-circuit current (A)  | Same as above   |
| Type of terminal  | Screw in  |
| Possible test case verdicts:  |   |
| - test case does not apply to the test object   | N/A   |
| - test object does meet the requirement   | P (Pass)  |
| - test object does not meet the requirement   | F (Fail)  |
| Testing   |   |
| Date of receipt of test item  | 2013-07-01  |
| Date (s) of performance of tests  | From 2013-07-05 to 2013-09-30   |
|   |   |
| General remarks:  |   |
| The test results presented in this report relate only to the This report shall not be reproduced, except in full, with laboratory.  "(see Enclosure #)" refers to additional information as "(see appended table)" refers to a table appended to the  | out the written approval of the Issuing testing opended to the report.                            |
| Throughout this report a $\boxtimes$ comma / $\square$ point is   | read as the desimal congrator   |
| Throughout this report a 🖂 comma / 🗌 point is t   | used as the decimal separator.  |
| Throughout this report a 🖂 comma / 🗌 point is a Manufacturer's Declaration per sub-clause 4.2.5 of  |   |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate  |   |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the   | IECEE 02:   |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are)   | IECEE 02:   |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the   | IECEE 02:  ☐ Yes ☐ Not applicable   |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided  | IECEE 02:  ☐ Yes  ☑ Not applicable  |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided  When differences exist; they shall be identified in the   | IECEE 02:  ☐ Yes ☑ Not applicable  the General product information section.                       |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided  | IECEE 02:  ☐ Yes ☑ Not applicable  the General product information section.                       |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided  When differences exist; they shall be identified in the Name and address of factory (ies)   | IECEE 02:  ☐ Yes ☑ Not applicable  the General product information section.                       |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided  When differences exist; they shall be identified in the   | IECEE 02:  ☐ Yes  ☑ Not applicable  he General product information section.  ELMARK INDUSTRIES SC |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided  When differences exist; they shall be identified in the Name and address of factory (ies)   | IECEE 02:  ☐ Yes  ☑ Not applicable  he General product information section.  ELMARK INDUSTRIES SC |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided  When differences exist; they shall be identified in the Name and address of factory (ies)   | IECEE 02:  ☐ Yes  ☑ Not applicable  he General product information section.  ELMARK INDUSTRIES SC |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided  | IECEE 02:  ☐ Yes  ☑ Not applicable  he General product information section.  ELMARK INDUSTRIES SC |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided  When differences exist; they shall be identified in the Name and address of factory (ies)  General product information:  Ue= 240V~(1P+N), 415V~(3P+N)  In=10, 16, 20, 25, 32, 40, 63A | IECEE 02:  ☐ Yes  ☑ Not applicable  he General product information section.  ELMARK INDUSTRIES SC |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|    | TEST SEQUENCE A <sub>1</sub> (1 sample: ln= 63A, IΔn= 0,03A, type A)   | A <sub>1</sub> -1 | Р   |
|----|--|-------------------|-----|
| 6. | Marking  |                   |     |
|    | a) manufacturer's name or trademark:   | ELMARK            | Р   |
|    | b) type designation, catalogue number or serial number   | JEL1              | Р   |
|    | c) rated voltage(s) (V)  | 240V~             | Р   |
|    | d) rated frequency (Hz)  | 50/60Hz           | Р   |
|    | e) rated current (A)   | 63A               | Р   |
|    | f) rated residual operating current (A)  | 30mA              | Р   |
|    | h) rated making and breaking capacity (A)  |                   | N/A |
|    | j) degree of protection:   |                   | N/A |
|    | k) position of use   |                   | N/A |
|    | I) rated residual making and breaking capacity (A)   |                   | N/A |
|    | m) symbol S for type S   | s                 | N/A |
|    | n) symbol of the method of operation:  |                   | N/A |
|    | o) operating means of test device  | Т                 | Р   |
|    | p) wiring diagram:   |                   | Р   |
|    | q) operating characteristic:   |                   | Р   |
|    | Marking on the RCCB itself or on nameplate or nameplates attached to the RCCB and located so that for small devices at least e), f), o) and q) (only for type A) are legible when the RCCB is installed: |                   | Р   |
|    | Joule integral withstand capacity (A2s)  |                   | N/A |
|    | Peak current withstand capacity (A)  |                   | N/A |
|    | Time delay when opening in case of failure of the line voltage (s)   |                   | N/A |
|    | Open position indicated by "0" and closed position by "I"  | 0/1               | Р   |
|    | For push-buttons the OFF push-button shall either be red or marked with "0"  |                   | N/A |
|    | If necessary to distinguish between supply and load terminals they shall be clearly marked:  |                   | N/A |

|        | IEC 61008-1   |                 |         |
|--------|---|-----------------|---------|
| Clause | Requirement + Test  | Result - Remark | Verdict |
|        |   |                 |         |
|        | Terminals for neutral conductor marked by "N"   |                 | Р_      |
|        | Terminals for protective conductor marked by  |                 | N/A     |
|        | [symbol IEC 417-5019 a]   |                 |         |
|        | Marking indelible, easy legible and not on  |                 | P       |
|        | removable parts   |                 |         |
| 9.3    | Test: 15 s with water, 15 s with hexane   |                 | P       |
|        | For universal terminals (rigid-solid, rigid-stranded and flexible conductors:   |                 | Р       |
|        | - no markings   |                 | Р       |
|        | For non-universal terminals:  |                 | N/A     |
|        | terminals for rigid-solid conductors only, marked<br>by the letters "s" or "sol"  |                 | N/A     |
|        | <ul> <li>terminals for rigid (solid and stranded)<br/>conductors<br/>only, marked by the letter "r"</li> </ul>            |                 | N/A     |
|        | marking on the RCCB or if the space available is not sufficient, on the smallest package unit or in technical information |                 | Р       |
| 8.     | Requirements for construction and operation   |                 |         |
| 8.1.1  | General   |                 | st 7 m  |
|        | Residual current detection is located between the   |                 | Р       |
|        | incoming and outgoing terminals   |                 |         |
|        | Not possible to alter the operating characteristics   |                 | Р       |
|        | by means of external interventions other than those   |                 |         |
|        | specifically intended for changing the setting of the   |                 |         |
|        | residual operating current  |                 |         |
|        | Changing from one setting to another shall not be   |                 | N/A     |
|        | possible without a tool   |                 |         |
|        | In case of an RCCB having multiple settings of  |                 | N/A     |
|        | residual operating current the rating refers to   |                 |         |
|        | the highest setting   |                 |         |
| 8.1.2  | Mechanism   |                 |         |
|        | Moving contacts of all poles so mechanically  |                 | Р       |
|        | coupled that all poles except the switched neutral,   |                 |         |
|        | make and break substantially together   |                 |         |

| Clause Requirement + Test Result - Remark Ver  Switched neutral opens after and closes before other poles  Compliance is checked by inspection and by manual tests, using any appropriate means (e.g.: indicator lights, oscilloscope, etc.)  Trip-free mechanism  9.15 Test: the RCCB is mounted and wired as in normal use  - test circuit according to fig. 4a  - a residual current equal to 1,5 I <sub>Δn</sub> is passed by closing S2, the RCCB having been closed and the operating means being held in the closed position.  The RCCB shall trip  - test repeated by moving the operating means slowly (1 s) to a position where the current starts to flow. Tripping shall occur without further movement  8.1.2 Possible to switch on and off by hand  No intermediate positions of the contacts  In the open position isolation distance in accordance with the requirements necessary to satisfy the isolating function | lict |
|--|------|
| other poles  Compliance is checked by inspection and by manual tests, using any appropriate means (e.g.: indicator lights, oscilloscope, etc.)  Trip-free mechanism  9.15  Test: the RCCB is mounted and wired as in normal use  - test circuit according to fig. 4a  - a residual current equal to 1,5 I <sub>Δn</sub> is passed by closing S2, the RCCB having been closed and the operating means being held in the closed position.  The RCCB shall trip  - test repeated by moving the operating means slowly (1 s) to a position where the current starts to flow. Tripping shall occur without further movement  8.1.2  Possible to switch on and off by hand  No intermediate positions of the contacts  In the open position isolation distance in accordance with the requirements necessary to  |      |
| other poles  Compliance is checked by inspection and by manual tests, using any appropriate means (e.g.: indicator lights, oscilloscope, etc.)  Trip-free mechanism  9.15  Test: the RCCB is mounted and wired as in normal use  - test circuit according to fig. 4a  - a residual current equal to 1,5 l <sub>An</sub> is passed by closing S2, the RCCB having been closed and the operating means being held in the closed position.  The RCCB shall trip  - test repeated by moving the operating means slowly (1 s) to a position where the current starts to flow. Tripping shall occur without further movement  8.1.2  Possible to switch on and off by hand  No intermediate positions of the contacts  In the open position isolation distance in accordance with the requirements necessary to  |      |
| Compliance is checked by inspection and by manual tests, using any appropriate means (e.g.: indicator lights, oscilloscope, etc.)  Trip-free mechanism  9.15  Test: the RCCB is mounted and wired as in normal use  - test circuit according to fig. 4a  - a residual current equal to 1,5 I <sub>An</sub> is passed by closing S2, the RCCB having been closed and the operating means being held in the closed position.  The RCCB shall trip  - test repeated by moving the operating means slowly (1 s) to a position where the current starts to flow. Tripping shall occur without further movement  8.1.2  Possible to switch on and off by hand  No intermediate positions of the contacts  In the open position isolation distance in accordance with the requirements necessary to   |      |
| manual tests, using any appropriate means (e.g.: indicator lights, oscilloscope, etc.)  Trip-free mechanism  9.15  Test: the RCCB is mounted and wired as in normal use  - test circuit according to fig. 4a  - a residual current equal to 1,5 l <sub>An</sub> is passed by closing S2, the RCCB having been closed and the operating means being held in the closed position.  The RCCB shall trip  - test repeated by moving the operating means slowly (1 s) to a position where the current starts to flow. Tripping shall occur without further movement  8.1.2  Possible to switch on and off by hand  No intermediate positions of the contacts  In the open position isolation distance in accordance with the requirements necessary to  |      |
| indicator lights, oscilloscope, etc.)  Trip-free mechanism  9.15  Test: the RCCB is mounted and wired as in normal use  - test circuit according to fig. 4a  - a residual current equal to 1,5 l <sub>An</sub> is passed by closing S2, the RCCB having been closed and the operating means being held in the closed position.  The RCCB shall trip  - test repeated by moving the operating means slowly (1 s) to a position where the current starts to flow. Tripping shall occur without further movement  8.1.2  Possible to switch on and off by hand  No intermediate positions of the contacts  In the open position isolation distance in accordance with the requirements necessary to   |      |
| Trip-free mechanism  9.15 Test: the RCCB is mounted and wired as in normal use  - test circuit according to fig. 4a  - a residual current equal to 1,5 l <sub>Δn</sub> is passed by closing S2, the RCCB having been closed and the operating means being held in the closed position.  The RCCB shall trip  - test repeated by moving the operating means slowly (1 s) to a position where the current starts to flow. Tripping shall occur without further movement  8.1.2 Possible to switch on and off by hand No intermediate positions of the contacts In the open position isolation distance in accordance with the requirements necessary to  |      |
| 9.15 Test: the RCCB is mounted and wired as in normal use  - test circuit according to fig. 4a  - a residual current equal to 1,5 I <sub>Δn</sub> is passed by closing S2, the RCCB having been closed and the operating means being held in the closed position. The RCCB shall trip  - test repeated by moving the operating means slowly (1 s) to a position where the current starts to flow. Tripping shall occur without further movement  8.1.2 Possible to switch on and off by hand  No intermediate positions of the contacts  In the open position isolation distance in accordance with the requirements necessary to  |      |
| - test circuit according to fig. 4a  - a residual current equal to 1,5 I <sub>Δn</sub> is passed by closing S2, the RCCB having been closed and the operating means being held in the closed position.  The RCCB shall trip  - test repeated by moving the operating means slowly (1 s) to a position where the current starts to flow. Tripping shall occur without further movement  8.1.2 Possible to switch on and off by hand  No intermediate positions of the contacts  In the open position isolation distance in accordance with the requirements necessary to  |      |
| - a residual current equal to 1,5 l <sub>Δn</sub> is passed by closing S2, the RCCB having been closed and the operating means being held in the closed position. The RCCB shall trip  - test repeated by moving the operating means slowly (1 s) to a position where the current starts to flow. Tripping shall occur without further movement  8.1.2 Possible to switch on and off by hand  No intermediate positions of the contacts  In the open position isolation distance in accordance with the requirements necessary to  |      |
| closing S2, the RCCB having been closed and the operating means being held in the closed position.  The RCCB shall trip  - test repeated by moving the operating means slowly (1 s) to a position where the current starts to flow. Tripping shall occur without further movement  8.1.2 Possible to switch on and off by hand  No intermediate positions of the contacts  In the open position isolation distance in accordance with the requirements necessary to  |      |
| operating means being held in the closed position.  The RCCB shall trip  - test repeated by moving the operating means slowly (1 s) to a position where the current starts to flow. Tripping shall occur without further movement  8.1.2 Possible to switch on and off by hand No intermediate positions of the contacts In the open position isolation distance in accordance with the requirements necessary to  |      |
| The RCCB shall trip  - test repeated by moving the operating means slowly (1 s) to a position where the current starts to flow. Tripping shall occur without further movement  8.1.2 Possible to switch on and off by hand No intermediate positions of the contacts In the open position isolation distance in accordance with the requirements necessary to  |      |
| - test repeated by moving the operating means slowly (1 s) to a position where the current starts to flow. Tripping shall occur without further movement  8.1.2 Possible to switch on and off by hand No intermediate positions of the contacts In the open position isolation distance in accordance with the requirements necessary to   |      |
| slowly (1 s) to a position where the current starts to flow. Tripping shall occur without further movement  8.1.2 Possible to switch on and off by hand  No intermediate positions of the contacts  In the open position isolation distance in accordance with the requirements necessary to   |      |
| flow. Tripping shall occur without further movement  8.1.2 Possible to switch on and off by hand  No intermediate positions of the contacts  In the open position isolation distance in accordance with the requirements necessary to  |      |
| 8.1.2 Possible to switch on and off by hand  No intermediate positions of the contacts  In the open position isolation distance in accordance with the requirements necessary to   |      |
| No intermediate positions of the contacts  In the open position isolation distance in accordance with the requirements necessary to  |      |
| In the open position isolation distance in accordance with the requirements necessary to   |      |
| accordance with the requirements necessary to  |      |
|  |      |
| satisfy the isolating function   |      |
|  |      |
| 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)  |      |
| - a separate mechanical indicator  |      |
| If a separate mechanical indicator is used, this   |      |
| shall show the colour red for the closed position  |      |
| and the colour green for the open position   |      |
| means of indication of the contact position shall be   |      |
| reliable   |      |
| -checked by inspection and by the tests of 9.15  |      |

|        | Page 11 of 179   | Report No.:130700 | 0023SHA-00 |
|--------|--|-------------------|------------|
|        | IEC 61008-1  |                   |            |
| Clause | Requirement + Test                                     | Result - Remark   | Verdict    |
|        |  |                   |            |
|        | RCCBs shall be designed so that the actuator, front    |                   | Р          |
|        | plate or cover can only be correctly fitted in a       |                   |            |
|        | manner which ensures correct indication of the         |                   |            |
|        | contact position                                       |                   |            |
|        | -checked by inspection and by the tests of 9.11        |                   |            |
|        | When means are provided or specified by the            | No such locking   | N/A        |
|        | manufacturer to lock the operating means in the        |                   |            |
|        | open position: locking only possible when the main     |                   |            |
|        | contacts are in the open position                      |                   |            |
|        | If the operating means is used for indication, it      |                   | Р          |
|        | shall, when released, automatically take up the        |                   |            |
|        | position to that of the moving contacts; the           |                   |            |
|        | operating means shall have two distinct rest           |                   |            |
|        | positions except that for automatic opening a third    |                   |            |
|        | distinct position may be provided, when necessary      |                   |            |
|        | to reset before reclosing                              |                   |            |
|        | For RCCBs functionally dependent on line voltage,      |                   | Р          |
|        | reclosing automatically when the line voltage is       |                   |            |
|        | restored after failure, the operating means shall      |                   |            |
|        | remain in the ON position and the contacts shall       |                   |            |
|        | reclose automatically unless the operating means       |                   |            |
|        | has been placed in the OFF position                    |                   |            |
|        | When an indicator light is used this shall be lit when |                   | N/A        |
|        | the RCCB is in the closed position                     |                   |            |
|        | The indicator light shall not be the only means to     |                   | N/A        |
|        | indicate the closed position                           |                   |            |
|        | The action of the mechanism shall not be               |                   | Р          |
|        | influenced by the position of enclosures or covers     |                   |            |
|        | and shall be independent of any removable part.        |                   |            |
|        | If the cover is used as a guiding means for push-      |                   | Р          |
|        | buttons, it shall not be possible to remove the        |                   |            |
|        | buttons from the outside                               |                   |            |
|        | Operating means securely fixed; not possible to        |                   | Р          |
|        |  |                   |            |

remove them without a tool

|         | IEC 61008-1  |                         |          |
|---------|--|-------------------------|----------|
| Clause  | Requirement + Test   | Result - Remark         | Verdict  |
|         |  |                         | 1        |
|         | For "up-down" operating means the contacts shall   |                         | Р        |
|         | be closed by the up movement   |                         |          |
| 8.1.4   | Screws, current-carrying parts and connections   |                         | 57,845.2 |
| 8.1.4.1 | Connections withstand mechanical stresses  |                         | P        |
|         | occurring in normal use  |                         |          |
|         | Screws for mounting the RCCB are not of thread-  |                         | N/A      |
|         | cutting type   |                         |          |
| 9.4     | Screws and nuts which are operated when  |                         | Р        |
|         | mounting and connecting comply with the test of  |                         |          |
|         | 9.4  |                         |          |
|         | Torque test:   |                         |          |
|         | - torque (Nm); 5/10 times; diameter (mm):  | 2,5Nm; 5 times; Ø 5,9mm | Р        |
| 3.1.4.2 | Screws with a thread of insulating material  |                         | N/A      |
|         | operated when mounting the RCCB: correct   |                         |          |
|         | introduction ensured   |                         |          |
| 8.1.4.3 | Electrical connections: contact pressure not   |                         | Р        |
|         | transmitted through insulating material unless there   |                         |          |
|         | is sufficient resilience in the metallic parts   |                         |          |
| 8.1.4.4 | Current-carrying parts including parts intended for protective conductors, if any, shall be made of a metal having, under the conditions occurring in the equipment, mechanical strength, electrical conductivity and resistance to corrosion adequate for their intended use. Examples below: |                         | Р        |
|         | - copper   |                         | N/A      |
|         | - an alloy 58% copper for parts worked cold  |                         | Р        |
|         | - an alloy 50% copper for other parts  |                         | N/A      |
|         | - other metal  |                         | N/A      |
|         | In case of using ferrous alloys or suitably coated ferrous alloys, compliance to resistance to corrosion is checked by a test of resistance to rusting (see 9.25).   |                         | Р        |
|         | The requirements of this subclause do not apply to: contacts, magnetic circuits, heater elements, bimetals, shunts, parts of electronic devices or to screws, nuts, washers, clamping plates, similar parts of terminals and parts of the test circuit   |                         | Р        |
| 3.1.5   | Terminals for external conductors  |                         | Р        |

|         | IEC 61008-1   |  |               |
|---------|---|--|---------------|
| Clause  | Requirement + Test  | Result - Remark  | Verdict       |
|         |   |  | <del></del> : |
|         | Compliance is checked by inspection and by the tests as relevant for the type of connection:  |  | Р             |
|         | 9.5 for screw-type terminals  |  | Р             |
|         | by specific tests for plug-in or bolt-on RCCBs included in the standard   |  | N/A           |
|         | by the tests of Annexes J, K or L   |  | N/A           |
| 8.1.5.1 | Terminals ensure the necessary contact pressure   |  | Р             |
| 9.5     | Torque test:  |  | Р             |
|         | - torque (Nm); diameter (mm)  | 2,5Nm; Ø5,9mm  | Р             |
|         | - max. cross-sectional area (mm²)   | 16mm <sup>2</sup>  | . (38-46-2)   |
| 9.5.1   | Pull test:  |  | Р             |
|         | Terminal shall be suitable for all types of conductors: rigid (solid or stranded) and flexible, unless otherwise specified by the manufacturer. |  |               |
|         | Min. cross-section solid / stranded / flexible (mm²):   | 1,0mm²   |               |
|         | Max. cross-section solid / stranded / flexible (mm²):   | 16mm²  | 200           |
|         | Torque <sup>2</sup> / <sub>3</sub> (Nm):  | -  |               |
|         | Pull for 1 min solid / stranded / flexible (N):   | 50N for 1,0mm <sup>2</sup><br>100N for 16mm <sup>2</sup> | Р             |
|         | During the test no noticeable move of conductor   |  | Р             |
| 9.5.2   | Torque test:  |  | Р             |
|         | - torque (2/3) (Nm)   | 1,67Nm   | FAIR IN       |
|         | - min. cross-sectional area (mm²)   | 1,0 mm²  |               |
|         | - max. cross-sectional area (mm²)   | 16 mm²   |               |
|         | The conductor shows no damage   |  | Р             |
|         | Terminals have not worked loose and no damage   |  | Р             |
| 9.5.3   | Terminals fitted with the largest cross-section area specified in Table 6, for stranded and/or flexible copper conductor.                       | 1,0 to 16 mm²  |               |
|         | Max. cross-section stranded (mm²)   | 7  |               |
|         | Max. cross-section flexible (mm²)   | 2,14 mm  |               |
|         | Torque <sup>2</sup> / <sub>3</sub> (Nm)   |  |               |
|         | After the test no strand of conductor escaped outside   |  | Р             |
| 8.1.5.2 | RCCBs shall be provided with:   |  |               |
|         | terminals which shall allow the connection of<br>copper conductors having nominal cross-<br>sectional areas as shown in Table 6                 |  | Р             |

|         |   | !  | IEC 6100                                       | 8-1                 |  |         |
|---------|---|--|--|---------------------|--|---------|
| Clause  | Requirement + Tes   | t  |  |                     | Result - Remark  | Verdict |
|         | 1   |  |  |                     |  |         |
|         | Rated current (A)   | Range of nominato be clamped* (  |  | ections             |  | Р       |
|         |   | Rigid (solid<br>or stranded)<br>conductors   | Flexibl<br>condu                               |                     |  |         |
|         | ≤ 13<br>> 13 ≤ 16<br>> 16 ≤ 25<br>> 25 ≤ 32<br>> 32 ≤ 50<br>> 50 ≤ 80<br>> 80 ≤ 100<br>> 100 ≤ 125                                    | 1 to 2,5<br>1 to 4<br>1,5 to 6<br>2,5 to 10<br>4 to 16<br>10 to 25<br>16 to 35<br>24 to 50             | 1 to 1,5 to 2,5 to 4 to 10 to 16 to 16         | o 6<br>o 10<br>o 16 | 1,0 to 25 mm² for Rigid conductors 1,0 to 16 mm² for flexible conductors |         |
|         | *It is required that, including 50 A, ter solid conductors a conductors. Neve terminals for cond from 1 mm² up to solid conductors of | minals be design<br>as well as rigid st<br>rtheless, it is per<br>luctors having cr<br>6 mm² be design | ned to cla<br>randed<br>mitted th<br>oss-secti | amp<br>at<br>ions   | The terminal is designed for solid conductors of 1-6 mm².                | Р       |
|         | - or terminals for e<br>conductors and v<br>terminals for use<br>conductors acco  | with aluminium s<br>with copper or v   | crew-typ<br>with alum                          | е                   |  | N/A     |
| 8.1.5.3 | Means for clamping  | g the conductors   | in the te                                      | rminals             |  | Р       |
|         | do not serve to fix   | any other compo  | nent (se                                       | e tests             |  |         |
|         | of 9.5)   |  |  |                     |  |         |
| 8.1.5.4 | Terminals for In ≤ 3  | 32 A allow the co  | onnection                                      | ı of                |  | N/A     |
|         | conductors without  | special prepara  | tion   |                     | _  |         |
| 8.1.5.5 | Terminals shall have  | ve adequate me   | chanical                                       |                     |  | Р       |
|         | strength and metric   | ISO thread or e  | equivalen                                      | it (see             |  |         |
|         | tests of 9.4 and 9.5  | •  |  |                     |  |         |
| 8.1.5.6 | Clamping of condu   |  | ue dama  | ge to               |  | Р       |
|         | conductor (see tes  |  |  |                     |  |         |
| 8.1.5.7 | Clamping of condu   | ·  |  | n metal             |  | P       |
|         | surfaces (see tests   |  |  |                     |  |         |
| 8.1.5.8 | Terminals so desig  | ,  |  |                     |  | Р       |
|         | conductor can slip  |  |  | crews or            |  |         |
|         | nuts are tightened  |  |  |                     |  | _       |
| 8.1.5.9 | Terminals so fixed  |  | •  |                     |  | Р       |
|         | loose when the cla  | , -  |  | 9                   |  |         |
|         | tightened or looser   | ned (see tests of  | 9.4)   |                     |  |         |

|          | IEC 61008-1   |                 |         |  |  |
|----------|---|-----------------|---------|--|--|
| Clause   | Requirement + Test                                  | Result - Remark | Verdict |  |  |
|          |   |                 |         |  |  |
| 8.1.5.10 | Clamping screws or nuts of terminals for the        |                 | N/A     |  |  |
|          | protective conductors adequately secured against    |                 |         |  |  |
|          | accidental loosening and not possible to unclamp    |                 |         |  |  |
|          | without a tool                                      |                 |         |  |  |
| 8.1.5.11 | Screws and nuts of terminals for external           |                 | Р       |  |  |
|          | conductors shall be in engagement with a metal      |                 |         |  |  |
|          | thread and the screws shall not be of the tapping   |                 |         |  |  |
|          | screw type  |                 |         |  |  |
| 8.2      | Protection against electric shock                   |                 |         |  |  |
|          | Live parts not accessible in normal use             |                 | Р       |  |  |
|          | For RCCBs other than plug-in type, external parts,  |                 | Р       |  |  |
|          | other than screws or other means for fixing covers, |                 |         |  |  |
|          | which are accessible in normal use shall be of      |                 |         |  |  |
|          | insulating material or be lined throughout with     |                 |         |  |  |
|          | insulating material                                 |                 |         |  |  |
|          | Lining reliably fixed                               |                 | N/A     |  |  |
|          | Lining has adequate thickness and mechanical        |                 | N/A     |  |  |
|          | strength  |                 |         |  |  |
|          | Inlet openings for cables or conduits shall be of   |                 | N/A     |  |  |
|          | insulating material or be provided with bushings or |                 |         |  |  |
|          | similar devices of insulating material              |                 |         |  |  |
|          | Such devices shall be reliably fixed                |                 | N/A     |  |  |
|          | Such devices shall have adequate mechanical         |                 | N/A     |  |  |
|          | strength  |                 |         |  |  |
|          | For plug-in RCCBs, external parts, other than       |                 | N/A     |  |  |
|          | screws or other means for fixing covers, which are  |                 |         |  |  |
|          | accessible, shall be of insulating material         |                 |         |  |  |
|          | Metallic operating means insulated from live parts  |                 | N/A     |  |  |
|          | Metal parts of the mechanism not accessible,        |                 | Р       |  |  |
|          | insulated from accessible metal parts, from metal   |                 |         |  |  |
|          | frames (for flush-type), from screws or other means |                 |         |  |  |
|          | for fixing the base and from metal plates           |                 |         |  |  |
|          | Possible to replace plug-in RCCBs easily without    |                 | N/A     |  |  |
|          | touching live parts                                 |                 |         |  |  |

|        | IEC 61008-1   |                   |         |
|--------|---|-------------------|---------|
| Clause | Requirement + Test  | Result - Remark   | Verdict |
|        |   |                   | ·       |
|        | Lacquer or enamel not considered to provide   |                   | Р       |
|        | adequate insulation   |                   |         |
| 9.6    | Test: verify with test finger, 1 min with a force of  |                   | Р       |
|        | 75 N  |                   |         |
|        | Enclosures or covers not deformed to such an  |                   | P       |
|        | extent that live parts can be touched   |                   |         |
| 8.9    | Resistance to heat  |                   |         |
|        | RCCB sufficiently resistant to heat   |                   | Р       |
| 9.13.1 | Test: 1 h; test temperature (°C): (100 ± 2) °C for  | 100 °C            | Р       |
|        | not removable covers or (70 ± 2)°C for removable  |                   |         |
|        | covers  |                   |         |
|        | No change impairing further use and no flow of  |                   | Р       |
|        | sealing compound so that live parts are exposed   |                   |         |
|        | No access to live parts even if the test finger is  |                   | P       |
|        | applied with a force not exceeding 5 N  |                   |         |
|        | The RCCB shall trip with a test current of 1,25 $I_{\Delta n}$  | Trip, 21ms        | Р       |
|        | (ms):   |                   |         |
|        | Marking still legible after test  |                   | Р       |
| 9.13.2 | Ball-pressure test for external parts of insulating   | 1,5 mm(Enclosure) | Р       |
|        | material (parts retaining live parts in position); test   |                   |         |
|        | temperature: 125 °C ± 2°C for 1 h; diameter of  |                   |         |
|        | impression (mm): ≤ 2 mm:  |                   |         |
| 9.13.3 | Ball-pressure test for external parts of insulating   | 1,0 mm(Handle)    | Р       |
|        | material (parts not retaining live parts in position);  |                   |         |
|        | test temperature (°C): (70 ± 2)°C or (40 ± 2) °C  |                   |         |
|        | + max. temperature rise of 9.8; diameter of   |                   |         |
|        | impression (mm): ≤ 2 mm   |                   |         |
| 8.1.3  | Clearances and creepage distances (internal and ex  | rternal parts)    | EC.     |
|        | The minimum required clearances and creepage distances are based on the RCCB being designed for operating in an environment with pollution degree 2   |                   | P       |
|        | Compliance for item 1 in is checked by measurement and by the test of 9.7.7.4.1 and 9.7.7.4.2. The test is carried out with samples not submitted to the humidity treatment described in 9.7.1. |                   | Р       |

Page 17 of 179

Report No.:130700023SHA-001

IEC 61008-1 Result - Remark Verdict Clause Requirement + Test The clearances of items 2 and 4 may be reduced N/A provided that the measured clearances are not shorter than the minimum allowed in IEC 60664-1 for homogenous field conditions. In this case, after the humidity treatment in 9.7.1, N/A compliance for item 2 and 4 and arrangements of 9.7.2 items b), c), d) and e) is checked: - Tests according to 9.7.2 to 9.7.6 as applicable N/A Test according to 9.7.7.2 with test voltages acc. N/A Table 16 with test arrangements of 9.7.2 items b), c), d), e) If measurement does not show any reduced Р clearance, test 9.7.7.2 is not applied Compliance for item 3, checked by measurement N/A Parts of PCBs connected to the live parts protected N/A against pollution by the use of a type 2 protection according to IEC 60664-3 are exempt from this verification The insulating materials are classified into Material Ρ Groups on the basis of their comparative tracking index (CTI) acc. to IEC 60664-1 and measured according to IEC 60112 Clearances [mm] U<sub>lmp</sub>  $\boxtimes$ 4kV (see table 5) 2,5kV(see table 5) Minimum clearances (see table 5) minimum clearances [mm] 1. between live parts which are separated when Ρ 4,3mm the main contacts are in the open position >5,0mm 2. between live parts of different polarity Ρ 3. between circuits supplied from different sources, N/A one of which being PELV or SELV 4. between live parts and: Ρ - accessible surfaces of operating means >5,0mm Р - screws or other means for fixing covers which N/A have to be removed when mounting the RCCB - surface on which the RCCB is mounted N/A screws or other means for fixing the RCCB N/A metal covers or boxes N/A other accessible metal parts >10.0mm Р - metal frames supporting flush-type RCCBs >10,0mm Р

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |
|        | <u> </u>           |             |                 |         |

|      | Minimum creepage distances (see table 5)   |                                    | _   |
|------|--|------------------------------------|-----|
|      | Material group   | IIIb                               | Р   |
|      |  | minimum creepage distances<br>[mm] | _   |
|      | between live parts which are separated when the main contacts are in the open position     | >4,5mm                             | Р   |
|      | 2. between live parts of different polarity  | >5,0mm                             | Р   |
|      | 3. between circuits supplied from different sources, one of which being PELV or SELV       |                                    | N/A |
|      | 4. between live parts and:   |                                    | Р   |
|      | - accessible surfaces of operating means   | >5,0mm                             | Р   |
|      | - screws or other means for fixing covers which have to be removed when mounting the RCCB  |                                    | N/A |
|      | - surface on which the RCCB is mounted   |                                    | N/A |
|      | - screws or other means for fixing the RCCB  |                                    | N/A |
|      | - metal covers or boxes  |                                    | N/A |
|      | - other accessible metal parts   | >10,0mm                            | Р   |
|      | - metal frames supporting flush-type RCCBs   | >10,0mm                            | Р   |
| 9.25 | Test of resistance to rusting:   |                                    |     |
|      | - 10 min immersed in a cold chemical degreaser such as methyl-chloroform or refined petrol |                                    | Р   |
|      | - 10 min immersed in a 10% solution of ammonium chloride in water at 20°C±5°C              |                                    | Р   |
|      | - 10 min in a box containing air saturated with moisture at 20°C±5°C                       |                                    | Р   |
|      | - 10 min at 100°C  |                                    | P   |
|      | No sign of rust  |                                    | Р   |

| 18232-11 | TEST SEQUENCE A <sub>2</sub> (3 samples: In= 63A, I <sub>Δn</sub> = 0,03A, type A) | A <sub>2</sub> -1 | A <sub>2</sub> -2 | A <sub>2</sub> -3 | P |
|----------|--|-------------------|-------------------|-------------------|---|
| 8.10     | Resistance to abnormal heat and fire   |                   |                   |                   | P |
|          | External parts of insulating material shall not be                                 |                   |                   |                   | Р |
|          | liable to ignite and to spread fire under fault or                                 |                   |                   |                   |   |
|          | overload conditions  |                   |                   |                   |   |

Page 19 of 179 Report No.:130700023\$HA-001

|        | IEC C4000 4  |                   |         |
|--------|--|-------------------|---------|
|        | IEC 61008-1  |                   |         |
| Clause | Requirement + Test                                   | Result - Remark   | Verdict |
|        |  |                   |         |
| 9.14   | Glow wire test                                       |                   | Р       |
|        | Test performed on a complete RCCB                    |                   | Р       |
|        | Glow-wire test: (960 + 15) °C for external parts of  | 960(Enclosure)    | Р       |
|        | insulating material retaining current-carrying parts |                   |         |
|        | or parts of the protective circuit in position       |                   |         |
|        | Głow-wire test: (650 + 10) °C for all other external | 650(Handle)       | Р       |
|        | parts insulating material                            |                   |         |
|        | No visible flames, no sustained glowing, or          | No flames(Handle) | Р       |
|        | flames and glowing extinguish within 30 s after      | 5,6s(Enclosure)   | Р       |
|        | removal:   |                   |         |
|        | No ignition of tissue paper or scorching of the      |                   | Р       |
|        | pinewood board                                       |                   |         |

|         | TEST SEQUENCE B (3 samples: In= 63A, I <sub>Δn</sub> = 0,03A, type A)   | B1       | B2       | В3 | P   |
|---------|---|----------|----------|----|-----|
| 8       | REQUIREMENTS FOR CONSTRUCTION AND OPE   | RATION   | 11.1     |    | -   |
| 8.3     | DIELECTRIC PROPERTIES AND ISOLATING CAPA  | BILITY   |          |    |     |
|         | RCCBs have adequate dielectric properties   |          |          |    | Р   |
| 9.7     | TEST OF DIELECTRIC PROPERTIES AND ISOLATI   | ING CAPA | BILITY   |    |     |
| 9.7.7.4 | VERIFICATION OF RESISTANCE OF THE INSULAT<br>AND BASIC INSULATION AGAINST AN IMPULSE V<br>CONDITIONS  |          |          |    |     |
|         | These tests are not preceded by the humidity treatment described in 9.7.1.  |          |          |    | Р   |
|         | The test is carried out on an RCCB fixed on a metal support   |          |          |    | Р   |
|         | The impulses are given by a generator producing positive and negative impulses having a front time of 1,2µs, and a time to half-value of 50µs                           |          | 1,2/50μs |    | Р   |
|         | The shape of the impulses is adjusted with the RCCB under test connected to the impulse generator.  |          |          |    | Р   |
|         | For RCCBs with incorporated surge arresters that cannot be disconnected, the shape of the impulses is adjusted without connection of the RCCB to the impulse generator. |          |          |    | N/A |
|         | rated impulse withstand voltage [kV]:   | 4 kV     |          |    |     |

|           | IEC 61008-1  |                 |         |
|-----------|--|-----------------|---------|
| Clause    | Requirement + Test   | Result - Remark | Verdict |
|           |  |                 |         |
|           | see level of test laboratory [m]   | 5m              |         |
|           | test voltage (acc. Table 22) [kV]:   | 6,2kV           |         |
| 9.7.7.4.2 | RCCB in open position (contacts in open position)  |                 | Р       |
|           | The impulses are applied between:  |                 | Р       |
|           | the line terminals connected together and the load terminals connected together  |                 | Р       |
| 9.7.7.4.3 | RCCB in closed position  |                 | Р       |
|           | All components bridging the basic insulation disconnected  |                 | N/A     |
|           | A first series of tests is made applying the impulse voltage between the phase pole(s) and the neutral pole (or path) connected together and the metal support connected to the terminal(s) intended for the protective conductor(s), if any |                 | Р       |
|           | A second series of tests is made applying the impulse voltage between the phase pole(s), connected together, and the neutral pole (or path) of the RCCB  |                 | P       |
|           | Five positive impulses and five 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.                 |                 | Р       |
|           | no disruptive discharges during the test   |                 | P       |
| 9.7.7.5   | VERIFICATION OF THE BEHAVIOUR OF COMPONENTS BRIDGING THE BASIC INSULATION  |                 |         |
|           | A new RCCB sample is tested  |                 | N/A     |
|           | Test only performed on RCCBs, where components bridging the basic insulation have been disconnected during the impulse voltage test of 9.7.7.4.3   |                 | N/A     |
|           | test voltage 1200V+U <sub>0</sub>  |                 | N/A     |
|           | The voltage is applied during 5s between the phase pole(s) and the neutral pole (or path) connected together and the metal support connected to the terminal(s) intended for the prospective conductor(s), if any                            |                 | N/A     |
|           | after test, no component bridging the basic insulation should show a visible alteration.   |                 | N/A     |

N/A

[ms]

Then, the equipment is connected to the mains acc. manufacturer's instruction

The RCCB shall trip with a test current of 1,25  $I_{\Delta N}$ 

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|         |   |                      |            |            | N/A |
|---------|---|----------------------|------------|------------|-----|
|         | Test switch $S_2$ and RCCB in the closed position, test voltage established by closing the test switch $S_1$ .                              |                      |            |            | N/A |
| 9.7.1   | RESISTANCE TO HUMIDITY  |                      |            |            | Р   |
| 9.7.1.1 | Parts which can be removed without a tool are removed, spring lids kept open, inlet openings are left open and if knock-outs one is opened. |                      |            |            | N/A |
| 9.7.1.2 | Test conditions: 48 h in humidity cabinet RH = 91% to 95% T = 20 to 30°C ± 1°C  | RH = 93%<br>T = 25°C | 6          |            |     |
| 9.7.1.4 | The samples show no damage  |                      |            |            | Р   |
| 9.7.2   | Insulation resistance of the main circuit measured between 30 and 60 min after this treatment with 500 V DC after 5 s:                      | B1<br>[MΩ]           | B2<br>[MΩ] | B3<br>[MΩ] |     |
|         | a) between the terminals which are electrically connected together when the RCCB is in the closed position $\geq$ 2 M $\Omega$              | > 500MΩ              | > 500MΩ    | > 500MΩ    | Р   |
|         | b) between each pole and the others connected together (electronic components, connected between current path being disconnected)≥ 2 MΩ     | > 500MΩ              | > 500MΩ    | > 500MΩ    | Р   |
|         | c) between all poles connected together and the frame $\geq$ 5 M $\Omega$   | > 500MΩ              | > 500MΩ    | > 500MΩ    | Р   |
|         | d) between metal parts of the mechanism and the frame   |                      |            |            | N/A |
|         | e) between the frame and a metal foil in contact with the inner surface of the lining of insulating material≥ 5 MΩ                          |                      |            |            | N/A |
| 9.7.3   | Dielectric strength of the main circuit measured with an AC voltage (45-65Hz) for 1 min:  |                      |            |            |     |
|         | a) electronic components disconnected 2000 V  | 2000                 | 2000       | 2000       | P   |
|         | b) electronic components disconnected 2000 V  | 2000                 | 2000       | 2000       | Р   |
|         | c) electronic components disconnected 2000 V  | 2000                 | 2000       | 2000       | Р   |
|         | d) electronic components disconnected 2000 V  |                      |            |            | N/A |
|         | e) electronic components disconnected 2500 V  |                      |            |            | N/A |
|         | No flashover or breakdown   |                      |            |            | Р   |
| 9.7.4   | Insulation resistance of auxiliary circuits measured with 500 V DC after 1 min:   | B1<br>[MΩ]           | B2<br>[MΩ] | B3<br>[MΩ] |     |
|         | 1) between all auxiliary circuits and the frame≥ 2 MΩ   |                      |            |            | N/A |

|         | IEC 61008-1   |                 |         |
|---------|---|-----------------|---------|
| Clause  | Requirement + Test  | Result - Remark | Verdict |
|         | 2) between each part of the auxiliary circuits which might be isolated from the other parts and the whole of the other parts connected together≥ 2 MΩ                   |                 | N/A     |
|         | Dielectric strength of auxiliary circuits measured with an AC voltage at rated frequency for 1 min:   |                 |         |
|         | Rated voltage of Test voltage (V) auxiliary circuits (a.c. or d.c.)   |                 |         |
|         | $\leq 30$ 600<br>> $30 \leq 50$ 1000<br>> $50 \leq 110$ 1500<br>> $110 \leq 250$ 2000<br>> $250 \leq 500$ 2500  | V               |         |
|         | 1) between all auxiliary circuits and the frame   |                 | N/A     |
|         | between each part of the auxiliary circuits     which might be isolated from the other parts     and the whole of the other parts connected     together                |                 | N/A     |
|         | No flashover or perforation   |                 | N/A     |
| 9.7.7.2 | Verification of clearances with the impulse withstand voltage   |                 |         |
|         | If the measurement of clearances of items 2 and 4 in Table 5 shows a reduction of the required length, this test applies.   |                 | 74 107  |
|         | The test is carried out on an RCCB fixed on a metal support and being in the closed position  |                 | Р       |
|         | The impulses are given by a generator producing positive and negative impulses having a front time of 1,2µs, and a time to half-value of 50µs                           | 1,2/50μs        | Р       |
|         | The shape of the impulses is adjusted with the RCCB under test connected to the impulse generator.  |                 | P       |
|         | For RCCBs with incorporated surge arresters that cannot be disconnected, the shape of the impulses is adjusted without connection of the RCCB to the impulse generator. |                 | Р       |
|         | test performed with:  |                 |         |
|         | - surge impedance of the test apparatus ≤500Ω and surge protective devices disconnected before testing or   |                 | Р       |
|         | - hybrid generator with an surge impedance of 2 $\Omega$ and surge protective devices not diconnected before testing  |                 | P       |
|         | rated impulse withstand voltage [kV]:   | 4kV             |         |

|        | IEC 61008-1  |       |     |     | 0200111100     |  |  |  |  |  |
|--------|--|-------|-----|-----|----------------|--|--|--|--|--|
| Clause | Requirement + Test Result - Remark   |       |     |     |                |  |  |  |  |  |
|        |  |       |     |     | · <del>-</del> |  |  |  |  |  |
|        | see level of test laboratory [m]   | 5m    |     |     | 22             |  |  |  |  |  |
|        | test voltage (acc. Table 16) [kV]:   | 4,9kV |     |     | 1-             |  |  |  |  |  |
|        | A first series of tests is made applying the impulse voltage between the phase pole(s) and the neutral pole (or path) connected together and the metal support connected to the terminal(s) intended for the protective conductor(s), if any |       |     |     | Р              |  |  |  |  |  |
|        | A second series of tests is made applying the impulse voltage between the phase pole(s), connected together, and the neutral pole (or path) of the RCCB  |       |     |     | Р              |  |  |  |  |  |
|        | A third series of tests is made applying the impulse voltage between (and not tested during the two first sequences described here above):   |       |     |     | P              |  |  |  |  |  |
|        | b) between each pole and the others connected together (electronic components, connected between current path being disconnected)  |       |     |     | Р              |  |  |  |  |  |
|        | c) between all poles connected together and the frame  |       |     |     | Р              |  |  |  |  |  |
|        | d) between metal parts of the mechanism and the frame  |       |     |     | N/A            |  |  |  |  |  |
|        | between the frame and a metal foil in contact<br>with the inner surface of the lining of insulating<br>material  |       |     |     | N/A            |  |  |  |  |  |
|        | Five positive impulses and five 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.                 |       |     |     | P              |  |  |  |  |  |
|        | no disruptive discharges during the test   |       |     |     | Р              |  |  |  |  |  |
| 9.7.5  | Secondary circuit of detection transformers  |       |     |     |                |  |  |  |  |  |
|        | No insulation test, provided that no connection with accessible metal parts or with protective conductor or live parts exists.   |       |     |     | Р              |  |  |  |  |  |
| 9.7.6  | Capability of control circuits connected to the main circuit of withstanding high DC voltages due to insulation measurements   |       |     |     |                |  |  |  |  |  |
|        | RCCB fixed on metal support in closed position with all control circuits connected as in service.  |       |     |     | Р              |  |  |  |  |  |
|        | Open test voltage 600 V +25 / -0 V Maximum ripple 5% Short-circuit current 12 mA +2 / -0 mA Applied for 1 min between each pole and the other poles connected together to the frame.   | 600   | 600 | 600 | Р              |  |  |  |  |  |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test | _           | Result - Remark | Verdict |

|         | Туре   | I <sub>N</sub> A        | I <sub>AN</sub> A      |                     |             |             |     |                           | reak time a    |      | )                               |         |
|---------|--|-------------------------|------------------------|---------------------|-------------|-------------|-----|---------------------------|----------------|------|---------------------------------|---------|
|         |  |                         |                        | lan                 | 2 lan       | 5 lan       |     | <sub>4N</sub> ог<br>5А а) | 5A-200A,<br>b) | 500A |                                 |         |
| ,       | General  | Any<br>value            | <0,03                  | 0,3                 | 0,15        | -           | 0   | ,04                       | 0,04           | 0,04 | Max. break                      | -       |
|         |  |                         | 0,03                   | 0,3                 | 0,15        |             | 0   | ,04                       | 0,04           | 0,04 | times                           |         |
|         |  |                         | >0,03                  | 0,3                 | 0,15        | 0,04        |     | -                         | 0,04           | 0,04 | 1 [                             |         |
|         | S  | ≥ 25                    | >0,03                  | 0,5                 | 0,2         | 0,15        |     |                           | 0,15           | 0,15 | Max. break<br>times             | 4111139 |
|         |  |                         |                        | 0,13                | 0,06        | 0,05        |     |                           | 0,04           | 0,04 | Min. non-<br>actuating<br>times |         |
|         | a) value   | to be de                | cided by t             | he manu             | ıfacturer   | for this te | st  |                           |                |      |                                 | 7.5     |
|         | b) The te  | est are or              | nly made<br>on as me   | during ve           | erification | of the      |     |                           |                |      |                                 |         |
| 9.9.2.3 | Verificati<br>sudden a<br>S <sub>1</sub> , (S <sub>2</sub> a | on of the               | e correct<br>nce of re | operati<br>sidual c | on in cas   | se of       | I   |                           |                |      |                                 | P       |
|         | Maximur  |                         |                        |                     | ,           |             |     | [n                        | ns]            | [ms] | [ms]                            | ***     |
|         | - I <sub>AN</sub>  |                         |                        |                     |             |             |     | 3                         | 37             | 36   | 34                              | Р       |
|         | - 2 I <sub>AN</sub>  |                         |                        |                     |             |             |     | 2                         | 29             | 28   | 27                              | Р       |
|         | - 5 I <sub>∆N</sub> o  | r                       |                        |                     |             |             |     |                           | -              | ı    | -                               | N/A     |
|         | - 0,25 A   |                         |                        |                     |             |             |     | 2                         | 21             | 20   | 21                              | Р       |
|         | - I <sub>∆t</sub>  |                         | <u>500</u>             | Α                   |             |             |     |                           | 8              | 8    | 8                               | Р       |
|         | No value value   | exceed                  | ls the rel             | evant sp            | pecified I  | limiting    |     |                           |                |      |                                 |         |
|         | Additiona  | al test fo              | r type S:              |                     |             |             |     |                           |                |      |                                 |         |
|         | Minimum  | non-ac                  | tuating ti             | me at:              |             |             |     | [ก                        | ns]            | [ms] | [ms]                            |         |
|         | - I <sub>ΔN</sub>  |                         |                        |                     |             | 0,1         | 3 s |                           |                |      |                                 | N/A     |
|         | - 2 I <sub>ΔN</sub> .  | *************           |                        |                     |             | 0,0         | 6 s |                           |                |      |                                 | N/A     |
|         | - 5 I <sub>ΔN</sub> .  |                         |                        |                     |             | 0,0         | 5 s |                           |                |      |                                 | N/A     |
|         | - l <sub>∆t</sub>  |                         |                        |                     |             | 0,0         | 4 s |                           |                |      |                                 | N/A     |
|         | The test closed pestablish non-oper                          | osition, t<br>led by cl | the test wo            | oltage i<br>test sv | s suddei    | nly         |     |                           |                |      |                                 | N/A     |
|         | No trippi  | ng durin                | g tests                |                     |             |             |     |                           |                |      |                                 | N/A     |
| 8.4     | Tempera  | iture rise              | )                      |                     |             |             |     |                           |                |      |                                 |         |
|         | Tempera<br>stated in   |                         |                        | exceed              | the limi    | iting valu  | ies |                           |                |      |                                 | Р       |

|        | IEC 61008-1  |          |        |      |         |
|--------|--|----------|--------|------|---------|
| Clause | Requirement + Test   | Result - | Remark |      | Verdict |
|        |  |          |        |      |         |
|        | Cross-section (mm²)  | 16mm²    |        |      |         |
| 9.8.1  | Ambient air temperature (°C)   | 22°C     |        |      |         |
| 9.8.2  | Test current I <sub>N</sub> (A) until steady state values are reached.   | 63A      |        |      |         |
|        | Four pole RCCBs:   |          |        |      | N/A     |
|        | Current passing through  |          |        |      | N/A     |
|        | - 3 phase poles (1)  |          |        |      | N/A     |
|        | - neutral and adjacent pole (2)  |          |        |      | N/A     |
|        | Parts Temperature rise K   | [K]      | [K]    | [K]  |         |
|        | Terminals for external connections   | 53       | 48     | 49   | Р       |
|        | External parts liable to be touched during manual operation of the RCCB, including operating means of insulating material and metallic means for coupling insulated operating means of several poles | 8        | 9      | 7    | Р       |
|        | External metallic parts of operating means 25  | -        | _      | _    | N/A     |
|        | Other external parts, including that face of the RCCB in direct contact with the mounting surface 60   | 31       | 30     | 29   | Р       |
| 8.16   | Reliability  |          |        |      |         |
|        | RCCBs operate reliably even after long service.  |          |        |      | Р       |
| 9.22.2 | Test with 28 cycles at 40 ± 2°C  |          |        |      |         |
|        | Cross-section (mm²)  | 16mm²    |        |      |         |
|        | Torque <sup>2</sup> / <sub>3</sub> (Nm)  |          |        |      |         |
|        | Test current I <sub>N</sub> (A)  |          |        |      |         |
|        | - with current passing21 h   |          |        |      | Р       |
|        | - without current  |          |        |      | Р       |
|        | For 4 pole RCCBs with 3 overcurrent protected poles only 3 poles loaded  |          |        |      | N/A     |
|        | At the end of the last period of 21 h with current passing the temperature rise of the terminals shall not exceed 65K  | [K]      | [K]    | [K]  | Р       |
|        |  | 54       | 50     | 50   |         |
|        | After cool down the RCCB shall trip with a test current of 1,25 $I_{\Delta N}$ - break time not exceeding the value for $I_{\Delta N}$ in table 2  | [ms]     | [ms]   | [ms] | -       |
|        |  | 25       | 29     | 21   | Р       |
|        | Test switch $S_2$ and RCCB in the closed position, test voltage established by closing the test switch $S_1$ .   |          |        |      | Р       |

|        | IEC 61008-1   |                   |            |      |         |
|--------|---|-------------------|------------|------|---------|
| Clause | Requirement + Test  | Resul             | t - Remark |      | Verdict |
| 9.23   | Verification of ageing of electronic components   |                   |            |      |         |
|        | 168 h at 40 ± 2°C   | 40°C              |            |      |         |
|        | Test current I <sub>N</sub> (A)   | 63A               |            |      |         |
|        | Cross-section (mm²)   | 16mm <sup>2</sup> | ~~         |      |         |
|        | Electronic parts at 1,1 U <sub>N</sub>  | 264V              |            |      |         |
|        | After cool down:  |                   |            |      | Р       |
|        | - electronic parts show no damage   |                   |            |      | Р       |
|        | The RCCB shall trip with a test current of 1,25 $I_{\Delta N}$ - break time not exceeding the value for $I_{\Delta N}$ in table 2 | [ms]              | [ms]       | [ms] |         |
|        |   | 29                | 31         | 27   | Р       |
|        | Test switch $S_2$ and RCCB in the closed position, test voltage established by closing the test switch $S_1$                      |                   |            |      | Р       |

|      | TEST SEQUENCE C (3 samples: In= 63A, I <sub>Δn</sub> = 0,03A, type A)                           | C1 C2 C3                      | Р   |  |  |  |
|------|---|-------------------------------|-----|--|--|--|
| 8.6  | Mechanical and electrical endurance   |                               |     |  |  |  |
|      | RCCBs shall be capable of performing an adequate number of mechanical and electrical operations |                               | Р   |  |  |  |
| 9.10 | Test is made:   |                               | Р   |  |  |  |
|      | - In ≤ 25 A; 2 s on; 13 s off:  |                               | N/A |  |  |  |
|      | - In > 25 A; 2 s on; 28 s off   | 63A                           | Р   |  |  |  |
|      | Number of operating cycles: 2000  | 2000                          | Р   |  |  |  |
|      | Test voltage Un (V); test current In (A); cos phi 0,85-0,9                                      |                               |     |  |  |  |
|      | Cross-sectional area (mm²)  |                               |     |  |  |  |
|      | RCCBs having I <sub>an</sub> > 0,010 A tested at:   |                               |     |  |  |  |
|      | - 1000 cycles for manual operation  |                               |     |  |  |  |
|      | - 500 cycles by using the test device:  | C1 - OK<br>C2 - OK<br>C3 - OK | P   |  |  |  |
|      | - 500 cycles at a current of I <sub>Δn</sub>  | C1 - OK<br>C2 - OK<br>C3 - OK | Р   |  |  |  |

|        |                    | IEC 61008-1 | _               |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

| RCCBs having I <sub>∆n</sub> ≤ 0,010 A tested at:       |           |     |
|---|-----------|-----|
| - 500 cycles for manual operation                       | C1 -      | N/A |
|   | C2 -      |     |
|   | C3 -      |     |
| - 750 cycles by using the test device:                  | C1 -      | N/A |
|   | C2 -      |     |
|   | C3 -      |     |
| - 750 cycles at a current of I <sub>Δn</sub>            | C1 -      | N/A |
|   | C2 -      |     |
|   | C3 -      |     |
| Test is made without load using manual operation:       |           |     |
| - In ≤ 25 A; 2000 cycles                                | C1 -      | N/A |
|   | C2 -      |     |
|   | C3 -      |     |
| - In > 25 A; 1000 cycles:                               | C1 - OK   | Р   |
|   | C2 - OK   |     |
|   | C3 - OK   |     |
| After the test:   |           |     |
| - no undue wear   |           | Р   |
| - no damage   |           | Р   |
| - no loosening of connections                           |           | Р   |
| - no seepage of sealing compound                        |           | N/A |
| The RCCB shall trip with a test current of 1,25 lan     | C1 - 34ms | Р   |
| (ms)  | C2 - 29ms |     |
|   | C3 - 29ms |     |
| Dielectric strength test at a voltage of 900 V a.c. for | 1 min:    |     |
| a):   | C1 - OK   | Р   |
|   | C2 - OK   |     |
|   | C3 - OK   |     |
| b)  | C1 - OK   | Р   |
|   | C2 - OK   |     |
|   | C3 - OK   |     |

Page 28 of 179

Report No.:130700023SHA-001 IEC 61008-1 Requirement + Test Result - Remark Verdict Clause C1 - OK Ρ C2 - OK C3 - OK d) .....: C1 -N/A C2 -C3 -C1 e) .....: N/A C2 -

C3 -

|       | 100                       | EQUEN            |  | ,n= 0,03/ | A, type /   | <b>A)</b>         |     |               | 01             | D2   | D3                              | P   |
|-------|---------------------------|------------------|--|-----------|---|-------------------|-----|---------------|----------------|------|---------------------------------|-----|
|       | Tests "                   | Tests "D0"       |  |           |   |                   |     |               |                |      |                                 | Р   |
| 8.5   | Operating characteristics |                  |  |           |   |                   |     |               |                |      |                                 |     |
|       | For mul                   | tiple set        | ings of I  | Δn tests  | are mad   | e for ea          | ch  |               |                |      |                                 | N/A |
| 9.9.1 | RCCB in according         |                  |  | ormal us  | nal use, test circuit Test on s   |                   |     | st on 50 a    | and 60h        | łz   | Р                               |     |
| 9.9.5 | each te                   | st is mad        | nctionally dependent on line voltage, ade at 1,1 and 0,85 times the rated oltage (V) |           |   |                   |     |               | Р              |      |                                 |     |
|       | Туре                      | I <sub>N</sub> A | I <sub>ΔN</sub> A  |           | Standard values of break time and non-actuating time at a residual current equal to |                   |     |               |                |      |                                 |     |
|       |                           |                  |  | IAN       | 2 I <sub>AN</sub>   | 5 I <sub>AN</sub> |     | м or<br>iA a) | 5A-200A,<br>b) | 500A |                                 |     |
|       | General                   | Any<br>value     | <0,03  | 0,3       | 0,15  |                   | 0,6 | 04            | 0,04           | 0,04 | Max.<br>- break                 |     |
|       |                           |                  | 0,03   | 0,3       | 0,15  |                   | 0,  | 04            | 0,04           | 0,04 | times                           |     |
|       |                           |                  | >0,03  | 0,3       | 0,15  | 0,04              | -   | -             | 0,04           | 0,04 |                                 |     |
|       | S                         | ≥ 25             | >0,03  | 0,5       | 0,2   | 0,15              | -   | _             | 0,15           | 0,15 | Max.<br>break<br>times          |     |
|       |                           |                  |  | 0,13      | 0,06  | 0,05              | -   | •             | 0,04           | 0,04 | Min. non-<br>actuating<br>times |     |
|       | a) value                  | to be de         | cided by   | the manu  | ufacturer   | for this te       | est |               |                |      |                                 |     |
|       |                           |                  |  |           | erificatior<br>in 9.9.2.4   |                   |     |               |                |      |                                 |     |

|         | IEC 61008-1  |                               |         |
|---------|--|-------------------------------|---------|
| Clause  | Requirement + Test   | Result - Remark               | Verdict |
|         |  |                               |         |
| 9.9.2   | Off-load tests made at a temperature of 20 ± 2 °C                              | 21°C                          | P       |
| 9.9.2.1 | Verification of the correct operation in case of a stea                        | dy increase residual current: |         |
|         | - steady increase from 0,2 I <sub>Δn</sub> to I <sub>Δn</sub> within 30 s (mA) |                               | Р       |
|         | :  | IΔn= 30mA                     |         |
|         | - tripping current between I <sub>Δno</sub> and I <sub>Δn</sub> (mA):          | D1 - 21,6 - 22,1mA            | Р       |
|         |  | D2 - 21,7 - 22,3mA            |         |
|         |  | D3 - 21,6 - 22,3mA            |         |
| 9.9.2.2 | Verification of the correct operation at closing on res                        | idual current                 |         |
|         | - the RCCB closes on I <sub>Δn</sub> : no value exceeds the                    | D1 - 27 - 38ms                | Р       |
|         | specified limiting value of Table 1 (ms):                                      | D2 - 27 - 39ms                |         |
|         |  | D3 - 30 - 38ms                |         |
| 9.9.2.3 | The test circuit being successively calibrated at each current                 |                               |         |
|         | specified in Table 1, the test switch S2 and the RCCI                          |                               |         |
|         | the test voltage is suddenly established by closing the                        |                               |         |
|         | - maximum break time (ms) at: I <sub>Δn</sub>                                  | D1 - 36ms                     | P       |
|         |  | D2 - 37ms                     |         |
|         |  | D3 - 35ms                     |         |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub>                                | D1 - 29ms                     | Р       |
|         |  | D2 - 27ms                     |         |
|         |  | D3 - 29ms                     |         |
|         | - maximum break time (ms) at: 5 l <sub>sn</sub>                                | D1 -                          | N/A     |
|         |  | D2 -                          |         |
|         |  | D3 -                          |         |
|         | - maximum break time (ms) at: 0,25 A (if                                       | D1 - 22ms                     | Р       |
|         | applicable)  | D2 - 21ms                     |         |
|         | _  | D3 - 21ms_                    |         |
|         | - maximum break time (ms) at: 500 A  | D1 - 12ms                     | Р       |
|         |  | D2 - 11ms                     |         |
|         |  | D3 - 11ms                     |         |
|         | No value exceeds the relevant specified limiting value                         |                               | Р       |
| 9.9.2.4 | Verification of the correct operation in case of sudde                         | n appearance of residual      |         |
|         | current of values between 5 I∆n and 500A :                                     |                               |         |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|             | The test switch S1 and the RCCB being in the closed                                 | d position, the residual current |     |
|-------------|---|----------------------------------|-----|
|             | is suddenly established by closing the test switch S2                               |                                  |     |
|             | - maximum break time (ms) at: 5A (value 1   | D1 - 15ms                        | Р   |
|             | between 5A and 200A) :  | D2 - 15ms                        |     |
|             |   | D3 - 15ms                        |     |
|             | - maximum break time (ms) at: 200A (value 2   | D1 - 8ms                         | Р   |
|             | between 5A and 200A) :  | D2 - 9ms                         |     |
|             |   | D3 - 9ms                         |     |
|             | No value exceeds the relevant specified limiting                                    |                                  | Р   |
|             | value   |                                  |     |
|             | Additional test for type S:   |                                  |     |
|             | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :                    | D1 -                             | N/A |
|             |   | D2 -                             |     |
|             |   | D3 -                             |     |
|             | - minimum non actuating time (ms) at: 2 Ι <sub>Δη</sub> ; 0,06 s                    | D1 -                             | N/A |
|             | :   | D2 -                             |     |
|             |   | D3 -                             |     |
|             | - minimum non actuating time (ms) at: 5 I <sub>Δn</sub> ; 0,05 s                    | D1 -                             | N/A |
|             | :   | D2 -                             |     |
|             |   | D3 -                             |     |
|             | - minimum non actuating time (ms) at: 500 A;  | D1 -                             | N/A |
|             | 0,04 s:   | D2 -                             |     |
|             |   | D3 -                             |     |
|             | No tripping during tests  |                                  | N/A |
| 9. <u>4</u> | a) Tests repeated at a temperature of -5 °C:  |                                  |     |
|             | The test circuit being successively calibrated at each of the values of residual    |                                  |     |
|             | current   |                                  |     |
|             | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                                  |     |
|             | the test voltage is suddenly established by closing the test switch S1              |                                  |     |
|             | - maximum break time (ms) at: I <sub>Δn</sub>                                       | D1 - 38ms                        | Р   |
|             |   | D2 - 38ms                        |     |
|             |   | D3 - 37ms                        |     |

| IEC 61008-1 |  |                 |            |
|-------------|--|-----------------|------------|
| Clause      | Requirement + Test   | Result - Remark | Verdict    |
|             |  |                 |            |
|             | - maximum break time (ms) at: 2 l <sub>Δn</sub> :                | D1 - 29ms       | Р          |
|             |  | D2 - 30ms       |            |
|             |  | D3 - 33ms       |            |
|             | - maximum break time (ms) at: 5 I <sub>Δn</sub> :                | D1 -            | N/A        |
|             |  | D2 -            |            |
|             |  | D3 -            |            |
|             | - maximum break time (ms) at: 0,25 A (if                         | D1 - 24ms       | Р          |
|             | applicable)  | D2 - 22ms       |            |
|             |  | D3 - 23ms       |            |
|             | - maximum break time (ms) at: 500 A                              | D1 - 12ms       | Р          |
|             |  | D2 - 12ms       |            |
|             |  | D3 - 12ms       |            |
|             | No value exceeds the relevant specified limiting value           |                 | Р          |
|             | Additional test for type S:                                      | 116             |            |
|             | - minimum non actuating time (ms) at: I <sub>Δn</sub> : 0,13 s : | D1 -            | N/A        |
|             |  | D2 -            |            |
|             |  | D3 -            |            |
|             | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s | D1 -            | N/A        |
|             |  | D2 -            |            |
|             |  | D3 -            |            |
|             | - minimum non actuating time (ms) at: 5 l <sub>an</sub> ; 0,05 s | D1 -            | N/A        |
|             |  | D2 -            |            |
|             |  | D3 -            |            |
|             | - minimum non actuating time (ms) at: 500 A;                     | D1 -            | N/A        |
|             | 0,04 s   | D2 -            |            |
|             |  | D3 -            |            |
|             | No tripping during the tests                                     |                 | N/A        |
| 9,9.3       | Tests repeated with the RCCB loaded with rated cur               |                 |            |
|             | - test current (A): In, until steady state conditions            |                 |            |
|             | are reached  | 63A             |            |
|             | - cross-sectional area (mm²)                                     | 16mm²           | ST. ITALIA |

| IEC 61008-1 |  |                         |        |
|-------------|--|-------------------------|--------|
| Clause      | Requirement + Test   | Result - Remark         | Verdio |
|             | the PCCP alocae on L.; no value eveneds the                      | D1 - 29 - 37ms          | P      |
|             | - the RCCB closes on I <sub>An</sub> : no value exceeds the      |                         |        |
|             | specified limiting value of Table 1 (ms)                         | D2 - 29 - 37ms          |        |
|             | TI 11 0 11 0000 11 11 11 11                                      | D3 - 24 - 39ms          |        |
|             | The switch S1 and the RCCB are in closed position.               | The residual current is |        |
|             | established by closing S2:                                       |                         |        |
|             | - maximum break time (ms) at: I <sub>Δn</sub>                    | D1 - 36ms               | P      |
|             |  | D2 - 37ms               |        |
|             | <del>-</del>   | D3 - 36ms               |        |
|             | - maximum break time (ms) at: 2 I <sub>Δn</sub>                  | D1 - 27ms               | P      |
|             |  | D2 - 28ms               |        |
|             |  | D3 - 29ms               |        |
|             | - maximum break time (ms) at: 5 l <sub>Δn</sub>                  | D1 -                    | N/A    |
|             |  | D2 -                    |        |
|             |  | D3 -                    |        |
|             | - maximum break time (ms) at: 0,25 A (if                         | D1 - 21ms               | Р      |
|             | applicable)  | D2 - 21ms               |        |
|             |  | D3 - 21ms               |        |
|             | - maximum break time (ms) at: 500 A:                             | D1 - 12ms               | Р      |
|             |  | D2 - 12ms               |        |
|             |  | D3 - 12ms               |        |
|             | No value exceeds the relevant specified limiting value           |                         | Р      |
|             | Additional test for type S:                                      |                         | Man.   |
|             | - minimum non actuating time (ms) at: 1 <sub>\ni</sub> 0,13 s :  | D1 -                    | N/A    |
|             |  | D2 -                    |        |
|             |  | D3 -                    |        |
|             | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s | D1 -                    | N/A    |
|             |  | D2 -                    |        |
|             |  | D3 -                    |        |
|             | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s | D1 -                    | N/A    |
|             |  | D2 -                    |        |
|             |  | D3 -                    |        |

|             | Page 33 of 179  | Report No.:130700           | 023SHA-00 |  |  |
|-------------|---|-----------------------------|-----------|--|--|
| IEC 61008-1 |   |                             |           |  |  |
| Clause      | Requirement + Test  | Result - Remark             | Verdict   |  |  |
|             | - minimum non actuating time (ms) at: 500 A;  | D1 -                        | N/A       |  |  |
|             | 0,04 s  | D2 -                        | IN/A      |  |  |
|             | 0,04 5  | D3 -                        |           |  |  |
|             | No tripping during the tests  |                             | N/A       |  |  |
| 9.9.4       | b) Tests repeated with the RCCB loaded with rated                                   | current:                    |           |  |  |
|             | - test current (A): In at a temperature of +40 °C:                                  |                             |           |  |  |
|             | until steady state conditions are reached   | 63A                         |           |  |  |
|             | - cross-sectional area (mm²)  | 16mm²                       | _         |  |  |
|             | The test circuit being successively calibrated at each                              | n of the values of residual | Р         |  |  |
|             | current   |                             |           |  |  |
|             | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                             |           |  |  |
|             | the test voltage is suddenly established by closing the                             |                             |           |  |  |
|             | - maximum break time (ms) at: I <sub>Δn</sub>                                       | D1 - 34ms                   | P         |  |  |
|             |   | D2 - 37ms                   |           |  |  |
|             |   | D3 - 37ms                   |           |  |  |
|             | - maximum break time (ms) at: 2 I <sub>Δn</sub>                                     | D1 - 28ms                   | Р         |  |  |
|             |   | D2 - 29ms                   |           |  |  |
|             |   | D3 - 28ms                   |           |  |  |
|             | - maximum break time (ms) at: 5 I <sub>Δn</sub>                                     | D1 -                        | N/A       |  |  |
|             |   | D2 -                        |           |  |  |
|             |   | D3 -                        |           |  |  |
|             | - maximum break time (ms) at: 0,25 A (if  | D1 - 21ms                   | P         |  |  |
|             | applicable)   | D2 - 21ms                   |           |  |  |
|             |   | D3 - 22ms                   |           |  |  |
|             | - maximum break time (ms) at: 500 A:  | D1 - 11ms                   | Р         |  |  |
|             |   | D2 - 11ms                   |           |  |  |
|             |   | D3 - 11ms                   |           |  |  |
|             | No value exceeds the relevant specified limiting value                              |                             | Р         |  |  |
|             | Additional test for type S:   |                             |           |  |  |
|             | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :                    | D1 -                        | N/A       |  |  |
|             | ,   | D2 -                        |           |  |  |

D3 -

| Report No.:130700023Sh | 1A-001 |
|------------------------|--------|
|------------------------|--------|

| IEC 61008-1 |  |                 |         |
|-------------|--|-----------------|---------|
| Clause      | Requirement + Test   | Result - Remark | Verdict |
|             |  |                 |         |
|             | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> for      | D1 -            | N/A     |
|             | 0,06 s   | D2 -            |         |
|             |  | D3 -            |         |
|             | - minimum non actuating time (ms) at: 5 I <sub>Δn</sub> ; 0,05 s | D1 -            | N/A     |
|             |  | D2 -            |         |
|             |  | D3 -            |         |
|             | - minimum non actuating time (ms) at: 500 A;                     | D1 -            | N/A     |
|             | 0,04 s   | D2 -            |         |
|             |  | D3 -            |         |
|             | No tripping during the tests                                     |                 | N/A     |

|        | Tests "D1"  | TO SEE STATE          |
|--------|---|-----------------------|
| 8.12   | RCCBs functionally dependent on line voltage                      |                       |
|        | RCCBs functionally dependent on the line voltage,                 | N/A                   |
|        | shall operate correctly between 0,85 and 1,1 times                |                       |
|        | their rated voltage; voltage (V):                                 |                       |
|        | Multipole RCCBs shall have all current paths                      | N/A                   |
|        | supplied from the phases and neutral, if any                      |                       |
| 9.17   | Verification of the behaviour of RCCBs opening automatically in c | ase of failure of N/A |
|        | the line voltage  |                       |
| 9.17.1 | Limiting value of the line voltage (Ux):                          |                       |
|        | - rated voltage applied to the line terminals and D1 -            | N/A                   |
|        | progressively lowered to attain zero within about D2 -            |                       |
|        | 30 s until automatic opening occurs; voltage (V) .: D3 -          |                       |
|        | - all values less than 0,85 times the rated voltage D1 -          | N/A                   |
|        | (V) D2 -  |                       |
|        | D3 -  |                       |
|        | - tripping test at test voltage (V) with I <sub>Δn</sub> and D1 - | N/A                   |
|        | operating according to Table 1 (ms)                               |                       |
|        | D3 -  |                       |
|        | No value exceeds the specified limiting values                    | N/A                   |
|        | Not possible to close the apparatus by manual D1 -                | N/A                   |
|        | operating means below Ux D2 -                                     |                       |
|        | D3 -  |                       |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

| 9.17.2  | Verification of behaviour in case of failure of the line                            | voltage                     |     |
|---------|---|-----------------------------|-----|
|         | RCCB supplied with rated voltage, and the line                                      |                             | N/A |
|         | voltage then switched off   |                             |     |
|         | Time (ms) interval between switching off and  | D1 -                        | N/A |
|         | opening of the main contacts:   | D2 -                        |     |
|         |   | D3 -                        |     |
|         | a) RCCBs opening without delay: no value exceeds                                    |                             | N/A |
|         | 0,5 s   |                             |     |
|         | b) RCCBs opening with delay: max. and min.  |                             | N/A |
|         | values within the range indicated by the  |                             |     |
|         | manufacturer  |                             |     |
| 9.17.3  | Verification of the correct operation, in presence of a                             | residual current, for RCCBs |     |
|         | opening with delay in case of failure of the line voltage                           |                             |     |
|         | RCCB connected according to fig. 4 at the rated                                     |                             | N/A |
|         | voltage (Un):   |                             |     |
|         | All phases but one switched off by means of S3                                      |                             | N/A |
|         | During the delay: test of 9.9.2:  |                             | N/A |
| 9.9.2.1 | - steady increase from 0,2 $I_{\Delta n}$ to $I_{\Delta n}$ within 30 s (mA)        | D1 -                        | N/A |
|         | :   | D2 -                        |     |
|         |   | D3 -                        |     |
|         | - tripping current between I <sub>Ano</sub> and I <sub>An</sub> (mA):               | D1 -                        | N/A |
|         |   | D2 -                        |     |
|         |   | D3 -                        |     |
|         | The RCCB closes on I <sub>Δn</sub> : no value exceeds the                           | D1 -                        | N/A |
|         | specified limiting value of Table 1 (ms):   | D2 -                        |     |
|         |   | D3 -                        |     |
| 9.9.2.3 | The test circuit being successively calibrated at each of the values of residual    |                             |     |
|         | current   |                             |     |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                             |     |
|         | the test voltage is suddenly established by closing the test switch S1              |                             |     |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :                                     | D1 -                        | N/A |
|         |   | D2 -                        |     |
|         |   | D3 -                        |     |

| IEC 61008-1 |  |                             |         |
|-------------|--|-----------------------------|---------|
| Clause      | Requirement + Test   | Result - Remark             | Verdict |
|             |  |                             |         |
|             | - maximum break time (ms) at: 2 l <sub>\lambdan</sub>            | D1 -                        | N/A     |
|             |  | D2 -                        |         |
|             |  | D3 -                        |         |
|             | - maximum break time (ms) at: 5 I <sub>Δn</sub> :                | D1 -                        | N/A     |
|             |  | D2 -                        |         |
|             |  | D3 -                        |         |
|             | - maximum break time (ms) at: 0,25 A (if                         | D1 -                        | N/A     |
|             | applicable):   | D2 -                        |         |
|             |  | D3 -                        |         |
|             | - maximum break time (ms) at: 500 A:                             | D1 -                        | N/A     |
|             |  | D2 -                        |         |
|             |  | D3 -                        |         |
|             | No value exceeds the relevant specified limiting                 |                             | N/A     |
|             | value  |                             |         |
|             | Additional test for type S:                                      |                             |         |
|             | - minimum non actuating time (ms) at: $I_{\Delta n}$ ; 0,13 s :  | D1 -                        | N/A     |
|             |  | D2 -                        |         |
|             |  | D3 -                        |         |
|             | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s | D1 -                        | N/A     |
|             | :  | D2 -                        |         |
|             |  | D3 -                        |         |
|             | - minimum non actuating time (ms) at: 5 $l_{\Delta n}$ ; 0,05 s  | D1 -                        | N/A     |
|             | :  | D2 -                        |         |
|             |  | D3 -                        |         |
|             | - minimum non actuating time (ms) at: 500 A;                     | D1 -                        | N/A     |
|             | 0,04 s:  | D2 -                        |         |
|             |  | D3 -                        |         |
|             | No tripping during tests   |                             | N/A     |
| 9.17.4      | Verification of the correct operation of RCCBs with 3            | or 4 current paths, neutral |         |
|             | and one line terminal only being energized in turn:              | <u> </u>                    |         |
|             | RCCB connected according to fig. 4                               |                             | N/A     |

| IEC 61008-1 |  |                                 |               |
|-------------|--|---------------------------------|---------------|
| Clause      | Requirement + Test   | Result - Remark                 | Verdict       |
|             |  |                                 |               |
| 9.9.2.3     | The test circuit being successively calibrated at each           | of the values of residual       |               |
|             | current  |                                 |               |
|             | specified in Table 1, the test switch S2 and the RCCI            | B being in the closed position, |               |
|             | the test voltage is suddenly established by closing th           | e test switch S1                |               |
|             | - maximum break time (ms) at: I <sub>Δn</sub> :                  | D1 -                            | N/A           |
|             |  | D2 -                            |               |
|             |  | D3 -                            |               |
|             | - maximum break time (ms) at: 2 I <sub>Δn</sub> :                | D1 -                            | N/A           |
|             |  | D2 -                            |               |
|             |  | D3 -                            |               |
|             | - maximum break time (ms) at: 5 I <sub>Δn</sub> :                | D1 -                            | N/A           |
|             |  | D2 -                            |               |
|             |  | D3 -                            |               |
|             | - maximum break time (ms) at: 0,25 A (if                         | D1 -                            | N/A           |
|             | applicable):   | D2 -                            |               |
|             |  | D3 -                            |               |
|             | - maximum break time (ms) at: 500 A:                             | D1 -                            | N/A           |
|             |  | D2 -                            |               |
|             |  | D3 -                            |               |
|             | No value exceeds the relevant specified limiting                 |                                 | N/A           |
|             | value  |                                 |               |
|             | Additional test for type S:                                      |                                 | 1 1 1 1 1 1 1 |
|             | - minimum non actuating time (ms) at: I <sub>An</sub> ; 0,13 s : | D1 -                            | N/A           |
|             |  | D2 -                            |               |
|             |  | D3 -                            |               |
|             | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s | D1 -                            | N/A           |
|             |  | D2 -                            |               |
|             |  | D3 -                            |               |
|             | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s | D1 -                            | N/A           |
|             |  | D2 -                            |               |
|             |  | D3 -                            |               |
|             | - minimum non actuating time (ms) at: 500 A;                     | D1 -                            | N/A           |
|             | 0,04 s   | D2 -                            |               |
|             | -,- : -  | D3 -                            |               |

|        |                    | IEC 61008-1     |         |
|--------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| Clause | Requirement + Test | Result - Remark | Vergio  |

|          | No tripping during tests   |   | N/A    |
|----------|--|---|--------|
| 9.17.5   | Verification of the reclosing function of automatically consideration)   | reclosing RCCBs (under                    |        |
| 8.14     | Behaviour of RCCBs in case of current surges caus  | ed by impulse voltages                    |        |
| 9.19     | Verification of behaviour of RCCBs in case of current voltages   | nt surges caused by impulse               |        |
| 9.19.1   | Current surge test for all RCCBs (0,5µs/100kHz ring  | g wave test)                              |        |
|          | One pole of the RCCB is submitted to 10 application according to the following requirements:                     | ns of a surge current                     |        |
|          | - peak value: 200 A + 10/0%  | 200A                                      |        |
|          | - virtual front time: 0,5 μs ± 30%   | 0,5 μs                                    |        |
|          | - period of the following oscillatory wave: 10 μs ± 20%  | 10 μs                                     | - ACAL |
|          | - each successive reverse peak; about 60% of the preceding peak  | ок  |        |
|          | The polarity shall be inverted after every two applications  | ОК  |        |
|          | The interval between two consecutive applications shall be about 30 s  | 30s                                       |        |
|          | During the test the RCCB shall not trip:   | D1 - not trip D2 - not trip D3 - not trip | Р      |
|          | - break time (ms) at: I <sub>Δn</sub> :  | D1 - 37ms<br>D2 - 34ms<br>D3 - 35ms       | Р      |
| 9.19.2   | Verification of behaviour at surge currents up to 300  | 00A (8/20µs surge current)                |        |
| 9.19.2.1 | Test conditions  |   | 50.    |
|          | One pole of the RCCB is submitted to 10 applications of a surge current according to the following requirements: |   | 10     |
|          | Peak value: 3000A +10/-0%  | 3000A                                     | 12300  |
|          | Virtual front time: 0,8µs ± 20%  | 0,8 μs                                    |        |
|          | Virtual time of half value: 20µs ± 20%   | 20 μs                                     |        |
|          | Peak of reverse current: less than 30 % of peak value  | 30%                                       |        |

|          | IEC 61008-1  |                              |         |
|----------|--|------------------------------|---------|
| Clause   | Requirement + Test   | Result - Remark              | Verdict |
|          |  | T                            |         |
|          | The polarity shall be inverted after every two                                     | ок                           |         |
|          | applications   |                              |         |
|          | The interval between two consecutive applications                                  | 30s                          |         |
|          | shall be about 30 s  |                              |         |
| 9.19.2.2 | S-type: During the test the RCCB shall not trip                                    | D1 -                         | N/A     |
|          |  | D2 -                         |         |
|          |  | D3 -                         |         |
|          | - break time (ms) at I <sub>Δn</sub> :   | D1 -                         | N/A     |
|          |  | D2 -                         |         |
|          |  | D3 -                         |         |
| 9.19.2.3 | General type: During the test the RCCB may trip.                                   |                              | Р       |
|          | After any tripping the RCCB shall be re-closed                                     |                              |         |
|          | - break time (ms) at I <sub>Δn</sub>   | D1 - 32ms                    | Р       |
|          |  | D2 - 31ms                    |         |
|          |  | D3 - 34ms                    |         |
| 8.15     | Behaviour of RCCBs in case of earth fault currents of                              | comprising a d.c. component  |         |
| 9.21     | Verification of the correct operation at residual curre                            | nts with d.c. components for | N/A     |
|          | RCCBs type A   |                              |         |
| 9.21.1   | RCCB installed as for normal use, test circuits                                    |                              | N/A     |
|          | according to fig. 5 and 6  |                              |         |
| 9.9.5    | For RCCBs functionally dependent on line voltage,                                  |                              | N/A     |
|          | each test is made at 1,1 and 0,85 times the rated                                  |                              |         |
|          | line voltage; voltage (V):   |                              |         |
| 9.21.1.1 | Verification of the correct operation in case of a continuous rise of the residual |                              |         |
|          | pulsating direct current (see Table 20):   |                              |         |
|          | - steady increase from zero to: 1,4 I <sub>Δn</sub> for                            | I <sub>Δ0</sub> =30mA        | Р       |
|          | $I_{\Delta n} > 0.01 \text{ A with } 1.4 I_{\Delta n} / 30 \text{ A/s (mA)}$       |                              |         |
|          | - steady increase from zero to: 2 l <sub>Δn</sub> for l <sub>Δn</sub> ≤ 0,01 A     |                              | N/A     |
|          | with 2 I <sub>sp</sub> /30 A/s (mA)  |                              |         |
|          | - angle α = 0° (+/-):  | D1- 23,1~24,6mA              | Р       |
|          |  | D2- 23,7~24,4mA              |         |
|          |  | D3- 23,7~24,4mA              |         |

|          | Page 40 of 179  IEC 61008-1   | Report No.:130          |            |
|----------|---|-------------------------|------------|
| 01       |   | DIt DIt                 | \          |
| Clause   | Requirement + Test  | Result - Remark         | Verdict    |
|          |   |                         |            |
|          | - angle α = 90° (+/-):  | D1- 24,3~25,3mA         | Р          |
|          |   | D2- 24,2~25,4mA         |            |
|          | _   | D3- 24,8~25,6mA         |            |
|          | - angle α = 135° (+/-):   | D1- 26,0~27,8mA         | Р          |
|          |   | D2- 26,2~27,1mA         |            |
|          |   | D3- 26,2~27,2mA         |            |
|          | No value exceeds the relevant specified limiting                    |                         | Р          |
|          | values  |                         |            |
| 9.21.1.2 | Verification of the correct operation in case of sudde              | enly appearing residual |            |
|          | pulsating direct currents by closing S2 (angle $\alpha = 0^{\circ}$ | )                       |            |
|          | For RCCBs functionally dependent on line voltage                    |                         | N/A        |
|          | according to 4.1.2.2 a) the residual current is                     |                         |            |
|          | established by closing S1   |                         |            |
|          | RCCBs with I <sub>An</sub> < 0,03 A:                                |                         |            |
|          | - maximum break time (ms) at: 2 Ι <sub>Δn</sub> (+/-):              | D1 -                    | N/A        |
|          |   | D2 -                    |            |
|          |   | D3 -                    |            |
|          | - maximum break time (ms) at: 4 l <sub>Δn</sub> (+/-):              | D1 -                    | N/A        |
|          |   | D2 -                    |            |
|          |   | D3 -                    |            |
|          | - maximum break time (ms) at: 0,5 A rms (+/-):                      | D1 -                    | N/A        |
|          |   | D2 -                    |            |
|          |   | D3 -                    |            |
|          | - maximum break time (ms) at: 350 A rms (+/-)                       | D1 -                    | N/A        |
|          | maximum stoak anto (mo) as soo / mine (*/ / ii.                     | D2 -                    |            |
|          |   | D3 -                    |            |
|          | RCCBs with I <sub>An</sub> = 0,03 A:                                |                         | 12.5.483.6 |
|          |   | D1- 27ms                | Р          |
|          | - maximum break time (ms) at: 1,4 I <sub>An</sub> (+/-):            | D2- 25ms                |            |
|          |   | D3- 27ms                |            |
|          | maximum brook time (max) at 0.01 (11)                               |                         |            |
|          | - maximum break time (ms) at: 2,8 I <sub>An</sub> (+/-):            | D1- 24ms                | P          |
|          |   | D2- 25ms                |            |
|          |   | D3- 26ms                |            |

| IEC 61008-1 |  |                               |         |
|-------------|--|-------------------------------|---------|
| Clause      | Requirement + Test   | Result - Remark               | Verdict |
|             |  |                               |         |
|             | - maximum break time (ms) at: 0,35 A rms (+/-) .:                              | D1- 14ms                      | Р       |
|             |  | D2- 12ms                      |         |
|             |  | D3- 13ms                      |         |
|             | - maximum break time (ms) at: 350 A rms (+/-):                                 | D1- 10ms                      | Р       |
|             |  | D2- 10ms                      |         |
|             |  | D3- 9ms                       |         |
|             | RCCBs with I <sub>An</sub> > 0,03 A:   |                               |         |
|             | - maximum break time (ms) at: 1,4 ( <sub>Δn</sub> (+/-):                       | D1 -                          | N/A     |
|             |  | D2 -                          |         |
|             |  | D3 -                          |         |
|             | - maximum break time (ms) at: 2,8 I <sub>Δn</sub> (+/-):                       | D1 -                          | N/A     |
|             |  | D2 -                          |         |
|             |  | D3 -                          |         |
|             | - maximum break time (ms) at: 7 I <sub>Δn</sub> (+/-):                         | D1 -                          | N/A     |
|             |  | D2 -                          |         |
|             |  | D3 -                          |         |
|             | - maximum break time (ms) at: 350 A rms (+/-):                                 | D1 -                          | N/A     |
|             |  | D2 -                          |         |
|             |  | D3 -                          |         |
|             | No value exceeds the relevant specified limiting                               |                               | N/A     |
|             | value  | _                             |         |
| 9.21.1.3    | Verification of the correct operation with the pole und                        | der test and one other pole   |         |
|             | loaded with rated current  |                               |         |
|             | - test current (A): In:  |                               |         |
|             | - steady increase from zero to: 1,4 $I_{\Delta n}$ for                         | $I_{\Delta n} = 30 \text{mA}$ | Р       |
|             | $I_{\Delta n} > 0.01 \text{ A with } 1.4 I_{\Delta n} / 30 \text{ A/s (mA)}$   |                               |         |
|             | - steady increase from zero to: 2 $I_{\Delta n}$ for $I_{\Delta n} \le 0.01$ A |                               | N/A     |
|             | with 2 I <sub>Δn</sub> /30 A/s (mA)  |                               |         |
|             | - angle $\alpha = 0^{\circ} (+/-)$ :   | D1- 23,6~24,7mA               | Р       |
|             |  | D2- 23,8~24,3mA               |         |
|             |  | D3- 23,8~24,6mA               |         |
|             | - angle α = 90° (+/-):   | D1- 25,1~25,6mA               | Р       |
|             |  | D2- 24,8~25,6mA               |         |
|             |  | D3- 24,6~25,7mA               |         |

| IEC 61008-1 |   |                                 |         |
|-------------|---|---------------------------------|---------|
| Clause      | Requirement + Test  | Result - Remark                 | Verdict |
|             |   | _                               |         |
|             | - angle α = 135° (+/-):   | D1- 26,8~27,4mA                 | Р       |
|             |   | D2- 26,6~27,3mA                 |         |
|             |   | D3- 26,4~27,2mA                 |         |
|             | No value exceeds the relevant specified limiting  |                                 | Р       |
|             | values  |                                 |         |
| 9.21.1.4    | Verification of the correct operation in case of residu                                 | al pulsating d.c. currents with |         |
|             | angle $\alpha = 0^{\circ}$ superimposed by smooth direct current                        | of 0,006 A:                     |         |
|             | - steady increase of pulsating d.c. current from zero                                   |                                 | Р       |
|             | to: 1,4 $I_{\Delta n}$ for $I_{\Delta n} > 0,01$ A with 1,4 $I_{\Delta n}$ /30 A/s (mA) | ΙΔn=30 mA                       |         |
|             | - steady increase of pulsating d.c. current from zero                                   |                                 | N/A     |
|             | to: $2 I_{\Delta n}$ for $I_{\Delta n} \le 0.01$ A with $2 I_{\Delta n} / 30$ A/s (mA)  |                                 |         |
|             | - angle $\alpha$ = 0° (+/-) (+/- 6 mA):   | D1- 26,8~28,0mA                 | Р       |
|             |   | D2- 27,0~27,8mA                 |         |
|             |   | D3- 26,4~27,7mA                 |         |
|             | No value exceeds the relevant specified limiting  |                                 | Р       |
|             | values  |                                 |         |
| 9.11.2.3    | Verification of the rated residual making and   | 630A                            | _       |
|             | breaking capacity (A): I <sub>Δm</sub>  |                                 |         |
|             | Test circuit according to figure:   | 7                               |         |
|             | Point of test circuit which is directly earthed:  | Neutral of power supply         | 15 m —  |
|             | Grid distance "a" (mm):   | 35                              | ******  |
|             | Prospective current (A)   | 630A                            |         |
|             | Prospective current obtained (A)  | 632A                            |         |
|             | Power factor  | 0,93-0,98                       |         |
|             | Power factor obtained   | 0,97                            |         |
|             | Point of initiation: 45° ± 5°   | 45                              | Р       |
|             | Test sequence: O-t-CO-t-CO on each pole in turn   | O-t-CO-t-CO                     | P       |
|             | excluding the switched neutral pole   |                                 | •       |
|             | During tests no endangering of operator, no   |                                 | P       |
|             | permanent arcing, no flashover and no melting of  |                                 | •       |
|             | fuse F  |                                 |         |
|             | After the tests no damage impairing further use   |                                 | P       |

| IEC 61008-1 |  |                                  |         |
|-------------|--|----------------------------------|---------|
| Clause      | Requirement + Test   | Result - Remark                  | Verdict |
|             |  |                                  |         |
| 9.7.7.3     | The leakage current flowing across the open                                  | D1 - 7,11×10 <sup>-3</sup> mA    | Р       |
|             | contacts is measured at 1,1 Un and shall not                                 | D2 - 7,23×10 <sup>-3</sup> mA    |         |
|             | exceed 2mA (mA)  | D3 - 7,14×10 <sup>-3</sup> mA    | ,       |
| 9.7.3       | Dielectric strength test of the main circuit at test voltage 2 Un for 1 min: |                                  |         |
|             | a):  | D1 - OK                          | Р       |
|             |  | D2 - OK                          |         |
|             |  | D3 - OK                          |         |
|             | b):  | D1 - OK                          | Р       |
|             |  | D2 - OK                          |         |
|             |  | D3 - OK                          |         |
|             | c):  | D1 - OK                          | Р       |
|             |  | D2 - OK                          |         |
|             |  | D3 - OK                          |         |
|             | d):  | D1 -                             | N/A     |
|             |  | D2 -                             |         |
|             |  | D3 -                             |         |
|             | e):  | D1 -                             | N/A     |
|             |  | D2 -                             |         |
|             |  | D3 -                             |         |
|             | No flashover or breakdown  | D1 - OK                          | Р       |
|             |  | D2 - OK                          |         |
|             |  | D3 - OK                          |         |
|             | Making and breaking In at Un   | D1 - OK                          | Р       |
|             |  | D2 - OK                          |         |
|             |  | D3 - OK                          |         |
|             | The RCCB shall trip with a test current of 1,25 I <sub>Δn</sub>              | D1- 32ms                         | Р       |
|             | (ms)   | D2- 27ms                         |         |
|             |  | D3- 30ms                         |         |
|             | The polyethylene sheet shows no holes  |                                  | Р       |
| 9.17        | Verification of the behaviour of RCCBs opening auto                          | omatically in case of failure of |         |
| 0.47.4      | the line voltage   |                                  |         |
| 9.17.1      | Limiting value of the line voltage (Ux):                                     |                                  |         |

| IEC 61008-1 |   |                 |         |
|-------------|---|-----------------|---------|
| Clause      | Requirement + Test  | Result - Remark | Verdict |
|             |   |                 |         |
|             | - rated voltage applied to the line terminals and                                   | D1 -            | N/A     |
|             | progressively lowered to attain zero within about                                   | D2 -            |         |
|             | 30 s until automatic opening occurs; voltage (V) .:                                 | D3 -            |         |
|             | - all values less than 0,85 times the rated voltage                                 | D1 -            | N/A     |
|             | (V):  | D2 -            |         |
|             |   | D3 -            |         |
|             | - tripping test at test voltage (V) with I <sub>\n</sub> and                        | D1 -            | N/A     |
|             | operating according to Table 1 (ms):  | D2 -            |         |
|             |   | D3 -            |         |
|             | No value exceeds the specified limiting values                                      |                 | N/A     |
|             | Not possible to close the apparatus by manual                                       | D1 -            | N/A     |
|             | operating means below Ux  | D2 -            |         |
|             |   | D3 -            |         |
| 9.17.2      | Verification of behaviour in case of failure of the line                            | voltage         | N/A     |
|             | RCCB supplied with rated voltage, and the line                                      |                 | N/A     |
|             | voltage then switched off   |                 |         |
|             | Time (ms) interval between switching off and  | D1 -            | N/A     |
|             | opening of the main contacts:   | D2 -            |         |
|             |   | D3 -            |         |
|             | a) RCCBs opening without delay: no value exceeds                                    |                 | N/A     |
|             | 0,5 s   |                 |         |
|             | b) RCCBs opening with delay: max. and min.  |                 | N/A     |
|             | values within the range indicated by the  |                 |         |
|             | manufacturer  |                 |         |
| 9.17.3      | Verification of the correct operation, in presence of a residual current, for RCCBs |                 |         |
|             | opening with delay in case of failure of the line voltage                           | je              |         |
|             | RCCB connected according to fig. 4 at the rated                                     |                 | N/A     |
|             | voltage (Un):   |                 |         |
|             | All phases but one switched off by means of S3                                      |                 | N/A     |
|             | During the delay: test of 9.9.2:  |                 |         |
| 9.9.2.1     | - steady increase from 0,2 $I_{\Delta n}$ to $I_{\Delta n}$ within 30 s (mA)        | D1 -            | N/A     |
|             | :   | D2 -            |         |
|             |   | D3 -            |         |

|         | IEC 61008-1  |                                 |            |  |
|---------|--|---------------------------------|------------|--|
| Clause  | Requirement + Test   | Result - Remark                 | Verdict    |  |
|         |  | 1                               |            |  |
|         | - tripping current between $I_{\Delta no}$ and $I_{\Delta n}$ (mA) | D1 -                            | N/A        |  |
|         |  | D2 -                            |            |  |
|         |  | D3 -                            |            |  |
|         | The RCCB closes on $I_{\Delta n}$ : no value exceeds the           | D1 -                            | N/A        |  |
|         | specified limiting value of Table 1 (ms)                           | D2 -                            |            |  |
|         |  | D3 -                            |            |  |
| 9.9.2.3 | The test circuit being successively calibrated at each current     | n of the values of residual     |            |  |
|         | specified in Table 1, the test switch S2 and the RCC               | B being in the closed position, |            |  |
|         | the test voltage is suddenly established by closing the            | e test switch S1                | Authority) |  |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :                    | D1 -                            | N/A        |  |
|         |  | D2 -                            |            |  |
|         |  | D3 -                            |            |  |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub> :                  | D1 -                            | N/A        |  |
|         |  | D2 -                            |            |  |
|         |  | D3 -                            |            |  |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub> :                  | D1 -                            | N/A        |  |
|         |  | D2 -                            |            |  |
|         |  | D3 -                            |            |  |
|         | - maximum break time (ms) at: 0,25 A (if                           | D1 -                            | N/A        |  |
|         | applicable)  | D2 -                            |            |  |
|         |  | D3 -                            |            |  |
|         | - maximum break time (ms) at: 500 A                                | D1 -                            | N/A        |  |
|         |  | D2 -                            |            |  |
|         |  | D3 -                            |            |  |
|         | No value exceeds the relevant specified limiting                   |                                 | N/A        |  |
|         | value  |                                 |            |  |
|         | Additional test for type S:  |                                 |            |  |
|         | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :   | D1 -                            | N/A        |  |
|         | ,                            | D2 -                            | •          |  |
|         |  | D3 -                            |            |  |
|         | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s   | D1 -                            | N/A        |  |
|         | · · · · · · · · · · · · · · · · · · ·                              | D2 -                            |            |  |
|         |  | D3 -                            |            |  |

| IEC 61008-1 |   |  |          |
|-------------|---|--|----------|
| Clause      | Requirement + Test  | Result - Remark  | Verdict  |
|             |   |  |          |
|             | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s                    | D1 -   | N/A      |
|             | :   | D2 -   |          |
|             |   | D3 -   |          |
|             | - minimum non actuating time (ms) at: 500 A;  | D1 -   | N/A      |
|             | 0,04 s  | D2 -   |          |
|             |   | D3 -   |          |
|             | No tripping during tests  |  | N/A      |
| 9.17.4      | Verification of the correct operation of RCCBs with 3                               | or 4 current paths, neutral  |          |
|             | and one line terminal only being energized in turn:                                 | and the state of t | 11=35    |
|             | RCCB connected according to fig. 4  |  | N/A      |
| 9.9.2.3     | The test circuit being successively calibrated at each                              | n of the values of residual  |          |
|             | current   |  |          |
|             | specified in Table 1, the test switch S2 and the RCCB being in the closed position. |  |          |
|             | the test voltage is suddenly established by closing the test switch S1              |  |          |
|             | - maximum break time (ms) at: I <sub>Δn</sub>                                       | D1 -   | N/A      |
|             | , ,   | D2 -   |          |
|             |   | D3 -   |          |
|             | - maximum break time (ms) at: 2 l <sub>an</sub> :                                   | D1 -   | N/A      |
|             |   | D2 -   |          |
|             |   | D3 -   |          |
|             | - maximum break time (ms) at: 5 l <sub>an</sub>                                     | D1 -   | N/A      |
|             | (,  | D2 -   |          |
|             |   | D3 -   |          |
|             | - maximum break time (ms) at: 0,25 A (if  | D1 -   | N/A      |
|             | applicable)   | D2 -   | 1 4/7 1  |
|             |   | D3 -   |          |
|             | - maximum break time (ms) at: 500 A   | D1 -   | N/A      |
|             | (, 5551,  | D2 -   |          |
|             |   | D3 -   |          |
|             | No value exceeds the relevant specified limiting value                              |  | N/A      |
|             | Additional test for type S:   |  | CANADA A |

|        | IEC 61008-1   |                            |          |  |
|--------|---|----------------------------|----------|--|
| Clause | Requirement + Test  | Result - Remark            | Verdict  |  |
|        |   |                            |          |  |
|        | - minimum non actuating time (ms) at: I <sub>sn</sub> ; 0,13 s :  | D1 -                       | N/A      |  |
|        |   | D2 -                       |          |  |
|        |   | D3 -                       |          |  |
|        | - minimum non actuating time (ms) at: 2 I <sub>.sn</sub> ; 0,06 s | D1 -                       | N/A      |  |
|        |   | D2 -                       |          |  |
|        |   | D3 -                       |          |  |
|        | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s  | D1 -                       | N/A      |  |
|        | :   | D2 -                       |          |  |
|        |   | D3 -                       |          |  |
|        | - minimum non actuating time (ms) at: 500 A;                      | D1 -                       | N/A      |  |
|        | 0,04 s  | D2 -                       |          |  |
|        |   | D3 -                       |          |  |
|        | No tripping during tests  |                            | N/A      |  |
| 9.17.5 | Verification of the reclosing function of automatically r         | eclosing RCCBs (under      | 1,547,85 |  |
|        | consideration)  |                            |          |  |
| 8.11   | Test device   | 1                          |          |  |
|        | RCCBs shall be provided with a test device                        |                            | Р        |  |
|        | Ampere-turns produced when operating the test                     | Ampere-turns produced by   | Р        |  |
|        | device do not exceed 2,5 times the ampere-turns                   | test device: 93,8          |          |  |
|        | produced by I <sub>Δn</sub>                                       | milliampere-turns          |          |  |
|        |   | 2,5 times the Ampere-turns |          |  |
|        |   | produced by I∆n: 150       |          |  |
|        |   | milliampere-turns          |          |  |
|        | Not possible to energize the circuit on the load side             |                            | Р        |  |
|        | by operating the test device when the RCCB is in                  |                            |          |  |
|        | the open position   |                            | 10 10 5  |  |
| 9.16   | Verification of the operation of the test device at the           | limits of rated voltage:   |          |  |
|        | a) RCCB at 0,85 times the rated voltage, test                     | D1 - OK                    | Р        |  |
|        | device actuated 25 times at intervals of 5 s:                     | D2 - OK                    |          |  |
|        |   | D3 - OK                    |          |  |
|        | b) test a) repeated at 1,1 times the rated voltage:               | D1 - OK                    | Р        |  |
|        |   | D2 - OK                    |          |  |
|        |   | D3 - OK                    |          |  |

|          | IEC 61008-1   |                 |         |
|----------|---|-----------------|---------|
| Clause   | Requirement + Test                                  | Result - Remark | Verdict |
|          |   |                 |         |
|          | c) test b) repeated, but only once, the operating   | D1 - OK         | Р       |
|          | means of the test device being held in the closed   | D2 - OK         |         |
|          | position for 30 s                                   | D3 - OK         |         |
|          | RCCB operated at each test                          | D1 - operated   | Р       |
|          |   | D2 - operated   |         |
|          |   | D3 - operated   |         |
|          | No change impairing further use:                    | D1 - OK         | Р       |
|          |   | D2 - OK         |         |
|          |   | D3 - OK         |         |
| 8.8      | Resistance to mechanical shock and impact           |                 |         |
|          | RCCBs shall have adequate mechanical behaviour      |                 | Р       |
|          | so as to withstand the stresses imposed during      |                 |         |
|          | installation and use                                |                 |         |
| 9.12.1.2 | Mechanical shock                                    |                 |         |
|          | Mechanical shock: 50 falls of 40 mm on one side;    |                 | Р       |
|          | 50 falls on opposite side C turned through 90°;     |                 |         |
|          | 50 falls on one side; 50 falls on opposite side     |                 |         |
|          | No opening of RCCB during the test:                 | D1 - OK         | P       |
|          |   | D2 - OK         |         |
|          |   | D3 - OK         |         |
| 9.12.2   | Mechanical impact                                   |                 |         |
| 9.12.2.1 | Impact test (10 blows, height 10 cm): no damage :   | D1 - OK         | Р       |
|          |   | D2 - OK         |         |
|          |   | D3 - OK         |         |
| 9.12.2.2 | RCCBs for rail mounting downward vertical force of  |                 | Р       |
|          | 50 N for 1 min, upward vertical force of 50 N for   |                 |         |
|          | 1 min   |                 |         |
|          | RCCB shall not become loose during test and no      | D1 - OK         | Р       |
|          | damage impairing its further use:                   | D2 - OK         |         |
|          |   | D3 - OK         |         |
| 9.12.2.3 | RCCBs of plug-in type (under consideration)         |                 | N/A     |
| 8.13     | Behaviour of RCCBs in case of overcurrents in the n | nain circuit    |         |
|          | RCCBs shall not operate under specified conditions  |                 | Р       |
|          | of overcurrent                                      |                 |         |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

| 9.18.1 | Verification of the limiting value of overcurrent in case of a load through a RCCB with two poles                       |                               |     |  |
|--------|---|-------------------------------|-----|--|
|        | RCCB connected as for normal use with a load equal to (A): 6 In switched on using a two-pole test switch for 1 s        | 378A 1s                       | Р   |  |
|        | Test repeated three times with an interval of at least 1 min  | D1 - Ok<br>D2 - Ok<br>D3 - Ok | Р   |  |
|        | The RCCB shall not open   | D1 - Ok<br>D2 - Ok<br>D3 - Ok | Р   |  |
|        | RCCBs functionally dependent on the line voltage at rated voltage (Un)  |                               | Р   |  |
| 9.18.2 | Verification of the limiting value of overcurrent in case of a single phase load through a three-pole or four-pole RCCB |                               |     |  |
|        | RCCB connected according to fig. 22  Test current (A): 6 In closed by S1 for 1 s:                                       |                               | N/A |  |
|        | Test repeated three times for each possible combination of current paths with an interval of at least 1 min             | D1 -<br>D2 -<br>D3 -          | N/A |  |
|        | The RCCB shall not open   | D1 -<br>D2 -<br>D3 -          | N/A |  |
|        | RCCBs functionally dependent on the line voltage at rated voltage   |                               | N/A |  |

|     | TEST SEQUENCE D   | D7        | Р      |
|-----|---|-----------|--------|
|     | (1 sample: In= 63A, IΔn= 0,03A, type AC)                        | or a land | Pales. |
|     | Tests "D0"  |           | Р      |
| 8.5 | Operating characteristics                                       |           |        |
|     | For multiple settings of $I_{\Delta n}$ tests are made for each |           | N/A    |
|     | setting   |           |        |

Report No.:130700023SHA-001

|         |   |  |            |                       |                         | 1008-1            |                            |                    | τοροιτ   | 10100700                        | 10235HA-UL |
|---------|---|--|------------|-----------------------|-------------------------|-------------------|----------------------------|--------------------|----------|---------------------------------|------------|
| Clause  | Require   | mont +   |            |                       | 120 0                   |                   | Resil                      | lt - Rer           | nork     | _                               | Verdict    |
| Clause  | Require   | ment +   |            |                       |                         |                   | INesu                      | ıı - Mei           |          |                                 | verdict    |
| 9.9.1   |   | RCCB installed as for normal use, test circuit  Test on 50 and 60Hz  according to fig. 4 |            |                       |                         |                   | P                          |                    |          |                                 |            |
| 9.9.5   | For RCCBs functionally dependent on line voltage,   |  |            |                       |                         |                   |                            |                    |          | Р                               |            |
|         |   |  |            | ,                     |                         | the rated         |                            |                    |          |                                 | •          |
|         |   |  |            |                       |                         | :                 |                            |                    |          |                                 |            |
|         | Туре  | I <sub>N</sub> A   | ΙΔΝΑ       |                       | S                       | standard values   |                            |                    |          |                                 |            |
|         |   |  |            | łan                   | 2 I <sub>ΔN</sub>       | 5 I <sub>ΔN</sub> | 5 lan<br>or<br>0,25A<br>a) | 5A-<br>200A,<br>b) | 500A     |                                 |            |
|         | General   | Any<br>value   | <0,03      | 0,3                   | 0,15                    |                   | 0,04                       | 0,04               | 0,04     | Max. break                      |            |
|         |   |  | 0,03       | 0,3                   | 0,15                    |                   | 0,04                       | 0,04               | 0,04     | unies                           |            |
|         |   |  | >0,03      | 0,3                   | 0,15                    | 0,04              |                            | 0,04               | 0,04     |                                 |            |
|         | S   | ≥ 25   | >0,03      | 0,5                   | 0,2                     | 0,15              |                            | 0,15               | 0,15     | Max. break<br>times             |            |
|         |   |  |            | 0,13                  | 0,06                    | 0,05              |                            | 0,04               | 0,04     | Min. non-<br>actuating<br>times |            |
|         | a) value  | to be d  | ecided by  | the mar               | ufacturer               | for this test     |                            | ,                  |          |                                 |            |
|         | b) The test are only made during verification of the correct operation as mentioned in 9.9.2.4                              |  |            |                       |                         |                   |                            |                    |          |                                 |            |
| 9.9.2   | Off-load  | tests n  | nade at a  | a tempe               | rature of               | 20 ± 2 °C         | 22°C                       |                    |          |                                 | Р          |
| 9.9.2.1 | Verification of the correct operation in case of a steady increase residual current:  |  |            |                       |                         |                   |                            |                    |          |                                 |            |
|         | - steady increase from 0,2 I <sub>Δn</sub> to I <sub>Δn</sub> within 30 s (mA)  |  |            |                       |                         |                   |                            |                    | Р        |                                 |            |
|         | - trippin   | g currer   | nt between | en I <sub>Ano</sub> a | nd I <sub>An</sub> (m   | A):               |                            | 21,9 -             | 22,1m/   | 4                               | P          |
| 9.9.2.2 |   |  |            |                       |                         | osing on res      |                            |                    | •        |                                 |            |
|         |   |  |            |                       | lue exce                |                   |                            | 28 - 36            | ms       |                                 | Р          |
| _       | specifie  | d limitin  | g value    | of Table              | 1 (ms) .                |                   |                            |                    |          |                                 |            |
| 9.9.2.3 | Specified limiting value of Table 1 (ms):  The test circuit being successively calibrated at each of the values of residual |  |            |                       |                         |                   |                            |                    | sidual   | L PAGE                          |            |
|         | current   |  |            |                       |                         |                   |                            |                    |          |                                 |            |
|         | specifie  | d in Tab   | ole 1, the | test sw               | ritch S2 a              | nd the RCC        | B being                    | g in the           | close    | d                               |            |
|         | position  | , the tes  | st voltage | e is sudo             | denly est               | ablished by       | closing                    | the te             | st swite | ch S1                           |            |
|         | - maxim   | num bre  | ak time (  | (ms) at:              | l <sub>Δn</sub>         | <u></u>           | D7 - 3                     | 37ms               |          |                                 | Р          |
|         | - maxim   | num bre  | ak time (  | (ms) at:              | 2 I <u>∆n</u> . <u></u> | :                 | D7 - 2                     | 28ms               |          |                                 | Р          |
|         | - maxim   | num_bre  | ak time (  | (ms) at:              | 5 Ι <sub>Δη</sub>       | :                 | D7 -                       |                    |          |                                 | N/A        |

| _       | IEC 61008-1  |                           |         |  |  |
|---------|--|---------------------------|---------|--|--|
| Clause  | Requirement + Test   | Result - Remark           | Verdict |  |  |
|         |  |                           |         |  |  |
|         | - maximum break time (ms) at: 0,25 A (if   | D7 - 21ms                 | Р       |  |  |
|         | applicable):   |                           |         |  |  |
|         | - maximum break time (ms) at: 500 A:   | D7 - 11ms                 | Р       |  |  |
|         | No value exceeds the relevant specified limiting                                 |                           | Р       |  |  |
|         | value  |                           |         |  |  |
| 9.9.2.4 | Verification of the correct operation in case of sudde                           | en appearance of residual |         |  |  |
|         | current of values between 5 l∆n and 500A:  |                           |         |  |  |
|         | The test switch S1 and the RCCB being in the close                               | d position, the residual  | 上70世)是  |  |  |
|         | current is suddenly established by closing the test so                           | witch S2                  |         |  |  |
|         | - maximum break time (ms) at: 5A (value 1  | D7 - 15ms                 | Р       |  |  |
|         | between 5A and 200A) :   |                           | _       |  |  |
|         | - maximum break time (ms) at: 200A (value 2                                      | D7 - 9ms                  | Р       |  |  |
|         | between 5A and 200A) :   |                           |         |  |  |
|         | No value exceeds the relevant specified limiting                                 |                           | Р       |  |  |
|         | value  |                           |         |  |  |
|         | Additional test for type S:  |                           |         |  |  |
|         | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :                 | D7 -                      | N/A     |  |  |
|         | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s                 | D7 -                      | N/A     |  |  |
|         | - minimum non actuating time (ms) at: 5 l <sub>An</sub> ; 0,05 s                 | D7 -                      | N/A     |  |  |
|         | - minimum non actuating time (ms) at: 500 A;                                     | D7 -                      | N/A     |  |  |
|         | 0,04 s   |                           |         |  |  |
|         | No tripping during tests   |                           | N/A     |  |  |
| 9.9.4   | a) Tests repeated at a temperature of -5 °C:                                     |                           |         |  |  |
|         | The test circuit being successively calibrated at each of the values of residual |                           |         |  |  |
|         | current  |                           |         |  |  |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed        |                           |         |  |  |
|         | position, the test voltage is suddenly established by closing the test switch S1 |                           |         |  |  |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :                                  | D7 - 39ms                 | Р       |  |  |
|         | - maximum break time (ms) at: 2 l <sub>Δn</sub> :                                | D7 - 33ms                 | Р       |  |  |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub> :                                | D7 -                      | N/A     |  |  |
|         | - maximum break time (ms) at: 0,25 A (if   | D7 - 25ms                 | Р       |  |  |
|         | applicable)  |                           |         |  |  |

| IEC 61008-1 |  |                                  |         |  |
|-------------|--|----------------------------------|---------|--|
| Clause      | Requirement + Test   | Result - Remark                  | Verdict |  |
|             |  |                                  | _       |  |
|             | - maximum break time (ms) at: 500 A                              | D7 - 12ms                        | Р       |  |
|             | No value exceeds the relevant specified limiting                 |                                  | Р       |  |
|             | valu <u>e</u>  |                                  |         |  |
|             | Additional test for type S:                                      | 1                                |         |  |
|             | - minimum non actuating time (ms) at: I <sub>Δn</sub> : 0,13 s : | D7 -                             | N/A     |  |
|             | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s | D7 -                             | N/A     |  |
|             | - minimum non actuating time (ms) at: 5 I <sub>Δn</sub> ; 0,05 s | D7 -                             | N/A     |  |
|             | - minimum non actuating time (ms) at: 500 A;                     | D7 -                             | N/A     |  |
|             | No tripping during the tests_                                    |                                  | N/A     |  |
| 9.9.3       | Tests repeated with the RCCB loaded with rated cu                | rrent:                           |         |  |
|             | - test current (A): In, until steady state conditions            |                                  |         |  |
|             | are reached:   | 63A                              | the t   |  |
|             | - cross-sectional area (mm²):                                    | 16mm²                            |         |  |
|             | - the RCCB closes on I <sub>Δn</sub> : no value exceeds the      | D7 - 35ms                        | Р       |  |
|             | specified limiting value of Table 1 (ms)                         | The marking and an investigation |         |  |
|             | The switch S1 and the RCCB are in closed position.               | The residual current is          |         |  |
|             | established by closing S2:                                       | D                                |         |  |
|             | - maximum break time (ms) at: I <sub>Δn</sub> :                  |                                  | P       |  |
|             | - maximum break time (ms) at: 2 I <sub>Δn</sub>                  | D7 - 31ms                        | P       |  |
| <u> </u>    | - maximum break time (ms) at: 5 I <sub>An</sub>                  | D7 -                             | N/A     |  |
|             | - maximum break time (ms) at: 0,25 A (if applicable)             | D7 - 24ms                        | P       |  |
|             | - maximum break time (ms) at: 500 A:                             | D7 - 12ms                        | Р       |  |
|             | No value exceeds the relevant specified limiting                 | D7 - 121119                      | Р       |  |
|             | value  |                                  |         |  |
|             |  |                                  |         |  |
|             | Additional test for type S:                                      | D7 -                             | N/A     |  |
|             | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s : |                                  |         |  |
|             | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s | D7 -                             | N/A     |  |
|             | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s | D7 -                             | N/A     |  |
|             | :  |                                  |         |  |

|        | IEC 61008-1   |                             |         |  |  |
|--------|---|-----------------------------|---------|--|--|
| Clause | Requirement + Test  | Result - Remark             | Verdict |  |  |
|        |   |                             |         |  |  |
|        | - minimum non actuating time (ms) at: 500 A;                              | D7 -                        | N/A     |  |  |
|        | 0,04 s . <u></u>  |                             |         |  |  |
|        | No tripping during the tests  |                             | N/A     |  |  |
| 0.9.4  | b) Tests repeated with the RCCB loaded with rated                         | current:                    |         |  |  |
|        | - test current (A): In at a temperature of +40 °C:                        |                             | -       |  |  |
|        | until steady state conditions are reached:                                | 63A                         |         |  |  |
|        | - cross-sectional area (mm²)  | 16mm²                       | _       |  |  |
|        | The test circuit being successively calibrated at eac                     | h of the values of residual | Р       |  |  |
|        | current   |                             |         |  |  |
|        | specified in Table 1, the test switch S2 and the RCCB being in the closed |                             |         |  |  |
|        | position, the test voltage is suddenly established by                     | closing the test switch S1  |         |  |  |
|        | - maximum break time (ms) at: I <sub>Δn</sub> :                           | D7 - 35ms                   | Р       |  |  |
|        | - maximum break time (ms) at: 2 l <sub>Δn</sub> :                         | D7 - 29ms                   | Р       |  |  |
|        | - maximum break time (ms) at: 5 l <sub>Δn</sub> :                         | D7 -                        | N/A     |  |  |
|        | - maximum break time (ms) at: 0,25 A (if                                  | D7 - 24ms                   | Р       |  |  |
|        | applicable):  |                             |         |  |  |
|        | - maximum break time (ms) at: 500 A:                                      | D7 - 11ms                   | Р       |  |  |
|        | No value exceeds the relevant specified limiting                          |                             | Р       |  |  |
|        | value   |                             | 1 11    |  |  |
|        | Additional test for type S:   |                             |         |  |  |
|        | - minimum non actuating time (ms) at: I <sub>Δα</sub> ; 0,13 s :          | D7 -                        | N/A     |  |  |
|        | - minimum non actuating time (ms) at: 2 l <sub>an</sub> for               | D7 -                        | N/A     |  |  |
|        | 0,06 s  |                             |         |  |  |
|        | - minimum non actuating time (ms) at: 5 l <sub>an</sub> ; 0,05 s          | D7 -                        | N/A     |  |  |
|        |   |                             |         |  |  |
|        | - minimum non actuating time (ms) at: 500 A;                              | D7 -                        | N/A     |  |  |
|        | 0,04 s  |                             |         |  |  |
|        | No tripping during the tests  |                             | N/A     |  |  |
|        |   |                             |         |  |  |
|        | Tests "D1"  |                             |         |  |  |

|      | Tests "D1"   |     |
|------|--|-----|
| 8.12 | RCCBs functionally dependent on line voltage       |     |
|      | RCCBs functionally dependent on the line voltage,  | N/A |
|      | shall operate correctly between 0,85 and 1,1 times |     |
|      | their rated voltage; voltage (V):                  |     |

N/A

N/A

N/A

|        | IEC 61008-1   |                                 |         |
|--------|---|---------------------------------|---------|
| Clause | Requirement + Test  | Result - Remark                 | Verdict |
|        |   |                                 |         |
|        | Multipole RCCBs shall have all current paths  |                                 | N/A     |
|        | supplied from the phases and neutral, if any  |                                 |         |
| 9.17   | Verification of the behaviour of RCCBs opening auto                                 | matically in case of failure of | N/A     |
|        | the line voltage  |                                 |         |
| 9.17.1 | Limiting value of the line voltage (Ux):  |                                 |         |
|        | - rated voltage applied to the line terminals and                                   | D7 -                            | N/A     |
|        | progressively lowered to attain zero within about                                   |                                 |         |
|        | 30 s until automatic opening occurs; voltage (V) .:                                 |                                 |         |
|        | - all values less than 0,85 times the rated voltage                                 | D7 -                            | N/A     |
|        | (V):  |                                 |         |
|        | - tripping test at test voltage (V) with $I_{\Delta n}$ and                         | D7 -                            | N/A     |
|        | operating according to Table 1 (ms)   |                                 |         |
|        | No value exceeds the specified limiting values                                      |                                 | N/A     |
|        | Not possible to close the apparatus by manual                                       | D7 -                            | N/A     |
|        | operating means below Ux  |                                 |         |
| 9.17.2 | Verification of behaviour in case of failure of the line                            | voltage                         |         |
|        | RCCB supplied with rated voltage, and the line                                      |                                 | N/A     |
|        | voltage then switched off   |                                 |         |
|        | Time (ms) interval between switching off and  | D7 -                            | N/A     |
|        | opening of the main contacts  |                                 |         |
|        | a) RCCBs opening without delay: no value exceeds                                    |                                 | N/A     |
|        | 0,5 s   |                                 |         |
|        | b) RCCBs opening with delay: max. and min.  |                                 | N/A     |
|        | values within the range indicated by the  |                                 |         |
|        | manufacturer  |                                 |         |
| 9.17.3 | Verification of the correct operation, in presence of a residual current, for RCCBs |                                 |         |
|        | opening with delay in case of failure of the line voltage                           | je                              | 5       |
|        | RCCB connected according to fig. 4 at the rated                                     |                                 | N/A     |
|        | voltage (Un):   |                                 |         |
|        | All phases but one switched off by means of S3                                      |                                 | N/A     |

9.9.2.1

During the delay: test of 9.9.2:

- steady increase from 0,2  $I_{\Delta n}$  to  $I_{\Delta n}$  within 30 s (mA) D7 -

D7 -

- tripping current between lոր and lոր (mA) ......:

|        |                    | IEC 61008-1     |         |
|--------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

|                 | The RCCB closes on I <sub>∆n</sub> : no value exceeds the D7 -                      | N/A    |  |
|-----------------|---|--------|--|
|                 | specified limiting value of Table 1 (ms)  |        |  |
| 9.9.2.3         | The test circuit being successively calibrated at each of the values of residual    | 0.000  |  |
|                 | current   |        |  |
|                 | specified in Table 1, the test switch S2 and the RCCB being in the closed posit     | ion,   |  |
|                 | the test voltage is suddenly established by closing the test switch S1              |        |  |
|                 | - maximum break time (ms) at: I <sub>Δn</sub> D7 -                                  | N/A    |  |
|                 | - maximum break time (ms) at: 2 l <sub>\text{\lambda}n</sub> D7 -                   | N/A    |  |
|                 | - maximum break time (ms) at: 5 I <sub>Δn</sub> D7 -                                | N/A    |  |
|                 | - maximum break time (ms) at: 0,25 A (if  | N/A    |  |
|                 | applicable)   |        |  |
|                 | - maximum break time (ms) at: 500 A   | N/A    |  |
|                 | No value exceeds the relevant specified limiting                                    | N/A    |  |
|                 | value   |        |  |
|                 | Additional test for type S:   |        |  |
|                 | - minimum non actuating time (ms) at: I <sub>.in;</sub> 0,13 s : D7 -               | N/A    |  |
|                 | - minimum non actuating time (ms) at: 2 I <sub>nn</sub> ; 0,06 s                    | N/A    |  |
|                 | - minimum non actuating time (ms) at: 5 l <sub>∆n</sub> ; 0,05 s D7 -               | N/A    |  |
|                 | - minimum non actuating time (ms) at: 500 A; D7 -                                   | N/A    |  |
|                 | 0,04 s  |        |  |
|                 | No tripping during tests  | N/A    |  |
| 9.17 <i>.</i> 4 | Verification of the correct operation of RCCBs with 3 or 4 current paths, neutra    |        |  |
|                 | and one line terminal only being energized in turn:                                 |        |  |
|                 | RCCB connected according to fig. 4  | N/A    |  |
| 9.9.2.3         | The test circuit being successively calibrated at each of the values of residual    |        |  |
| J.J.Z.O         | current   |        |  |
|                 | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |        |  |
|                 | the test voltage is suddenly established by closing the test switch S1              | .1013, |  |
|                 | - maximum break time (ms) at: I <sub>Δn</sub>                                       | N/A    |  |
|                 | - maximum break unte (ma) at I <sub>An</sub>   U / ~                                | i IN/A |  |
|                 | - maximum break time (ms) at: 2 l <sub>Δn</sub> D7 -                                | N/A    |  |

|        | Page 56 of 179   | Report No.:13070            | JUZUUI IAYUU |
|--------|--|-----------------------------|--------------|
|        | IEC 61008-1  | D 11 D 1                    |              |
| Clause | Requirement + Test   | Result - Remark             | Verdict      |
|        |  |                             | N/A          |
|        | - maximum break time (ms) at: 0,25 A (if applicable):            | D7 -                        | N/A          |
|        | - maximum break time (ms) at: 500 A                              | D7 -                        | N/A          |
|        | No value exceeds the relevant specified limiting value           |                             | N/A          |
|        | Additional test for type S:                                      |                             |              |
|        | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s : | D7 -                        | N/A          |
|        | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s | D7 -                        | N/A          |
|        | - minimum non actuating time (ms) at: 5 I <sub>Δn</sub> ; 0,05 s | D7 -                        | N/A          |
|        | - minimum non actuating time (ms) at: 500 A;                     | D7 -                        | N/A          |
|        | No tripping during tests   |                             | N/A          |
| 9.17.5 | Verification of the reclosing function of automatically r        | eclosing RCCBs (under       |              |
| 8.14   | Behaviour of RCCBs in case of current surges caus                | ed by impulse voltages      |              |
| 9.19   | Verification of behaviour of RCCBs in case of currer voltages    | nt surges caused by impulse |              |
| 9.19.1 | Current surge test for all RCCBs (0,5µs/100kHz ring              | wave test)                  |              |
|        | One pole of the RCCB is submitted to 10 application              | ns of a surge current       |              |
|        | according to the following requirements:                         |                             |              |
|        | - peak value: 200 A + 10/0%                                      | 200A                        | 16.          |
|        | - virtual front time: 0,5 μs ± 30%                               | 0,5 μs                      | 10           |
|        | - period of the following oscillatory wave: 10 μs ± 20%          | 10 μs                       |              |
|        | - each successive reverse peak: about 60% of the preceding peak  | ок                          |              |
|        | The polarity shall be inverted after every two applications      | ок                          |              |
|        | applications   |                             |              |

The interval between two consecutive applications

During the test the RCCB shall not trip .....:

- break time (ms) at: I<sub>An</sub> .....

30s

D7 - not trip

D7 - 37ms

Ρ

| TRF | No. | IEC61008 | 1F |
|-----|-----|----------|----|

shall be about 30 s

| IEC 61008-1 |                    |  |                 | _       |
|-------------|--------------------|--|-----------------|---------|
| Clause      | Requirement + Test |  | Result - Remark | Verdict |

| 9.19.2   | Verification of behaviour at surge currents up to 300   | 00A (8/20µs surge current)   |     |
|----------|---|------------------------------|-----|
| 9.19.2.1 | Test conditions  One pole of the RCCB is submitted to 10 applications of a surge current                                      |                              |     |
|          |   |                              |     |
|          | according to the following requirements:  |                              |     |
|          | Peak value: 3000A +10/-0%   | 3000A                        |     |
|          | Virtual front time: 0,8µs ± 20%   | 0,8 μs                       |     |
|          | Virtual time of half value: 20μs ± 20%  | 20 μs                        |     |
|          | Peak of reverse current: less than 30 % of peak value   | 30%                          |     |
|          | The polarity shall be inverted after every two applications   | ок                           |     |
|          | The interval between two consecutive applications shall be about 30 s   | 30s                          |     |
| 9.19.2.2 | S-type: During the test the RCCB shall not trip   | D7 -                         | N/A |
|          | - break time (ms) at I <sub>Δn</sub> :  | D7 -                         | N/A |
| 9.19.2.3 | General type: During the test the RCCB may trip.  After any tripping the RCCB shall be re-closed                              |                              | Р   |
|          | - break time (ms) at I <sub>Δn</sub>  | D7 - 35ms                    | Р   |
| 8.15     | Behaviour of RCCBs in case of earth fault currents  | <u> </u>                     |     |
| 9.21     | Verification of the correct operation at residual curre   | ·                            | N/A |
| 9.21.1   | RCCB installed as for normal use, test circuits according to fig. 5 and 6   |                              | N/A |
| 9.9.5    | For RCCBs functionally dependent on line voltage, each test is made at 1,1 and 0,85 times the rated line voltage; voltage (V) |                              | N/A |
| 9.21.1.1 | Verification of the correct operation in case of a con pulsating direct current (see Table 20):                               | tinuous rise of the residual |     |
|          | - steady increase from zero to: 1,4 $I_{An}$ for $I_{\Delta n} > 0,01$ A with 1,4 $I_{\Delta n}$ /30 A/s (mA)                 |                              | N/A |
|          | - steady increase from zero to: $2 I_{\Delta n}$ for $I_{\Delta n} \le 0.01$ A with $2 I_{\Delta n} /30$ A/s (mA)             |                              | N/A |
|          | - angle $\alpha = 0^{\circ} (+/-)$  | D7 -                         | N/A |
|          | - angle α = 90° (+/-)   | D7 -                         | N/A |

|          | IEC 61008-1   |                         |                 |
|----------|---|-------------------------|-----------------|
| Clause   | Requirement + Test  | Result - Remark         | Verdict         |
|          |   |                         |                 |
|          | - angle α = 135° (+/-):   | D7 -                    | N/A             |
|          | No value exceeds the relevant specified limiting                                  |                         | N/A             |
|          | values  |                         | CHANGE PROPERTY |
| 9.21.1.2 | Verification of the correct operation in case of sudde                            | enly appearing residual |                 |
|          | pulsating direct currents by closing S2 (angle $\alpha = 0^{\circ}$               | )                       |                 |
|          | For RCCBs functionally dependent on line voltage                                  |                         | N/A             |
|          | according to 4.1.2.2 a) the residual current is                                   |                         |                 |
|          | established by closing S1   |                         |                 |
|          | RCCBs with I <sub>An</sub> < 0,03 A:  |                         | 20005           |
|          | - maximum break time (ms) at: 2 l <sub>sn</sub> (+/-):                            | D7 -                    | N/A             |
|          | - maximum break time (ms) at: 4 I <sub>Δn</sub> (+/-):                            | D7 -                    | N/A             |
|          | - maximum break time (ms) at: 0,5 A rms (+/-):                                    | D7 -                    | N/A             |
|          | - maximum break time (ms) at: 350 A rms (+/-):                                    | D7 -                    | N/A             |
|          | RCCBs with I <sub>Δn</sub> = A:   |                         |                 |
|          | - maximum break time (ms) at: 1,4 I <sub>Δn</sub> (+/-):                          | D7 -                    | N/A             |
|          | - maximum break time (ms) at: 2,8 l <sub>Δn</sub> (+/-):                          | D7 -                    | N/A             |
|          | - maximum break time (ms) at: 0,35 A rms (+/-) .:                                 | D7 -                    | N/A             |
|          | - maximum break time (ms) at: 350 A rms (+/-):                                    | D7 -                    | N/A             |
|          | RCCBs with $I_{\Delta n} > 0.03$ A:   |                         |                 |
|          | - maximum break time (ms) at: 1,4 l <sub>Δn</sub> (+/-):                          | D7 -                    | N/A             |
|          | - maximum break time (ms) at: 2,8 l <sub>3n</sub> (+/-):                          | D7 -                    | N/A             |
|          | - maximum break time (ms) at: 7 I <sub>An</sub> (+/-)                             | D7 -                    | N/A             |
|          | - maximum break time (ms) at: 350 A rms (+/-):                                    |                         | N/A             |
|          | No value exceeds the relevant specified limiting                                  |                         | N/A             |
|          | value   |                         |                 |
| 9.21.1.3 | Verification of the correct operation with the pole under test and one other pole |                         |                 |
|          | loaded with rated current   |                         |                 |
|          | - test current (A): In  | A                       |                 |
|          | - steady increase from zero to: 1,4 l <sub>30</sub> for                           |                         | N/A             |
|          | I <sub>Δn</sub> > 0,01 A with 1,4 I <sub>Δn</sub> /30 A/s (mA)                    | IΔn= mA                 |                 |
|          | - steady increase from zero to: 2 l <sub>∆n</sub> for l <sub>∆n</sub> ≤ 0,01 A    |                         | N/A             |
|          | with 2 J <sub>M</sub> /30 A/s (mA)  |                         |                 |
| _        | - angle α = 0° (+/-)  | D7 -                    | N/A             |
|          | - angle α = 90° (+/-)   | D7 -                    | N/A             |

| IEC 61008-1 |   |                                 |         |  |
|-------------|---|---------------------------------|---------|--|
| Clause      | Requirement + Test  | Result - Remark                 | Verdict |  |
|             |   |                                 |         |  |
|             | - angle α = 135° (+/-):   | D7 -                            | N/A     |  |
|             | No value exceeds the relevant specified limiting  |                                 | N/A     |  |
|             | values  |                                 | -11444  |  |
| 9.21.1.4    | Verification of the correct operation in case of residu                                 | al pulsating d.c. currents with |         |  |
|             | angle $\alpha = 0^{\circ}$ superimposed by smooth direct current                        | of 0,006 A:                     |         |  |
|             | - steady increase of pulsating d.c. current from zero                                   |                                 | N/A     |  |
|             | to: 1,4 $I_{\Delta n}$ for $I_{\Delta n} > 0,01$ A with 1,4 $I_{\Delta n}$ /30 A/s (mA) | I∆n= mA                         |         |  |
|             | - steady increase of pulsating d.c. current from zero                                   |                                 | N/A     |  |
|             | to: $2 I_{\Delta n}$ for $I_{\Delta n} \le 0.01$ A with $2 I_{\Delta n} / 30$ A/s (mA)  |                                 |         |  |
|             | - angle α = 0° (+/-) (+/- 6 mA):  | D7 -                            | N/A     |  |
|             | No value exceeds the relevant specified limiting  |                                 | N/A     |  |
|             | values  |                                 |         |  |
| 9.11.2.3    | Verification of the rated residual making and   | 630A                            | -       |  |
|             | breaking capacity (A): I <sub>\u00e4m</sub>   | _                               |         |  |
|             | Test circuit according to figure:   | 7                               | _       |  |
|             | Point of test circuit which is directly earthed:  | Neutral of power supply         |         |  |
|             | Grid distance "a" (mm)  | 35mm                            | _       |  |
|             | Prospective current (A)   | 630A                            |         |  |
|             | Prospective current obtained (A)  | 632A                            |         |  |
|             | Power factor  | 0,93-0,98                       |         |  |
|             | Power factor obtained   | 0,97                            | 1000    |  |
|             | Point of initiation: 45° ± 5°   | 45                              | Р       |  |
|             | Test sequence: O-t-CO-t-CO on each pole in turn   | O-t-CO-t-CO                     | Р       |  |
|             | excluding the switched neutral pole   |                                 |         |  |
|             | During tests no endangering of operator, no   |                                 | Р       |  |
|             | permanent arcing, no flashover and no melting of  |                                 |         |  |
|             | fuse F  |                                 |         |  |
|             | After the tests no damage impairing further use   |                                 | Р       |  |
| 9.7.7.3     | The leakage current flowing across the open   | D7 - 7,32×10 <sup>-3</sup>      | Р       |  |
|             | contacts is measured at 1,1 Un and shall not  |                                 |         |  |
|             | exceed 2mA (mA)   |                                 |         |  |
| 9.7.3       | Dielectric strength test of the main circuit at test volta                              | age 2 Un for 1 min:             |         |  |
|             | a):   | D7 - OK                         | Р       |  |

| Report No.: | 130700023SHA-001 |
|-------------|------------------|
|             |                  |

|         | IEC 61008-1  |                                 | 1       |
|---------|--|---------------------------------|---------|
| Clause  | Requirement + Test   | Result - Remark                 | Verdict |
| _       |  | D7 - OK                         | P       |
|         | b)   | D7 - OK                         |         |
|         | c)   |                                 | P       |
|         | d)   | D7 -                            | N/A     |
|         | e)   | D7 -                            | N/A     |
|         | No flashover or breakdown  | D7 - OK                         | P       |
|         | Making and breaking In at Un   | D7 - OK                         | Р       |
|         | The RCCB shall trip with a test current of 1,25 $I_{\Delta n}$       | D7 - 37ms                       | Р       |
|         | (ms) <u></u>   |                                 |         |
|         | The polyethylene sheet shows no holes                                |                                 | Р       |
| 9.17    | Verification of the behaviour of RCCBs opening auto the line voltage | matically in case of failure of |         |
| 9.17.1  | Limiting value of the line voltage (Ux):                             |                                 |         |
| 0.,,,,  | - rated voltage applied to the line terminals and                    | D7 -                            | N/A     |
|         | progressively lowered to attain zero within about                    |                                 | 1477    |
|         | 30 s until automatic opening occurs; voltage (V) .:                  |                                 |         |
|         | - all values less than 0,85 times the rated voltage                  | D7 -                            | N/A     |
|         | (V)  |                                 |         |
|         | - tripping test at test voltage (V) with I <sub>Δn</sub> and         | D7 -                            | N/A     |
|         | operating according to Table 1 (ms)                                  |                                 |         |
|         | No value exceeds the specified limiting values                       |                                 | N/A     |
|         | Not possible to close the apparatus by manual                        | D7 -                            | N/A     |
|         | operating means below Ux:  |                                 |         |
| 9.17.2  | Verification of behaviour in case of failure of the line             | voltage                         | N/A     |
| 0.11.2  | RCCB supplied with rated voltage, and the line                       | Tollago                         | N/A     |
|         | voltage then switched off  |                                 | 1477    |
|         | Time (ms) interval between switching off and                         | D7 -                            | N/A     |
|         | opening of the main contacts   |                                 | 14// (  |
|         | a) RCCBs opening without delay: no value exceeds                     |                                 | N/A     |
|         | 0,5 s  |                                 | 14// (  |
|         | b) RCCBs opening with delay: max. and min.                           | _                               | N/A     |
|         | values within the range indicated by the                             |                                 | 19//3   |
|         | manufacturer   |                                 |         |
| 9.17.3  | Verification of the correct operation, in presence of a              | residual current for DCCPa      |         |
| ə. 17.3 |  |                                 |         |
|         | opening with delay in case of failure of the line voltage            | Ac                              |         |

Report No.:130700023SHA-001

|         | IEC 61008-1   | _                           |              |
|---------|---|-----------------------------|--------------|
| Clause  | Requirement + Test  | Result - Remark             | Verdict      |
|         |   |                             |              |
|         | RCCB connected according to fig. 4 at the rated                                     |                             | N/A          |
|         | voltage (Un)  |                             |              |
|         | All phases but one switched off by means of S3                                      |                             | N/A          |
|         | During the delay: test of 9.9.2:  |                             |              |
| 9.9.2.1 | - steady increase from 0,2 I <sub>Δn</sub> to I <sub>Δn</sub> within 30 s (mA)      | D7 -                        | N/A          |
|         | :   |                             |              |
|         | - tripping current between I <sub>Δno</sub> and I <sub>Δn</sub> (mA):               | D7 -                        | N/A          |
|         | The RCCB closes on I <sub>An</sub> : no value exceeds the                           | D7 -                        | N/A          |
|         | specified limiting value of Table 1 (ms)  |                             |              |
| 9.9.2.3 | The test circuit being successively calibrated at each                              | of the values of residual   | 100000       |
|         | current   |                             | - Hillian    |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                             |              |
|         | the test voltage is suddenly established by closing th                              | e test switch S1            | Desir Market |
|         | - maximum break time (ms) at: I <sub>.\text{in}</sub>                               | D7 -                        | N/A          |
|         | - maximum break time (ms) at: 2 l <sub>An</sub>                                     | D7 -                        | N/A          |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub>                                     | D7 -                        | N/A          |
|         | - maximum break time (ms) at: 0,25 A (if  | D7 -                        | N/A          |
|         | applicable)   |                             |              |
|         | - maximum break time (ms) at: 500 A   | D7 -                        | N/A          |
|         | No value exceeds the relevant specified limiting                                    |                             | N/A          |
|         | value   |                             |              |
|         | Additional test for type S:   |                             |              |
|         | - minimum non actuating time (ms) at: 1 <sub>.m</sub> ; 0,13 s :                    | D7 -                        | N/A          |
|         | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s                    | D7 -                        | N/A          |
|         |   |                             |              |
|         | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s                    | D7 -                        | N/A          |
|         |   |                             |              |
|         | - minimum non actuating time (ms) at: 500 A;  | D7 -                        | N/A          |
|         | 0,04_s:   |                             |              |
|         | No tripping during tests  |                             | N/A          |
| 9.17.4  | Verification of the correct operation of RCCBs with 3                               | or 4 current paths, neutral | -42 13       |
|         | and one line terminal only being energized in turn:                                 |                             | SARLE        |
|         | RCCB connected according to fig. 4  |                             | N/A          |

| Report No.:130700023SHA-0 |
|---------------------------|
|---------------------------|

| Clause  | Requirement + Test   | Result - Remark                 | Verdict |
|---------|--|---------------------------------|---------|
|         |  |                                 |         |
| 9.9.2.3 | The test circuit being successively calibrated at each                   | of the values of residual       |         |
|         | current  |                                 |         |
|         | specified in Table 1, the test switch S2 and the RCCI                    | 3 being in the closed position, |         |
|         | the test voltage is suddenly established by closing the test switch S1   |                                 | SA MEN  |
|         | - maximum break time (ms) at: I <sub>Δn</sub>                            | D7 -                            | N/A     |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub>                          | D7 -                            | N/A     |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub>                          | D7 -                            | Ŋ/A     |
|         | - maximum break time (ms) at: 0,25 A (if                                 | D7 -                            | N/A     |
|         | applicable)  |                                 |         |
|         | - maximum break time (ms) at: 500 A                                      | D7 -                            | N/A     |
|         | No value exceeds the relevant specified limiting                         |                                 | N/A     |
|         | value  |                                 |         |
|         | Additional test for type S:  |                                 | Table A |
|         | - minimum non actuating time (ms) at: I <sub>Δn;</sub> 0,13 s :          | D7                              | N/A     |
|         | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s         | D7 -                            | N/A     |
|         |  |                                 |         |
|         | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s         | D7 -                            | N/A     |
|         | - minimum non actuating time (ms) at: 500 A;                             | D7 -                            | N/A     |
|         | 0,04 s   | _                               |         |
|         | No tripping during tests   |                                 | N/A     |
| 9.17.5  | Verification of the reclosing function of automatically r consideration) | eclosing RCCBs (under           |         |
| 8.11    | Test device  |                                 |         |
|         | RCCBs shall be provided with a test device                               |                                 | Р       |
|         | Ampere-turns produced when operating the test                            | Ampere-turns produced by        | Р       |
|         | device do not exceed 2,5 times the ampere-turns                          | test device: 93,4               |         |
|         | produced by I <sub>Δn</sub>  | milliampere-turns               |         |
|         |  | 2,5 times the Ampere-turns      |         |
|         |  | produced by I∆n: 150            |         |
|         |  | milliampere-turns               |         |
|         | Not possible to energize the circuit on the load side                    |                                 | P       |
|         | by operating the test device when the RCCB is in                         |                                 |         |
|         | the open position  |                                 |         |

|        |                    | IEC 61008-1     |         |
|--------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
|        |                    |                 |         |

| 9.16     | Verification of the operation of the test device at the  | limits of rated voltage:   |        |  |  |  |  |
|----------|--|----------------------------|--------|--|--|--|--|
|          | a) RCCB at 0,85 times the rated voltage, test            | D7 - OK                    | Р      |  |  |  |  |
|          | device actuated 25 times at intervals of 5 s             |                            |        |  |  |  |  |
|          | b) test a) repeated at 1,1 times the rated voltage:      | D7 - OK                    | Р      |  |  |  |  |
|          | c) test b) repeated, but only once, the operating        | D7 - OK                    | Р      |  |  |  |  |
|          | means of the test device being held in the closed        |                            |        |  |  |  |  |
|          | position for 30 s:                                       |                            |        |  |  |  |  |
|          | RCCB operated at each test:                              | D7 - operated              | Р      |  |  |  |  |
|          | No change impairing further use:                         | D7 - OK                    | Р      |  |  |  |  |
| 8.8      | Resistance to mechanical shock and impact                |                            |        |  |  |  |  |
|          | RCCBs shall have adequate mechanical behaviour           |                            | Р      |  |  |  |  |
|          | so as to withstand the stresses imposed during           |                            |        |  |  |  |  |
|          | installation and use                                     |                            |        |  |  |  |  |
|          | Mechanical shock   |                            |        |  |  |  |  |
|          | Mechanical shock: 50 falls of 40 mm on one side;         |                            | Р      |  |  |  |  |
|          | 50 falls on opposite side C turned through 90°;          |                            |        |  |  |  |  |
|          | 50 falls on one side; 50 falls on opposite side          |                            |        |  |  |  |  |
|          | No opening of RCCB during the test                       | D7 - OK                    | Р      |  |  |  |  |
| 9.12.2   | Mechanical impact  |                            |        |  |  |  |  |
| 9.12.2.1 | Impact test (10 blows, height 10 cm): no damage :        | D7 - OK                    | Р      |  |  |  |  |
| 9.12.2.2 | RCCBs for rail mounting downward vertical force of       |                            | Р      |  |  |  |  |
|          | 50 N for 1 min, upward vertical force of 50 N for        |                            |        |  |  |  |  |
|          | 1 min  |                            |        |  |  |  |  |
|          | RCCB shall not become loose during test and no           | D7 - OK                    | Р      |  |  |  |  |
|          | damage impairing its further use                         |                            |        |  |  |  |  |
| 9.12.2.3 | RCCBs of plug-in type (under consideration)              |                            | N/A    |  |  |  |  |
| 8.13     | Behaviour of RCCBs in case of overcurrents in the n      | nain circuit               | Linkal |  |  |  |  |
|          | RCCBs shall not operate under specified conditions       |                            | Р      |  |  |  |  |
|          | of overcurrent   |                            |        |  |  |  |  |
| 9.18.1   | Verification of the limiting value of overcurrent in cas | e of a load through a RCCB |        |  |  |  |  |
|          | with two poles   |                            |        |  |  |  |  |
|          | RCCB connected as for normal use with a load             | 378A 1s                    | Р      |  |  |  |  |
|          | equal to (A): 6 In switched on using a two-pole test     |                            |        |  |  |  |  |
|          | switch for 1 s   |                            |        |  |  |  |  |

| Page  | 64      | of | 179  |
|-------|---------|----|------|
| 1 age | $\circ$ | 01 | ,, , |

|        | IEC 61008-1  |         |     |  |  |  |  |  |
|--------|--|---------|-----|--|--|--|--|--|
| Clause | Requirement + Test Result - Remark   |         |     |  |  |  |  |  |
|        |  |         |     |  |  |  |  |  |
|        | Test repeated three times with an interval of at                                 | D7 - OK | Р   |  |  |  |  |  |
|        | least 1 min  | _       |     |  |  |  |  |  |
|        | The RCCB shall not open  | D7 - OK | Р   |  |  |  |  |  |
|        | RCCBs functionally dependent on the line voltage                                 |         | Р   |  |  |  |  |  |
|        | at rated voltage (Un)  |         |     |  |  |  |  |  |
| 9.18.2 | Verification of the limiting value of overcurrent in case of a single phase load |         |     |  |  |  |  |  |
|        | through a three-pole or four-pole RCCB   |         |     |  |  |  |  |  |
|        | RCCB connected according to fig. 22  |         | N/A |  |  |  |  |  |
|        | Test current (A): 6 In closed by S1 for 1 s:                                     |         |     |  |  |  |  |  |
|        | Test repeated three times for each possible                                      | D7 -    | N/A |  |  |  |  |  |
|        | combination of current paths with an interval of at                              |         |     |  |  |  |  |  |
|        | least 1 min  |         |     |  |  |  |  |  |
|        | The RCCB shall not open  | D7 -    | N/A |  |  |  |  |  |
|        | RCCBs functionally dependent on the line voltage                                 |         | N/A |  |  |  |  |  |

| e march | TEST SEQUENCE D (1 sample: ln= 63A, IΔn= 0,1A, type AC)   |                  |            |                 |   |                   |                                  | D01  |      |            |   |
|---------|---|------------------|------------|-----------------|---|-------------------|----------------------------------|------|------|------------|---|
|         | Tests "I  | D <b>0</b> "     |            | l or one        | Tarica da   |                   |                                  |      |      |            | Р |
| 8.5     | Operatir  | ng chara         | cteristics | <u> </u>        |   |                   |                                  |      |      |            |   |
|         | For multiple settings of I <sub>Δn</sub> tests are made for each setting  |                  |            |                 |   |                   |                                  |      |      |            |   |
| 9.9.1   | RCCB installed as for normal use, test circuit  according to fig. 4  Test on 50 and 60Hz                                      |                  |            |                 |   |                   |                                  |      | P    |            |   |
| 9.9.5   | For RCCBs functionally dependent on line voltage, each test is made at 1,1 and 0,85 times the rated line voltage; voltage (V) |                  |            |                 |   |                   |                                  |      |      |            | P |
|         | Туре  | I <sub>N</sub> A | ΙΔΝ Α      |                 | Standard values of break time and non-actuating time at a residual current equal to |                   |                                  |      |      |            |   |
|         |   |                  |            | l <sub>ΔN</sub> | 2 IAN   | 5 I <sub>ΔN</sub> | 5 l <sub>sN</sub> or<br>0,25A a) |      | 500A |            |   |
|         | General   | Any<br>value     | <0,03      | 0,3             | 0,15  |                   | 0,04                             | 0,04 | 0,04 | Max. break |   |
|         |   |                  | 0,03       | 0,3             | 0,15  |                   | 0,04                             | 0,04 | 0,04 | - unics    |   |
|         |   |                  | >0,03      | 0,3             | 0,15  | 0,04              |                                  | 0,04 | 0,04 |            |   |

at rated voltage

|         |   |            |                       |                       | IEC 6                  | 1008-1            |          |                 |             |          |                                 |         |
|---------|---|------------|-----------------------|-----------------------|------------------------|-------------------|----------|-----------------|-------------|----------|---------------------------------|---------|
| Clause  | Require   | ment + -   | Test                  |                       | _                      |                   |          | Res             | sult - Rei  | mark     |                                 | Verdict |
|         |   |            |                       |                       |                        |                   |          |                 |             |          |                                 |         |
|         | S   | ≥ 25       | >0,03                 | 0,5                   | 0,2                    | 0,15              |          |                 | 0,15        | 0,15     | Max. break<br>times             |         |
|         |   |            |                       | 0,13                  | 0,06                   | 0,05              |          | _               | 0,04        | 0,04     | Min. non-<br>actuating<br>times | 70      |
|         | a) value  | to be de   | cided by t            | he manı               | ıfacturer t            | or this te        | st       |                 |             |          |                                 |         |
|         |   |            | nly made<br>on as me  |                       |                        | of the            |          |                 |             |          |                                 |         |
| 9.9.2   | Off-load  | tests_m    | ade at a              | tempera               | ature of               | 20 ± <u>2 °</u> C | 2        | 21°             | С           |          |                                 | Р       |
| 9.9.2.1 | Verificat   | tion of th | e correc              | t operat              | ion in ca              | se of a s         | tea      | dy in           | crease r    | esidual  | current:                        |         |
|         |   |            | e from 0              |                       |                        |                   |          | JΔn             | =100mA      | ı        |                                 | Р       |
|         | - tripping  | g curren   | t betwee              | n l <sub>∆no</sub> an | id l <sub>∆n</sub> (m/ | ٩)                | <u>:</u> | D01             | 1 - 78,6    | - 79,1m  | ıA                              | Р       |
| 9.9.2.2 | Verificat   | tion of th | e correc              | t operat              | ion at clo             | sing on           | res      | idual           | current     |          |                                 |         |
|         | - the RC  | CB clos    | es on l               | : no val              | ue exce                | eds the           |          |                 |             |          |                                 | Р       |
|         | specifie  | d limiting | y value o             | f Table               | 1 (ms)                 |                   | :        | D01             | 1 - 26 - 3  | 7ms      |                                 | 1992    |
| 9.9.2.3 | The test circuit being successively calibrated at each of the values of residual current specified in Table 1, the test switch S2 and the RCCB being in the closed position, the test voltage is suddenly established by closing the test switch S1 |            |                       |                       |                        |                   |          |                 |             |          |                                 |         |
|         |   |            | ak time (ı            |                       |                        |                   |          | T               | 1 - 35ms    |          |                                 | Р       |
|         |   |            | ak time (ı            |                       |                        |                   |          | D0 <sup>2</sup> | 1 - 30ms    | ;        |                                 | P       |
|         |   |            | ak time (ı            |                       |                        |                   |          | D0              | 1 -         |          |                                 | N/A     |
|         | - maxim   | ium brea   | ak time (ı            | ns) at: (             | 0,25 A (it             | :                 |          | D0              | 1 - 24ms    |          |                                 | P       |
|         | - maxim   | num brea   | ak time (ı            | ms) at: 5             | 500 <u>A</u>           |                   | :        | D0.             | 1 - 11ms    | <b>3</b> |                                 | Р       |
|         | No valu   | e excee    | ds the re             | levant s              | pecified               | limiting          |          |                 |             |          |                                 | Р       |
| 9.9.2.4 |   |            | e correct             | •                     |                        |                   | dde      | n ap            | pearanc     | e of res | idual                           | THE Z   |
|         | The tes   | t switch   |                       | he RCC                | B being                | in the clo        |          |                 | sition, the | e residu | al current                      |         |
|         |   | num brea   | ak time (             |                       |                        |                   |          |                 | 1 - 21ms    | 3        |                                 | Р       |
|         | - maxim   | num brea   | ak time (1<br>I 200A) | •                     | 200A (va               | lue 2             |          | D0              | 1 - 13ms    | 3        | _                               | Р       |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|       | No value exceeds the relevant specified limiting  |            | Р        |  |  |  |  |  |
|-------|---|------------|----------|--|--|--|--|--|
|       | value   |            |          |  |  |  |  |  |
|       | Additional test for type S:   |            | 24 7.16  |  |  |  |  |  |
|       | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :  | D01 -      | N/A      |  |  |  |  |  |
|       | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s  | D01 -      | N/A      |  |  |  |  |  |
|       | - minimum non actuating time (ms) at: 5 I <sub>Δn</sub> ; 0,05 s  | D01 -      | N/A      |  |  |  |  |  |
|       | - minimum non actuating time (ms) at: 500 A; 0,04 s   | D01 -      | N/A      |  |  |  |  |  |
|       | No tripping during tests  | _          | N/A      |  |  |  |  |  |
| 9.9.4 | a) Tests repeated at a temperature of -5 °C:  | ,          |          |  |  |  |  |  |
|       | The test circuit being successively calibrated at each current  |            | Р        |  |  |  |  |  |
|       | specified in Table 1, the test switch S2 and the RCCB being in the closed position the test voltage is suddenly established by closing the test switch S1 |            |          |  |  |  |  |  |
|       | - maximum break time (ms) at: I <sub>Δn</sub>   |            |          |  |  |  |  |  |
|       | - maximum break time (ms) at: 2 l <sub>Δn</sub> :   | D01 - 34ms | P<br>P   |  |  |  |  |  |
|       | - maximum break time (ms) at: 5 l <sub>Δn</sub>   | D01 -      | N/A      |  |  |  |  |  |
|       | - maximum break time (ms) at: 0,25 A (if  | D01 - 31ms | Р        |  |  |  |  |  |
|       | applicable)   | D04 40     | <u> </u> |  |  |  |  |  |
|       | - maximum break time (ms) at: 500 A:  | D01 - 12ms | P _      |  |  |  |  |  |
|       | No value exceeds the relevant specified limiting  |            |          |  |  |  |  |  |
|       | Additional test for type S:   |            | 121 32   |  |  |  |  |  |
|       | - minimum non actuating time (ms) at: I <sub>Δn</sub> : 0,13 s :  | D01 -      | N/A      |  |  |  |  |  |
|       | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s  | D01 -      | N/A      |  |  |  |  |  |
|       | - minimum non actuating time (ms) at: 5 I <sub>An</sub> ; 0,05 s  | D01 -      | N/A      |  |  |  |  |  |
|       | - minimum non actuating time (ms) at: 500 A; 0,04 s   | D01 -      | N/A      |  |  |  |  |  |
|       | No tripping during the tests  |            | N/A      |  |  |  |  |  |
| 9,9.3 | Tests repeated with the RCCB loaded with rated curr   | rent:      |          |  |  |  |  |  |

|        |                    | Page 67 of 179 | Report No.:130700 | 023SHA-001 |
|--------|--------------------|----------------|-------------------|------------|
|        |                    | IEC 61008-1    |                   |            |
| Clause | Requirement + Test |                | Result - Remark   | Verdict    |

|       | - test current (A): In, until steady state conditions   |                         | _      |  |  |  |  |  |
|-------|---|-------------------------|--------|--|--|--|--|--|
|       | are reached:  | 63A                     | 430033 |  |  |  |  |  |
|       | - cross-sectional area (mm²):   | 25mm²                   | _      |  |  |  |  |  |
|       | - the RCCB closes on I <sub>Δn</sub> : no value exceeds the specified limiting value of Table 1 (ms): | D01 - 26- 37ms          | Р      |  |  |  |  |  |
|       | The switch S1 and the RCCB are in closed position. established by closing S2:                         | The residual current is |        |  |  |  |  |  |
|       | - maximum break time (ms) at: I <sub>Δn</sub> :   | D01 - 37ms              | Р      |  |  |  |  |  |
|       | - maximum break time (ms) at: 2 I <sub>Δn</sub> :   | D01 - 30ms              | Р      |  |  |  |  |  |
|       | - maximum break time (ms) at: 5 lan:  | D01 -                   | N/A    |  |  |  |  |  |
|       | - maximum break time (ms) at: 0,25 A (if applicable)  | D01 - 26ms              | Р      |  |  |  |  |  |
|       | - maximum break time (ms) at: 500 A:  | D01 - 11ms              | Р      |  |  |  |  |  |
|       | No value exceeds the relevant specified limiting  |                         | Р      |  |  |  |  |  |
|       | value   |                         |        |  |  |  |  |  |
|       | Additional test for type S:   |                         |        |  |  |  |  |  |
|       | - minimum non actuating time (ms) at: Ι <sub>Δη</sub> ; 0,13 s :                                      | D01 -                   | N/A    |  |  |  |  |  |
|       | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s                                      | D01 -                   | N/A    |  |  |  |  |  |
|       | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s                                      | D01 -                   | N/A    |  |  |  |  |  |
|       | - minimum non actuating time (ms) at: 500 A; 0,04 s   | D01 -                   | N/A    |  |  |  |  |  |
|       | No tripping during the tests  |                         | N/A    |  |  |  |  |  |
| 9.9.4 | b) Tests repeated with the RCCB loaded with rated of  | current:                |        |  |  |  |  |  |
| 0.0.4 | - test current (A): In at a temperature of +40 °C:  |                         |        |  |  |  |  |  |
|       | until steady state conditions are reached:  | 63A                     |        |  |  |  |  |  |
|       | - cross-sectional area (mm²):   | 16mm²                   |        |  |  |  |  |  |
|       | The test circuit being successively calibrated at each  | '                       | Р      |  |  |  |  |  |
|       | current   |                         |        |  |  |  |  |  |
|       | specified in Table 1, the test switch S2 and the RCCB being in the closed position,                   |                         |        |  |  |  |  |  |
|       | the test voltage is suddenly established by closing the   |                         |        |  |  |  |  |  |
|       | - maximum break time (ms) at: I <sub>Δn</sub>   | D01 - 34ms              | Р      |  |  |  |  |  |
|       | - maximum break time (ms) at: 2 lan:  | D01 - 29ms              | Р      |  |  |  |  |  |

|        | IEC 61008-1  |                 |         |
|--------|--|-----------------|---------|
| Clause | Requirement + Test   | Result - Remark | Verdict |
|        | -  | T               |         |
|        | - maximum break time (ms) at: 5 l <sub>Δn</sub> :                | D01 -           | N/A     |
|        | - maximum break time (ms) at: 0,25 A (if                         | D01 - 26ms      | P       |
|        | applicable)  |                 |         |
|        | - maximum break time (ms) at: 500 A:                             | D01 - 11ms      | Р       |
|        | No value exceeds the relevant specified limiting                 |                 | Р       |
|        | value  |                 |         |
|        | Additional test for type S:                                      |                 |         |
|        | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s : | D01 -           | N/A     |
|        | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> for      | D01 -           | N/A     |
|        | 0,06 s:  |                 |         |
|        | - minimum non actuating time (ms) at: 5 I <sub>Δn</sub> ; 0,05 s | D01 -           | N/A     |
|        | :  |                 |         |
|        | - minimum non actuating time (ms) at: 500 A; 0,04 s              | D01 -           | N/A     |
|        |  |                 |         |
|        | No tripping during the tests                                     |                 | N/A     |

|          | TEST SEQUENCE D D02 (1 sample: In= 63A, IΔn= 0,3A, type AC)  |                  |                   |                 |   |       |                                 |      |            |            | Р |  |
|----------|--|------------------|-------------------|-----------------|---|-------|---------------------------------|------|------------|------------|---|--|
| 10000000 | Tests "I   | D0"              |                   |                 |   |       |                                 |      | mad Tree C | i i        | Р |  |
| 8.5      | Operatir   | g chara          | cteristics        | s               |   |       | 75,60                           |      |            |            |   |  |
|          | For multiple settings of $I_{\Delta n}$ tests are made for each setting  |                  |                   |                 |   |       |                                 |      |            |            |   |  |
| 9.9.1    | RCCB installed as for normal use, test circuit  according to fig. 4  Test on 50 and 60Hz                                       |                  |                   |                 |   |       |                                 |      |            | Р          |   |  |
| 9.9.5    | For RCCBs functionally dependent on line voltage, each test is made at 1,1 and 0,85 times the rated line voltage; voltage (V): |                  |                   |                 |   |       |                                 |      |            |            |   |  |
|          | Туре   | I <sub>N</sub> A | I <sub>ΔN</sub> A |                 | Standard values of break time and non-actuating time at a residual current equal to |       |                                 |      |            |            |   |  |
|          |  |                  |                   | I <sub>AN</sub> | 2 I <sub>ΔN</sub>   | 5 Ian | 5 I <sub>an</sub> or<br>0,25A a |      | 500A       |            |   |  |
|          | General  | Any<br>value     | <0,03             | 0,3             | 0,15  |       | 0,04                            | 0,04 | 0,04       | Max. break |   |  |
|          |  |                  | 0,03              | 0,3             | 0,15  |       | 0,04                            | 0,04 | 0,04       | UIIIOS     |   |  |
|          |  |                  | >0,03             | 0,3             | 0,15  | 0,04  |                                 | 0,04 | 0,04       |            |   |  |

Report No.:130700023SHA-001

|         |   |   |            |                | IEC 6             | 1008-1      |          |                       |            |            |                                 |         |
|---------|---|---|------------|----------------|-------------------|-------------|----------|-----------------------|------------|------------|---------------------------------|---------|
| Clause  | Require   | ment + 1  | Гest       | -11 -3:-316    | -72               |             |          | Res                   | sult - Rer | mark       |                                 | Verdict |
|         |   |   |            |                | 10                |             |          |                       |            |            |                                 |         |
|         | S   | ≥ 25  | >0,03      | 0,5            | 0,2               | 0,15        |          |                       | 0,15       | 0,15       | Max. break<br>times             |         |
|         |   |   |            | 0,13           | 0,06              | 0,05        |          |                       | 0,04       | 0,04       | Min. non-<br>actuating<br>times |         |
|         | a) value  | to be ded   | cided by t | the manu       | ıfacturer t       | for this te | st       |                       |            |            |                                 |         |
|         |   | est are or<br>ct operati  |            |                |                   |             |          |                       |            |            |                                 |         |
| 9.9.2   | Off-load  | tests m   | ade at a   | tempera        | ature of :        | 20 ± 2 °C   | <u> </u> | 21%                   | С          |            |                                 | P       |
| 9.9.2.1 | Verificat   | ion of th   | e correc   | t operati      | ion in ca         | se of a s   | tea      | dy in                 | crease r   | esidual o  | current:                        |         |
|         | - steady  |   |            |                |                   | ,           | ,        | <br>  <sub>Δη</sub> = | 300mA      |            |                                 | Р       |
|         |   | - tripping current between I <sub>Δno</sub> and I <sub>Δn</sub> (mA): D02 - 231 - 234mA |            |                |                   |             |          |                       |            |            |                                 | Р       |
| 9.9.2.2 | Verification of the correct operation at closing on residual current  |   |            |                |                   |             |          |                       |            |            |                                 |         |
|         | - the RC  | CB clos   | es on l∆r  | no vali        | ue excee          | eds the     |          |                       | 2 - 27 - 3 | 6ms        |                                 | Р       |
|         | specified   | d limiting  | value o    | f Table        | 1 (ms)            |             | :        |                       |            |            |                                 |         |
| 9.9.2.3 | The test circuit being successively calibrated at each of the values of residual current specified in Table 1, the test switch S2 and the RCCB being in the closed position, the test voltage is suddenly established by closing the test switch S1 |   |            |                |                   |             |          |                       |            |            |                                 |         |
|         | - maximum break time (ms) at: I <sub>Δn</sub> D02 - 35ms  |   |            |                |                   |             |          |                       |            | Р          |                                 |         |
|         | - maxim   | um brea   | ık time (ı | ms) at: 2      | 2 l <sub>∆n</sub> |             | :        | D02                   | 2 - 28ms   |            |                                 | Р       |
|         | - maxim   | um brea   | ık time (ı | ms) at: 5      | 5 l <sub>∆n</sub> |             | :        | D02                   | 2 -        |            |                                 | N/A     |
|         | - maxim   |   | ,          | •              | •                 |             |          | D02                   | 2 - 26ms   |            |                                 | Р       |
|         |   | - maximum break time (ms) at: 500 A   |            |                |                   |             |          |                       | 2 - 11ms   | Р          |                                 |         |
|         | No value exceeds the relevant specified limiting  |   |            |                |                   |             |          |                       |            | Р          |                                 |         |
|         | value   |   |            | '              |                   |             |          |                       |            |            |                                 |         |
| 9.9.2.4 | Verificat   | ion of th   | e correc   | t operati      | ion in ca         | se of su    | dde      | n app                 | pearance   | e of resid | dual                            |         |
|         | current o   | of values   | betwee     | n 5 l∆n        | and 500           | A :         |          |                       |            |            |                                 |         |
|         | The test switch S1 and the RCCB being in the closed position, the residual current  |   |            |                |                   |             |          |                       |            | al current | and the                         |         |
|         | is sudde  | nly esta  | blished b  | oy closin      | g the te          | st switch   | S2       |                       |            |            |                                 |         |
|         | - maxim   | um brea   | k time (ı  | ns) at: 5      | SA (value         | e 1 betwe   | en       | D02                   | 2 - 22ms   |            |                                 | P       |
|         | 5A and 2  | 200A)   | :          |                |                   |             |          |                       |            |            |                                 |         |
|         | - maxim   |   | ·          | ms) at: 2<br>: | 200A (va          | lue 2       |          | D02                   | 2 - 14ms   |            |                                 | Р       |
|         | <u> </u>  |   |            |                |                   |             |          |                       |            |            |                                 |         |

|        |                    | Page 70 of 179 | Report No.:130700 | 023SHA-001 |
|--------|--------------------|----------------|-------------------|------------|
|        |                    | IEC 61008-1    |                   |            |
| Clause | Requirement + Test |                | Result - Remark   | Verdict    |

|       | No value exceeds the relevant specified limiting value   |                                 | Р    |  |  |  |  |
|-------|--|---------------------------------|------|--|--|--|--|
|       | Additional test for type S:  | <del>-</del>                    |      |  |  |  |  |
|       | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :   | D02 -                           | N/A  |  |  |  |  |
|       | - minimum non actuating time (ms) at: 2 I <sub>Δni</sub> , 0,06 s  | D02 -                           | N/A  |  |  |  |  |
|       | - minimum non actuating time (ms) at: 5 I <sub>An</sub> ; 0,05 s   | D02 -                           | N/A  |  |  |  |  |
|       | - minimum non actuating time (ms) at: 500 A; 0,04 s  | D02 -                           | N/A  |  |  |  |  |
|       | No tripping during tests   |                                 | N/A  |  |  |  |  |
| 9.9.4 | a) Tests repeated at a temperature of -5 °C:   |                                 | IN/A |  |  |  |  |
|       | The test circuit being successively calibrated at each current specified in Table 1, the test switch S2 and the RCCE the test voltage is suddenly established by closing the | B being in the closed position, | Р    |  |  |  |  |
|       | - maximum break time (ms) at: I <sub>Δn</sub>  |                                 |      |  |  |  |  |
|       | - maximum break time (ms) at: 2 l <sub>an</sub> : D02 - 35ms   |                                 |      |  |  |  |  |
|       | - maximum break time (ms) at: 5 I <sub>Δn</sub> D02 -  |                                 |      |  |  |  |  |
|       | - maximum break time (ms) at: 0,25 A (if D02 - 30ms applicable)  |                                 |      |  |  |  |  |
|       | - maximum break time (ms) at: 500 A D02 - 11ms   |                                 |      |  |  |  |  |
|       | No value exceeds the relevant specified limiting value   |                                 |      |  |  |  |  |
|       | Additional test for type S:  |                                 |      |  |  |  |  |
|       | - minimum non actuating time (ms) at: l₄n: 0,13 s : D02 -  |                                 |      |  |  |  |  |
|       | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s   | D02 -                           | N/A  |  |  |  |  |
|       | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s   | D02 -                           | N/A  |  |  |  |  |
|       | - minimum non actuating time (ms) at: 500 A; 0,04 s  | D02 -                           | N/A  |  |  |  |  |
|       | No tripping during the tests   |                                 | N/A  |  |  |  |  |
| 9.9.3 | Tests repeated with the RCCB loaded with rated curr  | ent:                            | ,    |  |  |  |  |

|        | IE                 | EC 61008-1      | _       |
|--------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| Clause | Requirement + Test | Result - Remark | Verdi   |

|       | - test current (A): In, until steady state conditions   |                         | 1               |  |  |  |  |  |
|-------|---|-------------------------|-----------------|--|--|--|--|--|
|       | are reached   | 63A                     |                 |  |  |  |  |  |
|       | - cross-sectional area (mm²):   | 25mm²                   | _               |  |  |  |  |  |
|       | - the RCCB closes on I <sub>Δn</sub> : no value exceeds the specified limiting value of Table 1 (ms): | D02 - 27 - 36ms         | P               |  |  |  |  |  |
|       | The switch S1 and the RCCB are in closed position.  | The residual current is |                 |  |  |  |  |  |
|       | established by closing S2:  | The residual current is |                 |  |  |  |  |  |
| _     | - maximum break time (ms) at: l <sub>Δn</sub> :   | D02 - 37ms              | Р               |  |  |  |  |  |
|       | - maximum break time (ms) at: 2 I <sub>Δn</sub> :   | D02 - 31ms              | P               |  |  |  |  |  |
|       | - maximum break time (ms) at: 5 l <sub>Δn</sub> :   | D02 -                   | N/A             |  |  |  |  |  |
|       | - maximum break time (ms) at: 0,25 A (if  | D02 - 27ms              | P               |  |  |  |  |  |
|       | applicable)   | D02 - 27111 <b>5</b>    |                 |  |  |  |  |  |
|       | - maximum break time (ms) at: 500 A   | D02 - 11ms              | Р               |  |  |  |  |  |
|       | No value exceeds the relevant specified limiting  | 002 111110              | <u>-</u> '<br>Р |  |  |  |  |  |
|       | value   |                         | ,               |  |  |  |  |  |
|       | Additional test for type S:   |                         |                 |  |  |  |  |  |
|       | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :                                      | D02 -                   | N/A             |  |  |  |  |  |
|       | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s                                      | D02 -                   | N/A             |  |  |  |  |  |
|       | - minimum non actuating time (ms) at: 5 l <sub>\lambdan</sub> ; 0,05 s                                | D02 -                   | N/A             |  |  |  |  |  |
| _     | - minimum non actuating time (ms) at: 500 A; 0,04 s   | D02 -                   | N/A             |  |  |  |  |  |
|       | No tripping during the tests  |                         | N/A             |  |  |  |  |  |
| 9.9.4 | b) Tests repeated with the RCCB loaded with rated of  | current:                |                 |  |  |  |  |  |
|       | - test current (A): In at a temperature of +40 °C:  |                         |                 |  |  |  |  |  |
|       | until steady state conditions are reached:  | 63A                     |                 |  |  |  |  |  |
|       | - cross-sectional area (mm²):   | 16mm²                   |                 |  |  |  |  |  |
|       | The test circuit being successively calibrated at each of the values of residual current              |                         |                 |  |  |  |  |  |
|       | specified in Table 1, the test switch S2 and the RCCB being in the closed position,                   |                         |                 |  |  |  |  |  |
|       | the test voltage is suddenly established by closing the test switch S1                                |                         |                 |  |  |  |  |  |
|       | - maximum break time (ms) at: l₄n:  | D02 - 36ms              | Р               |  |  |  |  |  |
|       | - maximum break time (ms) at: 2 l <sub>Δn</sub> :   | D02 - 29ms              | Р               |  |  |  |  |  |

| Page 72 of 179 Report No.:130700023SHA-00 |                    |             |                 |         |  |  |  |
|---|--------------------|-------------|-----------------|---------|--|--|--|
|   |                    | IEC 61008-1 |                 |         |  |  |  |
| Clause                                    | Requirement + Test |             | Result - Remark | Verdict |  |  |  |

| - maximum break time (ms) at: 5 I <sub>Δn</sub> :                   | D02 -      | N/A |
|---|------------|-----|
| - maximum break time (ms) at: 0,25 A (if                            | D02 - 27ms | Р   |
| applicable):  |            |     |
| - maximum break time (ms) at: 500 A:                                | D02 - 11ms | Р   |
| No value exceeds the relevant specified limiting                    |            | Р   |
| value   |            |     |
| Additional test for type S:   |            |     |
| <br>- minimum non actuating time (ms) at: I <sub>Ani</sub> 0,13 s : | D02 -      | N/A |
| - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> for         | D02 -      | N/A |
| 0,06 s:   |            |     |
| - minimum non actuating time (ms) at: 5 l <sub>an</sub> ; 0,05 s    | D02 -      | N/A |
| :   |            |     |
| - minimum non actuating time (ms) at: 500 A; 0,04 s                 | D02 -      | N/A |
|   |            |     |
| No tripping during the tests  |            | N/A |

|                  | TEST S     |                  |                   | n= 0,1A   | , type A)  |           |    |                     |                | D03  |            | Р   |
|------------------|------------|------------------|-------------------|---|------------|-----------|----|---------------------|----------------|------|------------|-----|
|                  | Tests "D0" |                  |                   |   |            |           |    |                     |                |      |            | Р   |
| 8.5              | Operatir   | ng chara         | acteristic        | s   |            |           |    | ,                   |                |      |            |     |
|                  | For mul    | tiple set        | tings of I        | Δn tests  | are mad    | le for ea | ch |                     |                |      |            | N/A |
| 9.9.1            | RCCB is    |                  |                   | ormal us  | se, test c | circuit   |    | Test on 50 and 60Hz |                |      |            | Р   |
| 9.9.5            | each tes   | st is ma         | and 0,8           | ent on lir<br>35 times  | the rate   |           |    |                     |                | Р    |            |     |
|                  | Туре       | I <sub>N</sub> A | I <sub>AN</sub> A | Standard values of break time and non-actuating time at a residual current equal to |            |           |    |                     |                |      |            |     |
|                  |            |                  |                   | l <sub>an</sub>   | 2 Ian      | 5 lan     |    | or<br>SA a)         | 5A-200A,<br>b) | 500A |            | _   |
|                  | General    | Any<br>value     | <0,03             | 0,3   | 0,15       |           | 0, | 04                  | 0,04           | 0,04 | Max. break |     |
| e sties while en |            |                  | 0,03              | 0,3   | 0,15       |           | 0, | 04                  | 0,04           | 0,04 | unies      |     |
|                  |            |                  | >0,03             | 0,3   | 0,15       | 0,04      | -  | _                   | 0,04           | 0,04 |            |     |

|         |  |                         |           |                 | IEC 6             | 1008-1       |       |             |                |          |                                 |           |
|---------|--|-------------------------|-----------|-----------------|-------------------|--------------|-------|-------------|----------------|----------|---------------------------------|-----------|
| Clause  | Requirement + Test   |                         |           |                 |                   |              |       |             | sult - Re      | mark     |                                 | Verdict   |
|         | '  |                         |           |                 |                   |              |       |             |                |          |                                 | ,         |
|         | S  | ≥ 25                    | >0,03     | 0,5             | 0,2               | 0,15         | -     |             | 0,15           | 0,15     | Max. break<br>times             |           |
|         |  |                         |           | 0,13            | 0,06              | 0,05         | -     | <del></del> | 0,04           | 0,04     | Min. non-<br>actuating<br>times | gad Md    |
|         | a) valu  | e to be de              | cided by  | the man         | ufacture          | for this t   | est   |             |                |          |                                 |           |
|         |  | test are c<br>ect opera |           |                 |                   |              |       |             |                |          |                                 |           |
| 9.9.2   | Off-load   | d tests m               | ade at a  | ı temper        | ature of          | 20 ± 2 °     | С     | 21°         | С              |          |                                 | Р         |
| 9.9.2.1 | Verifica   | ation of th             | ne correc | t operat        | ion in ca         | ase of a     | stea  | dy in       | crease         | residual | current:                        |           |
|         |  | y increas               |           |                 |                   |              |       | IΔn         | =100m <i>A</i> | 4        |                                 | Р         |
|         |  | g curren                |           |                 |                   |              |       |             | 3 - 78,1       |          | nA                              | Р         |
| 9.9.2.2 |  | ation of th             |           |                 |                   |              |       |             |                |          |                                 |           |
|         | - the RCCB closes on I <sub>Δn</sub> , no value exceeds the                              |                         |           |                 |                   |              |       |             |                |          |                                 | Р         |
|         | specified limiting value of Table 1 (ms) D03 - 26 - 39ms                                 |                         |           |                 |                   |              |       |             |                |          |                                 |           |
| 9.9.2.3 |  |                         |           |                 |                   |              |       |             |                |          | sidual                          | A CAMPILL |
|         | The test circuit being successively calibrated at each of the values of residual current |                         |           |                 |                   |              |       |             |                |          |                                 |           |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position,      |                         |           |                 |                   |              |       |             |                |          |                                 |           |
|         | the test voltage is suddenly established by closing the test switch S1                   |                         |           |                 |                   |              |       |             |                |          |                                 |           |
|         | - maximum break time (ms) at: I <sub>Δn</sub>  |                         |           |                 |                   |              |       | D03 - 34ms  |                |          |                                 | P         |
|         | - maxin  | num bre                 | ak time ( | ms) at:         | 2 l <sub>an</sub> |              | :     | DO:         | 3 - 31ms       | 5        |                                 | Р         |
|         | - maxin  | num brea                | ak time ( | ms) at:         | 5 l <sub>an</sub> |              |       | DO:         | 3 -            |          |                                 | N/A       |
|         | - maximum break time (ms) at: 0,25 A (if   |                         |           |                 |                   |              |       | DO:         | 3 - 26ms       | 5        |                                 | Р         |
|         | applicable)  |                         |           |                 |                   |              |       |             |                |          |                                 |           |
|         | - maxin  | num brea                | ak time ( | ms) at:         | 500 <u>A</u>      | ************ | :     | D0:         | 3 - 11ms       | S        |                                 | Р         |
|         | No valu  | ae excee                | ds the re | elevant s       | specified         | limiting     |       |             |                |          |                                 | Р         |
|         | value  |                         |           |                 |                   |              |       |             |                |          |                                 |           |
| 9.9.2.4 | Verification of the correct operation in case of sudden appearance of residual           |                         |           |                 |                   |              |       |             |                |          | sidual                          |           |
|         | current  | of value                | s betwe   | en 5 l∆n        | and <u>50</u> 0   | DA :         |       |             |                |          |                                 |           |
|         | The test switch S1 and the RCCB being in the closed position, the residual               |                         |           |                 |                   |              |       |             |                |          | ual                             |           |
|         | current  | is sudde                | enly esta | bli <u>shed</u> | by closir         | ng the te    | st sv | witch       | S2             |          |                                 |           |
|         | - maxin  | num brea                | ak time ( | ms) at:         | 5A (valu          | e 1          |       | D0          | 3 - 21ms       | S        |                                 | Р         |
|         | 1, ,   | - A                     |           |                 |                   |              |       | 1           |                |          |                                 |           |

Р

D03 - 13ms

between 5A and 200A) :

between 5A and 200A) :

- maximum break time (ms) at: 200A (value 2

|        |   |                             | 1          |  |  |  |  |
|--------|---|-----------------------------|------------|--|--|--|--|
| Clause | Requirement + Test  | Result - Remark             | Verdict    |  |  |  |  |
|        |   |                             | <u> </u>   |  |  |  |  |
|        | No value exceeds the relevant specified limiting                                    |                             | P          |  |  |  |  |
|        | value   |                             | 5423-1-1-1 |  |  |  |  |
|        | Additional test for type S:   |                             |            |  |  |  |  |
|        | - minimum non actuating time (ms) at: l <sub>Δn</sub> ; 0,13 s :                    | D03 -                       | N/A        |  |  |  |  |
|        | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s                    | D03 -                       | N/A        |  |  |  |  |
|        | :   |                             |            |  |  |  |  |
|        | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s                    | D03 -                       | N/A        |  |  |  |  |
|        | - minimum non actuating time (ms) at: 500 A;  | D03 -                       | N/A        |  |  |  |  |
|        | 0,04 s  |                             |            |  |  |  |  |
|        | No tripping during tests  |                             | N/A        |  |  |  |  |
| 9.9.4  | a) Tests repeated at a temperature of -5 °C:  |                             |            |  |  |  |  |
|        | The test circuit being successively calibrated at each                              | n of the values of residual | Р          |  |  |  |  |
|        | current   |                             |            |  |  |  |  |
|        | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                             |            |  |  |  |  |
|        | the test voltage is suddenly established by closing the test switch S1              |                             |            |  |  |  |  |
|        | - maximum break time (ms) at: I <sub>Δn</sub>                                       | D03 - 36ms                  | Р          |  |  |  |  |
|        | - maximum break time (ms) at: 2 l <sub>Δn</sub>                                     | D03 - 33ms                  | Р          |  |  |  |  |
|        | - maximum break time (ms) at: 5 l <sub>an</sub> :                                   | D03 -                       | N/A        |  |  |  |  |
|        | - maximum break time (ms) at: 0,25 A (if  | D03 - 27ms                  | P          |  |  |  |  |
|        | applicable)   |                             |            |  |  |  |  |
|        | - maximum break time (ms) at: 500 A   | D03 - 12ms                  | Р          |  |  |  |  |
|        | No value exceeds the relevant specified limiting                                    |                             | Р          |  |  |  |  |
|        | value   |                             |            |  |  |  |  |
|        | Additional test for type S:   |                             |            |  |  |  |  |
|        | - minimum non actuating time (ms) at: $I_{\Delta n}$ : 0,13 s :                     | D03 -                       | N/A        |  |  |  |  |
|        | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s                    | D03 -                       | N/A        |  |  |  |  |
|        |   |                             |            |  |  |  |  |
|        | - minimum non actuating time (ms) at: 5 I <sub>Δn</sub> ; 0,05 s                    | D03 -                       | N/A        |  |  |  |  |
|        | :   |                             |            |  |  |  |  |
|        | - minimum non actuating time (ms) at: 500 A;  | D03 -                       | N/A        |  |  |  |  |
|        | 0,04 s  |                             |            |  |  |  |  |
|        | No tripping during the tests  |                             | N/A        |  |  |  |  |
| 9.9.3  | Tests repeated with the RCCB loaded with rated cur                                  | rent:                       |            |  |  |  |  |

| Page 75 of 179 Report No.:130700023SH |                    |             |                 |         |  |  |
|---------------------------------------|--------------------|-------------|-----------------|---------|--|--|
|                                       |                    | IEC 61008-1 |                 |         |  |  |
| Clause                                | Requirement + Test |             | Result - Remark | Verdict |  |  |

|       | - test current (A): In, until steady state conditions   |                                 |                                       |
|-------|---|---------------------------------|---------------------------------------|
|       | are reached   | 63A                             |                                       |
|       | - cross-sectional area (mm²)  | 25mm²                           | _                                     |
|       | - the RCCB closes on I <sub>Δn</sub> : no value exceeds the specified limiting value of Table 1 (ms):   | D03 - 27- 35ms                  | P P P P P N/A N/A N/A N/A N/A N/A N/A |
|       | The switch S1 and the RCCB are in closed position. established by closing S2:   | The residual current is         |                                       |
|       | - maximum break time (ms) at: I <sub>Δn</sub> :   | D03 - 35ms                      | Р                                     |
|       | - maximum break time (ms) at: 2 l <sub>Δn</sub> :   | D03 - 29ms                      | Р                                     |
|       | - maximum break time (ms) at: 5 l <sub>Δn</sub> :   | D03 -                           | N/A                                   |
|       | - maximum break time (ms) at: 0,25 A (if applicable)  | D03 - 32ms                      | Р                                     |
|       | - maximum break time (ms) at: 500 A   | D03 - 11ms                      | P P N/A P P N/A N/A N/A N/A N/A P     |
|       | No value exceeds the relevant specified limiting value  |                                 | Р                                     |
|       | Additional test for type S:   |                                 |                                       |
|       | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :  | D03 -                           | N/A                                   |
|       | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s  | D03 -                           | N/A                                   |
|       | - minimum non actuating time (ms) at: 5 l <sub>Δni</sub> 0,05 s   | D03 -                           | N/A                                   |
|       | - minimum non actuating time (ms) at: 500 A;  | D03 -                           | N/A                                   |
|       | No tripping during the tests  |                                 | N/A                                   |
| 9.9.4 | b) Tests repeated with the RCCB loaded with rated   | current:                        |                                       |
|       | - test current (A): In at a temperature of +40 °C:  |                                 | _                                     |
|       | until steady state conditions are reached   | 63A                             |                                       |
|       | - cross-sectional area (mm²)  | 16mm²                           | -                                     |
|       | The test circuit being successively calibrated at each current specified in Table 1, the test switch S2 and the RCC the test voltage is suddenly established by closing the stable of the test voltage. | B being in the closed position, |                                       |
|       | - maximum break time (ms) at: I <sub>Δn</sub>   | D03 - 34ms                      | Р                                     |
|       | - maximum break time (ms) at: 2 I <sub>Δn</sub>   | D03 - 31ms                      | P                                     |

|        |                    | IEC 61008-1 | 20              |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

| - maximum break time (ms) at: 5 l <sub>Δn</sub> :                | D03 -      | N/A      |
|--|------------|----------|
| - maximum break time (ms) at: 0,25 A (if  applicable)            | D03 - 26ms | Р        |
| applicable)  |            |          |
| - maximum break time (ms) at: 500 A                              | D03 - 11ms | Р        |
| No value exceeds the relevant specified limiting                 |            | Р        |
| <br>value  |            |          |
| Additional test for type S:                                      |            | _t482556 |
| - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s : | D03 -      | N/A      |
| - minimum non actuating time (ms) at: 2 $I_{\Delta n}$ for       | D03 -      | N/A      |
| 0,06 s   |            |          |
| - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s | D03 -      | N/A      |
|  |            |          |
| - minimum non actuating time (ms) at: 500 A;                     | D03 -      | N/A      |
| 0,04 s   | _          |          |
| No tripping during the tests                                     |            | N/A      |

|       |   | SEQUEN<br>ple: In=    |                   | n= 0,3A               | , type A          |                   |       |   | 1              | D04     |               | Р   |
|-------|---|-----------------------|-------------------|-----------------------|-------------------|-------------------|-------|---|----------------|---------|---------------|-----|
|       | Tests "   | D0"                   |                   |                       |                   |                   |       |   |                |         |               | Р   |
| 8.5   | Operati   | ng chara              | acteristic        | s                     |                   |                   |       |   |                |         |               |     |
|       | For mul   | ltiple set            | tings of          | l <sub>an</sub> tests | are mad           | le for ea         | ıch   |   |                | <u></u> |               | N/A |
| 9.9.1 |   | nstalled<br>ng to fig |                   | ormal u               | se, test o        | circuit           |       | Te  | st on 50       | and 60F | lz            | Р   |
| 9.9.5 | For RCCBs functionally dependent on line voltage, each test is made at 1,1 and 0,85 times the rated line voltage; voltage (V) |                       |                   |                       |                   |                   |       |   |                |         | Р             |     |
|       | Туре  | I <sub>N</sub> A      | I <sub>ΔN</sub> A |                       | S                 | tandard v         | alues | of break time and residual current equal to |                |         |               |     |
|       |   |                       |                   | IAN                   | 2 I <sub>ΔN</sub> | 5 l <sub>ΔN</sub> |       | <sub>N</sub> or<br>iA a)                    | 5A-200A,<br>b) | 500A    |               |     |
|       | General   | Any<br>value          | <0,03             | 0,3                   | 0,15              |                   | 0,0   | 04  | 0,04           | 0,04    | Max.<br>break |     |
|       |   |                       | 0,03              | 0,3                   | 0,15              |                   | 0,0   | 04  | 0,04           | 0,04    | times         |     |
| _     |   |                       | >0,03             | 0,3                   | 0,15              | 0,04              | -     | -   | 0,04           | 0,04    |               |     |

Report No.:130700023SHA-001

|         |  |   |           |          | IEC 6      | 1008-1          |       |         |            |           |                                 |         |
|---------|--|---|-----------|----------|------------|-----------------|-------|---------|------------|-----------|---------------------------------|---------|
| Clause  | Requir   | ement +   | Test      |          |            |                 |       | Re      | sult - Re  | mark      |                                 | Verdict |
|         |  |   |           |          |            |                 |       |         |            |           |                                 |         |
|         | S  | ≥ 25  | >0,03     | 0,5      | 0,2        | 0,15            |       |         | 0,15       | 0,15      | Max.<br>break<br>times          | -       |
|         |  |   |           | 0,13     | 0,06       | 0,05            |       | -       | 0,04       | 0,04      | Min. non-<br>actuating<br>times |         |
|         | a) value   | e to be de  | cided by  | the man  | ufacturer  | for this te     | est   |         |            |           |                                 |         |
|         |  | test are or<br>ect operat   |           |          |            |                 |       |         |            |           |                                 | -       |
| 9.9.2   | Off-loa  | d tests m   | nade at a | s tempe  | rature of  | 20 ± 2 °        | °C    | 219     | ,C         |           |                                 | Р       |
| 9.9.2.1 | Verifica   | ation of th   | ne corre  | ct opera | tion in ca | ase of <u>a</u> | stea  | ady ir  | ncrease    | residua   | l current:                      | 10.70   |
|         |  | ly increas  |           |          |            |                 |       |         | = 300mA    | <b>\</b>  |                                 | Р       |
|         |  | ng currer   |           |          |            |                 |       | D0      | 4 - 235    | - 238m/   | A                               | Р       |
| 9.9.2.2 |  | ation of th   |           |          |            |                 |       |         |            |           |                                 |         |
|         | - the R  | CCB clos  | ses on l  | տ: no va | lue exce   | eds the         |       | D0      | 4 - 26 - 3 |           |                                 | Р       |
| 9.9.2.3 | specified limiting value of Table 1 (ms)  The test circuit being successively calibrated at each of the values of residual |   |           |          |            |                 |       |         |            |           |                                 |         |
| 9.9.2.3 | current  |   | nellig sc | ICCESSIV | ely callo  | ialeu al        | eac   | 41 OI 1 | uie valut  | 55 UI 163 | siduai                          |         |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position,  |   |           |          |            |                 |       |         |            |           |                                 |         |
|         | '  | t voltage   |           |          |            |                 |       |         | _          |           | virile;                         |         |
|         |  | mum bre   |           |          |            |                 |       |         | 4 - 39ms   |           |                                 | Р       |
|         |  | mum bre   |           |          |            |                 |       |         | 4 - 34m:   |           |                                 | Р       |
|         |  | mum bre   |           |          |            |                 |       |         | 4 -        |           |                                 | N/A     |
|         |  | num bre   |           |          |            |                 |       |         | 4 - 27m:   | S         |                                 | Р       |
|         |  | able)   |           |          |            |                 | :     |         |            |           |                                 |         |
|         | - maxi   | mum bre   | ak time   | (ms) at: | 500 A      |                 | ,,,,  | D0      | 4 - 12m    | s         |                                 | Р       |
|         | No val   | ue excee  | ds the re | elevant  | specified  | limiting        |       |         |            |           | _                               | Р       |
|         | value  |   |           |          |            |                 |       |         |            |           |                                 |         |
| 9.9.2.4 | Verifica   | ation of t  | ne corre  | ct opera | ition in c | ase of s        | udd   | en ap   | opearan    | ce of res | sidual                          |         |
|         | curren   | Verification of the correct operation in case of sudden appearance of residual current of values between 5 l∆n and 500A : |           |          |            |                 |       |         |            |           |                                 |         |
|         | The te   | st switch   | \$1 and   | the RC0  | CB being   | in the c        | ose   | ed po   | sition, th | ne resid  | ual                             |         |
|         | curren   | t is sudde  | enly esta | ablished | by closin  | ng the te       | est s | witch   | n S2       |           |                                 |         |
|         | - maxii  | mum bre   | ak time   | (ms) at: | 5A (valu   | ıe 1            |       | D0      | 4 - 22m    | S         |                                 | P       |
|         |  |   |           |          |            |                 |       | 1       |            |           |                                 | 1       |
|         | betwee   | en 5A an  |           | :        |            |                 |       |         |            |           |                                 |         |
|         |  | en 5A and<br>mum bre  | d 200A)   |          | 200A (v    | alue 2          |       | D0      | 4 - 14m    | S         |                                 | Р       |

| Clause | Requirement + Test   | Result - Remark           | Verdict       |  |  |  |  |
|--------|--|---------------------------|---------------|--|--|--|--|
|        |  | <u> </u>                  |               |  |  |  |  |
|        | No value exceeds the relevant specified limiting   |                           | Р             |  |  |  |  |
|        | value  |                           |               |  |  |  |  |
|        | Additional test for type S:  |                           |               |  |  |  |  |
|        | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :                         | D04 -                     | N/A           |  |  |  |  |
|        | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s                         | D04 -                     | N/A           |  |  |  |  |
|        | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s                         | D04 ~                     | N/A           |  |  |  |  |
|        | - minimum non actuating time (ms) at: 500 A;   | D04 -                     | N/A           |  |  |  |  |
|        | No tripping during tests   |                           | N/A           |  |  |  |  |
| 9.9.4  | a) Tests repeated at a temperature of -5 °C:   |                           | 9142449       |  |  |  |  |
| 3.3.4  |  | of the values of residual | Р             |  |  |  |  |
|        | The test circuit being successively calibrated at each of the values of residual current |                           |               |  |  |  |  |
|        | specified in Table 1, the test switch S2 and the RCCB being in the closed position,      |                           |               |  |  |  |  |
|        | the test voltage is suddenly established by closing the test switch S1                   |                           |               |  |  |  |  |
|        | - maximum break time (ms) at: I <sub>Δn</sub> D04 - 36ms                                 |                           |               |  |  |  |  |
|        | - maximum break time (ms) at: 2 I <sub>Δn</sub>  | D04 - 34ms                | <u>Р</u><br>Р |  |  |  |  |
|        | - maximum break time (ms) at: 5 I <sub>Δn</sub>  | D04 -                     | N/A           |  |  |  |  |
|        | - maximum break time (ms) at: 0,25 A (if   | D04 - 29ms                | P             |  |  |  |  |
|        | applicable)  | 201113                    | '             |  |  |  |  |
|        | - maximum break time (ms) at: 500 A  | D04 - 11ms                | —————<br>Р    |  |  |  |  |
|        | No value exceeds the relevant specified limiting   | D04 - 11113               | <u>'</u><br>Р |  |  |  |  |
|        | value  |                           | r             |  |  |  |  |
|        | Additional test for type S:  |                           |               |  |  |  |  |
|        | - minimum non actuating time (ms) at: I <sub>Δn</sub> : 0,13 s :                         | D04 -                     | N/A           |  |  |  |  |
|        |  |                           | N/A           |  |  |  |  |
|        | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s                         |                           |               |  |  |  |  |
|        | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s                         | D04 -                     | N/A           |  |  |  |  |
|        | - minimum non actuating time (ms) at: 500 A;   | D04 -                     | N/A           |  |  |  |  |
|        | No tripping during the tests   |                           | N/A           |  |  |  |  |
| 9.9.3  | Tests repeated with the RCCB loaded with rated cur                                       | rent:                     | IN//\         |  |  |  |  |

| Clause | Requirement + Test  | Result - Remark         | Verdict         |
|--------|---|-------------------------|-----------------|
|        |   |                         | Figure 1940s    |
| P.9.4  | - test current (A): In, until steady state conditions   |                         |                 |
|        | are reached   | 63A                     |                 |
|        | - cross-sectional area (mm²)  | 25mm²                   |                 |
|        | - the RCCB closes on I <sub>Δn</sub> : no value exceeds the specified limiting value of Table 1 (ms): | D04 - 28 - 37ms         | Р               |
|        | The switch S1 and the RCCB are in closed position. established by closing S2:                         | The residual current is |                 |
|        | - maximum break time (ms) at: I <sub>Δn</sub>   | D04 - 37ms              | Р               |
|        | - maximum break time (ms) at: 2 J <sub>Δn</sub> :   | D04 - 29ms              | Р               |
|        | - maximum break time (ms) at: 5 l <sub>Δn</sub>   | D04 -                   | N/A             |
|        | - maximum break time (ms) at: 0,25 A (if applicable)  | D04 - 32ms              | Р               |
|        | - maximum break time (ms) at: 500 A   | D04 - 11ms              | Р               |
|        | No value exceeds the relevant specified limiting  |                         | Р               |
|        | value   |                         | No. of the last |
|        | Additional test for type S:   |                         |                 |
|        | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :                                      | D04 -                   | N/A             |
|        | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s                                      | D04 -                   | N/A             |
|        | - minimum non actuating time (ms) at: 5 I <sub>Δn</sub> ; 0,05 s                                      | D04 -                   | N/A             |
|        | - minimum non actuating time (ms) at: 500 A;  | D04 -                   | N/A             |
|        | No tripping during the tests  |                         | N/A             |
| .9.4   | b) Tests repeated with the RCCB loaded with rated   | current:                | Table 5         |
|        | - test current (A): In at a temperature of +40 °C:  |                         |                 |
|        | until steady state conditions are reached   | 63A                     |                 |
|        | - cross-sectional area (mm²)  | 16mm²                   |                 |
|        | The test circuit being successively calibrated at each current  |                         | Р               |
|        | specified in Table 1, the test switch S2 and the RCC  | , ,                     |                 |
|        | the test voltage is suddenly established by closing the   | ie test switch S1       |                 |

D04 - 36ms

D04 - 31ms

- maximum break time (ms) at: I<sub>Δn</sub> .....

- maximum break time (ms) at: 2 I<sub>Δn</sub>\_.....

| Page 80 of 179 Report No.:130700023SHA-00 |                    |  |                 |         |  |  |
|---|--------------------|--|-----------------|---------|--|--|
| IEC 61008-1                               |                    |  |                 |         |  |  |
| Clause                                    | Requirement + Test |  | Result - Remark | Verdict |  |  |

| <br>- maximum break time (ms) at: 5 l <sub>Δn</sub> :              | D04 -      | N/A |
|--|------------|-----|
| - maximum break time (ms) at: 0,25 A (if                           | D04 - 27ms | Р   |
| - maximum break time (ms) at: 500 A                                | D04 - 11ms | Р   |
| No value exceeds the relevant specified limiting                   |            | Р   |
| Additional test for type S:  |            | 200 |
| - minimum non actuating time (ms) at: 1 <sub>Δn</sub> ; 0,13 s :   | D04 -      | N/A |
| - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> for 0,06 s | D04 -      | N/A |
| - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s   | D04 -      | N/A |
| <br>- minimum non actuating time (ms) at: 500 A;                   | D04 -      | N/A |
| No tripping during the tests                                       |            | N/A |

| 112        | TEST SEQUENCE D2 (3 samples: In= 63A, IΔn= 0,03A, type A) | D <sub>2</sub> -1 D <sub>2</sub> -2 D <sub>2</sub> -3 | Р |
|------------|---|---|---|
| 9.11.2.3c) | Verification of suitability in IT system:                 | _   | _ |
|            | Test circuit according to figure                          | 8   |   |
|            | Point of test circuit which is directly earthed:          | Neutral of power supply                               | _ |
|            | Grid distance "a" (mm)                                    | 35mm  |   |
|            | Test voltage 105% of rated phase to neutral voltage       | 252V  |   |
|            | for the pole exclusively for the neutral                  |   |   |
|            | Test voltage 105% of rated phase to phase voltage         | 444V  |   |
|            | for the other poles                                       |   |   |
|            | Prospective current - 500A or                             | 10ln  |   |
|            | - 10 l <sub>n</sub> (A):                                  |   |   |
|            | Prospective current (A)                                   | 630A  | _ |
|            | Prospective current obtained (A)                          | 645A  |   |
|            | Power factor  | 0,93-0,98   |   |
|            | Power factor obtained                                     | 0,96  |   |

|        | IEC 61008-1   |                                |        |
|--------|---|--------------------------------|--------|
| Clause | Requirement + Test  | Result - Remark                | Verdic |
|        |   | 1                              |        |
|        | Point of initiation: $0 \pm 5^{\circ}$ for the first tested pole, | 0                              | Р      |
|        | shifted by 30° for the other poles                                |                                |        |
|        | Test sequence: O-t-CO on each pole in turn                        | O-t-CO                         | Р      |
|        | excluding the switched neutral pole                               |                                |        |
|        | During tests no endangering of operator, no                       |                                | P      |
|        | permanent arcing, no flashover and no melting of                  |                                |        |
|        | fuse F  |                                |        |
|        | After the tests no damage impairing further use                   |                                | Р      |
| .7.7.3 | The leakage current flowing across the open                       | D2-1- 7,37×10 <sup>-3</sup> mA | Р      |
|        | contacts is measured at 1,1 Un and shall not                      | D2-2- 7,43×10 <sup>-3</sup> mA |        |
|        | exceed 2mA (mA)   | D2-3- 7,57×10 <sup>-3</sup> mA |        |
| .7.3   | Dielectric strength test of the main circuit at test volt         | age 2 Un for 1 min:            |        |
|        | a):   | D2-1 - OK                      | Р      |
|        |   | D2-2 - OK                      |        |
|        |   | D2-3 - OK                      |        |
|        | b):   | D2-1 - OK                      | Р      |
|        |   | D2-2 - OK                      |        |
|        |   | D2-3 - OK                      |        |
|        | c):   | D2-1 - OK                      | Р      |
|        |   | D2-2 - OK                      |        |
|        |   | D2-3 - OK                      |        |
|        | d):   | D2-1-                          | N/A    |
|        |   | D2-2-                          |        |
|        |   | D2-3-                          |        |
|        | e):   | D2-1-                          | N/A    |
|        |   | D2-2-                          |        |
|        |   | D2-3-                          |        |
|        | No flashover or breakdown:  | D2-1-                          | Р      |
|        |   | D2-2-                          |        |
|        |   | D2-3-                          |        |
|        | Making and breaking In at Un                                      | D2-1-                          | Р      |
|        |   | D2-2-                          |        |
|        |   | D2-3-                          |        |

|        | IEC 61008-1   |                                 | -11                 |
|--------|---|---------------------------------|---------------------|
| Clause | Requirement + Test  | Result - Remark                 | Verdict             |
|        |   |                                 |                     |
|        | The RCCB shall trip with a test current of 1,25 I an      | D2-1- 34ms                      | Р                   |
|        | (ms)  | D2-2- 25ms                      |                     |
|        |   | D2-3- 30ms                      |                     |
|        | The polyethylene sheet shows no holes                     |                                 | Р                   |
| 9.17   | Verification of the behaviour of RCCBs opening auto       | matically in case of failure of |                     |
|        | the line voltage  |                                 | SHIE                |
| 9.17.1 | Limiting value of the line voltage (Ux):                  |                                 |                     |
|        | - rated voltage applied to the line terminals and         | D2-1-                           | N/A                 |
|        | progressively lowered to attain zero within about         | D2-2-                           |                     |
|        | 30 s until automatic opening occurs; voltage (V) .:       | D2-3-                           |                     |
|        | - all values less than 0,85 times the rated voltage       | D2-1-                           | N/A                 |
|        | (V):  | D2-2-                           |                     |
|        |   | D2-3-                           |                     |
|        | - tripping test at test voltage (V) with I₄n and          | D2-1-                           | N/A                 |
|        | operating according to Table 1 (ms):                      | D2-2-                           |                     |
|        |   | D2-3-                           |                     |
|        | No value exceeds the specified limiting values            |                                 | N/A                 |
|        | Not possible to close the apparatus by manual             | D2-1-                           | N/A                 |
|        | operating means below Ux                                  | D2-2-                           |                     |
|        |   | D2-3-                           |                     |
| 9.17.2 | Verification of behaviour in case of failure of the line  | voltage                         |                     |
|        | RCCB supplied with rated voltage, and the line            |                                 | N/A                 |
|        | voltage then switched off                                 |                                 |                     |
|        | Time (ms) interval between switching off and              | D2-1-                           | N/A                 |
|        | opening of the main contacts                              | D2-2-                           |                     |
|        |   | D2-3-                           |                     |
|        | a) RCCBs opening without delay: no value exceeds          |                                 | N/A                 |
|        | 0,5 s   |                                 |                     |
|        | b) RCCBs opening with delay: max. and min.                |                                 | N/A                 |
|        | values within the range indicated by the                  |                                 |                     |
|        | manufacturer  |                                 | Constitution of the |
| 9.17.3 | Verification of the correct operation, in presence of a   | a residual current, for RCCBs   |                     |
|        | opening with delay in case of failure of the line voltage |                                 |                     |

|         | IEC 61008-1   |                             |         |
|---------|---|-----------------------------|---------|
| Clause  | Requirement + Test  | Result - Remark             | Verdict |
|         |   |                             |         |
|         | RCCB connected according to fig. 4 at the rated                                     |                             | N/A     |
|         | voltage (Un)  |                             |         |
|         | All phases but one switched off by means of S3                                      |                             | N/A     |
|         | During the delay: test of 9.9.2:  |                             |         |
| .9.2.1  | - steady increase from 0,2 $I_{\Delta n}$ to $I_{\Delta n}$ within 30 s (mA)        | D2-1-                       | N/A     |
|         | :   | D2-2-                       |         |
|         |   | D2-3-                       |         |
|         | - tripping current between $I_{\Delta no}$ and $I_{\Delta n}$ (mA)                  | D2-1-                       | N/A     |
|         |   | D2-2-                       |         |
|         | _   | D2-3-                       |         |
|         | The RCCB closes on $I_{\Delta n}$ : no value exceeds the                            | D2-1-                       | N/A     |
|         | specified limiting value of Table 1 (ms):   | D2-2-                       |         |
|         |   | D2-3-                       |         |
| 9.9.2.3 | The test circuit being successively calibrated at each                              | n of the values of residual |         |
|         | current   |                             |         |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                             |         |
|         | the test voltage is suddenly established by closing the test switch S1              |                             |         |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :                                     | D2-1-                       | N/A     |
|         |   | D2-2-                       |         |
|         |   | D2-3-                       |         |
|         | - maximum break time (ms) at: 2 l <sub>Δn</sub> :                                   | D2-1-                       | N/A     |
|         |   | D2-2-                       |         |
|         |   | D2-3-                       |         |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub>                                     | D2-1-                       | N/A     |
|         |   | D2-2-                       |         |
|         |   | D2-3-                       | _       |
|         | - maximum break time (ms) at: 0,25 A (if  | D2-1-                       | N/A     |
|         | applicable):  | D2-2-                       |         |
|         |   | D2-3-                       |         |
|         | - maximum break time (ms) at: 500 A:  | D2-1-                       | N/A     |
|         |   | D2-2-                       |         |
|         | _   | D2-3-                       |         |
|         | No value exceeds the relevant specified limiting                                    |                             | N/A     |
|         | value   |                             |         |

|        |                    | IEC 61008-1 |        |          |         | ] |
|--------|--------------------|-------------|--------|----------|---------|---|
| Clause | Requirement + Test |             | Result | - Remark | Verdict | 1 |

|         | Additional test for type S:   |                           |     |
|---------|---|---------------------------|-----|
|         | - minimum non actuating time (ms) at: I <sub>Ani</sub> 0,13 s :                     | D2-1-                     | N/A |
|         |   | D2-2-                     |     |
|         |   | D2-3-                     |     |
|         | - minimum non actuating time (ms) at: 2 I <sub>an</sub> ; 0,06 s                    | D2-1-                     | N/A |
|         | :   | D2-2-                     |     |
|         |   | D2-3-                     |     |
|         | - minimum non actuating time (ms) at: 5 lan; 0,05 s                                 | D2-1-                     | N/A |
|         | :   | D2-2-                     |     |
|         |   | D2-3-                     |     |
|         | - minimum non actuating time (ms) at: 500 A;  | D2-1-                     | N/A |
|         | 0,04 s  | D2-2-                     |     |
|         |   | D2-3-                     |     |
|         | No tripping during tests  |                           | N/A |
| 9.17.4  | Verification of the correct operation of RCCBs with 3 or 4 current paths, neutral   |                           |     |
|         | and one line terminal only being energized in turn:                                 |                           |     |
|         | RCCB connected according to fig. 4  |                           | N/A |
| 9.9.2.3 | The test circuit being successively calibrated at each                              | of the values of residual |     |
|         | current   |                           |     |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                           |     |
|         | the test voltage is suddenly established by closing the test switch S1              |                           |     |
|         | - maximum break time (ms) at: I <sub>An</sub> :                                     | D2-1-                     | N/A |
|         |   | D2-2-                     |     |
|         |   | D2-3-                     |     |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub>                                     | D2-1-                     | N/A |
|         |   | D2-2-                     |     |
|         |   | D2-3-                     |     |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub>                                     | D2-1-                     | N/A |
|         |   | D2-2-                     |     |
|         |   | D2-3-                     |     |
|         | - maximum break time (ms) at: 0,25 A (if  | D2-1-                     | N/A |
|         | applicable)   | D2-2-                     |     |
|         |   | D2-3-                     |     |

Requirement + Test

Clause

| IEC 61008-1    |                             |
|----------------|-----------------------------|
| Page 85 of 179 | Report No.:130700023SHA-001 |

Result - Remark

Verdict

| 1                          |   | '''  |
|--|---|--|
|  |   | •  |
| - maximum break time (ms) at: 500 A                              | D2-1-   | N/A  |
|  | D2-2-   |  |
|  | D2-3-   |  |
| No value exceeds the relevant specified limiting                 |   | N/A  |
| value  |   |  |
| Additional test for type S:                                      |   |  |
| - minimum non actuating time (ms) at: $I_{\Delta n}$ ; 0,13 s :  | D2-1-   | N/A  |
|  | D2-2-   |  |
|  | D2-3-   |  |
| - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s | D2-1-   | N/A  |
|  | D2-2-   |  |
|  | D2-3-   |  |
| - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s | D2-1-   | N/A  |
| :  | D2-2-   |  |
|  | D2-3-   |  |
| - minimum non actuating time (ms) at: 500 A;                     | D2-1-   | N/A  |
| 0,04 s   | D2-2-   |  |
|  | D2-3-   |  |
| No tripping during tests   |   | N/A  |
|  | No value exceeds the relevant specified limiting value  Additional test for type S:  - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s:  - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s  - minimum non actuating time (ms) at: 5 I <sub>Δn</sub> ; 0,05 s  - minimum non actuating time (ms) at: 500 A; 0,04 s | D2-2-D2-3-  No value exceeds the relevant specified limiting value  Additional test for type S:  - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s : D2-1-D2-2-D2-3-  - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s D2-1-D2-2-D2-3-  - minimum non actuating time (ms) at: 5 I <sub>Δn</sub> ; 0,05 s D2-1-D2-2-D2-3-  - minimum non actuating time (ms) at: 5 I <sub>Δn</sub> ; 0,05 s D2-1-D2-2-D2-3-D2-3-D2-3-D2-3-D2-3-D2-3- |

|          | TEST SEQUENCE E<br>(3 samples: In= 63A, I△n= 0,03A, type A)                              | E1 E2 E3       | Р |
|----------|--|----------------|---|
| 8.7      | Performance at short-circuit currents  |                | Р |
| 9.11.2.4 | a) Verification of the coordination between the RCCI                                     | B and the SCPD |   |
|          | Verification of the coordination at the rated conditional short-circuit current (A): Inc | 6000A          | * |
|          | Test circuit according to figure   | 7              |   |
|          | Point of test circuit which is directly earthed:   | Neutral        |   |
|          | Grid distance "a" (mm)   | 45mm           |   |
|          | Silver wire diameter (mm) or fuse:   | 0,75mm         |   |
|          | Prospective current (A)  | 6000A          |   |
|          | Prospective current obtained (A)   | 6110A          |   |
|          | Power factor   | 0,65-0,70      |   |

| Report N | lo.:130700 | 023SHA- | -001 |
|----------|------------|---------|------|
|----------|------------|---------|------|

|        |                    | IEC 61008-1 |                 | _       |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|        | Power factor obtained   | 0,67                          | _   |
|--------|---|-------------------------------|-----|
|        | Point of initiation: 45° ± 5°   | 45°                           |     |
|        | Verification of I²t (kA²s) and Ip (kA) prior to testing                         | $I^2t = 25kA^2s$              |     |
|        | ((≥1x ≤1,1x values of table 15), RCCB replaced by                               | lp = 4,05kA                   |     |
|        | a connection having negligible impedance  |                               |     |
|        | Test sequence: O-t-CO   | 0-t-C0                        |     |
|        | l²t (kA²s); lp (kA)   | E1 - 13,6 kA2s, 3,78 kA       | Р   |
|        |   | E2 - 13,6 kA2s, 3,57 kA       |     |
|        |   | E3 - 13,2 kA2s, 3,71 kA       |     |
|        | During tests no endangering of operator, no                                     |                               | Р   |
|        | permanent arcing, no flashover and no melting of                                |                               |     |
|        | fuse F  |                               |     |
|        | After the tests no damage impairing further use                                 |                               | Р   |
| .7.7.3 | The leakage current flowing across the open                                     | E1 -6,87×10 <sup>-3</sup> mA  | Р   |
|        | contacts is measured at 1,1 Un and shall not                                    | E2 - 6,64×10 <sup>-3</sup> mA |     |
|        | exceed 2mA (mA)   | E3 - 6,79×10 <sup>-3</sup> mA |     |
| 0.7.3  | Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min: |                               |     |
|        | a):   | E1 - OK                       | Р   |
|        |   | E2 - OK                       |     |
|        |   | E3 - OK                       |     |
|        | b):   | E1 - OK                       | P   |
|        |   | E2 - OK                       |     |
|        |   | E3 - OK                       |     |
|        | c):   | E1 - OK                       | Р   |
|        |   | E2 - OK                       |     |
|        |   | E3 - OK                       |     |
|        | d):   | E1 -                          | N/A |
|        |   | E2 -                          |     |
|        |   | E3 -                          |     |
|        | e)  | E1 -                          | N/A |
|        |   | E2 -                          |     |
|        |   | E3 -                          |     |

|        | IEC 61008-1   |                                 |              |
|--------|---|---------------------------------|--------------|
| Clause | Requirement + Test  | Result - Remark                 | Verdict      |
|        |   |                                 |              |
|        | No flashover or breakdown                                       | E1 - OK                         | Р            |
|        |   | E2 - OK                         |              |
|        |   | E3 - OK                         |              |
|        | Making and breaking In at Un                                    | E1 - OK                         | Р            |
|        |   | E2 - OK                         |              |
|        |   | E3 - OK                         |              |
|        | The RCCB shall trip with a test current of 1,25 I <sub>Δn</sub> | E1- 38 ms                       | Р            |
|        | (ms):   | E2- 27 ms                       |              |
|        |   | E3- 29 ms                       |              |
|        | The polyethylene sheet shows no holes                           |                                 | Р            |
| 9.17   | Verification of the behaviour of RCCBs opening auto             | matically in case of failure of |              |
|        | the line voltage  |                                 | 3 P          |
| 9.17.1 | Limiting value of the line voltage (Ux):                        |                                 | e taulos est |
|        | - rated voltage applied to the line terminals and               | E1 -                            | N/A          |
|        | progressively lowered to attain zero within about               | E2 -                            |              |
|        | 30 s until automatic opening occurs; voltage (V) .:             | E3 -                            |              |
|        | - all values less than 0,85 times the rated voltage             | E1 -                            | N/A          |
|        | (V):  | E2 -                            |              |
|        |   | E3 -                            |              |
|        | - tripping test at test voltage (V) with I <sub>Δn</sub> and    | E1 -                            | N/A          |
|        | operating according to Table 1 (ms)                             | E2 -                            |              |
|        |   | E3 -                            |              |
|        | No value exceeds the specified limiting values                  |                                 | N/A          |
|        | Not possible to close the apparatus by manual                   | E1 -                            | N/A          |
|        | operating means below Ux  | E2 -                            |              |
|        |   | E3 -                            |              |
| 9.17.2 | Verification of behaviour in case of failure of the line        | voltage                         |              |
|        | RCCB supplied with rated voltage, and the line                  |                                 | N/A          |
|        | voltage then switched off                                       |                                 |              |
|        | Time (ms) interval between switching off and                    | E1 -                            | N/A          |
|        | opening of the main contacts                                    | E2 -                            |              |
|        |   | E3 -                            |              |
|        | a) RCCBs opening without delay: no value exceeds                |                                 | N/A          |
|        | 0,5 s   |                                 |              |

|         | IEC 61008-1   |                             |         |
|---------|---|-----------------------------|---------|
| Clause  | Requirement + Test  | Result - Remark             | Verdict |
|         |   |                             | Г       |
|         | b) RCCBs opening with delay: max. and min. values                                   |                             | N/A     |
|         | within the range indicated by the manufacturer                                      |                             | -       |
| 9.17.3  | Verification of the correct operation, in presence of a                             | residual current, for RCCBs |         |
|         | opening with delay in case of failure of the line voltage                           | ge                          |         |
|         | RCCB connected according to fig. 4 at the rated                                     |                             | N/A     |
|         | voltage (Un)  | _                           |         |
|         | All phases but one switched off by means of S3                                      |                             | N/A     |
|         | During the delay: test of 9.9.2:  |                             | _       |
| 9.9.2.1 | - steady increase from 0,2 $I_{\Delta n}$ to $I_{\Delta n}$ within 30 s (mA)        | E1 -                        | N/A     |
|         |   | E2 -                        |         |
|         |   | E3 -                        |         |
|         | - tripping current between $I_{\Delta no}$ and $I_{\Delta n}$ (mA)                  | E1 -                        | N/A     |
|         |   | E2 -                        |         |
|         |   | E3 -                        |         |
|         | The RCCB closes on $f_{\Delta n}$ : no value exceeds the                            | E1 -                        | N/A     |
|         | specified limiting value of Table 1 (ms):   | E2 -                        |         |
|         |   | E3                          |         |
| 9.9.2.3 | The test circuit being successively calibrated at each current                      | of the values of residual   | 15 15   |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                             |         |
|         | the test voltage is suddenly established by closing the test switch S1              |                             | 513.5   |
|         | - maximum break time (ms) at: I <sub>Δn</sub>                                       | E1 -                        | N/A     |
|         |   | E2 -                        |         |
|         |   | E3                          | _       |
|         | - maximum break time (ms) at: 2 l <sub>Δn</sub>                                     | E1 -                        | N/A     |
|         |   | E2 -                        |         |
|         |   | E3                          |         |
|         | - maximum break time (ms) at: 5 I <sub>Δn</sub>                                     | E1 -                        | N/A     |
|         |   | E2 -                        |         |
|         |   | E3                          |         |
|         | - maximum break time (ms) at: 0,25 A (if  | E1 -                        | N/A     |
|         | applicable)   | E2 -                        |         |
|         |   | E3                          |         |

|         | IEC 61008-1   |                           |           |
|---------|---|---------------------------|-----------|
| Clause  | Requirement + Test  | Result - Remark           | Verdict   |
|         |   |                           |           |
|         | - maximum break time (ms) at: 500 A   | E1 -                      | N/A       |
|         |   | E2 -                      |           |
|         |   | E3 -                      |           |
|         | No value exceeds the relevant specified limiting                                    |                           | N/A       |
|         | value   |                           |           |
|         | Additional test for type S:   |                           | al allery |
|         | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :                    | E1 -                      | N/A       |
|         |   | E2 -                      |           |
|         |   | E3 -                      |           |
|         | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s                    | E1 -                      | N/A       |
|         |   | E2 -                      |           |
|         |   | E3 -                      |           |
|         | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s                    | E1 -                      | N/A       |
|         |   | E2 -                      |           |
|         |   | E3                        |           |
|         | - minimum non actuating time (ms) at: 500 A;  | E1 -                      | N/A       |
|         | 0,04 s  | E2 -                      |           |
|         |   | E3 -                      |           |
|         | No tripping during tests  |                           | N/A       |
| 9.17.4  | Verification of the correct operation of RCCBs with 3 or 4 current paths, neutral   |                           |           |
|         | and one line terminal only being energized in turn:                                 |                           | 2 5       |
|         | RCCB connected according to fig. 4  |                           | N/A       |
| 9.9.2.3 | The test circuit being successively calibrated at each                              | of the values of residual |           |
|         | current   |                           |           |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                           |           |
|         | the test voltage is suddenly established by closing the test switch S1              |                           |           |
|         | - maximum break time (ms) at: I <sub>Δn</sub>                                       | E1 -                      | N/A       |
|         |   | E2 -                      |           |
|         |   | E3 -                      |           |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub>                                     | E1 -                      | N/A       |
|         |   | E2 -                      |           |
|         |   | E3 -                      |           |

|          | IEC 61008-1  |                         |               |  |
|----------|--|-------------------------|---------------|--|
| Clause   | Requirement + Test   | Result - Remark         | Verdict       |  |
|          |  |                         |               |  |
|          | - maximum break time (ms) at: 5 I <sub>Δn</sub>                  | E1 -                    | N/A           |  |
|          |  | E2 -                    |               |  |
|          |  | E3 -                    | _             |  |
|          | - maximum break time (ms) at: 0,25 A (if                         | E1 -                    | N/A           |  |
|          | applicable)  | E2 -                    |               |  |
|          |  | E3                      |               |  |
|          | - maximum break time (ms) at: 500 A                              | E1 -                    | N/A           |  |
|          |  | E2 -                    |               |  |
|          |  | E3 -                    |               |  |
|          | No value exceeds the relevant specified limiting                 |                         | N/A           |  |
|          | value  |                         |               |  |
|          | Additional test for type S:                                      |                         |               |  |
|          | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s : | E1 -                    | N/A           |  |
|          |  | E2 -                    |               |  |
|          |  | E3 -                    |               |  |
|          | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s | E1 -                    | N/A           |  |
|          |  | E2 -                    |               |  |
|          |  | E3 -                    |               |  |
|          | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s | E1 -                    | N/A           |  |
|          |  | E2 -                    |               |  |
|          |  | E3 -                    |               |  |
|          | - minimum non actuating time (ms) at: 500 A;                     | E1 -                    | N/A           |  |
|          | 0,04 s   | E2 -                    |               |  |
|          |  | E3 -                    |               |  |
|          | No tripping during tests   |                         | N/A           |  |
| 9.17.5   | Verification of the reclosing function of automatically r        | eclosing RCCBs (under   | Circulate for |  |
|          | consideration)   |                         |               |  |
| 9.11.2.2 | Verification of the rated making and breaking                    | 630A                    | _             |  |
|          | capacity (A): Im   |                         |               |  |
|          | Test circuit according to figure                                 | 7                       |               |  |
|          | Residual operating current (A): 10 I <sub>Δn</sub>               | 0,3A                    |               |  |
|          | Point of test circuit which is directly earthed:                 | Neutral of power supply |               |  |
| _        | Grid distance "a" (mm)   | 35mm                    |               |  |
|          | Prospective current (A)  | 630A                    |               |  |

|        |                    | Page 91 of 179 | Report No.:13   | 30700023SHA-001 |
|--------|--------------------|----------------|-----------------|-----------------|
|        |                    | IEC 61008-1    |                 |                 |
| Clause | Requirement + Test |                | Result - Remark | Verdict         |

|         | Prospective current obtained (A)  | 632A                          |   |
|---------|---|-------------------------------|---|
|         | Power factor  | 0,93-0,98                     | _                                       |
|         | Power factor obtained   | 0,95                          | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |
|         | Point of initiation: 45° ± 5°   | 45°                           | Р                                       |
|         | Test sequence: CO-t-CO-t-CO   | CO-t-CO-t-CO                  | Р                                       |
|         | During tests no endangering of operator, no                                     |                               | Р                                       |
|         | permanent arcing, no flashover and no melting of fuse F                         |                               |   |
|         | After the tests no damage impairing further use                                 |                               | Р                                       |
| 9.7.7.3 | The leakage current flowing across the open                                     | E1 - 6,94×10 <sup>-3</sup> mA | Р                                       |
|         | contacts is measured at 1,1 Un and shall not                                    | E2 - 6,70×10 <sup>-3</sup> mA |   |
|         | exceed 2mA (mA)   | E3 - 6,83×10 <sup>-3</sup> mA |   |
| 9.7.3   | Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min: |                               |   |
|         | a)  | E1 - OK                       | Р                                       |
|         |   | E2 - OK                       |   |
|         |   | E3 - OK                       |   |
|         | b)  | E1 - OK                       | P                                       |
|         |   | E2 - OK                       |   |
|         |   | E3 - OK                       |   |
|         | c)  | E1 - OK                       | Р                                       |
|         |   | E2 - OK                       |   |
|         |   | E3 - OK                       |   |
|         | d)  | E1 -                          | N/A                                     |
|         |   | E2 -                          |   |
|         |   | E3 -                          |   |
|         | e)  | E1 -                          | N/A                                     |
|         |   | E2 -                          |   |
|         |   | E3                            |   |
|         | No flashover or breakdown   | E1 - OK                       | Р                                       |
|         |   | E2 - OK                       |   |
|         |   | E3 - OK                       |   |
|         | Making and breaking In at Un  | E1 - OK                       | Р                                       |
|         |   | E2 - OK                       |   |
|         |   | E3 - OK                       |   |

| IEC 61008-1 |  |                                 |         |
|-------------|--|---------------------------------|---------|
| Clause      | Requirement + Test   | Result - Remark                 | Verdict |
|             |  |                                 |         |
|             | The RCCB shall trip with a test current of 1,25 $I_{\Delta n}$ | E1- 32 ms                       | Р       |
|             | (ms):  | E2- 31 ms                       |         |
|             |  | E3- 26 ms                       | _       |
|             | The polyethylene sheet shows no holes                          |                                 | P       |
| 9.17        | Verification of the behaviour of RCCBs opening auto            | matically in case of failure of |         |
|             | the line voltage   |                                 |         |
| 9.17.1      | Limiting value of the line voltage (Ux):                       |                                 |         |
|             | - rated voltage applied to the line terminals and              | E1 -                            | N/A     |
|             | progressively lowered to attain zero within about              | E2 -                            |         |
|             | 30 s until automatic opening occurs; voltage (V) .:            | E3 -                            | _       |
|             | - all values less than 0,85 times the rated voltage            | E1 -                            | N/A     |
|             | (V):   | E2 -                            |         |
|             |  | E3 -                            |         |
|             | - tripping test at test voltage (V) with $l_{\Delta n}$ and    | E1 -                            | N/A     |
|             | operating according to Table 1 (ms)                            | E2 -                            |         |
|             |  | E3 -                            | _       |
|             | No value exceeds the specified limiting values                 |                                 | N/A     |
|             | Not possible to close the apparatus by manual                  | E1 -                            | N/A     |
|             | operating means below Ux                                       | E2 -                            |         |
|             |  | E3                              |         |
| 9.17.2      | Verification of behaviour in case of failure of the line       | voltage                         |         |
|             | RCCB supplied with rated voltage, and the line                 |                                 | N/A     |
|             | voltage then switched off                                      | _                               |         |
|             | Time (ms) interval between switching off and                   | E1 -                            | N/A     |
|             | opening of the main contacts:                                  | E2 -                            |         |
|             |  | E3                              |         |
|             | a) RCCBs opening without delay: no value exceeds               |                                 | N/A     |
|             | 0,5 s  |                                 |         |
|             | b) RCCBs opening with delay: max. and min. values              |                                 | N/A     |
|             | within the range indicated by the manufacturer                 |                                 |         |
| 9.17.3      | Verification of the correct operation, in presence of a        | residual current, for RCCBs     |         |
|             | opening with delay in case of failure of the line voltag       | e                               |         |
|             | RCCB connected according to fig. 4 at the rated                |                                 | N/A     |
|             | voltage (Un)   |                                 |         |

|        |                    | Page 93 of 179 | Report No.:130700023SHA-00 |         |
|--------|--------------------|----------------|----------------------------|---------|
|        |                    | IEC 61008-1    |                            |         |
| Clause | Requirement + Test |                | Result - Remark            | Verdict |

|         | All phases but one switched off by means of S3                                      | _                         | N/A      |
|---------|---|---------------------------|----------|
|         | During the delay: test of 9.9.2:  |                           |          |
| 9.9.2.1 | - steady increase from 0,2 l <sub>Δn</sub> to l <sub>Δn</sub> within 30 s (mA)      | E1 -                      | N/A      |
|         |   | E2 -                      |          |
|         |   | E3 -                      |          |
|         | - tripping current between I <sub>Δno</sub> and I <sub>Δn</sub> (mA):               | E1 -                      | N/A      |
|         |   | E2 -                      |          |
|         |   | E3 -                      |          |
|         | The RCCB closes on $I_{\Delta n}$ no value exceeds the                              | E1 -                      | N/A      |
|         | specified limiting value of Table 1 (ms)  | E2 -                      |          |
|         |   | E3 -                      |          |
| 9.9.2.3 | The test circuit being successively calibrated at each                              | of the values of residual |          |
|         | current   |                           |          |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                           |          |
|         | the test voltage is suddenly established by closing the test switch S1              |                           | SERIES S |
|         | - maximum break time (ms) at: I <sub>Δn</sub>                                       | E1 -                      | N/A      |
|         |   | E2 -                      |          |
|         |   | E3 -                      |          |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub>                                     | E1 -                      | N/A      |
|         |   | E2 -                      |          |
|         |   | E3                        | _        |
|         | - maximum break time (ms) at: 5 I <sub>Δn</sub>                                     | E1 -                      | N/A      |
|         |   | E2 -                      |          |
|         |   | E3 -                      |          |
|         | - maximum break time (ms) at: 0,25 A (if  | E1 -                      | N/A      |
|         | applicable)   | E2 -                      |          |
|         |   | E3                        | _        |
|         | - maximum break time (ms) at: 500 A   | E1 -                      | N/A      |
|         |   | E2 -                      |          |
|         | _   | E3 -                      |          |
|         | No value exceeds the relevant specified limiting value                              |                           | N/A      |
|         | Additional test for type S:   |                           |          |

|        | ĮE                 | EC 61008-1      |         |
|--------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
|        | <u> </u>           | <u> </u>        |         |

|         | - minimum non actuating time (ms) at: $I_{\Delta n}; \; 0,13 \; s \; :$             | E1 - | N/A |
|---------|---|------|-----|
|         |   | E2 - |     |
|         |   | E3 - |     |
|         | - minimum non actuating time (ms) at: 2 I <sub>.vn</sub> ; 0,06 s                   | E1 - | N/A |
|         |   | E2 - |     |
|         |   | E3 - |     |
|         | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s                    | E1 - | N/A |
|         |   | E2 - |     |
|         |   | E3   |     |
|         | - minimum non actuating time (ms) at: 500 A;  | E1 - | N/A |
|         | 0,04 s  | E2 - |     |
|         |   | E3   |     |
|         | No tripping during tests  |      | N/A |
| 9.17.4  | Verification of the correct operation of RCCBs with 3 or 4 current paths, neutral   |      |     |
|         | and one line terminal only being energized in turn:                                 |      |     |
|         | RCCB connected according to fig. 4  |      | N/A |
| 9.9.2.3 | The test circuit being successively calibrated at each of the values of residual    |      |     |
|         | current   |      |     |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |      |     |
|         | the test voltage is suddenly established by closing the test switch S1              |      |     |
|         | - maximum break time (ms) at: I <sub>Δn</sub>                                       | E1 - | N/A |
|         |   | E2 - |     |
|         |   | E3   |     |
|         | - maximum break time (ms) at: 2 l <sub>nn</sub>                                     | E1 - | N/A |
|         |   | E2 - |     |
|         |   | E3   |     |
|         | - maximum break time (ms) at: 5 l <sub>\delta n</sub>                               | E1 - | N/A |
|         |   | E2 - |     |
|         |   | E3   |     |
|         | - maximum break time (ms) at: 0,25 A (if  | E1 - | N/A |
|         | applicable)   | E2 - |     |
|         |   | E3 - |     |

|        | IEC 61008-1  |                 |         |  |  |
|--------|--|-----------------|---------|--|--|
| Clause | Requirement + Test   | Result - Remark | Verdict |  |  |
|        |  |                 |         |  |  |
|        | - maximum break time (ms) at: 500 A  | E1 -            | N/A     |  |  |
|        |  | E2 -            |         |  |  |
|        |  | E3 -            |         |  |  |
|        | No value exceeds the relevant specified limiting                               |                 | N/A     |  |  |
|        | value  |                 |         |  |  |
|        | Additional test for type S:  |                 |         |  |  |
|        | - minimum non actuating time (ms) at: $I_{\Delta n}$ ; 0,13 s :                | E1 -            | N/A     |  |  |
|        |  | E2 -            |         |  |  |
|        |  | E3              | _       |  |  |
|        | - minimum non actuating time (ms) at: 2 $l_{\Delta n}$ ; 0,06 s                | E1 -            | N/A     |  |  |
|        |  | E2 -            |         |  |  |
|        |  | E3 -            |         |  |  |
|        | - minimum non actuating time (ms) at: 5 $I_{\Delta n}$ ; 0,05 s                | E1 -            | N/A     |  |  |
|        |  | E2 -            |         |  |  |
|        | _  | E3 -            |         |  |  |
|        | - minimum non actuating time (ms) at: 500 A;                                   | E1 -            | N/A     |  |  |
|        | 0,04 s   | E2 -            |         |  |  |
|        |  | E3 -            |         |  |  |
|        | No tripping during tests   |                 | N/A     |  |  |
| 9.17.5 | Verification of the reclosing function of automatically reclosing RCCBs (under |                 |         |  |  |
|        | consideration)   |                 |         |  |  |

|          | TEST SEQUENCE F (3 samples: In= 63A, I <sub>Δn</sub> = 0,03A, type A)                  | F1 F2 F3                | Р   |
|----------|--|-------------------------|-----|
| 8.7      | Performance at short-circuit currents  |                         |     |
| 9.11.2.4 | Verification of the coordination between the RCCB a                                    | nd the SCPD             |     |
|          | b) Verification of the coordination at the rated making and breaking capacity (A): Im: | 630A                    | - 1 |
|          | Test circuit according to figure   | 7                       |     |
|          | Point of test circuit which is directly earthed:                                       | Neutral of power supply |     |
|          | Grid distance "a" (mm)   | 35mm                    |     |
|          | Silver wire diameter (mm) or fuse  | 0,70mm                  |     |
|          | Prospective current (A)  | 630A                    |     |

|        |                    | IEC 61008-1 |                |         |
|--------|--------------------|-------------|----------------|---------|
| Clause | Requirement + Test | R           | esult - Remark | Verdict |

|         | Prospective current obtained (A)  | 632A                          | - 2 |
|---------|---|-------------------------------|-----|
|         | Power factor  | 0,93-0,98                     | *** |
|         | Power factor obtained   | 0,95                          |     |
|         | Point of initiation: 45° ± 5°   | 45°                           | Р   |
|         | Test sequence: O-t-CO-t-CO  | O-t-CO-t-CO                   | Р   |
|         | During tests no endangering of operator, no                                     |                               | P   |
|         | permanent arcing, no flashover and no melting of fuse F                         |                               |     |
|         | After the tests no damage impairing further use                                 |                               | Р   |
| 9.7.7.3 | The leakage current flowing across the open                                     | F1 - 6,41×10 <sup>-3</sup> mA | Р   |
|         | contacts is measured at 1,1 Un and shall not                                    | F2 - 6,78×10 <sup>-3</sup> mA |     |
|         | exceed 2mA (mA)   | F3 - 6,31×10 <sup>-3</sup> mA |     |
| 9.7.3   | Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min: |                               |     |
|         | a)  | F1 - OK                       | P   |
|         |   | F2 - OK                       |     |
|         | _   | F3 - OK                       |     |
|         | b):   | F1 - OK                       | Р   |
|         |   | F2 - OK                       |     |
|         |   | F3 - OK                       |     |
|         | c):   | F1 - OK                       | Р   |
|         |   | F2 - OK                       |     |
|         |   | F3 - OK                       |     |
|         | d):   | F1 -                          | N/A |
|         |   | F2 -                          |     |
|         |   | F3                            |     |
|         | e)  | F1 -                          | N/A |
|         |   | F2 -                          |     |
|         |   | F3 -                          |     |
|         | No flashover or breakdown:  | F1 - OK                       | Р   |
|         |   | F2 - OK                       |     |
| _       |   | F3 - OK                       |     |
|         | Making and breaking In at Un  | F1 - OK                       | Р   |
|         |   | F2 - OK                       |     |
|         |   | F3 - OK                       |     |

| Report No. | :130700023SHA-001 |
|------------|-------------------|
|            |                   |

| Clause | Requirement + Test  | Result - Remark                 | Verdict  |
|--------|---|---------------------------------|----------|
|        |   |                                 |          |
|        | The RCCB shall trip with a test current of 1,25 $I_{\Delta n}$        | F1 - 37 ms                      | Р        |
|        | (ms):   | F2 - 32 ms                      |          |
|        |   | F3 - 28 ms                      |          |
|        | The polyethylene sheet shows no holes                                 |                                 | Р        |
| 9.17   | Verification of the behaviour of RCCBs opening autor the line voltage | matically in case of failure of |          |
| 9.17.1 | Limiting value of the line voltage (Ux):                              |                                 |          |
|        | - rated voltage applied to the line terminals and                     | F1 -                            | N/A      |
|        | progressively lowered to attain zero within about                     | F2 -                            |          |
|        | 30 s until automatic opening occurs; voltage (V) .:                   | F3 -                            |          |
|        | - all values less than 0,85 times the rated voltage                   | F1 -                            | N/A      |
|        | (V):  | F2 -                            |          |
|        |   | F3                              |          |
|        | - tripping test at test voltage (V) with I <sub>Δn</sub> and          | F1 -                            | N/A      |
|        | operating according to Table 1 (ms)                                   | F2 -                            |          |
|        |   | F3                              |          |
|        | No value exceeds the specified limiting values                        |                                 | N/A      |
|        | Not possible to close the apparatus by manual                         | F1 -                            | N/A      |
|        | operating means below Ux:   | F2 -                            |          |
|        |   | F3                              |          |
| .17.2  | Verification of behaviour in case of failure of the line voltage      |                                 |          |
|        | RCCB supplied with rated voltage, and the line                        |                                 | N/A      |
|        | voltage then switched off   |                                 |          |
|        | Time (ms) interval between switching off and                          | F1 -                            | N/A      |
|        | opening of the main contacts  | F2 -                            |          |
|        |   | F3 -                            |          |
|        | a) RCCBs opening without delay: no value exceeds                      |                                 | N/A      |
|        | 0,5 s   |                                 |          |
|        | b) RCCBs opening with delay: max. and min. values                     |                                 | N/A      |
|        | within the range indicated by the manufacturer                        | <u> </u>                        | 125 - 13 |
| .17.3  | Verification of the correct operation, in presence of a               | residual current, for RCCBs     |          |
|        | opening with delay in case of failure of the line voltage             |                                 |          |
|        | RCCB connected according to fig. 4 at the rated                       |                                 | N/A      |
|        | voltage (Un)  |                                 |          |

Report No.:130700023SHA-001

|        |                    | IEC 6 | 1008-1          |         |
|--------|--------------------|-------|-----------------|---------|
| Clause | Requirement + Test |       | Result - Remark | Verdict |

|         | All phases but one switched off by means of S3   |                  | N/A      |
|---------|--|------------------|----------|
|         | During the delay: test of 9.9.2:   | _                |          |
| 9.9.2.1 | - steady increase from 0,2 $I_{\Delta n}$ to $I_{\Delta n}$ within 30 s (mA)             | F1 -             | N/A      |
|         |  | F2 -             |          |
|         |  | F3 -             |          |
|         | - tripping current between I <sub>Δno</sub> and I <sub>.\n</sub> (mA):                   | F1 -             | N/A      |
|         |  | F2 -             |          |
|         |  | F3 -             | _        |
|         | The RCCB closes on I <sub>sn</sub> : no value exceeds the                                | F1 -             | N/A      |
|         | specified limiting value of Table 1 (ms):  | F2 -             |          |
|         |  | F3               |          |
| 9.9.2.3 | The test circuit being successively calibrated at each of the values of residual current |                  | -        |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position,      |                  |          |
|         | the test voltage is suddenly established by closing the                                  | e test switch S1 | 1.00     |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :  | F1 -             | N/A      |
|         |  | F2 -             |          |
|         |  | F3 -             |          |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub> :  | F1 -             | N/A      |
|         |  | F2 -             |          |
|         |  | F3               |          |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub>  | F1 -             | N/A      |
|         |  | F2 -             |          |
|         |  | F3               |          |
|         | - maximum break time (ms) at: 0,25 A (if applicable)                                     | F1 -             | N/A      |
|         |  | F2 -             | 1        |
|         |  | F3 -             | <u> </u> |
|         | - maximum break time (ms) at: 500 A:   | F1 -             | N/A      |
|         |  | F2 -             |          |
|         |  | F3 -             |          |
|         | No value exceeds the relevant specified limiting value                                   |                  | N/A      |
| _       | Additional test for type S:  |                  | ETERNIAN |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|        | - minimum non actuating time (ms) at: I <sub>ni</sub> ; 0,13 s :                    | F1 -  | <br>N/A |  |
|--------|---|-------|---------|--|
|        | - minimum non actuating time (ms) at $t_{\text{in}}$ , 0, 10 5.                     | F2 -  | 11//    |  |
|        |   | F3 -  |         |  |
|        | - minimum non actuating time (ms) at: 2 I <sub>sn</sub> ; 0,06 s                    | F1 -  | <br>N/A |  |
|        | - Intilliant non actuating time (ms) at 2 1,0,100 s                                 | F2 -  | IN/A    |  |
|        |   | F3 -  |         |  |
|        | - minimum non actuating time (ms) at: 5 I <sub>Δn</sub> ; 0,05 s                    | F1 -  | <br>N/A |  |
|        | - minimum non actuating time (ms) at 3 1gn, 0,03 s                                  | F2 -  | IN/A    |  |
|        |   | F3 -  |         |  |
|        | - minimum non actuating time (ms) at: 500 A; 0,04 s                                 | F1 -  | N/A     |  |
|        | - minimum non actuating time (BIS) at: 500 A, 0,04 S                                | F2 -  | IN/A    |  |
|        |   | F3 -  |         |  |
|        | No tripping during toots  | 1.3.4 | N/A     |  |
| 9.17.4 | No tripping during tests  |       | IV/A    |  |
|        | Verification of the correct operation of RCCBs with 3 or 4 current paths, neutral   |       |         |  |
|        | and one line terminal only being energized in turn:                                 |       |         |  |
|        | RCCB connected according to fig. 4  |       | N/A     |  |
| .9.2.3 | The test circuit being successively calibrated at each of the values of residual    |       |         |  |
|        | current   |       |         |  |
|        | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |       |         |  |
|        | the test voltage is suddenly established by closing the test switch S1              |       |         |  |
|        | - maximum break time (ms) at: I <sub>Δn</sub>                                       | F1 -  | N/A     |  |
|        |   | F2 -  |         |  |
|        |   | F3 -  |         |  |
|        | - maximum break time (ms) at: 2 I <sub>An</sub>                                     | F1 -  | N/A     |  |
|        |   | F2 -  |         |  |
|        |   | F3 -  |         |  |
|        | - maximum break time (ms) at: 5 l <sub>Δn</sub> :                                   | F1 -  | N/A     |  |
|        |   | F2 -  |         |  |
|        |   | F3 -  |         |  |
|        | - maximum break time (ms) at: 0,25 A (if applicable)                                | F1 -  | N/A     |  |
|        | :   | F2 -  |         |  |
|        |   | F3 -  |         |  |

|        |                    | IEC 61008-1     |         |
|--------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
|        | •                  |                 |         |

|          | - maximum break time (ms) at: 500 A:                             | F1 -                    | N/A                                     |
|----------|--|-------------------------|---|
|          |  | F2 -                    |   |
|          |  | F3 -                    |   |
|          | No value exceeds the relevant specified limiting                 |                         | N/A                                     |
|          | value  |                         |   |
|          | Additional test for type S:                                      | T                       | as Alline                               |
|          | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s : | F1 -                    | N/A                                     |
|          |  | F2 -                    |   |
|          |  | F3 -                    |   |
|          | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s | F1 -                    | N/A                                     |
|          | :  | F2 -                    |   |
|          |  | F3 -                    |   |
|          | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s | F1 -                    | N/A                                     |
|          | :  | F2 -                    |   |
|          |  | F3 -                    |   |
|          | - minimum non actuating time (ms) at: 500 A; 0,04 s              | F1 -                    | N/A                                     |
|          | :  | F2 -                    |   |
|          |  | F3 -                    |   |
|          | No tripping during tests   |                         | N/A                                     |
| 9.17.5   | Verification of the reclosing function of automatically re       | eclosing RCCBs (under   | 1                                       |
|          | consideration)   |                         | 1 A A A A A A A A A A A A A A A A A A A |
| 9.11.2.4 | c) Verification of the coordination at the rated                 | 6000A                   |   |
|          | conditional residual short-circuit current (A): IAC .:           | _                       |   |
|          | Test circuit according to figure:                                | 7                       |   |
|          | Point of test circuit which is directly earthed:                 | Neutral of power supply | _                                       |
|          | Grid distance "a" (mm):  | 45mm                    | _                                       |
|          | Silver wire diameter (mm) or fuse                                | 0,75mm                  |   |
|          | Prospective current (A)  | 6000A                   | _                                       |
|          | Prospective current obtained (A)                                 | 6110A                   |   |
|          | Power factor   | 0,65-0,70               |   |
|          | Power factor obtained:   | 0,67                    | _                                       |
|          | Point of initiation: 45° ± 5°                                    | 45°                     | Р                                       |

| Report  | No :13 | በፖበበበ | 23SH   | 4_001 |
|---------|--------|-------|--------|-------|
| LZEDOLL | INO IS |       | 2001 I | へつひひょ |

| Clause | Requirement + Test  | Result - Remark                      | Verdict  |
|--------|---|--------------------------------------|----------|
|        | Verification of I²t (kA²s) and Ip (kA) prior to testing                         | 2t =25 kA2s                          | P        |
|        | (≥1x ≤1,1x values of table 15), RCCB replaced by a                              | ip =4,05kA                           | '        |
|        |   | ip =4,00001                          |          |
|        | connection having negligible impedance  | 0.4.00.4.00                          |          |
|        | Test sequence: O-t-CO-t-CO  | O-t-CO-t-CO                          | P _      |
|        | I²t (kA²s); Ip (kA)   | F1 - 19,7 kA <sup>2</sup> s, 3,98 kA | Р        |
|        |   | F2 - 15,5 kA <sup>2</sup> s, 3,97 kA |          |
|        | <del></del>   | F3 - 15,3 kA <sup>2</sup> s, 3,87 kA | _        |
|        | During tests no endangering of operator, no                                     |                                      | P        |
|        | permanent arcing, no flashover and no melting of                                |                                      |          |
|        | fuse F  |                                      |          |
|        | After the tests no damage impairing further use                                 |                                      | P        |
| 7.7.3  | The leakage current flowing across the open                                     | F1 - 6,48×10 <sup>-3</sup> mA        | Р        |
|        | contacts is measured at 1,1 Un and shall not                                    | F2 - 6,86×10 <sup>-3</sup> mA        |          |
|        | exceed 2mA (mA)   | F3 - 6,41×10 <sup>-3</sup> mA        |          |
| .7.3   | Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min: |                                      |          |
|        | a)  | F1 - OK                              | Р        |
|        | ,   | F2 - OK                              |          |
|        |   | F3 - OK                              |          |
|        | b)  | F1 - OK                              | Р        |
|        | <b>7</b>  | F2 - OK                              |          |
|        |   | F3 - OK                              |          |
|        | c):   | F1 - OK                              | P        |
|        | 0)  | F2 - OK                              |          |
|        |   | F3 - OK                              |          |
|        |   |                                      | - N14A   |
|        | d):   | F1 -                                 | N/A      |
|        |   | F2 -                                 |          |
|        |   | F3 -                                 | <u> </u> |
|        | e):   | F1 -                                 | N/A      |
|        |   | F2 -                                 |          |
|        |   | F3 -                                 |          |
|        | No flashover or breakdown:  | F1 - OK                              | P        |
|        |   | F2 - OK                              |          |
|        |   | F3 - OK                              |          |

|        | IEC 61008-1   |                                 |                   |
|--------|---|---------------------------------|-------------------|
| Clause | Requirement + Test  | Result - Remark                 | Verdict           |
|        |   |                                 |                   |
|        | Making and breaking In at Un:                                   | F1 - OK                         | Р                 |
|        |   | F2 - OK                         |                   |
|        |   | F3 - OK                         |                   |
|        | The RCCB shall trip with a test current of 1,25 I <sub>An</sub> | F1- 36 ms                       | P                 |
|        | (ms):   | F2- 35 ms                       |                   |
|        |   | F3- 31 ms                       |                   |
|        | The polyethylene sheet shows no holes                           |                                 | Р                 |
| 9.17   | Verification of the behaviour of RCCBs opening autor            | matically in case of failure of |                   |
|        | the line voltage  |                                 |                   |
| 9.17.1 | Limiting value of the line voltage (Ux):                        | <del>-</del>                    | A PARTY OF STREET |
|        | - rated voltage applied to the line terminals and               | F1 -                            | N/A               |
|        | progressively lowered to attain zero within about               | F2 -                            |                   |
|        | 30 s until automatic opening occurs; voltage (V) .:             | F3                              |                   |
|        | - all values less than 0,85 times the rated voltage             | F1 -                            | N/A               |
|        | (V)   | F2 -                            |                   |
|        | _   | F3 -                            |                   |
|        | - tripping test at test voltage (V) with $I_{\Delta n}$ and     | F1 -                            | N/A               |
|        | operating according to Table 1 (ms):                            | F2 -                            |                   |
|        |   | F3                              | _                 |
|        | No value exceeds the specified limiting values                  |                                 | N/A               |
|        | Not possible to close the apparatus by manual                   | F1 -                            | N/A               |
|        | operating means below Ux:                                       | F2 -                            |                   |
|        |   | F3                              |                   |
| 9.17.2 | Verification of behaviour in case of failure of the line        | voltage                         |                   |
|        | RCCB supplied with rated voltage, and the line                  |                                 | N/A               |
|        | voltage then switched off                                       |                                 | _                 |
|        | Time (ms) interval between switching off and                    | F1 -                            | N/A               |
|        | opening of the main contacts                                    | F2 -                            |                   |
|        |   | F3 -                            |                   |
|        | a) RCCBs opening without delay: no value exceeds                |                                 | N/A               |
|        | 0,5 s   |                                 |                   |
|        | b) RCCBs opening with delay: max. and min. values               |                                 | N/A               |
|        | within the range indicated by the manufacturer                  |                                 |                   |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

| 9.17.3  | Verification of the correct operation, in presence of a  | residual current, for RCCBs |                |
|---------|--|-----------------------------|----------------|
|         | opening with delay in case of failure of the line voltag   | e                           |                |
|         | RCCB connected according to fig. 4 at the rated  |                             | N/A            |
|         | voltage (Un):  |                             |                |
|         | All phases but one switched off by means of S3   |                             | N/A            |
|         | During the delay: test of 9.9.2:   |                             | WE TO SERVE TO |
| 9.9.2.1 | - steady increase from 0,2 l <sub>an</sub> to l <sub>an</sub> within 30 s (mA)   | F1 -                        | N/A            |
|         |  | F2 -                        |                |
|         |  | F3 -                        |                |
|         | - tripping current between I <sub>Δno</sub> and I <sub>Δn</sub> (mA):  | F1 -                        | N/A            |
|         |  | F2 -                        |                |
|         |  | F3 -                        |                |
|         | The RCCB closes on I <sub>Δn</sub> : no value exceeds the  | F1 -                        | N/A            |
|         | specified limiting value of Table 1 (ms)   | F2 -                        |                |
|         |  | F3 -                        |                |
| 3.9.2.3 | The test circuit being successively calibrated at each of the values of residual current specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                             |                |
|         | the test voltage is suddenly established by closing the test switch S1   |                             |                |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :  | F1 -                        | N/A            |
|         |  | F2 -                        |                |
|         |  | F3 -                        |                |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub> :  | F1 -                        | N/A            |
|         |  | F2 -                        |                |
|         |  | F3 -                        |                |
|         | - maximum break time (ms) at: 5 I <sub>Δn</sub>  | F1 -                        | N/A            |
|         |  | F2 -                        |                |
|         |  | F3 -                        |                |
|         | - maximum break time (ms) at: 0,25 A (if applicable)   | F1 -                        | N/A            |
|         | :  | F2 -                        |                |
|         |  | F3                          |                |
|         | - maximum break time (ms) at: 500 A  | F1 -                        | N/A            |
|         |  | F2 -                        |                |
|         |  | F3 -                        |                |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|         | No value exceeds the relevant specified limiting   |                                 | N/A   |  |
|---------|--|---------------------------------|-------|--|
|         | value Additional test for type S:  |                                 | - 工作法 |  |
|         | - minimum non actuating time (ms) at: l <sub>Δn</sub> ; 0,13 s :   | F1 -                            | N/A   |  |
|         | Thinning the decading time (me) at tall of the con-  | F2 -                            |       |  |
|         |  | F3 -                            |       |  |
|         | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s   | F1 -                            | N/A   |  |
|         | Tall of the control o | F2 -                            |       |  |
|         |  | F3 -                            |       |  |
|         | - minimum non actuating time (ms) at: 5 Ι <sub>Δη</sub> ; 0,05 s   | F1 -                            | N/A   |  |
|         |  | F2 -                            |       |  |
|         |  | F3 -                            |       |  |
|         | - minimum non actuating time (ms) at: 500 A; 0,04 s  | F1 -                            | N/A   |  |
|         |  | F2 -                            |       |  |
|         |  | F3 -                            |       |  |
|         | No tripping during tests   |                                 | N/A   |  |
| 9.17.4  | Verification of the correct operation of RCCBs with 3 or 4 current paths, neutral  |                                 |       |  |
|         | and one line terminal only being energized in turn:  |                                 |       |  |
| _       | RCCB connected according to fig. 4   | _                               | N/A   |  |
| 9.9.2.3 | The test circuit being successively calibrated at each of the values of residual current   |                                 |       |  |
|         | specified in Table 1, the test switch S2 and the RCCE  | B being in the closed position, |       |  |
|         | the test voltage is suddenly established by closing the  | e test switch S1                |       |  |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :  | F1 -                            | N/A   |  |
|         |  | F2 -                            |       |  |
|         |  | F3                              |       |  |
|         | - maximum break time (ms) at: 2 l <sub>Δn</sub> :  | F1 -                            | N/A   |  |
|         |  | F2 -                            |       |  |
|         |  | F3                              |       |  |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub> :  | F1 -                            | N/A   |  |
|         |  | F2 -                            |       |  |
|         |  | F3                              |       |  |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|        | - maximum break time (ms) at: 0,25 A (if applicable)                     | F1 -                  | N/A  |
|--------|--|-----------------------|--|
|        | :  | F2 -                  |  |
|        |  | F3 -                  |  |
|        | - maximum break time (ms) at: 500 A                                      | F1 -                  | N/A  |
|        |  | F2 -                  |  |
|        |  | F3 -                  |  |
|        | No value exceeds the relevant specified limiting                         |                       | N/A  |
|        | value  |                       | and the set of the final |
|        | Additional test for type S:  |                       |  |
|        | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :         | F1 -                  | N/A  |
|        |  | F2 -                  |  |
|        |  | F3 -                  |  |
|        | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s         | F1 -                  | N/A  |
|        | :  | F2 -                  |  |
|        | _  | F3 -                  |  |
|        | - minimum non actuating time (ms) at: 5 I <sub>Δn</sub> ; 0,05 s         | F1 -                  | N/A  |
|        | :  | F2 -                  |  |
|        |  | F3 -                  |  |
|        | - minimum non actuating time (ms) at: 500 A; 0,04 s                      | F1 -                  | N/A  |
|        | :  | F2 -                  |  |
|        |  | F3 -                  |  |
|        | No tripping during tests   |                       | N/A  |
| 9.17.5 | Verification of the reclosing function of automatically reconsideration) | eclosing RCCBs (under |  |

|          | TEST SEQUENCE F (3 samples: In=10A, I <sub>Δn</sub> = 0,3A, type AC) | F4 F5 F6                | Р |
|----------|--|-------------------------|---|
| 8.7      | Performance at short-circuit currents                                |                         |   |
| 9.11.2.4 | Verification of the coordination between the RCCB a                  | nd the SCPD             |   |
|          | b) Verification of the coordination at the rated                     | 500A                    | _ |
|          | making and breaking capacity (A): Im                                 |                         |   |
|          | Test circuit according to figure:                                    | 7                       |   |
|          | Point of test circuit which is directly earthed:                     | Neutral of power supply |   |
|          | Grid distance "a" (mm)   | 35mm                    |   |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

| _       | Silver wire diameter (mm) or fuse   | 0,35mm                        |     |
|---------|---|-------------------------------|-----|
|         | Prospective current (A)   | 500A                          |     |
|         | Prospective current obtained (A)  | 509A                          | _   |
| _       | Power factor  | 0,95~1                        | _   |
|         | Power factor obtained:  | 0,95                          |     |
|         | Point of initiation: 45° ± 5°   | 45°                           | Р   |
|         | Test sequence: O-t-CO-t-CO  | O-t-CO-t-CO                   | Р   |
|         | During tests no endangering of operator, no permanent arcing, no flashover and no melting of fuse F |                               | Р   |
|         | After the tests no damage impairing further use   |                               | Р   |
| 9.7.7.3 | The leakage current flowing across the open   | F4 - 6,36×10 <sup>-3</sup> mA | Р   |
|         | contacts is measured at 1,1 Un and shall not  | F5 - 6,41×10 <sup>-3</sup> mA |     |
|         | exceed 2mA (mA)   | F6 - 6,38×10 <sup>-3</sup> mA |     |
| 9.7.3   | Dielectric strength test of the main circuit at test volt   | age of 2 Un for 1 min:        |     |
|         | a):   | F4 - OK                       | Р   |
|         |   | F5 - OK                       |     |
|         |   | F6 - OK                       |     |
|         | b):   | F4 - OK                       | Р   |
|         |   | F5 - OK                       |     |
|         |   | F6 - OK                       |     |
|         | c):   | F4 - OK                       | Р   |
|         |   | F5 - OK                       |     |
|         |   | F6 - OK                       |     |
|         | d):   | F4 -                          | N/A |
|         |   | F5 -                          |     |
|         |   | F6                            |     |
|         | e)  | F4 -                          | N/A |
|         |   | F5 -                          |     |
|         |   | F6 -                          |     |
|         | No flashover or breakdown   | F4 - OK                       | Р   |
|         |   | F5 - OK                       |     |
|         |   | F6 - OK                       |     |

|        | IEC 61008-1   |                 |                |
|--------|---|-----------------|----------------|
| Clause | Requirement + Test  | Result - Remark | Verdict        |
|        |   |                 | Τ              |
|        | Making and breaking In at Un  | F4 - OK         | P              |
|        |   | F5 - OK         |                |
|        |   | F6 - OK         |                |
|        | The RCCB shall trip with a test current of 1,25 I <sub>∆n</sub>                                     | F4 - 36ms       | Р              |
|        | (ms)  | F5 - 29ms       |                |
|        | <u> </u>  | F6 - 31ms       |                |
|        | The polyethylene sheet shows no holes   |                 | P              |
| 9.17   | Verification of the behaviour of RCCBs opening automatically in case of failure of the line voltage |                 |                |
| 9.17.1 | Limiting value of the line voltage (Ux):  |                 | 28 a S a S a S |
|        | - rated voltage applied to the line terminals and   | F4 -            | N/A            |
|        | progressively lowered to attain zero within about   | F5 -            |                |
|        | 30 s until automatic opening occurs; voltage (V) .:   | F6              |                |
|        | - all values less than 0,85 times the rated voltage   | F4 -            | N/A            |
|        | (V):  | F5 -            |                |
|        |   | F6 -            |                |
|        | - tripping test at test voltage (V) with I <sub>Δn</sub> and  | F4 -            | N/A            |
|        | operating according to Table 1 (ms):  | F5 -            |                |
|        |   | F6 -            |                |
| _      | No value exceeds the specified limiting values  |                 | N/A            |
|        | Not possible to close the apparatus by manual   | F4 -            | N/A            |
|        | operating means below Ux  | F5 -            |                |
|        |   | F6              |                |
| 9.17.2 | Verification of behaviour in case of failure of the line voltage                                    |                 |                |
|        | RCCB supplied with rated voltage, and the line  |                 | N/A            |
|        | voltage then switched off   |                 |                |
|        | Time (ms) interval between switching off and  | F4 -            | N/A            |
|        | opening of the main contacts  | F5 -            |                |
|        |   | F6 -            |                |
|        | a) RCCBs opening without delay: no value exceeds  |                 | N/A            |
|        | 0,5 s   |                 |                |
|        | b) RCCBs opening with delay: max. and min. values   | _               | N/A            |
|        | within the range indicated by the manufacturer  |                 |                |

|        |                    | Page 108 of 179 | Report No.:130700 | 0023SHA-001 |
|--------|--------------------|-----------------|-------------------|-------------|
|        |                    | IEC 61008-1     |                   |             |
| Clause | Requirement + Test | -               | Result - Remark   | Verdict     |

| 9.17.3  | Verification of the correct operation, in presence of a residual current, for RCCBs      |  | PER PER    |
|---------|--|--|------------|
|         | opening with delay in case of failure of the line voltage                                |  |            |
|         | RCCB connected according to fig. 4 at the rated  |  | N/A        |
|         | voltage (Un):  |  |            |
| _       | All phases but one switched off by means of S3   |  | N/A        |
|         | During the delay: test of 9.9.2:   | <u> </u>   |            |
| 9.9.2.1 | - steady increase from 0,2 I <sub>Δn</sub> to I <sub>Δn</sub> within 30 s (mA)           | F4 -   | N/A        |
|         | :  | F5 -   |            |
|         |  | F6   |            |
|         | - tripping current between I <sub>Ano</sub> and I <sub>An</sub> (mA):                    | F4 -   | N/A        |
|         |  | F5 -   |            |
|         |  | F6 -   |            |
|         | The RCCB closes on I <sub>Δn</sub> : no value exceeds the                                | F4 -   | N/A        |
|         | specified limiting value of Table 1 (ms):  | F5 -   |            |
|         |  | F6 -   |            |
| 9.9.2.3 | The test circuit being successively calibrated at each of the values of residual current |  |            |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position,      |  |            |
|         | the test voltage is suddenly established by closing the test switch S1                   |  |            |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :  | F4 -   |            |
|         |  | 1 4 -  | N/A        |
|         |  | F5 -   | N/A        |
|         |  |  | N/A        |
|         | - maximum break time (ms) at: 2 l <sub>Δn</sub> :  | F5 -   | N/A<br>N/A |
|         | - maximum break time (ms) at: 2 l <sub>Δn</sub> :  | F5 -<br>F6 -   |            |
| _       | - maximum break time (ms) at: 2 l <sub>Δn</sub> :  | F5 -<br>F6 -<br>F4 -   |            |
| _       | - maximum break time (ms) at: 2 l <sub>Δn</sub>  | F5 -<br>F6 -<br>F4 -<br>F5 -   |            |
|         |  | F5 -<br>F6 -<br>F4 -<br>F5 -<br>F6 -   | N/A        |
|         |  | F5 -<br>F6 -<br>F4 -<br>F5 -<br>F6 -   | N/A        |
|         |  | F5 -<br>F6 -<br>F4 -<br>F5 -<br>F6 -<br>F4 -<br>F5 -                         | N/A        |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub> :  | F5 -<br>F6 -<br>F4 -<br>F5 -<br>F6 -<br>F5 -<br>F6 -                         | N/A<br>N/A |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub>  | F5 -<br>F6 -<br>F4 -<br>F5 -<br>F6 -<br>F5 -<br>F6 -<br>F4 -                 | N/A<br>N/A |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub>  | F5 -<br>F6 -<br>F4 -<br>F5 -<br>F6 -<br>F4 -<br>F5 -<br>F6 -<br>F4 -<br>F5 - | N/A<br>N/A |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub>  | F5 - F6 - F4 - F5 - F6 - F4 - F5 - F6 - F6 - F6 - F6 - F6 -                  | N/A<br>N/A |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|         | No value exceeds the relevant specified limiting value                              |              | N/A  |
|---------|---|--------------|------|
|         | Additional test for type S:   |              |      |
|         | - minimum non actuating time (ms) at: $I_{\Delta n}$ ; 0,13 s :                     | F4 -         | N/A  |
|         |   | F5 -         |      |
|         |   | F6 -         |      |
|         | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s                    | F4 -         | N/A  |
|         | :   | F5 -         |      |
|         | _   | F6 -         |      |
|         | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s                    | F4 -         | N/A  |
|         | :   | F5 -         |      |
|         |   | F6           |      |
|         | - minimum non actuating time (ms) at: 500 A; 0,04 s                                 | F4 -         | N/A  |
|         | :   | F5 -         |      |
|         |   | F6           |      |
|         | No tripping during tests  |              | N/A  |
| 9.17.4  | Verification of the correct operation of RCCBs with 3 or 4 current paths, neutral   |              |      |
|         | and one line terminal only being energized in turn:                                 |              |      |
|         | RCCB connected according to fig. 4  |              | N/A  |
| 9.9.2.3 | The test circuit being successively calibrated at each of the values of residual    |              |      |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |              |      |
|         | the test voltage is suddenly established by closing the                             |              |      |
|         |   |              | NICO |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :                                     | F4 -<br>F5 - | N/A  |
|         |   | F6 -         |      |
|         | maximum broak time (ma) at 2 l  | F4 -         | A1/0 |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub> :                                   | F5 -         | N/A  |
|         |   | F6 -         |      |
|         | maximum brook time (ms) at 51   |              | NIZA |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub> :                                   | F4 -<br>F5 - | N/A  |
|         |   | F6 -         |      |

|        | IE                 | C 61008-1       | _       |
|--------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

|          | - maximum break time (ms) at: 0,25 A (if applicable)                     | F4 -                    | N/A                                     |
|----------|--|-------------------------|---|
|          |  | F5 -                    |   |
|          |  | F6 -                    |   |
|          | - maximum break time (ms) at: 500 A:                                     | F4 -                    | N/A                                     |
|          |  | F5 -                    |   |
|          |  | F6                      |   |
|          | No value exceeds the relevant specified limiting value                   |                         | N/A                                     |
|          | Additional test for type S:  |                         |   |
|          | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :         | F4 -                    | N/A                                     |
|          |  | F5 -                    |   |
|          |  | F6                      |   |
|          | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s         | F4 -                    | N/A                                     |
|          | :  | F5 -                    |   |
|          |  | F6                      |   |
|          | - minimum non actuating time (ms) at: 5 I <sub>Δn</sub> ; 0,05 s         | F4 -                    | N/A                                     |
|          | :  | F5 -                    |   |
| _        |  | F6 -                    |   |
|          | - minimum non actuating time (ms) at: 500 A; 0,04 s                      | F4 -                    | N/A                                     |
|          |  | F5 -                    |   |
| _        |  | F6 -                    |   |
|          | No tripping during tests   |                         | N/A                                     |
| 9.17.5   | Verification of the reclosing function of automatically reconsideration) | eclosing RCCBs (under   |   |
| 9.11.2.4 | c) Verification of the coordination at the rated                         | 6000A                   |   |
|          | conditional residual short-circuit current (A): IΔc .:                   |                         | 100000000000000000000000000000000000000 |
|          | Test circuit according to figure   | 7                       |   |
|          | Point of test circuit which is directly earthed                          | Neutral of power supply |   |
|          | Grid distance "a" (mm)   | 45mm                    | 15 mm                                   |
|          | Silver wire diameter (mm) or fuse  | 0,35mm                  | -                                       |
|          | Prospective current (A)  | 6000A                   |   |
|          | Prospective current obtained (A)   | 6110A                   |   |
|          | Power factor   | 0,65-0,70               |   |
|          | Power factor obtained  |                         | _                                       |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|         | Point of initiation: 45° ± 5°                              | 45°                                     | Р   |
|---------|--|---|-----|
|         | Verification of I²t (kA²s) and Ip (kA) prior to testing    | I <sup>2</sup> t =3,7 kA <sup>2</sup> s | Р   |
|         | (≥1x ≤1,1x values of table 15), RCCB replaced by a         | Ip =1,7 kA                              |     |
|         | connection having negligible impedance                     |   |     |
|         | Test sequence: O-t-CO-t-CO                                 | O-t-CO-t-CO                             | P   |
|         | I²t (kA²s); Ip (kA)  | F4 - 1,11kA2s, 1,20 kA                  | Р   |
|         |  | F5 - 0,88kA <sup>2</sup> s, 1,25 kA     |     |
|         |  | F6 - 0,78kA2s, 1,15 kA                  |     |
|         | During tests no endangering of operator, no                |   | Р   |
|         | permanent arcing, no flashover and no melting of           |   |     |
|         | fuse F   |   |     |
|         | After the tests no damage impairing further use            |   | Р   |
| 9.7.7.3 | The leakage current flowing across the open                | F4 - 6,59×10 <sup>-3</sup> mA           | Р   |
|         | contacts is measured at 1,1 Un and shall not               | F5 - 6,50×10 <sup>-3</sup> mA           |     |
|         | exceed 2mA (mA)  | F6 - 6,40×10 <sup>-3</sup> mA           |     |
| 9.7.3   | Dielectric strength test of the main circuit at test volta | age of 2 Un for 1 min:                  |     |
|         | a)   | F4 - OK                                 | Р   |
|         |  | F5 - OK                                 |     |
|         |  | F6 - OK                                 |     |
|         | b):  | F4 - OK                                 | Р   |
|         |  | F5 - OK                                 |     |
|         |  | F6 - OK                                 |     |
|         | c)   | F4 - OK                                 | Р   |
|         | ,  | F5 - OK                                 |     |
|         |  | F6 - OK                                 |     |
|         | d)   | F4 -                                    | N/A |
|         | ,  | F5 -                                    |     |
|         |  | F6 -                                    |     |
|         | e)   | F4 -                                    | N/A |
|         | ,  | F5 -                                    |     |
|         |  | F6 -                                    |     |
|         | No flashover or breakdown                                  | F4 - OK                                 | P   |
|         |  | F5 - OK                                 |     |
|         |  | F6 - OK                                 |     |

|        | IEC 61008-1  |                                 |         |
|--------|--|---------------------------------|---------|
| Clause | Requirement + Test   | Result - Remark                 | Verdict |
|        | -  |                                 |         |
|        | Making and breaking In at Un:                                  | F4 - OK                         | Р       |
|        |  | F5 - OK                         |         |
|        |  | F6 - OK                         |         |
|        | The RCCB shall trip with a test current of 1,25 $I_{\Delta n}$ | F4- 37 ms                       | P       |
|        | (ms):  | F5- 30 ms                       |         |
|        |  | F6- 28 ms                       |         |
|        | The polyethylene sheet shows no holes                          |                                 | Р       |
| 9.17   | Verification of the behaviour of RCCBs opening autor           | natically in case of failure of |         |
|        | the line voltage   |                                 | - 15 6  |
| 9.17.1 | Limiting value of the line voltage (Ux):                       |                                 |         |
|        | - rated voltage applied to the line terminals and              | F4 -                            | N/A     |
|        | progressively lowered to attain zero within about              | F5 -                            |         |
|        | 30 s until automatic opening occurs; voltage (V) :             | F6                              |         |
|        | - all values less than 0,85 times the rated voltage            | F4 -                            | N/A     |
|        | (V):   | F5 -                            |         |
|        |  | F6                              |         |
|        | - tripping test at test voltage (V) with I <sub>Δn</sub> and   | F4 -                            | N/A     |
|        | operating according to Table 1 (ms)                            | F5 -                            |         |
|        |  | F6                              |         |
|        | No value exceeds the specified limiting values                 |                                 | N/A     |
|        | Not possible to close the apparatus by manual                  | F4 -                            | N/A     |
|        | operating means below Ux                                       | F5 -                            |         |
|        |  | F6                              |         |
| 9.17.2 | Verification of behaviour in case of failure of the line       | /oltage                         |         |
|        | RCCB supplied with rated voltage, and the line                 |                                 | N/A     |
|        | voltage then switched off                                      |                                 |         |
|        | Time (ms) interval between switching off and                   | F4 -                            | N/A     |
|        | opening of the main contacts                                   | F5 -                            |         |
|        |  | F6 -                            |         |
|        | a) RCCBs opening without delay: no value exceeds               |                                 | N/A     |
|        | 0,5 s  |                                 |         |
|        | b) RCCBs opening with delay: max. and min. values              |                                 | N/A     |
|        | within the range indicated by the manufacturer                 |                                 |         |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

| 9.17.3  | Verification of the correct operation, in presence of a  | residual current, for RCCBs   |            |
|---------|--|---|------------|
|         | opening with delay in case of failure of the line voltag   | e   |            |
|         | RCCB connected according to fig. 4 at the rated  |   | N/A        |
|         | voltage (Un)   |   |            |
|         | All phases but one switched off by means of S3   |   | N/A        |
|         | During the delay: test of 9.9.2:   |   |            |
| 9.9.2.1 | - steady increase from 0,2 I <sub>Δn</sub> to I <sub>Δn</sub> within 30 s (mA)   | F4 -  | N/A        |
|         |  | F5 -  |            |
|         |  | F6  |            |
| _       | - tripping current between I <sub>Δno</sub> and I <sub>Δn</sub> (mA):  | F4 -  | N/A        |
|         |  | F5 -  |            |
|         |  | F6 -  |            |
|         | The RCCB closes on I <sub>3n</sub> : no value exceeds the  | F4 -  | N/A        |
|         | specified limiting value of Table 1 (ms):  | F5 -  |            |
|         | <b>5</b>   | F6 -  |            |
| 9.9.2.3 | The test circuit being successively calibrated at each of the values of residual current specified in Table 1, the test switch S2 and the RCCB being in the closed position, the test voltage is suddenly established by closing the test switch S1. |   |            |
|         | the test voltage is suddenly established by closing the  |   |            |
|         | the test voltage is suddenly established by closing the  |   | N/A        |
|         | the test voltage is suddenly established by closing the - maximum break time (ms) at: $I_{\Delta n}$ :   | e test switch S1  | N/A        |
|         |  | e test switch S1  | N/A        |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :  | F4 -<br>F5 -  |            |
|         |  | F4 - F6 - F4 -  | N/A        |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :  | F4 -<br>F5 -<br>F6 -  |            |
|         | - maximum break time (ms) at: I <sub>Δn</sub>  | F4 - F5 - F6 - F5 -   |            |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :  | F4 - F5 - F6 - F6 - F7                       | N/A        |
|         | - maximum break time (ms) at: I <sub>Δn</sub>  | F4 - F5 - F6 - F6 - F6 - F7                  | N/A        |
|         | - maximum break time (ms) at: I <sub>Δn</sub>  | F4 - F5 - F6                                 | N/A<br>N/A |
|         | - maximum break time (ms) at: I <sub>Δn</sub>  | F4 - F5 - F6 - F4 - F5 - F5 - F6 - | N/A        |
|         | - maximum break time (ms) at: I <sub>Δn</sub>  | F4 - F5 - F6 - F5 - F6 - F5 - F6 - | N/A<br>N/A |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub>  | F4 - F5 - F6 - F4 - F5 - F5 - F6 - | N/A<br>N/A |
|         | - maximum break time (ms) at: I <sub>Δn</sub>  | F4 - F5 - F6 - F6 - F6 - F6 -      | N/A<br>N/A |

| Ranort | Nο   | :1307000  | 1235H   | <u>Δ_</u> Δη1 |
|--------|------|-----------|---------|---------------|
| Report | IVO. | . 1307000 | JZ337I/ | 4-UU I        |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|         | No value exceeds the relevant specified limiting                                    |                  | N/A |
|---------|---|------------------|-----|
|         | value   |                  |     |
|         | Additional test for type S:   |                  |     |
|         | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :                    | F4 -             | N/A |
|         |   | F5 -             |     |
|         |   | F6               |     |
|         | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s                    | F4 -             | N/A |
|         | :   | F5 -             |     |
|         |   | F6 -             |     |
|         | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s                    | F4 -             | N/A |
|         | :   | F5 -             |     |
|         |   | F6               |     |
|         | - minimum non actuating time (ms) at: 500 A; 0,04 s                                 | F4 ~             | N/A |
|         | :   | F5 -             |     |
|         |   | F6               |     |
|         | No tripping during tests  |                  | N/A |
| 9.17.4  | Verification of the correct operation of RCCBs with 3 or 4 current paths, neutral   |                  |     |
|         | and one line terminal only being energized in turn:                                 |                  |     |
|         | RCCB connected according to fig. 4  |                  | N/A |
| 9.9.2.3 | The test circuit being successively calibrated at each of the values of residual    |                  |     |
|         | current   |                  |     |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                  |     |
|         | the test voltage is suddenly established by closing the                             | e test switch S1 |     |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :                                     | F4 -             | N/A |
|         |   | F5 -             |     |
|         |   | F6               |     |
|         | - maximum break time (ms) at: 2 l <sub>Δn</sub> :                                   | F4 -             | N/A |
|         |   | F5 -             |     |
|         |   | F6 -             |     |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub> :                                   | F4 -             | N/A |
|         |   | F5 -             |     |
|         |   | F6 -             |     |

| IEC 61008-1 |  |                 |              |  |
|-------------|--|-----------------|--------------|--|
| Clause      | Requirement + Test   | Result - Remark | Verdict      |  |
|             |  |                 |              |  |
|             | - maximum break time (ms) at: 0,25 A (if applicable)                               | F4 -            | N/A          |  |
|             | :  | F5 -            |              |  |
|             | _  | F6              |              |  |
|             | - maximum break time (ms) at: 500 A:   | F4 -            | N/A          |  |
|             |  | F5 -            |              |  |
|             |  | F6 -            |              |  |
|             | No value exceeds the relevant specified limiting                                   |                 | N/A          |  |
|             | value  |                 |              |  |
|             | Additional test for type S:  |                 | Maining      |  |
|             | - minimum non actuating time (ms) at: $I_{\Delta n}$ ; 0,13 s :                    | F4 -            | N/A          |  |
|             |  | F5 -            |              |  |
|             |  | F6 -            |              |  |
|             | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s                   | F4 -            | N/A          |  |
|             | :  | F5 -            |              |  |
|             |  | F6              |              |  |
|             | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s                   | F4 -            | N/A          |  |
|             | :  | F5 -            |              |  |
|             |  | F6              |              |  |
|             | - minimum non actuating time (ms) at: 500 A; 0,04 s                                | F4 -            | N/A          |  |
|             |  | F5 -            |              |  |
| _           |  | F6 -            |              |  |
|             | No tripping during tests   | _               | N/A          |  |
| .17.5       | 7.5 Verification of the reclosing function of automatically reclosing RCCBs (under |                 |              |  |
|             | consideration)   |                 | Veri in Line |  |

|        | TEST SEQUENCE G (3 samples: In= 63A, I <sub>∆n</sub> = 0,03A, type AC) | G1 G2 G3               | P   |
|--------|--|------------------------|-----|
| 9.22   | Verification of reliability  |                        | 173 |
| 9.22.1 | Climatic test based on Clause 4 of IEC 60068-2-3:20                    | 000 and IEC 60068-3-4: |     |
|        | - number of cycles: 28   | 28                     | Р_  |
|        | - test temperature: upper temperature 55 °C ± 2 °C                     | 55 °C                  | _ P |
|        | Initial verification:  |                        |     |

|             | Page 116 of 179  | Report No.:13     | 30700023SHA-0 |  |  |  |
|-------------|--|-------------------|---------------|--|--|--|
| IEC 61008-1 |  |                   |               |  |  |  |
| Clause      | Requirement + Test   | Result - Remark   | Verdict       |  |  |  |
|             |  |                   |               |  |  |  |
| 9.9.2.3     | - maximum break time at I <sub>Δn</sub> (ms)                     | G1 - 33ms         | Р             |  |  |  |
|             |  | G2 - 34ms         |               |  |  |  |
|             |  | G3 - <u>34</u> ms |               |  |  |  |
|             | No value exceeds the specified limiting value                    | ок                | Р             |  |  |  |
|             | Additional test for type S:                                      |                   |               |  |  |  |
|             | - minimum non actuating time (ms) at: I <sub>An</sub> ; 0,13 s : | G1 -              | N/A           |  |  |  |
|             |  | G2 -              |               |  |  |  |
|             |  | G3 -              |               |  |  |  |
|             | No tripping during tests   |                   | P             |  |  |  |
|             | Climatic test: no tripping during 28 cycles test:                | G1 - No trip      | Р             |  |  |  |
|             |  | G2 - No trip      |               |  |  |  |
|             |  | G3 - No trip      |               |  |  |  |
|             | Final verification: the RCCB shall trip with a test              | G1 - 31ms         | P             |  |  |  |
|             | current of 1,25 I <sub>∆n</sub> (ms):                            | G2 - 24ms         |               |  |  |  |

G3 - 27ms

| l.      | TEST SEQUENCE G<br>(3 samples: In= 10A, I <sub>∆n</sub> = 0,3A, type A) | G4 G5 G6               | Р     |
|---------|---|------------------------|-------|
| 9.22    | Verification of reliability   |                        |       |
| 9.22.1  | Climatic test based on Clause 4 of IEC 60068-2-3:20                     | 000 and IEC 60068-3-4: |       |
|         | - number of cycles: 28  | 28                     | Р     |
|         | - test temperature: upper temperature 55 °C ± 2 °C                      | 55 °C                  | Р     |
|         | Initial verification:   |                        |       |
| 9.9.2.3 | - maximum break time at I <sub>Δn</sub> (ms):                           | G4 - 37ms              | Р     |
|         |   | G5 - 38ms              |       |
|         |   | G6 - 35ms              | _     |
|         | No value exceeds the specified limiting value                           | ок                     | Р     |
|         | Additional test for type S:   |                        | TIP T |
|         | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :        | G4 -                   | N/A   |
|         |   | G5 -                   |       |
|         |   | G6 -                   |       |
|         | No tripping during tests  |                        | р     |

|        | Page 117 of 179                                     | Report No.:130700023SHA-0 |         |  |  |  |  |
|--------|---|---------------------------|---------|--|--|--|--|
|        | IEC 61008-1   |                           |         |  |  |  |  |
| Clause | Requirement + Test                                  | Result - Remark           | Verdict |  |  |  |  |
|        | Climatic test: no tripping during 28 cycles test:   | G4 - No trip              |         |  |  |  |  |
|        | ,   | G5 - No trip              |         |  |  |  |  |
|        |   | G6 - No trip              |         |  |  |  |  |
|        | Final verification: the RCCB shall trip with a test | G4 - 26ms                 | Р       |  |  |  |  |
|        | current of 1,25 I <sub>Δn</sub> (ms):               | G5 - 29ms                 |         |  |  |  |  |
|        |   | G6 - 31ms                 |         |  |  |  |  |

Page 118 of 179

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|                 | TEST SEQUENCE H (3 samples: In=63A, IΔn= 0                      | ,03A, type A)   | IN SOUTH    |
|-----------------|---|---|-------------|
| IEC 61543:      |   |   | i e i e i e |
| table4-<br>T1.1 | Harmonics, interharmonics                                       |   | Р           |
| table4-         | Signalling voltage  |   | Р           |
| table5-         | Conducted unidirectional transients of the ms and µs time scale |   |             |
|                 | Test results of test sequence H:                                |   |             |
|                 | see test report No.   | See 130700024SHA  |             |
|                 | Testing location / address                                      | Building No.86, 1198 Qinzhou<br>Road (North), Shanghai<br>200233, China |             |

|                 | TEST SEQUENCE I (3 samples: In= 63A, iΔn= 0,03A, type A)                      |   |   |  |  |
|-----------------|---|---|---|--|--|
| IEC 61543:      | 1000年後7月7日の日本の大学の大学<br>1000年 - 1000日 日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日 |   |   |  |  |
| table5-<br>T2.1 | Conducted sine-wave voltages or currents                                      |   | Р |  |  |
| table5-<br>T2.5 | Radiated high-frequency phenomena   |   |   |  |  |
| table5-<br>T2.2 | Fast transients (burst)   |   | P |  |  |
|                 | Test results of test sequence I:  |   |   |  |  |
|                 | see test report No.   | See 130700024SHA  |   |  |  |
|                 | Testing location / address  | Building No.86, 1198 Qinzhou<br>Road (North), Shanghai<br>200233, China |   |  |  |

|            | TEST SEQUENCE J (3 samples: In= 63A, IΔn= 0,03A, type A)             |   |
|------------|--|---|
| IEC 61543: |  |   |
| table5-    | Conducted common mode disturbances in the frequency range lower than | Р |
| T2.6       | 150 kHz  |   |

| Page 119 of 179 Report No.:130700023SHA           |  |  |  | 30700023SHA-001 |  |  |
|---|--|--|--|-----------------|--|--|
| IEC 61008-1                                       |  |  |  |                 |  |  |
| Clause Requirement + Test Result - Remark Verdict |  |  |  |                 |  |  |

| table6- | Electrostatic discharges         |                              | Р |
|---------|----------------------------------|------------------------------|---|
|         | Test results of test sequence J: |                              |   |
|         | see test report No.              | See 130700024SHA             | _ |
|         | Testing location / address       | Building No.86, 1198 Qinzhou |   |
|         |                                  | Road (North), Shanghai       |   |
|         |                                  | 200233, China                |   |

| Page 120 of 179 Report No.:130700023SHA- |   |  | 023SHA-001 |  |  |
|--|---|--|------------|--|--|
| IEC 61008-1                              |   |  |            |  |  |
| Clause                                   | Clause Requirement + Test Result - Remark Verdict |  |            |  |  |

|                 | <b>对社员</b>  | ANNEX A (NORMATIVE)  |
|-----------------|---|--|
|                 | Test sequenc  | e and number of samples to be submitted for certification purposes Table A 1 - Test sequences  |
| Test sequen     | ce Clause or subclause  | Test ( or inspection)  |
| Aı              | 6<br>8.1.1<br>8.1.2<br>9.3<br>8.1.3<br>9.15<br>9.4<br>9.5<br>9.6<br>9.13<br>8.1.3<br>9.25 | Marking General Mechanism Indelibility of marking Clearance and creepage distances (external parts only) Trip free mechanism Reliability of screws, current-carrying parts and connections Reliability of terminals for external conductors Protection against electric shock Resistance to heat Clearances and creepage distances (internal parts) Resistance to rusting  |
| A <sub>2</sub>  | 9.14  | Resistance to abnormal heat and to fire  |
| В               | 9.7.7.4  9.7.7.5 b) 9.7.1  9.7.2  9.7.3  9.7.4  9.7.7.2  9.7.5  9.7.6  9.8  9.22.2  9.23  | Resistance of the insulation of open contacts and basic insulation against an impulse voltage in normal conditions  Verification of the behaviour of components bridging the basic insulation Resistance to humidity Insulation resistance of the main circuit Dielectric strength of the main circuit Insulation resistance an dielectric strength of auxiliary circuits  Verification of clearances with the impulse withstand voltage  Secondary circuit of detection transformers  Capability of control circuits connected to the main circuits etc.  Temperature-rise Reliability at 40°C  Ageing of electronic components |
| С               | 9.10  | Mechanical and electrical endurance  |
|                 | 0 9.9   | Residual operating characteristics   |
| D               | 9.17<br>9.19<br>9.21<br>9.11.2.3 a)b)<br>9.16<br>9.12<br>9.18                             | Behaviour in case of failure of the line voltage Unwanted tripping Behaviour in case of surge currents D.C. components Performance at lon Test device Resistance to mechanical shock and impact Non-operating current under overcurrent conditions   |
| D <sub>2</sub>  | 9.11.2.3 c)   | Verification of the suitability of RCCBs for use in IT-systems   |
| Ε               | 9.11.2.4 a)   | Coordination at I <sub>nc</sub>  |
|                 | 9.11.2.2  | Performance at I <sub>m</sub>  |
| F               | 9.11.2.4 b)   | Coordination at I <sub>m</sub>   |
|                 | 9.11.2.4 c)   | Coordination at I <sub>de</sub>  |
| G               | 9.22.1  | Reliability (climatic tests)   |
| H <sup>a)</sup> | IEC 61543 Table 4 -T1.1<br>IEC 61543 Table 4 -T1.2<br>IEC 61543 Table 5 -T2.3             | Harmonics, interharmonics<br>Signalling voltage<br>Surges  |
| ı               | JEC 61543 Table 5 -T2.1<br>IEC 61543 Table 5 -T2.5<br>IEC 61543 Table 5 -T2.2             | Conducted sine-wave voltages or currents Radiated electromagnetic field Fast transients (burst)  |
| J               | IEC 61543 Table 5 - T2.6  | Conducted common mode disturbances in the frequency range lower than 150 kHz Electrostatic discharges  |
| tests           |   | erating oscillator, the test of CISPR 14-1 shall be carried out on the samples prior to the  |

| Page 121 of 179 Report No.:130700023SHA-001 |                    |  |                 |         |  |  |
|---|--------------------|--|-----------------|---------|--|--|
| IEC 61008-1                                 |                    |  |                 |         |  |  |
| Clause                                      | Requirement + Test |  | Result - Remark | Verdict |  |  |

| Table A.2 - Number of samples for full test procedure |                   |   |   |  |  |  |
|---|-------------------|---|---|--|--|--|
| Test sequence <sup>a</sup>                            | Number of samples | Minimum number of accepted samples <sup>b</sup> | Maximum number of samples for repeated tests <sup>c</sup> |  |  |  |
| A <sub>1</sub>  | 1                 | 1   |   |  |  |  |
| A <sub>2</sub>  | 3                 | 2   | 3   |  |  |  |
| В   | 3                 | 2   | 3   |  |  |  |
| С   | 3                 | 2   | 3   |  |  |  |
| D   | 3                 | 2 <sup>d</sup>                                  | 3   |  |  |  |
| D <sub>2</sub>  | 3                 | 3   | 3   |  |  |  |
| E E   | 3                 | 2 <sup>d</sup>                                  | 3   |  |  |  |
| F   | 3                 | 2 <sup>d</sup>                                  | 3   |  |  |  |
| G   | 3                 | 2   | 3   |  |  |  |
| H <sup>e</sup>  | 3                 | 2   | 3   |  |  |  |
| l e   | 3                 | 2   | 3   |  |  |  |
| J e   | 3                 | 2   | 3   |  |  |  |

- In total a maximum of three test sequences may be repeated. a)
- It is assumed that a sample which has not passed a test has not met the requirements due to b) workmanship or assembly defects which are not representative of the design.
- In the case of repeated tests, all test results must be acceptable. c)
- d) All samples shall meet the requirements in 9.9.2, 9.9.3, and 9.11.2.3, as appropriate. In addition, permanent arcing or flashover between poles or between poles and frame shall not occur in any sample during tests of 9.11.2.2, 9.11.2.4 a), 9.11.2.4 b) or 9.11.2.4 c).
- At the manufacturer's request, the same set of samples may be subjected to more than one of e) these test sequences.

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

| Tool coor once                  | Number                       | f samples according to the numb            | or of notice a) a)                                |
|---------------------------------|------------------------------|--|---|
| Test sequence                   |                              |  |   |
|                                 | 2-poles b) c)                | 3-poles (3-f) (1)                          | 4-poles e)  |
| A <sub>1</sub>                  | 1 max. rating I <sub>N</sub> | 1 max. rating I <sub>N</sub>               | 1 max. rating IN                                  |
|                                 | min. rating I <sub>2N</sub>  | min. rating I <sub>ΔN</sub>                | min. rating l <sub>ΔN</sub>                       |
| $A_2$                           | 3 max. rating I <sub>N</sub> | 3 max. rating I <sub>N</sub>               | 3 max. rating IN                                  |
|                                 | min. rating l₄N              | min. rating lan                            | min, rating l <sub>△N</sub>                       |
| В                               | 3 max. rating I <sub>N</sub> | 3 max. rating I <sub>N</sub>               | 3 max. rating I <sub>N</sub>                      |
|                                 | min. rating I <sub>△N</sub>  | min. rating I <sub>ΔN</sub>                | min. rating lan                                   |
| С                               | 3 max. rating I <sub>N</sub> | 3 max. rating I <sub>N</sub>               | 3 max. rating I <sub>N</sub>                      |
|                                 | min. rating $I_{\Delta N}$   | min. rating $I_{\Delta N}$                 | min. rating l <sub>ΔN</sub>                       |
| D <sub>0</sub> + D <sub>1</sub> | 3 max. rating I <sub>N</sub> | 3 max. rating I <sub>N</sub>               | 3 max. rating I <sub>N</sub>                      |
|                                 | min. rating I <sub>AN</sub>  | min. rating I <sub>AN</sub>                | min. rating I <sub>ΔN</sub>                       |
| D <sub>0</sub>                  |                              | 1 for all other ratings of I <sub>ΔN</sub> |   |
| D <sub>2</sub>                  | 3 max. rating I <sub>N</sub> | 3 max. rating I <sub>N</sub>               | 3 max. rating I <sub>N</sub>                      |
|                                 | min. rating $I_{\Delta N}$   | min. rating $I_{\Delta N}$                 | min. rating $I_{\Delta N}$                        |
| Ĕ                               | 3 max. rating I <sub>N</sub> | 3 max. rating I <sub>N</sub>               | 3 max, rating I <sub>N</sub>                      |
|                                 | min. rating $I_{\Delta N}$   | min. rating $I_{\Delta N}$                 | min. rating $I_{\Delta N}$                        |
| F                               | 3 max. rating I <sub>N</sub> | 3 max. rating I <sub>N</sub>               | 3 max. rating I <sub>N</sub>                      |
|                                 | min, rating $I_{\Delta N}$   | min. rating $I_{\Delta N}$                 | min. rating $I_{\Delta N}$                        |
|                                 | 3 min. rating I <sub>N</sub> | 3 min. rating $I_N$                        | 3 min. rating $I_N$                               |
|                                 | max. rating I <sub>AN</sub>  | max. rating l <sub>△N</sub>                | max. rating I <sub>AN</sub>                       |
|                                 | 3 max. rating I <sub>N</sub> | 3 max, rating I <sub>N</sub>               | 3 max. rating I <sub>N</sub>                      |
|                                 | min. rating I <sub>AN</sub>  | min. rating $I_{\Delta N}$                 | min. rating $I_{\Delta N}$                        |
|                                 | 3 min. rating I <sub>N</sub> | 3 min. rating I <sub>N</sub>               | 3 min. rating I <sub>N</sub>                      |
|                                 | max, rating I <sub>△N</sub>  | max. rating I <sub>AN</sub>                | max. rating $I_{\Delta N}$                        |
| Н                               |                              |  | 3 <sup>h)</sup> samples of the same rat           |
|                                 |                              |  | $I_N$ chosen at random min. rating $I_{\Delta N}$ |
|                                 |                              |  | 3 h) samples of the same rate                     |
| •                               |                              |  | I <sub>N</sub> chosen at random                   |
|                                 |                              |  | min. rating l <sub>△N</sub>                       |
| J                               |                              |  | 3 h) samples of the same rat                      |
|                                 |                              |  | $l_N$ chosen at random min. rating $l_{\Delta N}$ |

If a test is to be repeated according to the minimum performance criteria of clause A.2, a new set of samples is used for the a) relevant test. In the repeated test all test results must be acceptable.

- Also applicable to 1-pole RCCBs with uninterrupted neutral and 2-pole RCCBs with 1 protected pole. c)
- d) Also applicable to 3-pole RCCBs with two protected poles
- e) f) Also applicable to 3-pole RCCBs with uninterrupted neutral and 4-pole RCCBs with 3 protected poles.
- This column is omitted when 4-pole RCCBs have been tested.
- g) h) If only one value of  $I_{\Delta N}$  is submitted, min. rating  $I_{\Delta N}$  and max. rating  $I_{\Delta N}$  are replaced by  $I_{\Delta N}$ .
- Only the highest number of current paths.
- i) If a 3-pole RCCB with 4 current paths and a 4-pole RCCB are submitted, then only the 4-pole RCCB is tested, with exception of the test of 9.8 of test sequence B for which both types are submitted to the test.

b) If only 3-pole or 4-pole RCCBs are submitted, this column shall also apply to a set of samples with the smallest number of

| IEC 61008-1 |                    |  |                 |  |         |
|-------------|--------------------|--|-----------------|--|---------|
| Clause      | Requirement + Test |  | Result - Remark |  | Verdict |

| Test sequence Number of samples according to the number of poles a) |  |  |  |
|---|--|--|--|
|   | 2-pole b) c)   | 3-pole e)  | 4-pole d)  |
| D <sub>0</sub> + D <sub>1</sub>                                     | 1 max. rating I <sub>N</sub> min. rating I <sub>AN</sub>             | 1 max. rating I <sub>N</sub> min. rating I <sub>AN</sub> | 1 max. rating I <sub>N</sub> min. rating I <sub>ΔN</sub> |
| D <sub>0</sub>  | 1 for all other ratings of I <sub>AN</sub> with max. I <sub>AN</sub> |  |  |

- a) If a test is to be repeated according to the minimum performance criteria of clause A.2, a new set of samples is used for the relevant test. In the repeated test all test results must be acceptable.
- b) If only 3-pole or 4-pole RCCBs are submitted, this column shall also apply to a set of samples with the smallest number of poles.
- c) Also applicable to 1-pole RCCBs with uninterrupted neutral.
- d) Also applicable to 3-pole RCCBs with uninterrupted neutral.
- e) This column is omitted when 4-pole RCCBs are being tested.

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|     | ANNEX B DETERMINATION OF CLEARANCES AND CREEPAGE DISTANCES  |     |
|-----|---|-----|
| B.1 | General   | Р   |
|     | In determining clearances and creepage distances, it is recommended that the following points should be considered.   | P   |
| B.2 | Orientation and location of a creepage distance   | Р   |
|     | If necessary, the manufacturer shall indicate the intended orientation of the equipment or component in order that creepage distances are not adversely affected by the accumulation of pollution for which they were not designed.   | Р   |
| B.3 | Creepage distances where more than one material is used   | N/A |
|     | A creepage distance may be split in several portions of different materials and/or have different pollution degrees if one of the creepage distances is dimensioned to withstand the total voltage or if the total distance is dimensioned according to the material having the lowest CTI.                       | N/A |
| B.4 | Creepage distances split by floating conductive part  | N/A |
|     | A creepage distance may be split into several parts, made with insulation material having the same CTI, including or separated by floating conductors as long as the sum of the distances across each individual part is equal or greater than the creepage distance required if the floating part did not exist. | N/A |
|     | The minimum distance X for each individual part of the creepage distance is given in IEC 60664-1:2007, 6.2 (see also Example 11 in Figure B.1).   |     |
| B.5 | Measurement of creepage distances and clearances  | Р   |
|     | In determining creepage distances according to IEC 60664-1, the dimension X, specified in the following examples, has a minimum value of 1,0 mm for pollution degree 2.   | N/A |
|     | If the associated clearance is less than 3 mm, the minimum dimension $X$ may be reduced to one third of this clearance.   | N/A |
|     | The methods of measuring creepage distances and clearances are indicated in Example 1 to 11. These cases do not differentiate between gaps and grooves or between types of insulation.  | P   |
|     | The following assumptions are made:   | P   |
|     | <ul> <li>any recess is assumed to be bridged with an insulating link having a length<br/>equal<br/>to the specified width X and being placed in the most unfavourable position (see<br/>Example 3);</li> </ul>  | Р   |
|     | - where the distance across a groove is equal to or larger than the specified width X, the creepage distance is measured along the contours of the groove (see Example 3);  | Р   |
|     | - creepage distances and clearances measured between parts which can assume different positions in relation to each other, are measured when these parts are in their most unfavourable position.   | Р   |

|        |                  | IEC 61008-1 |                 |         |
|--------|------------------|-------------|-----------------|---------|
| Clause | Requirement + Te | st          | Result - Remark | Verdict |

| ANNEX C ARRANGEMENT FOR THE DETECTION OF THE EMISSION OF ION GASES DURING SHORT-CIRCUIT TESTS   | IIZED      |
|---|------------|
| The device under test is mounted as shown in figure C.1, which may req adapting to the specific design of the device, and in accordance with the manufacturer's instructions.   |            |
| When required (i.e. during "O" operations), a clear polyethylene sheet (0 0,01) mm thick, of a size at least 50 mm larger, in each direction, than th overall dimensions of the front face of the device but not less than 200 m 200 mm, is fixed and reasonably stretched in a frame, placed at a distart 10 mm from | nm ×       |
| <ul> <li>either the maximum projection of the operating means of a device without recess for the operating means;</li> </ul>  | out P      |
| <ul> <li>or the rim of a recess for the operating means of a device with recess for operating means.</li> </ul>   | or the N/A |
| The sheet should have the following physical properties:  | Р          |
| Density at 23 °C: 0,92 ± 0,05 g/cm³   |            |
| Melting-point: 110 °C - 120 °C.   |            |
| When required, a barrier of insulating material, at least 2 mm thick, is pla<br>as shown in figure C.1, between the arc vent and the polyethylene sheet<br>prevent damage of the sheet due to hot particles emitted from the arc ve   | to         |
| When required, a grid (or grids) according to figure C.2 is (are) placed at distance of "a" mm from each arc vent side of the device.   | ta P       |
| The grid circuit (see figure C.3) shall be connected to the points B and C figures 7 or 8, as applicable).  | (see P     |
| The parameters for the grid circuit are as follows:   | Р          |
| Resistor R': 1,5 Ω  | Р          |
| Copper wire F': length 50 mm, and diameter in accordance with 9.11.2.1  | f 1). P    |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|     | ANNEX D<br>ROUTINE TESTS   |      |      |      |     |  |
|-----|--|------|------|------|-----|--|
| D.1 | General  |      |      |      |     |  |
|     | The tests specified in this standard are intended to reveal, as far as safety is concerned, unacceptable variations in material or manufacture.  |      |      |      |     |  |
|     | In general, further tests have to be made to ensure that every RCCB conforms with the samples that withstood the tests of this standard, according to the experience gained by the manufacturer.   |      | _    |      | N/A |  |
| D.2 | Tripping test  |      |      |      |     |  |
|     | A residual current is passed through each pole of the RCCB in turn. The RCCB shall not trip at a current less than or equal to $0.5\ l_{\Delta N}$ , but it shall trip at $l_{\Delta N}$ within a specified time (see Table 1).                          | [ms] | [ms] | [ms] | N/A |  |
| _   |  |      |      |      | N/A |  |
|     | The test current shall be applied at least five times to each RCCB and shall be applied at least twice to each pole.   |      |      |      | N/A |  |
| D.3 | Electric strength test   |      |      |      | ~~  |  |
|     | A voltage of substantially sine-wave form of 1 500 V having a frequency of 50 Hz/60 Hz is applied for 1 s as follows:  |      |      |      | N/A |  |
|     | a) with the RCCB in the open position, between each pair of terminals which are electrically connected together when the RCCB is in closed position  |      |      |      | N/A |  |
|     | b) for RCCBs not incorporating electronic components, with the RCCB in the closed position, between each pole in turn and the others connected together  |      |      |      | N/A |  |
|     | c) for RCCBs incorporating electronic components, with the RCCB in the open position, either between all incoming terminals of poles in turn or between all outgoing terminals of poles in turn, depending on the position of the electronic components. |      |      |      | N/A |  |
| _   | No flashover or breakdown shall occur  |      |      |      | N/A |  |
| 0.4 | Performance of the test device   |      |      |      |     |  |
|     | With the RCCB in the closed position, and connected to a supply at the appropriate voltage, the test device, when operated, shall open the RCCB.   |      |      |      | N/A |  |
|     | Where the test device is intended to operate at more than one value of rated voltage, the test shall be made at the lowest value of rated voltage.   |      |      |      | N/A |  |

|        |                    | IEC 61008-1 |                 |   |         |
|--------|--------------------|-------------|-----------------|---|---------|
| Clause | Requirement + Test |             | Result - Remark | _ | Verdict |

| J     | ANNEX J Particular requirements for RCCBs with screwless type terminals for external copper conductors  |     |  |  |  |  |
|-------|---|-----|--|--|--|--|
| J.1   | 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 <sup>2</sup> . |     |  |  |  |  |
| J.6   | Marking and other product information   |     |  |  |  |  |
|       | in addition to clause 6:  | N/A |  |  |  |  |
|       | universal terminals:  | N/A |  |  |  |  |
|       | no markings   | N/A |  |  |  |  |
| _     | non-universal terminals:  | N/A |  |  |  |  |
|       | terminals for rigid-solid conductors marked by "sol"  | N/A |  |  |  |  |
|       | terminals for rigid (solid and stranded) conductors marked by "r"   | N/A |  |  |  |  |
|       | terminals for flexible conductors marked by "f"   | N/A |  |  |  |  |
|       | Marking on the RCCB or  | N/A |  |  |  |  |
|       | if the space available is not sufficient on the smallest package unit or in technical information   | N/A |  |  |  |  |
|       | Marking indicating the length of insulation to be removed before insertion of the conductor into the terminal shown on the RCBO   | N/A |  |  |  |  |
|       | Manufacturer shall provide information in his literature, on the maximum number of conductors which may be clamped.   | N/A |  |  |  |  |
| J.8   | Standard conditions for operating in service and for installation   |     |  |  |  |  |
|       | clause 8 applies with the following modifications: in 8.1.5, only 8.1.5.1, 8.1.5.2, 8.1.5.3, 8.1.5.6 and 8.1.5.7 apply  | N/A |  |  |  |  |
|       | Compliance is checked by inspection and by the tests of J.9.1 and J.9.2 of this annex, instead of 9.4 and 9.5.  | N/A |  |  |  |  |
| J.8.1 | Connection or disconnection of conductors   | N/A |  |  |  |  |
|       | The connection or disconnection of conductors shall be made:  | N/A |  |  |  |  |
|       | - by the use of a general purpose tool or by a convenient device integral with the terminal to open it and to assist the insertion or the withdrawal of the conductors (e.g. for universal terminals)   | N/A |  |  |  |  |

| IEC 61008-1 |  |                 |         |  |  |
|-------------|--|-----------------|---------|--|--|
| Clause      | Requirement + Test   | Result - Remark | Verdict |  |  |
|             |  |                 |         |  |  |
|             | or, for rigid conductors by simple insertion. For the disconnection of the conductors an operation other than a pull on the conductor shall be necessary (e.g. for push-wire terminals). |                 | N/A     |  |  |
|             | Universal terminals shall accept rigid (solid or stranded) and flexible unprepared conductors.   |                 | N/A     |  |  |
|             | Non-universal terminals shall accept the types of conductors declared by the manufacturer.   |                 | N/A     |  |  |
|             | Compliance is checked by inspection and by the tests of J.9.1 and J.9.2.   |                 | N/A     |  |  |
| J.8.2       | Dimensions of connectable conductors   |                 | N/A     |  |  |
|             | The dimensions of connectable conductors are given in Table J.1.   |                 | N/A     |  |  |
|             | The ability to connect these conductors shall be checked by inspection and by the tests of J.9.1 and J.9.2.  |                 | N/A     |  |  |
| J.8.3       | Connectable cross-sectional areas  |                 | N/A     |  |  |
|             | nominal cross-sections to be clamped acc. table J.2  |                 | N/A     |  |  |
| _           | compliance checked by inspection and tests of J.9.1 and J.9.2.   |                 | N/A     |  |  |
| J.8.5       | Design and construction of terminals   |                 | N/A     |  |  |
|             | terminals so designed and constructed that:  |                 |         |  |  |
|             | - each conductor clamped individually  |                 | N/A     |  |  |
|             | - during operation of connection or disconnection the conductors can be connected or disconnected either at the same time or separately  |                 | N/A     |  |  |
|             | - inadequate insertion of the conductor is avoided   |                 | N/A     |  |  |
|             | It shall be possible to clamp securely any number of conductors up to the maximum provided for   |                 | N/A     |  |  |
|             | compliance checked by inspection and tests of J.9.1 and J.9.2.   |                 | N/A     |  |  |
| J.8.6       | Resistance to ageing   |                 | N/A     |  |  |
|             | compliance checked by the test of J.9.3.   |                 | N/A     |  |  |
| J.9         | Tests  |                 |         |  |  |
|             | Clause 9 applies, by replacing 9.4 and 9.5 by the following tests  |                 | N/A     |  |  |
| J.9.1       | Test of reliability of screwless terminals   |                 |         |  |  |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

| J.9.1.1 | Reliability of screwless system   |     | N/A |
|---------|---|-----|-----|
|         | three terminals of poles of new samples, with copper conductors of the rated cross sectional area in accordance with Table J.2, types of conductors in accordance with J.8.1.   |     | N/A |
|         | The connection and subsequent disconnection shall be made five times with:  |     | N/A |
| _       | Min. cross-section (mm²)  | mm² | N/A |
|         | Max. cross-section (mm²)  | mm² | N/A |
|         | new conductors used each time, except for the fifth time, when the conductor used for the fourth insertion is clamped at the same place. Before insertion into the terminal, wires of stranded rigid conductors re-shaped and wires of flexible conductors twisted to consolidate the ends. |     | N/A |
|         | After each insertion, the conductor being inserted rotated 90 ° along its axis at the level of the clamped section and subsequently disconnected.   |     | N/A |
|         | After tests, the terminal not damaged in such a way as to impair its further use.   |     | N/A |
| J.9.1.2 | Test of reliability of connection   |     | N/A |
|         | three terminals of poles of new samples, with copper conductors of the rated cross sectional area in accordance with Table J.2, types of conductors in accordance with J.8.1.   |     | N/A |
|         | Before insertion into the terminal, wires of stranded rigid conductors and flexible conductors reshaped and wires of flexible conductors twisted to consolidate the ends.   |     | N/A |
|         | possible to fit the conductor into the terminal without undue force in the case of universal terminals and with the force necessary by hand in the case of push-wire terminals.   |     | N/A |
|         | conductor pushed as far as possible into the terminal or inserted so that adequate connection is obvious.   |     | N/A |
|         | Min. cross-section (mm²)  | mm² | N/A |
|         | Max. cross-section (mm²)  |     | N/A |
|         | After the test, no wire of the conductor shall have escaped outside the terminal.   |     | N/A |
| J.9.2   | Tests of reliability of terminals for external conductors: mechanical strength  |     | N/A |

|        | IEC 61008-1   |             |          |          |           |  |
|--------|---|-------------|----------|----------|-----------|--|
| Clause | Requirement + Test  | Result      | - Remark |          | Verdic    |  |
|        | three terminals of poles of new samples fitted with new conductors of the type and of the minimum and maximum cross-sectional areas acc. Table J.2. | _           |          |          | N/A       |  |
|        | Min. cross-section (mm²)  | mm²         |          |          | N/A       |  |
|        | Max. cross-section (mm²)  | mm²         |          |          | N/A       |  |
|        | wires of stranded rigid conductors and flexible conductors reshaped and wires of flexible conductors twisted to consolidate the ends.               |             |          |          | N/A       |  |
|        | Pull for 1 min, min. cross-section (N)  | N           |          |          | N/A       |  |
|        | Pull for 1 min, max. cross-section (N)  | N           |          |          | N/A       |  |
| _      | During the test no noticeable move of conductor   |             |          |          | N/A       |  |
| .9.3   | Cycling test  |             |          |          | N/A       |  |
|        | Universal, rigid conductors - 3 samples<br>Universal, flexible conductors - 3 samples   |             |          |          |           |  |
|        | Non-universal, solid conductors - 3 samples   |             |          |          | N/A       |  |
|        | Non-universal, rigid (solid) stranded conductors - 3 samples Non-universal, rigid (stranded) stranded conductors - 3 samples                        |             |          |          |           |  |
|        | Non-universal, flexible conductors - 3 samples  |             |          |          | N/A       |  |
|        | Cross-section (mm²)   | . mm²       |          |          | N/A       |  |
|        | Test current I <sub>N</sub> (A)   | Α           |          |          | N/A       |  |
|        | samples subjected to 192 temperature cycles   |             |          |          | N/A       |  |
|        | Voltage drop after 192 cycles:  |             |          |          |           |  |
|        | voltage drop, measured at each terminal, at the end of the 192 <sup>nd</sup> cycle, exceeded not the smaller of the two following values:           |             |          |          | N/A       |  |
|        | - 22,5 mV   |             |          |          | N/A       |  |
|        | - 1,5 times the value measured after the 24th cycle   |             |          |          | N/A       |  |
|        |   | sample<br>1 | sample 2 | sample 3 | <b></b>   |  |
|        |   | [mV]        | [mV]     | [mV]     | <u></u> _ |  |
|        | - rigid solid conductors  |             |          |          | N/A       |  |
|        | - rigid stranded conductors   |             |          | _        | N/A       |  |
|        | - flexible conductors   |             |          |          | N/A       |  |
|        | Voltage drop after 24 <sup>th</sup> cycle:  |             |          |          |           |  |
|        |   | sample<br>1 | sample 2 | sample 3 |           |  |
|        |   | [mV]        | [mV]     | [mV]     |           |  |

|        | Page 131 of 179 Report No  |                 | 130700023SHA-001 |
|--------|--|-----------------|------------------|
|        | IEC 61008-1  |                 |                  |
| Clause | Requirement + Test   | Result - Remark | Verdict          |
|        |  |                 |                  |
|        | - rigid solid conductors   |                 | N/A              |
|        | - rigid stranded conductors  |                 | N/A              |
|        | - flexible conductors  |                 | N/A              |
|        | after this test: no changes evidently impairing further use, such as cracks, deformations or the like. |                 | N/A              |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

| K       | Par   | ticular requirements   | ANNEX K<br>for RCCBs with flat qu              | ick-connect terminations |     |  |  |
|---------|---|--|--|--------------------------|-----|--|--|
| K.1     | quick<br>width<br>conn  | -connect terminations<br>6,3 mm and thicknes<br>ector for connecting e                     |  | ctors according to the   |     |  |  |
| K.6     | Marki   | ng and other product in  | nformation                                     |                          |     |  |  |
|         | in add  | dition to clause 6, addit<br>():   | ion after the lettered                         |                          |     |  |  |
|         | IEC 6   | nation regarding the fe<br>1210 and type of cond<br>ven in the manufacture                 |  |                          | N/A |  |  |
|         | I) mar  | nufacturer's name or tr  | ade mark                                       |                          | N/A |  |  |
|         | m) typ  | oe reference   |  |                          | N/A |  |  |
|         |   | r code of insulated fem  | ions of conductors and nale connectors (see    |                          | N/A |  |  |
|         | o) the  | use of only silver or til  | n-plated copper alloys                         |                          | N/A |  |  |
| K.8     | Requi   | Requirements for construction and operation  |  |                          |     |  |  |
|         | Claus   | Clause 8 applies, with the following exceptions:   |  |                          |     |  |  |
|         |   | ause 8.1.3 applies, the fitted to the male tabs  |  |                          | N/A |  |  |
|         | replac  | replace the contents of 8.1.5 by the following:  |  |                          |     |  |  |
| K.8.2   | Term  | inals for external condi   | uctors   |                          | N/A |  |  |
| K.8.2.1 | metal<br>condu  | tabs and female conne<br>having mechanical structivity and resistance<br>air intended use. | ength, electrical                              |                          | N/A |  |  |
| K.8.2.2 | The nominal width of the mathematic the thickness 0,8 mm, applup to and including 16 A.  NOTE 1:The use for rated curre 20 A is accepted in BE, FR, IT, P |  | cable to rated currents                        |                          | N/A |  |  |
|         | those   | limensions of the male<br>specified in Table K.3<br>nd K.5                                 | tab shall comply with and in figures K.2, K.3, |                          | N/A |  |  |
|         |   | Dimensions of tabs   | according Table K.3                            | Measured in mm           |     |  |  |
|         |   | Minimum [mm]   | Maximum [mm]                                   |                          |     |  |  |
| Α       | Dimple  | 0,7  | 1,0  |                          | N/A |  |  |
|         | Hole  | 0,5  | 1,0  |                          | N/A |  |  |
| В       | Dimple  | 7,8 min  |  |                          | N/A |  |  |

|        |        |       |   | IEC 61008-1  |                       |                           |                   |         |
|--------|--------|-------|---|--|-----------------------|---------------------------|-------------------|---------|
| Clause | Red    | quire | ment + Test                                   | _  | Result                | - Remark                  |                   | Verdict |
|        |        |       |   |  |                       |                           |                   |         |
|        | Hole   |       | 7,8 min                                       |  |                       |                           |                   | N/A     |
| С      | Dimple | :     | 0,77  | 0,84   |                       |                           |                   | N/A     |
|        | Hole   |       | 0,77  | 0,84   |                       |                           |                   | N/A     |
| D      | Dimple | ;     | 6,20  | 6,40   |                       |                           |                   | N/A     |
|        | Hole   |       | 6,20  | 6,40   |                       |                           |                   | N/A     |
| E      | Dimple | ;     | 3,6   | 4,1  |                       |                           |                   | N/A     |
|        | Hole   |       | 4,3   | 4,7  |                       |                           |                   | N/A     |
| F      | Dimple | ;     | 1,6   | 2,0  |                       |                           |                   | N/A     |
|        | Hole   |       | 1,6   | 2,0  |                       | _                         |                   | N/A     |
| J      | Dimple | ;     | 8°  | 12°  |                       |                           |                   | N/A     |
|        | Hole   |       | 8°  | 12°  |                       |                           |                   | N/A     |
| М      | Dimple | ;     | 2,2   | 2,5  |                       | <del>-</del>              |                   | N/A     |
|        | Hole   |       |   |  |                       |                           |                   |         |
| N      | Dimple | ,     | 1,8   | 2,0  |                       |                           |                   | N/A     |
|        | Hole   |       |   |  |                       |                           |                   |         |
| Р      | Dimple | ,     | 0,7   | 1,8  |                       |                           |                   | N/A     |
|        | Hole   |       | 0,7   | 1,8  |                       |                           |                   | N/A     |
| Q      | Dimple |       | 8,9 min                                       |  |                       |                           |                   | N/A     |
|        | Hole   |       | 8,9 min                                       |  |                       |                           |                   | N/A     |
|        |        |       |   | onnector which may be K.6 and in Table K.4.        |                       |                           |                   | N/A     |
|        |        |       |   |  |                       | request acc.<br>table K.3 | measured<br>value |         |
|        |        |       |   |  | B <sub>3</sub>        | 7,8mm                     |                   | N/A     |
|        |        |       |   |  | max                   | ,                         |                   |         |
|        |        |       |   |  | L <sub>2</sub><br>max | 3,5mm                     |                   | N/A     |
| K.9    | Tes    | sts   |   |  |                       |                           |                   | *=      |
|        | cla    | use   | 9 applies with the fol                        | lowing modifications:                              |                       |                           |                   | N/A     |
|        | rep    | lace  | the contents of 9.5                           | by the following text:                             |                       |                           |                   | N/A     |
| K.9.1  | Me     | char  | nical overload-force                          | ·  |                       |                           |                   | N/A     |
|        |        |       | one on 10 terminals on all use when wiring to |  |                       |                           | N/A               |         |
|        | for    |       |   | ssively the axial pull<br>e male tab integrated in |                       |                           |                   | N/A     |
|        | Pu     | sh 9  | 6N  |  |                       |                           | _                 | N/A     |
|        | Pu     | i 88  | N   | _  |                       |                           |                   | N/A     |

|        | Page 134 of 179  | Report No.:1    | 30700023SHA-001 |
|--------|--|-----------------|-----------------|
|        | IEC 61008-1  | _               |                 |
| Clause | Requirement + Test   | Result - Remark | Verdict         |
|        |  |                 |                 |
|        | No damage occurred to the tab or to the RCCB in which the tab is integrated.   |                 | N/A             |
|        | addition to 9.8.3:   |                 | N/A             |
|        | Fine -wire thermocouples shall be placed in such a way as not to influence the contact or the connection area. An example of placement is shown in fig K.1 |                 | N/A             |

| IEC 61008-1 |                    |  |                 |         |  |
|-------------|--------------------|--|-----------------|---------|--|
| Clause      | Requirement + Test |  | Result - Remark | Verdict |  |

| L       | ANNEX L Specific requirements for RCCBs with screw-type terminals for external untreated aluminium conductors and with aluminium screw-type terminals for use with copper or with aluminium conductors  |           |     |
|---------|---|-----------|-----|
| L.6     | Marking and other product information   |           |     |
|         | In addition to clause 6 the following apply:  |           | N/A |
|         | Terminal marking according table L.1, on the RCCB, near the terminals   |           | N/A |
|         | Conductor types accepted:   |           | N/A |
|         | Copper only   | None      | N/A |
|         | Aluminium only  | "AI"      | N/A |
|         | Aluminium and copper  | ☐ "Al/Cu" | N/A |
|         | Other information concerning the number of conductors, screw torque (if different from table 10) and cross-section shall be indicated on the RCCB   | Nm<br>mm² | N/A |
| L.7     | Standard conditions for operation in service  |           |     |
|         | Clause 7 applies  |           | N/A |
| L.8     | Constructional requirements   |           |     |
|         | Clause 8 applies with the following exceptions:   |           | N/A |
| 8.1.5.2 | add the following text at the end of 8.1.5.2:   |           | N/A |
|         | For connection of aluminium conductors, RCCBs shall be provided with screw-type terminals allowing the connection of conductors having nominal cross-sections as shown in table L.2   |           | N/A |
|         | Terminals for the connection of aluminium conductors and terminals of aluminium for the connection of copper or aluminium conductors shall have mechanical strength adequate to withstand the tests of 9.4, with the test conductors tightened with the torque indicated in table 11, or with the torque specified by the manufacturer, which shall never be lower than that specified in table 11. |           | N/A |
|         | Compliance is checked by inspection, by measurement and by fitting in turn one conductor of the smallest and one of the largest cross-section areas as specified  |           | N/A |
| 3.1.5.4 | replace the text of 8.1.5.4 by the following:   |           | N/A |
|         | Terminals shall allow the conductors to be connected without special preparation  |           | N/A |
|         | Compliance is checked by inspection and by the tests of L.9   |           | N/A |

|         | IEC 61008-1  |   |         |
|---------|--|---|---------|
| Clause  | Requirement + Test   | Result - Remark                                 | Verdict |
|         |  |   |         |
| L.9     | Tests  |   |         |
|         | Clause 9 applies with the following modifications/additions:   |   | N/A     |
|         | For the tests which are influenced by the material of the terminal and the type of conductor that can be connected, the test conditions of table L.3 are applied   |   | N/A     |
|         | Additionally the test of L.9.2 is carried out on terminals separated from the RCCB   |   | N/A     |
| L.9.2   | Current cycling test   |   | N/A     |
|         | This test is carried out on separate terminals   |   | N/A     |
| L.9.2.3 | Test arrangement   |   | N/A     |
|         | The general arrangement of the samples shall be as shown in figure L.1   |   | N/A     |
|         | 90 % of torque stated by the manufacturer or selected in table 10 used for the specimens   | torque: Nm                                      | N/A     |
|         | The test is carried out with conductors according to table L.5. The length of the test conductor from the point of entry to the screw-type terminal specimens to the equalizer shall be as in table L.6  | cross-section: mm² minimum conductor length: mm | N/A     |
|         | Cross section of equalizer not greater than that given in table L.7  | max. cross-section: mm²                         | N/A     |
| L.9.2.5 | Test method and acceptance criteria  |   | N/A     |
|         | Test loop subjected to 500 cycles of 1h current-<br>on and 1h current-off, starting at an a.c. current<br>value of 1,12 times the test current value<br>determined in table L.8  | test current: A                                 | N/A     |
|         | Near the end of each current-on period of the first 24 cycles, the current shall subsequently be adjusted to raise the temperature of the reference conductor to 75°C  |   | N/A     |
|         | At the end of the 25 <sup>th</sup> cycle the test current shall<br>be adjusted the last time and the stable<br>temperature shall be recorded as the first<br>measurement. No further adjustment of test<br>current for the remainder of the test |   | N/A     |
|         | Temperatures recorded for at least one cycle of each working day, and after approximately 25, 50, 75, 100, 125, 175, 225, 275, 350, 425 and 500 cycles   |   | N/A     |
|         | For each screw-type terminal:  |   | N/A     |
|         | - the temperature rise shall not exceed 110 K  |   | N/A     |
|         | - the stability factor Sf shall not exceed ± 10 °C   |   | N/A     |
|         | ambient air temperature: °C  |   | N/A     |

| Report | No.:13070 | 0023SHA- | -001 |
|--------|-----------|----------|------|
|--------|-----------|----------|------|

| IEC 61008-1 |                    |    |                |         |
|-------------|--------------------|----|----------------|---------|
| Clause      | Requirement + Test | Re | esult - Remark | Verdict |

|            | max.<br>temperature rise<br>[K] | max.<br>stability factor Sf<br>[°C] |     |
|------------|---------------------------------|-------------------------------------|-----|
| Terminal 1 |                                 |                                     | N/A |
| Terminal 2 |                                 |                                     | N/A |
| Terminal 3 |                                 |                                     | N/A |
| Terminal 4 |                                 |                                     | N/A |
| Terminal 5 |                                 |                                     | N/A |
| Terminal 6 |                                 |                                     | N/A |
| Terminal 7 |                                 |                                     | N/A |
| Terminal 8 |                                 |                                     | N/A |

|        | IEC 61008-1        |  |                 |         |  |  |
|--------|--------------------|--|-----------------|---------|--|--|
| Clause | Requirement + Test |  | Result - Remark | Verdict |  |  |

## ATTACHMENT TO TEST REPORT IEC 61008-1 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES

Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs)

Differences according to.....: EN 61008-1:2012 used in conjunction with

EN 61008-2-1:1994 + A11:1998

Attachment Form No...... EU\_GD\_IEC61008\_1F

Attachment Originator .....: OVE

Master Attachment.....: Dated 2013-01

Copyright © 2013 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.

|             | CENELEC COMMON MODIFICATIONS (EN)  |                   | P |
|-------------|--|-------------------|---|
|             |  |                   |   |
|             | GENERAL  |                   |   |
| 9.11        | Short circuit tests  |                   |   |
| 9.11.2.1 d) | Value of power frequency recovery voltage shall be equal to 110% of the rated voltage    |                   |   |
| 9.11.2.1 b) | Tolerances and test quantities   |                   |   |
|             | voltage (including recovery voltage): 0, -5%   |                   |   |
|             | TEST SEQUENCE "A" replace the complete test sequences "A <sub>1</sub> , A <sub>2</sub> " | A <sub>1</sub> -1 | P |
|             | (1 sample: In= 63A, IΔn= 0,03A, type A)  |                   |   |
| 6           | MARKING  |                   |   |
| 6.Z1        | standard marking   |                   |   |
|             | EACH RCCB SHALL BE MARKED IN A DURABLE MANNER ACCORDING TO THE FOLLOWING TABLE Z3.       |                   | P |
|             | RCCB MARKED WITH:  |                   |   |
| a)          | The manufacturer's name or trademark   | ELMARK            | P |
| b)          | Type designation, catalogue number or serial number                                      | JEL1              | P |
| c)          | Rated voltage(s) with the symbol ~   | 240~              | P |
| d)          | Rated frequency, if the RCCB is designed for frequencies other than 50Hz                 | 50/60Hz           | Р |
| e)          | rated current  | 63A               | Р |
| f)          | Rated residual operating current (I <sub>Δn</sub> ) in A or in mA                        | 30mA              | Р |

|         | IEC 61008-1   |                 |         |
|---------|---|-----------------|---------|
| Ciause  | Requirement + Test  | Result - Remark | Verdict |
| <u></u> |   |                 |         |
| h) *)   | Rated making and breaking capacity (I <sub>m</sub> )  |                 | N/A     |
| )<br>   | The degree of protection (only if different from IP20)  |                 | N/A     |
| <)      | The position of use (symbol according to IEC 60051), if necessary   |                 | N/A     |
| ) *}    | Rated residual making and breaking capacity ( $I_{\Delta m}$ ), if different from rated short-circuit capacity ( $I_m$ )  |                 | N/A     |
| n)      | The symbol S (S in a square) for type S devices   |                 | N/A     |
| ٦)      | symbol of the method of operation according to Table Z1 of 4.1 if the RCCB is functionally dependent on the line voltage  |                 | Р       |
| o)      | Operating means of the test device, by the letter T (It is recommended to advise the user to test the device regularly)   | Т               | P       |
| p)      | Wiring diagram unless the correct mode of operation is evident  |                 | Р       |
| )       | Operating characteristic in presence of residual currents with d.c. components  |                 |         |
|         | - RCCBs of type AC with the symbol 🖂  |                 | N/A     |
|         | - RCCBs of type A with the symbol   | <u></u>         | P       |
| 5)      | RCCBs according to 4 Z2 marked with the symbol (snowflake enclosing -25)  |                 | Р       |
| )       | Indication of the terminal for the neutral with "N"   |                 | Р       |
| (۱      | Additional marking of performance to other standards or additional requirements according to 6.Z2   |                 | N/A     |
|         | *) $I_{\Delta M}$ and $I_m$ (if different of $I_{\Delta M}$ ) may be anywhere on the device or in the catalogue but shall be together.  |                 | N/A     |
|         | 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 this shall be specified in the manufacturers literature |                 | N/A     |
|         | The manufacturer shall state the Joule integral I²t and the peak current Ip withstand capability of the RCCB. Where this are not stated, minimum values as given in table 15 apply.   |                 | N/A     |
|         | RCCB classified acc. 4.1.2.1: Time delay when opening in case of failure of the line voltage (s)  |                 | N/A     |
|         | RCCB's other than operated by means of push button, open position indicated by "0" and closed position by " "   |                 | Р       |
|         | Additional national symbols are allowed<br>Provisionally the use of national indications only is<br>allowed   |                 | N/A     |

|        | Page 140 of 179  IEC 61008-1   | Report No.:13070 |           |
|--------|--|------------------|-----------|
|        |  | Daniel Damanie   | \\/amdiat |
| Clause | Requirement + Test   | Result - Remark  | Verdict   |
|        | These indication visible when RCCB is installed  |                  |           |
|        | For push-buttons the OFF push-button shall either  |                  | N/A       |
|        | be red and/or marked with "O"  |                  |           |
|        | RED shall not be uses for any other push-button  |                  | Р         |
|        | If a push-button is used for closing the contacts and is evidently identified as such, its depressed position is sufficient to indicate the closed position.   |                  | N/A       |
|        | 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. |                  | N/A       |
|        | If necessary to distinguish between supply and load terminals they shall be clearly marked   |                  | N/A       |
|        | Terminals for neutral circuit N  |                  | P         |
|        | Terminal for protective conductor  |                  | N/A       |
|        | The suitability for isolation, which is provided by all RCCBs of this standard, may be indicated by the symbol on the device   |                  | Р         |
|        | The base for plug-in RCCBs shall be marked with the following:   |                  | N/A       |
|        | - rated current or maximum rated current   |                  | N/A       |
| _      | - trade mark   |                  | N/A       |
|        | Marking indelible, easy legible and not on removable parts   |                  | Р         |
|        | Labels not easy to remove and no curling. Test acc. to cl. 9.3: 15 s with water and 15 s with hexane   |                  | Р         |
| 6.Z2   | additional marking   |                  |           |
|        | Additional marking to other standards (EN or IEC or other) or additional requirements are allowed under the following conditions:  |                  | N/A       |
|        | - The RCCB shall comply with all the requirements of the additional standard.  |                  | N/A       |
|        | - The relevant standards 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.Z.1.   |                  | N/A       |
|        | 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.   |                  | N/A       |

| Report | No | .:1307 | 70002 | 23SH | IA-001 |
|--------|----|--------|-------|------|--------|
|--------|----|--------|-------|------|--------|

| Clause | Requirement + Test  | Result - Remark | Verdict |
|--------|---|-----------------|---------|
|        |   |                 | _       |
| 3.     | Requirements for construction and operation   |                 |         |
| 3.1    | mechanical design   |                 |         |
| 8.1.1  | General   |                 |         |
|        | Not possible to alter the operating characteristics by means of external interventions  |                 | Р       |
|        | It shall not be possible to disable or inhibit the RCCB function by any means.  |                 | Р       |
|        | In case of an RCCB having multiple settings of residual operating current, the rating refers to the highest setting.  |                 | N/A     |
| 3.1.2  | Mechanism   |                 |         |
|        | Moving contacts of all poles so mechanically coupled that all poles except switched neutral make and break substantially together   |                 | Р       |
|        | Switched neutral of four-pole RCCBs shall not close after and shall not open before the other poles   |                 | N/A     |
|        | Trip-free mechanism   |                 | P       |
|        | Possible to switch on and off by hand   |                 | Р       |
|        | No intermediate position of the contacts  |                 | Р       |
|        | RCCBs shall provide in the open position an isolating distance in accordance with the requirements necessary to satisfy the isolating function (see 8.3)  |                 | P       |
|        | Indication of the open and closed position of the main contacts shall be provided by one or both of the following means:  |                 | Р       |
|        | - the position of the actuator (this being preferred)   |                 | Р       |
|        | - a separate mechanical indicator   |                 | Р       |
|        | If a separate mechanical indicator is used to indicate the position of the main contacts, this shall show the colour:   |                 | Р       |
|        | - red for the closed position (ON)  |                 | Р       |
|        | - green for the opened position (OFF)   |                 | Р       |
|        | The means of indication of the contact position shall be reliable (Compliance is checked by inspection and by the test of 9.15  |                 | Р       |
|        | RCCBs 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 9.9 and 9.11) |                 | Р       |
|        | When means are provided or specified by the manufacturer to lock the operating means in the   |                 | N/A     |

| IEC 61008-1 |   |                 |         |  |
|-------------|---|-----------------|---------|--|
| Clause      | Requirement + Test  | Result - Remark | Verdict |  |
|             | open position, locking in that position shall only be possible when the main contacts are in the open position. (Compliance is checked by inspection, taking into account the instructions of the manufacturer)   |                 |         |  |
|             | If operating means is used for indication it shall, when released, automatically take up the position to that of the moving contacts; operating means shall have two rest positions except that for automatic opening a third distinct position may be provided, when necessary to reset before reclosing |                 | Р       |  |
|             | When an indicator light is used this shall be lit when the RCCB is in the closed position   |                 | N/A     |  |
|             | The indicator light shall not be the only means to indicate the closed position.  |                 | N/A     |  |
|             | The action of the mechanism shall not be influenced by the position of enclosures or covers and shall be independent of any removable part.   |                 | Р       |  |
|             | If the cover is used as a guiding means for push-<br>buttons, it shall not possible to remove the buttons<br>from the outside   |                 | Р       |  |
| _           | Operating means securely fixed, not possible to remove them without a tool.   |                 | Р       |  |
|             | For "up-down" operating means the contacts are closed by the up movement.   |                 | Р       |  |
| 9.15        | Test:   |                 |         |  |
| -           | - The RCCB is mounted and wired as in normal use.   |                 | Р       |  |
|             | - Test circuit according to figure 4.   |                 | Р       |  |
|             | A residual current equal to 1,5 $I_{\Delta N}$ is passed by closing $S_2$ , the RCCB having been closed and the operating means being held in the closed position. The RCCB shall trip.   |                 | Р       |  |
|             | Test repeated by moving the operating means slowly (1 s) to a position where the current starts to flow. Tripping shall occur without further movement.   |                 | P       |  |
| 8.1.3       | Clearances and creepage distances (internal and ex  | ternal parts)   |         |  |
|             | The minimum required clearances and creepage distances are based on the RCCB  |                 | P       |  |
|             | being designed for operating in an environment with pollution degree 2  |                 |         |  |
|             | Compliance is checked by inspection and/or by measurement and in addition for item 1 by the test of 9.7.7.1.  |                 | Р       |  |

| IEC 61008-1 |   |                                 |         |  |  |
|-------------|---|---------------------------------|---------|--|--|
| Clause      | Requirement + Test  | Result - Remark                 | Verdict |  |  |
|             |   |                                 |         |  |  |
|             | However, the clearances of item 2 and 4 may be reduced provided that the tests at rated impulse voltage are withstood   |                                 | N/A     |  |  |
|             | The insulating materials are classified into Material Groups on the basis of their comparative tracking index (CTI) acc. to IEC 60664-1 and measured according to IEC 60112 |                                 | Р       |  |  |
|             | Clearances [mm] U <sub>lmp</sub> 4kV  |                                 |         |  |  |
|             |   | minimum clearances [mm]         | _       |  |  |
|             | between live parts which are separated when the main contacts are in the open position  | 4,3mm                           | Р       |  |  |
|             | 2. between live parts of different polarity   | >5,0mm                          | Р       |  |  |
| _           | between circuits supplied from different sources, one of which being PELV or SELV   |                                 | N/A     |  |  |
|             | 4. between live parts and:  |                                 |         |  |  |
|             | - accessible surfaces of operating means  | >5,0mm                          | P       |  |  |
|             | - screws or other means for fixing covers which have to be removed when mounting the RCCB   |                                 | N/A     |  |  |
|             | - surface on which the RCCB is mounted  |                                 | N/A     |  |  |
|             | - screws or other means for fixing the RCCB   |                                 | N/A     |  |  |
|             | - metal covers or boxes   |                                 | N/A     |  |  |
|             | - other accessible metal parts  | >10,0mm                         | Р       |  |  |
|             | - metal frames supporting flush-type RCCBs  | >10,0mm                         | Р       |  |  |
|             | Creepage distances [mm] (see table 5)   |                                 |         |  |  |
|             | Material group  | IIIb                            | P       |  |  |
|             |   | minimum creepage distances [mm] |         |  |  |
|             | between live parts which are separated when<br>the main contacts are in the open position   | >4,5mm                          | Р       |  |  |
|             | 2. between live parts of different polarity   | >5,0mm                          | Р       |  |  |
|             | between circuits supplied from different sources, one of which being PELV or SELV   |                                 | N/A     |  |  |
|             | 4. between live parts and:  |                                 |         |  |  |
|             | - accessible surfaces of operating means  | >5,0mm                          | Р       |  |  |
|             | - screws or other means for fixing covers which   |                                 | N/A     |  |  |

| Clause  | Requirement + Test   | Result - Remark |     | Verdict  |
|---------|--|-----------------|-----|----------|
|         | Troquironi - Foot  | 1100011         |     | 7 07 0.0 |
|         | have to be removed when mounting the RCCB  |                 |     | <u> </u> |
|         | - surface on which the RCCB is mounted   |                 | _   | N/A      |
| _       | - screws or other means for fixing the RCCB  |                 |     | N/A      |
|         | - metal covers or boxes  |                 |     | N/A      |
|         | - other accessible metal parts   | >10,            | 0mm | Р        |
|         | - metal frames supporting flush-type RCCB  | >10,            | 0mm | Р        |
| .1.4    | Screws, current-carrying parts and connections   |                 |     |          |
| 8.1.4.1 | Connections withstand mechanical stresses occurring in normal use.   |                 |     | Р        |
|         | Screws for mounting the RCCB are not of thread-<br>cutting type.   |                 |     | Р        |
|         | Screws and nuts which are operated when mounting and connecting  |                 |     | Р        |
| .4      | Test according to cl. 9.4:   |                 |     |          |
| -       | - 10 times (screw Ø / torque Nm)   | Ømm             | Nm  | N/A      |
|         | - 5 times (screw Ø / torque Nm)  | Ø5,9 mm; 2,5l   | Nm  | Р        |
|         | Plug-in connections are tested by plugging the RCCB in and pulling it out five times.  |                 |     | N/A      |
|         | After the test the connection shall not have become loose nor shall their electrical function be impaired.   |                 |     | Р        |
| 3.1.4.2 | Screws with a thread of insulating material operated when mounting the RCCB; correct introduction ensured.   |                 |     | N/A      |
| 3.1.4.3 | Electrical connections contact pressure not transmitted through insulating material unless there is sufficient resilience in the metallic parts.   |                 |     | Р        |
| .1.4.4  | Current carrying parts of  |                 |     |          |
|         | - copper   |                 |     | N/A      |
|         | - an alloy 58% copper for parts worked cold  |                 |     | Р        |
|         | - an alloy 50% copper for other parts  |                 |     | N/A      |
|         | - other metal  |                 |     | N/A      |
| .1.5    | Terminals for external conductors  |                 |     |          |
| 8.1.5.1 | Terminals ensure the necessary contact pressure  |                 |     |          |
|         | Compliance is checked by inspection and 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 J, as relevant for the type of connection |                 |     | Р        |
|         | Annex J: RCCBs with screwless type terminals for external copper conductors  |                 |     | N/A      |

| Report | No.:130700023SHA-0 | 01 |
|--------|--------------------|----|
|--------|--------------------|----|

|         |  |   | IEC 61008-1   |  |                 |   |  |
|---------|--|---|---|--|-----------------|---|--|
| Clause  | Requirement + T  | est   |   | Result - Rem   | Result - Remark |   |  |
|         |  |   |   |  |                 |   |  |
|         | Torque   |   |   |  |                 |   |  |
|         | Ømm  | Nm  |   | Ø5,9mm   | 2,5Nm           | P |  |
|         | Max. cross-sect.   | : mm²   |   |  |                 | Р |  |
| 9.5.1   | Pull test:   |   |   |  |                 |   |  |
|         |  | on (mm²)  |   |  |                 |   |  |
|         |  | on (mm²)  |   |  |                 |   |  |
|         | Torque <sup>2</sup> / <sub>3</sub> (Nm).   |   |   | : 1,67Nm   |                 |   |  |
|         | Pull (N) for 1 mir   | 1   |   | : 50/100N  |                 |   |  |
|         | During the test n  | o noticeable move   | e of conductor  |  |                 | Р |  |
| 9.5.2   | Min. cross-section   | on (mm²)  |   | : 1,0mm²   |                 |   |  |
|         |  | on (mm²)  |   |  |                 |   |  |
|         |  |   |   |  |                 |   |  |
|         | The conductor s  | hows no damage  |   |  |                 | Р |  |
|         | Terminals not we   | orked loose and n   | o damage  |  |                 | Р |  |
| 9.5.3   | Nominal cross-s  | ections from  | : 1,0 to 16mm   | 2  |                 |   |  |
|         | Number of stran  | ds  | : 7   |  |                 |   |  |
|         | Ø of strands (mr   | m)  | : 2,14mm  |  |                 |   |  |
|         | Torque <sup>2</sup> / <sub>3</sub> (Nm)  |   | : 1,67Nm  |  |                 |   |  |
|         |  | strand of conduct   |   |  |                 | P |  |
| _       | Rated current  | Range of nomir sections to be o   | nal cross (A)<br>clamped* (mm²)   |  |                 |   |  |
|         |  | Rigid (solid<br>or stranded)<br>conductors  | Flexible conductors   |  |                 |   |  |
|         | ≤ 13<br>> 13 ≤ 16<br>> 16 ≤ 25<br>> 25 ≤ 32<br>> 32 ≤ 50<br>> 50 ≤ 80<br>> 80 ≤ 100<br>> 100 ≤ 125 | 1 to 2,5 1 to 4 1,5 to 6 2,5 to 10 4 to 16 10 to 25 16 to 35 24 to 50   | 1 to 2,5<br>1 to 4<br>1,5 to 6<br>2,5 to 6<br>4 to 10<br>10 to 16<br>16 to 25<br>25 to 35 | 1,0 to 25 mm²<br>conductors<br>1,0 to 16 mm²<br>conductors | ū               |   |  |
|         | including 50 A,<br>solid conductor<br>conductors. Ne<br>terminals for co                           | at, for current ratin<br>terminals be desig<br>s as well as rigid s<br>vertheless, it is pe<br>inductors having c<br>to 6 mm² be desig<br>s only. | gned to clamp<br>stranded<br>rmitted that<br>ross-sections                                |  |                 |   |  |
| 8.1.5.3 |  | oing the conductor  |   |  |                 | P |  |

| IEC 61008-1 |   |                 |         |  |  |  |
|-------------|---|-----------------|---------|--|--|--|
| Clause      | Requirement + Test  | Result - Remark | Verdict |  |  |  |
|             |   |                 |         |  |  |  |
|             | of sub-clause 9.5)  |                 |         |  |  |  |
| 8.1.5.4     | Terminals for $I_N \le 32$ A allow the connection of conductors without special preparation.  | _               | N/A     |  |  |  |
| 8.1.5.5     | Terminals have adequate mechanical strength and metric ISO thread or equivalent. (See tests of subclauses 9.4 and 9.5.1)  |                 | P       |  |  |  |
| 8.1.5.6     | Clamping of conductor without undue damage to conductor. (See tests of sub-clause 9.5.2)  |                 | Р       |  |  |  |
| 8.1.5.7     | Clamping of conductor reliably and between metal surfaces. (See tests of sub-clauses 9.4 and 9.5.1)   |                 | Р       |  |  |  |
| 8.1.5.8     | Terminals so designed or positioned that no conductor can slip out while the clamping screws or nuts are tightened. (See tests of sub-clause 9.5.3)   |                 | Р       |  |  |  |
| 8.1.5.9     | Terminals so fixed or located that they do not work loose when the clamping screws or nuts are tightened or loosened. (See tests of sub-clause 9.4)   |                 | Р       |  |  |  |
| 8.1.5.10    | Clamping screws or nuts of terminals for the protective conductors adequately secured against accidental loosening and not possible to unclamp without a tool.  |                 | N/A     |  |  |  |
| 8.1.5.11    | Screws and nuts of terminals for external conductors shall be in engagement with a metal thread and not be of the tapping screw type.   |                 | Р       |  |  |  |
| 8.1.Z1      | Non-interchangeability  |                 | N/A     |  |  |  |
|             | 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. |                 | N/A     |  |  |  |
| 8.1.Z2      | Mechanical mounting of plug-in type RCCBs   |                 | N/A     |  |  |  |
|             | 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.   |                 | N/A     |  |  |  |
| 8.1.Z2.1    | Plug-in type RCCBs, the holding in position of which does not depend solely on their plug-in connection(s)  |                 | N/A     |  |  |  |
| 8.1.Z2.2    | Plug-in type RCCBs, the holding in position of which depends solely on their plug-in connection(s)  |                 | N/A     |  |  |  |
|             | Compliance of the mechanical mounting is checked by the relevant tests of 9.12.   |                 | N/A     |  |  |  |
| 8.2         | Protection against electric shock   |                 |         |  |  |  |
|             | Live parts not accessible in normal use   |                 | P       |  |  |  |

| IEC 61008-1 |  |                 |         |  |  |  |
|-------------|--|-----------------|---------|--|--|--|
| Clause      | Requirement + Test   | Result - Remark | Verdict |  |  |  |
|             |  |                 |         |  |  |  |
|             | For RCCBs other than plug-in type, external parts, other than screws or other means for fixing covers, which are accessible in normal use shall be of insulating material or be lined throughout with insulating material. |                 | Р       |  |  |  |
|             | Linings  |                 | N/A     |  |  |  |
|             | - reliably fixed   |                 | N/A     |  |  |  |
|             | - adequate thickness and   |                 | N/A     |  |  |  |
|             | - mechanical strength  |                 | N/A     |  |  |  |
|             | Inlet openings for cables or conduits shall be of insulating material or be provided with bushings or similar devices of insulating material.  |                 | N/A     |  |  |  |
|             | Such devices   |                 | N/A     |  |  |  |
|             | - reliably fixed   |                 | N/A     |  |  |  |
|             | - adequate mechanical strength   |                 | N/A     |  |  |  |
|             | For plug-in RCCBs external parts other than screws or other means for fixing covers, which are accessible, shall be of insulating material.  |                 | N/A     |  |  |  |
|             | Metallic operating means insulated from live parts.  |                 | N/A     |  |  |  |
|             | Metal parts of mechanism not accessible, insulated from accessible metal parts, from metal frames (for flush-type), from screws or other means for fixing the base and from metal plates.                                  |                 | Р       |  |  |  |
|             | Possible to replace plug-in RCCBs easily with-out touching live parts.   |                 | N/A     |  |  |  |
|             | Lacquer or enamel not considered to provide adequate insulation.   |                 | Р       |  |  |  |
| 9.6         | Test: Standard test finger   |                 |         |  |  |  |
|             | Straight test finger with a force of 75 N for 1 min at 35°C ± 2°C  | 75N, 1min, 35°C | Р       |  |  |  |
|             | Enclosures or covers not deformed to such an extent that live parts can be touched.  |                 | Р       |  |  |  |
| 8.9         | Resistance to heat   |                 |         |  |  |  |
|             | RCCB sufficiently resistant to heat  |                 | Р       |  |  |  |
| 9.13.1      | Test:  |                 |         |  |  |  |
|             | - without removable covers 1 h (100 $\pm$ 2) °C  | 1h, 100°C       | Р       |  |  |  |
|             | - removable covers 1 h (70 ± 2) °C   |                 | N/A     |  |  |  |
|             | No change impairing further use and no flow of sealing compound that live parts are exposed  |                 | Р       |  |  |  |
|             | No access to live parts even with test finger with a force not exceeding 5 N.  |                 | Р       |  |  |  |

| Report | No.:130700023SHA- | 001 |
|--------|-------------------|-----|
|--------|-------------------|-----|

|         | IEC 61008-1   |                   |         |
|---------|---|-------------------|---------|
| Clause  | Requirement + Test  | Result - Remark   | Verdict |
|         |   |                   |         |
|         | The RCCB shall trip with a test current of 1,25 $I_{\Delta N}$ -break time not exceeding the value for $I_{\Delta N}$ in table 1                            | 21ms              | P       |
|         | Marking still legible after test  |                   | P       |
| 9.13.2  | Ball pressure test for external parts of insulating material necessary to retain current-carrying parts or parts of the protective circuit in position:     |                   | P       |
|         | - T = 125 ± 2°C   | 125°C             | Р       |
| _       | After 1 h Ø of impression ≤ 2 mm  | 1,5mm             | Р       |
| 9.13.3  | Ball pressure test for external parts of insulating material not necessary to retain current-carrying parts or parts of the protective circuit in position: |                   | Р       |
|         | ☐ T = 70 ± 2°C  | 70°C              | Р       |
|         | ☐ T =± 2°C  | 1,0mm             | N/A     |
|         | (40°C + max. temperature rise of sub-clause 9.8)  |                   |         |
|         | Ø of impression ≤ 2 mm  |                   | Р       |
| 8.10    | Resistance to abnormal heat and to fire   |                   |         |
|         | External parts of insulating material are not liable to ignite and to spread fire under fault or overload conditions.                                       |                   | Р       |
| 9.14    | Glow-wire test  |                   |         |
|         | - External parts of insulating material necessary to retain current-carrying parts or parts of the protective circuit in position                           | 960(Enclosure)    | P       |
|         | - All other external parts of insulating material:  | 650(Handle)       | Р       |
|         | No visible flame and no sustained glowing   | No flames(Handle) | Р       |
|         | Flames and glowing extinguish within 30 s after removal   | 5,6s(Enclosure)   | Р       |
|         | No ignition of tissue paper or scorching of the pinewood board  |                   | Р       |
|         |   |                   |         |
|         | TEST SEQUENCE "B" replace the complete test sequence "B"  | B1 B2 B3          | Р       |
|         | (3 samples: in= 63A, i <sub>Δn</sub> = 0,03A, type A)   |                   |         |
| 3       | requirements for construction and operation   |                   |         |
| 3.3     | dielectric properties and isolating capability  |                   |         |
|         | RCCBs have adequate dielectric properties   |                   | Р       |
| 9.7     | test of dielectric properties and isolating capability  | у                 |         |
| 9.7.1.1 | Parts which can be removed without a tool are removed, spring lids kept open, inlet openings are  |                   | N/A     |

| IEC 61008-1 |   |             |                     |            |             |  |
|-------------|---|-------------|---------------------|------------|-------------|--|
| Clause      | Requirement + Test  | Result - F  | Verdict             |            |             |  |
|             |   |             |                     |            |             |  |
|             | left open and if knock-outs one is opened.  |             |                     |            |             |  |
| 9.7.1.2     | Test conditions: 48 h in humidity cabinet RH = 91% to 95% T = 20 to 30°C ± 1°C  | 93%<br>25°C |                     |            |             |  |
| 9.7.1.4     | The samples show no damage  |             |                     |            | Р           |  |
| 9.7.2       | Insulation resistance of the main circuit measured between 30 and 60 min after this treatment with 500 V DC after 5 s:  | B1<br>[MΩ]  | B2<br>[MΩ]          | B3<br>[MΩ] |             |  |
|             | a) between the terminals which are electrically connected together when the RCCB is in the closed position $\geq$ 2 M $\Omega$  | >500MΩ      | > 500MΩ             | > 500MΩ    | Р           |  |
|             | b) between each pole and the others connected together (electronic components, connected between poles being disconnected)≥ 2 MΩ  | >500MΩ      | > 500MΩ             | > 500MΩ    | Р           |  |
|             | c) with the RCCB in the closed position, between all poles connected together and the frame, including a metal foil in contact with the outer surface of the internal enclosure of insulating material, if any $\geq 5 \text{ M}\Omega$ | >500ΜΩ      | > 500MΩ             | > 500ΜΩ    | Р           |  |
|             | d) between the frame and a metal foil in contact with the inner surface of the lining of insulating material $\geq 5~\text{M}\Omega$  |             |                     |            | N/A         |  |
| 9.7.3       | Dielectric strength of the main circuit measured with an AC voltage (45-65Hz) for 1 min:  |             |                     |            |             |  |
|             | a)2000 V  | 2000        | 2000                | 2000       | P           |  |
| -           | b) (electronic components, connected between poles being disconnected) 2000 V   | 2000        | 2000                | 2000       | P           |  |
|             | c)  | 2000        | 2000                | 2000       | P           |  |
|             | e)2500 V  | _           |                     | _          | N/A         |  |
|             | No flashover or breakdown   |             |                     |            | P           |  |
| 9.7.4       | Insulation resistance of auxiliary circuits measured with 500 V DC after 1 min:   | B1<br>[MΩ]  | B2<br>[ <b>M</b> Ω] | B3<br>[MΩ] | <del></del> |  |
|             | 1) between all auxiliary circuits and the frame≥ 2 MΩ   |             |                     |            | N/A         |  |
|             | 2) between each part of the auxiliary circuits which might be isolated from the other parts and the whole of the other parts connected together≥ 2 MΩ   |             |                     |            | N/A         |  |
|             | Dielectric strength of auxiliary circuits measured with an AC voltage at rated frequency for 1 min:   |             |                     |            |             |  |
|             | Rated voltage of Test voltage (V) auxiliary circuits (a.c. or d.c.)   |             |                     |            |             |  |
|             | ≤ 30 600  |             |                     |            |             |  |

|         |  |  |   |                  | IEC 610                      | 008-1             |                                  |                     |                    |                                     |         |
|---------|--|--|---|------------------|------------------------------|-------------------|----------------------------------|---------------------|--------------------|-------------------------------------|---------|
| Clause  | Require  | ment +   | Test                                    |                  |                              |                   | Resu                             | lt - Rema           | rk                 |                                     | Verdict |
|         |  |  |   |                  |                              |                   |                                  |                     |                    |                                     |         |
|         | > 30 \le 5<br>> 50 \le 1<br>> 110 \le<br>> 250 \le   | 110<br>250                                     |   |                  | 1000<br>1500<br>2000<br>2500 |                   | V                                |                     |                    |                                     |         |
|         | 1) between   | een all a                                      | uxiliary c                              | ircuits ar       | nd the fra                   | ıme               |                                  |                     |                    |                                     | N/A     |
|         | which  | h might<br>the whol                            | h part of t<br>be isolate<br>e of the o | d from t         | he other                     | parts             |                                  |                     |                    |                                     | N/A     |
|         | No flash   | nover or                                       | perforation                             | on               |                              |                   |                                  |                     |                    |                                     | N/A     |
| 9.7.5   | Second   | ary circu                                      | uit of dete                             | ction tra        | nsformer                     | 'S                |                                  |                     |                    |                                     |         |
|         |  | ble meta                                       | st, provid<br>al parts or<br>sts.       |                  |                              |                   |                                  |                     |                    |                                     | N/A     |
| 9.7.6   | Capability of control circuits connected to the main circuit of withstanding high DC voltages due to insulation measurements |  |   |                  |                              |                   |                                  |                     |                    |                                     |         |
|         | RCCB fixed on metal support in closed position with all control circuits connected as in service.                            |  |   |                  |                              |                   |                                  |                     | Р                  |                                     |         |
|         | Maximu<br>Short-ci<br>Applied  | im ripple<br>rcuit cur<br>for 1 mi<br>n each p | rent 12 m<br>n<br>oole and t            | nA +2 / -        | 0 mA                         | nnected           | 60                               | 0 6                 | 00                 | 600                                 | P       |
| 9.9.1.2 | Verification of the correct operation in case of sudden appearance of residual current by closing S <sub>1</sub>             |  |   |                  |                              |                   |                                  |                     |                    | Р                                   |         |
|         | Type I <sub>N</sub> A I <sub>ΔN</sub> A Standard values of break time and non-actuating time at a residual current equal to  |  |   |                  |                              |                   |                                  |                     |                    |                                     |         |
|         |  |  |   | ļ <sub>a</sub> N | 2 I <sub>ΔN</sub>            | 5 t <sub>ΔN</sub> | 5 l <sub>an</sub> or<br>0,25A a) | 5A-200A,<br>500A b) | l <sub>∆t</sub> c) |                                     |         |
|         | General  | Any<br>value                                   | <0,03                                   | 0,3              | 0,15                         | -                 | 0,04                             | 0,04                | 0,04               | Max.                                |         |
|         |  |  | 0,03                                    | 0,3              | 0,15                         |                   | 0,04                             | 0,04                | 0,04               | times                               |         |
|         |  |  | >0,03                                   | 0,3              | 0,15                         | 0,04              |                                  | 0,04                | 0,04               | <b>1</b>                            | _       |
|         | S  | ≥ 25   | >0,03                                   | 0,5              | 0,2                          | 0,15              | -                                | 0,15                | 0,15               | Max.<br>break<br>times              |         |
|         |  |  |   | 0,13             | 0,06                         | 0,05              |                                  | 0,04                | 0,04               | Min.<br>non-<br>actuatin<br>g times |         |
|         | a) value   | to be de                                       | ecided by t                             | the manu         | facturer fo                  | or this tes       | t                                |                     |                    |                                     |         |
|         | corre  | ect opera                                      | only made<br>tion as me<br>les exceed   | ntioned i        | n 9.9.1.2                    | d) but in         |                                  |                     |                    |                                     |         |

| Report No.:130700023SHA-001 | 1 |
|-----------------------------|---|
|-----------------------------|---|

| Clause | Requirement + Test   | Result - R | Verdic     |              |           |
|--------|--|------------|------------|--------------|-----------|
|        | overcurrent instantaneous tripping range are not   |            |            | _            |           |
|        | tested.  |            |            |              |           |
|        | c) The test is made with a current I <sub>Δt</sub> equal to the<br>lower limit of the overcurrent instantaneous<br>tripping range according to type B, C or D, as<br>applicable      |            |            |              |           |
| .9.2.3 | Verification of the correct operation in case of sudden appearance of residual current by closing S <sub>1</sub> , (S <sub>2</sub> and RCCB in closed position):                     |            |            |              | Р         |
|        | Maximum break times at:  | [ms]       | [ms]       | [ms]         |           |
|        | - I <sub>aN</sub>  | 37         | 36         | 34           | P         |
|        | - 2 I <sub>ΔN</sub>  | 29         | 28         | 27           | Р         |
|        | - 5 I <sub>ΔN</sub> or   |            | _          | -            | N/A       |
|        | - 0,25 A   | 21         | 20         | 21           | Р         |
|        | - 500 A  | 8          | 8          | 8            | Р         |
|        | No value exceeds the relevant specified limiting value   |            |            |              | Р         |
|        | Additional test for type S:  |            |            | -            |           |
|        | Minimum non-actuating time at:   | [ms]       | [ms]       | [ms]         |           |
|        | - I <sub>ΔN</sub> 0,13 s   |            |            |              | N/A       |
|        | - 2 I <sub>ΔN</sub>  |            |            |              |           |
|        | - 5 I <sub>ΔN</sub>  |            |            |              | N/A       |
|        | - 500 A  |            |            |              | N/A       |
|        | The test switch $S_1$ and the RCCB being in the closed position, the test voltage is suddenly established by closing the test switch $S_2$ for min. non-operating times acc. table 1 |            |            |              | N/A       |
| .7.7   | verification of impulse withstand voltages (across and of leakage current across open contacts   | clearance  | s and acr  | oss solid i  | insulatio |
| .7.7.1 | verification of impulse withstand voltage across thisolation)  | ne open co | ontacts (s | uitAbility f | or        |
|        | The test is carried out on an RCCB fixed on a metal support  |            |            | _            | Р         |
|        | The impulses are given by a generator producing positive and negative impulses having a front time of 1,2µs, and a time to half-value of 50µs  |            |            |              | Р         |
|        | The shape of the impulses is adjusted with the RCCB under test connected to the impulse generator.   |            |            | _            | Р         |
|        | The test voltage is applied between the line terminals connected together and the load terminals connected together with the contacts in the open position                           |            |            |              | Р         |
|        |  |            |            |              |           |

Report No.:130700023SHA-001

|         | IEC 61008-1   |         |
|---------|---|---------|
| Clause  | Requirement + Test Result - Remark  | Verdict |
|         |   |         |
|         | at least 1 s for impulses of the same polarity and being at least 10 s for impulses of the opposite polarity.   |         |
|         | rated impulse withstand voltage [kV]:   |         |
|         | see level of test laboratory [m]  |         |
|         | test voltage (acc. Table 15) [kV]:  |         |
|         | no disruptive discharges during the test  | Р       |
| 9.7.7.2 | verification of impulse withstand voltage for the parts not tested in 9.7.7.1   |         |
|         | The test is carried out on an RCCB fixed on a metal support   | N/A     |
|         | The impulses are given by a generator producing positive and negative impulses having a front time of 1,2µs, and a time to half-value of 50µs   | N/A     |
|         | The shape of the impulses is adjusted with the RCCB under test connected to the impulse generator.  | N/A     |
|         | A first series of tests is made applying the impulse voltage between the phase pole(s), connected together, and the neutral pole (or path) of the RCCB, as applicable.  | N/A     |
|         | A second series of tests is made applying the impulse voltage between the metal support connected to the terminal(s) intended for the protective conductor(s), if any, and the phase pole(s) and the neutral pole (or path) connected together. | N/A     |
|         | In both cases three positive impulses and three negative impulses are applied, the interval   | N/A     |
|         | between consecutive impulses being at least 1 s for impulses of the same polarity and at least  |         |
|         | 10 s for impulses of the opposite polarity.   |         |
|         | rated impulse withstand voltage [kV]:   |         |
| _       | see level of test laboratory [m]  |         |
|         | test voltage (acc. Table 16) [kV]:  |         |
|         | no disruptive discharges during the test  | N/A     |
| 9.7.7.3 | verification of leakage currents across open contacts (suitability for isolation)   | -       |
|         | Each pole of RCCB having been submitted to the test of 9.11.2.2, 9.11.2.3, 9.11.2.4a), 9.11.2.4b), 9.11.2.4c) is supplied at a voltage 1,1 times its rated operational voltage, the RCCB being in the open position                             | Р       |
|         | The leakage current flowing across the open contacts is measured and shall not exceed 2mA   | Р       |

|        | IEC 61008-1  |        |     |     |     |  |  |  |
|--------|--|--------|-----|-----|-----|--|--|--|
| Clause | Requirement + Test Result - Remark   |        |     |     |     |  |  |  |
|        |  |        |     |     |     |  |  |  |
|        | No tripping during tests   |        |     |     | Р   |  |  |  |
| 8.4    | Temperature rise   |        |     |     |     |  |  |  |
|        | Temperature rises do not exceed the limiting values stated in table 7.   |        |     |     | Р   |  |  |  |
|        | Cross-section (mm²)  | 16mm²  |     |     |     |  |  |  |
| 9.8.1  | Ambient air temperature (°C)   | 22°C   |     |     |     |  |  |  |
| 9.8.2  | Test current $I_N$ (A) until steady state values are reached.  | 63A    |     |     |     |  |  |  |
|        | Four pole RCCBs:   |        |     |     | N/A |  |  |  |
| _      | Current passing through  |        |     |     | N/A |  |  |  |
| -      | - 3 phase poles (1)  |        |     |     | N/A |  |  |  |
|        | - neutral and adjacent pole (2)  |        |     |     | N/A |  |  |  |
|        | PartsTemperature rise K  | [K]    | [K] | [K] |     |  |  |  |
|        | Terminals for external connections65   | 53     | 48  | 49  | Р   |  |  |  |
|        | External parts liable to be touched during manual operation of the RCCB, including operating means of insulating material and metallic means for coupling insulated operating means of several poles | 8      | 9   | 7   | Р   |  |  |  |
|        | External metallic parts of operating means25   | -      | -   | -   | N/A |  |  |  |
|        | Other external parts, including that face of the RCCB in direct contact with the mounting surface60  | 31     | 30  | 29  | Р   |  |  |  |
| 9.20   | Verification of resistance of the insulation against an impulse voltage  |        |     |     |     |  |  |  |
|        | RCCB fixed on metal support in closed position and wired as in normal use.   |        |     |     | Р   |  |  |  |
|        | Impulse voltage 1,2 / 50 µs with a peak value of:  |        |     |     |     |  |  |  |
|        | <ul> <li>6 kV between the phase pole(s) connected<br/>together and the neutral pole or, in absence of<br/>the neutral pole, on one pole taken at random</li> </ul>                                   |        |     |     | Р   |  |  |  |
|        | 8 kV between the metal support connected to terminal(s) for the protective conductor(s) and all poles connected together   |        |     | ·   | Р   |  |  |  |
|        | No unintentional disruptive discharge  |        |     |     | Р   |  |  |  |
| B.16   | Reliability  |        |     |     |     |  |  |  |
|        | RCCBs operate reliably even after long service.  |        |     |     | Р   |  |  |  |
| 9.22.2 | Test with 28 cycles at 40 ± 2°C  |        |     |     | _   |  |  |  |
|        | Cross-section (mm²)  | 16mm²  |     |     |     |  |  |  |
|        | Torque <sup>2</sup> / <sub>3</sub> (Nm)  | 1,67Nm |     |     |     |  |  |  |
|        | Test current I <sub>N</sub> (A)  |        |     |     |     |  |  |  |

| Report N | No.:130700023SHA-( | 01 |
|----------|--------------------|----|
|----------|--------------------|----|

|        | IEC 61008-1   |                 |      | _       |     |
|--------|---|-----------------|------|---------|-----|
| Clause | Requirement + Test  | Result - Remark |      | Verdict |     |
|        |   |                 |      |         |     |
|        | - with current passing21 h  |                 |      |         | Р   |
|        | - without current3 h  |                 |      |         | Р   |
|        | For 4 pole RCCBs with 3 overcurrent protected poles only 3 poles loaded   |                 |      |         | N/A |
|        | At the end of the last period of 21 h with current passing the temperature rise of the terminals shall not exceed 65K                             | [K]             | [K]  | [K]     |     |
|        |   | 54              | 50   | 50      | Р   |
|        | After cool down the RCCB shall trip with a test current of 1,25 $I_{\Delta N}$ - break time not exceeding the value for $I_{\Delta N}$ in table 1 | [ms]            | [ms] | [ms]    |     |
|        |   | 25              | 29   | 21      | Р   |
|        | Test switch $S_2$ and RCCB in the closed position, test voltage established by closing the test switch $S_1$ .                                    |                 |      | -       | Р   |
| 9.23   | Verification of ageing  |                 |      |         |     |
|        | 168 h at 40 ± 2°C   | 40°C            | _    |         |     |
|        | Test current I <sub>N</sub> (A)   | : 63A           |      |         |     |
| _      | Cross-section (mm²)   |                 |      |         | +   |
|        | Electronic parts at 1,1 U <sub>N</sub>  | 264V            |      |         |     |
|        | After cool down:  |                 |      |         | P   |
|        | - electronic parts show no damage   |                 |      |         | Р   |
|        | The RCCB shall trip with a test current of 1,25 $I_{\Delta N}$ - break time not exceeding the value for $I_{\Delta N}$ in table 1                 | [ms]            | [ms] | [ms]    |     |
|        |   | 29              | 31   | 27      | Р   |
|        | Test switch S <sub>2</sub> and RCCB in the closed position, test voltage established by closing the test switch S <sub>1</sub>                    |                 |      |         | Р   |
|        | TEST SEQUENCE "C"   | C1              | C2   | C3      | Р   |
|        | (3 samples: In= 63A, I <sub>A</sub> = 0.03A, type A)  |                 |      |         |     |

|                   | TEST SEQUENCE "C"  | C1   | C2   | C3   | Р |
|-------------------|--|------|------|------|---|
|                   | (3 samples: ln= 63A, l <sub>Δn</sub> = 0,03A, type A)  |      |      |      |   |
|                   | TESTS C <sub>1</sub>   |      |      |      |   |
| 8                 | requirements for construction and operation  |      |      |      |   |
| 8.6               | Mechanical and electrical endurance  |      |      |      |   |
|                   | RCCBs shall be capable of performing an adequate number of mechanical and electrical operations. |      | _    | _    | Р |
| 9.10.3<br>modify: | After test:  |      |      |      |   |
|                   | a)   | 900V | 900V | 900V | Р |
|                   | b)   | 900V | 900V | 900V | Р |

|                       | IEC 61008-1  |                              |       |      |         |
|-----------------------|--|------------------------------|-------|------|---------|
| Ciause                | Requirement + Test   | Result - R                   | emark |      | Verdict |
|                       |  |                              |       | _    |         |
|                       | c)   | 900V                         | 900V  | 900V | Р       |
|                       | d)   |                              |       |      | N/A     |
|                       |  |                              |       |      |         |
|                       | TEST SEQUENCE "D"  | D1                           | D2    | D3   | Р       |
|                       | (3 samples: In= 63A, I <sub>∆n</sub> = 0,03A, type A)  |                              |       |      |         |
|                       | TEST D₀  |                              |       |      | Р       |
| 9.9.2.4<br>modify:    | Verification of the correct operation in case of sudden appearance of residual current between 5 I <sub>ΔN</sub> and 500A among the following list: 5A - 10A - 20A - 50A - 100A - 200A |                              |       |      | Р       |
|                       | by closing S <sub>2</sub> , (S <sub>1</sub> and RCCB in closed position):  |                              |       |      |         |
|                       | - 5A (value 1 between 5A and 200A)   | 14ms                         | 15ms  | 15ms | Р       |
|                       | - 10A (value 1 between 5A and 200A)  | 13ms                         | 13ms  | 13ms | Р       |
|                       | - 20A (value 1 between 5A and 200A)  | 11ms                         | 10ms  | 10ms | Р       |
|                       | - 50A (value 1 between 5A and 200A)  | 7ms                          | 8ms   | 8ms  | P       |
|                       | - 100A (value 1 between 5A and 200A)   | 9ms                          | 9ms   | 9ms  | Р       |
|                       | ~ 200A (value 1 between 5A and 200A)   | 8ms                          | 8ms   | 9ms  | P       |
|                       | No value exceeds the relevant specified limiting value   |                              |       |      | Р       |
|                       | TEST D <sub>1</sub>  |                              |       |      |         |
| 8                     | requirements for construction and operation  |                              |       |      |         |
| 8.12                  | RCCBs functionally dependent on line voltage   |                              |       |      |         |
|                       | RCCBs functionally dependent on the line voltage operate correctly between 0,85 and 1,1 UN   |                              |       |      |         |
| 9.17                  | Verification of the behaviour of RCCBs opening a failure of the line voltage   | ing automatically in case of |       |      |         |
| 9.17.1<br>replace by: | Limiting value of the line voltage U <sub>x</sub>  |                              |       |      |         |
|                       | U <sub>N</sub> applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs  | [V]                          | [V]   | [V]  |         |
|                       |  |                              |       |      | N/A     |
|                       | All values less than 0,7 U <sub>N</sub>  |                              |       |      | N/A     |
|                       | Tripping test:   |                              |       |      | N/A     |
|                       | Test voltage (V)   | : V                          |       |      |         |
|                       |  |                              |       |      |         |

Residual current 1,25.I  $_{\Delta N}$  .....

Time corresponding to value for  $I_{\Delta N}$  in table 1

 $1,25.I_{\Delta N} = A$ 

[ms]

[ms]

[ms]

|                        | IEC 61008-1  |            |        |             |         |
|------------------------|--|------------|--------|-------------|---------|
| Clause                 | Requirement + Test   | Result - F | Remark |             | Verdict |
|                        |  |            |        | <del></del> |         |
|                        | No value exceeds the specified limiting values   |            |        |             | N/A     |
|                        | Not possible to close the apparatus by manual operating means below U <sub>x</sub>   |            |        |             | N/A     |
| 9.17.2<br>replace by:  | Verification of behaviour in case of failure of the line   | voltage    |        |             | N/A     |
|                        | RCCB supplied with U <sub>N</sub> and line voltage, then switched off  |            |        |             | N/A     |
|                        | Time interval between switching off and opening of the main contacts:  | [ms]       | [ms]   | [ms]        |         |
| a)                     | RCCBs opening without delay  |            |        |             | N/A     |
|                        | - no value exceeds 0,5 s   |            |        |             | N/A     |
|                        | <ul> <li>no tripping shall occur if the voltage is switched<br/>off for a time not exceeding 0,03 s</li> </ul>   |            |        |             | N/A     |
| b)                     | RCCBs opening with delay   |            |        |             | N/A     |
|                        | Values within the range indicated by manufacturer  | to         |        | ms          | N/A     |
|                        | RCCBs classified 4.1.2.1b): switch off at U <sub>N</sub>   |            |        |             | N/A     |
|                        | Voltage off and on at the line side:   |            |        |             | N/A     |
|                        | No automatically closing   |            |        |             | N/A     |
| 9.17.4<br>replace by:  | Verification of the correct operation of RCCBs with 3 or 4 poles, in presence of a residual current, the neutral and one line terminal only being energized (replace the title by) |            |        |             | N/A     |
|                        |  |            |        |             |         |
| 8.11<br>REPLACE<br>BY: | Test device  |            |        |             |         |
|                        | RCCBs provided with a test device  |            |        |             | Р       |
|                        | RCCBs with rated residual current of 30mA:   |            |        |             | Р       |
|                        | Ampere-turns produced when operating the test device do not exceed 1,66 times the ampere turns produced by I∆N   |            |        |             | P       |
|                        | RCCBs with rated residual current other than 30mA:   |            |        |             |         |
|                        | Ampere-turns produced when operating the test device do not exceed 2,5 times the ampere turns produced by l <sub>NN</sub>  |            |        |             | N/A     |
|                        | Not possible to energize the circuit on the load side<br>by operating the test device when the RCCB is in<br>the open position   |            |        |             | P       |
|                        |  |            |        |             |         |

Р

Mechanical impact

9.12.2

|                         | Page 157 of 179   | Report No I     | 307000235HA-00 |
|-------------------------|---|-----------------|----------------|
|                         | IEC 61008-1   |                 |                |
| Clause                  | Requirement + Test  | Result - Remark | Verdict        |
|                         |   |                 |                |
|                         | test acc. 9.12.2.1 for all types, in addition by the tests of:  |                 | Р              |
|                         | - 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;   |                 | Р              |
|                         | - 9.12.2.3 for plug-in type RCCBs, the holding in position of which depends solely on their connections.  |                 | N/A            |
| 9.12.2.2<br>replace by: | RCCBs for rail mounting downward vertical force of 50 N for 1 min, upward vertical force of 50 N for 1 min  |                 | P              |
|                         | 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.  |                 | N/A            |
|                         | RCCB shall not become loose during test and no  | D1 -            | Р              |
|                         | damage impairing its further use:   | D2 -            |                |
|                         |   | D3 -            |                |
| 9.12.2.3<br>replace 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). |                 | N/A            |

|                    | TEST SEQUENCE "D"  |   | D7   |   | Р |
|--------------------|--|---|------|---|---|
|                    | (3 samples: In= 63A, $I_{\Delta n}$ = 0,03A, type AC)  |   |      |   |   |
|                    | TEST D₀  |   |      |   | P |
| 9.9.2.4<br>modify: | Verification of the correct operation in case of sudden appearance of residual current between 5 $I_{\Delta N}$ and 500A among the following list: 5A - 10A - 20A - 50A - 100A - 200A by closing $S_2$ , ( $S_1$ and RCCB in closed position): |   |      |   | Р |
|                    | - 5A (value 1 between 5A and 200A)   | _ | 15ms | - | Р |
|                    | - 10A (value 1 between 5A and 200A)  | - | 13ms | - | Р |
|                    | - 20A (value 1 between 5A and 200A)  | - | 11ms | - | Р |
|                    | - 50A (value 1 between 5A and 200A)  | - | 12ms | - | Р |
|                    | - 100A (value 1 between 5A and 200A)   | - | 10ms | _ | Р |
|                    | - 200A (value 1 between 5A and 200A)   | - | 8ms  | - | Р |

|                       | IEC 61008-1   |                         |            |      |     |
|-----------------------|---|-------------------------|------------|------|-----|
| Clause                | Requirement + Test Result - Remark  |                         |            |      |     |
|                       |   |                         |            |      |     |
|                       | No value exceeds the relevant specified limiting value  |                         |            |      | P   |
|                       | TEST D <sub>1</sub>   |                         |            |      | P   |
| 3                     | requirements for construction and operation   |                         |            |      |     |
| 8.12                  | RCCBs functionally dependent on line voltage  |                         |            |      |     |
|                       | RCCBs functionally dependent on the line voltage operate correctly between 0,85 and 1,1 UN  |                         |            |      | N/A |
| 9.17                  | Verification of the behaviour of RCCBs opening au failure of the line voltage   | utomatical              | ly in case | of   |     |
| 9.17.1<br>replace by: | Limiting value of the line voltage U <sub>x</sub>   |                         |            |      | N/A |
|                       | U <sub>N</sub> applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs | [V]                     | [V]        | []   |     |
|                       |   |                         |            |      | N/A |
|                       | All values less than 0,7 U <sub>N</sub>   |                         |            |      | N/A |
|                       | Tripping test:  |                         |            |      | N/A |
|                       | Test voltage (V)  | V                       |            |      |     |
|                       | Residual current 1,25.l <sub>ΔN</sub>   | $1,25.I_{\Delta N} = A$ |            |      |     |
|                       | Time corresponding to value for l <sub>ΔN</sub> in table 1  | [ms]                    | [ms]       | [ms] |     |
|                       | No value exceeds the specified limiting values  |                         |            |      | N/A |
|                       | Not possible to close the apparatus by manual operating means below U <sub>x</sub>  |                         | _          |      | N/A |
| 9.17.2<br>replace by: | Verification of behaviour in case of failure of the line  | voltage                 |            |      | N/A |
|                       | RCCB supplied with $U_N$ and line voltage, then switched off  |                         |            |      | N/A |
|                       | Time interval between switching off and opening of the main contacts:   | [ms]                    | [ms]       | [ms] |     |
| a)                    | RCCBs opening without delay   |                         |            |      | N/A |
|                       | - no value exceeds 0,5 s  |                         |            |      | N/A |
|                       | <ul> <li>no tripping shall occur if the voltage is switched<br/>off for a time not exceeding 0,03 s</li> </ul>                        |                         |            |      | N/A |
| o)                    | RCCBs opening with delay  |                         |            |      | N/A |
|                       | Values within the range indicated by manufacturer   | to                      |            | ms   | N/A |
|                       | RCCBs classified 4.1.2.1b); switch off at U <sub>N</sub>  |                         |            |      | N/A |
|                       | Voltage off and on at the line side:  |                         |            |      | N/A |
|                       | No automatically closing  |                         |            |      | N/A |

|   | IEC 61008-1   |  |         |  |  |  |
|---|---|--|---------|--|--|--|
| Clause  | Requirement + Test  | Result - Remark  | Verdict |  |  |  |
| 9.17.4 Verification of the correct operation of RCCBs with 3 or 4 poles, in presence of a residual current, the neutral and one line terminal only being energized (replace the title by) |   |  |         |  |  |  |
| 8.11<br>REPLACE<br>BY:  | Test device   |  |         |  |  |  |
|   | RCCBs provided with a test device   |  | P       |  |  |  |
|   | RCCBs with rated residual current of 30mA:  |  | Р       |  |  |  |
|   | Ampere-turns produced when operating the test device do not exceed 1,66 times the ampere turns produced by IAN  | Ampere-turns produced by test device: 93,4 milliampere turns 1,66 times the Ampere turns produced by I∆n: 99,6 milliampere-turns | Р       |  |  |  |
|   | RCCBs with rated residual current other than 30mA:  |  | N/A     |  |  |  |
|   | Ampere-turns produced when operating the test device do not exceed 2,5 times the ampere turns produced by $I_{\Delta N}$  |  | N/A     |  |  |  |
|   | Not possible to energize the circuit on the load side<br>by operating the test device when the RCCB is in<br>the open position  |  | Р       |  |  |  |
| 9.12.2  | Mechanical impact   |  | P       |  |  |  |
|   | test acc. 9.12.2.1 for all types, in addition by the tests of:  |  | P       |  |  |  |
|   | <ul> <li>9.12.2.2 for RCCBs intended to be mounted on a<br/>rail and for all types of plug-in RCCBs designed for<br/>surface mounting;</li> </ul>   |  | P       |  |  |  |
|   | - 9.12.2.3 for plug-in type RCCBs, the holding in position of which depends solely on their connections.  |  | N/A     |  |  |  |
| 9.12.2.2<br>replace by:   | RCCBs for rail mounting downward vertical force of 50 N for 1 min, upward vertical force of 50 N for 1 min  |  | P       |  |  |  |
|   | 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.  |  | N/A     |  |  |  |
|   | RCCB shall not become loose during test and no damage impairing its further use   | D7 -   | Р       |  |  |  |
| 9.12.2.3<br>replace 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 |  | N/A     |  |  |  |

|  | Page 160 of 179   |                    | Report | No.:130700 | 0023SHA-00 |
|--|---|--------------------|--------|------------|------------|
|  | IEC 61008-1   |                    |        |            |            |
| Clause   | Requirement + Test  | Result - Re        | emark  |            | Verdict    |
|  | is applied to the RCCB portion at a point equidistant between the plug-in connections, without jerks for 1 min (see Figure Z4).       |                    |        |            |            |
| 9.11.2.3c)   | Tests "D2"  | D2-1               | D2-2   | D2-3       | P          |
| · · · · · · · · · · · · · · · · · · ·  | (3 samples: In= 63A, I <sub>∆n</sub> = 0,03A, type A)   |                    |        |            |            |
| modify:  | Test voltage 110% of rated phase to neutral voltage for the pole exclusively for the neutral  |                    |        |            | Р          |
|  | TEST SEQUENCE E   |                    |        |            |            |
|  | (3 samples: In= 63A, $I_{\Delta n}$ = 0,03A, type A)  | E1                 | E2     | E3         | Р          |
| 9.11.2.4a)   | Verification of the coordination at the rated conditional short-circuit current (A): Inc  | 6000A              |        |            | Р          |
| modify:  | After the tests no damage impairing further use   |                    |        |            | Р          |
| 9.7.3  | Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:   |                    |        |            | Р          |
|  | a):   | E1 - OK            |        |            | Р          |
|  |   | E2 - OK<br>E3 - OK |        |            |            |
| _  | b)  | E1 - OK            |        |            | P          |
|  |   | E2 - OK            |        |            |            |
|  |   | E3 - OK            |        |            |            |
|  | c):   | E1 - OK            |        |            | Р          |
|  |   | E2 - OK            |        |            |            |
|  |   | E3 - OK            |        |            |            |
|  | d):   | E1 -               |        |            | N/A        |
|  |   | E2 -               |        |            |            |
| -  |   | E3 -               |        |            |            |
|  | No flashover or breakdown:  |                    |        |            | Р          |
| 9.17 Verification of the behaviour of RCCBs opening automatically in case of failure of the line voltage |   |                    |        | e of       |            |
| 9.17.1<br>replace by:  | Limiting value of the line voltage U <sub>x</sub>   |                    |        |            | N/A        |
|  | U <sub>N</sub> applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs | [V]                | [V]    | [\]        |            |
|  |   |                    |        |            | N/A        |
|  |   |                    |        |            |            |

N/A

All values less than 0,7  $U_{\text{N}}$ 

|                       | IEC 61008-1   |                        |      |      |     |
|-----------------------|---|------------------------|------|------|-----|
| Clause                | Requirement + Test Result - Remark  |                        |      |      |     |
|                       |   | ,                      |      |      |     |
|                       | Tripping test:  |                        |      |      | N/A |
|                       | Test voltage (V)  | V                      |      |      |     |
|                       | Residual current 1,25.1 <sub>ΔN</sub>   | 1,25.l <sub>AN</sub> = | Α    |      |     |
|                       | Time corresponding to value for $I_{\Delta N}$ in table 1   | [ms]                   | [ms] | [ms] |     |
|                       | No value exceeds the specified limiting values  |                        |      |      | N/A |
|                       | Not possible to close the apparatus by manual operating means below $U_x$   |                        |      |      | N/A |
| 9.17.2<br>replace by: | Verification of behaviour in case of failure of the line voltage  |                        |      |      |     |
|                       | RCCB supplied with U <sub>N</sub> and line voltage, then switched off   |                        |      |      | N/A |
|                       | Time interval between switching off and opening of the main contacts:   | [ms]                   | [ms] | [ms] |     |
| a)                    | RCCBs opening without delay   |                        |      |      | N/A |
|                       | - no value exceeds 0,5 s  | _                      |      |      | N/A |
|                       | - no tripping shall occur if the voltage is switched off for a time not exceeding 0,03 s  |                        |      |      | N/A |
| b)                    | RCCBs opening with delay  |                        |      |      | N/A |
|                       | Values within the range indicated by manufacturer   | to ms                  |      |      | N/A |
|                       | RCCBs classified 4.1.2.1b): switch off at U <sub>N</sub>  |                        |      |      | N/A |
|                       | Voltage off and on at the line side:  |                        |      | N/A  |     |
|                       | No automatically closing  |                        |      |      | N/A |
| 9.17.4<br>replace by: | Verification of the correct operation of RCCBs with 3 or 4 poles, in presence of a y: residual current, the neutral and one line terminal only being energized (replace the title by) |                        |      |      | N/A |
| 9.11.2.2              | Verification of the rated making and breaking   | 630A                   |      |      | Р   |
|                       | capacity (A): Im  |                        |      | _    |     |
| modify:               | After the tests no damage impairing further use   |                        |      | P    |     |
| 9.7.3                 | Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:   |                        |      |      | P   |
|                       | a):   | E1 - OK                |      |      | Р   |
|                       | <u>a</u> ,  |                        |      |      |     |
|                       |   | E3 - OK                |      |      |     |
|                       | b)  | E1 - OK                |      |      | Р   |
|                       |   | E2 - OK                |      |      |     |
|                       |   | E3 - OK                |      |      |     |
|                       | c) E1 - OK  |                        |      | P    |     |

| Report | No.: | 1307000 | )23SHA | -001 |
|--------|------|---------|--------|------|
|--------|------|---------|--------|------|

|                       | IEC 61008-1   |                          |      |      |     |  |
|-----------------------|---|--------------------------|------|------|-----|--|
| Clause                | Requirement + Test Result - Remark  |                          |      |      |     |  |
|                       | ,   |                          |      |      |     |  |
|                       |   | E2 - OK                  |      |      |     |  |
|                       |   | E3 - OK                  |      |      |     |  |
|                       | d)  | E1 -                     |      |      | N/A |  |
|                       |   | E2 -                     |      |      |     |  |
|                       |   | E3 -                     |      |      |     |  |
|                       | No flashover or breakdown:  | over or breakdown . E1 - |      |      |     |  |
|                       |   | E2 -                     |      |      |     |  |
|                       |   | E3                       |      |      |     |  |
| 0.17                  | Verification of the behaviour of RCCBs opening automatically in case of failure of the line voltage                                   |                          |      |      |     |  |
| 9.17.1<br>replace by: | Limiting value of the line voltage U <sub>x</sub>   |                          |      |      |     |  |
|                       | U <sub>N</sub> applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs | [\]                      | [V]  | [V]  |     |  |
|                       |   |                          |      |      | N/A |  |
|                       | All values less than 0,7 U <sub>N</sub>   |                          | _    |      | N/A |  |
|                       | Tripping test:  |                          |      |      | N/A |  |
|                       | Test voltage (V)  | V                        |      |      |     |  |
|                       | Residual current 1,25.l <sub>ΔN</sub>   | 1,25.l <sub>ΔN</sub> = A |      |      |     |  |
|                       | Time corresponding to value for I <sub>ΔN</sub> in table 1  | [ms]                     | [ms] | [ms] |     |  |
|                       | No value exceeds the specified limiting values  |                          |      |      | N/A |  |
|                       | Not possible to close the apparatus by manual operating means below $U_x$   |                          |      |      | N/A |  |
| 9.17.2<br>eplace by:  | Verification of behaviour in case of failure of the line  | voltage                  |      |      | N/A |  |
|                       | RCCB supplied with $U_N$ and line voltage, then switched off  |                          |      |      | N/A |  |
|                       | Time interval between switching off and opening of the main contacts:   | [ms]                     | [ms] | [ms] |     |  |
| a)                    | RCCBs opening without delay   |                          |      |      | N/A |  |
|                       | - no value exceeds 0,5 s  |                          |      |      | N/A |  |
|                       | <ul> <li>no tripping shall occur if the voltage is switched<br/>off for a time not exceeding 0,03 s</li> </ul>                        |                          |      |      | N/A |  |
| )<br>                 | RCCBs opening with delay  |                          |      |      | N/A |  |
|                       | Values within the range indicated by manufacturer   | to                       |      | ms   | N/A |  |
|                       | RCCBs classified 4.1.2.1b): switch off at U <sub>N</sub>  |                          |      |      | N/A |  |
|                       | Voltage off and on at the line side:  |                          |      |      | N/A |  |

| Report N | No.:130700023SHA-001 |
|----------|----------------------|
|----------|----------------------|

| IEC 61008-1   |                                    |         |  |  |  |  |  |
|---|------------------------------------|---------|--|--|--|--|--|
| Clause  | Requirement + Test Result - Remark | Verdict |  |  |  |  |  |
|   |                                    | _       |  |  |  |  |  |
|   | No automatically closing           | N/A     |  |  |  |  |  |
| 9.17.4 Verification of the correct operation of RCCBs with 3 or 4 poles, in presence of a residual current, the neutral and one line terminal only being energized (replace the title by) |                                    |         |  |  |  |  |  |

|                       | TEST SEQUENCE F   |            |          |       |     |
|-----------------------|---|------------|----------|-------|-----|
|                       | (3 samples: In= 63A, I∆n= 0,03A, type A)  | F1         | F2       | F3    | Р   |
| 9.11.2.4b)            | Verification of the coordination at the rated making  | 630A       |          |       | Р   |
|                       | and breaking capacity (A): Im:  |            |          |       |     |
| modify:               | After the tests no damage impairing further use   |            |          |       | Р   |
| 9.7.3                 | Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:   |            |          |       | Р   |
|                       | a):   | F1 - OK    |          |       | Р   |
|                       |   | F2 - OK    |          |       |     |
|                       |   | F3 - OK    |          |       |     |
|                       | L)  | F1 - OK    |          | _     | Р   |
|                       | b):   | F2 - OK    |          |       |     |
|                       |   | F3 - OK    |          |       |     |
|                       |   | F1 - OK    |          |       | P   |
|                       | c):   | F2 - OK    |          |       |     |
|                       |   | F3 - OK    |          |       |     |
|                       | 4)  | F1 -       |          |       | N/A |
|                       | d):   | F2 -       |          |       |     |
|                       |   | F3 -       |          |       |     |
|                       | No flashover or breakdown   |            |          |       | P   |
| 9.17                  | Verification of the behaviour of RCCBs opening at failure of the line voltage   | utomatical | ly in ca | se of |     |
| 9.17.1<br>replace by: | Limiting value of the line voltage U <sub>x</sub>   |            |          |       | N/A |
|                       | U <sub>N</sub> applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs | [V]        | [V]      | [V]   | -   |
|                       |   |            |          |       | N/A |
|                       | All values less than 0,7 U <sub>N</sub>   |            |          |       | N/A |
|                       | Tripping test:  |            |          |       | N/A |
| _                     | Test voltage (V)  | V          |          |       |     |
|                       | Residual current 1,25.I <sub>AN</sub>   |            | Α        |       |     |

|                       | IEC 61008-1  |                               |       |      |         |
|-----------------------|--|-------------------------------|-------|------|---------|
| Clause                | Requirement + Test   | Result - R                    | emark |      | Verdict |
|                       |  |                               |       |      | _       |
|                       | Time corresponding to value for I <sub>ΔN</sub> in table 1   | [ms]                          | [ms]  | [ms] |         |
|                       | No value exceeds the specified limiting values   |                               |       |      | N/A     |
|                       | Not possible to close the apparatus by manual operating means below $U_x$  |                               |       |      | N/A     |
| 9.17.2<br>replace by: | Verification of behaviour in case of failure of the line   | voltage                       |       |      | N/A     |
|                       | RCCB supplied with $U_N$ and line voltage, then switched off   |                               |       |      | N/A     |
|                       | Time interval between switching off and opening of the main contacts:  | [ms]                          | [ms]  | [ms] |         |
| a)                    | RCCBs opening without delay  |                               |       |      | N/A     |
|                       | - no value exceeds 0,5 s   |                               |       |      | N/A     |
|                       | - no tripping shall occur if the voltage is switched off for a time not exceeding 0,03 s                                   |                               |       |      | N/A     |
| b)                    | RCCBs opening with delay   |                               | N/A   |      |         |
|                       | Values within the range indicated by manufacturer  | to ms                         |       |      | N/A     |
|                       | RCCBs classified 4.1.2.1b): switch off at U <sub>N</sub>   |                               |       |      | N/A     |
|                       | Voltage off and on at the line side:   |                               |       |      | N/A     |
|                       | No automatically closing   |                               |       |      |         |
| 9.17.4<br>replace by: | Verification of the correct operation of RCCBs with 3 residual current, the neutral and one line terminal on the title by) |                               |       | N/A  |         |
| 9.11.2.4c)            | Verification of the coordination at the rated  | 6000A                         |       |      | Р       |
|                       | conditional residual short-circuit current (A): IΔc .:   |                               |       |      |         |
| modify:               | After the tests no damage impairing further use  |                               |       | _    | Р       |
| 9.7.3                 | Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:  |                               |       |      | Р       |
|                       | a):  | F1 - OK<br>F2 - OK<br>F3 - OK |       |      | Р       |
|                       | b)   | F1 - OK<br>F2 - OK<br>F3 - OK |       |      | Р       |
|                       | c)   | F1 - OK<br>F2 - OK<br>F3 - OK |       |      | Р       |
|                       | d):  | F1 -<br>F2 -                  |       |      | N/A     |

| _                     | IEC 61008-1   |                          |            |      |         |
|-----------------------|---|--------------------------|------------|------|---------|
| Clause                | Requirement + Test  | Result - F               | <br>Remark |      | Verdict |
|                       |   |                          |            |      |         |
|                       |   | F3 -                     | _          |      |         |
|                       | No flashover or breakdown   | F1 -                     |            |      | Р       |
|                       | No hashover of breakdown  | F2 -                     |            |      |         |
|                       |   | F3 -                     |            |      |         |
| 9.17                  | Verification of the behaviour of RCCBs opening at failure of the line voltage   | utomatica                | of         |      |         |
| 9.17.1<br>replace by: | Limiting value of the line voltage U <sub>x</sub>   |                          |            |      | N/A     |
|                       | U <sub>N</sub> applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs | [V]                      | [V]        | [V]  |         |
|                       |   |                          |            |      | N/A     |
|                       | All values less than 0,7 U <sub>N</sub>   |                          |            |      | N/A     |
|                       | Tripping test:  |                          |            |      | N/A     |
|                       | Test voltage (V)  | V                        |            |      |         |
|                       | Residual current 1,25.l <sub>4N</sub>   | 1,25.I <sub>ΔN</sub> = A |            |      | ****    |
|                       | Time corresponding to value for $I_{\Delta N}$ in table 1   | [ms]                     | [ms]       | [ms] |         |
|                       | No value exceeds the specified limiting values  |                          |            |      | N/A     |
|                       | Not possible to close the apparatus by manual operating means below U <sub>x</sub>  |                          |            |      | N/A     |
| 9.17.2<br>replace by: | Verification of behaviour in case of failure of the line  | voltage                  |            |      | N/A     |
|                       | RCCB supplied with U <sub>N</sub> and line voltage, then switched off   |                          |            |      | N/A     |
|                       | Time interval between switching off and opening of the main contacts:   | [ms]                     | [ms]       | [ms] |         |
| а)                    | RCCBs opening without delay   |                          |            |      | N/A     |
|                       | - no value exceeds 0,5 s  |                          |            |      | N/A     |
|                       | <ul> <li>no tripping shall occur if the voltage is switched<br/>off for a time not exceeding 0,03 s</li> </ul>                        |                          |            |      | N/A     |
| p)                    | RCCBs opening with delay  |                          |            |      | N/A     |
|                       | Values within the range indicated by manufacturer   | to                       |            | ms   | N/A     |
|                       | RCCBs classified 4.1.2.1b): switch off at U <sub>N</sub>  |                          |            |      | N/A     |
|                       | Voltage off and on at the line side:  |                          |            |      | N/A     |

|                       | F3 -  |  |      |      |     |  |
|-----------------------|---|--|------|------|-----|--|
| 9.17                  | Verification of the behaviour of RCCBs opening automatically in case of failure of the line voltage                                   |  |      |      |     |  |
| 9.17.1<br>replace by: | Limiting value of the line voltage U <sub>x</sub>   |  |      |      |     |  |
|                       | U <sub>N</sub> applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs | [V]  | [V]  | [V]  |     |  |
|                       |   |  |      |      | N/A |  |
|                       | All values less than 0,7 U <sub>N</sub>   |  | •    |      | N/A |  |
|                       | Tripping test:  |  |      |      | N/A |  |
|                       | Test voltage (V)  | V  |      |      |     |  |
|                       | Residual current 1,25.l <sub>ΔN</sub>   | 1,25.I <sub>ΔN</sub> = A   |      |      |     |  |
|                       | Time corresponding to value for I <sub>ΔN</sub> in table 1  | [ms]   | [ms] | [ms] |     |  |
|                       | No value exceeds the specified limiting values  |  | _    |      | N/A |  |
|                       | Not possible to close the apparatus by manual operating means below U <sub>x</sub>  |  |      |      | N/A |  |
| 9.17.2<br>replace by: | Verification of behaviour in case of failure of the line voltage  |  |      |      |     |  |
|                       | RCCB supplied with $U_N$ and line voltage, then switched off  |  |      |      | N/A |  |
|                       | Time interval between switching off and opening of the main contacts:   | [ms]   | [ms] | [ms] |     |  |
| a)                    | RCCBs opening without delay   |  | _    |      | N/A |  |
|                       | - no value exceeds 0,5 s  |  |      |      | N/A |  |
| `                     | <ul> <li>no tripping shall occur if the voltage is switched<br/>off for a time not exceeding 0,03 s</li> </ul>                        |  |      |      | N/A |  |
| b)                    | RCCBs opening with delay  |  |      |      | N/A |  |
|                       | Values within the range indicated by manufacturer   | to   |      | ms   | N/A |  |
|                       | RCCBs classified 4.1.2.1b): switch off at U <sub>N</sub>  |  |      |      | N/A |  |
|                       | Voltage off and on at the line side:  |  |      |      | N/A |  |
|                       | No automatically closing  |  |      |      |     |  |
| 9.17.4<br>replace by: |   | Verification of the correct operation of RCCBs with 3 or 4 poles, in presence of a residual current, the neutral and one line terminal only being energized (replace |      |      |     |  |

| IEC 61008-1 |                    |  |                 |  |         |  |  |
|-------------|--------------------|--|-----------------|--|---------|--|--|
| Clause      | Requirement + Test |  | Result - Remark |  | Verdict |  |  |

|                       | TEST SEQUENCE F   |                               |           |               | r.  |  |
|-----------------------|---|-------------------------------|-----------|---------------|-----|--|
|                       | (3 samples: In=10A, IΔn= 0,3A, type AC)   | F4                            | F5        | F6            | P   |  |
| 9.11.2.4b)            | Verification of the coordination at the rated making  | 500A                          |           | _             | Р   |  |
| ,                     | and breaking capacity (A): Im   |                               |           |               |     |  |
| modify:               | After the tests no damage impairing further use   |                               |           |               | P   |  |
| 9.7.3                 | Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:   |                               |           |               | Р   |  |
|                       | a):   | F4 - OK<br>F5 - OK<br>F6 - OK |           |               | Р   |  |
|                       | b):   | F4 - OK<br>F5 - OK<br>F6 - OK | _         |               | Р   |  |
|                       | c):   | F4 - OK<br>F5 - OK<br>F6 - OK |           |               | P   |  |
|                       | d):   | F4 -<br>F5 -<br>F6 -          |           |               | N/A |  |
|                       | No flashover or breakdown:  |                               |           |               | P   |  |
| 9.17                  | Verification of the behaviour of RCCBs opening at of the line voltage   | utomatical                    | ly in cas | se of failure |     |  |
| 9.17.1<br>replace by: | Limiting value of the line voltage U <sub>x</sub>   |                               |           |               |     |  |
|                       | U <sub>N</sub> applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs | [V]                           | [\]       | [V]           |     |  |
|                       |   |                               |           |               | N/A |  |
|                       | All values less than 0,7 U <sub>N</sub>   |                               |           |               | N/A |  |
|                       | Tripping test:  |                               |           |               | N/A |  |
|                       | Test voltage (V)  | V                             |           | 116774        |     |  |
|                       | Residual current 1,25.l <sub>ΔN</sub>   | 1,25.I <sub>ΔN</sub> =        | Α         |               |     |  |
|                       | Time corresponding to value for I <sub>ΔN</sub> in table 1  | [ms]                          | [ms]      | [ms]          |     |  |
|                       | No value exceeds the specified limiting values  |                               |           |               | N/A |  |
|                       | Not possible to close the apparatus by manual operating means below U <sub>x</sub>  |                               |           |               | N/A |  |

|                       | IEC 61008-1  |   |       |      |         |  |
|-----------------------|--|---|-------|------|---------|--|
| Clause                | Requirement + Test   | Result - R  | emark |      | Verdict |  |
| 9.17.2<br>replace by: | Verification of behaviour in case of failure of the line voltage   |   |       |      |         |  |
|                       | RCCB supplied with U <sub>N</sub> and line voltage, then switched off  |   |       |      | N/A     |  |
|                       | Time interval between switching off and opening of the main contacts:  | [ms]  | [ms]  | [ms] |         |  |
| a)                    | RCCBs opening without delay  |   |       |      | N/A     |  |
| _                     | - no value exceeds 0,5 s   |   |       |      | N/A     |  |
|                       | <ul> <li>no tripping shall occur if the voltage is switched<br/>off for a time not exceeding 0,03 s</li> </ul>             |   |       |      | N/A     |  |
| b)                    | RCCBs opening with delay   |   |       |      | N/A     |  |
|                       | Values within the range indicated by manufacturer  | to ms   |       |      | N/A     |  |
|                       | RCCBs classified 4.1.2.1b): switch off at U <sub>N</sub>   |   |       |      | N/A     |  |
| _                     | Voltage off and on at the line side:   |   |       |      | N/A     |  |
|                       | No automatically closing   |   |       |      | N/A     |  |
| 9.17.4<br>replace by: | Verification of the correct operation of RCCBs with 3 residual current, the neutral and one line terminal on the title by) |   |       |      | N/A     |  |
| 9.11.2.4c)            | Verification of the coordination at the rated  | 6000A   |       | Р    |         |  |
|                       | conditional residual short-circuit current (A): IΔc .:   |   |       |      |         |  |
| modify:               | After the tests no damage impairing further use  |   |       |      | P       |  |
| 9.7.3                 | Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:  |   |       |      | Р       |  |
|                       | a):  | F4 - OK   |       |      |         |  |
|                       |  | F5 - OK<br>F6 - OK                                  |       |      | P       |  |
|                       | b):  | F6 - OK<br>F4 - OK<br>F5 - OK                       |       |      | P       |  |
|                       | b)   | F6 - OK   |       |      |         |  |
|                       |  | F6 - OK<br>F4 - OK<br>F5 - OK<br>F6 - OK<br>F4 - OK |       |      | Р       |  |

| Report | No.  | ·1207  | വവാദ  | асна.              | 001   |
|--------|------|--------|-------|--------------------|-------|
| Kepoil | INO. | . 3307 | UUUZJ | $\circ$ HH $\circ$ | ·UU I |

|        |                    | IEC 6 | 1008-1 |             |         |
|--------|--------------------|-------|--------|-------------|---------|
| Clause | Requirement + Test |       | Resu   | lt - Remark | Verdict |

|                       |   | F6 -                   |            |            |         |
|-----------------------|---|------------------------|------------|------------|---------|
| 9.17                  | Verification of the behaviour of RCCBs opening at of the line voltage   | utomatical             | ly in case | of failure |         |
| 9.17.1<br>replace by: | Limiting value of the line voltage U <sub>x</sub>   |                        |            | N/A        |         |
|                       | U <sub>N</sub> applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs | [V]                    | [V]        | [V]        | <u></u> |
|                       |   |                        |            |            | N/A     |
|                       | All values less than 0,7 U <sub>N</sub>   |                        |            |            | N/A     |
|                       | Tripping test:  |                        |            | _          | N/A     |
|                       | Test voltage (V)  | V                      |            | 9          |         |
|                       | Residual current 1,25.l <sub>ΔN</sub>   | 1,25.1 <sub>ΔN</sub> = | A          |            | ~~      |
|                       | Time corresponding to value for I <sub>ΔN</sub> in table 1  | [ms]                   | [ms]       | [ms]       |         |
|                       | No value exceeds the specified limiting values  |                        |            |            | N/A     |
| _                     | Not possible to close the apparatus by manual operating means below $U_x$   |                        |            |            | N/A     |
| 9.17.2<br>replace by: | Verification of behaviour in case of failure of the line  | voltage                |            |            | N/A     |
|                       | RCCB supplied with $U_N$ and line voltage, then switched off  |                        |            |            | N/A     |
|                       | Time interval between switching off and opening of the main contacts:   | [ms]                   | [ms]       | [ms]       |         |
| a)                    | RCCBs opening without delay   |                        |            |            | N/A     |
|                       | - no value exceeds 0,5 s  |                        |            |            | N/A     |
|                       | <ul> <li>no tripping shall occur if the voltage is switched<br/>off for a time not exceeding 0,03 s</li> </ul>                        |                        |            |            | N/A     |
| b)                    | RCCBs opening with delay  |                        | _          |            | N/A     |
|                       | Values within the range indicated by manufacturer   | to                     | _          | ms         | N/A     |
|                       | RCCBs classified 4.1.2.1b): switch off at U <sub>N</sub>  |                        | _          |            | N/A     |
|                       | Voltage off and on at the line side:  |                        |            |            | N/A     |
| _                     | No automatically closing  |                        |            |            | N/A     |
| 9.17.4<br>replace by: | Verification of the correct operation of RCCBs with 3 residual current, the neutral and one line terminal on the title by)            |                        |            |            | N/A     |

| modify: | TEST SEQUENCE "G"                                      | G1 | G2 | G3 | Р |
|---------|--|----|----|----|---|
|         | (3 samples: in= 63A, I <sub>∆n</sub> = 0,03A, type AC) |    |    |    |   |
| 9.22    | Verification of reliability                            |    |    |    | Р |

| IEC 61008-1 |   |                 |             |  |  |  |
|-------------|---|-----------------|-------------|--|--|--|
| Clause      | Requirement + Test                                  | Result - Remark | Verdict     |  |  |  |
|             | -   | <del></del>     |             |  |  |  |
| 9.22.1      | Climatic test                                       |                 | Р           |  |  |  |
| modify:     | TEST SEQUENCE "G"                                   | G4 G5 (         | <b>G6</b> P |  |  |  |
|             | (3 samples: In= 10A, $I_{\Delta n}$ = 0,3A, type A) |                 |             |  |  |  |
| 9.22        | Verification of reliability                         |                 | Р           |  |  |  |
| 9.22.1      | Climatic test                                       |                 | Р           |  |  |  |
|             |   |                 |             |  |  |  |
|             |   |                 |             |  |  |  |

|              | TEST SEQUENCE "H" (add the new test sequence)  | H1          | H2       | Н3       | N/A |
|--------------|--|-------------|----------|----------|-----|
| 8            | requirements for construction and operation  |             |          | _        |     |
| add:<br>8.Z1 | Behaviour of RCCBs at low ambient air temperatur   | 'e          |          |          |     |
|              | RCCBs for use between -25°C and +40°C operate reliably at low ambient air temperature                        |             |          |          | N/A |
| add:<br>9.Z1 | Verification of the correct operation at low ambient<br>for use at temperatures between<br>-25° C and +40° C | t air tempe | rature f | or RCCBs |     |
|              | RCCBs mounted in enclosure with degree of protection IP 55 and connected for normal use                      |             |          |          | N/A |
|              | RCCBs in a test chamber at +23°C $\pm$ 2°C and rH 90% $\pm$ 3%   |             |          |          | N/A |
|              | RCCBs in ON-position without load  |             |          |          | N/A |
|              | Five test cycles performed acc. to figure Z6   |             |          |          | N/A |
|              | No tripping during cycles  |             |          |          | N/A |
|              | At the end of last 6 h period at -25°C an a.c. residual current is passed through one pole (see figure 4a)   |             |          |          | N/A |
|              | - general type:  | [ms]        | [ms]     | [ms]     |     |
|              | break time at 1,25 $I_{\Delta N}$ not exceeding the value for $I_{\Delta N}$ in table 1                      |             |          |          | N/A |
|              | - S-type:  | [ms]        | [ms]     | [ms]     |     |
|              | break time at 2,5 $I_{\Delta N}$ not exceeding the value for 2 $I_{\Delta N}$ in table 1                     |             |          |          | N/A |
|              | Additionally for RCCBs of type A:  |             |          |          | N/A |
|              | Break time with pulsating d.c. residual currents of  |             |          |          | N/A |
|              | - 1,25 I <sub>ΔN</sub> (general type)  |             |          |          | N/A |
|              | - 2,5 I <sub>ΔN</sub> (S-type)   |             |          |          | N/A |
|              | Multiplied by:   | [ms]        | [ms]     | [ms]     |     |
|              | 1,4 for I <sub>ΔN</sub> > 0,01 A   |             |          |          | N/A |

Report No.:130700023SHA-001

| IEC 61008-1 |  |                 |         |  |  |  |
|-------------|--|-----------------|---------|--|--|--|
| Clause      | Requirement + Test   | Result - Remark | Verdict |  |  |  |
|             |  |                 |         |  |  |  |
|             | 2 for I <sub>ΔN</sub> ≤ 0,01 A   |                 | N/A     |  |  |  |
|             | at $\alpha$ = 0°el (test circuit figure 4b)                                    |                 | N/A     |  |  |  |
|             | After test possible to switch on the RCCB without presence of residual current |                 | N/A     |  |  |  |

## EN 61008-1

|        |                 |   | ANNEX A (NORMATIVE)   |
|--------|-----------------|---|---|
|        |                 | Toet ecoupar  | e and number of samples to be submitted for certification purposes  |
|        |                 | rest sequence   | Table A.1 - Test sequences  |
| rest s | equence         | Clause or subclause   | Test ( or inspection)   |
|        | A               | 6<br>8.1.1<br>8.1.2<br>9.3<br>8.1.3<br>9.15<br>9.4<br>9.5<br>9.6<br>9.13<br>8.1.3<br>9.14 | Marking General Mechanism Indelibility of marking Clearance and creepage distances (external parts only) Trip free mechanism Reliability of screws, current-carrying parts and connections Reliability of terminals for external conductors Protection against electric shock Resistance to heat Clearances and creepage distances (internal parts) Resistance to abnormal heat and to fire |
|        | В               | 9.7<br>9.8<br>9.20<br>9.22.2<br>9.23  | Dielectric properties Temperature-rise Resistance of insulation against impulse voltages Reliability at 40°C Ageing of electronic components  |
|        | С               | 9.10  | Mechanical and electrical endurance   |
|        | Do              | 9.9   | Residual operating characteristics  |
| D      | Dı              | 9.17<br>9.19<br>9.21<br>9.11.2.3 a)b)<br>9.16<br>9.12<br>9.18                             | Behaviour in case of failure of the line voltage Unwanted tripping Behaviour in case of surge currents O.C. components Performance at I <sub>Am</sub> Test device Resistance to mechanical shock and impact Non-operating current under overcurrent conditions  |
|        | D <sub>2</sub>  | 9.11.2.3 c)   | Verification of the suitability of RCCBs for use in IT-systems  |
|        | E               | 9.11.2.4 a)   | Coordination at Inc   |
|        |                 | 9.11.2.2  | Performance at I <sub>m</sub>   |
|        | F               | 9.11.2.4 b)   | Coordination at I <sub>m</sub>  |
|        |                 | 9.11.2.4 c)   | Coordination at I <sub>Ac</sub>   |
|        | Ge              | 9.22.1  | Reliability (climatic tests)  |
|        | G <sub>1</sub>  | 9.Z1  | Verification of correct operation at low Ambient air temperature of RCCBs for use of -25°C to +40°C   |
|        | H <sup>®)</sup> | IEC 61543 Table 4 -T1.1<br>IEC 61543 Table 4 -T1.2<br>IEC 61543 Table 5 -T2.3             | Harmonics, interharmonics<br>Signalling voltage<br>Surges   |
|        | I               | IEC 61543 Table 5 -T2.1<br>IEC 61543 Table 5 -T2.5<br>IEC 61543 Table 5 -T2.2             | Conducted sine-wave voltages or currents Radiated high-frequency phenomena Fast transients (burst)  |
|        | J               | IEC 61543 Table 5 - T2.6 IEC 61543 Table 6 -T3.1  | Conducted common mode disturbances in the frequency range lower than 150 kHz Electrostatic discharges   |

#### EN 61008-1

|   | replace tai       | ble A.2 by:                                     |   |  |  |  |  |
|---|-------------------|---|---|--|--|--|--|
| Table A.2 - Number of samples for full test procedure |                   |   |   |  |  |  |  |
| Test sequence <sup>a</sup>                            | Number of samples | Minimum number of accepted samples <sup>b</sup> | Maximum number of samples for repeated tests <sup>c</sup> |  |  |  |  |
| А   | 1+3 <sup>f</sup>  | 1+3 <sup>f</sup>                                |   |  |  |  |  |
| В   | 3                 | 2   | 3   |  |  |  |  |
| С   | 3                 | 2   | 3   |  |  |  |  |
| D   | 3                 | 2 <sup>d</sup>                                  | 3   |  |  |  |  |
| D <sub>2</sub>  | 3                 | 3   | 3   |  |  |  |  |
| E   | 3                 | 2 <sup>d</sup>                                  | 3   |  |  |  |  |
| F   | 3                 | 2 <sup>d</sup>                                  | 3   |  |  |  |  |
| G <sub>0</sub>  | 3                 | 2   | 3   |  |  |  |  |
| G <sub>1</sub>  | 3                 | 2   | 3   |  |  |  |  |
| H <sup>e</sup>  | 3                 | 2   | 3   |  |  |  |  |
| l e   | 3                 | 2   | 3   |  |  |  |  |
| J°  | 3                 | 2   | 3   |  |  |  |  |

- a) In total a maximum of three test sequences may be repeated.
- b) It is assumed that a sample which has not passed a test has not met the requirements due to workmanship or assembly defects which are not representative of the design.
- c) In the case of repeated tests, all test results must be acceptable.
- d) All samples shall meet the requirements in 9.9.2, 9.9.3, and 9.11.2.3, as appropriate. In addition, permanent arcing or flashover between poles or between poles and frame shall not occur in any sample during tests of 9.11.2.2, 9.11.2.4 a), 9.11.2.4 b) or 9.11.2.4 c).
- e) At the manufacturer's request, the same set of samples may be subjected to more than one of these test sequences.
- f) Test 9.14 shall applied to 3 additional new samples

### Report No.:130700023SHA-001

### EN 61008-1

|                                 | replace  | table A.3 by:   |  |
|---------------------------------|--|---|--|
|                                 | Table A.3 - Number of sam                      | ples for simplified test procedure                          |  |
| Test sequence                   | Number of sa                                   | amples according to the number of                           | poles a) g)  |
|                                 | 2-poles b) c)                                  | 3-poles d) f) i)  | 4-poles e)   |
| A <sup>j)</sup>                 | 1 max. rating $I_N$ min. rating $I_{\Delta N}$ | 1 max. rating I <sub>N</sub><br>min. rating I <sub>AN</sub> | 1 max, rating I <sub>N</sub><br>min, rating I <sub>AN</sub>  |
| В                               | 3 max. rating $I_N$ min. rating $I_{\Delta N}$ | 3 max. rating $I_N$ min. rating $I_{\Delta N}$              | 3 max. rating I <sub>N</sub> min. rating I <sub>SN</sub>   |
| С                               | 3 max. rating $l_N$ min. rating $l_{\Delta N}$ | 3 max. rating $I_N$ min. rating $I_{\Delta N}$              | 3 max. rating $I_N$ min. rating $I_{\Delta N}$   |
| D <sub>0</sub> + D <sub>1</sub> | 3 max. rating $I_N$ min. rating $I_{\Delta N}$ | 3 max. rating I <sub>N</sub> min. rating I <sub>AN</sub>    | 3 max. rating l <sub>N</sub><br>min. rating l <sub>△N</sub>  |
| D <sub>0</sub>                  |  | 1 for all other ratings of I <sub>ΔN</sub>                  |  |
| D <sub>2</sub>                  | 3 max. rating $I_N$ min. rating $I_{\Delta N}$ | 3 max. rating I <sub>N</sub> min. rating I <sub>AN</sub>    | 3 max. rating l <sub>N</sub><br>min. rating l <sub>∆N</sub>  |
| E                               | 3 max. rating $I_N$ min. rating $I_{\Delta N}$ | 3 max. rating I <sub>N</sub> min. rating I <sub>AN</sub>    | 3 max. rating $I_N$ min. rating $I_{\Delta N}$   |
| F                               | 3 max. rating $I_N$ min. rating $I_{\Delta N}$ | 3 max. rating I <sub>N</sub> min. rating I <sub>AN</sub>    | 3 max. rating I <sub>N</sub> min. rating I <sub>AN</sub>   |
|                                 | 3 min. rating $I_N$ max. rating $I_{\Delta N}$ | 3 min. rating $I_N$ max. rating $I_{\Delta N}$              | 3 min. rating $I_N$ max. rating $I_{\Delta N}$   |
| G <sub>0</sub>                  | 3 max. rating $I_N$ min. rating $I_{\Delta N}$ | 3 max. rating I <sub>N</sub> min. rating I <sub>AN</sub>    | 3 max. rating $I_N$ min. rating $I_{\Delta N}$   |
| G <sub>1</sub> h)               | 3 max. rating $I_N$ min. rating $I_{\Delta N}$ | 3 max. rating $I_N$ min. rating $I_{\Delta N}$              | 3 max. rating I <sub>N</sub> min. rating I <sub>AN</sub>   |
|                                 | 3 min. rating $I_N$ max. rating $I_{\Delta N}$ | 3 min. rating $I_N$ max. rating $I_{\Delta N}$              | 3 min. rating $I_N$ max. rating $I_{\Delta N}$   |
| Н                               |  |   | $3^{\rm hj}$ samples of the sale rating IN chosen at random min. rating INN                                    |
| I                               |  |   | 3 h) samples of the sai<br>rating<br>I <sub>N</sub> chosen at random<br>min. rating I <sub>AN</sub>            |
| J                               |  |   | 3 <sup>h)</sup> samples of the sal<br>rating<br>I <sub>N</sub> chosen at randon<br>min. rating I <sub>AN</sub> |

- a) If a test is to be repeated according to the minimum performance criteria of clause A.2, a new set of samples is used for the relevant test. In the repeated test all test results must be acceptable.
- If only 3-pole or 4-pole RCCBs are submitted, this column shall also apply to a set of samples with the smallest number of b) poles.
- c) d) deleted
- deleted
- e) f) deleted
- This column is omitted when 4-pole RCCBs have been tested.
- If only one value of  $I_{\Delta N}$  is submitted, min. rating  $I_{\Delta N}$  and max, rating  $I_{\Delta N}$  are replaced by  $I_{\Delta N}$
- g) h) Only the highest number of pole.
- deleted
- j) Three additional samples of the minimum number of poles, with ratings In and IAN chosen at random, shall be used for the test of 9.14.

|        |                    | Page 174 of 179 | Report No       | .:13070002 | 23SHA-001 |
|--------|--------------------|-----------------|-----------------|------------|-----------|
|        |                    | EN 61008-1      |                 |            |           |
| Clause | Requirement + Test |                 | Result - Remark |            | Verdict   |

|                 | ANNEX J Particular requirements for RCCBs with screwless type terminals for external copper conductors                          | N/A |
|-----------------|---|-----|
|                 |   | N/A |
| J.6<br>replace: | Marking   |     |
|                 | In addition to Clause 6, the following requirements apply:  | N/A |
|                 | Marking on the RCCB or  | N/A |
|                 | if the space available is not sufficient on the smallest package unit or in technical information                               | N/A |
|                 | Marking indicating the length of insulation to be removed before insertion of the conductor into the terminal shown on the RCCB | N/A |
| _               | Manufacturer shall provide information in his literature, on the maximum number of conductors which may be clamped.             | N/A |

|         | ANNEX ZB                                     |     |
|---------|--|-----|
|         | Special national conditions                  |     |
| Germany | The use of RCCBs of type AC is not permitted | N/A |

| _       | ANNEX ZC<br>A-deviations                        | N/A |
|---------|---|-----|
| Austria | subclause 4.1, Table Z1 is not valid in Austria | N/A |

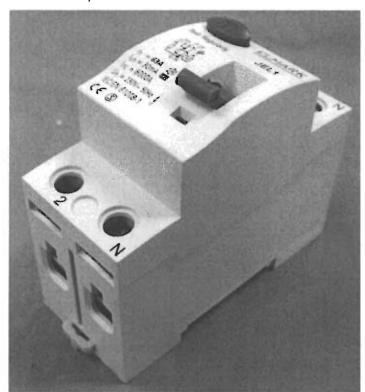
| IEC 61008-1 |                    |  |                 |         |
|-------------|--------------------|--|-----------------|---------|
| Clause      | Requirement + Test |  | Result - Remark | Verdict |

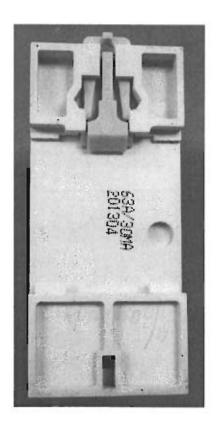
Table Z3 - Requirements for marking

|    |  | 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 <u>side</u> 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   |  | Х   |   |   |  |
| b) | Type designation, catalogue number or serial number  |  | Х   |   |   |  |
| c) | Rated voltage(s) with the symbol ~   |  | x   |   |   |  |
| d) | Rated frequency, if the RCCB is designed for frequencies other than 50Hz   |  | Х   |   |   |  |
| e) | rated current  | x  |   |   |   |  |
| f) | Rated residual operating current ( $I_{\Delta n}$ ) in A or in mA  | ×  |   |   |   |  |
| h) | rated making and breaking capacity (I <sub>m</sub> )   |  |   |   | X (*)   |  |
| j) | The degree of protection (only if different from IP20)   |  |   |   | Х   |  |
| k) | The position of use (symbol according to IEC 60051), if necessary  |  | х   |   |   |  |
| l) | Rated residual making and breaking capacity ( $l_{\Delta m}$ ), if different from rated short-circuit capacity ( $l_m$ )   |  |   |   | X (*)   |  |
| m) | The symbol S (S in a square) for type S devices  | x  |   |   |   |  |
| D) | symbol of the method of operation according to Table Z1 of 4.1 if the RCCB is functionally dependent on the line voltage   |  | ×   | Х   |   |  |
| 0) | Operating means of the test device, by the letter T (**)   | X  |   |   |   |  |
| p) | Wiring diagram unless the correct mode of operation is evident   |  | ×   | 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  | Х  |   |   |   |  |
| s) | RCCBs according to 4 Z2 marked with the symbol (snowflake enclosing -25)   |  | Х   |   |   |  |
| t> | Indication of the terminal for the neutral with "N"  |  | Х   |   |   |  |
| น) | Additional marking of performance to other standards or additional requirements according to 6.Z2  |  | Х   |   |   |  |
|    |  |  |   |   | 1   |  |

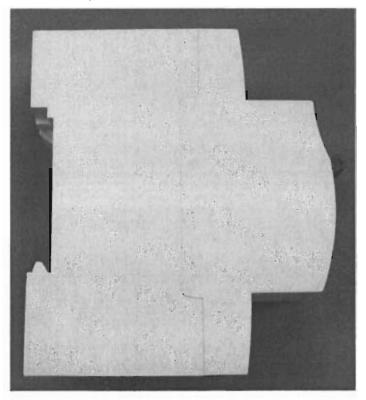
 $I_{\Delta m}$  and  $I_m$  (if different of  $I_{\Delta m}$ ) may be anywhere on the device or in the catalogue but shall be together it is recommended to advise the user to test the device regularly

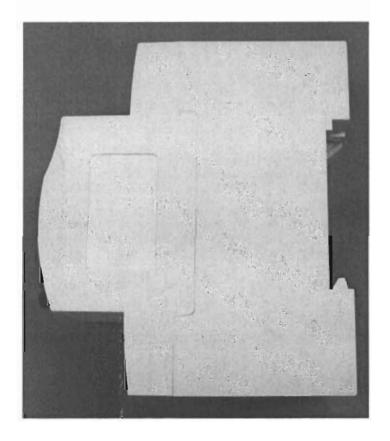
| IEC 61008-1 |                    |  |                 |         |  |
|-------------|--------------------|--|-----------------|---------|--|
| Clause      | Requirement + Test |  | Result - Remark | Verdict |  |





| IEC 61008-1 |                    |    |                |         |
|-------------|--------------------|----|----------------|---------|
| Clause      | Requirement + Test | Re | esult - Remark | Verdict |



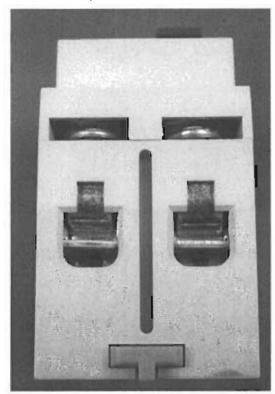


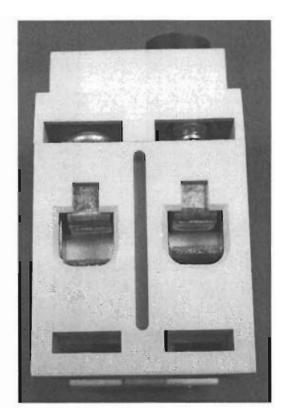
TRF No. IEC61008\_1F

Page 178 of 179

Report No. 130700023SHA-001

| IEC 61008-1 |                    |  |                 |         |
|-------------|--------------------|--|-----------------|---------|
| Clause      | Requirement + Test |  | Result - Remark | Verdict |

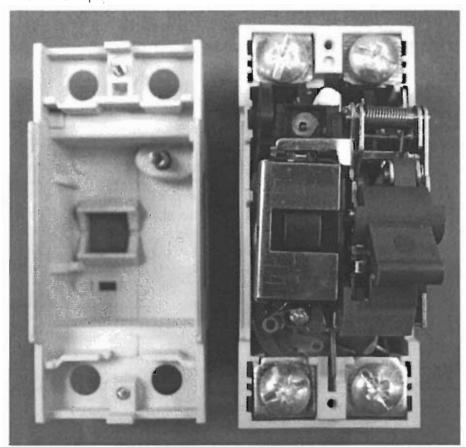




Page 179 of 179

Report No. 130700023SHA-001

| IEC 61008-1 |                    |  |                 |         |
|-------------|--------------------|--|-----------------|---------|
| Clause      | Requirement + Test |  | Result - Remark | Verdict |







## TEST REPORT IEC 61008-1

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

Report Number.....: 130700023SHA-002

Date of issue.....: 2013-10-15

Total number of pages .....: 164

Applicant's name .....: ELMARK INDUSTRIES SC

Address...... 2 Dobrudzha blvd., Dobrich, Bulgaria

Test specification:

Standard .....: IEC 61008-1:2010 (Third Edition) +A1:2012 used in conjunction with

IEC 61008-2-1:1990 (First Edition) and

EN 61008-1:2012

Test procedure .....: CB and S

Non-standard test

method....:

N/A

Test Report Form No.....: IEC61008\_1F

Test Report Form(s) Originator ....: OVE

Master TRF .....: Dated 2012-12

Copyright © 2012 Worldwide System for Conformity Testing and Certification of Electrotechnical Equipment and Components (IECEE), Geneva, Switzerland. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the IECEE is acknowledged as copyright owner and source of the material. IECEE takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

Test item description....: RCCBs

Trade Mark.....: ELMARK

Manufacturer.....: Same as applicant

Model/Type reference.....: JEL1

Ratings.....: Ue= 415V~(1P+N), In= 10, 16, 20, 25, 32, 40, 63A;

 $|\Delta n = 0.03, 0.1, 0.3A$ , type AC & type A; Inc=  $|\Delta c = 6000A$ 

| Testi                      | ng procedure and testing location: |  |   |  |
|----------------------------|------------------------------------|--|---|--|
| $\boxtimes$                | CB Testing Laboratory:             | Intertek Testing Service                           | es Shanghai   |  |
| Testi                      | ng location/ address:              | Building No.86, 1198 Qinzhou Road (North),         |   |  |
|                            |                                    | Shanghai 200233, China                             |   |  |
| $\boxtimes$                | Associated CB Testing Laboratory:  | Inspection Center of Pr<br>Electric Apparatus in Z | roducts' Quality of Low Voltage<br>hejiang Province |  |
| Testing location/ address: |                                    | West Zhonghuan Road<br>P.R.China                   | d, Jiaxing City, Zhejiang Province,                 |  |
|                            | Tested by (name + signature):      | Vincent Yang                                       | Vinet Young   |  |
| ,                          | Approved by (name + signature):    | Jim Hua  | Jim la  |  |
| _                          | Testing procedure: TMP             | Selection and the contract of                      |   |  |
|                            |                                    |  |   |  |
| lesti                      | ng location/ address:              |  |   |  |
| -                          | Tested by (name + signature):      |  |   |  |
|                            | Approved by (name + signature):    |  |   |  |
| F=~~;                      |                                    |  |   |  |
|                            | Testing procedure: WMT             |  |   |  |
| Testi                      | ng location/ address:              |  |   |  |
| -                          | Tested by (name + signature):      |  |   |  |
| ١                          | Witnessed by (name + signature):   |  |   |  |
|                            | Approved by (name + signature):    |  |   |  |
| 10, 10                     |                                    | A SERVE VOLUMENTE                                  |   |  |
|                            | Testing procedure: SMT             |  |   |  |
| Testi                      | ng location/ address:              |  |   |  |
|                            | Fested by (name + signature):      |  |   |  |
| ,                          | Approved by (name + signature):    |  |   |  |
| (                          | Supervised by (name + signature):  |  |   |  |

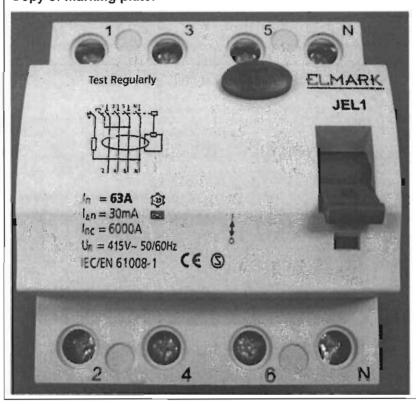
| Summary of  | testing:   |                  |
|-------------|--|------------------|
| Clause      | Testing items  | Testing location |
| 6           | Marking and other product information  | CBTL             |
| 8.1.1       | General  | CBTL             |
| 8.1.2       | Mechanism  | CBTL             |
| 8.1.3       | Clearances and creepage distances  | CBTL             |
| 8.1.6       | Non-interchangeability   | CBTL             |
| 9.3         | Test of Indelibility of marking  | CBTL             |
| 9.4         | Test of reliability of screws, current-carrying parts and connections.                     | CBTL             |
| 9.5         | Reliability of terminals for external conductors   | CBTL             |
| 9.6         | Test of protection against electric shock  | CBTL             |
| 9.7         | Test of dielectric properties  |                  |
| 9.7.1       | Resistance to humidity   | CBTL             |
| 9.7.2       | Insulation resistance of the main circuit  | CBTL             |
| 9.7.3~9.7.7 | Dielectric strength  | CBTL             |
| 9.8         | Test of temperature-rise   | CBTL             |
| 9.9         | Operating characteristic   | ACTL             |
| 9.10        | Mechanical and electrical endurance  | ACTL             |
| 9.11        | Behavior of the RCCBs under short circuit conditions                                       | ACTL             |
| 9.12        | Resistance to mechanical shock and impact  |                  |
| 9.12.1      | Mechanical shock   | CBTL             |
| 9.12.2      | Mechanical impact  | CBTL             |
| 9.13        | Resistance to heat   | CBTL             |
| 9.14        | Resistance to abnormal heat and to fire  | CBTL             |
| 9.15        | Trip-free mechanism  | CBTL             |
| 9.16        | Operation of the test device at the limits of rated voltage                                | CBTL             |
| 9.17        | Behaviour of RCCBs in case of failure of the line voltage, classified according to 4.1.2.1 | CBTL             |
| 9.18        | Limiting values of the non-operating current under over current conditions                 | ACTL             |
| 9.19        | Resistance against unwanted tripping due to current surges                                 | ACTL             |
| 9.20        | Resistance of the insulation against an impulse voltages                                   | ACTL             |
| 9.21        | Behaviour of RCCBs in case of an earth fault current comprising a d.c. components          | ACTL             |
| 9.22        | Reliability  |                  |
| 9.22.1      | Climatic test  | CBTL             |

| 9.22.2 | Test with temperature of 40°C       | ACTL |
|--------|-------------------------------------|------|
| 9.23   | Ageing of electronic components     | ACTL |
| 9.24   | Electromagnetic compatibility (EMC) | CBTL |

## Summary of compliance with National Differences

The test results obtained and the general performance is considered to comply with the group differences of EN 61008-1:2012.

## Copy of marking plate:



| Summary       | of testin | g:  |      | (1)  |      |                |   |        |                                |                |      |       |       |                 | 107   |
|---------------|-----------|-----|------|------|------|----------------|---|--------|--------------------------------|----------------|------|-------|-------|-----------------|-------|
| Report        | No. of    | 1,  | Isn  | _    | 9.51 |                | Т | est se | quence ar                      | nd nui         | mber | of sa | mples |                 |       |
| ref.No        | poles     | (A) | (A)  | Туре | A    | A <sub>2</sub> | В | С      | D <sub>0</sub> +D <sub>1</sub> | D <sub>2</sub> | E    | F     | G     | H <sup>a)</sup> | EMC b |
|               | 1P+N      | 63  | 0,03 | Α    | Х    | Х              | Х | х      | х                              | ×              | Х    | Х     | -     | -               | -     |
|               | 1P+N      | 63  | 0,03 | AC   | -    | -              | - | -      | ×                              | -              | -    | -     | x     | -               | -     |
| 1307000       | 1P+N      | 63  | 0,1  | Α    | -    | -              | - | -      | x -                            | -              | -    | -     | -     | -               | -     |
| 23SHA-<br>001 | 1P+N      | 63  | 0,1  | AC   | -    | -              | - | _      | x -                            | -              | -    | -     | -     | _               | _     |
|               | 1P+N      | 63  | 0,3  | Α    | -    | -              | - | -      | x -                            | -              | -    | -     | -     | -               | -     |
|               | 1P+N      | 63  | 0,3  | AC   | -    | -              | - | -      | x -                            | -              | -    | -     | -     | -               | -     |
|               | 1P+N      | 10  | 0,3  | AC   | _    | -              | - | -      |                                | -              | -    | ×     | -     | _               | -     |
|               | 1P+N      | 10  | 0,3  | Α    | _    | -              | - | -      |                                | -              | -    | -     | x     | -               | -     |
|               | 3P+N      | 63  | 0,03 | Α    | Х    | ×              | X | x      | ×                              | ×              | ×    | ×     | _     | ×               | ×     |
| 1307000       | 3P+N      | 63  | 0,03 | AC   | -    | -              | - | -      | ×                              | _              | _    | _     | x     | ,               | _     |
| 23SHA-<br>002 | 3P+N      | 10  | 0,3  | AC   | -    | -              | _ | -      | -                              | -              | -    | х     | _     | х               | _     |
| * *           | 3P+N      | 10  | 0,3  | Α    | _    | _              | - | _      | -                              | _              | _    | _     | x     | _               | _     |

## Note:

- a). Test sequence in EN 61008-1.
- b). See EMC test report No. 130700024SHA.

| Test item particulars  |                            |
|--|----------------------------|
| Classification of RCCBs functionally dependent on the line voltage             | Yes / No                   |
| Opening automatically in case of failure of the line voltage:                  | Yes / No                   |
| - reclosing automatically when the line voltage is restored                    | Yes / No                   |
| - not reclosing automatically when the line voltage is restored                | Yes / No                   |
| Not opening automatically in case of failure of the line voltage               | Yes / No                   |
| - able to trip in a hazardous situation arising on failure of line voltage     | Yes / No                   |
| - not able to trip in a hazardous situation arising on failure of line voltage | <del>Yes</del> / <b>No</b> |
| Type of RCCB   |                            |
| - type AC  | Yes / No                   |
| - type A:  | Yes / No                   |
| - independent of the line voltage  | Yes / No                   |
| - dependent on the line voltage  | Yes / No                   |
| - without time delay   | Yes / No                   |
| - with time delay: type S  | Yes / No                   |
| - enclosed   | Yes / No                   |
| - unenclosed   | Yes / No                   |
| - IP number:   | 20 ( for built in use)     |
| - for fixed installation   |                            |
| - for mobile installation  | No                         |
| Number of poles  | 4(3+N)                     |
| Ambient air temperature (°C)   | -25 ~ +40                  |
| Method of mounting   |                            |
| Method of connection   | -                          |
| Rated residual operating current (A)   |                            |
| Rated current (A)  |                            |
| Rated voltage (V)  |                            |
| Rated impulse withstand voltage (U <sub>imp</sub> )                            | 4kV                        |
| Nature of supply:  | ~                          |
| Rated frequency (Hz)   | 50/60                      |

| Rated making and breaking capacity (A)   | - 6000/6000 E000/40 46 90 9E 99 /000   |
|--|--|
|  |  |
| Rated residual making and breaking capacity (A)  |  |
| Rated conditional short-circuit current (A)  | 6000   |
| Rated conditional residual short-circuit current (A)   | Same as above  |
| Type of terminal   | Screw in   |
| Possible test case verdicts:   |  |
| - test case does not apply to the test object  | : N/A  |
| - test object does meet the requirement  | P (Pass)   |
| - test object does not meet the requirement  | F (Fail)   |
| Testing  | :  |
| Date of receipt of test item   | 2013-07-01   |
| Date (s) of performance of tests   | From 2013-07-05 to 2013-09-30  |
| and the second s |  |
| General remarks:   |  |
| This report shall not be reproduced, except in full, with laboratory.  "(see Enclosure #)" refers to additional information a "(see appended table)" refers to a table appended to the state of the second state of the second sec | opended to the report.   |
| Throughout this report a 🗵 comma / 🗌 point is  | used as the decimal separator.   |
| Throughout this report a 🗵 comma / 🗌 point is Manufacturer's Declaration per sub-clause 4.2.5 of   | <u> </u>   |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate   | <u> </u>   |
| Manufacturer's Declaration per sub-clause 4.2.5 of   | IECEE 02:  ☐ Yes  ☐ Not applicable   |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has   | IECEE 02:  ☐ Yes  ☑ Not applicable   |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided   | IECEE 02:  ☐ Yes  ☑ Not applicable  : the General product information section.                       |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided   | IECEE 02:  ☐ Yes  ☑ Not applicable  : the General product information section.                       |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided   | IECEE 02:  ☐ Yes ☐ Not applicable  : the General product information section. : ELMARK INDUSTRIES SC |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided   | IECEE 02:  ☐ Yes ☐ Not applicable  : the General product information section. : ELMARK INDUSTRIES SC |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided   | IECEE 02:  ☐ Yes ☐ Not applicable  : the General product information section. : ELMARK INDUSTRIES SC |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided   | IECEE 02:  ☐ Yes ☐ Not applicable  : the General product information section. : ELMARK INDUSTRIES SC |
| Manufacturer's Declaration per sub-clause 4.2.5 of The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided   | IECEE 02:  ☐ Yes ☐ Not applicable  : the General product information section. : ELMARK INDUSTRIES SC |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|    | TEST SEQUENCE A <sub>1</sub> (1 sample: ln= 63A, lΔn= 0,03A, type A)  | A <sub>1</sub> -2     | Р   |
|----|---|-----------------------|-----|
| 6. | Marking   | Control of the second |     |
|    | a) manufacturer's name or trademark   | ELMARK                | Р   |
|    | b) type designation, catalogue number or serial number  | JEL1                  | Р   |
|    | c) rated voltage(s) (V)   | 415V~                 | Р   |
|    | d) rated frequency (Hz)   |                       | Р   |
|    | e) rated current (A)  |                       | Р   |
|    | f) rated residual operating current (A)   |                       | Р   |
|    | h) rated making and breaking capacity (A)   |                       | N/A |
|    | j) degree of protection   |                       | N/A |
| _  | k) position of use  |                       | N/A |
|    | I) rated residual making and breaking capacity (A)  |                       | N/A |
|    | m) symbol S for type S  | S                     | N/A |
|    | n) symbol of the method of operation  |                       | N/A |
|    | o) operating means of test device   |                       | Р   |
|    | p) wiring diagram   |                       | Р   |
|    | q) operating characteristic   |                       | P   |
|    | Marking on the RCCB itself or on nameplate or nameplates attached to the RCCB and located so that for small devices at least e), f), o) and q) (only for type A) are legible when the RCCB is installed | ,                     | Р   |
|    | Joule integral withstand capacity (A²s)   |                       | N/A |
|    | Peak current withstand capacity (A)   |                       | N/A |
|    | Time delay when opening in case of failure of the line voltage (s)  |                       | N/A |
|    | Open position indicated by "0" and closed position by "I"   | 0/1                   | Р   |
|    | For push-buttons the OFF push-button shall either be red or marked with "0"   |                       | N/A |
|    | If necessary to distinguish between supply and load terminals they shall be clearly marked:   |                       | N/A |

| Report | No.  | 130 | 70002     | 3SH | 200_A |
|--------|------|-----|-----------|-----|-------|
| LEDOIL | INU. |     | / /////// |     | ヘーリレム |

| Clause | Requirement + Test  | Result - Remark | Verdict          |
|--------|---|-----------------|------------------|
|        |   |                 |                  |
| _      | Terminals for neutral conductor marked by "N"   |                 | Р                |
|        | Terminals for protective conductor marked by  |                 | N/A              |
|        | [symbol IEC 417-5019 a]   |                 | _                |
|        | Marking indelible, easy legible and not on  |                 | P                |
|        | removable parts   |                 |                  |
| 9.3    | Test: 15 s with water, 15 s with hexane   |                 | Р                |
|        | For universal terminals (rigid-solid, rigid-stranded and flexible conductors:   |                 | Р                |
|        | - no markings   |                 | Р                |
|        | For non-universal terminals:  |                 | N/A              |
|        | <ul> <li>terminals for rigid-solid conductors only, marked<br/>by the letters "s" or "sol"</li> </ul>                     |                 | N/A              |
|        | <ul> <li>terminals for rigid (solid and stranded)<br/>conductors<br/>only, marked by the letter "r"</li> </ul>            |                 | N/A              |
|        | marking on the RCCB or if the space available is not sufficient, on the smallest package unit or in technical information |                 | Р                |
| 8.     | Requirements for construction and operation   |                 |                  |
| 8.1.1  | General   |                 |                  |
|        | Residual current detection is located between the   |                 | Р                |
|        | incoming and outgoing terminals   | _               |                  |
|        | Not possible to alter the operating characteristics   |                 | Р                |
|        | by means of external interventions other than   |                 |                  |
|        | those specifically intended for changing the setting  |                 |                  |
|        | of the residual operating current   | <u> </u>        |                  |
|        | Changing from one setting to another shall not be   |                 | N/A              |
|        | possible without a tool   |                 | N1/0             |
|        | In case of an RCCB having multiple settings of  |                 | N/A              |
|        | residual operating current the rating refers to   |                 |                  |
| 9.4.9  | the highest setting   |                 | west transfer of |
| 8.1.2  | Mechanism  Maying pertode of all pales as machanisally  |                 |                  |
|        | Moving contacts of all poles so mechanically  |                 | P                |
|        | coupled that all poles except the switched neutral, make and break substantially together                                 |                 |                  |
|        |   |                 |                  |

| 11,794 | IEC 61008-1  |                 |         |
|--------|--|-----------------|---------|
| Clause | Requirement + Test                                     | Result - Remark | Verdict |
|        |  |                 |         |
|        | Switched neutral opens after and closes before         |                 | P       |
|        | other poles  |                 |         |
|        | Compliance is checked by inspection and by             |                 | Р       |
|        | manual tests, using any appropriate means (e.g.:       |                 |         |
|        | indicator lights, oscilloscope, etc.)                  |                 |         |
|        | Trip-free mechanism                                    |                 | Р       |
| 9.15   | Test: the RCCB is mounted and wired as in normal       | use             | 11108   |
|        | - test circuit according to fig. 4a                    |                 | Р       |
|        | - a residual current equal to 1,5 l₄n is passed by     |                 | Р       |
|        | closing S2, the RCCB having been closed and the        |                 |         |
|        | operating means being held in the closed position.     |                 |         |
|        | The RCCB shall trip                                    |                 |         |
|        | - test repeated by moving the operating means          |                 | Р       |
|        | slowly (1 s) to a position where the current starts to |                 |         |
|        | flow. Tripping shall occur without further movement    |                 |         |
| 8.1.2  | Possible to switch on and off by hand                  |                 | Р_      |
|        | No intermediate positions of the contacts              |                 | Р       |
|        | In the open position isolation distance in             |                 | Р       |
|        | accordance with the requirements necessary to          |                 |         |
|        | satisfy the isolating function                         |                 |         |
|        | Indication of the open and closed position of the      |                 | P       |
|        | main contacts shall be provided by one or both of      |                 |         |
|        | the following means:                                   |                 |         |
|        | - the position of the actuator (this being preferred)  |                 | Р       |
|        | - a separate mechanical indicator                      | _               | Р       |
|        | If a separate mechanical indicator is used, this       |                 | P       |
|        | shall show the colour red for the closed position      |                 |         |
|        | and the colour green for the open position             |                 |         |
|        | means of indication of the contact position shall be   |                 | Р       |
|        | reliable   |                 |         |
|        | -checked by inspection and by the tests of 9.15        |                 |         |

| Clause Requirement + Test Result - Remark Verd  RCCBs 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 -checked by inspection and by the tests of 9.11  When means are provided or specified by the manufacturer to lock the operating means in the open position: locking only possible when the main contacts are in the open position  If the operating means is used for indication, it shall, when released, automatically take up the position to that of the moving contacts; the operating means shall have two distinct rest positions except that for automatic opening a third distinct position may be provided, when necessary |      |
|---|------|
| front plate or cover can only be correctly fitted in a manner which ensures correct indication of the contact position -checked by inspection and by the tests of 9.11  When means are provided or specified by the manufacturer to lock the operating means in the open position: locking only possible when the main contacts are in the open position  If the operating means is used for indication, it shall, when released, automatically take up the position to that of the moving contacts; the operating means shall have two distinct rest positions except that for automatic opening a third   | lict |
| front plate or cover can only be correctly fitted in a manner which ensures correct indication of the contact position -checked by inspection and by the tests of 9.11  When means are provided or specified by the manufacturer to lock the operating means in the open position: locking only possible when the main contacts are in the open position  If the operating means is used for indication, it shall, when released, automatically take up the position to that of the moving contacts; the operating means shall have two distinct rest positions except that for automatic opening a third   |      |
| manner which ensures correct indication of the contact position  -checked by inspection and by the tests of 9.11  When means are provided or specified by the manufacturer to lock the operating means in the open position: locking only possible when the main contacts are in the open position  If the operating means is used for indication, it shall, when released, automatically take up the position to that of the moving contacts; the operating means shall have two distinct rest positions except that for automatic opening a third   |      |
| contact position  -checked by inspection and by the tests of 9.11  When means are provided or specified by the manufacturer to lock the operating means in the open position: locking only possible when the main contacts are in the open position  If the operating means is used for indication, it shall, when released, automatically take up the position to that of the moving contacts; the operating means shall have two distinct rest positions except that for automatic opening a third  |      |
| -checked by inspection and by the tests of 9.11  When means are provided or specified by the manufacturer to lock the operating means in the open position: locking only possible when the main contacts are in the open position  If the operating means is used for indication, it shall, when released, automatically take up the position to that of the moving contacts; the operating means shall have two distinct rest positions except that for automatic opening a third  |      |
| When means are provided or specified by the manufacturer to lock the operating means in the open position: locking only possible when the main contacts are in the open position  If the operating means is used for indication, it shall, when released, automatically take up the position to that of the moving contacts; the operating means shall have two distinct rest positions except that for automatic opening a third   |      |
| manufacturer to lock the operating means in the open position: locking only possible when the main contacts are in the open position  If the operating means is used for indication, it part shall, when released, automatically take up the position to that of the moving contacts; the operating means shall have two distinct rest positions except that for automatic opening a third  |      |
| open position: locking only possible when the main contacts are in the open position  If the operating means is used for indication, it shall, when released, automatically take up the position to that of the moving contacts; the operating means shall have two distinct rest positions except that for automatic opening a third   |      |
| contacts are in the open position  If the operating means is used for indication, it shall, when released, automatically take up the position to that of the moving contacts; the operating means shall have two distinct rest positions except that for automatic opening a third  |      |
| If the operating means is used for indication, it shall, when released, automatically take up the position to that of the moving contacts; the operating means shall have two distinct rest positions except that for automatic opening a third   |      |
| shall, when released, automatically take up the position to that of the moving contacts; the operating means shall have two distinct rest positions except that for automatic opening a third   |      |
| position to that of the moving contacts; the operating means shall have two distinct rest positions except that for automatic opening a third   |      |
| operating means shall have two distinct rest positions except that for automatic opening a third  |      |
| positions except that for automatic opening a third   |      |
|   |      |
| distinct position may be provided, when necessary   |      |
|   |      |
| to reset before reclosing   |      |
| For RCCBs functionally dependent on line voltage,   |      |
| reclosing automatically when the line voltage is  |      |
| restored after failure, the operating means shall   |      |
| remain in the ON position and the contacts shall  |      |
| reclose automatically unless the operating means  |      |
| has been placed in the OFF position   |      |
| When an indicator light is used this shall be lit   | ,    |
| when the RCCB is in the closed position   |      |
| The indicator light shall not be the only means to N/A  |      |
| indicate the closed position  |      |
| The action of the mechanism shall not be  |      |
| influenced by the position of enclosures or covers  |      |
| and shall be independent of any removable part.   |      |
| If the cover is used as a guiding means for push-   |      |
| buttons, it shall not be possible to remove the   |      |
| buttons from the outside  |      |
| Operating means securely fixed; not possible to   |      |
| remove them without a tool  |      |

|         | IEC 61008-1  |                        |         |
|---------|--|------------------------|---------|
| Clause  | Requirement + Test   | Result - Remark        | Verdict |
|         |  |                        |         |
|         | For "up-down" operating means the contacts shall   |                        | P       |
|         | be closed by the up movement   |                        |         |
| 8.1.4   | Screws, current-carrying parts and connections   |                        |         |
| 8.1.4.1 | Connections withstand mechanical stresses  |                        | Р       |
|         | occurring in normal use  |                        |         |
|         | Screws for mounting the RCCB are not of thread-  |                        | N/A     |
|         | cutting type   |                        |         |
| 9.4     | Screws and nuts which are operated when  |                        | P       |
|         | mounting and connecting comply with the test of  |                        |         |
|         | 9.4  |                        |         |
|         | Torque test:   |                        |         |
|         | - torque (Nm); 5/10 times; diameter (mm):  | 2,5Nm; 5 times; Ø5,9mm | Р       |
| 8.1.4.2 | Screws with a thread of insulating material  |                        | N/A     |
|         | operated when mounting the RCCB: correct   |                        |         |
|         | introduction ensured   |                        |         |
| 8.1.4.3 | Electrical connections: contact pressure not   |                        | Р       |
|         | transmitted through insulating material unless   |                        |         |
|         | there is sufficient resilience in the metallic parts   |                        |         |
| 8.1.4.4 | Current-carrying parts including parts intended for protective conductors, if any, shall be made of a metal having, under the conditions occurring in the equipment, mechanical strength, electrical conductivity and resistance to corrosion adequate for their intended use. Examples below: |                        | P       |
|         | - copper   |                        | N/A     |
|         | - an alloy 58% copper for parts worked cold  |                        | P       |
|         | - an alloy 50% copper for other parts  |                        | N/A     |
|         | - other metal  |                        | N/A     |
|         | In case of using ferrous alloys or suitably coated ferrous alloys, compliance to resistance to corrosion is checked by a test of resistance to rusting (see 9.25).   |                        | Р       |
|         | The requirements of this subclause do not apply to:  |                        | Р       |
|         | contacts, magnetic circuits, heater elements, bimetals, shunts, parts of electronic devices or to screws, nuts, washers, clamping plates, similar parts of terminals and parts of the test circuit   |                        |         |
| 8.1.5   | Terminals for external conductors  |                        | Р       |

| IEC 61008-1 |   |  |           |
|-------------|---|--|-----------|
| Clause      | Requirement + Test  | Result - Remark  | Verdict   |
|             |   |  |           |
|             | Compliance is checked by inspection and by the tests as relevant for the type of connection:  |  | Р         |
|             | 9.5 for screw-type terminals  |  | p         |
|             | by specific tests for plug-in or bolt-on RCCBs included in the standard   |  | N/A       |
|             | by the tests of Annexes J, K or L   |  | N/A       |
| 8.1.5.1     | Terminals ensure the necessary contact pressure   |  | Р         |
| 9.5         | Torque test:  |  | P_        |
|             | - torque (Nm); diameter (mm)  | 2,5Nm; Ø5,9mm  | Р         |
|             | - max. cross-sectional area (mm²)   | 16mm²  |           |
| 9.5.1       | Pull test:  |  | Р         |
|             | Terminal shall be suitable for all types of conductors: rigid (solid or stranded) and flexible, unless otherwise specified by the manufacturer. |  |           |
|             | Min. cross-section solid / stranded / flexible (mm²)  | 1,0mm²   |           |
|             | Max. cross-section solid / stranded / flexible (mm²)  | 16mm²  |           |
|             | Torque <sup>2</sup> / <sub>3</sub> (Nm)   | 1,67Nm   |           |
|             | Pull for 1 min solid / stranded / flexible (N)  | 50N for 1,0mm <sup>2</sup><br>100N for 16mm <sup>2</sup> | Р         |
|             | During the test no noticeable move of conductor   |  | Р         |
| 9.5.2       | Torque test:  |  | Р         |
|             | - torque (2/3) (Nm)   | 1,67Nm   | _         |
|             | - min. cross-sectional area (mm²)   | 1,0 mm²  |           |
|             | - max. cross-sectional area (mm²):  | 16 mm²   | N-14-     |
|             | The conductor shows no damage   |  | Р         |
|             | Terminals have not worked loose and no damage   |  | Р         |
| 9.5.3       | Terminals fitted with the largest cross-section area specified in Table 6, for stranded and/or flexible copper conductor.                       | 1,0 to 16 mm²  | _         |
|             | Max. cross-section stranded (mm²)   | 7  |           |
|             | Max. cross-section flexible (mm²)   | 2,14 mm  |           |
|             | Torque <sup>2</sup> / <sub>3</sub> (Nm)   | 1,67 Nm  |           |
|             | After the test no strand of conductor escaped outside   |  | Р         |
| 8.1.5.2     | RCCBs shall be provided with:   |  | are by Na |

| Report No.: | 13070002 | 23SHA | -002 |
|-------------|----------|-------|------|
|-------------|----------|-------|------|

| Clause  | Requirement + Test   | Result - Remark  | Verdict |
|---------|--|--|---------|
|         | terminals which shall allow the connection of copper conductors having nominal cross-sectional areas as shown in Table 6   |  | P       |
|         | Rated current (A) Range of nominal cross section to be clamped* (mm²) $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | 1,0 to 25 mm² for Rigid conductors 1,0 to 16 mm² for flexible conductors | Р       |
|         | *It is required that, for current ratings up to and including 50 A, terminals be designed to clamp solid conductors as well as rigid stranded conductors. Nevertheless, it is permitted that terminals for conductors having cross-sections from 1 mm² up to 6 mm² be designed to clamp solid conductors only. | The terminal is designed for solid conductors of 1-6 mm².                | P       |
|         | <ul> <li>or terminals for external untreated aluminium<br/>conductors and with aluminium screw-type<br/>terminals for use with copper or with aluminium<br/>conductors according to Annex L.</li> </ul>  |  | N/A     |
| 8.1.5.3 | Means for clamping the conductors in the terminals do not serve to fix any other component (see tests of 9.5)  | t  | Р       |
| 8.1.5.4 | Terminals for In ≤ 32 A allow the connection of conductors without special preparation   |  | N/A     |
| 8.1.5.5 | Terminals shall have adequate mechanical strength and metric ISO thread or equivalent (see tests of 9.4 and 9.5.1)   |  | P       |
| 8.1.5.6 | Clamping of conductor without undue damage to conductor (see tests of 9.5.2)   |  | Р       |
| 8.1.5.7 | Clamping of conductor reliably and between meta surfaces (see tests of 9.4 and 9.5.1)  | al   | P       |
| 8.1.5.8 | Terminals so designed or positioned that no conductor can slip out while the clamping screws or nuts are tightened (see tests of 9.5.3.)   |  | Р       |

| IEC 61008-1 |   |                 |         |
|-------------|---|-----------------|---------|
| Clause      | Requirement + Test                                  | Result - Remark | Verdict |
|             |   |                 |         |
| 8.1.5.9     | Terminals so fixed or located that they do not work |                 | P       |
|             | loose when the clamping screws or nuts are          |                 |         |
|             | tightened or loosened (see tests of 9.4)            |                 |         |
| 8.1.5.10    | Clamping screws or nuts of terminals for the        |                 | N/A     |
|             | protective conductors adequately secured against    |                 |         |
|             | accidental loosening and not possible to unclamp    |                 |         |
|             | without a tool                                      |                 |         |
| 8.1.5.11    | Screws and nuts of terminals for external           |                 | Р       |
|             | conductors shall be in engagement with a metal      |                 |         |
|             | thread and the screws shall not be of the tapping   |                 |         |
|             | screw type  |                 |         |
| 8.2         | Protection against electric shock                   |                 |         |
|             | Live parts not accessible in normal use             |                 | Р       |
|             | For RCCBs other than plug-in type, external parts,  |                 | Р       |
|             | other than screws or other means for fixing covers, |                 |         |
|             | which are accessible in normal use shall be of      |                 |         |
|             | insulating material or be lined throughout with     |                 |         |
|             | insulating material                                 |                 |         |
| _           | Lining reliably fixed                               |                 | N/A_    |
|             | Lining has adequate thickness and mechanical        |                 | N/A     |
|             | strength  |                 |         |
|             | Inlet openings for cables or conduits shall be of   |                 | N/A     |
|             | insulating material or be provided with bushings or |                 |         |
|             | similar devices of insulating material              |                 |         |
|             | Such devices shall be reliably fixed                |                 | N/A     |
|             | Such devices shall have adequate mechanical         |                 | N/A     |
|             | strength  |                 |         |
|             | For plug-in RCCBs, external parts, other than       |                 | N/A     |
|             | screws or other means for fixing covers, which are  |                 |         |
| _           | accessible, shall be of insulating material         |                 |         |
|             | Metallic operating means insulated from live parts  |                 | N/A     |

|        | IEC 61008-1   |                   |              |  |  |
|--------|---|-------------------|--------------|--|--|
| Clause | Requirement + Test                                      | Result - Remark   | Verdict      |  |  |
|        |   |                   |              |  |  |
|        | Metal parts of the mechanism not accessible,            |                   | Р            |  |  |
|        | insulated from accessible metal parts, from metal       |                   |              |  |  |
|        | frames (for flush-type), from screws or other           |                   |              |  |  |
|        | means for fixing the base and from metal plates         |                   | _            |  |  |
|        | Possible to replace plug-in RCCBs easily without        |                   | N/A          |  |  |
|        | touching live parts                                     |                   |              |  |  |
|        | Lacquer or enamel not considered to provide             |                   | Р            |  |  |
|        | adequate insulation                                     |                   |              |  |  |
| 9.6    | Test: verify with test finger, 1 min with a force of    |                   | Р            |  |  |
|        | 75 N  | _                 |              |  |  |
|        | Enclosures or covers not deformed to such an            |                   | Р            |  |  |
|        | extent that live parts can be touched                   | _                 |              |  |  |
| 8.9    | Resistance to heat                                      |                   |              |  |  |
|        | RCCB sufficiently resistant to heat                     |                   | Р            |  |  |
| 9.13.1 | Test: 1 h; test temperature (°C): (100 ± 2) °C for      | 100 °C            | Р            |  |  |
|        | not removable covers or (70 ± 2)°C for removable        |                   |              |  |  |
|        | covers:   |                   |              |  |  |
|        | No change impairing further use and no flow of          |                   | Р            |  |  |
|        | sealing compound so that live parts are exposed         |                   |              |  |  |
|        | No access to live parts even if the test finger is      |                   | Р            |  |  |
|        | applied with a force not exceeding 5 N                  | _                 |              |  |  |
|        | The RCCB shall trip with a test current of 1,25 I       | Trip, 23ms        | Р            |  |  |
|        | (ms)  |                   |              |  |  |
|        | Marking still legible after test                        |                   | Р            |  |  |
| 9.13.2 | Ball-pressure test for external parts of insulating     | 1,5 mm(Enclosure) | Р            |  |  |
|        | material (parts retaining live parts in position); test |                   |              |  |  |
|        | temperature: 125 °C ± 2°C for 1 h; diameter of          |                   |              |  |  |
|        | impression (mm): ≤ 2 mm                                 | _                 |              |  |  |
| 9.13.3 | Ball-pressure test for external parts of insulating     | 1,0 mm(Handle)    | Р            |  |  |
|        | material (parts not retaining live parts in position);  |                   |              |  |  |
|        | test temperature (°C): (70 ± 2)°C or (40 ± 2) °C        |                   |              |  |  |
|        | + max. temperature rise of 9.8; diameter of             |                   |              |  |  |
|        | impression (mm): ≤ 2 mm                                 |                   |              |  |  |
| 8.1.3  | Clearances and creepage distances (internal and e       | xternal parts)    | Mary Control |  |  |

| IEC 61008-1 |   |                         |         |
|-------------|---|-------------------------|---------|
| Clause      | Requirement + Test  | Result - Remark         | Verdict |
|             |   |                         |         |
|             | The minimum required clearances and creepage distances are based on the RCCB being designed for operating in an environment with pollution degree 2   |                         | Р       |
|             | Compliance for item 1 in is checked by measurement and by the test of 9.7.7.4.1 and 9.7.7.4.2. The test is carried out with samples not submitted to the humidity treatment described in 9.7.1. |                         | Р       |
|             | The clearances of items 2 and 4 may be reduced provided that the measured clearances are not shorter than the minimum allowed in IEC 60664-1 for homogenous field conditions.                   |                         | N/A     |
|             | In this case, after the humidity treatment in 9.7.1, compliance for item 2 and 4 and arrangements of 9.7.2 items b), c), d) and e) is checked:  |                         | N/A     |
|             | - Tests according to 9.7.2 to 9.7.6 as applicable   |                         | N/A     |
|             | - Test according to 9.7.7.2 with test voltages acc. Table 16 with test arrangements of 9.7.2 items b), c), d), e)   |                         | N/A     |
|             | If measurement does not show any reduced clearance, test 9.7.7.2 is not applied   |                         | Р       |
|             | Compliance for item 3, checked by measurement   |                         | N/A     |
|             | Parts of PCBs connected to the live parts protected against pollution by the use of a type 2 protection according to IEC 60664-3 are exempt from this verification                              |                         | N/A     |
|             | The insulating materials are classified into Material Groups on the basis of their comparative tracking index (CTI) acc. to IEC 60664-1 and measured according to IEC 60112                     |                         | P       |
|             | Clearances [mm] U <sub>lmp</sub>  |                         |         |
|             | 4kV (see table 5)<br>2,5kV(see table 5)   |                         |         |
|             | Minimum clearances (see table 5)  |                         |         |
|             |   | minimum clearances [mm] |         |
|             | between live parts which are separated when the main contacts are in the open position  | 4,3mm                   | P       |
|             | 2. between live parts of different polarity   | >5,0mm                  | P       |
|             | 3. between circuits supplied from different sources, one of which being PELV or SELV  |                         | N/A     |
|             | 4. between live parts and:  |                         | _P      |
|             | - accessible surfaces of operating means  | >5,0mm                  | P       |

|        | IEC 61008-1  |                                    |            |  |  |
|--------|--|------------------------------------|------------|--|--|
| Clause | Requirement + Test   | Result - Remark                    | Verdict    |  |  |
|        |  |                                    |            |  |  |
|        | - screws or other means for fixing covers which have to be removed when mounting the RCCB  |                                    | N/A        |  |  |
|        | - surface on which the RCCB is mounted   |                                    | N/A        |  |  |
|        | - screws or other means for fixing the RCCB  |                                    | N/A        |  |  |
|        | - metal covers or boxes  |                                    | N/A        |  |  |
|        | - other accessible metal parts   | >10,0mm                            | Р          |  |  |
|        | - metal frames supporting flush-type RCCBs   | >10,0mm                            | Р          |  |  |
|        | Minimum creepage distances (see table 5)   | _                                  | Ang-loop . |  |  |
|        | Material group   | b                                  | Р          |  |  |
|        |  | minimum creepage distances<br>[mm] |            |  |  |
|        | between live parts which are separated when the main contacts are in the open position     | >4,5mm                             | Р          |  |  |
|        | 2. between live parts of different polarity  | >5,0mm                             | Р          |  |  |
|        | 3. between circuits supplied from different sources, one of which being PELV or SELV       |                                    | N/A        |  |  |
|        | 4. between live parts and:   |                                    | Р          |  |  |
|        | - accessible surfaces of operating means   | >5,0mm                             | P          |  |  |
|        | - screws or other means for fixing covers which have to be removed when mounting the RCCB  |                                    | N/A        |  |  |
|        | - surface on which the RCCB is mounted   |                                    | N/A        |  |  |
|        | - screws or other means for fixing the RCCB  |                                    | N/A        |  |  |
|        | - metal covers or boxes  |                                    | N/A        |  |  |
|        | - other accessible metal parts   | >10,0mm                            | P          |  |  |
|        | - metal frames supporting flush-type RCCBs   | >10,0mm                            | P          |  |  |
| 9.25   | Test of resistance to rusting:   |                                    |            |  |  |
|        | - 10 min immersed in a cold chemical degreaser such as methyl-chloroform or refined petrol |                                    | Р          |  |  |
|        | - 10 min immersed in a 10% solution of ammonium chloride in water at 20°C±5°C              |                                    | Р          |  |  |
|        | - 10 min in a box containing air saturated with moisture at 20°C±5°C                       |                                    | Р          |  |  |
|        | - 10 min at 100°C  |                                    | P          |  |  |
|        | No sign of rust  |                                    | Р          |  |  |

| IEC 61008-1 |                    |  |                 |         |
|-------------|--------------------|--|-----------------|---------|
| Clause      | Requirement + Test |  | Result - Remark | Verdict |

|      | TEST SEQUENCE A <sub>2</sub> (3 samples: $ln = 63A$ , $l_{\Delta n} = 0,03A$ , type A)  | A <sub>2</sub> -4 A <sub>2</sub> -5 A <sub>2</sub> -6 | Р |
|------|---|---|---|
| 8.10 | Resistance to abnormal heat and fire  |   | Р |
|      | External parts of insulating material shall not be liable to ignite and to spread fire under fault or overload conditions                               |   | P |
| 9.14 | Glow wire test  |   | P |
|      | Test performed on a complete RCCB   |   | P |
|      | Glow-wire test: (960 + 15) °C for external parts of insulating material retaining current-carrying parts or parts of the protective circuit in position | 960(Enclosure)  | P |
|      | Glow-wire test: (650 + 10) °C for all other external parts insulating material  | 650(Handle)   | P |
|      | No visible flames, no sustained glowing, or   | No flames(Handle)                                     | Р |
|      | flames and glowing extinguish within 30 s after removal   | 5,6s(Enclosure)                                       | Р |
|      | No ignition of tissue paper or scorching of the pinewood board  |   | Р |

|         | TEST SEQUENCE B (3 samples: In= 63A, I <sub>∆n</sub> = 0,03A, type A)   | B4 B5 B6      | P |
|---------|---|---------------|---|
| 8       | REQUIREMENTS FOR CONSTRUCTION AND OPE   | RATION        |   |
| 8.3     | DIELECTRIC PROPERTIES AND ISOLATING CAPA  | BILITY        |   |
|         | RCCBs have adequate dielectric properties   |               | Р |
| 9.7     | TEST OF DIELECTRIC PROPERTIES AND ISOLATI   | NG CAPABILITY |   |
| 9.7.7.4 | VERIFICATION OF RESISTANCE OF THE INSULAT<br>AND BASIC INSULATION AGAINST AN IMPULSE VI<br>CONDITIONS   |               |   |
|         | These tests are not preceded by the humidity treatment described in 9.7.1.  |               | Р |
|         | The test is carried out on an RCCB fixed on a metal support   |               | Р |
|         | The impulses are given by a generator producing positive and negative impulses having a front time of 1,2µs, and a time to half-value of 50µs | 1,2/50μs      | Р |

| IEC 61008-1 |  |                 |         |  |
|-------------|--|-----------------|---------|--|
| Clause      | Requirement + Test   | Result - Remark | Verdict |  |
|             |  |                 |         |  |
|             | The shape of the impulses is adjusted with the RCCB under test connected to the impulse generator.   |                 | Р       |  |
|             | For RCCBs with incorporated surge arresters that cannot be disconnected, the shape of the impulses is adjusted without connection of the RCCB to the impulse generator.  |                 | N/A     |  |
|             | rated impulse withstand voltage [kV]:  | 4 kV            |         |  |
|             | see level of test laboratory [m]   | 5m              |         |  |
|             | test voltage (acc. Table 22) [kV]:   | 6,2kV           |         |  |
| 9.7.7.4.2   | RCCB in open position (contacts in open position)  |                 | Р       |  |
|             | The impulses are applied between:  |                 | Р       |  |
|             | the line terminals connected together and the load terminals connected together  |                 | Р       |  |
| 9.7.7.4.3   | RCCB in closed position  |                 | Р       |  |
| _           | All components bridging the basic insulation disconnected  |                 | N/A     |  |
|             | A first series of tests is made applying the impulse voltage between the phase pole(s) and the neutral pole (or path) connected together and the metal support connected to the terminal(s) intended for the protective conductor(s), if any |                 | P       |  |
|             | A second series of tests is made applying the impulse voltage between the phase pole(s), connected together, and the neutral pole (or path) of the RCCB  |                 | P       |  |
|             | Five positive impulses and five 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.                 |                 | Р       |  |
|             | no disruptive discharges during the test   |                 | Р       |  |
| 9.7.7.5     | VERIFICATION OF THE BEHAVIOUR OF COMPONENTS BRIDGING THE BASIC INSULATION  |                 |         |  |
|             | A new RCCB sample is tested  |                 | N/A     |  |
|             | Test only performed on RCCBs, where components bridging the basic insulation have been disconnected during the impulse voltage test of 9.7.7.4.3   |                 | N/A     |  |
|             | test voltage 1200V+U₀  |                 | N/A     |  |

|        | IEC 61008-1   |                      |            |            |         |
|--------|---|----------------------|------------|------------|---------|
| Clause | Requirement + Test  | Result -             | Remark     |            | Verdict |
|        | The voltage is applied during 5s between the phase pole(s) and the neutral pole (or path) connected together and the metal support connected to the terminal(s) intended for the prospective conductor(s), if any |                      |            |            | N/A     |
|        | after test, no component bridging the basic insulation should show a visible alteration.  |                      |            |            | N/A     |
|        | Then, the equipment is connected to the mains acc. manufacturer's instruction   |                      |            |            | N/A     |
|        | The RCCB shall trip with a test current of 1,25 $I_{\Delta N}$  |                      | [ms]       |            |         |
|        |   |                      |            |            | N/A     |
|        | Test switch $S_2$ and RCCB in the closed position, test voltage established by closing the test switch $S_1$ .  |                      |            |            | N/A     |
| .7.1   | RESISTANCE TO HUMIDITY  |                      |            |            | Р       |
| .7.1.1 | Parts which can be removed without a tool are removed, spring lids kept open, inlet openings are left open and if knock-outs one is opened.   |                      |            |            | N/A     |
| .7.1.2 | Test conditions:<br>48 h in humidity cabinet<br>RH = 91% to 95%<br>T = 20 to 30°C $\pm$ 1°C   | RH = 92%<br>T = 25°C |            |            |         |
| .7.1.4 | The samples show no damage  |                      |            |            | P       |
| .7.2   | Insulation resistance of the main circuit measured between 30 and 60 min after this treatment with 500 V DC after 5 s:  | B4<br>[ <b>M</b> Ω]  | B5<br>[MΩ] | B6<br>[MΩ] | had bee |
|        | a) between the terminals which are electrically connected together when the RCCB is in the closed position≥ 2 MΩ  | >500MΩ               | >500MΩ     | > 500MΩ    | Р       |
|        | <ul> <li>b) between each pole and the others connected<br/>together (electronic components, connected<br/>between current path being disconnected)≥ 2 MΩ</li> </ul>   | >500MΩ               | >500MΩ     | > 500MΩ    | P       |
|        | c) between all poles connected together and the frame   | >500MΩ               | >500MΩ     | > 500MΩ    | P       |
|        | d) between metal parts of the mechanism and the frame   |                      |            |            | N/A     |
|        | e) between the frame and a metal foil in contact with the inner surface of the lining of insulating material≥ 5 MΩ  |                      |            |            | N/A     |
| .7.3   | Dielectric strength of the main circuit measured with an AC voltage (45-65Hz) for 1 min:  |                      |            |            |         |
|        | a) electronic components disconnected 2000 V  | 2000                 | 2000       | 2000       | Р       |
|        | b) electronic components disconnected 2000 V  | 2000                 | 2000       | 2000       | Р       |
|        | c) electronic components disconnected 2000 V  | 2000                 | 2000       | 2000       | P       |

|         | IEC 61008-1   |            |            |            |             |  |  |  |  |  |  |
|---------|---|------------|------------|------------|-------------|--|--|--|--|--|--|
| Clause  | Requirement + Test Result - Remark  |            |            |            |             |  |  |  |  |  |  |
|         |   |            |            |            |             |  |  |  |  |  |  |
|         | d) electronic components disconnected 2000 V  |            |            |            | N/A         |  |  |  |  |  |  |
|         | e) electronic components disconnected 2500 V  |            |            |            | N/A         |  |  |  |  |  |  |
|         | No flashover or breakdown   |            |            |            | Р           |  |  |  |  |  |  |
| 9.7.4   | Insulation resistance of auxiliary circuits measured with 500 V DC after 1 min:   | B4<br>[MΩ] | B5<br>[MΩ] | B6<br>[MΩ] |             |  |  |  |  |  |  |
|         | 1) between all auxiliary circuits and the frame≥ 2 MΩ   |            |            |            | N/A         |  |  |  |  |  |  |
|         | 2) between each part of the auxiliary circuits which might be isolated from the other parts and the whole of the other parts connected together≥ 2 MΩ                   |            |            |            | N/A         |  |  |  |  |  |  |
|         | Dielectric strength of auxiliary circuits measured with an AC voltage at rated frequency for 1 min:   |            |            |            |             |  |  |  |  |  |  |
|         | Rated voltage of Test voltage (V) auxiliary circuits (a.c. or d.c.)   |            |            |            |             |  |  |  |  |  |  |
|         | $\leq 30$ 600<br>> $30 \leq 50$ 1000<br>> $50 \leq 110$ 1500<br>> $110 \leq 250$ 2000<br>> $250 \leq 500$ 2500  | V          |            |            |             |  |  |  |  |  |  |
|         | 1) between all auxiliary circuits and the frame   |            |            |            | N/A         |  |  |  |  |  |  |
|         | between each part of the auxiliary circuits     which might be isolated from the other parts     and the whole of the other parts connected     together                |            |            |            | N/A         |  |  |  |  |  |  |
|         | No flashover or perforation   |            | ,          | <u> </u>   | N/A         |  |  |  |  |  |  |
| 9.7.7.2 | Verification of clearances with the impulse withstand voltage   |            |            |            |             |  |  |  |  |  |  |
|         | If the measurement of clearances of items 2 and 4 in Table 5 shows a reduction of the required length, this test applies.   |            |            |            | <del></del> |  |  |  |  |  |  |
|         | The test is carried out on an RCCB fixed on a metal support and being in the closed position  |            |            |            | Р           |  |  |  |  |  |  |
|         | The impulses are given by a generator producing positive and negative impulses having a front time of 1,2µs, and a time to half-value of 50µs                           | 1,2/50μ    | s          |            | Р           |  |  |  |  |  |  |
|         | The shape of the impulses is adjusted with the RCCB under test connected to the impulse generator.  |            |            |            | Р           |  |  |  |  |  |  |
|         | For RCCBs with incorporated surge arresters that cannot be disconnected, the shape of the impulses is adjusted without connection of the RCCB to the impulse generator. |            |            |            | P           |  |  |  |  |  |  |

| IEC 61008-1 |  |                 |         |  |  |  |  |  |
|-------------|--|-----------------|---------|--|--|--|--|--|
| Clause      | Requirement + Test   | Result - Remark | Verdict |  |  |  |  |  |
|             |  |                 |         |  |  |  |  |  |
|             | test performed with:   |                 |         |  |  |  |  |  |
|             | - surge impedance of the test apparatus ≤500Ω and surge protective devices disconnected before testing or  |                 | Р       |  |  |  |  |  |
|             | - hybrid generator with an surge impedance of 2 $\Omega$ and surge protective devices not diconnected before testing   |                 | Р       |  |  |  |  |  |
|             | rated impulse withstand voltage [kV]:  | 4kV             |         |  |  |  |  |  |
|             | see level of test laboratory [m]   | 5m              |         |  |  |  |  |  |
|             | test voltage (acc. Table 16) [kV]:   | 4,9kV           |         |  |  |  |  |  |
|             | A first series of tests is made applying the impulse voltage between the phase pole(s) and the neutral pole (or path) connected together and the metal support connected to the terminal(s) intended for the protective conductor(s), if any |                 | P       |  |  |  |  |  |
|             | A second series of tests is made applying the impulse voltage between the phase pole(s), connected together, and the neutral pole (or path) of the RCCB  |                 | Р       |  |  |  |  |  |
|             | A third series of tests is made applying the impulse voltage between (and not tested during the two first sequences described here above):   |                 | Р       |  |  |  |  |  |
|             | b) between each pole and the others connected together (electronic components, connected between current path being disconnected)  |                 | Р       |  |  |  |  |  |
|             | c) between all poles connected together and the frame  |                 | Р       |  |  |  |  |  |
|             | d) between metal parts of the mechanism and the frame  |                 | N/A     |  |  |  |  |  |
|             | between the frame and a metal foil in contact with the inner surface of the lining of insulating material  |                 | N/A     |  |  |  |  |  |
|             | Five positive impulses and five 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.                 |                 | P       |  |  |  |  |  |
|             | no disruptive discharges during the test   |                 | Р       |  |  |  |  |  |
| 9.7.5       | Secondary circuit of detection transformers  |                 |         |  |  |  |  |  |
|             | No insulation test, provided that no connection with accessible metal parts or with protective conductor or live parts exists.   |                 | Р       |  |  |  |  |  |

N/A

- 2 I<sub>ΔN</sub> ......0,06 s

|        | IEC 61008-1   |          |        |     |         |
|--------|---|----------|--------|-----|---------|
| Clause | Requirement + Test  | Result - | Remark |     | Verdict |
|        |   |          |        |     |         |
|        | - 5 I <sub>ΔN</sub> 0,05 s  |          |        |     | N/A     |
|        | - I <sub>Δt</sub> 0,04 s  |          |        |     | N/A     |
|        | The test switch $S_1$ and the RCCB being in the closed position, the test voltage is suddenly established by closing the test switch $S_2$ for min. non-operating times acc. table 2                    |          |        |     | N/A     |
|        | No tripping during tests  |          |        |     | N/A     |
| 8.4    | Temperature rise  |          |        |     |         |
|        | Temperature rises do not exceed the limiting values stated in table 7.  |          |        |     | Р       |
|        | Cross-section (mm²)   | 16mm²    |        |     |         |
| 9.8.1  | Ambient air temperature (°C)  | 20°C     |        |     |         |
| 9.8.2  | Test current $I_N$ (A) until steady state values are reached.   | 63A      |        |     |         |
|        | Four pole RCCBs:  |          |        |     | Р       |
|        | Current passing through   |          |        |     | Р       |
|        | - 3 phase poles (1)   |          |        |     | Р       |
|        | - neutral and adjacent pole (2)   |          |        |     | P       |
|        | Parts Temperature rise K  | [K]      | [K]    | [K] |         |
|        | Terminals for external connections 65   | 52       | 53     | 53  | Р       |
|        | External parts liable to be touched during manual operation of the RCCB, including operating means of insulating material and metallic means for coupling insulated operating means of several poles 40 | 8        | 10     | 10  | P       |
|        | External metallic parts of operating means 25   | -        |        | _   | N/A     |
|        | Other external parts, including that face of the RCCB in direct contact with the mounting surface 60  | 20       | 21     | 21  | P       |
| 8.16   | Reliability   |          |        |     |         |
|        | RCCBs operate reliably even after long service.   |          |        |     | P       |
| 9.22.2 | Test with 28 cycles at 40 ± 2°C   |          |        |     |         |
|        | Cross-section (mm²)   | 16mm²    |        |     |         |
|        | Torque <sup>2</sup> / <sub>3</sub> (Nm)   | 1,67Nm   |        |     |         |
|        | Test current I <sub>N</sub> (A)   | 63A      |        |     |         |
|        | - with current passing 21 h   |          |        |     | Р       |
|        | - without current   |          |        |     | Р       |
|        | For 4 pole RCCBs with 3 overcurrent protected poles only 3 poles loaded   |          |        |     | Р       |

|        | Page 26 01 164  |                 | Keborr | 110 13070 | 00235HA-00 |  |  |  |  |
|--------|---|-----------------|--------|-----------|------------|--|--|--|--|
|        | IEC 61008-1   |                 |        |           |            |  |  |  |  |
| Clause | Requirement + Test  | Result - Remark |        |           |            |  |  |  |  |
|        |   |                 |        |           |            |  |  |  |  |
|        | At the end of the last period of 21 h with current passing the temperature rise of the terminals shall not exceed 65K                             | [K]             | [K]    | [K]       | Р          |  |  |  |  |
|        |   | 52              | 55     | 54        |            |  |  |  |  |
|        | After cool down the RCCB shall trip with a test current of 1,25 $I_{\Delta N}$ - break time not exceeding the value for $I_{\Delta N}$ in table 2 | [ms]            | [ms]   | [ms]      |            |  |  |  |  |
|        |   | 21              | 23     | 22        | Р          |  |  |  |  |
|        | Test switch $S_2$ and RCCB in the closed position, test voltage established by closing the test switch $S_1$ .                                    |                 | -      |           | Р          |  |  |  |  |
| 9.23   | Verification of ageing of electronic components   |                 |        |           |            |  |  |  |  |
|        | 168 h at 40 ± 2°C   | 40°C            |        |           | -          |  |  |  |  |
|        | Test current I <sub>N</sub> (A)   | 63A             | _      |           |            |  |  |  |  |
|        | Cross-section (mm²)   | 16mm²           |        | _         |            |  |  |  |  |
|        | Electronic parts at 1,1 U <sub>N</sub> :  | 457V            |        |           |            |  |  |  |  |
|        | After cool down:  |                 |        |           | Р          |  |  |  |  |
|        | - electronic parts show no damage   |                 |        |           | Р          |  |  |  |  |
|        | The RCCB shall trip with a test current of 1,25 $I_{\Delta N}$ - break time not exceeding the value for $I_{\Delta N}$ in table 2                 | [ms]            | [ms]   | [ms]      |            |  |  |  |  |
|        |   | 26              | 27     | 23        | Р          |  |  |  |  |
|        | Test switch $S_2$ and RCCB in the closed position, test voltage established by closing the test switch $S_1$                                      |                 |        |           | Р          |  |  |  |  |

|      | TEST SEQUENCE C (3 samples: In= 63A, I <sub>∆n</sub> = 0,03A, type A)                           | C4 C5 C6          | Р   |
|------|---|-------------------|-----|
| 8.6  | Mechanical and electrical endurance   |                   |     |
|      | RCCBs shall be capable of performing an adequate number of mechanical and electrical operations |                   | Р   |
| 9.10 | Test is made:   |                   | Р   |
|      | - In ≤ 25 A; 2 s on; 13 s off:  |                   | N/A |
|      | - In > 25 A; 2 s on; 28 s off:  | 63A               | P   |
|      | Number of operating cycles: 2000  | 2000              | Р   |
|      | Test voltage Un (V); test current In (A); cos phi 0,85-0,9                                      | 420V, 63,3A, 0,88 |     |
|      | Cross-sectional area (mm²)  | 16mm²             |     |
|      | RCCBs having I <sub>an</sub> > 0,010 A tested at:   |                   |     |

|        | IEC 61008-1   |                 |         |
|--------|---|-----------------|---------|
| Clause | Requirement + Test  | Result - Remark | Verdict |
|        |   |                 |         |
|        | - 1000 cycles for manual operation:                             | C4 - OK         | P       |
|        |   | C5 - OK         |         |
|        |   | C6 - OK         |         |
|        | - 500 cycles by using the test device:                          | C4 - OK         | P       |
|        |   | C5 - OK         |         |
|        |   | C6 - OK         |         |
|        | - 500 cycles at a current of I <sub>Δn</sub> :                  | C4 - OK         | Р       |
|        |   | C5 - OK         |         |
|        |   | C6 - OK         |         |
|        | RCCBs having I <sub>xn</sub> ≤ 0,010 A tested at:               |                 |         |
|        | - 500 cycles for manual operation:                              | C4 -            | N/A     |
|        |   | C5 -            |         |
|        |   | C6 -            |         |
|        | - 750 cycles by using the test device:                          | C4 -            | N/A     |
|        |   | C5 -            |         |
|        |   | C6 -            |         |
|        | - 750 cycles at a current of I <sub>Δn</sub> :                  | C4 -            | N/A     |
|        |   | C5 -            |         |
|        |   | C6 -            |         |
|        | Test is made without load using manual operation:               |                 |         |
|        | - In ≤ 25 A; 2000 cycles:                                       | C4 -            | N/A     |
|        |   | C5 -            |         |
|        |   | C6 -            |         |
|        | - In > 25 A; 1000 cycles  | C4 - OK         | Р       |
|        |   | C5 - OK         |         |
|        |   | C6 - OK         |         |
|        | After the test:   |                 |         |
|        | - no undue wear   |                 | Р       |
|        | - no damage   |                 | Р       |
|        | - no loosening of connections                                   | _               | Р       |
| _      | - no seepage of sealing compound                                | _               | N/A     |
|        | The RCCB shall trip with a test current of 1,25 I <sub>Δn</sub> | C4 - 29ms       | P       |
|        | (ms)  | C5 - 36ms       | '       |
|        | (110)   | C6 - 31ms       |         |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test | F           | Result - Remark | Verdict |

| <br>Dielectric strength test at a voltage of 900 V a.c. for | <u>1</u> min: |     |
|---|---------------|-----|
| a):   | C4 - OK       | Р   |
|   | C5 - OK       |     |
|   | C6 - OK       |     |
| b):   | C4 - OK       | Р   |
|   | C5 - OK       |     |
|   | C6 - OK       |     |
| c):   | C4 - OK       | Р   |
|   | C5 - OK       |     |
|   | C6 - OK       |     |
| d):   | C4 -          | N/A |
|   | C5 -          |     |
|   | C6 -          |     |
| e):   | C4 -          | N/A |
|   | C5 -          |     |
|   | C6 -          |     |

|       |   | EQUEN            |                   | <sub>An</sub> = 0,03 | A, type           | A)                |       |                          | 04                    | D5      | D6         | Р   |
|-------|---|------------------|-------------------|----------------------|-------------------|-------------------|-------|--------------------------|-----------------------|---------|------------|-----|
|       | Tests "   | D0"              |                   |                      |                   |                   |       |                          |                       |         |            | Р   |
| 8.5   | Operati   | ng chara         | cteristic         | s                    |                   |                   |       |                          |                       |         |            |     |
|       | For mul setting   | tiple set        | tings of I        | Δn tests             | are mad           | e for ead         | ch    |                          |                       |         |            | N/A |
| 9.9.1 | RCCB in according   |                  |                   | ormal us             | se, test c        | ircuit            |       | Tes                      | st on 50              | and 60F | łz         | Р   |
| 9.9.5 | For RCCBs functionally dependent on line voltage, each test is made at 1,1 and 0,85 times the rated line voltage; voltage (V) |                  |                   |                      |                   |                   |       |                          |                       |         | Р          |     |
|       | Туре  | I <sub>N</sub> A | I <sub>ΔN</sub> A |                      | 5                 | Standard v        | alues |                          | reak time a           |         |            |     |
|       |   |                  |                   | I <sub>an</sub>      | 2 I <sub>AN</sub> | 5 I <sub>ΔN</sub> |       | <sub>N</sub> ог<br>5A а) | 5A-200A,<br><b>b)</b> | 500A    |            |     |
|       | General   | Any<br>value     | <0,03             | 0,3                  | 0,15              |                   | 0,    | 04                       | 0,04                  | 0,04    | Max. break |     |
|       |   |                  | 0,03              | 0,3                  | 0,15              |                   | 0,0   | 04                       | 0,04                  | 0,04    | lines      |     |

|         |   |                         |            |                       | IEC 6                  | 1008-1      |      |        |                   |           |                                 |           |
|---------|---|-------------------------|------------|-----------------------|------------------------|-------------|------|--------|-------------------|-----------|---------------------------------|-----------|
| Clause  | Require   | ement +                 | Test       |                       |                        |             |      | Res    | sult - Re         | mark      |                                 | Verdict   |
|         | - Ju  |                         |            |                       |                        |             |      |        |                   |           |                                 |           |
|         |   |                         | >0,03      | 0,3                   | 0,15                   | 0,04        |      |        | 0,04              | 0,04      |                                 |           |
|         | S   | ≥ 25                    | >0,03      | 0,5                   | 0,2                    | 0,15        |      |        | 0,15              | 0,15      | Max. break<br>times             |           |
|         |   |                         |            | 0,13                  | 0,06                   | 0,05        |      |        | 0,04              | 0,04      | Min. non-<br>actuating<br>times |           |
|         | a) value  | e to be de              | ecided by  | the man               | ufacturer              | for this t  | est  |        |                   |           |                                 |           |
|         |   | test are c<br>ect opera |            |                       |                        |             |      |        |                   |           |                                 |           |
| 9.9.2   | Off-load  | d tests m               | ade at a   | temper                | ature of               | 20 ± 2 °    | С    | 21°    | С                 |           |                                 | Р         |
| 9.9.2.1 | Verifica  | ition of th             | ne correc  | t operat              | tion in ca             | se of a     | stea | dy in  | crease            | residual  | current:                        | SAS MEDIS |
|         | - steady  | y increas               | e from 0   | ,2 l <sub>∆n</sub> to | l <sub>∆n</sub> withir | 30 s (n     | nA)  |        |                   |           |                                 | Р         |
|         |   |                         |            |                       |                        |             | .,:  | IΔn    | = 3 <u>0m</u> A   |           |                                 |           |
|         | - trippin   | ig curren               | t betwee   | n I <sub>∆no</sub> ar | nd l <sub>∆n</sub> (m  | A)          | :    | D4     | - 21,8 <b>-</b>   | 22,5m/    | 4                               | Р         |
|         |   |                         |            |                       |                        |             |      | D5     | - 21,7 -          | 22,5m     | 4                               | 18        |
|         |   |                         | _          |                       |                        |             |      | D6     | - 2 <u>1</u> ,9 - | 22,3m     | 4                               |           |
| 9.9.2.2 | Verification of the correct operation at closing on residual current                |                         |            |                       |                        |             |      |        |                   |           |                                 | 1000      |
|         | - the R0  | CCB clos                | ses on l∆  | <sub>n</sub> : no val | lue exce               | eds the     |      | D4     | - 29 - 37         | 7ms       |                                 | Р         |
|         | specifie  | ed limiting             | g value o  | of Table              | 1 (ms) .               |             | :    | D5     | - 28 - 38         | 3ms       |                                 |           |
|         |   |                         |            |                       |                        |             |      | D6     | - 27 - 37         | 7ms       |                                 |           |
| 9.9.2.3 | The tes   | st circuit I            | being su   | ccessive              | ely calibr             | ated at     | eact | n of t | he value          | es of res | idual                           |           |
|         | current   |                         |            |                       |                        |             |      |        |                   |           |                                 |           |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                         |            |                       |                        |             |      |        |                   |           |                                 |           |
|         | the test voltage is suddenly established by closing the test switch S1              |                         |            |                       |                        |             |      |        |                   |           |                                 |           |
|         | - maxin   | num brea                | ak time (  | ms) at:               | l <sub>Δn</sub>        |             | :    | 1      | - 34ms            |           | Р                               |           |
|         | D5 - 37ms   |                         |            |                       |                        |             |      |        |                   |           |                                 |           |
|         | D6 - 36ms   |                         |            |                       |                        |             |      |        |                   |           |                                 |           |
|         | - maximum break time (ms) at: 2 l <sub>Δn</sub> D4 - 28ms                           |                         |            |                       |                        |             |      |        |                   | Р         |                                 |           |
|         | D5 - 29ms   |                         |            |                       |                        |             |      |        |                   |           |                                 |           |
|         | _ maximum break time (ms) at: 5 l <sub>Δn</sub>                                     |                         |            |                       |                        |             |      |        |                   | N/A       |                                 |           |
|         | - maxim   | nuiti bie               | an uiile ( | moj at.               | ∪ 1∆n                  | *********** | •••  | D5     |                   |           |                                 | 13//5     |
|         |   |                         |            |                       |                        |             |      | D6     |                   |           |                                 |           |
|         | - maxin   | num brea                | ak fime /  | ms) at                | 0 25 A (i              | f           |      |        | - 25ms            |           |                                 | P         |
|         |   | ble)                    |            | •                     | •                      |             | :    |        | - 21ms            |           |                                 | ,         |
|         | applied   | /                       |            |                       |                        |             |      |        | - 21ms            |           |                                 |           |

|         | IEC 61008-1  |                           |         |
|---------|--|---------------------------|---------|
| Clause  | Requirement + Test   | Result - Remark           | Verdict |
|         |  |                           |         |
|         | - maximum break time (ms) at: 500 A:                             | D4 - 12ms                 | Р       |
|         |  | D5 - 12ms                 |         |
|         |  | D6 - 12ms                 |         |
|         | No value exceeds the relevant specified limiting                 |                           | Р       |
|         | value  |                           |         |
| 9.9.2.4 | Verification of the correct operation in case of sudde           | en appearance of residual |         |
|         | current of values between 5 l∆n and 500A :                       |                           |         |
|         | The test switch S1 and the RCCB being in the close               | d position, the residual  | 108.00  |
|         | current is suddenly established by closing the test so           | witch S2                  | 1,582   |
|         | - maximum break time (ms) at: 5A (value 1                        | D4 - 16ms                 | Р       |
|         | between 5A and 200A) :   | D5 - 15ms                 |         |
|         |  | D6 - 15ms                 |         |
|         | - maximum break time (ms) at: 200A (value 2                      | D4 - 8ms                  | Р       |
|         | between 5A and 200A) :   | D5 - 8ms                  |         |
|         |  | D6 - 8ms                  |         |
|         | No value exceeds the relevant specified limiting                 |                           | Р       |
|         | value  |                           |         |
|         | Additional test for type S:                                      |                           |         |
|         | - minimum non actuating time (ms) at: $I_{\Delta n}$ ; 0,13 s :  | D4 -                      | N/A     |
|         |  | D5 -                      |         |
|         |  | D6 -                      |         |
|         | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s | D4 -                      | N/A     |
|         |  | D5 -                      |         |
|         |  | D6 -                      |         |
|         | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s | D4 -                      | N/A     |
|         |  | D5 -                      |         |
|         |  | D6 -                      |         |
|         | - minimum non actuating time (ms) at: 500 A;                     | D4 -                      | N/A     |
|         | 0,04 s:  | D5 -                      |         |
|         |  | D6 -                      |         |
|         | No tripping during tests   |                           | N/A     |
| 9.9.4   | a) Tests repeated at a temperature of -5 °C:                     |                           |         |

|        | IEC 61008-1  |                             |         |  |
|--------|--|-----------------------------|---------|--|
| Clause | Requirement + Test   | Result - Remark             | Verdict |  |
|        | The test circuit being successively calibrated at each   | h of the values of residual | Р       |  |
|        | current specified in Table 1, the test switch S2 and the RCC the test voltage is suddenly established by closing the | , ,                         |         |  |
|        | - maximum break time (ms) at: I <sub>Δn</sub>  | D4 - 39ms                   | Р       |  |
|        |  | D5 - 38ms                   |         |  |
|        |  | D6 - 37ms                   |         |  |
|        | - maximum break time (ms) at: 2 I <sub>Δn</sub> :  | D4 - 37ms                   | Р       |  |
|        |  | D5 - 36ms                   |         |  |
|        |  | D6 - 38ms                   |         |  |
|        | - maximum break time (ms) at: 5 I <sub>Δn</sub> :  | D4 -                        | N/A     |  |
|        |  | D5 -                        |         |  |
|        |  | D6 -                        |         |  |
|        | - maximum break time (ms) at: 0,25 A (if   | D4 - 31ms                   | Р       |  |
|        | applicable)  | D5 - 31ms                   |         |  |
|        |  | D6 - 25ms                   |         |  |
|        | - maximum break time (ms) at: 500 A:   | D4 - 12ms                   | Р       |  |
|        |  | D5 - 12ms                   |         |  |
|        |  | D6 - 12ms                   |         |  |
|        | No value exceeds the relevant specified limiting value   |                             | Р       |  |
|        | Additional test for type S:  |                             |         |  |
|        | - minimum non actuating time (ms) at: l <sub>Δn</sub> : 0,13 s :   | D4 -                        | N/A     |  |
|        |  | D5 -                        |         |  |
|        |  | D6 -                        |         |  |
|        | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s   | D4 -                        | N/A     |  |
|        |  | D5 -                        |         |  |
|        |  | D6 -                        |         |  |
|        |  |                             |         |  |

D4 -

D5 -D6 -

D4 -

D5 -D6 - N/A

N/A

- minimum non actuating time (ms) at: 5 l<sub>an</sub>; 0,05 s

- minimum non actuating time (ms) at: 500 A;

0,04 s .....:

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|       | No tripping during the tests                                     |                         | N/A |
|-------|--|-------------------------|-----|
| 9.9.3 | Tests repeated with the RCCB loaded with rated current:          |                         |     |
|       | - test current (A): In, until steady state conditions            |                         | -   |
|       | are reached  | 63A                     |     |
|       | - cross-sectional area (mm²):                                    | 16mm²                   |     |
|       | - the RCCB closes on Ian: no value exceeds the                   | D4 - 29- 37ms           | Р   |
|       | specified limiting value of Table 1 (ms):                        | D5 - 29- 37ms           |     |
|       |  | D6 - 26- 38ms           |     |
|       | The switch S1 and the RCCB are in closed position.               | The residual current is | 100 |
|       | established by closing S2:                                       |                         |     |
|       | - maximum break time (ms) at: I <sub>Δn</sub> :                  | D4 - 36ms               | Р   |
|       |  | D5 - 36ms               |     |
|       |  | D6 - 37ms               |     |
|       | - maximum break time (ms) at: 2 I <sub>An</sub>                  | D4 - 30ms               | Р   |
|       |  | D5 - 29ms               |     |
|       |  | D6 - 30ms               |     |
|       | - maximum break time (ms) at: 5 l <sub>An</sub>                  | D4 -                    | N/A |
|       |  | D5 -                    |     |
|       |  | D6 -                    |     |
|       | - maximum break time (ms) at: 0,25 A (if                         | D4 - 23ms               | Р   |
|       | applicable)  | D5 - 24ms               |     |
|       |  | D6 - 23ms               |     |
|       | - maximum break time (ms) at: 500 A:                             | D4 - 12ms               | Р   |
|       |  | D5 - 11ms               |     |
|       |  | D6 - 12ms               |     |
|       | No value exceeds the relevant specified limiting                 |                         | Р   |
|       | value  |                         |     |
|       | Additional test for type S:                                      |                         |     |
|       | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s : | D4 -                    | N/A |
|       |  | D5 -                    |     |
|       |  | D6 -                    |     |
|       | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s | D4 -                    | N/A |
|       |  | D5 -                    |     |
|       |  | D6 -                    |     |

| IEC 61008-1 |   |                                 |           |  |
|-------------|---|---------------------------------|-----------|--|
| Clause      | Requirement + Test  | Result - Remark                 | Verdict   |  |
|             | - minimum non actuating time (ms) at: 5 l <sub>.vn</sub> ; 0,05 s |                                 | N/A       |  |
|             | · · · · · · · · · · · · · · · · · · ·                             | D5 -                            |           |  |
|             |   | D6 -                            |           |  |
|             | - minimum non actuating time (ms) at: 500 A;                      | D4 -                            | N/A       |  |
|             | 0,04 s  | D5 -                            |           |  |
|             |   | D6                              |           |  |
|             | No tripping during the tests                                      |                                 | N/A       |  |
| .9.4        | b) Tests repeated with the RCCB loaded with rated of              | current:                        |           |  |
|             | - test current (A): In at a temperature of +40 °C:                |                                 | _         |  |
|             | until steady state conditions are reached:                        | 63A                             |           |  |
|             | - cross-sectional area (mm²)                                      | 16mm²                           |           |  |
|             | The test circuit being successively calibrated at each            | of the values of residual       | Р         |  |
|             | current   |                                 |           |  |
|             | specified in Table 1, the test switch S2 and the RCCI             | B being in the closed position, |           |  |
|             | the test voltage is suddenly established by closing th            | e test switch S1                |           |  |
|             | - maximum break time (ms) at: I <sub>An</sub> :                   | D4 - 36ms                       | Р         |  |
|             |   | D5 - 35ms                       |           |  |
|             |   | D6 - 36ms                       |           |  |
|             | - maximum break time (ms) at: 2 I <sub>Δn</sub>                   | D4 - 35ms                       | Р         |  |
|             |   | D5 - 32ms                       |           |  |
|             |   | D6 - 31ms                       |           |  |
|             | - maximum break time (ms) at: 5 I <sub>Δn</sub>                   | D4 -                            | N/A       |  |
|             |   | D5 -                            |           |  |
|             |   | D6 -                            |           |  |
|             | - maximum break time (ms) at: 0,25 A (if                          | D4 - 25ms                       | Р         |  |
|             | applicable)   | D5 - 23ms                       |           |  |
|             |   | D6 - 24ms                       |           |  |
|             | - maximum break time (ms) at: 500 A                               | D4 - 11ms                       | Р         |  |
|             |   | D5 - 11ms                       |           |  |
|             |   | D6 - 11ms                       |           |  |
|             | No value exceeds the relevant specified limiting                  |                                 | Р         |  |
|             | value Additional test for type S:                                 |                                 | Signature |  |

| IEC 61008-1 |  |                 |         |
|-------------|--|-----------------|---------|
| Clause      | Requirement + Test   | Result - Remark | Verdict |
|             |  |                 |         |
|             | - minimum non actuating time (ms) at: $I_{\Delta n}$ : 0,13 s :  | D4 -            | N/A     |
|             |  | D5 -            |         |
|             |  | D6 -            |         |
|             | - minimum non actuating time (ms) at: 2 $I_{\Delta n}$ for       | D4 -            | N/A     |
|             | 0,06 s   | D5 -            |         |
|             |  | D6              |         |
|             | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s | D4 -            | N/A     |
|             |  | D5 -            |         |
|             |  | D6 -            |         |
|             | - minimum non actuating time (ms) at: 500 A;                     | D4 -            | N/A     |
|             | 0,04 s   | D5 -            |         |
|             | _  | D6              |         |
|             | No tripping during the tests                                     |                 | N/A     |

|                | Tests "D1"   |                                 |       |
|----------------|--|---------------------------------|-------|
| 8.12           | RCCBs functionally dependent on line voltage                 |                                 |       |
|                | RCCBs functionally dependent on the line voltage,            |                                 | N/A   |
|                | shall operate correctly between 0,85 and 1,1 times           |                                 | 1 500 |
|                | their rated voltage; voltage (V)                             |                                 |       |
|                | Multipole RCCBs shall have all current paths                 |                                 | N/A   |
|                | supplied from the phases and neutral, if any                 |                                 | 2     |
| 9.17           | Verification of the behaviour of RCCBs opening auto-         | matically in case of failure of | N/A   |
|                | the line voltage   |                                 |       |
| 9.17 <u>.1</u> | Limiting value of the line voltage (Ux):                     |                                 |       |
|                | - rated voltage applied to the line terminals and            | D4 -                            | N/A   |
|                | progressively lowered to attain zero within about            | D5 -                            |       |
|                | 30 s until automatic opening occurs; voltage (V) ::          | D6                              |       |
|                | - all values less than 0,85 times the rated voltage          | D4 -                            | N/A   |
|                | (V):   | D5 -                            |       |
|                |  | D6 -                            |       |
|                | - tripping test at test voltage (V) with I <sub>Δn</sub> and | D4 -                            | N/A   |
|                | operating according to Table 1 (ms)                          | D5 -                            |       |
|                |  | D6 -                            |       |
|                | No value exceeds the specified limiting values               |                                 | N/A   |

| IEC 61008-1 |   |                 |           |  |
|-------------|---|-----------------|-----------|--|
| Clause      | Requirement + Test  | Result - Remark | Verdict   |  |
|             |   |                 | 1112-     |  |
|             | Not possible to close the apparatus by manual D4 -                                  |                 |           |  |
|             | operating means below Ux:   | D5 -            | n.rece    |  |
|             |   | D6 -            |           |  |
| 9.17.2      | Verification of behaviour in case of failure of the line voltage                    |                 |           |  |
|             | RCCB supplied with rated voltage, and the line                                      |                 | N/A       |  |
|             | voltage then switched off   |                 |           |  |
|             | Time (ms) interval between switching off and  | D4 -            | N/A       |  |
|             | opening of the main contacts  | D5 -            |           |  |
| _           |   | D6 -            |           |  |
|             | a) RCCBs opening without delay: no value exceeds                                    |                 | N/A       |  |
|             | 0,5 s   |                 |           |  |
|             | b) RCCBs opening with delay: max. and min. values                                   |                 | N/A       |  |
|             | within the range indicated by the manufacturer                                      |                 |           |  |
| .17.3       | Verification of the correct operation, in presence of a residual current, for RCCBs |                 |           |  |
|             | opening with delay in case of failure of the line voltage                           | ge              |           |  |
|             | RCCB connected according to fig. 4 at the rated                                     |                 | N/A       |  |
|             | voltage (Un)  |                 |           |  |
|             | All phases but one switched off by means of S3                                      |                 | N/A       |  |
|             | During the delay: test of 9.9.2:  |                 | N/A       |  |
| .9.2.1      | - steady increase from 0,2 I <sub>Δn</sub> to I <sub>Δn</sub> within 30 s (mA)      | D4 -            | N/A       |  |
|             |   | D5 -            |           |  |
|             |   | D6 -            |           |  |
|             | - tripping current between I <sub>Δno</sub> and I <sub>Δn</sub> (mA):               | D4 -            | N/A       |  |
|             |   | D5 -            |           |  |
|             |   | D6 -            |           |  |
| _           | The RCCB closes on I <sub>Δn</sub> : no value exceeds the                           | D4 -            | N/A       |  |
|             | specified limiting value of Table 1 (ms)  | D5 -            |           |  |
|             |   | D6 -            |           |  |
| .9.2.3      | The test circuit being successively calibrated at each of the values of residual    |                 | V.1142.74 |  |
|             | current   |                 | 1         |  |
|             | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                 |           |  |
|             | the test voltage is suddenly established by closing the test switch S1              |                 | AL SIL    |  |

| IEC 61008-1 |  |   |         |
|-------------|--|---|---------|
| Clause      | Requirement + Test   | Result - Remark                         | Verdict |
|             |  |   |         |
|             | - maximum break time (ms) at: I <sub>Δn</sub> :                  | D4 -                                    | N/A     |
|             |  | D5 -                                    |         |
|             |  | D6 -                                    |         |
|             | - maximum break time (ms) at: 2 I <sub>Δn</sub>                  | D4 -                                    | N/A     |
|             |  | D5 -                                    |         |
|             |  | D6 -                                    |         |
|             | - maximum break time (ms) at: 5 $I_{\Delta n}$                   | D4 -                                    | N/A     |
|             |  | D5 -                                    |         |
|             |  | D6 -                                    |         |
|             | - maximum break time (ms) at: 0,25 A (if                         | D4 -                                    | N/A     |
|             | applicable):   | D5 -                                    |         |
|             |  | D6                                      |         |
|             | - maximum break time (ms) at: 500 A                              | D4 -                                    | N/A     |
|             |  | D5 -                                    |         |
|             |  | D6 -                                    |         |
|             | No value exceeds the relevant specified limiting                 |   | N/A     |
|             | value  |   |         |
|             | Additional test for type S:                                      |   | 是是      |
|             | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s:  | D4 -                                    | N/A     |
|             |  | D5 -                                    |         |
|             |  | D6 -                                    |         |
|             | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s | D4 -                                    | N/A     |
|             |  | D5 -                                    |         |
|             |  | D6 -                                    |         |
| _           | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s | D4 -                                    | N/A     |
|             |  | D5 -                                    |         |
|             |  | D6 -                                    |         |
|             | - minimum non actuating time (ms) at: 500 A; 0,04 s              | D4 -                                    | N/A     |
|             |  | D5 -                                    |         |
|             |  | D6 -                                    |         |
| _           | No tripping during tests   |   | N/A     |
| .17.4       | Verification of the correct operation of RCCBs with 3            | or 4 current paths, neutral             | 24664   |
|             | and one line terminal only being energized in turn:              | , |         |
|             | RCCB connected according to fig. 4                               |   | N/A     |

|        | IEC (              | 61008-1         |         |
|--------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 9.9.2.3 | The test circuit being successively calibrated at each current   | of the values of residual       |     |
|---------|--|---------------------------------|-----|
|         | specified in Table 1, the test switch S2 and the RCCE            | B being in the closed position, |     |
|         | the test voltage is suddenly established by closing the          |                                 |     |
|         | - maximum break time (ms) at: I <sub>sn</sub>                    | D4 -                            | N/A |
|         | , , 5  | D5 -                            |     |
|         |  | D6 -                            |     |
|         | - maximum break time (ms) at: 2 l <sub>Δn</sub>                  | D4 -                            | N/A |
|         | , ,  | D5 -                            |     |
|         |  | D6 -                            |     |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub>                  | D4 -                            | N/A |
|         | , , ==.  | D5 -                            |     |
|         |  | D6 -                            |     |
|         | - maximum break time (ms) at: 0,25 A (if                         | D4 -                            | N/A |
|         | applicable)  | D5 -                            |     |
|         |  | D6 -                            |     |
|         | - maximum break time (ms) at: 500 A                              | D4 -                            | N/A |
|         |  | D5 -                            |     |
|         |  | D6 -                            |     |
|         | No value exceeds the relevant specified limiting value           |                                 | N/A |
|         | Additional test for type S:                                      |                                 |     |
|         | - minimum non actuating time (ms) at: I <sub>An</sub> ; 0,13 s : | D4 -                            | N/A |
|         |  | D5 -                            |     |
|         |  | D6 -                            |     |
|         | - minimum non actuating time (ms) at: 2 l <sub>an</sub> ; 0,06 s | D4 -                            | N/A |
|         |  | D5 -                            |     |
|         |  | D6 -                            |     |
|         | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s | D4 -                            | N/A |
|         |  | D5 -                            |     |
|         |  | D6 -                            |     |
|         | - minimum non actuating time (ms) at: 500 A; 0,04 s              | D4 -                            | N/A |
|         |  | D5 -                            |     |
|         |  | D6 -                            |     |

| Rep | ort No.:130 | 0700023SHA-002 | 2  |
|-----|-------------|----------------|----|
|     |             |                | ٦. |

|        |                    | IEC 61008-1 |                |         |
|--------|--------------------|-------------|----------------|---------|
| Clause | Requirement + Test | R           | esult - Remark | Verdict |

|          | No tripping during tests  |                                 | N/A       |
|----------|---|---------------------------------|-----------|
| 9.17.5   | Verification of the reclosing function of automatically reclosing RCCBs (under consideration) |                                 |           |
| 8.14     | Behaviour of RCCBs in case of current surges caused by impulse voltages                       |                                 |           |
| 9.19     | Verification of behaviour of RCCBs in case of currer voltages                                 | nt surges caused by impulse     |           |
| 9.19.1   | Current surge test for all RCCBs (0,5µs/100kHz ring   | y wave test)                    |           |
|          | One pole of the RCCB is submitted to 10 application to the following requirements:            | ns of a surge current according | i was     |
|          | - peak value: 200 A + 10/0%   | 200A                            |           |
|          | - virtual front time: 0,5 μs ± 30%  | 0,5 μs                          |           |
|          | - period of the following oscillatory wave: 10 μs ± 20%                                       | 10 μs                           |           |
|          | - each successive reverse peak; about 60% of the preceding peak                               | ОК                              |           |
|          | The polarity shall be inverted after every two applications                                   | ок                              |           |
|          | The interval between two consecutive applications shall be about 30 s                         | 30s                             |           |
|          | During the test the RCCB shall not trip   | D4 - not trip                   | Р         |
|          |   | D5 - not trip                   |           |
|          |   | D6 - not trip                   |           |
|          | - break time (ms) at: I <sub>Δn</sub>   | D4 - 35ms                       | Р         |
|          |   | D5 - 37ms                       |           |
|          |   | D6 - 35ms                       |           |
| 9.19.2   | Verification of behaviour at surge currents up to 300   | 0A (8/20µs surge current)       |           |
| 9.19.2.1 | Test conditions   |                                 |           |
|          | One pole of the RCCB is submitted to 10 applications of a surge current according             |                                 |           |
|          | to the following requirements:  |                                 | L. Albert |
|          | Peak value: 3000A +10/-0%   | 3000A                           |           |
|          | Virtual front time: 0,8µs ± 20%   | 0,8 μs                          |           |
|          | Virtual time of half value: 20µs ± 20%  | 20 μs                           |           |
|          | Peak of reverse current: less than 30 % of peak value   | 30%                             |           |

| Clause   | Requirement + Test  | Result - Remark             | Verdict |
|----------|---|-----------------------------|---------|
|          |   |                             |         |
|          | The polarity shall be inverted after every two applications   | ОК                          |         |
|          | The interval between two consecutive applications shall be about 30 s   | 30s                         |         |
| 9.19.2.2 | S-type: During the test the RCCB shall not trip   | D4 -                        | N/A     |
|          |   | D5 -                        |         |
|          |   | D6                          |         |
|          | - break time (ms) at I <sub>Δn</sub>  | D4 -                        | N/A     |
|          |   | D5 -                        |         |
|          |   | D6 -                        |         |
| 9.19.2.3 | General type: During the test the RCCB may trip.  |                             | Р       |
|          | After any tripping the RCCB shall be re-closed  |                             |         |
|          | - break time (ms) at I <sub>Δn</sub>  | D4 - 37ms                   | Р       |
|          |   | D5 - 29ms                   |         |
|          |   | D6 - 36ms                   |         |
| 3.15     | Behaviour of RCCBs in case of earth fault currents of   | comprising a d.c. component |         |
| 9.21     | Verification of the correct operation at residual currents with d.c. components for RCCBs type A                              |                             | N/A     |
| 9.21.1   | RCCB installed as for normal use, test circuits according to fig. 5 and 6   |                             | N/A     |
| 9.9.5    | For RCCBs functionally dependent on line voltage, each test is made at 1,1 and 0,85 times the rated line voltage; voltage (V) |                             | N/A     |
| 9.21.1.1 | Verification of the correct operation in case of a continuous rise of the residual pulsating direct current (see Table 20):   |                             |         |
|          | - steady increase from zero to: 1,4 $I_{\Delta n}$ for $I_{\Delta n} > 0,01$ A with 1,4 $I_{\Delta n}$ /30 A/s (mA)           | Ι <sub>Δn</sub> =30mA       | Р       |
|          | - steady increase from zero to: 2 $I_{\Delta n}$ for $I_{\Delta n} \le 0.01$ A with 2 $I_{\Delta n}$ /30 A/s (mA)             |                             | N/A     |
|          | - angle α = 0° (+/-)  | D4- 23,1~23,7mA             | Р       |
|          |   | D5- 22,8~24,0mA             |         |
|          |   | D6- 22,9~23,6mA             |         |

| IEC 61008-1 |  |                         |         |  |
|-------------|--|-------------------------|---------|--|
| Clause      | Requirement + Test   | Result - Remark         | Verdict |  |
|             |  |                         |         |  |
|             | - angle $\alpha$ = 90° (+/-):                                | D4- 24,6~25,2mA         | Р       |  |
|             |  | D5- 24,2~25,6mA         |         |  |
|             |  | D6- 24,4~25,7mA         |         |  |
|             | - angle α = 135° (+/-)                                       | D4- 26,1~27,4mA         | Р       |  |
|             |  | D5- 26,1~27,2mA         |         |  |
|             |  | D6- 26,6~27,2mA         |         |  |
|             | No value exceeds the relevant specified limiting             |                         | P       |  |
|             | values   |                         |         |  |
| .21.1.2     | Verification of the correct operation in case of sudde       | enly appearing residual |         |  |
|             | pulsating direct currents by closing S2 (angle $\alpha$ = 0° | <u> </u>                |         |  |
|             | For RCCBs functionally dependent on line voltage             |                         | N/A     |  |
|             | according to 4.1.2.2 a) the residual current is              |                         |         |  |
|             | established by closing S1                                    |                         |         |  |
|             | RCCBs with I <sub>An</sub> < 0,03 A:                         |                         |         |  |
|             | - maximum break time (ms) at: 2 I <sub>Δn</sub> (+/-)        | D4 -                    | N/A     |  |
|             |  | D5 -                    |         |  |
|             |  | D6                      |         |  |
|             | - maximum break time (ms) at: 4 l <sub>An</sub> (+/-)        | D4 -                    | N/A     |  |
|             |  | D5 -                    |         |  |
|             |  | D6                      |         |  |
|             | - maximum break time (ms) at: 0,5 A rms (+/-):               | D4 -                    | N/A     |  |
|             |  | D5 -                    |         |  |
|             |  | D6 -                    |         |  |
|             | - maximum break time (ms) at: 350 A rms (+/-):               | D4 -                    | N/A     |  |
|             |  | D5 -                    |         |  |
|             |  | D6 -                    |         |  |
|             | RCCBs with $I_{\Delta n} = 0.03$ A:                          |                         |         |  |
|             | - maximum break time (ms) at: 1,4 I <sub>Δn</sub> (+/-)      | D4 - 27ms               | Р       |  |
|             |  | D5 - 29ms               |         |  |
|             |  | D6 - 27ms               |         |  |
|             | - maximum break time (ms) at: 2,8 I <sub>Δn</sub> (+/-):     | D4 - 21ms               | Р       |  |
|             |  | D5 - 21ms               |         |  |
|             |  | D6 - 24ms               |         |  |

| IEC 61008-1 |   |                       |          |  |
|-------------|---|-----------------------|----------|--|
| Clause      | Requirement + Test  | Result - Remark       | Verdict  |  |
|             |   |                       |          |  |
|             | - maximum break time (ms) at: 0,35 A rms (+/-)                                    | D4 - 14ms             | Р        |  |
|             |   | D5 - 14ms             |          |  |
|             |   | D6 - 13ms             |          |  |
|             | - maximum break time (ms) at: 350 A rms (+/-):                                    | D4 - 10ms             | Р        |  |
|             |   | D5 - 10ms             |          |  |
|             |   | D6 - 10ms             |          |  |
|             | RCCBs with I <sub>Δn</sub> > 0,03 A:  |                       |          |  |
|             | - maximum break time (ms) at: 1,4 l <sub>\(\alpha\)n</sub> (+/-):                 | D4 -                  | N/A      |  |
|             |   | D5 -                  |          |  |
|             |   | D6 -                  |          |  |
|             | - maximum break time (ms) at: 2,8 I <sub>An</sub> (+/-)                           | D4 -                  | N/A      |  |
|             |   | D5 -                  |          |  |
| _           |   | D6 -                  | _        |  |
|             | - maximum break time (ms) at: 7 l <sub>3n</sub> (+/-)                             | D4 -                  | N/A      |  |
|             |   | D5 -                  |          |  |
|             |   | D6 -                  |          |  |
|             | - maximum break time (ms) at: 350 A rms (+/-):                                    | D4 -                  | N/A      |  |
|             |   | D5 -                  |          |  |
| _           |   | D6 -                  |          |  |
|             | No value exceeds the relevant specified limiting                                  |                       | N/A      |  |
|             | value   |                       |          |  |
| 9.21.1.3    | Verification of the correct operation with the pole under test and one other pole |                       |          |  |
|             | loaded with rated current   |                       | 1-010048 |  |
|             | - test current (A): In  |                       |          |  |
|             | - steady increase from zero to: 1,4 I <sub>An</sub> for                           | I <sub>Δn</sub> =30mA | Р        |  |
|             | I <sub>Δn</sub> > 0,01 A with 1,4 I <sub>Δn</sub> /30 A/s (mA)                    |                       | _        |  |
|             | - steady increase from zero to: 2 $I_{\Delta n}$ for $I_{\Delta n} \le 0.01$ A    |                       | N/A      |  |
|             | with 2 I <sub>Δn</sub> /30 A/s (mA)   |                       |          |  |
|             | - angle α = 0° (+/-)  | D4- 22,7~23,7mA       | Р        |  |
|             |   | D5- 22,6~23,6mA       |          |  |
|             |   | D6- 22,4~24,0mA       |          |  |
|             | - angle α = 90° (+/-):  | D4- 24,6~25,8mA       | Р        |  |
|             |   | D5- 24,4~25,3mA       |          |  |
|             |   | D6- 24,4~25,6mA       |          |  |

|          | IEC 61008-1   |                                 |         |  |
|----------|---|---------------------------------|---------|--|
| Clause   | Requirement + Test  | Result - Remark                 | Verdict |  |
|          |   |                                 |         |  |
|          | - angle α = 135° (+/-)  | D4- 26,2~27,2mA                 | Р       |  |
|          |   | D5- 26,2~27,4mA                 |         |  |
|          |   | D6- 26,2~27,4mA                 | _       |  |
|          | No value exceeds the relevant specified limiting  |                                 | P       |  |
|          | values  | _                               | _       |  |
| 9.21.1.4 | Verification of the correct operation in case of residua                                | al pulsating d.c. currents with |         |  |
|          | angle $\alpha$ = 0° superimposed by smooth direct current                               | of 0,006 A:                     |         |  |
|          | - steady increase of pulsating d.c. current from zero                                   |                                 | Р       |  |
|          | to: 1,4 $I_{\Delta n}$ for $I_{\Delta n} > 0,01$ A with 1,4 $I_{\Delta n}$ /30 A/s (mA) | IΔn=30 mA                       |         |  |
|          | - steady increase of pulsating d.c. current from zero                                   |                                 | N/A     |  |
|          | to: $2 I_{\Delta n}$ for $I_{\Delta n} \le 0.01$ A with $2 I_{\Delta n} /30$ A/s (mA)   | _                               |         |  |
|          | - angle α = 0° (+/-) (+/- 6 mA)   | D4- 29,4~31,3mA                 | Р       |  |
|          |   | D5- 29,2~33,4mA                 |         |  |
|          |   | D6- 29,2~33,4mA                 |         |  |
|          | No value exceeds the relevant specified limiting  |                                 | Р       |  |
|          | values  |                                 |         |  |
| 9.11.2.3 | Verification of the rated residual making and   | 630A                            | -       |  |
|          | breaking capacity (A): I <sub>Δm</sub>  |                                 |         |  |
|          | Test circuit according to figure  | 7                               | <u></u> |  |
|          | Point of test circuit which is directly earthed   | Neutral of power supply         | _       |  |
|          | Grid distance "a" (mm)  | 35                              |         |  |
|          | Prospective current (A)   | 630A                            | ма      |  |
|          | Prospective current obtained (A)  | 632A                            | *****   |  |
|          | Power factor  | 0,93-0,98                       |         |  |
|          | Power factor obtained   | 0,97                            |         |  |
|          | Point of initiation: 45° ± 5°   | 45                              | Р       |  |
|          | Test sequence: O-t-CO-t-CO on each pole in turn   | O-t-CO-t-CO                     | Р       |  |
|          | excluding the switched neutral pole   |                                 |         |  |
|          | During tests no endangering of operator, no   |                                 | Р       |  |
|          | permanent arcing, no flashover and no melting of  |                                 |         |  |
|          | fuse F  |                                 |         |  |
|          | After the tests no damage impairing further use   |                                 | P       |  |

| IEC 61008-1 |   |                                  |              |  |
|-------------|---|----------------------------------|--------------|--|
| Clause      | Requirement + Test  | Result - Remark                  | Verdict      |  |
| _           |   |                                  |              |  |
| 9.7.7.3     | The leakage current flowing across the open                     | D4 - 9,14×10 <sup>-3</sup> mA    | P            |  |
|             | contacts is measured at 1,1 Un and shall not                    | D5 - 9,11×10 <sup>-3</sup> mA    |              |  |
|             | exceed 2mA (mA)   | D6 - 9,14×10 <sup>-3</sup> mA    |              |  |
| 9.7.3       | Dielectric strength test of the main circuit at test volta      | age 2 Un for 1 min:              |              |  |
|             | a):   | D4 - OK                          | Р            |  |
|             |   | D5 - OK                          |              |  |
|             | _   | D6 - OK                          |              |  |
|             | b):   | D4 - OK                          | Р            |  |
|             |   | D5 - OK                          |              |  |
|             |   | D6 - OK                          |              |  |
|             | c)  | D4 - OK                          | P            |  |
|             |   | D5 - OK                          |              |  |
|             |   | D6 - OK                          |              |  |
|             | d)  | D4 -                             | N/A          |  |
|             |   | D5 -                             |              |  |
|             |   | D6 -                             |              |  |
| _           | e)  | D4 -                             | N/A          |  |
|             |   | D5 -                             |              |  |
|             |   | D6 -                             |              |  |
|             | No flashover or breakdown                                       | D4 - OK                          | Р            |  |
|             |   | D5 - OK                          |              |  |
|             |   | D6 - OK                          |              |  |
| _           | Making and breaking In at Un                                    | D4 - OK                          | P            |  |
|             |   | D5 - OK                          |              |  |
|             |   | D6 - OK                          |              |  |
|             | The RCCB shall trip with a test current of 1,25 I <sub>Δn</sub> | D4- 24ms                         | P            |  |
|             | (ms)  | D5- 29ms                         |              |  |
|             |   | D6- 21ms                         |              |  |
|             | The polyethylene sheet shows no holes                           |                                  | P            |  |
| 9.17        | Verification of the behaviour of RCCBs opening auto             | omatically in case of failure of |              |  |
|             | the line voltage  | ,                                |              |  |
| 9.17.1      | Limiting value of the line voltage (Ux):                        |                                  | a regular to |  |

| IEC 61008-1 |   |                 |         |  |
|-------------|---|-----------------|---------|--|
| Clause      | Requirement + Test  | Result - Remark | Verdict |  |
|             |   |                 |         |  |
|             | - rated voltage applied to the line terminals and                                   | D4 -            | N/A     |  |
|             | progressively lowered to attain zero within about                                   | D5 -            |         |  |
|             | 30 s until automatic opening occurs; voltage (V) .:                                 | D6 -            |         |  |
|             | - all values less than 0,85 times the rated voltage                                 | D4 -            | N/A     |  |
|             | (V):  | D5 -            |         |  |
|             |   | D6 -            | _       |  |
|             | - tripping test at test voltage (V) with $I_{\Delta n}$ and                         | D4 -            | N/A     |  |
|             | operating according to Table 1 (ms)   | D5 -            |         |  |
|             |   | D6              |         |  |
|             | No value exceeds the specified limiting values                                      |                 | N/A     |  |
|             | Not possible to close the apparatus by manual                                       | D4 -            | N/A     |  |
|             | operating means below Ux:   | D5 -            |         |  |
|             |   | D6              |         |  |
| 9.17.2      | Verification of behaviour in case of failure of the line voltage                    |                 | N/A     |  |
|             | RCCB supplied with rated voltage, and the line                                      |                 | N/A     |  |
|             | voltage then switched off   |                 |         |  |
|             | Time (ms) interval between switching off and  | D4 -            | N/A     |  |
|             | opening of the main contacts  | D5 -            |         |  |
|             |   | D6              |         |  |
|             | a) RCCBs opening without delay: no value exceeds                                    |                 | N/A     |  |
|             | 0,5 s   |                 |         |  |
|             | b) RCCBs opening with delay: max. and min. values                                   |                 | N/A     |  |
|             | within the range indicated by the manufacturer                                      |                 |         |  |
| 9.17.3      | Verification of the correct operation, in presence of a residual current, for RCCBs |                 |         |  |
|             | opening with delay in case of failure of the line voltage                           |                 |         |  |
|             | RCCB connected according to fig. 4 at the rated                                     |                 | N/A     |  |
|             | voltage (Un)  |                 |         |  |
|             | All phases but one switched off by means of S3                                      | -               | N/A     |  |
|             | During the delay: test of 9.9.2:  |                 |         |  |
| 9.9.2.1     | - steady increase from 0,2 I <sub>Δn</sub> to I <sub>Δn</sub> within 30 s (mA)      | D4 -            | N/A     |  |
|             |   | D5 -            |         |  |
|             |   | D6 -            |         |  |

| IEC 61008-1 |   |                                 |         |  |
|-------------|---|---------------------------------|---------|--|
| Clause      | Requirement + Test  | Result - Remark                 | Verdict |  |
| _           |   |                                 | _       |  |
|             | - tripping current between I <sub>Δno</sub> and I <sub>Δn</sub> (mA): | D4 -                            | N/A     |  |
|             |   | D5 -                            |         |  |
|             |   | D6 -                            |         |  |
|             | The RCCB closes on I <sub>Δn</sub> : no value exceeds the             | D4 -                            | N/A     |  |
|             | specified limiting value of Table 1 (ms)                              | D5 -                            |         |  |
|             |   | D6                              |         |  |
| 9.9.2.3     | The test circuit being successively calibrated at each current        | of the values of residual       |         |  |
|             | specified in Table 1, the test switch S2 and the RCC                  | B being in the closed position, |         |  |
|             | the test voltage is suddenly established by closing th                | e test switch S1                | 1.00    |  |
|             | - maximum break time (ms) at: I <sub>Δn</sub>                         | D4 -                            | N/A     |  |
|             |   | D5 -                            |         |  |
|             | <u> </u>  | D6 -                            |         |  |
|             | - maximum break time (ms) at: 2 I <sub>Δn</sub>                       | D4 -                            | N/A     |  |
|             |   | D5 -                            |         |  |
|             |   | D6 -                            |         |  |
|             | - maximum break time (ms) at: 5 I <sub>Δn</sub>                       | D4 -                            | N/A     |  |
|             |   | D5 -                            |         |  |
|             |   | D6                              |         |  |
|             | - maximum break time (ms) at: 0,25 A (if                              | D4 -                            | N/A     |  |
|             | applicable)   | D5 -                            |         |  |
|             |   | D6                              |         |  |
|             | - maximum break time (ms) at: 500 A                                   | D4 -                            | N/A     |  |
|             |   | D5 -                            |         |  |
|             |   | D6                              |         |  |
|             | No value exceeds the relevant specified limiting                      |                                 | N/A     |  |
|             | value   |                                 |         |  |
|             | Additional test for type S:   |                                 |         |  |
|             | - minimum non actuating time (ms) at: I <sub>An</sub> ; 0,13 s :      | D4 -                            | N/A     |  |
|             |   | D5 -                            |         |  |
|             |   | D6                              |         |  |
|             | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s      | D4 -                            | N/A     |  |
|             |   | D5 -                            |         |  |
|             |   | D6 -                            |         |  |

| IEC 61008-1 |  |                             |         |  |
|-------------|--|-----------------------------|---------|--|
| Clause      | Requirement + Test   | Result - Remark             | Verdict |  |
|             |  |                             | Г       |  |
|             | - minimum non actuating time (ms) at: 5 l <sub>Ani</sub> : 0,05 s  | D4 -                        | N/A     |  |
|             |  | D5 -                        |         |  |
|             |  | D6                          |         |  |
|             | - minimum non actuating time (ms) at: 500 A; 0,04 s  | D4 -                        | N/A     |  |
|             |  | D5 -                        |         |  |
|             |  | D6                          |         |  |
|             | No tripping during tests   |                             | N/A     |  |
| 1.17.4      | Verification of the correct operation of RCCBs with 3  | or 4 current paths, neutral |         |  |
|             | and one line terminal only being energized in turn:  |                             |         |  |
|             | RCCB connected according to fig. 4   |                             | N/A     |  |
| .9.2.3      | The test circuit being successively calibrated at each   | of the values of residual   |         |  |
|             | current  |                             |         |  |
|             | specified in Table 1, the test switch S2 and the RCCB being in the closed position,  |                             |         |  |
|             | the test voltage is suddenly established by closing the test switch S1   |                             |         |  |
|             | - maximum break time (ms) at: I <sub>Δn</sub>  | D4 -                        | N/A     |  |
|             | , ,  | D5 -                        |         |  |
|             |  | D6 -                        |         |  |
|             | - maximum break time (ms) at: 2 l <sub>3n</sub>  | D4 -                        | N/A     |  |
|             | (4.2)  | D5 -                        |         |  |
|             |  | D6 -                        |         |  |
| _           | - maximum break time (ms) at: 5 l <sub>Δn</sub>  | D4 -                        | N/A     |  |
|             | The state of the s | D5 -                        | 1377    |  |
|             |  | D6 -                        |         |  |
| _           | - maximum break time (ms) at: 0,25 A (if   | D4 -                        | N/A     |  |
|             | applicable)  | D5 -                        | 1977    |  |
|             |  | D6 -                        |         |  |
|             | - maximum break time (ms) at: 500 A  | D4 -                        | N/A     |  |
|             | - maximum break time (ms) at 500 A   | D5 -                        | IN/A    |  |
|             |  | D6 -                        |         |  |
| -           | No valve expends the relevant excellent limiting   |                             | N1/A    |  |
|             | No value exceeds the relevant specified limiting   |                             | N/A     |  |
|             | value  |                             | 124     |  |
|             | Additional test for type S:  |                             | 4       |  |

|        | IEC 61008-1  |                            |         |  |  |
|--------|--|----------------------------|---------|--|--|
| Clause | Requirement + Test   | Result - Remark            | Verdict |  |  |
| _      |  |                            |         |  |  |
|        | - minimum non actuating time (ms) at: $I_{\Delta n}$ ; 0,13 s :                | D4 -                       | N/A     |  |  |
|        |  | D5 -                       |         |  |  |
|        |  | D6 -                       |         |  |  |
|        | - minimum non actuating time (ms) at: 2 l <sub>\lambda</sub> ; 0,06 s          | D4 -                       | N/A     |  |  |
|        |  | D5 -                       |         |  |  |
|        |  | D6 -                       |         |  |  |
|        | - minimum non actuating time (ms) at: 5 l <sub>An</sub> ; 0,05 s               | D4 -                       | N/A     |  |  |
|        |  | D5 -                       |         |  |  |
|        |  | D6                         |         |  |  |
|        | - minimum non actuating time (ms) at: 500 A; 0,04 s                            | D4 -                       | N/A     |  |  |
|        |  | D5 -                       |         |  |  |
|        |  | D6                         |         |  |  |
|        | No tripping during tests   |                            | N/A     |  |  |
| 9.17.5 | Verification of the reclosing function of automatically reclosing RCCBs (under |                            |         |  |  |
|        | consideration)   |                            |         |  |  |
| 8.11   | Test device  |                            |         |  |  |
|        | RCCBs shall be provided with a test device                                     |                            | Р       |  |  |
|        | Ampere-turns produced when operating the test                                  | Ampere-turns produced by   | P       |  |  |
|        | device do not exceed 2,5 times the ampere-turns                                | test device: 94,0          |         |  |  |
|        | produced by lan  | milliampere-turns          |         |  |  |
|        |  | 2,5 times the Ampere-turns |         |  |  |
|        |  | produced by I∆n: 150       |         |  |  |
|        |  | milliampere-turns          |         |  |  |
|        | Not possible to energize the circuit on the load side                          |                            | P       |  |  |
|        | by operating the test device when the RCCB is in                               |                            |         |  |  |
|        | the open position  |                            |         |  |  |
| 9.16   | Verification of the operation of the test device at the                        | limits of rated voltage:   |         |  |  |
|        | a) RCCB at 0,85 times the rated voltage, test device                           | D4 - OK                    | Р       |  |  |
|        | actuated 25 times at intervals of 5 s  | D5 - OK                    |         |  |  |
|        |  | D6 - OK                    |         |  |  |
|        | b) test a) repeated at 1,1 times the rated voltage:                            | D4 - OK                    | Р       |  |  |
|        |  | D5 - OK                    |         |  |  |
|        |  | D6 - OK                    |         |  |  |

|          | IEC 61008-1   |                 |           |
|----------|---|-----------------|-----------|
| Clause   | Requirement + Test                                  | Result - Remark | Verdict   |
|          |   | _               |           |
|          | c) test b) repeated, but only once, the operating   | D4 - OK         | Р         |
|          | means of the test device being held in the closed   | D5 - OK         |           |
|          | position for 30 s                                   | D6 - OK         |           |
|          | RCCB operated at each test                          | D4 - operated   | Р         |
|          |   | D5 - operated   |           |
|          |   | D6 - operated   |           |
|          | No change impairing further use                     | D4 - OK         | Р         |
|          |   | D5 - OK         |           |
|          |   | D6 - OK         |           |
| 3.8      | Resistance to mechanical shock and impact           | <del></del>     |           |
|          | RCCBs shall have adequate mechanical behaviour      |                 | Р         |
|          | so as to withstand the stresses imposed during      |                 |           |
|          | installation and use                                |                 |           |
| 3.12.1.2 | Mechanical shock                                    |                 |           |
|          | Mechanical shock: 50 falls of 40 mm on one side;    |                 | Р         |
|          | 50 falls on opposite side C turned through 90°;     |                 |           |
|          | 50 falls on one side; 50 falls on opposite side     |                 |           |
|          | No opening of RCCB during the test:                 | D4 - OK         | Р         |
|          |   | D5 - OK         |           |
|          |   | D6 - OK         |           |
| .12.2    | Mechanical impact                                   |                 |           |
| 3.12.2.1 | Impact test (10 blows, height 10 cm): no damage :   | D4 - OK         | P         |
|          |   | D5 - OK         |           |
|          |   | D6 - OK         |           |
| 9.12.2.2 | RCCBs for rail mounting downward vertical force of  |                 | Р         |
|          | 50 N for 1 min, upward vertical force of 50 N for   |                 |           |
|          | 1 min   |                 |           |
|          | RCCB shall not become loose during test and no      | D4 - OK         | Р         |
|          | damage impairing its further use                    | D5 - OK         |           |
|          |   | D6 - OK         |           |
| .12.2.3  | RCCBs of plug-in type (under consideration)         |                 | N/A       |
| 3.13     | Behaviour of RCCBs in case of overcurrents in the m | nain circuit    | il događe |
|          | RCCBs shall not operate under specified conditions  |                 | Р         |
|          | of overcurrent                                      |                 |           |

|        |                    | IEC 61008-1 |                 |      |      |
|--------|--------------------|-------------|-----------------|------|------|
| Clause | Requirement + Test |             | Result - Remark | Verd | lict |

| 9.18.1 | Verification of the limiting value of overcurrent in case of a load through a RCCB with two poles                       |                               |     |  |  |
|--------|---|-------------------------------|-----|--|--|
|        | RCCB connected as for normal use with a load equal to (A): 6 In switched on using a two-pole test switch for 1 s        | 378A 1s                       | Р   |  |  |
|        | Test repeated three times with an interval of at least 1 min  | D4 - Ok<br>D5 - Ok<br>D6 - Ok | Р   |  |  |
|        | The RCCB shall not open   | D4 - Ok<br>D5 - Ok<br>D6 - Ok | Р   |  |  |
|        | RCCBs functionally dependent on the line voltage at rated voltage (Un)  |                               | Р   |  |  |
| 9.18.2 | Verification of the limiting value of overcurrent in case of a single phase load through a three-pole or four-pole RCCB |                               |     |  |  |
|        | RCCB connected according to fig. 22  Test current (A): 6 In closed by S1 for 1 s  |                               | N/A |  |  |
|        | Test repeated three times for each possible combination of current paths with an interval of at least 1 min             | D4 -<br>D5 -<br>D6 -          | N/A |  |  |
|        | The RCCB shall not open   | D4 -<br>D5 -<br>D6 -          | N/A |  |  |
|        | RCCBs functionally dependent on the line voltage at rated voltage   |                               | N/A |  |  |

|     | TEST SEQUENCE D (1 sample: ln= 63A, IΔn= 0,03A, type AC)                 | D8 P |
|-----|--|------|
|     | Tests "D0"   | P    |
| 8.5 | Operating characteristics  |      |
|     | For multiple settings of I <sub>Δn</sub> tests are made for each setting | N/A  |

| Require  | ment +   | Test  |  |   |   | Resu   | lt - Rer  | nark  |   | Verdict  |
|--|--|---|--|---|---|--|---|---|---|--|
|  |  |   |  |   |   |  |   |   |   |  |
| RCCB i   | RCCB installed as for normal use, test circuit   |   |  |   |   | Test on 50 and 60Hz  |   |   | Р   |  |
| accordi  | ng to fig  | . 4   |  |   |   |  |   |   |   |  |
| For RCCBs functionally dependent on line voltage,                                    |  |   |  |   |   |  |   |   |   | Р  |
| each test is made at 1,1 and 0,85 times the rated                                    |  |   |  |   |   |  |   |   |   |  |
| line volt  | age; vo  | tage (V)  |  |   | <u>.</u> :  |  |   |   | _   | _  |
| Туре   | I <sub>N</sub> A   | I <sub>AN</sub> A   |  |   |   |  |   |   |   | Migrae   |
|  |  |   | IAN  | 2 l <sub>an</sub>   | 5 I <sub>ΔN</sub>   | 5 l <sub>aN</sub><br>or<br>0,25A<br>a)   | 5A-<br>200A,<br>b)  | 500A  |   | agrina   |
| General  | Any<br>value   | <0,03   | 0,3  | 0,15  |   | 0,04   | 0,04  | 0,04  | Max. break  |  |
|  |  | 0,03  | 0,3  | 0,15  |   | 0,04   | 0,04  | 0,04  | times -   |  |
|  |  | >0,03   | 0,3  | 0,15  | 0,04  |  | 0,04  | 0,04  |   |  |
| S  | ≥ 25   | >0,03   | 0,5  | 0,2   | 0,15  | -  | 0,15  | 0,15  | Max. break<br>times   |  |
|  |  |   | 0,13   | 0,06  | 0,05  |  | 0,04  | 0,04  | Min. non-<br>actuating<br>times   | ***  |
| a) value   | e to be d  | ecided by   | the mai  | nufacturer  | for this test   |  |   |   |   |  |
| b) The   | test are dect opera  | only made<br>ition as m   | e during<br>entioned   | verification<br>d in 9.9.2.4  | n of the  |  |   |   |   |  |
| Off-load   | d tests n  | nade at a   | a tempe  | rature of   | 20 ± 2 °C   | 22°C   |   |   | _   | Р  |
| Verification of the correct operation in case of a steady increase residual current: |  |   |  |   |   |  | OARANI  |   |   |  |
| - steady increase from 0,2 $I_{\Delta n}$ to $I_{\Delta n}$ within 30 s (mA)         |  |   |  |   |   | 14   | 20 4  |   | N. Valendary  | Р  |
|  |  |   |  |   |   |  |   | 00.0  | •   |  |
|  |  |   |  |   |   |  |   | 4,000   | Α   | Р  |
|  |  |   |  |   |   |  |   |   |   | P  |
|  |  |   |  |   |   | 00-7   | 20 - 31   | 1115  |   | ۲  |
|  |  |   |  |   |   | h of the   | - Value   | e of rea  | eidual  | 20 70  |
|  |  | being sc  | iccessiv   | rely callor   | aled al each  | ii Oi tite   | value   | S OI IE   | siduai  |  |
|  |  |   |  |   |   |  |   |   |   |  |
| '  |  |   |  |   |   |  | _   |   |   |  |
|  |  | _   |  |   |   |  |   | 2. 0411   | 01  | P  |
|  |  |   |  |   |   |  |   |   |   | <u>_</u>   |
|  |  |   |  |   |   |  |   |   |   | N/A  |
|  | RCCB is according accordin | RCCB installed according to fig For RCCBs funceath test is maline voltage; voltage; voltage; voltage and value    General   Any value | according to fig. 4  For RCCBs functionally each test is made at 1,1 line voltage; voltage (V)  Type IN A IN A  General Any value  0,03  >0,03  >0,03  >0,03  >0,03  solve to be decided by b) The test are only made correct operation as moderated of the correct operation | RCCB installed as for normal unaccording to fig. 4  For RCCBs functionally dependence each test is made at 1,1 and 0, line voltage; voltage (V) | RCCB installed as for normal use, test conformation according to fig. 4  For RCCBs functionally dependent on line each test is made at 1,1 and 0,85 times line voltage; voltage (V)  Type INA INNA INNA INNA INNA INDICATE INTO INTO INDICATE INTO INTO INTO INTO INTO INTO INTO INTO | RCCB installed as for normal use, test circuit according to fig. 4  For RCCBs functionally dependent on line voltage, each test is made at 1,1 and 0,85 times the rated line voltage; voltage (V)  Type INA IANA Standard values non-actuating time at a low value solution of the correct operation of the correct operation of the correct operation at closing on rest the RCCB closes on I <sub>An</sub> : no value exceeds the specified limiting value of Table 1 (ms)  The test circuit being successively calibrated at each current specified in Table 1, the test switch S2 and the RCC are rested limiting value of Table 1, the test switch S2 and the RCC are rested. | RCCB installed as for normal use, test circuit according to fig. 4  For RCCBs functionally dependent on line voltage, each test is made at 1,1 and 0,85 times the rated line voltage; voltage (V) | RCCB installed as for normal use, test circuit according to fig. 4  For RCCBs functionally dependent on line voltage, each test is made at 1,1 and 0,85 times the rated line voltage; voltage (V) | RCCB installed as for normal use, test circuit according to fig. 4  For RCCBs functionally dependent on line voltage, each test is made at 1,1 and 0,85 times the rated line voltage; voltage (V) | RCCB installed as for normal use, test circuit according to fig. 4  For RCCBs functionally dependent on line voltage, each test is made at 1,1 and 0,85 times the rated line voltage; voltage; voltage (V) |

| IEC 61008-1 |  |                            |                |  |  |  |
|-------------|--|----------------------------|----------------|--|--|--|
| Clause      | Requirement + Test   | Result - Remark            | Verdict        |  |  |  |
|             |  |                            |                |  |  |  |
|             | - maximum break time (ms) at: 0,25 A (if   | D8 - 23ms                  | P              |  |  |  |
|             | applicable):   |                            |                |  |  |  |
|             | - maximum break time (ms) at: 500 A:   | D8 - 12ms                  | Р              |  |  |  |
|             | No value exceeds the relevant specified limiting                                 |                            | Р              |  |  |  |
|             | value  |                            |                |  |  |  |
| 9.9.2.4     | Verification of the correct operation in case of sudde                           | en appearance of residual  |                |  |  |  |
| _           | current of values between 5 IAn and 500A:  |                            |                |  |  |  |
|             | The test switch S1 and the RCCB being in the close                               | ed position, the residual  | -100           |  |  |  |
|             | current is suddenly established by closing the test s                            | witch S2                   | L42-13         |  |  |  |
|             | - maximum break time (ms) at: 5A (value 1  | D8 - 16ms                  | Р              |  |  |  |
|             | between 5A and 200A) :   |                            |                |  |  |  |
|             | - maximum break time (ms) at: 200A (value 2                                      | D8 - 9ms                   | Р              |  |  |  |
|             | between 5A and 200A) :   |                            | <u> </u>       |  |  |  |
|             | No value exceeds the relevant specified limiting                                 |                            | Р              |  |  |  |
|             | value  |                            |                |  |  |  |
|             | Additional test for type S:  |                            | <del>  _</del> |  |  |  |
|             | - minimum non actuating time (ms) at: I₄n; 0,13 s :                              | D8                         | N/A            |  |  |  |
|             | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s                 | D8 -                       | N/A            |  |  |  |
|             | - minimum non actuating time (ms) at: 5 l <sub>An</sub> ; 0,05 s                 | D8 -                       | N/A            |  |  |  |
|             | - minimum non actuating time (ms) at: 500 A;                                     | D8 -                       | N/A            |  |  |  |
|             | 0,04 s   |                            |                |  |  |  |
|             | No tripping during tests   |                            | N/A            |  |  |  |
| 9.9.4       | a) Tests repeated at a temperature of -5 °C;                                     |                            | The sta        |  |  |  |
|             | The test circuit being successively calibrated at each of the values of residual |                            |                |  |  |  |
|             | current  |                            |                |  |  |  |
|             | specified in Table 1, the test switch S2 and the RCC                             | B being in the closed      |                |  |  |  |
|             | position, the test voltage is suddenly established by                            | closing the test switch S1 |                |  |  |  |
|             | - maximum break time (ms) at: I <sub>Δn</sub> :                                  | D8 - 37ms                  | Р              |  |  |  |
|             | - maximum break time (ms) at: 2 I <sub>Δn</sub> :                                | D8 - 30ms                  | Р              |  |  |  |
|             | - maximum break time (ms) at: 5 l <sub>Δn</sub> :                                | D8 -                       | N/A            |  |  |  |
|             | - maximum break time (ms) at: 0,25 A (if   | D8 - 25ms                  | P              |  |  |  |
|             | applicable):   |                            |                |  |  |  |

|          | IEC 61008-1   |                         |             |  |  |  |  |
|----------|---|-------------------------|-------------|--|--|--|--|
| Clause   | Requirement + Test  | Result - Remark         | Verdict     |  |  |  |  |
|          |   |                         | <del></del> |  |  |  |  |
|          | - maximum break time (ms) at: 500 A:  | D8 - 12ms               | P           |  |  |  |  |
|          | No value exceeds the relevant specified limiting  |                         | Р           |  |  |  |  |
|          | value   |                         | P00000      |  |  |  |  |
|          | Additional test for type S:   |                         |             |  |  |  |  |
|          | - minimum non actuating time (ms) at: I <sub>Δn</sub> : 0,13 s :                                      | D8 -                    | N/A         |  |  |  |  |
|          | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s                                      | D8 ~                    | N/A         |  |  |  |  |
|          | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s                                      | D8 -                    | N/A         |  |  |  |  |
|          | - minimum non actuating time (ms) at: 500 A;  | D8 -                    | N/A         |  |  |  |  |
|          | No tripping during the tests  |                         | N/A         |  |  |  |  |
| 9.9.3    | Tests repeated with the RCCB loaded with rated cur  | rrent:                  |             |  |  |  |  |
|          | - test current (A): In, until steady state conditions   | 624                     |             |  |  |  |  |
| <u> </u> | are reached   | 63A                     |             |  |  |  |  |
| <u> </u> | - cross-sectional area (mm²)  | 16mm²                   |             |  |  |  |  |
|          | - the RCCB closes on I <sub>Δn</sub> : no value exceeds the   | D8 - 34ms               | P           |  |  |  |  |
|          | specified limiting value of Table 1 (ms)  | The residual current is | 142         |  |  |  |  |
|          | The switch S1 and the RCCB are in closed position. The residual current is established by closing S2: |                         |             |  |  |  |  |
|          | - maximum break time (ms) at: I <sub>Δn</sub> :   | D8 - 38ms               | Р           |  |  |  |  |
|          | - maximum break time (ms) at: 2   _n  | D8 - 29ms               | P           |  |  |  |  |
|          | - maximum break time (ms) at: 5 l <sub>Δn</sub>   | D8 -                    | N/A         |  |  |  |  |
|          | - maximum break time (ms) at: 0,25 A (if  | D8 - 25ms               | P           |  |  |  |  |
|          | applicable):  | D0 - 20113              |             |  |  |  |  |
|          | - maximum break time (ms) at: 500 A   | D8 - 11ms               | P           |  |  |  |  |
|          | No value exceeds the relevant specified limiting  | 50 11110                | P           |  |  |  |  |
|          | value   |                         | '           |  |  |  |  |
| _        | Additional test for type S:   |                         |             |  |  |  |  |
|          | - minimum non actuating time (ms) at: l <sub>Δn</sub> ; 0,13 s :                                      | D8 -                    | N/A         |  |  |  |  |
|          | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s                                      | D8 -                    | N/A         |  |  |  |  |
|          | - minimum non actuating time (ms) at: 5 I <sub>Δn</sub> ; 0,05 s                                      | D8 -                    | N/A         |  |  |  |  |

|        | IEC 61008-1  |                             |         |
|--------|--|-----------------------------|---------|
| Clause | Requirement + Test   | Result - Remark             | Verdict |
|        |  |                             |         |
|        | - minimum non actuating time (ms) at: 500 A;                     | D8 -                        | N/A     |
|        | 0,04 s   |                             |         |
|        | No tripping during the tests                                     |                             | N/A     |
| 9.9.4  | b) Tests repeated with the RCCB loaded with rated                | current:                    |         |
|        | - test current (A): In at a temperature of +40 °C:               |                             | -       |
|        | until steady state conditions are reached:                       | 63A                         | 40.00   |
|        | - cross-sectional area (mm²):                                    | 16mm²                       | -       |
|        | The test circuit being successively calibrated at each           | n of the values of residual | Р       |
|        | current  |                             |         |
|        | specified in Table 1, the test switch S2 and the RCC             | B being in the closed       |         |
|        | position, the test voltage is suddenly established by            | closing the test switch S1  |         |
|        | - maximum break time (ms) at: l <sub>Δn</sub>                    | D8 - 36ms                   | P       |
|        | - maximum break time (ms) at: 2 I <sub>Δn</sub>                  | D8 - 30ms                   | Р       |
|        | - maximum break time (ms) at: 5 l <sub>Δn</sub>                  | D8                          | N/A     |
|        | - maximum break time (ms) at: 0,25 A (if                         | D8 - 21ms                   | Р       |
|        | applicable):   |                             |         |
|        | - maximum break time (ms) at: 500 A:                             | D8 - 11ms                   | Р       |
|        | No value exceeds the relevant specified limiting                 |                             | Р       |
|        | value  |                             |         |
|        | Additional test for type S:                                      |                             |         |
|        | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s : | D8 -                        | N/A     |
|        | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> for      | D8 -                        | N/A     |
|        | 0,06 s   |                             |         |
|        | - minimum non actuating time (ms) at: 5 l <sub>An</sub> ; 0,05 s | D8 -                        | N/A     |
|        |  |                             |         |
|        | - minimum non actuating time (ms) at: 500 A;                     | D8 -                        | N/A     |
|        | 0,04 s   |                             |         |
|        | No tripping during the tests                                     |                             | N/A     |

|      | Tests "D1"   | a la side a |
|------|--|-------------|
| 8.12 | RCCBs functionally dependent on line voltage       |             |
|      | RCCBs functionally dependent on the line voltage,  | N/A         |
|      | shall operate correctly between 0,85 and 1,1 times |             |
|      | their rated voltage; voltage (V):                  |             |

|                | IEC 61008-1  |                                 |               |  |  |
|----------------|--|---------------------------------|---------------|--|--|
| Clause         | Requirement + Test   | Result - Remark                 | Verdict       |  |  |
|                |  |                                 |               |  |  |
|                | Multipole RCCBs shall have all current paths                                   |                                 | N/A           |  |  |
|                | supplied from the phases and neutral, if any                                   |                                 |               |  |  |
| 9.17           | Verification of the behaviour of RCCBs opening auto                            | matically in case of failure of | N/A           |  |  |
|                | the line voltage   |                                 |               |  |  |
| 9.17 <u>.1</u> | Limiting value of the line voltage (Ux):                                       |                                 | <del></del> - |  |  |
|                | - rated voltage applied to the line terminals and                              | D8 -                            | N/A           |  |  |
|                | progressively lowered to attain zero within about                              |                                 |               |  |  |
|                | 30 s until automatic opening occurs; voltage (V) .:                            |                                 |               |  |  |
|                | - all values less than 0,85 times the rated voltage                            | D8 -                            | N/A           |  |  |
|                | (V):   |                                 |               |  |  |
|                | - tripping test at test voltage (V) with $I_{\Delta n}$ and                    | D8 -                            | N/A           |  |  |
|                | operating according to Table 1 (ms):   |                                 |               |  |  |
|                | No value exceeds the specified limiting values                                 |                                 | N/A           |  |  |
|                | Not possible to close the apparatus by manual                                  | D8 -                            | N/A           |  |  |
|                | operating means below Ux   |                                 |               |  |  |
| 9.17.2         | Verification of behaviour in case of failure of the line voltage               |                                 |               |  |  |
|                | RCCB supplied with rated voltage, and the line                                 |                                 | N/A           |  |  |
|                | voltage then switched off  |                                 |               |  |  |
|                | Time (ms) interval between switching off and                                   | D8 -                            | N/A           |  |  |
|                | opening of the main contacts   |                                 |               |  |  |
|                | a) RCCBs opening without delay: no value exceeds                               |                                 | N/A           |  |  |
|                | 0,5 s  |                                 |               |  |  |
|                | b) RCCBs opening with delay: max. and min.                                     |                                 | N/A           |  |  |
|                | values within the range indicated by the                                       |                                 |               |  |  |
|                | manufacturer   |                                 |               |  |  |
| 3.17.3         | Verification of the correct operation, in presence of a                        | residual current, for RCCBs     |               |  |  |
|                | opening with delay in case of failure of the line voltage                      |                                 |               |  |  |
|                | RCCB connected according to fig. 4 at the rated                                |                                 | N/A           |  |  |
|                | voltage (Un)   |                                 |               |  |  |
|                | All phases but one switched off by means of S3                                 |                                 | N/A           |  |  |
|                | During the delay: test of 9.9.2:   |                                 | N/A           |  |  |
| 3.9.2.1        | - steady increase from 0,2 I <sub>An</sub> to I <sub>An</sub> within 30 s (mA) | D8 -                            | N/A           |  |  |

- tripping current between  $I_{\Delta no}$  and  $I_{\Delta n}$  (mA) ......

D8 -

N/A

|         | IEC 61008-1   |                                 |         |  |
|---------|---|---------------------------------|---------|--|
| Clause  | Requirement + Test  | Result - Remark                 | Verdict |  |
| _       |   |                                 |         |  |
|         | The RCCB closes on $I_{\Delta n}$ : no value exceeds the                            | D8 -                            | N/A     |  |
|         | specified limiting value of Table 1 (ms):   | _                               |         |  |
| 9.9.2.3 | The test circuit being successively calibrated at each                              | of the values of residual       |         |  |
|         | current   |                                 |         |  |
|         | specified in Table 1, the test switch S2 and the RCCI                               | B being in the closed position, |         |  |
|         | the test voltage is suddenly established by closing th                              | e test switch S1                |         |  |
|         | - maximum break time (ms) at: I <sub>Δn</sub>                                       | D8 -                            | N/A     |  |
|         | - maximum break time (ms) at: 2 l <sub>an</sub> :                                   | D8                              | N/A     |  |
|         | - maximum break time (ms) at: 5 lan   | D8                              | N/A     |  |
|         | - maximum break time (ms) at: 0,25 A (if  | D8 -                            | N/A     |  |
|         | applicable)   | _                               |         |  |
| _       | - maximum break time (ms) at: 500 A   | D8                              | N/A     |  |
|         | No value exceeds the relevant specified limiting                                    |                                 | N/A     |  |
|         | value   | _                               |         |  |
|         | Additional test for type S:   |                                 |         |  |
|         | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :                    | D8 -                            | N/A     |  |
|         | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s                    | D8 -                            | N/A     |  |
|         | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s                    | D8 -                            | N/A     |  |
|         |   | -                               | <b></b> |  |
|         | - minimum non actuating time (ms) at: 500 A;  | D8 -                            | N/A     |  |
|         | No tripping during tests  |                                 | N/A     |  |
| 9.17.4  | Verification of the correct operation of RCCBs with 3                               | or 4 current paths, neutral     | 479     |  |
| 0.17.4  | and one line terminal only being energized in turn:                                 | or -r ourion pane, nearar       |         |  |
| _       | RCCB connected according to fig. 4  |                                 | N/A     |  |
| 9.9.2.3 | The test circuit being successively calibrated at each                              | of the values of residual       |         |  |
|         | current   | or the values of residual       |         |  |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                                 |         |  |
|         | the test voltage is suddenly established by closing the test switch S1              |                                 |         |  |
|         | - maximum break time (ms) at: I <sub>Δn</sub>                                       | D8 -                            | N/A     |  |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub>                                     | D8 -                            | N/A     |  |
| -       | - maximum break time (ms) at: 5 l <sub>Δn</sub>                                     | D8 -                            | N/A     |  |

|            | IEC 61008-1   |                             |         |  |  |
|------------|---|-----------------------------|---------|--|--|
| Clause     | Requirement + Test  | Result - Remark             | Verdict |  |  |
| _          |   |                             |         |  |  |
|            | - maximum break time (ms) at: 0,25 A (if                                | D8 -                        | N/A     |  |  |
|            | applicable)   |                             |         |  |  |
|            | - maximum break time (ms) at: 500 A                                     | D8 -                        | N/A     |  |  |
|            | No value exceeds the relevant specified limiting                        |                             | N/A     |  |  |
|            | value   |                             |         |  |  |
|            | Additional test for type S:   |                             |         |  |  |
|            | - minimum non actuating time (ms) at: IΔn; 0,13 s :                     | D8 -                        | N/A     |  |  |
|            | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s        | D8 -                        | N/A     |  |  |
|            | - minimum non actuating time (ms) at: 5 l <sub>an</sub> ; 0,05 s        | D8 -                        | N/A     |  |  |
|            |   |                             |         |  |  |
|            | - minimum non actuating time (ms) at: 500 A;                            | D8 -                        | N/A     |  |  |
|            | 0,04 s  |                             | -       |  |  |
| <br>9.17.5 | No tripping during tests  |                             | N/A     |  |  |
| 9.17.3<br> | Verification of the reclosing function of automatically consideration)  | reclosing RCCBs (under      |         |  |  |
| 3.14       | Behaviour of RCCBs in case of current surges caus                       | sed by impulse voltages     |         |  |  |
| 9.19       | Verification of behaviour of RCCBs in case of curre-                    | nt surges caused by impulse | 5       |  |  |
| 9.19.1     | Current surge test for all RCCBs (0,5µs/100kHz ring                     | g wave test)                | 2, 1 3  |  |  |
|            | One pole of the RCCB is submitted to 10 applications of a surge current |                             |         |  |  |
|            | according to the following requirements:                                |                             |         |  |  |
|            | - peak value: 200 A + 10/0%   | 200A                        |         |  |  |
|            | - virtual front time: 0,5 μs ± 30%                                      | 0,5 μs                      |         |  |  |
|            | - period of the following oscillatory wave: 10 μs ± 20%                 | 10 μs                       |         |  |  |
|            | - each successive reverse peak: about 60% of the preceding peak         | ОК                          | 115     |  |  |
|            | The polarity shall be inverted after every two applications             | ок                          |         |  |  |
|            | The interval between two consecutive applications                       | 30s                         |         |  |  |
|            | shall be about 30 s   |                             |         |  |  |
|            | During the test the RCCB shall not trip                                 | D8 - not trip               | Р       |  |  |
|            | - break time (ms) at: I <sub>Δn</sub>                                   | D8 - 34ms                   | P       |  |  |

|          | IEC 61008-1  |                             |         |
|----------|--|-----------------------------|---------|
| Clause   | Requirement + Test   | Result - Remark             | Verdict |
|          |  |                             |         |
| 9.19.2   | Verification of behaviour at surge currents up to 3000A (8/20µs surge current)     |                             |         |
| 9.19.2.1 | Test conditions  |                             |         |
|          | One pole of the RCCB is submitted to 10 applications of a surge current            |                             |         |
|          | according to the following requirements:   | _                           |         |
|          | Peak value: 3000A +10/-0%  | 3000A                       |         |
|          | Virtual front time: 0,8µs ± 20%  | 0,8 μs                      |         |
|          | Virtual time of half value: 20µs ± 20%   | 20 μs                       |         |
|          | Peak of reverse current: less than 30 % of peak value                              | 30%                         |         |
|          | The polarity shall be inverted after every two applications                        | ок                          |         |
|          | The interval between two consecutive applications shall be about 30 s              | 30s                         |         |
| 9.19.2.2 | S-type: During the test the RCCB shall not trip                                    | D8 -                        | N/A     |
|          | - break time (ms) at I <sub>Δn</sub>   | D8 -                        | N/A     |
| 9.19.2.3 | General type: During the test the RCCB may trip.                                   |                             | Р       |
|          | After any tripping the RCCB shall be re-closed                                     |                             |         |
|          | - break time (ms) at I <sub>Δn</sub> :   | D8 - 34ms                   | Р       |
| 8.15     | Behaviour of RCCBs in case of earth fault currents                                 | comprising a d.c. component |         |
| 9.21     | Verification of the correct operation at residual curre                            | •                           | N/A     |
| 9.21.1   | RCCB installed as for normal use, test circuits                                    |                             | N/A     |
|          | according to fig. 5 and 6  |                             |         |
| 9.9.5    | For RCCBs functionally dependent on line voltage,                                  |                             | N/A     |
|          | each test is made at 1,1 and 0,85 times the rated                                  |                             |         |
|          | line voltage; voltage (V):   |                             |         |
| 9.21.1.1 | Verification of the correct operation in case of a continuous rise of the residual |                             |         |
|          | pulsating direct current (see Table 20):   |                             |         |
|          | - steady increase from zero to: 1,4 I <sub>Δn</sub> for                            |                             | N/A     |
|          | Ι <sub>Δη</sub> > 0,01 A with 1,4 Ι <sub>Δη</sub> /30 A/s (mA)                     | _                           |         |
|          | - steady increase from zero to: 2 $I_{\Delta n}$ for $I_{\Delta n} \le 0.01$ A     |                             | N/A     |
|          | with 2 I <sub>An</sub> /30 A/s (mA)  | _                           | _       |
|          | - angle α = 0° (+/-)   | D8 -                        | N/A     |
|          | - angle α = 90° (+/-):   | D8 -                        | N/A     |

| IEC 61008-1 |   |                        |             |  |
|-------------|---|------------------------|-------------|--|
| Clause      | Requirement + Test  | Result - Remark        | Verdict     |  |
|             |   |                        |             |  |
|             | - angle α = 135° (+/-):   | D8 -                   | N/A         |  |
|             | No value exceeds the relevant specified limiting                                  |                        | N/A         |  |
|             | values  |                        |             |  |
| 9.21.1.2    | Verification of the correct operation in case of sudde                            | nly appearing residual |             |  |
|             | pulsating direct currents by closing S2 (angle $\alpha = 0^{\circ}$ )             |                        |             |  |
|             | For RCCBs functionally dependent on line voltage                                  |                        | N/A         |  |
|             | according to 4.1.2.2 a) the residual current is                                   |                        |             |  |
|             | established by closing S1   |                        |             |  |
|             | RCCBs with I <sub>.vn</sub> < 0,03 A:   |                        | To the same |  |
|             | - maximum break time (ms) at: 2 I <sub>Δn</sub> (+/-)                             | D8 -                   | N/A         |  |
|             | - maximum break time (ms) at: 4 I <sub>Δn</sub> (+/-)                             | D8                     | N/A         |  |
|             | - maximum break time (ms) at: 0,5 A rms (+/-):                                    | D8 -                   | N/A         |  |
|             | - maximum break time (ms) at: 350 A rms (+/-):                                    | D8 -                   | N/A         |  |
|             | RCCBs with $I_{\Delta D} = A$ :   |                        |             |  |
|             | - maximum break time (ms) at: 1,4  n (+/-):                                       | D8 -                   | N/A         |  |
|             | - maximum break time (ms) at: 2,8 I <sub>Δn</sub> (+/-):                          | D8 -                   | N/A         |  |
| _           | - maximum break time (ms) at: 0,35 A rms (+/-) .:                                 | D8                     | N/A         |  |
|             | - maximum break time (ms) at: 350 A rms (+/-):                                    | D8 -                   | N/A         |  |
|             | RCCBs with I <sub>30</sub> > 0,03 A:  |                        |             |  |
|             | - maximum break time (ms) at: 1,4 I <sub>Δn</sub> (+/-):                          | D8                     | N/A         |  |
|             | - maximum break time (ms) at: 2,8 l <sub>Δn</sub> (+/-):                          | D8 -                   | N/A         |  |
|             | - maximum break time (ms) at: 7 I <sub>Δn</sub> (+/-):                            | D8 -                   | N/A         |  |
|             | - maximum break time (ms) at: 350 A rms (+/-)                                     | D8 -                   | N/A         |  |
|             | No value exceeds the relevant specified limiting                                  |                        | N/A         |  |
|             | value   |                        |             |  |
| .21.1.3     | Verification of the correct operation with the pole under test and one other pole |                        |             |  |
|             | loaded with rated current   |                        | A L         |  |
|             | - test current (A): In:   | Α                      |             |  |
|             | - steady increase from zero to: 1,4 I <sub>Δn</sub> for                           |                        | N/A         |  |
|             | $I_{\Delta n} > 0.01 \text{ A with } 1.4 I_{\Delta n} /30 \text{ A/s (mA)}$       | Δn= m <u>A</u>         |             |  |
|             | - steady increase from zero to: $2 I_{\Delta n}$ for $I_{\Delta n} \le 0.01$ A    |                        | N/A         |  |
|             | with 2 I <sub>Δn</sub> /30 A/s (mA)   |                        |             |  |
|             | - angle α = 0° (+/-):   | D8 -                   | N/A         |  |
|             | - angle α = 90° (+/-)   | D8 -                   | N/A         |  |

| IEC 61008-1 |  |                                 |  |  |
|-------------|--|---------------------------------|--|--|
| Clause      | Requirement + Test   | Result - Remark                 | Verdict                                      |  |
|             |  |                                 |  |  |
|             | - angle α = 135° (+/-):  | D8 -                            | N/A  |  |
|             | No value exceeds the relevant specified limiting   |                                 | N/A  |  |
|             | values   |                                 |  |  |
| 9.21.1.4    | Verification of the correct operation in case of residu                                    | al pulsating d.c. currents with |  |  |
|             | angle α = 0° superimposed by smooth direct current of 0,006 A:                             |                                 | - 109  |  |
|             | - steady increase of pulsating d.c. current from zero                                      |                                 | N/A  |  |
|             | to: 1,4 I <sub>Δn</sub> for I <sub>Δn</sub> > 0,01 A with 1,4 I <sub>Δn</sub> /30 A/s (mA) | IΔn= <u>m</u> A                 |  |  |
|             | - steady increase of pulsating d.c. current from zero                                      |                                 | N/A  |  |
|             | to: $2 I_{\Delta n}$ for $I_{\Delta n} \le 0,01$ A with $2 I_{\Delta n} /30$ A/s (mA)      |                                 |  |  |
|             | - angle α = 0° (+/-) (+/- 6 mA)  | D8 -                            | N/A  |  |
|             | No value exceeds the relevant specified limiting   |                                 | N/A  |  |
|             | values   |                                 |  |  |
| .11.2.3     | Verification of the rated residual making and  | 630A                            |  |  |
|             | breaking capacity (A): I <sub>Δm</sub>   |                                 |  |  |
| _           | Test circuit according to figure   | 7                               | _  |  |
|             | Point of test circuit which is directly earthed:   | Neutral of power supply         |  |  |
|             | Grid distance "a" (mm)   | 35mm                            | _  |  |
|             | Prospective current (A)  | 630A                            |  |  |
|             | Prospective current obtained (A)   | 632A                            | - <u>-                                  </u> |  |
|             | Power factor   | 0,93-0,98                       |  |  |
| _           | Power factor obtained  | 0,97                            |  |  |
|             | Point of initiation: 45° ± 5°  | 45                              | Р  |  |
|             | Test sequence: O-t-CO-t-CO on each pole in turn  | O-t-CO-t-CO                     | P  |  |
|             | excluding the switched neutral pole  |                                 |  |  |
|             | During tests no endangering of operator, no  |                                 | Р  |  |
|             | permanent arcing, no flashover and no melting of   |                                 |  |  |
|             | fuse F   |                                 |  |  |
|             | After the tests no damage impairing further use  |                                 | Р  |  |
| .7.7.3      | The leakage current flowing across the open  | D8 - 7,39×10 <sup>-3</sup>      | Р  |  |
|             | contacts is measured at 1,1 Un and shall not   |                                 |  |  |
|             | exceed 2mA (mA)  |                                 |  |  |
| .7.3        | Dielectric strength test of the main circuit at test voltage 2 Un for 1 min:               |                                 |  |  |
|             | a):  | D8 - OK                         | P  |  |

|        | Page 60 of 164 Report No.:130700023SHA-002   |                 |         |  |  |
|--------|--|-----------------|---------|--|--|
| Clause | IEC 61008-1  | Popult Domark   | Vardiat |  |  |
| Clause | Requirement + Test   | Result - Remark | Verdict |  |  |
|        | b):  | D8 - OK         | Р       |  |  |
|        | c)   | D8 - OK         | Р       |  |  |
|        | d)   | D8 -            | N/A     |  |  |
| _      | e)   | D8 -            | N/A     |  |  |
|        | No flashover or breakdown  | D8 - OK         | Р       |  |  |
|        | Making and breaking In at Un:  | D8 - OK         | Р       |  |  |
|        | The RCCB shall trip with a test current of 1,25 I <sub>Δn</sub>                    | D8 - 26ms       | P       |  |  |
|        | (ms)   |                 |         |  |  |
|        | The polyethylene sheet shows no holes  |                 | Р       |  |  |
| 9.17   | Verification of the behaviour of RCCBs opening automatically in case of failure of |                 | 122     |  |  |
|        | the line voltage   |                 |         |  |  |
| 9.17.1 | Limiting value of the line voltage (Ux):   |                 |         |  |  |
|        | - rated voltage applied to the line terminals and                                  | D8 -            | N/A     |  |  |
|        | progressively lowered to attain zero within about                                  |                 |         |  |  |
|        | 30 s until automatic opening occurs; voltage (V) .:                                |                 |         |  |  |
|        | - all values less than 0,85 times the rated voltage                                | D8 -            | N/A     |  |  |
|        | (V):   |                 |         |  |  |
|        | - tripping test at test voltage (V) with $I_{\Delta n}$ and                        | D8 -            | N/A     |  |  |
|        | operating according to Table 1 (ms)  |                 |         |  |  |
|        | No value exceeds the specified limiting values                                     |                 | N/A     |  |  |
|        | Not possible to close the apparatus by manual                                      | D8 -            | N/A     |  |  |
|        | operating means below Ux   |                 | _       |  |  |
| 9.17.2 | Verification of behaviour in case of failure of the line                           | voltage         | N/A     |  |  |
|        | RCCB supplied with rated voltage, and the line                                     |                 | N/A     |  |  |
|        | voltage then switched off  |                 |         |  |  |
| ]      | Time (ms) interval between switching off and                                       | D8 -            | N/A     |  |  |
|        | opening of the main contacts   |                 | _       |  |  |
|        | a) RCCBs opening without delay: no value exceeds                                   |                 | N/A     |  |  |
|        | 0,5 s  | _               |         |  |  |
|        | b) RCCBs opening with delay: max. and min.   |                 | N/A     |  |  |
|        | values within the range indicated by the   |                 |         |  |  |
|        | manufacturer   |                 |         |  |  |

Verification of the correct operation, in presence of a residual current, for RCCBs

opening with delay in case of failure of the line voltage

9.17.3

|         | IEC 61008-1   |                             |         |  |
|---------|---|-----------------------------|---------|--|
| Clause  | Requirement + Test  | Result - Remark             | Verdict |  |
| _       |   |                             |         |  |
|         | RCCB connected according to fig. 4 at the rated   |                             | N/A     |  |
|         | voltage (Un)  |                             |         |  |
|         | All phases but one switched off by means of S3  |                             | N/A     |  |
|         | During the delay: test of 9.9.2:  |                             | 25.2    |  |
| 9.9.2.1 | - steady increase from 0,2 I <sub>Δn</sub> to I <sub>Δn</sub> within 30 s (mA)                            | D8 -                        | N/A     |  |
|         | - tripping current between I <sub>Δno</sub> and I <sub>Δn</sub> (mA):                                     | D8 -                        | N/A     |  |
|         | The RCCB closes on I <sub>.vn</sub> : no value exceeds the  | D8 -                        | N/A     |  |
|         | specified limiting value of Table 1 (ms):   |                             |         |  |
| 9.9.2.3 | The test circuit being successively calibrated at each  | of the values of residual   |         |  |
|         | current   |                             |         |  |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position,                       |                             |         |  |
|         | the test voltage is suddenly established by closing th  | e test switch S1            |         |  |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :   | D8                          | N/A     |  |
|         | - maximum break time (ms) at: 2 l <sub>ող</sub> :   | D8 -                        | N/A     |  |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub> :   | D8 -                        | N/A     |  |
|         | - maximum break time (ms) at: 0,25 A (if  | D8 -                        | N/A     |  |
|         | applicable):  |                             |         |  |
|         | - maximum break time (ms) at: 500 A:  | D8 -                        | N/A     |  |
|         | No value exceeds the relevant specified limiting  |                             | N/A     |  |
|         | value   |                             |         |  |
| _       | Additional test for type S:   |                             | 100     |  |
|         | - minimum non actuating time (ms) at: I <sub>An</sub> ; 0,13 s :  | D8 -                        | N/A     |  |
|         | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s  | D8 -                        | N/A     |  |
|         | - minimum non actuating time (ms) at: 5 I <sub>Δn</sub> ; 0,05 s  | D8 -                        | N/A     |  |
|         | - minimum non actuating time (ms) at: 500 A;  | D8 -                        | N/A     |  |
|         | 0,04 s  | _                           |         |  |
|         | No tripping during tests  |                             | N/A     |  |
| 9.17.4  | Verification of the correct operation of RCCBs with 3 and one line terminal only being energized in turn: | or 4 current paths, neutral |         |  |
|         | RCCB connected according to fig. 4  |                             | N/A     |  |

| Clause   | Requirement + Test   | Result - Remark                 | Verdict |
|----------|--|---------------------------------|---------|
|          |  |                                 |         |
| 9.9.2.3  | The test circuit being successively calibrated at each current           | of the values of residual       |         |
|          | specified in Table 1, the test switch S2 and the RCCI                    | B being in the closed position, |         |
|          | the test voltage is suddenly established by closing th                   | e test switch S1_               |         |
|          | - maximum break time (ms) at: I <sub>Δn</sub>                            | D8 -                            | N/A_    |
|          | - maximum break time (ms) at: 2 l <sub>Δn</sub>                          | D8                              | N/A     |
|          | - maximum break time (ms) at: 5 l <sub>Δn</sub> :                        | D8                              | N/A     |
|          | - maximum break time (ms) at: 0,25 A (if applicable)                     | D8 -                            | N/A     |
|          | - maximum break time (ms) at: 500 A                                      | D8 -                            | N/A     |
|          | No value exceeds the relevant specified limiting                         |                                 | N/A     |
|          | value  |                                 |         |
|          | Additional test for type S:  |                                 |         |
|          | ~ minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :         | D8 -                            | N/A     |
|          | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s         | D8 -                            | N/A     |
|          | - minimum non actuating time (ms) at: 5 I <sub>Δn</sub> ; 0,05 s         | D8 -                            | N/A     |
|          | - minimum non actuating time (ms) at: 500 A;                             | D8 -                            | N/A     |
|          | No tripping during tests   | _                               | N/A     |
| 9.17.5   | Verification of the reclosing function of automatically reconsideration) | eclosing RCCBs (under           |         |
| <br>3.11 | Test device  |                                 |         |
|          | RCCBs shall be provided with a test device                               |                                 | P       |
|          | Ampere-turns produced when operating the test                            | Ampere-turns produced by        | Р       |
|          | device do not exceed 2,5 times the ampere-turns                          | test device: 80,4               |         |
|          | produced by I <sub>Δn</sub>  | milliampere-turns               |         |
|          |  | 2,5 times the Ampere-turns      |         |
|          |  | produced by I∆n: 150            |         |
|          |  | milliampere-turns               |         |
|          | Not possible to energize the circuit on the load side                    |                                 | Р       |
|          | by operating the test device when the RCCB is in                         |                                 |         |
|          | the open position  |                                 |         |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

| 9.16     | Verification of the operation of the test device at the  | limits of rated voltage:   | 从沿海 |
|----------|--|----------------------------|-----|
|          | a) RCCB at 0,85 times the rated voltage, test device actuated 25 times at intervals of 5 s   | D8 - OK                    | Р   |
|          | b) test a) repeated at 1,1 times the rated voltage:  | D8 - OK                    | Р   |
|          | c) test b) repeated, but only once, the operating means of the test device being held in the closed position for 30 s                            | D8 - OK                    | Р   |
|          | RCCB operated at each test:  | D8 - operated              | Р   |
|          | No change impairing further use:   | D8 - OK                    | Р   |
| 8.8      | Resistance to mechanical shock and impact  |                            |     |
|          | RCCBs shall have adequate mechanical behaviour so as to withstand the stresses imposed during installation and use                               |                            | Р   |
| 9.12.1.2 | Mechanical shock   |                            |     |
|          | Mechanical shock: 50 falls of 40 mm on one side; 50 falls on opposite side C turned through 90°; 50 falls on one side; 50 falls on opposite side |                            | Р   |
|          | No opening of RCCB during the test   | D8 - OK                    | Р   |
| 9.12.2   | Mechanical impact  |                            |     |
| 9.12.2.1 | Impact test (10 blows, height 10 cm): no damage :  | D8 - OK                    | P   |
| 9.12.2.2 | RCCBs for rail mounting downward vertical force of 50 N for 1 min, upward vertical force of 50 N for 1 min                                       |                            | Р   |
|          | RCCB shall not become loose during test and no damage impairing its further use  | D8 - OK                    | Р   |
| 9.12.2.3 | RCCBs of plug-in type (under consideration)  |                            | N/A |
| 8.13     | Behaviour of RCCBs in case of overcurrents in the n  | nain circuit               |     |
|          | RCCBs shall not operate under specified conditions of overcurrent  |                            | Р   |
| 9.18.1   | Verification of the limiting value of overcurrent in cas with two poles  | e of a load through a RCCB |     |
|          | RCCB connected as for normal use with a load equal to (A): 6 In switched on using a two-pole test switch for 1 s                                 | 378A 1s                    | Р   |

| Report | No.:130 | 700023 | SHA-002 |
|--------|---------|--------|---------|
|--------|---------|--------|---------|

| IEC 61008-1 |   |                           |         |  |
|-------------|---|---------------------------|---------|--|
| Clause      | Requirement + Test  | Result - Remark           | Verdict |  |
|             |   |                           |         |  |
|             | Test repeated three times with an interval of at          | D8 - OK                   | Р       |  |
|             | least 1 min:  |                           |         |  |
|             | The RCCB shall not open                                   | D8 - OK                   | P       |  |
|             | RCCBs functionally dependent on the line voltage          |                           | Р       |  |
|             | at rated voltage (Un):                                    |                           |         |  |
| 9.18.2      | Verification of the limiting value of overcurrent in case | se of a single phase load |         |  |
|             | through a three-pole or four-pole RCCB                    |                           |         |  |
|             | RCCB connected according to fig. 22                       |                           | N/A     |  |
|             | Test current (A): 6 In closed by S1 for 1 s:              |                           |         |  |
|             | Test repeated three times for each possible               | D8 -                      | N/A     |  |
|             | combination of current paths with an interval of at       |                           |         |  |
|             | least 1 min   |                           |         |  |
|             | The RCCB shall not open                                   | D8 -                      | N/A     |  |
|             | RCCBs functionally dependent on the line voltage          |                           | N/A     |  |
|             | at rated voltage  |                           |         |  |

| 11         | TEST SEQUENCE D2<br>(3 samples: In= 63A, IΔn= 0,03A, type A) | D <sub>2</sub> -4 D <sub>2</sub> -5 D <sub>2</sub> -6 | P        |
|------------|--|---|----------|
| 9.11.2.3c) | Verification of suitability in IT system:                    |   | 12       |
|            | Test circuit according to figure:                            | 8   |          |
|            | Point of test circuit which is directly earthed:             | Neutral of power supply                               |          |
|            | Grid distance "a" (mm)                                       | 35mm  |          |
|            | Test voltage 105% of rated phase to neutral voltage          | 252V  |          |
|            | for the pole exclusively for the neutral                     |   |          |
|            | Test voltage 105% of rated phase to phase voltage            | 444V  |          |
|            | for the other poles  |   | 200      |
|            | Prospective current - 500A or                                | 10ln  | Constant |
|            | - 10 l <sub>n</sub> (A):                                     |   |          |
|            | Prospective current (A)                                      | 630A  |          |
|            | Prospective current obtained (A)                             | 645A  |          |
|            | Power factor   | 0,93-0,98   |          |
|            | Power factor obtained  | 0,96  |          |

|         | IEC 61008-1   |                                |                           |
|---------|---|--------------------------------|---------------------------|
| Clause  | Requirement + Test  | Result - Remark                | Verdict                   |
|         |   |                                |                           |
|         | Point of initiation: 0 ± 5° for the first tested pole,    | 0                              | P                         |
|         | shifted by 30° for the other poles                        |                                |                           |
|         | Test sequence: O-t-CO on each pole in turn                | O-t-CO                         | Р                         |
|         | excluding the switched neutral pole                       |                                |                           |
|         | During tests no endangering of operator, no               |                                | Р                         |
|         | permanent arcing, no flashover and no melting of          |                                |                           |
|         | fuse F  | _                              |                           |
|         | After the tests no damage impairing further use           |                                | Р                         |
| 3.7.7.3 | The leakage current flowing across the open               | D2-4- 9,31×10 <sup>-3</sup> mA | P                         |
|         | contacts is measured at 1,1 Un and shall not              | D2-5- 9,11×10 <sup>-3</sup> mA |                           |
|         | exceed 2mA (mA)   | D2-6- 9,34×10 <sup>-3</sup> mA | 2000 No. (1000 COLUMN 100 |
| 9.7.3   | Dielectric strength test of the main circuit at test volt | tage 2 Un for 1 min:           |                           |
|         | a):   | D2-4 - OK                      | Р                         |
|         |   | D2-5 - OK                      |                           |
|         |   | D2-6 - OK                      |                           |
|         | b):   | D2-4 - OK                      | Р                         |
|         |   | D2-5 - OK                      |                           |
|         |   | D2-6 - OK                      |                           |
|         | c):   | D2-4 - OK                      | Р                         |
|         |   | D2-5 - OK                      |                           |
|         |   | D2-6 - OK                      |                           |
|         | d):   | D2-4-                          | N/A                       |
|         |   | D2-5-                          |                           |
|         |   | D2-6-                          |                           |
|         | e):   | D2-4-                          | N/A                       |
|         |   | D2-5-                          |                           |
|         |   | D2-6-                          |                           |
|         | No flashover or breakdown                                 | D2-4-                          | Р                         |
|         |   | D2-5-                          |                           |
|         |   | D2-6-                          |                           |
|         | Making and breaking In at Un                              | D2-4-                          | Р                         |
|         |   | D2-5-                          |                           |
|         |   | D2-6-                          |                           |

|        | Page 66 of 164  | Report No.:130700               | 0023SHA-002 |
|--------|---|---------------------------------|-------------|
|        | IEC 61008-1   | - Wiles (1999)                  |             |
| Clause | Requirement + Test  | Result - Remark                 | Verdict     |
|        | ***   |                                 | Γ           |
|        | The RCCB shall trip with a test current of 1,25 I <sub>Δn</sub>   | D2-4- 32ms                      | P           |
|        | (ms)  | D2-5- 27ms                      |             |
|        |   | D2-6- 24ms                      |             |
|        | The polyethylene sheet shows no holes   | <del>- ,</del>                  | Р           |
| 9.17   | Verification of the behaviour of RCCBs opening autom the line voltage   | natically in case of failure of | g           |
| 9.17.1 | Limiting value of the line voltage (Ux):  |                                 |             |
|        | - rated voltage applied to the line terminals and   | <br>D2-4-                       | N/A         |
|        | progressively lowered to attain zero within about   | D2-5-                           |             |
|        | 30 s until automatic opening occurs; voltage (V) .: [   | D2-6-                           |             |
|        | - all values less than 0,85 times the rated voltage   | D2-4-                           | N/A         |
|        | (V): [[   | D2-5-                           |             |
|        |   | D2-6                            |             |
|        | - tripping test at test voltage (V) with I <sub>Δn</sub> and  | D2-4-                           | N/A         |
|        | operating according to Table 1 (ms)   | D2-5-                           |             |
|        |   | D2-6                            |             |
|        | No value exceeds the specified limiting values  |                                 | N/A         |
|        | Not possible to close the apparatus by manual   | D2-4-                           | N/A         |
|        | operating means below Ux  | D2-5-                           |             |
|        |   | D2-6-                           |             |
| 9.17.2 | Verification of behaviour in case of failure of the line verification of behaviour in case of failure of the line verification. | oltage                          |             |
|        | RCCB supplied with rated voltage, and the line voltage then switched off  |                                 | N/A         |
|        |   | <br>D2-4-                       | N/A         |
|        | , ,   | D2-5-                           |             |
|        |   | D2-6-                           |             |
|        | a) RCCBs opening without delay: no value exceeds  |                                 | N/A         |
|        | 0,5 s   |                                 |             |
|        | b) RCCBs opening with delay: max. and min.  |                                 | N/A         |
|        | values within the range indicated by the  |                                 |             |
|        | manufacturer  |                                 |             |
| 9.17.3 | Verification of the correct operation, in presence of a r   | residual current, for RCCBs     |             |

opening with delay in case of failure of the line voltage

|         | IEC 61008-1  |                 |         |
|---------|--|-----------------|---------|
| Clause  | Requirement + Test   | Result - Remark | Verdict |
|         |  |                 | Ι       |
|         | RCCB connected according to fig. 4 at the rated  |                 | N/A     |
|         | voltage (Un):  |                 |         |
|         | All phases but one switched off by means of S3   |                 | N/A     |
|         | During the delay: test of 9.9.2:   |                 |         |
| .9.2.1  | - steady increase from 0,2 $I_{\Delta n}$ to $I_{\Delta n}$ within 30 s (mA)   | D2-4-           | N/A     |
|         |  | D2-5-           |         |
|         |  | D2-6-           |         |
|         | - tripping current between $I_{\Delta no}$ and $I_{\Delta n}$ (mA)   | D2-4-           | N/A     |
|         |  | D2-5-           |         |
|         |  | D2-6-           |         |
|         | The RCCB closes on $I_{\Delta n}$ : no value exceeds the   | D2-4-           | N/A     |
|         | specified limiting value of Table 1 (ms)   | D2-5-           |         |
|         |  | D2-6-           |         |
| 9.9.2.3 | The test circuit being successively calibrated at each of the values of residual current specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                 |         |
|         | the test voltage is suddenly established by closing the  |                 |         |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :  | D2-4-           | N/A     |
|         |  | D2-5-           |         |
|         |  | D2-6-           |         |
|         | - maximum break time (ms) at: 2 l <sub>an</sub> :  | D2-4-           | N/A     |
|         |  | D2-5-           |         |
|         |  | D2-6-           |         |
|         | - maximum break time (ms) at: 5 l <sub>\text{An}</sub>   | D2-4-           | N/A     |
|         |  | D2-5-           |         |
|         |  | D2-6-           |         |
|         | - maximum break time (ms) at: 0,25 A (if   | D2-4-           | N/A     |
|         | applicable):   | D2-5-           |         |
|         | <del>                                     </del>   | D2-6-           |         |
|         | - maximum break time (ms) at: 500 A:   | D2-4-           | N/A     |
|         |  | D2-5-           |         |
|         | <del>-</del>   | D2-6-           |         |
|         | No value exceeds the relevant specified limiting value   |                 | N/A     |

|        |                    | IEC 61008- | 1               |         |
|--------|--------------------|------------|-----------------|---------|
| Clause | Requirement + Test |            | Result - Remark | Verdict |

|          | Additional test for type S:                                      |                                 |          |
|----------|--|---------------------------------|----------|
|          | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s : | D2-4-                           | N/A      |
|          |  | D2-5-                           |          |
|          |  | D2-6-                           |          |
|          | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s | D2-4-                           | N/A      |
|          | :  | D2-5-                           |          |
|          |  | D2-6                            |          |
|          | - minimum non actuating time (ms) at: 5 l <sub>.n</sub> ; 0,05 s | D2-4-                           | N/A      |
|          |  | D2-5-                           |          |
|          |  | D2-6-                           |          |
|          | - minimum non actuating time (ms) at: 500 A;                     | D2-4-                           | N/A      |
|          | 0,04 s   | D2-5-                           |          |
|          |  | D2-6-                           |          |
|          | No tripping during tests   |                                 | N/A      |
| 9.17.4   | Verification of the correct operation of RCCBs with 3            | or 4 current paths, neutral     |          |
| <u>_</u> | and one line terminal only being energized in turn:              |                                 |          |
| _        | RCCB connected according to fig. 4                               |                                 | N/A      |
| .9.2.3   | The test circuit being successively calibrated at each           | of the values of residual       | ** 20 m  |
|          | current  |                                 | V. Horis |
|          | specified in Table 1, the test switch S2 and the RCCI            | B being in the closed position, | A STAN   |
| _        | the test voltage is suddenly established by closing th           | e test switch S1                |          |
|          | - maximum break time (ms) at: I <sub>Δn</sub> :                  | D2-4-                           | N/A      |
|          |  | D2-5-                           |          |
|          |  | D2-6-                           |          |
|          | - maximum break time (ms) at: 2 l <sub>Δn</sub> :                | D2-4-                           | N/A      |
|          |  | D2-5-                           |          |
|          |  | D2-6-                           |          |
|          | - maximum break time (ms) at: 5 l <sub>Δn</sub>                  | D2-4-                           | N/A      |
|          |  | D2-5-                           |          |
|          | _  | D2-6-                           |          |
|          | - maximum break time (ms) at: 0,25 A (if                         | D2-4-                           | N/A      |
|          | applicable):   | D2-5-                           |          |
|          |  | D2-6-                           |          |

| IEC 61008-1 |  |                 |         |  |
|-------------|--|-----------------|---------|--|
| Clause      | Requirement + Test   | Result - Remark | Verdict |  |
|             | - maximum break time (ms) at: 500 A:                             | D2-4-           | N/A     |  |
|             |  | D2-5-           |         |  |
|             |  | D2-6-           |         |  |
|             | No value exceeds the relevant specified limiting value           |                 | N/A     |  |
|             | Additional test for type S:                                      |                 |         |  |
|             | - minimum non actuating time (ms) at: $I_{\Delta ni}$ 0,13 s :   | D2-4-           | N/A     |  |
|             |  | D2-5-           |         |  |
|             |  | D2-6-           |         |  |
|             | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s | D2-4-           | N/A     |  |
|             |  | D2-5-           |         |  |
|             |  | D2-6-           |         |  |
|             | - minimum non actuating time (ms) at: 5 $I_{\Delta n}$ ; 0,05 s  | D2-4-           | N/A     |  |
|             |  | D2-5-           |         |  |
|             |  | D2-6-           |         |  |
|             | - minimum non actuating time (ms) at: 500 A;                     | D2-4-           | N/A     |  |
|             | 0,04 s:  | D2-5-           |         |  |
|             |  | D2-6-           |         |  |
|             | No tripping during tests   |                 | N/A     |  |

|          | TEST SEQUENCE E<br>(3 samples: In= 63A, I <sub>∆n</sub> = 0,03A, type A)                 | E4 E5 E6       | Р |
|----------|--|----------------|---|
| 8.7      | Performance at short-circuit currents  |                | Р |
| 9.11.2.4 | a) Verification of the coordination between the RCCI                                     | 3 and the SCPD |   |
|          | Verification of the coordination at the rated conditional short-circuit current (A): Inc | 6000A          |   |
|          | Test circuit according to figure   | 7              |   |
|          | Point of test circuit which is directly earthed:   | Neutral        |   |
|          | Grid distance "a" (mm)   | 45mm           |   |
|          | Silver wire diameter (mm) or fuse  | 0,75mm         | _ |
|          | Prospective current (A):   | 6000A          |   |
|          | Prospective current obtained (A)   | 6060A          |   |
|          | Power factor   | 0,65-0,70      | - |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|         | Power factor obtained   | 0,68                                 |          |
|---------|---|--------------------------------------|----------|
|         | Point of initiation: 45° ± 5°   | 45°                                  |          |
|         | Verification of I2t (kA2s) and Ip (kA) prior to testing                         |                                      |          |
|         | ((≥1x ≤1,1x values of table 15), RCCB replaced by a                             | lp = 4,05kA                          |          |
|         | connection having negligible impedance  |                                      |          |
|         | Test sequence: O-t-CO   | O-t-CO                               |          |
|         | l²t (kA²s); Ip (kA)   | E4 - 33,8 kA2s, 4,06 kA              | Р        |
|         |   | E5 - 32,4 kA <sup>2</sup> s, 3,93 kA |          |
|         |   | E6 - 33,4 kA2s, 3,90 kA              |          |
|         | During tests no endangering of operator, no                                     |                                      | Р        |
|         | permanent arcing, no flashover and no melting of                                |                                      |          |
|         | fuse F  |                                      |          |
|         | After the tests no damage impairing further use                                 |                                      | Р        |
| 3.7.7.3 | The leakage current flowing across the open                                     | E4 - 6,63×10 <sup>-3</sup> mA        | Р        |
|         | contacts is measured at 1,1 Un and shall not                                    | E5 - 6,53×10 <sup>-3</sup> mA        |          |
|         | exceed 2mA (mA)   | E6 - 6,82×10 <sup>-3</sup> mA        | <u> </u> |
| 9.7.3   | Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min: |                                      |          |
|         | a):   | E4 - OK                              | Р        |
|         |   | E5 - OK                              |          |
|         |   | E6 - OK                              |          |
|         | b):   | E4 - OK                              | Р        |
|         |   | E5 - OK                              |          |
|         |   | E6 - OK                              |          |
|         | c):   | E4 - OK                              | Р        |
|         |   | E5 - OK                              |          |
|         |   | E6 - OK                              |          |
|         | d):   | E4 -                                 | N/A      |
|         |   | E5 -                                 |          |
|         |   | E6 -                                 |          |
|         | e):   | E4 -                                 | N/A      |
|         |   | E5 -                                 |          |
|         |   | E6 -                                 |          |

|        | IEC 61008-1   | 1                               |         |
|--------|---|---------------------------------|---------|
| Clause | Requirement + Test  | Result - Remark                 | Verdict |
|        | No fine transmission in the   | F4 01/                          |         |
|        | No flashover or breakdown:  | E4 - OK                         | Р       |
|        |   | E5 - OK                         |         |
|        |   | E6 - OK                         |         |
|        | Making and breaking In at Un:   | E4 - OK                         | P       |
|        |   | E5 - OK                         |         |
|        | T) D00D   | E6 - OK                         |         |
|        | The RCCB shall trip with a test current of 1,25 l <sub>Δn</sub>       | E4- 31 ms                       | Р       |
|        | (ms):   | E5- 33 ms                       |         |
|        | <del>-</del>  | E6- 35 ms                       |         |
|        | The polyethylene sheet shows no holes                                 |                                 | P       |
| ).17   | Verification of the behaviour of RCCBs opening autor the line voltage | matically in case of failure of |         |
| 9.17.1 | Limiting value of the line voltage (Ux):                              |                                 |         |
|        | - rated voltage applied to the line terminals and                     | E4 -                            | N/A     |
|        | progressively lowered to attain zero within about                     | E5 -                            |         |
|        | 30 s until automatic opening occurs; voltage (V) .:                   | E6 -                            |         |
|        | - all values less than 0,85 times the rated voltage                   | E4 -                            | N/A     |
|        | (V):  | E5 -                            |         |
|        |   | E6 -                            |         |
|        | - tripping test at test voltage (V) with I <sub>Δn</sub> and          | E4 -                            | N/A     |
|        | operating according to Table 1 (ms):                                  | E5 -                            |         |
|        |   | E6 -                            |         |
|        | No value exceeds the specified limiting values                        |                                 | N/A     |
|        | Not possible to close the apparatus by manual                         | E4 -                            | N/A     |
|        | operating means below Ux:   | E5 -                            |         |
|        |   | E6 -                            |         |
| .17.2  | Verification of behaviour in case of failure of the line              | voltage                         | 5344    |
|        | RCCB supplied with rated voltage, and the line                        |                                 | N/A     |
|        | voltage then switched off   |                                 |         |
|        | Time (ms) interval between switching off and                          | E4 -                            | N/A     |
|        | opening of the main contacts:   | E5 -                            |         |
|        |   | E6 -                            |         |
|        | a) RCCBs opening without delay: no value exceeds                      |                                 | N/A     |
|        | 0,5 s   |                                 |         |

| _      | _                  | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|         | b) RCCBs opening with delay: max, and min. values   |                               | N/A               |
|---------|---|-------------------------------|-------------------|
| 9.17.3  | within the range indicated by the manufacturer  Verification of the correct operation, in presence of a | regidual current for DCCRs    |                   |
| 3.17.3  |   |                               | 4                 |
|         | opening with delay in case of failure of the line voltage   | <del>-</del>                  | N/A               |
|         | RCCB connected according to fig. 4 at the rated   |                               | IN/A              |
|         | voltage (Un)  |                               | NI/A              |
|         | All phases but one switched off by means of S3  |                               | N/A               |
|         | During the delay: test of 9.9.2:  |                               | NI/A              |
| .9.2.1  | - steady increase from 0,2 I <sub>Δn</sub> to I <sub>Δn</sub> within 30 s (mA)                          | E4 -                          | N/A               |
|         | :   | E5 -                          |                   |
|         | <u> </u>  | E6 -                          |                   |
|         | - tripping current between I <sub>Δno</sub> and I <sub>Δn</sub> (mA):                                   | E4 -                          | N/A               |
|         |   | E5 -                          |                   |
|         |   | E6 -                          |                   |
|         | The RCCB closes on I <sub>Δn</sub> : no value exceeds the   | E4 -                          | N/A               |
|         | specified limiting value of Table 1 (ms)  | E5 -                          |                   |
|         |   | E6 -                          | ESPANCE LONGS AND |
| 0.9.2.3 | The test circuit being successively calibrated at each current  | of the values of residual     |                   |
|         | specified in Table 1, the test switch S2 and the RCCB   | being in the closed position, |                   |
|         | the test voltage is suddenly established by closing the test switch S1                                  |                               |                   |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :   | E4 -                          | N/A               |
|         |   | E5 -                          |                   |
|         |   | E6 -                          |                   |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub>   | E4 -                          | N/A               |
|         |   | E5 -                          |                   |
|         |   | E6 -                          |                   |
| _       | - maximum break time (ms) at: 5 l <sub>Δn</sub> :   | E4 -                          | N/A               |
|         |   | E5 -                          |                   |
|         |   | E6 -                          |                   |
|         | - maximum break time (ms) at: 0,25 A (if applicable)  | E4 -                          | N/A               |
|         |   | E5 -                          |                   |
|         |   | E6 -                          |                   |

|         | IEC 61008-1   |                             |         |
|---------|---|-----------------------------|---------|
| Clause  | Requirement + Test  | Result - Remark             | Verdict |
|         |   |                             |         |
|         | - maximum break time (ms) at: 500 A   | E4 -                        | N/A     |
|         |   | E5 -                        |         |
|         |   | E6 -                        |         |
|         | No value exceeds the relevant specified limiting                                    |                             | N/A     |
|         | value   |                             |         |
|         | Additional test for type S:   |                             |         |
|         | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :                    | E4 -                        | N/A     |
|         |   | E5 -                        |         |
|         |   | E6 -                        |         |
|         | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s                    | E4 -                        | N/A     |
|         | :   | E5 -                        |         |
|         |   | E6 -                        |         |
|         | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s                    | E4 -                        | N/A     |
|         | :   | E5 -                        |         |
|         |   | E6 -                        |         |
|         | - minimum non actuating time (ms) at: 500 A; 0,04 s                                 | E4 -                        | N/A     |
|         |   | E5 -                        |         |
|         |   | E6 -                        |         |
|         | No tripping during tests  |                             | N/A     |
| 9.17.4  | Verification of the correct operation of RCCBs with 3                               | or 4 current paths, neutral |         |
|         | and one line terminal only being energized in turn:                                 |                             |         |
|         | RCCB connected according to fig. 4  |                             | N/A     |
| 9.9.2.3 | The test circuit being successively calibrated at each                              | of the values of residual   |         |
|         | current   |                             |         |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                             |         |
|         | the test voltage is suddenly established by closing the test switch S1              |                             |         |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :                                     | E4 -                        | N/A     |
|         |   | E5 -                        |         |
|         |   | E6 -                        |         |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub>                                     | E4 -                        | N/A     |
|         |   | E5 -                        |         |
|         |   | E6 -                        |         |

| Clause | Requirement + Test   | Result - Remark         | Verdict |
|--------|--|-------------------------|---------|
|        |  | I                       |         |
|        | - maximum break time (ms) at: 5 I <sub>∆n</sub> :                | E4 -                    | N/A     |
|        |  | E5 -                    |         |
|        |  | E6 -                    |         |
|        | - maximum break time (ms) at: 0,25 A (if applicable)             | E4 -                    | N/A     |
|        | :  | E5 -                    |         |
|        |  | E6 -                    |         |
|        | - maximum break time (ms) at: 500 A                              | E4 -                    | N/A     |
|        |  | E5 -                    |         |
|        |  | E6 -                    |         |
|        | No value exceeds the relevant specified limiting                 |                         | N/A     |
|        | value  |                         |         |
|        | Additional test for type S:                                      |                         |         |
|        | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s : | E4 -                    | N/A     |
|        |  | E5 -                    |         |
|        |  | E6 -                    |         |
|        | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s | E4 -                    | N/A     |
|        | :  | E5 -                    |         |
|        |  | E6 -                    |         |
|        | - minimum non actuating time (ms) at: 5 l <sub>an</sub> ; 0,05 s | E4 -                    | N/A     |
|        |  | E5 -                    |         |
|        |  | E6 -                    |         |
|        | - minimum non actuating time (ms) at: 500 A; 0,04 s              | E4 -                    | N/A     |
|        | :  | E5 -                    |         |
|        |  | E6 -                    |         |
|        | No tripping during tests   |                         | N/A     |
| 17.5   | Verification of the reclosing function of automatically re       | closing RCCBs (under    | SASTS   |
|        | consideration)   |                         |         |
| 11.2.2 | Verification of the rated making and breaking                    | 630A                    | 100     |
|        | capacity (A): Im   |                         |         |
|        | Test circuit according to figure                                 | 7                       | *       |
|        | Residual operating current (A): 10 I <sub>Δn</sub>               | 0,3A                    |         |
|        | Point of test circuit which is directly earthed:                 | Neutral of power supply |         |
|        | Grid distance "a" (mm):  | 35mm                    |         |
|        | Prospective current (A)  | 630A                    | ******* |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|         | Prospective current obtained (A):                         | 634A                          |     |
|---------|---|-------------------------------|-----|
|         | Power factor  | 0,93-0,98                     | _   |
|         | Power factor obtained:                                    | 0,97                          |     |
|         | Point of initiation: 45° ± 5°                             | 45°                           | P   |
|         | Test sequence: CO-t-CO-t-CO                               | CO-t-CO-t-CO                  | Р   |
|         | During tests no endangering of operator, no               |                               | Р   |
|         | permanent arcing, no flashover and no melting of fuse F   |                               |     |
|         | After the tests no damage impairing further use           |                               | Р   |
| 9.7.7.3 | The leakage current flowing across the open               | E4 - 6,78×10 <sup>-3</sup> mA | Р   |
|         | contacts is measured at 1,1 Un and shall not              | E5 - 6,64×10 <sup>-3</sup> mA |     |
|         | exceed 2mA(mA)  | E6 - 6,96×10 <sup>-3</sup> mA |     |
| 9.7.3   | Dielectric strength test of the main circuit at test volt | age of 2 Un for 1 min:        |     |
|         | a)  | E4 - OK                       | Р   |
|         |   | E5 - OK                       |     |
|         |   | E6 - OK                       |     |
|         | b):   | E4 - OK                       | Р   |
|         |   | E5 - OK                       |     |
|         |   | E6 - OK                       |     |
|         | c):   | E4 - OK                       | Р   |
|         |   | E5 - OK                       |     |
|         |   | E6 - OK                       |     |
|         | d):   | E4 -                          | N/A |
|         |   | E5 -                          |     |
|         |   | E6 -                          |     |
|         | e):   | E4 -                          | N/A |
|         |   | E5 -                          |     |
|         |   | E6 -                          |     |
|         | No flashover or breakdown                                 | E4 - OK                       | Р   |
|         |   | E5 - OK                       |     |
|         |   | E6 - OK                       |     |
|         | Making and breaking In at Un                              | E4 - OK                       | Р   |
|         |   | E5 - OK                       |     |
|         |   | E6 - OK                       |     |

|        | IEC 61008-1   |                                 |         |
|--------|---|---------------------------------|---------|
| Clause | Requirement + Test  | Result - Remark                 | Verdict |
|        |   |                                 |         |
|        | The RCCB shall trip with a test current of 1,25 $I_{\Delta n}$                      | E4- 29 ms                       | Р       |
|        | (ms):   | E5- 33 ms                       |         |
|        |   | E6- 31ms                        |         |
|        | The polyethylene sheet shows no holes   |                                 | Р       |
| .17    | Verification of the behaviour of RCCBs opening autor the line voltage               | matically in case of failure of |         |
| .17.1  | Limiting value of the line voltage (Ux):  |                                 |         |
| . 11.1 | - rated voltage applied to the line terminals and                                   | E4 -                            | N/A     |
|        | progressively lowered to attain zero within about                                   | E5 -                            | INC     |
|        | 30 s until automatic opening occurs; voltage (V) .:                                 | E6 -                            |         |
|        | - all values less than 0,85 times the rated voltage                                 | E4 -                            | N/A     |
|        | (V):  | E5 -                            |         |
|        | (*/   | E6 -                            |         |
|        | - tripping test at test voltage (V) with I <sub>Δn</sub> and                        | E4 -                            | N/A     |
|        | operating according to Table 1 (ms):  | E5 -                            |         |
|        | operating containing of vertical (interpretation)                                   | E6 -                            |         |
|        | No value exceeds the specified limiting values                                      |                                 | N/A     |
|        | Not possible to close the apparatus by manual                                       | E4 -                            | N/A     |
|        | operating means below Ux:   | E5 -                            |         |
|        |   | E6 -                            |         |
| .17.2  | Verification of behaviour in case of failure of the line voltage                    |                                 |         |
|        | RCCB supplied with rated voltage, and the line                                      |                                 | N/A     |
|        | voltage then switched off   |                                 |         |
|        | Time (ms) interval between switching off and  | E4 -                            | N/A     |
|        | opening of the main contacts  | E5 -                            |         |
|        |   | E6 -                            |         |
|        | a) RCCBs opening without delay: no value exceeds                                    |                                 | N/A     |
|        | 0,5 s   |                                 |         |
|        | b) RCCBs opening with delay: max. and min. values                                   |                                 | N/A     |
|        | within the range indicated by the manufacturer                                      |                                 |         |
| .17.3  | Verification of the correct operation, in presence of a residual current, for RCCBs |                                 |         |
|        | opening with delay in case of failure of the line voltage                           |                                 |         |
|        | RCCB connected according to fig. 4 at the rated                                     |                                 | N/A     |
|        | voltage (Un)  |                                 |         |

|        | IEC 61008-1        |   |                 |         |  |
|--------|--------------------|---|-----------------|---------|--|
| Clause | Requirement + Test | _ | Result - Remark | Verdict |  |

|         | All phases but one switched off by means of S3                                      |                  | N/A |  |
|---------|---|------------------|-----|--|
|         | During the delay: test of 9.9.2:  |                  |     |  |
| 9.9.2.1 | - steady increase from 0,2 I <sub>an</sub> to I <sub>an</sub> within 30 s (mA)      | E4 -             | N/A |  |
|         |   | E5 -             |     |  |
|         | ·   | E6 -             |     |  |
|         | - tripping current between I <sub>Δno</sub> and I <sub>Δn</sub> (mA):               | E4 -             | N/A |  |
|         |   | E5 -             |     |  |
|         |   | E6 -             |     |  |
|         | The RCCB closes on I <sub>an</sub> : no value exceeds the                           | E4 -             | N/A |  |
|         | specified limiting value of Table 1 (ms)  | E5 -             |     |  |
|         |   | E6 -             |     |  |
| .9.2.3  | The test circuit being successively calibrated at each of the values of residual    |                  |     |  |
|         | current   |                  |     |  |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                  |     |  |
|         | the test voltage is suddenly established by closing the                             | e test switch S1 |     |  |
|         | - maximum break time (ms) at: I <sub>Δn</sub>                                       | E4 -             | N/A |  |
|         |   | E5 -             |     |  |
|         |   | E6 -             |     |  |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub> :                                   | E4 -             | N/A |  |
|         |   | E5 -             |     |  |
|         |   | E6 -             |     |  |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub> :                                   | E4 -             | N/A |  |
|         |   | E5 -             |     |  |
|         |   | E6 -             |     |  |
|         | - maximum break time (ms) at: 0,25 A (if applicable)                                | E4 -             | N/A |  |
|         | :   | E5 -             |     |  |
|         |   | E6 -             |     |  |
|         | - maximum break time (ms) at: 500 A:  | E4 -             | N/A |  |
|         |   | E5 -             |     |  |
|         |   | E6 -             |     |  |
|         | No value exceeds the relevant specified limiting                                    |                  | N/A |  |
|         | value   |                  |     |  |
|         | Additional test for type S:   |                  |     |  |

| Clause | Deswirement / Test   | Pocult Pemerk   | Vordiat |  |
|--------|--|-----------------|---------|--|
| Clause | Requirement + Test   | Result - Remark | Verdict |  |
|        |  |                 |         |  |
|        | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s:                          | E4 -            | N/A     |  |
|        |  | E5 -            |         |  |
|        | _  | E6 -            |         |  |
|        | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s                         | E4 -            | N/A     |  |
|        | :  | E5 -            |         |  |
|        |  | E6 -            |         |  |
|        | - minimum non actuating time (ms) at: 5 l <sub>an</sub> ; 0,05 s                         | E4 -            | N/A     |  |
|        | :  | E5 -            |         |  |
|        | _  | E6 -            |         |  |
|        | - minimum non actuating time (ms) at: 500 A; 0,04 s                                      | E4 -            | N/A     |  |
|        | :  | E5 -            |         |  |
|        |  | E6 -            |         |  |
|        | No tripping during tests   |                 | N/A     |  |
| 17.4   | Verification of the correct operation of RCCBs with 3 or 4 current paths, neutral        |                 |         |  |
|        | and one line terminal only being energized in turn:                                      |                 |         |  |
|        | RCCB connected according to fig. 4   |                 | N/A     |  |
| .9.2.3 | The test circuit being successively calibrated at each of the values of residual current |                 |         |  |
|        | specified in Table 1, the test switch S2 and the RCCB being in the closed position,      |                 |         |  |
|        | the test voltage is suddenly established by closing the test switch S1                   |                 |         |  |
|        | - maximum break time (ms) at: I <sub>Δn</sub> :  | E4 -            | N/A     |  |
|        | <b>,</b> , , , , , , , , , , , , , , , , , ,   | E5 -            |         |  |
|        |  | E6 -            |         |  |
|        | - maximum break time (ms) at: 2 I <sub>An</sub> :  | E4 -            | N/A     |  |
|        | 113/11/13/11 5/52/. (11/5) 21/2 1/31   | E5 -            |         |  |
|        |  | E6 -            |         |  |
|        | - maximum break time (ms) at: 5 I <sub>Δn</sub> :  | E4 -            | N/A     |  |
|        | - maximum break time (me) at 9 14n   | E5 -            | 1977    |  |
|        |  | E6 -            |         |  |
|        | manipular brook time (m-1) -ti 0.05 A (if anylicable)                                    |                 | NI/A    |  |
|        | - maximum break time (ms) at: 0,25 A (if applicable)                                     | E4 -            | N/A     |  |
|        |  | E5 -            |         |  |
|        |  | E6 -            |         |  |

|        | IEC 61008-1  |                 |         |
|--------|--|-----------------|---------|
| Clause | Requirement + Test   | Result - Remark | Verdict |
|        |  |                 |         |
|        | - maximum break time (ms) at: 500 A  | E4 -            | N/A     |
|        |  | E5 -            |         |
|        |  | E6 -            |         |
|        | No value exceeds the relevant specified limiting                               |                 | N/A     |
|        | value  |                 |         |
|        | Additional test for type S:  |                 |         |
|        | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s:                | E4 -            | N/A     |
|        |  | E5 -            |         |
|        |  | E6 -            |         |
|        | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s               | E4 -            | N/A     |
|        |  | E5 -            |         |
|        |  | E6 -            |         |
|        | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s               | E4 -            | N/A     |
|        |  | E5 -            |         |
|        |  | E6 -            |         |
|        | - minimum non actuating time (ms) at: 500 A; 0,04 s                            | E4 -            | N/A     |
|        | :  | E5 -            |         |
|        |  | E6 -            |         |
|        | No tripping during tests   |                 | N/A     |
| 17.5   | Verification of the reclosing function of automatically reclosing RCCBs (under |                 |         |
|        | consideration)   |                 |         |

|          | TEST SEQUENCE F (3 samples: In= 63A, I <sub>Δn</sub> = 0,03A, type A) | F7 F8 F9                | P |
|----------|---|-------------------------|---|
| 8.7      | Performance at short-circuit currents                                 |                         |   |
| 9.11.2.4 | Verification of the coordination between the RCCB a                   | nd the SCPD             |   |
|          | b) Verification of the coordination at the rated                      | 630A                    |   |
|          | making and breaking capacity (A): Im                                  |                         |   |
|          | Test circuit according to figure                                      | 7                       |   |
|          | Point of test circuit which is directly earthed:                      | Neutral of power supply |   |
|          | Grid distance "a" (mm):   | 35mm                    |   |
|          | Silver wire diameter (mm) or fuse:                                    | 0,75mm                  |   |
|          | Prospective current (A)   | 630A                    |   |
|          | Prospective current obtained (A)                                      | 634A                    |   |

| IEC 61008-1 |                    |                 |         |  |
|-------------|--------------------|-----------------|---------|--|
| Clause      | Requirement + Test | Result - Remark | Verdict |  |

|         | Power factor   | 0,93-0,98                     |       |
|---------|--|-------------------------------|-------|
|         | Power factor obtained                                      | 0,97                          | -     |
|         | Point of initiation: 45° ± 5°                              | 45°                           | Р     |
|         | Test sequence: O-t-CO-t-CO                                 | O-t-CO-t-CO                   | Р     |
|         | During tests no endangering of operator, no                |                               | Р     |
|         | permanent arcing, no flashover and no melting of fuse F    |                               |       |
|         | After the tests no damage impairing further use            |                               | Р     |
| 9.7.7.3 | The leakage current flowing across the open                | F7 - 6,54×10 <sup>-3</sup> mA | Р     |
|         | contacts is measured at 1,1 Un and shall not               | F8 - 6,73×10 <sup>-3</sup> mA |       |
|         | exceed 2mA (mA)  | F9 - 6,72×10 <sup>-3</sup> mA |       |
| 9.7.3   | Dielectric strength test of the main circuit at test volta | age of 2 Un for 1 min:        | 5.000 |
|         | a):  | F7 - OK                       | Р     |
|         |  | F8 - OK                       |       |
|         |  | F9 - OK                       |       |
|         | b):  | F7 - OK                       | Р     |
|         |  | F8 - OK                       |       |
|         |  | F9 - OK                       |       |
|         | c):  | F7 - OK                       | Р     |
|         |  | F8 - OK                       |       |
|         |  | F9 - OK                       |       |
|         | d):  | F7 -                          | N/A   |
|         |  | F8 -                          |       |
|         |  | F9 -                          |       |
|         | e):  | F7 -                          | N/A   |
|         |  | F8 -                          |       |
|         |  | F9 -                          |       |
|         | No flashover or breakdown                                  | F7 - OK                       | Р     |
|         |  | F8 - OK                       |       |
|         |  | F9 - OK                       |       |
|         | Making and breaking In at Un                               | F7 - OK                       | Р     |
|         |  | F8 - OK                       |       |
|         |  | F9 - OK                       |       |

| Report  | No " | 13070 | 00235 | HA-002   |
|---------|------|-------|-------|----------|
| IVEDUIL | 140  | 10070 | UULUU | 1117-002 |

| Clause | Requirement + Test   | Result - Remark                 | Verdict |
|--------|--|---------------------------------|---------|
|        |  |                                 |         |
|        | The RCCB shall trip with a test current of 1,25 $I_{\Delta n}$   | F7 - 32ms                       | Р       |
|        | (ms):  | F8 - 37ms                       |         |
|        |  | F9 - 39ms                       |         |
|        | The polyethylene sheet shows no holes                            |                                 | Р       |
| 9.17   | Verification of the behaviour of RCCBs opening autor             | matically in case of failure of |         |
| 9.17.1 | Limiting value of the line voltage (Ux):                         |                                 |         |
|        | - rated voltage applied to the line terminals and                | F7 -                            | N/A     |
|        | progressively lowered to attain zero within about                | F8 -                            |         |
|        | 30 s until automatic opening occurs; voltage (V) .:              | F9 -                            |         |
|        | - all values less than 0,85 times the rated voltage              | F7 -                            | N/A     |
|        | (V):   | F8 -                            |         |
|        |  | F9 -                            |         |
|        | - tripping test at test voltage (V) with $I_{\Delta n}$ and      | F7 -                            | N/A     |
|        | operating according to Table 1 (ms):                             | F8 -                            |         |
|        |  | F9 -                            |         |
|        | No value exceeds the specified limiting values                   |                                 | N/A     |
|        | Not possible to close the apparatus by manual                    | F7 -                            | N/A     |
|        | operating means below Ux   | F8 -                            |         |
|        |  | F9 -                            |         |
| 9.17.2 | Verification of behaviour in case of failure of the line voltage |                                 |         |
|        | RCCB supplied with rated voltage, and the line                   |                                 | N/A     |
|        | voltage then switched off  |                                 |         |
|        | Time (ms) interval between switching off and                     | F7 -                            | N/A     |
|        | opening of the main contacts:                                    | F8 -                            |         |
|        |  | F9 -                            |         |
|        | a) RCCBs opening without delay: no value exceeds                 |                                 | N/A     |
|        | 0,5 s  |                                 |         |
|        | b) RCCBs opening with delay: max. and min. values                |                                 | N/A     |
|        | within the range indicated by the manufacturer                   |                                 |         |
| .17.3  | Verification of the correct operation, in presence of a          | residual current, for RCCBs     |         |
|        | opening with delay in case of failure of the line voltage        |                                 |         |
|        | RCCB connected according to fig. 4 at the rated                  |                                 | N/A     |
|        | voltage (Un)   |                                 |         |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|         | All phases but one switched off by means of S3   |                           | N/A |
|---------|--|---------------------------|-----|
|         | During the delay: test of 9.9.2:   |                           |     |
| 9.9.2.1 | - steady increase from 0,2 I <sub>Δn</sub> to I <sub>Δn</sub> within 30 s (mA)   | F7 -                      | N/A |
|         |  | F8 -                      |     |
|         |  | F9 -                      |     |
|         | - tripping current between I <sub>Δno</sub> and I <sub>Δn</sub> (mA):  | F7 -                      | N/A |
|         |  | F8 -                      |     |
|         |  | F9 -                      |     |
|         | The RCCB closes on I <sub>Δn</sub> ; no value exceeds the  | F7 -                      | N/A |
|         | specified limiting value of Table 1 (ms):  | F8 -                      |     |
|         |  | F9 -                      |     |
| 9.9.2.3 | The test circuit being successively calibrated at each   | of the values of residual |     |
|         | current  |                           |     |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position, the test voltage is suddenly established by closing the test switch S1   |                           | 4   |
|         | - maximum break time (ms) at: I <sub>Δn</sub>  | F7 -                      | N/A |
|         | - Maximum break time (ms) at 1 <sub>Δn</sub>   | F8 -                      |     |
|         |  | F9 -                      |     |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub> :  | F7 -                      | N/A |
|         | The Attribute of the At | F8 -                      |     |
|         |  | F9 -                      |     |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub> :  | F7 -                      | N/A |
|         | The state of the s | F8 -                      |     |
|         |  | F9 -                      |     |
|         | - maximum break time (ms) at: 0,25 A (if applicable)   | F7 -                      | N/A |
|         |  | F8 -                      |     |
|         |  | F9 -                      |     |
|         | - maximum break time (ms) at: 500 A  | F7 -                      | N/A |
|         | (,   | F8 -                      |     |
|         |  | F9 -                      |     |
|         | No value exceeds the relevant specified limiting   |                           | N/A |
|         | value  |                           |     |
|         | Additional test for type S:  |                           |     |

| IEC 61008-1 |                    |                 |         |
|-------------|--------------------|-----------------|---------|
| Clause      | Requirement + Test | Result - Remark | Verdict |

|         | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :                    | F7 - | N/A |
|---------|---|------|-----|
|         |   | F8 - |     |
|         |   | F9 - |     |
|         | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s                    | F7 - | N/A |
|         |   | F8 - |     |
|         |   | F9 - |     |
|         | - minimum non actuating time (ms) at: 5 I <sub>Δn</sub> ; 0,05 s                    | F7 - | N/A |
|         |   | F8 - |     |
|         |   | F9 - |     |
| _       | - minimum non actuating time (ms) at: 500 A; 0,04 s                                 | F7 - | N/A |
|         |   | F8 - |     |
|         |   | F9 - |     |
|         | No tripping during tests  |      | N/A |
| 9.17.4  | Verification of the correct operation of RCCBs with 3 or 4 current paths, neutral   |      |     |
|         | and one line terminal only being energized in turn:                                 |      |     |
|         | RCCB connected according to fig. 4  |      | N/A |
| 9.9.2.3 | The test circuit being successively calibrated at each of the values of residual    |      |     |
|         | current   |      |     |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |      |     |
|         | the test voltage is suddenly established by closing the test switch S1              |      |     |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :                                     | F7 - | N/A |
|         |   | F8 - |     |
|         |   | F9 - |     |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub> :                                   | F7 - | N/A |
|         |   | F8 - |     |
|         |   | F9 - |     |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub> :                                   | F7 - | N/A |
|         |   | F8 - |     |
|         |   | F9 - |     |
|         | - maximum break time (ms) at: 0,25 A (if applicable)                                | F7 - | N/A |
|         |   | F8 - |     |
|         |   | F9 - |     |

| Clause   | Requirement + Test   | Result - Remark         | Verdict          |
|----------|--|-------------------------|------------------|
|          |  |                         |                  |
|          | - maximum break time (ms) at: 500 A:                                     | F7 -                    | N/A              |
|          |  | F8 -                    |                  |
|          |  | F9 -                    |                  |
|          | No value exceeds the relevant specified limiting value                   |                         | N/A              |
|          | Additional test for type S:  |                         | A. S. S.         |
|          | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :         | F7 -                    | N/A              |
|          |  | F8 -                    |                  |
|          |  | F9 -                    |                  |
|          | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s         | F7 -                    | N/A              |
|          |  | F8 -                    |                  |
|          |  | F9 -                    |                  |
|          | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s         | F7 -                    | N/A              |
|          | :  | F8 -                    |                  |
|          |  | F9 -                    |                  |
|          | - minimum non actuating time (ms) at: 500 A; 0,04 s                      | F7 -                    | N/A              |
|          | :  | F8 -                    |                  |
|          |  | F9 -                    |                  |
|          | No tripping during tests   |                         | N/A              |
| 9.17.5   | Verification of the reclosing function of automatically reconsideration) | eclosing RCCBs (under   | and the state of |
| 9.11.2.4 | c) Verification of the coordination at the rated                         | 6000A                   | _                |
|          | conditional residual short-circuit current (A): I∆c .:                   |                         |                  |
|          | Test circuit according to figure:  | 7                       |                  |
|          | Point of test circuit which is directly earthed:                         | Neutral of power supply |                  |
|          | Grid distance "a" (mm):  | 45mm                    |                  |
|          | Silver wire diameter (mm) or fuse  | 0,75mm                  |                  |
|          | Prospective current (A):   | 6000A                   |                  |
|          | Prospective current obtained (A)   | 6110A                   | Ampatrum .       |
|          | Power factor   | 0,65-0,70               | 100              |
|          | _  | 411/2                   |                  |

0,67 45°

Р

Power factor obtained .....

Point of initiation:  $45^{\circ} \pm 5^{\circ}$ 

|         |  | la b                                 |         |  |
|---------|--|--------------------------------------|---------|--|
| Clause  | Requirement + Test   | Result - Remark                      | Verdict |  |
|         |  |                                      |         |  |
|         | Verification of I²t (kA²s) and Ip (kA) prior to testing  | 12t =25 kA2s                         | Р       |  |
|         | (≥1x ≤1,1x values of table 15), RCCB replaced by a   | lp =4,05 kA                          |         |  |
|         | connection having negligible impedance   |                                      |         |  |
|         | Test sequence: O-t-CO-t-CO   | O-t-CO-t-CO                          | Р       |  |
|         | I²t (kA²s); Ip (kA)  | F7 - 15,6 kA <sup>2</sup> s, 3,90 kA | P       |  |
|         |  | F8 - 15,3 kA <sup>2</sup> s, 3,94 kA |         |  |
|         |  | F9 - 15,5 kA2s, 3,73 kA              |         |  |
|         | During tests no endangering of operator, no  |                                      | Р       |  |
|         | permanent arcing, no flashover and no melting of   |                                      |         |  |
|         | fuse F   |                                      |         |  |
|         | After the tests no damage impairing further use  |                                      | Р       |  |
| 9.7.7.3 | The leakage current flowing across the open  | F7 - 6,63×10 <sup>-3</sup> mA        | Р       |  |
|         | contacts is measured at 1,1 Un and shall not   | F8 - 6,80×10 <sup>-3</sup> mA        |         |  |
|         | exceed 2mA (mA)  | F9 - 6,71×10 <sup>-3</sup> mA        |         |  |
| 9,7.3   | Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:  |                                      |         |  |
|         | a)   | F7 - OK                              | Р       |  |
|         | , and the second | F8 - OK                              |         |  |
|         |  | F9 - OK                              |         |  |
|         | b)   | F7 - OK                              | Р       |  |
|         | ,  | F8 - OK                              |         |  |
|         |  | F9 - OK                              |         |  |
|         | c)   | F7 - OK                              | Р       |  |
|         | -,   | F8 - OK                              |         |  |
|         |  | F9 - OK                              |         |  |
|         | d)   | F7 -                                 | N/A     |  |
|         |  | F8 -                                 |         |  |
|         |  | F9 -                                 |         |  |
|         | e):  | F7 -                                 | N/A     |  |
|         | G/   | F8 -                                 | IN/A    |  |
|         |  |                                      |         |  |
|         | No final area and a study  | F9 -                                 |         |  |
|         | No flashover or breakdown  | F7 - OK                              | P       |  |

F8 - OK F9 - OK

|        | IEC 61008-1   |                                 |         |
|--------|---|---------------------------------|---------|
| Clause | Requirement + Test  | Result - Remark                 | Verdict |
|        |   |                                 | Τ       |
|        | Making and breaking In at Un                                      | F7 - OK                         | Р       |
|        |   | F8 - OK                         |         |
|        |   | F9 - OK                         |         |
|        | The RCCB shall trip with a test current of 1,25 l <sub>.\sh</sub> | F7- 37 ms                       | Р       |
|        | (ms)  | F8- 31 ms                       |         |
|        |   | F9- 28 ms                       |         |
|        | The polyethylene sheet shows no holes                             |                                 | Р       |
| 9.17   | Verification of the behaviour of RCCBs opening autor              | matically in case of failure of | 中国集     |
|        | the line voltage  |                                 |         |
| 9.17.1 | Limiting value of the line voltage (Ux):                          | -                               | 1.003   |
|        | - rated voltage applied to the line terminals and                 | F7 -                            | N/A     |
|        | progressively lowered to attain zero within about                 | F8 -                            |         |
|        | 30 s until automatic opening occurs; voltage (V) .:               | F9 -                            |         |
|        | - all values less than 0,85 times the rated voltage               | F7 -                            | N/A     |
|        | (V):  | F8 -                            |         |
|        |   | F9 -                            |         |
|        | - tripping test at test voltage (V) with I <sub>Δn</sub> and      | F7 -                            | N/A     |
|        | operating according to Table 1 (ms):                              | F8 -                            |         |
|        |   | F9 -                            |         |
|        | No value exceeds the specified limiting values                    |                                 | N/A     |
|        | Not possible to close the apparatus by manual                     | F7 -                            | N/A     |
|        | operating means below Ux  | F8 -                            |         |
|        |   | F9 -                            |         |
| 9.17.2 | Verification of behaviour in case of failure of the line v        | voltage                         |         |
|        | RCCB supplied with rated voltage, and the line                    |                                 | N/A     |
|        | voltage then switched off   |                                 |         |
|        | Time (ms) interval between switching off and                      | F7 -                            | N/A     |
|        | opening of the main contacts:                                     | F8 -                            |         |
|        |   | F9 -                            |         |
|        | a) RCCBs opening without delay: no value exceeds                  |                                 | N/A     |
|        | 0,5 s   |                                 |         |
|        | b) RCCBs opening with delay: max. and min. values                 |                                 | N/A     |
|        | within the range indicated by the manufacturer                    |                                 |         |

| IEC 61008-1 |                    |                 |         |
|-------------|--------------------|-----------------|---------|
| Clause      | Requirement + Test | Result - Remark | Verdict |

| 9.17.3  | Verification of the correct operation, in presence of a residual current, for RCCBs  |                |           |
|---------|--|----------------|-----------|
|         | opening with delay in case of failure of the line voltag   | e              |           |
|         | RCCB connected according to fig. 4 at the rated  |                | N/A       |
|         | voltage (Un):  |                |           |
|         | All phases but one switched off by means of S3   |                | N/A       |
|         | During the delay: test of 9.9.2:   |                |           |
| 9.9.2.1 | - steady increase from 0,2 $I_{\Delta n}$ to $I_{\Delta n}$ within 30 s (mA)   | F7 -           | N/A       |
|         | :  | F8 -           |           |
|         |  | F9 -           |           |
|         | - tripping current between I <sub>λno</sub> and I <sub>Δn</sub> (mA):  | F7 -           | N/A       |
|         |  | F8 -           |           |
|         |  | F9 -           |           |
|         | The RCCB closes on Ian: no value exceeds the   | F7 -           | N/A       |
|         | specified limiting value of Table 1 (ms):  | F8 -           |           |
|         |  | F9 -           |           |
| 9.9.2.3 | The test circuit being successively calibrated at each of the values of residual current   |                |           |
|         | specified in Table 1, the test switch S2 and the RCCB being in the closed position, the test voltage is suddenly established by closing the test switch S1 |                |           |
|         |  | F7 -           | N/A       |
|         | - maximum break time (ms) at: I <sub>Δn</sub>  | F8 -           | IN/A      |
|         |  | F9 -           |           |
|         | maximum brook time (me) et; 2 l  |                | NI/A      |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub>  | F7 -<br>  F8 - | N/A       |
|         |  | F9 -           |           |
|         |  |                | N1/A      |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub> :  | F7 -           | N/A       |
|         |  | F8 -           |           |
|         |  | F9 -           | NUA .     |
|         | - maximum break time (ms) at: 0,25 A (if applicable)   | F7 -           | N/A       |
|         | · · · · · · · · · · · · · · · · · · ·  | F8 -           |           |
|         |  | F9 -           | A * * * * |
|         | - maximum break time (ms) at: 500 A:   | F7 -           | N/A       |
|         |  | F8 -           |           |
|         |  | F9 -           |           |

| Report | No.:1307 | 700023S | HA-002 |
|--------|----------|---------|--------|
|--------|----------|---------|--------|

N/A

N/A

N/A

| IEC 61008-1 |   |                 |         |  |
|-------------|---|-----------------|---------|--|
| Clause      | Requirement + Test  | Result - Remark | Verdict |  |
|             |   | _               |         |  |
|             | No value exceeds the relevant specified limiting                                  |                 | N/A     |  |
|             | value   |                 |         |  |
|             | Additional test for type S:   |                 | No co   |  |
|             | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :                  | F7 -            | N/A     |  |
|             |   | F8 -            |         |  |
|             |   | F9 -            |         |  |
|             | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s                  | F7 -            | N/A     |  |
|             | :   | F8 -            |         |  |
|             |   | F9 -            |         |  |
|             | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s                  | F7 -            | N/A     |  |
|             | :   | F8 -            |         |  |
|             |   | F9              |         |  |
|             | - minimum non actuating time (ms) at: 500 A; 0,04 s                               | F7 -            | N/A     |  |
|             | :   | F8 -            |         |  |
|             |   | F9              |         |  |
|             | No tripping during tests  |                 | N/A     |  |
| 9.17.4      | Verification of the correct operation of RCCBs with 3 or 4 current paths, neutral |                 |         |  |
|             | and one line terminal only being energized in turn:                               | _               |         |  |
|             | RCCB connected according to fig. 4  |                 | N/A     |  |
|             |   |                 |         |  |

The test circuit being successively calibrated at each of the values of residual

the test voltage is suddenly established by closing the test switch S1

- maximum break time (ms) at: I<sub>Δn</sub> ......

- maximum break time (ms) at: 2 l<sub>∆n</sub> .....:

- maximum break time (ms) at: 5 I<sub>Δn</sub> .....

specified in Table 1, the test switch S2 and the RCCB being in the closed position,

F7 -

F8 -F9 -

**F**7 -

F8 -<u>F9 -</u> F7 -

F8 -F9 -

9.9.2.3

current

| Report | No :130 | 700023SHA | -002 |
|--------|---------|-----------|------|
|        |         |           |      |

|        | IEC 61008-1  |                      |         |
|--------|--|----------------------|---------|
| Clause | Requirement + Test   | Result - Remark      | Verdict |
|        |  |                      |         |
|        | - maximum break time (ms) at: 0,25 A (if applicable)             | F7 -                 | N/A     |
|        | :  | F8 -                 |         |
|        |  | F9                   |         |
|        | - maximum break time (ms) at: 500 A:                             | F7 -                 | N/A     |
|        |  | F8 -                 |         |
|        |  | F9 -                 |         |
|        | No value exceeds the relevant specified limiting                 |                      | N/A     |
|        | value  |                      |         |
|        | Additional test for type S:                                      | <del>-</del>         |         |
|        | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s ; | F7 -                 | N/A     |
|        |  | F8 -                 |         |
|        |  | F9 -                 |         |
|        | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s | F7 -                 | N/A     |
|        | :  | F8 -                 |         |
|        |  | F9                   |         |
|        | - minimum non actuating time (ms) at: 5 I₄n; 0,05 s              | F7 -                 | N/A     |
|        | :  | F8 -                 |         |
| _      |  | F9                   |         |
|        | - minimum non actuating time (ms) at: 500 A; 0,04 s              | F7 -                 | N/A     |
|        |  | F8 -                 |         |
|        |  | F9 -                 |         |
|        | No tripping during tests   | _                    | N/A     |
| 17.5   | Verification of the reclosing function of automatically re       | closing RCCBs (under |         |
|        | consideration)   |                      |         |

|          | TEST SEQUENCE F<br>(3 samples: In= 10A, I <sub>∆n</sub> = 0,3A, type AC) | F10 F11 F12             | P |
|----------|--|-------------------------|---|
| 8.7      | Performance at short-circuit currents                                    |                         |   |
| 9.11.2.4 | Verification of the coordination between the RCCB a                      | nd the SCPD             |   |
|          | b) Verification of the coordination at the rated                         | 500A                    |   |
|          | making and breaking capacity (A): Im                                     | _                       |   |
|          | Test circuit according to figure   | 7                       | _ |
|          | Point of test circuit which is directly earthed:                         | Neutral of power supply |   |
|          | Grid distance "a" (mm):  | 35mm                    |   |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test | _           | Result - Remark | Verdict |

|         | Silver wire diameter (mm) or fuse   | 0,35mm                           |     |
|---------|---|----------------------------------|-----|
|         | Prospective current (A)   | 500A                             |     |
|         | Prospective current obtained (A)  | 516A                             | _   |
|         | Power factor  | 0,95~1                           |     |
|         | Power factor obtained   | 0,96                             |     |
|         | Point of initiation: 45° ± 5°   | 45°                              | Р   |
|         | Test sequence: O-t-CO-t-CO  | O-t-CO-t-CO                      | Р   |
|         | During tests no endangering of operator, no permanent arcing, no flashover and no melting of fuse F |                                  | Р   |
|         | After the tests no damage impairing further use   |                                  | Р   |
| 3.7.7.3 | The leakage current flowing across the open   | F10 - 6,56×10 <sup>-3</sup> mA   | Р   |
|         | contacts is measured at 1,1 Un and shall not  | F11 - 6,58×10 <sup>-3</sup> mA   |     |
|         | exceed 2mA (mA)   | F12 - 6,42×10 <sup>-3</sup> mA   |     |
| 9.7.3   | Dielectric strength test of the main circuit at test volt   | age of 2 Un for 1 min:           |     |
|         | a):   | F10 - OK<br>F11 - OK<br>F12 - OK | Р   |
|         | b):   | F10 - OK<br>F11 - OK<br>F12 - OK | Р   |
|         | c):   | F10 - OK<br>F11 - OK<br>F12 - OK | Р   |
|         | d):   | F10 -<br>F11 -<br>F12 -          | N/A |
|         | e):   | F10 -<br>F11 -<br>F12 -          | N/A |
|         | No flashover or breakdown:  | F10 - OK<br>F11 - OK<br>F12 - OK | Р   |

|        | IEC 61008-1  |                                 |              |
|--------|--|---------------------------------|--------------|
| Clause | Requirement + Test   | Result - Remark                 | Verdict      |
|        |  |                                 |              |
|        | Making and breaking In at Un                                     | F10 - OK                        | Р            |
|        |  | F11 - OK                        |              |
|        |  | F12 - OK                        |              |
|        | The RCCB shall trip with a test current of 1,25 I <sub>Δn</sub>  | F10 - 28ms                      | Р            |
|        | (ms):  | F11 - 27ms                      |              |
|        |  | F12 - 36ms                      |              |
|        | The polyethylene sheet shows no holes                            |                                 | Р            |
| 9.17   | Verification of the behaviour of RCCBs opening autor             | natically in case of failure of |              |
|        | the line voltage   |                                 | And the said |
| 9.17.1 | Limiting value of the line voltage (Ux):                         |                                 |              |
|        | - rated voltage applied to the line terminals and                | F10 -                           | N/A          |
|        | progressively lowered to attain zero within about                | F11 -                           |              |
|        | 30 s until automatic opening occurs; voltage (V) .:              | F12 -                           |              |
|        | - all values less than 0,85 times the rated voltage              | F10 -                           | N/A          |
|        | (V):   | F11 -                           |              |
|        |  | F12 -                           |              |
|        | - tripping test at test voltage (V) with $I_{\Delta n}$ and      | F10 -                           | N/A          |
|        | operating according to Table 1 (ms):                             | F11 -                           |              |
|        |  | F12 -                           |              |
|        | No value exceeds the specified limiting values                   |                                 | N/A          |
|        | Not possible to close the apparatus by manual                    | F10 -                           | N/A          |
|        | operating means below Ux   | F11 -                           |              |
|        |  | F12 -                           |              |
| 9.17.2 | Verification of behaviour in case of failure of the line voltage |                                 |              |
|        | RCCB supplied with rated voltage, and the line                   |                                 | N/A          |
|        | voltage then switched off  |                                 |              |
|        | Time (ms) interval between switching off and                     | F10 -                           | N/A          |
|        | opening of the main contacts                                     | F11 -                           |              |
|        |  | F12 -                           |              |
|        | a) RCCBs opening without delay: no value exceeds                 |                                 | N/A          |
|        | 0,5 s  | _                               |              |
|        | b) RCCBs opening with delay: max. and min. values                |                                 | N/A          |
|        | within the range indicated by the manufacturer                   |                                 |              |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

| 9.17.3  | Verification of the correct operation, in presence of a residual current, for RCCBs   |  |            |
|---------|---|--|------------|
|         | opening with delay in case of failure of the line voltage   |  |            |
|         | RCCB connected according to fig. 4 at the rated   |  | N/A        |
|         | voltage (Un)  |  |            |
| _       | All phases but one switched off by means of S3  |  | N/A        |
|         | During the delay: test of 9.9.2:  |  |            |
| 9.9.2.1 | - steady increase from 0,2 I <sub>Δn</sub> to I <sub>Δn</sub> within 30 s (mA)  | F10 -  | N/A        |
|         | :   | F11 -  |            |
|         |   | F12 -  | <u>_</u>   |
|         | - tripping current between I <sub>Δno</sub> and I <sub>Δn</sub> (mA):   | F10 -  | N/A        |
|         |   | F11 -  |            |
|         |   | F12 -  |            |
|         | The RCCB closes on Ian: no value exceeds the  | F10 -  | N/A        |
|         | specified limiting value of Table 1 (ms):   | F11 -  |            |
|         |   | F12 -  |            |
| 9.9.2.3 | The test circuit being successively calibrated at each of the values of residual current specified in Table 1, the test switch S2 and the RCCB being in the closed position, the test voltage is suddenly established by closing the test switch S1 |  |            |
| _       | - maximum break time (ms) at: I <sub>Δn</sub> :   | F10 -  | N/A        |
|         | 3.1   | F11 -  |            |
|         |   | F12 -  |            |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub> :   | F10 -  | N/A        |
|         | , , , , ,   |  |            |
|         |   | F11 -  |            |
|         |   | F11 -<br>F12 -                                     |            |
|         | - maximum break time (ms) at: 5 I <sub>An</sub>   | F11 -<br>F12 -                                     | <br>N/A    |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub> :   | F12 -  | N/A        |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub> :   | F12 -<br>F10 -<br>F11 -                            | N/A        |
| _       |   | F12 -  |            |
|         | - maximum break time (ms) at: 5 I <sub>Δn</sub>   | F12 -<br>F10 -<br>F11 -<br>F12 -                   | N/A<br>N/A |
|         | - maximum break time (ms) at: 0,25 A (if applicable)  | F12 -<br>F10 -<br>F11 -<br>F12 -<br>F10 -<br>F11 - |            |
|         | - maximum break time (ms) at: 0,25 A (if applicable)  | F12 -<br>F10 -<br>F11 -<br>F12 -<br>F10 -          |            |
|         | - maximum break time (ms) at: 0,25 A (if applicable)  | F12 - F10 - F12 - F10 - F12 - F10 - F11 - F12 -    | N/A        |

| IEC 61008-1 |   |                 |           |  |
|-------------|---|-----------------|-----------|--|
| Clause      | Requirement + Test  | Result - Remark | Verdict   |  |
|             |   |                 |           |  |
|             | No value exceeds the relevant specified limiting                                    |                 | N/A       |  |
|             | value   |                 |           |  |
|             | Additional test for type S:   |                 |           |  |
|             | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :                    | F10 -           | N/A       |  |
|             |   | F11 -           |           |  |
|             |   | F12 -           |           |  |
|             | - minimum non actuating time (ms) at: 2 I <sub>Δn</sub> ; 0,06 s                    | F10 -           | N/A       |  |
|             | :   | F11 -           |           |  |
|             |   | F12 -           |           |  |
|             | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s                    | F10 -           | N/A       |  |
|             | :   | F11 -           |           |  |
|             |   | F12 -           |           |  |
|             | - minimum non actuating time (ms) at: 500 A; 0,04 s                                 | F10 -           | N/A       |  |
|             |   | F11 -           |           |  |
|             |   | F12             |           |  |
|             | No tripping during tests  |                 | N/A       |  |
| .17.4       | Verification of the correct operation of RCCBs with 3 or 4 current paths, neutral   |                 |           |  |
|             | and one line terminal only being energized in turn:                                 |                 |           |  |
|             | RCCB connected according to fig. 4  |                 | N/A       |  |
| .9.2.3      | The test circuit being successively calibrated at each of the values of residual    |                 |           |  |
|             | current   |                 | i vintera |  |
|             | specified in Table 1, the test switch S2 and the RCCB being in the closed position, |                 |           |  |
|             | the test voltage is suddenly established by closing the test switch S1              |                 |           |  |
|             | - maximum break time (ms) at: I <sub>Δn</sub> :                                     | F10 -           | N/A       |  |
|             |   | F11 -           |           |  |
|             |   | F12 -           |           |  |
|             | - maximum break time (ms) at: 2 l <sub>Δn</sub> :                                   | F10 -           | N/A       |  |
|             | . ,   | F11 -           |           |  |
|             |   | F12 -           |           |  |
|             | - maximum break time (ms) at: 5 l <sub>Δn</sub> :                                   | F10 -           | N/A       |  |
|             | ,   | F11 -           |           |  |
|             |   | F12 -           |           |  |

|          | IEC 61008-1  |                         |          |  |
|----------|--|-------------------------|----------|--|
| Clause   | Requirement + Test   | Result - Remark         | Verdict  |  |
|          |  |                         |          |  |
|          | - maximum break time (ms) at: 0,25 A (if applicable)                     | F10 -                   | N/A      |  |
|          | :  | F11 -                   |          |  |
|          |  | F12 -                   |          |  |
|          | - maximum break time (ms) at: 500 A:                                     | F10 -                   | N/A      |  |
|          |  | F11 -                   |          |  |
|          |  | F12 -                   |          |  |
|          | No value exceeds the relevant specified limiting                         |                         | N/A      |  |
|          | value  |                         |          |  |
|          | Additional test for type S:  | _                       | S. white |  |
|          | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :         | F10 -                   | N/A      |  |
|          |  | F11 -                   |          |  |
| _        |  | F12 -                   | _        |  |
|          | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s         | F10 -                   | N/A      |  |
|          | :  | F11 -                   |          |  |
|          |  | F12 -                   |          |  |
|          | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s         | F10 -                   | N/A      |  |
|          | :  | F11 -                   |          |  |
|          |  | F12 -                   |          |  |
|          | - minimum non actuating time (ms) at: 500 A; 0,04 s                      | F10 -                   | N/A      |  |
|          | :  | F11 -                   |          |  |
|          |  | F12 -                   |          |  |
|          | No tripping during tests   |                         | N/A      |  |
| 9.17.5   | Verification of the reclosing function of automatically reconsideration) | closing RCCBs (under    |          |  |
| 9.11.2.4 | c) Verification of the coordination at the rated                         | 6000A                   | <u> </u> |  |
|          | conditional residual short-circuit current (A): IAc .:                   |                         |          |  |
|          | Test circuit according to figure:  | 7                       |          |  |
|          | Point of test circuit which is directly earthed:                         | Neutral of power supply |          |  |
|          | Grid distance "a" (mm):  | 45mm                    |          |  |
|          | Silver wire diameter (mm) or fuse  | 0,75mm                  |          |  |
|          | Prospective current (A)  | 6000A                   |          |  |
|          | Prospective current obtained (A)   | 6110A                   |          |  |
|          | Power factor   | 0,65-0,70               |          |  |
|          | Power factor obtained:   | 0,67                    | 200      |  |

| Clause | Requirement + Test  | Result - Remark                | Verdict |  |
|--------|---|--------------------------------|---------|--|
|        |   |                                |         |  |
|        | Point of initiation: 45° ± 5°   | 45°                            | Р       |  |
|        | Verification of I²t (kA²s) and Ip (kA) prior to testing                         | l²t =3,7 kA²s                  | Р       |  |
|        | (≥1x ≤1,1x values of table 15), RCCB replaced by a                              | lp =1,7 kA                     |         |  |
|        | connection having negligible impedance  |                                |         |  |
|        | Test sequence: O-t-CO-t-CO  | O-t-CO-t-CO                    | Р       |  |
|        | I²t (kA²s); Ip (kA):  | F10 - 0,75 kA2s, 1,14 kA       | Р       |  |
|        |   | F11 - 0,73 kA2s, 1,14 kA       |         |  |
|        |   | F12 - 0,86 kA2s, 1,18 kA       |         |  |
|        | During tests no endangering of operator, no                                     |                                | Р       |  |
|        | permanent arcing, no flashover and no melting of                                |                                |         |  |
|        | fuse F  |                                |         |  |
|        | After the tests no damage impairing further use                                 |                                | Р       |  |
| .7.7.3 | The leakage current flowing across the open                                     | F10 - 6,63×10 <sup>-3</sup> mA | Р       |  |
|        | contacts is measured at 1,1 Un and shall not                                    | F11 - 6,80×10 <sup>-3</sup> mA |         |  |
|        | exceed 2mA (mA)   | F12 - 6,52×10 <sup>-3</sup> mA |         |  |
| .7.3   | Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min: |                                |         |  |
|        | a):   | F10 - OK                       | Р       |  |
|        |   | F11 - OK                       |         |  |
|        |   | F12 - OK                       |         |  |
|        | b):   | F10 - OK                       | Р       |  |
|        | ,   | F11 - OK                       |         |  |
|        |   | F12 - OK                       |         |  |
|        | c):   | F10 - OK                       | Р       |  |
|        |   | F11 - OK                       |         |  |
|        |   | F12 - OK                       |         |  |
|        | d):   | F10 -                          | N/A     |  |
|        |   | F11 -                          |         |  |
|        |   | F12 -                          |         |  |
|        | e):   | F10 -                          | N/A     |  |
|        | -,  | F11 -                          |         |  |
|        |   | F12 -                          |         |  |
|        | No flashover or breakdown:  | F10 - OK                       | P       |  |
|        | No hashover of breakdown  | F10 - OK                       |         |  |
|        |   |                                |         |  |
|        |   | F12 - OK                       |         |  |

| IEC 61008-1 |   |                                 |         |  |
|-------------|---|---------------------------------|---------|--|
| Clause      | Requirement + Test  | Result - Remark                 | Verdict |  |
|             |   |                                 |         |  |
|             | Making and breaking In at Un:   | F10 - OK                        | Р       |  |
|             |   | F11 - OK                        |         |  |
|             |   | F12 - OK                        |         |  |
|             | The RCCB shall trip with a test current of 1,25 $I_{\Delta n}$        | F10- 29 ms                      | Р       |  |
|             | (ms):   | F11- 24 ms                      |         |  |
|             |   | F12- 30 ms                      |         |  |
|             | The polyethylene sheet shows no holes                                 | _                               | Р       |  |
| 9.17        | Verification of the behaviour of RCCBs opening autor the line voltage | matically in case of failure of |         |  |
| 9.17.1      | Limiting value of the line voltage (Ux):                              |                                 |         |  |
|             | - rated voltage applied to the line terminals and                     | F10 -                           | N/A     |  |
|             | progressively lowered to attain zero within about                     | F11 -                           |         |  |
|             | 30 s until automatic opening occurs; voltage (V) .:                   | F12 -                           |         |  |
|             | - all values less than 0,85 times the rated voltage                   | F10 -                           | N/A     |  |
|             | (V):  | F11 -                           |         |  |
|             |   | F12 -                           |         |  |
|             | - tripping test at test voltage (V) with I <sub>Δn</sub> and          | F10 -                           | N/A     |  |
|             | operating according to Table 1 (ms):                                  | F11 -                           |         |  |
|             |   | F12 -                           |         |  |
|             | No value exceeds the specified limiting values                        |                                 | N/A     |  |
|             | Not possible to close the apparatus by manual                         | F10 -                           | N/A     |  |
|             | operating means below Ux:   | F11 -                           |         |  |
|             |   | F12 -                           |         |  |
| 9.17.2      | Verification of behaviour in case of failure of the line v            | voltage                         |         |  |
|             | RCCB supplied with rated voltage, and the line                        |                                 | N/A     |  |
|             | voltage then switched off   |                                 |         |  |
|             | Time (ms) interval between switching off and                          | F10 -                           | N/A     |  |
|             | opening of the main contacts:   | F11 -                           |         |  |
|             |   | F12 -                           |         |  |
|             | a) RCCBs opening without delay: no value exceeds                      |                                 | N/A     |  |
|             | 0,5 s   | _                               |         |  |
|             | b) RCCBs opening with delay: max. and min. values                     |                                 | N/A     |  |
|             | within the range indicated by the manufacturer                        |                                 |         |  |

|        | IEC 61008-1        |                 |         |
|--------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 9.17.3 | Verification of the correct operation, in presence of a   | residual current, for RCCBs  |                |
|--------|---|--|----------------|
|        | opening with delay in case of failure of the line voltag  | e  | A VIII SERVICE |
|        | RCCB connected according to fig. 4 at the rated   |  | N/A            |
|        | voltage (Un):   | _  |                |
|        | All phases but one switched off by means of S3  |  | N/A            |
|        | During the delay: test of 9.9.2:  |  |                |
| .9.2.1 | - steady increase from 0,2 I <sub>Δn</sub> to I <sub>Δn</sub> within 30 s (mA)  | F10 -  | N/A            |
|        |   | F11 -  |                |
|        |   | F12  |                |
|        | - tripping current between I <sub>Δno</sub> and I <sub>Δn</sub> (mA):   | F10 -  | N/A            |
|        |   | F11 -  |                |
|        |   | F12 -  |                |
|        | The RCCB closes on I <sub>An</sub> : no value exceeds the   | F10 ~  | N/A            |
|        | specified limiting value of Table 1 (ms)  | F11 -  |                |
|        |   | F12 -  |                |
|        | current   | of the values of residual  |                |
|        | current specified in Table 1, the test switch S2 and the RCCE the test voltage is suddenly established by closing the                                       | B being in the closed position,  |                |
|        | specified in Table 1, the test switch S2 and the RCCE the test voltage is suddenly established by closing the   | B being in the closed position,  | N/A            |
|        | specified in Table 1, the test switch S2 and the RCCE   | B being in the closed position, e test switch S1   | N/A            |
|        | specified in Table 1, the test switch S2 and the RCCE the test voltage is suddenly established by closing the   | B being in the closed position, e test switch S1   | N/A            |
|        | specified in Table 1, the test switch S2 and the RCCE the test voltage is suddenly established by closing the - maximum break time (ms) at: I <sub>Δn</sub> | B being in the closed position,<br>e test switch S1<br>F10 -<br>F11 -  | N/A<br>N/A     |
|        | specified in Table 1, the test switch S2 and the RCCE the test voltage is suddenly established by closing the   | B being in the closed position, e test switch S1  F10 -  F11 -  F12 -  | _              |
|        | specified in Table 1, the test switch S2 and the RCCE the test voltage is suddenly established by closing the - maximum break time (ms) at: I <sub>Δn</sub> | S being in the closed position, te test switch S1  F10 - F11 - F12 - F10 -   | _              |
|        | specified in Table 1, the test switch S2 and the RCCE the test voltage is suddenly established by closing the - maximum break time (ms) at: I <sub>Δn</sub> | B being in the closed position, e test switch S1  F10 - F11 - F12 -  F10 - F11 -   | _              |
|        | specified in Table 1, the test switch S2 and the RCCE the test voltage is suddenly established by closing the - maximum break time (ms) at: I <sub>Δn</sub> | S being in the closed position, te test switch S1  F10 - F11 - F12 -  F10 - F11 - F12 -  F10 - F11 - F11 -   | N/A            |
|        | specified in Table 1, the test switch S2 and the RCCE the test voltage is suddenly established by closing the - maximum break time (ms) at: I <sub>Δn</sub> | F10 - F10 - F10 - F12 - F10 - F11 - F10 - F10 - F11 - F10 - F11 - F10 -  | N/A            |
|        | specified in Table 1, the test switch S2 and the RCCE the test voltage is suddenly established by closing the - maximum break time (ms) at: I <sub>Δn</sub> | F10 - F11 - F10 - F11 - F11 - F11 - F11 - F11 -  | N/A            |
|        | specified in Table 1, the test switch S2 and the RCCE the test voltage is suddenly established by closing the - maximum break time (ms) at: I <sub>Δn</sub> | B being in the closed position, te test switch S1  F10 - F11 - F12 - F10 - F11 - F12 - F10 - F11 - F12 - F10 - F12 -   | N/A<br>N/A     |
|        | specified in Table 1, the test switch S2 and the RCCE the test voltage is suddenly established by closing the - maximum break time (ms) at: I <sub>Δn</sub> | B being in the closed position, e test switch S1  F10 -  F11 -  F12 -  F10 -  F11 -  F12 -  F10 - | N/A<br>N/A     |
|        | specified in Table 1, the test switch S2 and the RCCE the test voltage is suddenly established by closing the - maximum break time (ms) at: I <sub>Δn</sub> | F10 - F11 - F12 - F10 - F11 -                              | N/A<br>N/A     |
|        | specified in Table 1, the test switch S2 and the RCCE the test voltage is suddenly established by closing the - maximum break time (ms) at: I <sub>Δn</sub> | B being in the closed position, e test switch S1  F10 - F11 - F12 -                      | N/A<br>N/A     |

|         | IEC 61008-1   |                               |         |
|---------|---|-------------------------------|---------|
| Clause_ | Requirement + Test  | Result - Remark               | Verdict |
|         |   |                               | _       |
|         | No value exceeds the relevant specified limiting                                  |                               | N/A     |
| _       | value   |                               |         |
|         | Additional test for type S:   |                               |         |
|         | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :                  | F10 -                         | N/A     |
|         |   | F11 -                         |         |
|         |   | F12                           |         |
|         | - minimum non actuating time (ms) at: 2 Ι <sub>Δπ</sub> ; 0,06 s                  | F10 -                         | N/A     |
|         | :   | F11 -                         |         |
|         |   | F12 -                         |         |
|         | - minimum non actuating time (ms) at: 5 l₄n; 0,05 s                               | F10 -                         | N/A     |
|         | :   | F11 -                         |         |
|         |   | F12 -                         |         |
|         | - minimum non actuating time (ms) at: 500 A; 0,04 s                               | F10 -                         | N/A     |
|         | :   | F11 -                         |         |
|         |   | F12                           |         |
|         | No tripping during tests  |                               | N/A     |
| .17.4   | Verification of the correct operation of RCCBs with 3 or 4 current paths, neutral |                               |         |
|         | and one line terminal only being energized in turn:                               |                               |         |
|         | RCCB connected according to fig. 4  |                               | N/A     |
| .9.2.3  | The test circuit being successively calibrated at each of the values of residual  |                               |         |
|         | current   |                               |         |
|         | specified in Table 1, the test switch S2 and the RCCB                             | being in the closed position, |         |
|         | the test voltage is suddenly established by closing the                           | e test switch S1              |         |
|         | - maximum break time (ms) at: I <sub>Δn</sub> :                                   | F10 -                         | N/A     |
|         |   | F11 -                         |         |
|         |   | F12 -                         |         |
|         | - maximum break time (ms) at: 2 I <sub>Δn</sub>                                   | F10 -                         | N/A     |
|         |   | F11 -                         |         |
|         |   | F12 -                         |         |
|         | - maximum break time (ms) at: 5 l <sub>Δn</sub> :                                 | F10 -                         | N/A     |
|         | , , ===   | F11 -                         |         |
|         |   | F12 -                         |         |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|      | - maximum break time (ms) at: 0,25 A (if applicable)                     | F10 -                 | N/A |
|------|--|-----------------------|-----|
|      |  | F11 -                 |     |
|      |  | F12 -                 |     |
|      | - maximum break time (ms) at: 500 A                                      | F10 -                 | N/A |
|      |  | F11 -                 |     |
|      |  | F12 -                 |     |
|      | No value exceeds the relevant specified limiting                         |                       | N/A |
|      | value  |                       |     |
|      | Additional test for type S:  |                       |     |
|      | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s :         | F10 -                 | N/A |
|      |  | F11 -                 |     |
|      |  | F12                   |     |
|      | - minimum non actuating time (ms) at: 2 l <sub>Δn</sub> ; 0,06 s         | F10 -                 | N/A |
|      | :  | F11 -                 |     |
|      |  | F12 -                 |     |
|      | - minimum non actuating time (ms) at: 5 l <sub>Δn</sub> ; 0,05 s         | F10 -                 | N/A |
|      | :  | F11 -                 |     |
|      |  | F12 <u>-</u>          |     |
|      | - minimum non actuating time (ms) at: 500 A; 0,04 s                      | F10 -                 | N/A |
|      | :  | F11 -                 |     |
|      |  | F12 -                 |     |
|      | No tripping during tests   |                       | N/A |
| 17.5 | Verification of the reclosing function of automatically reconsideration) | eclosing RCCBs (under |     |

|        | TEST SEQUENCE G<br>(3 samples: In= 63A, I <sub>∆n</sub> = 0,03A, type AC) | G7 G8 G9 | Р   |
|--------|---|----------|-----|
| 9.22   | Verification of reliability   |          |     |
| 9.22.1 | Climatic test based on Clause 4 of IEC 60068-2-3:2000 and IEC 60068-3-4:  |          |     |
|        | - number of cycles: 28  | 28       | _ P |
|        | - test temperature: upper temperature 55 °C ± 2 °C                        | 55 °C    | P   |
|        | Initial verification:   |          |     |

| IEC 61008-1 |   |                 |         |  |
|-------------|---|-----------------|---------|--|
| Clause      | Requirement + Test  | Result - Remark | Verdict |  |
|             |   |                 |         |  |
| 9.9.2.3     | - maximum break time at I <sub>Δn</sub> (ms):                     | G7 - 36ms       | Р       |  |
|             |   | G8 - 34ms       |         |  |
|             |   | G9 - 33ms       |         |  |
|             | No value exceeds the specified limiting value                     | ок              | Р       |  |
|             | Additional test for type S:                                       |                 | 1.7     |  |
|             | - minimum non actuating time (ms) at: 1 <sub>.\n</sub> ; 0,13 s : | G7 -            | N/A     |  |
|             |   | G8 -            |         |  |
|             |   | G9 -            |         |  |
|             | No tripping during tests  |                 | Р       |  |
|             | Climatic test: no tripping during 28 cycles test:                 | G7 - No trip    | Р       |  |
|             |   | G8 - No trip    |         |  |
|             |   | G9 - No trip    |         |  |
|             | Final verification: the RCCB shall trip with a test               | G7 - 25ms       | Р       |  |
|             | current of 1,25 l <sub>Δn</sub> (ms):                             | G8 - 30ms       |         |  |
|             |   | G9 - 27ms       |         |  |

|         | TEST SEQUENCE G (3 samples: ln= 10A, l <sub>Δn</sub> = 0,3A, type A) | G10 G11 G12            | P   |
|---------|--|------------------------|-----|
| 9.22    | Verification of reliability  |                        |     |
| 9.22.1  | Climatic test based on Clause 4 of IEC 60068-2-3:20                  | 000 and IEC 60068-3-4: |     |
|         | - number of cycles: 28   | 28                     | Р   |
|         | - test temperature: upper temperature 55 °C ± 2 °C                   | 55 °C                  | Р   |
|         | Initial verification:  |                        |     |
| 9.9.2.3 | - maximum break time at I <sub>∆n</sub> (ms):                        | G10 - 34ms             | Р   |
|         |  | G11 - 38ms             |     |
|         |  | G12 - 33ms             |     |
|         | No value exceeds the specified limiting value                        | ОК                     | Р   |
|         | Additional test for type S:  |                        |     |
|         | - minimum non actuating time (ms) at: I <sub>Δn</sub> ; 0,13 s:      | G10 -                  | N/A |
|         |  | G11 -                  |     |
|         |  | G12 -                  |     |
|         | No tripping during tests   |                        | Р   |

|        | Page 101 of 164                                     | Report No.:13   | 30700023SHA-002 |  |  |  |
|--------|---|-----------------|-----------------|--|--|--|
|        | IEC 61008-1   |                 |                 |  |  |  |
| Clause | Requirement + Test                                  | Result - Remark | Verdict         |  |  |  |
|        |   | _               |                 |  |  |  |
|        | Climatic test: no tripping during 28 cycles test:   | G10 - No trip   | Р               |  |  |  |
|        |   | G11 - No trip   |                 |  |  |  |
|        |   | G12 - No trip   |                 |  |  |  |
|        | Final verification: the RCCB shall trip with a test | G10 - 27ms      | P               |  |  |  |
|        | current of 1,25 I <sub>Δn</sub> (ms)                | G11 - 30ms      |                 |  |  |  |
|        |   | G12 - 34ms      |                 |  |  |  |

| Report  | No 11 | 307000 | )23SH  | A-002 |
|---------|-------|--------|--------|-------|
| IVEDUIL | 110   | 00/000 | 120011 | 7-002 |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|                 | TEST SEQUENCE H (3 samples: In= 63A, IΔn= 0,03A, type A)        |  |   |
|-----------------|---|--|---|
| IEC 61543:      |   |  |   |
| table4-<br>T1.1 | Harmonics, interharmonics                                       |  | Р |
| table4-<br>T1.2 | Signalling voltage  |  | Р |
| table5-<br>T2.3 | Conducted unidirectional transients of the ms and µs time scale |  | Р |
|                 | Test results of test sequence H:                                |  |   |
|                 | see test report No.   | See 130700024SHA                                       |   |
|                 | Testing location / address:                                     | Building No.86, 1198 Qinzhou<br>Road (North), Shanghai |   |
|                 |   | 200233, China  |   |

|                 | TEST SEQUENCE I (3 samples: In= 63A, IΔn= 0. | .03A, type A)  |   |
|-----------------|--|--|---|
| IEC 61543:      |  |  |   |
| table5-<br>T2.1 | Conducted sine-wave voltages or currents     |  | Р |
| table5-<br>T2.5 | Radiated high-frequency phenomena            |  | Р |
| table5-<br>T2.2 | Fast transients (burst)                      |  | Р |
|                 | Test results of test sequence I:             |  |   |
|                 | see test report No.                          | See 130700024SHA                                       |   |
|                 | Testing location / address                   | Building No.86, 1198 Qinzhou<br>Road (North), Shanghai |   |
|                 |  | 200233, China  |   |

|            | TEST SEQUENCE J (3 samples: ln= 63A, l∆n= 0,03A, type A)             | 8330    |
|------------|--|---------|
| IEC 61543: |  | (48430) |
| table5-    | Conducted common mode disturbances in the frequency range lower than | Р       |
| T2.6       | 150 kHz  |         |

|        |                    | Page 103 of 164 | Report No.:130700023SHA-002 |         |
|--------|--------------------|-----------------|-----------------------------|---------|
|        |                    | IEC 61008-1     |                             |         |
| Clause | Requirement + Test |                 | Result - Remark             | Verdict |

| table6- | Electrostatic discharges         |                              | Р |
|---------|----------------------------------|------------------------------|---|
|         | Test results of test sequence J: |                              |   |
|         | see test report No.              | See 130700024SHA             |   |
|         | Testing location / address:      | Building No.86, 1198 Qinzhou |   |
|         |                                  | Road (North), Shanghai       |   |
|         |                                  | 200233, China                |   |

|        | IEC 61008-1        |                 |         |
|--------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

|                |                | A. 1201-16  | ANNEX A (NORMATIVE)   |
|----------------|----------------|---|---|
|                |                | Test sequenc  | e and number of samples to be submitted for certification purposes Table A 1 - Test sequences   |
| Test sec       | quence         | Clause or subclause   | Test ( or inspection)   |
| A              |                | 6<br>8.1.1<br>8.1.2<br>9.3<br>8.1.3<br>9.15<br>9.4<br>9.5<br>9.6<br>9.13<br>8.1.3<br>9.25 | Marking General Mechanism Indelibility of marking Clearance and creepage distances (external parts only) Trip free mechanism Reliability of screws, current-carrying parts and connections Reliability of terminals for external conductors Protection against electric shock Resistance to heat Clearances and creepage distances (internal parts) Resistance to rusting   |
| A              | -              | 9.14  | Resistance to abnormal heat and to fire   |
| В              |                | 9.7.7.4  9.7.7.5 b)  9.7.1  9.7.2  9.7.3  9.7.4  9.7.7.2  9.7.5  9.7.6  9.8  9.22.2  9.23 | Resistance of the insulation of open contacts and basic insulation against an impulse voltage in normal conditions  Verification of the behaviour of components bridging the basic insulation Resistance to humidity Insulation resistance of the main circuit Dielectric strength of the main circuit Insulation resistance an dielectric strength of auxillary circuits Verification of clearances with the impulse withstand voltage Secondary circuit of detection transformers Capability of control circuits connected to the main circuits etc. Temperature-rise Reliability at 40°C Ageing of electronic components |
| C              |                | 9.10  | Mechanical and electrical endurance   |
|                | D <sub>0</sub> | 9.9   | Residual operating characteristics  |
| D              | D <sub>1</sub> | 9.17<br>9.19<br>9.21<br>9.11.2.3 a)b)<br>9.16<br>9.12<br>9.18                             | Behaviour in case of failure of the line voltage Unwanted tripping Behaviour in case of surge currents D.C. components Performance at I <sub>Am</sub> Test device Resistance to mechanical shock and impact Non-operating current under overcurrent conditions  |
| D <sub>2</sub> | 2              | 9.11.2.3 c)   | Verification of the suitability of RCCBs for use in IT-systems  |
| E              |                | 9.11.2.4 a)   | Coordination at I <sub>nc</sub>   |
|                |                | 9.11.2.2  | Performance at I <sub>m</sub>   |
| F              |                | 9.11.2.4 b)   | Coordination at I <sub>m</sub>  |
|                |                | 9.11.2.4 c)   | Coordination at I <sub>Ac</sub>   |
| G              |                | 9.22.1  | Reliability (climatic tests)  |
| H ª            | )              | IEC 61543 Table 4 -T1,1<br>IEC 61543 Table 4 -T1,2<br>IEC 61543 Table 5 -T2,3             | Harmonics, interharmonics<br>Signalling voltage<br>Surges   |
| ı              |                | IEC 61543 Table 5 -T2.1<br>IEC 61543 Table 5 -T2.5<br>IEC 61543 Table 5 -T2.2             | Conducted sine-wave voltages or currents<br>Radiated electromagnetic field<br>Fast transients (burst)   |
| J              |                | IEC 61543 Table 5 - T2.6 IEC 61543 Table 6 -T3.1  | Conducted common mode disturbances in the frequency range lower than 150 kHz Electrostatic discharges   |

b) This test may be done on separate samples.

|        |                    | IEC 61008-1     |         |
|--------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

|                            | Table A.2 - Number of san | nples for full test procedure                   |  |
|----------------------------|---------------------------|---|--|
| Test sequence <sup>a</sup> | Number of samples         | Minimum number of accepted samples <sup>b</sup> | Maximum number of samples for repeated tests |
| A <sub>1</sub>             | 1                         | 1   |  |
| A <sub>2</sub>             | 3                         | 2   | 3  |
| В                          | 3                         | 2   | 3  |
| С                          | 3                         | 2   | 3  |
| D                          | 3                         | 2 <sup>d</sup>                                  | 3  |
| $D_2$                      | 3                         | 3   | 3  |
| E                          | 3                         | 2 <sup>d</sup>                                  | 3  |
| F                          | 3                         | 2 <sup>d</sup>                                  | 3  |
| G                          | 3                         | 2   | 3  |
| H <sup>e</sup>             | 3                         | 2   | 3  |
| l e                        | 3                         | 2   | 3  |
| J e                        | 3                         | 2   | 3  |

- a) In total a maximum of three test sequences may be repeated.
- b) It is assumed that a sample which has not passed a test has not met the requirements due to workmanship or assembly defects which are not representative of the design.
- c) In the case of repeated tests, all test results must be acceptable.
- d) All samples shall meet the requirements in 9.9.2, 9.9.3, and 9.11.2.3, as appropriate. In addition, permanent arcing or flashover between poles or between poles and frame shall not occur in any sample during tests of 9.11.2.2, 9.11.2.4 a), 9.11.2.4 b) or 9.11.2.4 c).
- e) At the manufacturer's request, the same set of samples may be subjected to more than one of these test sequences.

|        | IEC 61008-1        |                 |         |
|--------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| Test sequence                   | Number of samples according to the number of poles alig)    |   |   |  |
|---------------------------------|---|---|---|--|
|                                 | 2-poles b) c)   | 3-poles d fin   | 4-poles e)  |  |
| A <sub>1</sub>                  | 1 max. rating l <sub>N</sub><br>min. rating l <sub>∆N</sub> | 1 max. rating I <sub>N</sub><br>min. rating I <sub>AN</sub> | 1 max. rating I <sub>N</sub><br>min. rating I <sub>AN</sub>                                     |  |
| A <sub>2</sub>                  | 3 max. rating l <sub>N</sub><br>min. rating l <sub>△N</sub> | 3 max. rating $I_N$ min. rating $I_{\Delta N}$              | 3 max. rating $I_N$ min. rating $I_{\Delta N}$  |  |
| В                               | 3 max. rating $I_N$ min. rating $I_{\Delta N}$              | 3 max. rating I <sub>N</sub><br>min. rating I <sub>AN</sub> | 3 max. rating $I_N$ min. rating $I_{\Delta N}$  |  |
| С                               | 3 max. rating $I_{N}$ min. rating $I_{NN}$                  | 3 max. rating $I_N$ min. rating $I_{\Delta N}$              | 3 max. rating $I_N$ min. rating $I_{\Delta N}$  |  |
| D <sub>0</sub> + D <sub>1</sub> | 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 $I_{\Delta N}$  |  |
| D <sub>0</sub>                  |   | 1 for all other ratings of I <sub>ΔN</sub>                  |   |  |
| D <sub>2</sub>                  | 3 max. rating I <sub>N</sub><br>min. rating I <sub>N</sub>  | 3 max. rating $I_N$ min. rating $I_{\Delta N}$              | 3 max. rating $I_N$ min. rating $I_{\Delta N}$  |  |
| E                               | 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 $I_{\Delta N}$  |  |
| F                               | 3 max. rating l <sub>N</sub><br>min. rating l <sub>∆N</sub> | 3 max. rating $I_N$ min. 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 min. rating I <sub>N</sub> max. rating I <sub>AN</sub>    | 3 mln. rating I <sub>N</sub> max. rating I <sub>AN</sub>  |  |
| G                               | 3 max. rating I <sub>N</sub> min. rating I <sub>AN</sub>    | 3 max, rating $I_N$ min, rating $I_{\Delta N}$              | 3 max. rating I <sub>N</sub> min. rating I <sub>AN</sub>  |  |
|                                 | 3 min. rating $I_N$ max. rating $I_{\Delta N}$              | 3 min. rating $I_N$ max. rating $I_{\Delta N}$              | 3 min. rating $I_N$ max. rating $I_{\Delta N}$  |  |
| н                               |   |   | 3 h) samples of the same ration $I_N$ chosen at random min. rating $I_{\Delta N}$               |  |
| ſ                               |   |   | 3 h) samples of the same ration I <sub>N</sub> chosen at random min. rating I <sub>ΔN</sub>     |  |
| J                               |   |   | 3 h) samples of the same rati<br>I <sub>N</sub> chosen at random<br>min. rating I <sub>AN</sub> |  |

a) If a test is to be repeated according to the minimum performance criteria of clause A.2, a new set of samples is used for the relevant test. In the repeated test all test results must be acceptable.

- Also applicable to 1-pole RCCBs with uninterrupted neutral and 2-pole RCCBs with 1 protected pole. Also applicable to 3-pole RCCBs with two protected poles c)
- ď)
- Also applicable to 3-pole RCCBs with uninterrupted neutral and 4-pole RCCBs with 3 protected poles. e)
- f) This column is omitted when 4-pole RCCBs have been tested.
- If only one value of  $I_{\Delta N}$  is submitted, min. rating  $I_{\Delta N}$  and max. rating  $I_{\Delta N}$  are replaced by  $I_{\Delta N}$ . g)
- h) Only the highest number of current paths.
- If a 3-pole RCCB with 4 current paths and a 4-pole RCCB are submitted, then only the 4-pole RCCB is tested, with exception of the test of 9.8 of test sequence B for which both types are submitted to the test.

b) If only 3-pole or 4-pole RCCBs are submitted, this column shall also apply to a set of samples with the smallest number of

Page 107 of 164

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

| Test sequence                   | Number of samples according to the number of poles a)                |  |  |
|---------------------------------|--|--|--|
| 13                              | 2-pole b) c)   | 3-pole e)                                      | 4-pole d)  |
| D <sub>0</sub> + D <sub>1</sub> | 1 max. rating I <sub>N</sub> min. rating I <sub>AN</sub>             | 1 max. rating $I_N$ min. rating $I_{\Delta N}$ | 1 max. rating I <sub>N</sub> min. rating I <sub>AN</sub> |
| $D_0$                           | 1 for all other ratings of I <sub>ΔN</sub> with max. I <sub>ΔN</sub> |  |  |

- a) If a test is to be repeated according to the minimum performance criteria of clause A.2, a new set of samples is used for the relevant test. In the repeated test all test results must be acceptable.
- b) If only 3-pole or 4-pole RCCBs are submitted, this column shall also apply to a set of samples with the smallest number of poles.
- c) Also applicable to 1-pole RCCBs with uninterrupted neutral.
- d) Also applicable to 3-pole RCCBs with uninterrupted neutral.
- e) This column is omitted when 4-pole RCCBs are being tested.

| Report No.:13 | 0700023SHA-002 |
|---------------|----------------|
|               |                |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|     | ANNEX B DETERMINATION OF CLEARANCES AND CREEPAGE DISTANCES  |     |  |
|-----|---|-----|--|
| B.1 | General   |     |  |
|     | In determining clearances and creepage distances, it is recommended that the following points should be considered.   | Р   |  |
| B.2 | Orientation and location of a creepage distance   | Р   |  |
|     | If necessary, the manufacturer shall indicate the intended orientation of the equipment or component in order that creepage distances are not adversely affected by the accumulation of pollution for which they were not designed.   | Р   |  |
| B.3 | Creepage distances where more than one material is used   | N/A |  |
|     | A creepage distance may be split in several portions of different materials and/or have different pollution degrees if one of the creepage distances is dimensioned to withstand the total voltage or if the total distance is dimensioned according to the material having the lowest CTI.                       | N/A |  |
| B.4 | Creepage distances split by floating conductive part  | N/A |  |
|     | A creepage distance may be split into several parts, made with insulation material having the same CTI, including or separated by floating conductors as long as the sum of the distances across each individual part is equal or greater than the creepage distance required if the floating part did not exist. | N/A |  |
|     | The minimum distance X for each individual part of the creepage distance is given in IEC 60664-1:2007, 6.2 (see also Example 11 in Figure B.1).   |     |  |
| B.5 | Measurement of creepage distances and clearances  | Р   |  |
|     | In determining creepage distances according to IEC 60664-1, the dimension X, specified in the following examples, has a minimum value of 1,0 mm for pollution degree 2.   | N/A |  |
|     | If the associated clearance is less than 3 mm, the minimum dimension $X$ may be reduced to one third of this clearance.   | N/A |  |
|     | The methods of measuring creepage distances and clearances are indicated in Example 1 to 11. These cases do not differentiate between gaps and grooves or between types of insulation.  | Р   |  |
|     | The following assumptions are made:   | Р   |  |
|     | - any recess is assumed to be bridged with an insulating link having a length equal to the specified width X and being placed in the most unfavourable position (see Example 3);  | Р   |  |
|     | - where the distance across a groove is equal to or larger than the specified width X, the creepage distance is measured along the contours of the groove (see Example 3);  | Р   |  |
|     | - creepage distances and clearances measured between parts which can assume different positions in relation to each other, are measured when these parts are in their most unfavourable position.   | Р   |  |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

| 100 | ANNEX C ARRANGEMENT FOR THE DETECTION OF THE EMISSION OF IONIZED GASES DURING SHORT-CIRCUIT TESTS   |     |
|-----|---|-----|
|     | The device under test is mounted as shown in figure C.1, which may require adapting to the specific design of the device, and in accordance with the manufacturer's instructions.   | Р   |
|     | When required (i.e. during "O" operations), a clear polyethylene sheet (0,05 $\pm$ 0,01) mm thick, of a size at least 50 mm larger, in each direction, than the overall dimensions of the front face of the device but not less than 200 mm $\times$ 200 mm, is fixed and reasonably stretched in a frame, placed at a distance of 10 mm from | Р   |
|     | <ul> <li>either the maximum projection of the operating means of a device without<br/>recess for the operating means;</li> </ul>  | Р   |
|     | - or the rim of a recess for the operating means of a device with recess for the operating means.   | N/A |
|     | The sheet should have the following physical properties:  Density at 23 °C: 0,92 ± 0,05 g/cm³  Melting-point: 110 °C - 120 °C.  | Р   |
|     | When required, a barrier of insulating material, at least 2 mm thick, is placed, as shown in figure C.1, between the arc vent and the polyethylene sheet to prevent damage of the sheet due to hot particles emitted from the arc vent.   | Р   |
|     | When required, a grid (or grids) according to figure C.2 is (are) placed at a distance of "a" mm from each arc vent side of the device.   | Р   |
|     | The grid circuit (see figure C.3) shall be connected to the points B and C (see figures 7 or 8, as applicable).   | Р   |
|     | The parameters for the grid circuit are as follows:   | Р   |
|     | Resistor R': 1,5 Ω  | Р   |
|     | Copper wire F': length 50 mm, and diameter in accordance with 9.11.2.1 f 1).  | Р   |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|     | ANNEX D<br>ROUTINE TESTS   |      |      |      |     |
|-----|--|------|------|------|-----|
| D.1 | General  |      |      |      |     |
|     | The tests specified in this standard are intended to reveal, as far as safety is concerned, unacceptable variations in material or manufacture.  |      |      |      | N/A |
|     | In general, further tests have to be made to ensure that every RCCB conforms with the samples that withstood the tests of this standard, according to the experience gained by the manufacturer.   |      |      |      | N/A |
| D.2 | Tripping test  |      | _    |      |     |
|     | A residual current is passed through each pole of the RCCB in turn. The RCCB shall not trip at a current less than or equal to $0.5\ l_{\Delta N}$ , but it shall trip at $l_{\Delta N}$ within a specified time (see Table 1).                          | [ms] | [ms] | [ms] | N/A |
| _   |  |      |      |      | N/A |
|     | The test current shall be applied at least five times to each RCCB and shall be applied at least twice to each pole.   |      |      |      | N/A |
| D.3 | Electric strength test   |      |      |      |     |
|     | A voltage of substantially sine-wave form of 1 500 V having a frequency of 50 Hz/60 Hz is applied for 1 s as follows:  |      |      |      | N/A |
|     | a) with the RCCB in the open position, between<br>each pair of terminals which are electrically<br>connected together when the RCCB is in closed<br>position   | -    |      |      | N/A |
|     | b) for RCCBs not incorporating electronic components, with the RCCB in the closed position, between each pole in turn and the others connected together  |      |      |      | N/A |
|     | c) for RCCBs incorporating electronic components, with the RCCB in the open position, either between all incoming terminals of poles in turn or between all outgoing terminals of poles in turn, depending on the position of the electronic components. |      |      |      | N/A |
|     | No flashover or breakdown shall occur  |      |      |      | N/A |
| D.4 | Performance of the test device   |      |      |      |     |
|     | With the RCCB in the closed position, and connected to a supply at the appropriate voltage, the test device, when operated, shall open the RCCB.   |      |      |      | N/A |
|     | Where the test device is intended to operate at more than one value of rated voltage, the test shall be made at the lowest value of rated voltage.   |      | _    | _    | N/A |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

| J    | ANNEX J Particular requirements for RCCBs with screwless type terminals for external copper conductors  |     |  |  |
|------|---|-----|--|--|
| J.1  | 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 <sup>2</sup> . |     |  |  |
| J.6  | Marking and other product information   |     |  |  |
|      | in addition to clause 6:  | N/A |  |  |
|      | universal terminals:  | N/A |  |  |
|      | no markings   | N/A |  |  |
|      | non-universal terminals:  | N/A |  |  |
|      | terminals for rigid-solid conductors marked by "sol"  | N/A |  |  |
|      | terminals for rigid (solid and stranded) conductors marked by "r"   | N/A |  |  |
|      | terminals for flexible conductors marked by "f"   | N/A |  |  |
|      | Marking on the RCCB or  | N/A |  |  |
|      | if the space available is not sufficient on the smallest package unit or in technical information   | N/A |  |  |
|      | Marking indicating the length of insulation to be removed before insertion of the conductor into the terminal shown on the RCBO   | N/A |  |  |
|      | Manufacturer shall provide information in his literature, on the maximum number of conductors which may be clamped.   | N/A |  |  |
| .8   | Standard conditions for operating in service and for installation   |     |  |  |
|      | clause 8 applies with the following modifications: in 8.1.5, only 8.1.5.1, 8.1.5.2, 8.1.5.3, 8.1.5.6 and 8.1.5.7 apply  | N/A |  |  |
|      | Compliance is checked by inspection and by the tests of J.9.1 and J.9.2 of this annex, instead of 9.4 and 9.5.  | N/A |  |  |
| .8.1 | Connection or disconnection of conductors   | N/A |  |  |
|      | The connection or disconnection of conductors shall be made:  | N/A |  |  |
|      | - by the use of a general purpose tool or by a convenient device integral with the terminal to open it and to assist the insertion or the withdrawal of the conductors (e.g. for universal terminals)   | N/A |  |  |

|        | IEC 61008-1  |                 |         |  |  |  |
|--------|--|-----------------|---------|--|--|--|
| Clause | Requirement + Test   | Result - Remark | Verdict |  |  |  |
|        |  |                 |         |  |  |  |
|        | - or, for rigid conductors by simple insertion. For the disconnection of the conductors an operation other than a pull on the conductor shall be necessary (e.g. for push-wire terminals). |                 | N/A     |  |  |  |
|        | Universal terminals shall accept rigid (solid or stranded) and flexible unprepared conductors.   |                 | N/A     |  |  |  |
|        | Non-universal terminals shall accept the types of conductors declared by the manufacturer.   |                 | N/A     |  |  |  |
|        | Compliance is checked by inspection and by the tests of J.9.1 and J.9.2.   |                 | N/A     |  |  |  |
| J.8.2  | Dimensions of connectable conductors   |                 | N/A     |  |  |  |
|        | The dimensions of connectable conductors are given in Table J.1.   |                 | N/A     |  |  |  |
|        | The ability to connect these conductors shall be checked by inspection and by the tests of J.9.1 and J.9.2.  |                 | N/A     |  |  |  |
| J.8.3  | Connectable cross-sectional areas  |                 | N/A     |  |  |  |
|        | nominal cross-sections to be clamped acc. table J.2  |                 | N/A     |  |  |  |
|        | compliance checked by inspection and tests of J.9.1 and J.9.2.   |                 | N/A     |  |  |  |
| J.8.5  | Design and construction of terminals   |                 | N/A     |  |  |  |
|        | terminals so designed and constructed that:  |                 |         |  |  |  |
|        | - each conductor clamped individually  |                 | N/A     |  |  |  |
|        | - during operation of connection or disconnection the conductors can be connected or disconnected either at the same time or separately  |                 | N/A     |  |  |  |
|        | - inadequate insertion of the conductor is avoided   |                 | N/A     |  |  |  |
|        | It shall be possible to clamp securely any number of conductors up to the maximum provided for   |                 | N/A     |  |  |  |
|        | compliance checked by inspection and tests of J.9.1 and J.9.2.   |                 | N/A     |  |  |  |
| J.8.6  | Resistance to ageing   |                 | N/A     |  |  |  |
|        | compliance checked by the test of J.9.3.   |                 | N/A     |  |  |  |
| J.9    | Tests  |                 |         |  |  |  |
|        | Clause 9 applies, by replacing 9.4 and 9.5 by the following tests  |                 | N/A     |  |  |  |
| J.9.1  | Test of reliability of screwless terminals   |                 |         |  |  |  |

|         | IEC 61008-1   |                 |         |
|---------|---|-----------------|---------|
| Clause  | Requirement + Test  | Result - Remark | Verdict |
|         |   |                 |         |
| J.9.1.1 | Reliability of screwless system   |                 | N/A     |
|         | three terminals of poles of new samples, with copper conductors of the rated cross sectional area in accordance with Table J.2, types of conductors in accordance with J.8.1.   |                 | N/A     |
|         | The connection and subsequent disconnection shall be made five times with:  |                 | N/A     |
|         | Min. cross-section (mm²)  | mm²             | N/A     |
|         | Max. cross-section (mm²)  | mm²             | N/A     |
|         | new conductors used each time, except for the fifth time, when the conductor used for the fourth insertion is clamped at the same place. Before insertion into the terminal, wires of stranded rigid conductors re-shaped and wires of flexible conductors twisted to consolidate the ends. |                 | N/A     |
|         | After each insertion, the conductor being inserted rotated 90 ° along its axis at the level of the clamped section and subsequently disconnected.   |                 | N/A     |
|         | After tests, the terminal not damaged in such a way as to impair its further use.   |                 | N/A     |
| J.9.1.2 | Test of reliability of connection   |                 | N/A     |
|         | three terminals of poles of new samples, with copper conductors of the rated cross sectional area in accordance with Table J.2, types of conductors in accordance with J.8.1.   |                 | N/A     |
|         | Before insertion into the terminal, wires of stranded rigid conductors and flexible conductors reshaped and wires of flexible conductors twisted to consolidate the ends.   |                 | N/A     |
|         | possible to fit the conductor into the terminal without undue force in the case of universal terminals and with the force necessary by hand in the case of push-wire terminals.   |                 | N/A     |
|         | conductor pushed as far as possible into the terminal or inserted so that adequate connection is obvious.   |                 | N/A     |
|         | Min. cross-section (mm²)  | mm²             | N/A     |
|         | Max. cross-section (mm²)  | mm²             | N/A     |
|         | After the test, no wire of the conductor shall have escaped outside the terminal.   |                 | N/A     |
| J.9.2   | Tests of reliability of terminals for external conductors: mechanical strength  |                 | N/A     |

| Report N | lo.:1307 | 0002381 | HA-002 |
|----------|----------|---------|--------|
|----------|----------|---------|--------|

|  | IEC 61008-1   |             | •        |          |         |
|--|---|-------------|----------|----------|---------|
| Clause   | Requirement + Test  | Result      | - Remark |          | Verdict |
|  | · · · · · · · · · · · · · · · · · · ·   |             |          |          |         |
| ,  | three terminals of poles of new samples fitted with new conductors of the type and of the minimum and maximum cross-sectional areas acc. Table J.2. |             | _        |          | N/A     |
|  | Min. cross-section (mm²)  | mm²         |          |          | N/A     |
|  | Max. cross-section (mm²)  | mm²         |          |          | N/A     |
|  | wires of stranded rigid conductors and flexible conductors reshaped and wires of flexible conductors twisted to consolidate the ends.               |             |          |          | N/A     |
|  | Pull for 1 min, min. cross-section (N)  | N           |          |          | N/A     |
|  | Pull for 1 min, max. cross-section (N)  | N           |          | _        | N/A     |
|  | During the test no noticeable move of conductor   |             | _        |          | N/A     |
| J.9.3  | Cycling test  |             |          |          | N/A     |
|  | Universal, rigid conductors - 3 samples<br>Universal, flexible conductors - 3 samples   |             |          | _        | N/A     |
|  | Non-universal, solid conductors - 3 samples   |             |          |          | N/A     |
|  | Non-universal, rigid (solid) stranded conductors - 3 samples<br>Non-universal, rigid (stranded) stranded conductors - 3<br>samples                  |             |          |          | N/A     |
|  | Non-universal, flexible conductors - 3 samples  |             |          |          | N/A     |
|  | Cross-section (mm²)   | . mm²       |          | N/A      |         |
|  | Test current I <sub>N</sub> (A)   | А           |          |          | N/A     |
|  | samples subjected to 192 temperature cycles   |             |          |          | N/A     |
|  | Voltage drop after 192 cycles:  |             |          | 1        |         |
|  | voltage drop, measured at each terminal, at the end of the 192 <sup>nd</sup> cycle, exceeded not the smaller of the two following values:           |             |          |          | N/A     |
|  | - 22,5 mV   |             |          |          | N/A     |
|  | - 1,5 times the value measured after the 24th cycle   |             |          |          | N/A     |
|  |   | sample<br>1 | sample 2 | sample 3 |         |
|  |   | [mV]        | [mV]     | [mV]     |         |
|  | - rigid solid conductors  |             |          |          | N/A     |
|  | - rigid stranded conductors   |             |          |          | N/A     |
|  | - flexible conductors   |             |          |          | N/A     |
|  | Voltage drop after 24 <sup>th</sup> cycle:  |             |          |          |         |
|  |   | sample<br>1 | sample 2 | sample 3 |         |
| <u>,                                      </u> |   | [mV]        | [mV]     | [mV]     |         |

|        | Page 115 of 164  | Report No.:1    | 30700023SHA-002 |  |  |  |  |  |
|--------|--|-----------------|-----------------|--|--|--|--|--|
|        | IEC 61008-1  |                 |                 |  |  |  |  |  |
| Clause | Requirement + Test   | Result - Remark | Verdict         |  |  |  |  |  |
|        |  |                 |                 |  |  |  |  |  |
|        | - rigid solid conductors   |                 | N/A             |  |  |  |  |  |
|        | - rigid stranded conductors  |                 | N/A             |  |  |  |  |  |
|        | - flexible conductors  |                 | N/A             |  |  |  |  |  |
|        | after this test: no changes evidently impairing further use, such as cracks, deformations or the like. |                 | N/A             |  |  |  |  |  |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

| K       | Pai                     | ANNEX K Particular requirements for RCCBs with flat quick-connect terminations   |  |                |     |  |  |
|---------|-------------------------|--|--|----------------|-----|--|--|
| K.1     | quick<br>width<br>conn  | This annex applies to RCCBs within the scope of Clause 1, equipped with flat quick-connect terminations consisting of a male tab (see K.3.2) with nominal width 6,3 mm and thickness0,8 mm, to be used with a mating female connector for connecting electrical copper conductors according to the manufacturer's instructions, for rated currents up to and including 16 A. |  |                |     |  |  |
| K.6     | Marki                   | ng and other product i   | nformation   |                | -   |  |  |
|         | in add                  | dition to clause 6, addit  | tion after the lettered                            |                | -   |  |  |
|         | to IEC                  | nation regarding the fe<br>0 61210 and type of co<br>be given in the manufa  | nductor to be used                                 |                | N/A |  |  |
|         | I) mar                  | nufacturer's name or t   | rade mark  |                | N/A |  |  |
|         | m) ty                   | oe reference   |  |                | N/A |  |  |
|         | and c                   | ormation on cross-sectolour code of insulated<br>Table K.1)  |  |                | N/A |  |  |
|         | 1 '                     | o) the use of only silver or tin-plated copper alloys  |  |                |     |  |  |
| K.8     | Requ                    | Requirements for construction and operation  |  |                |     |  |  |
|         | Claus                   | Clause 8 applies, with the following exceptions:   |  |                | N/A |  |  |
|         |                         | subclause 8.1.3 applies, the female connectors being fitted to the male tabs of the RCCB   |  |                |     |  |  |
|         | replac                  | ce the contents of 8.1.  | 5 by the following:                                |                | N/A |  |  |
| <.8.2   | Term                    | inals for external cond  | uctors   |                | N/A |  |  |
| K.8.2.1 | metal<br>condu          | tabs and female conne<br>having mechanical st<br>uctivity and resistance<br>uate for their intended  | rength, electrical<br>to corrosion                 |                | N/A |  |  |
| K.8.2.2 | the th<br>curre<br>NOTE | iominal width of the maickness 0,8 mm, applints up to and including 1:The use for rated currencepted in BE, FR, IT, PT   | cable to rated<br>16 A.<br>nts up to and including |                | N/A |  |  |
|         | with t                  | The dimensions of the male tab shall comply with those specified in Table K.3 and in figures K.2, K.3, K.4 and K.5   |  |                | N/A |  |  |
|         |                         | Dimensions of tabs<br>K.3  | according Table                                    | Measured in mm |     |  |  |
|         |                         | Minimum [mm]   | Maximum [mm]                                       |                |     |  |  |
| Α       | Dimple                  | 0,7  | 1,0  |                | N/A |  |  |
|         | Hole                    | 0,5  | 1,0  |                | N/A |  |  |

|             |  |                               |                        | IEC 61008-1                                     |                    |                           |                   |         |
|-------------|--|-------------------------------|------------------------|---|--------------------|---------------------------|-------------------|---------|
| Clause      | R  | equire                        | ment + Test            |   | Result             | - Remark                  | _                 | Verdict |
| В           | Dimp   | ماد                           | 7,8 min                |   |                    |                           |                   | N/A     |
|             | Hole   |                               | 7,8 min                |   |                    |                           |                   | N/A     |
|             | Dimp   | le l                          | 0,77                   | 0,84  |                    |                           | <del>_</del> .    | N/A     |
|             | Hole   |                               | 0,77                   | 0,84  |                    |                           | _                 | N/A     |
|             | Dimp   | le                            | 6,20                   | 6,40  |                    |                           |                   | N/A     |
|             | Hole   |                               | 6,20                   | 6,40  |                    |                           |                   | N/A     |
| ———<br>Е    | Dimp   | le                            | 3,6                    | 4,1   |                    |                           |                   | N/A     |
|             | Hole   |                               | 4,3                    | 4,7   |                    |                           |                   | N/A     |
| F           | Dimp   | le                            | 1,6                    | 2,0   | _                  |                           |                   | N/A     |
|             | Hole   |                               | 1,6                    | 2,0   | _                  |                           |                   | N/A     |
| J           | Dimp   | le                            | 8°                     | 12°   |                    |                           |                   | N/A     |
|             | Hole   |                               | 8°                     | 12°   |                    |                           |                   | N/A     |
| M           | Dimp   | le                            | 2,2                    | 2,5   |                    |                           |                   | N/A     |
|             | Hole   |                               |                        |   |                    |                           |                   |         |
| Ν           | Dimp   | le                            | 1,8                    | 2,0   |                    |                           |                   | N/A     |
|             | Hole   |                               |                        | <del>-</del> -                                  |                    |                           |                   |         |
| Р           | Dimp   | le                            | 0,7                    | 1,8   |                    |                           |                   | N/A     |
|             | Hole   |                               | 0,7                    | 1,8   |                    |                           |                   | N/A     |
| Q           | Dimple   |                               | 8,9 min                |   |                    |                           |                   | N/A     |
|             | Hole   |                               | 8,9 min                |   |                    | _                         |                   | N/A     |
|             | be   |                               |                        | onnector which may<br>ure K.6 and in Table      |                    |                           |                   | N/A     |
|             |  |                               |                        |   |                    | request acc.<br>table K.3 | measured<br>value |         |
|             |  |                               |                        |   | B <sub>3</sub> max | 7,8mm                     |                   | N/A     |
|             |  |                               |                        |   | L <sub>2</sub> max | 3,5mm                     |                   | N/A     |
| <b>(</b> .9 | Te   | ests                          |                        |   |                    |                           | _                 |         |
|             | cl   | clause 9 applies with the fol |                        | owing modifications:                            |                    |                           |                   | N/A     |
|             | ге   | place                         | the contents of 9.5 b  | by the following text:                          |                    |                           |                   | N/A     |
| (.9.1       | М  | echan                         | ical overload-force    |   |                    |                           |                   | N/A     |
|             | Test done on 10 terminals of as in normal use when wirin |                               |                        |   |                    |                           |                   | N/A     |
|             | fo   |                               | adually applied to the | ssively the axial pull<br>e male tab integrated |                    |                           |                   | N/A     |
|             | P  | ush 96                        | N                      |   |                    |                           |                   | N/A     |
|             | Pi   | ull 88N                       |                        |   |                    |                           |                   | N/A     |

|        | Page 118 of 164  | Report No.:1    | 130700023SHA-002 |  |  |  |
|--------|--|-----------------|------------------|--|--|--|
|        | IEC 61008-1  |                 |                  |  |  |  |
| Clause | Requirement + Test   | Result - Remark | Verdict          |  |  |  |
|        |  |                 |                  |  |  |  |
|        | No damage occurred to the tab or to the RCCB in which the tab is integrated.   |                 | N/A              |  |  |  |
|        | addition to 9.8.3:   |                 | N/A              |  |  |  |
|        | Fine -wire thermocouples shall be placed in such a way as not to influence the contact or the connection area. An example of placement is shown in fig K.1 |                 | N/A              |  |  |  |

| Report | No :130 | 0700023SH | 4A-002 |
|--------|---------|-----------|--------|
|        |         |           |        |

|        | IEC 61008-1        |                 |         |
|--------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| L       | ANNEX L Specific requirements for RCCBs with screw untreated aluminium conductors and with alufor use with copper or with alumi   | minium screw-type terminals |     |
|---------|---|-----------------------------|-----|
| L.6     | Marking and other product information   |                             |     |
|         | In addition to clause 6 the following apply:  |                             | N/A |
|         | Terminal marking according table L.1, on the RCCB, near the terminals   |                             | N/A |
|         | Conductor types accepted:   |                             | N/A |
|         | Copper only   | None                        | N/A |
|         | Aluminium only  | ☐ "AI"                      | N/A |
|         | Aluminium and copper  | ☐ "Al/Cu"                   | N/A |
|         | Other information concerning the number of conductors, screw torque (if different from table 10) and cross-section shall be indicated on the RCCB   | Nm<br>mm²                   | N/A |
| 7       | Standard conditions for operation in service  |                             |     |
|         | Clause 7 applies  |                             | N/A |
| .,8     | Constructional requirements   |                             |     |
|         | Clause 8 applies with the following exceptions:   |                             | N/A |
| 3.1.5.2 | add the following text at the end of 8.1.5.2:   |                             | N/A |
|         | For connection of aluminium conductors, RCCBs shall be provided with screw-type terminals allowing the connection of conductors having nominal cross-sections as shown in table L.2   |                             | N/A |
|         | Terminals for the connection of aluminium conductors and terminals of aluminium for the connection of copper or aluminium conductors shall have mechanical strength adequate to withstand the tests of 9.4, with the test conductors tightened with the torque indicated in table 11, or with the torque specified by the manufacturer, which shall never be lower than that specified in table 11. |                             | N/A |
|         | Compliance is checked by inspection, by measurement and by fitting in turn one conductor of the smallest and one of the largest cross-section areas as specified  |                             | N/A |
| 3.1.5.4 | replace the text of 8.1.5.4 by the following:   |                             | N/A |
|         | Terminals shall allow the conductors to be connected without special preparation  |                             | N/A |
|         | Compliance is checked by inspection and by the tests of L.9   |                             | N/A |

| Clause | Requirement + Test   | Result - Remark                                 | Verdict |
|--------|--|---|---------|
|        |  |   |         |
| 9      | Tests  |   |         |
|        | Clause 9 applies with the following modifications/additions:   |   | N/A     |
|        | For the tests which are influenced by the material of the terminal and the type of conductor that can be connected, the test conditions of table L.3 are applied   |   | N/A     |
|        | Additionally the test of L.9.2 is carried out on terminals separated from the RCCB   |   | N/A     |
| 9.2    | Current cycling test   |   | N/A     |
|        | This test is carried out on separate terminals   |   | N/A     |
| .9.2.3 | Test arrangement   |   | N/A     |
|        | The general arrangement of the samples shall be as shown in figure L.1   |   | N/A     |
|        | 90 % of torque stated by the manufacturer or selected in table 10 used for the specimens   | torque: Nm                                      | N/A     |
|        | The test is carried out with conductors according to table L.5. The length of the test conductor from the point of entry to the screw-type terminal specimens to the equalizer shall be as in table L.6  | cross-section: mm² minimum conductor length: mm | N/A     |
|        | Cross section of equalizer not greater than that given in table L.7  | max. cross-section: mm²                         | N/A     |
| .9.2.5 | Test method and acceptance criteria  |   | N/A     |
|        | Test loop subjected to 500 cycles of 1h current-<br>on and 1h current-off, starting at an a.c. current<br>value of 1,12 times the test current value<br>determined in table L.8  | test current: A                                 | N/A     |
|        | Near the end of each current-on period of the first 24 cycles, the current shall subsequently be adjusted to raise the temperature of the reference conductor to 75°C  |   | N/A     |
|        | At the end of the 25 <sup>th</sup> cycle the test current shall<br>be adjusted the last time and the stable<br>temperature shall be recorded as the first<br>measurement. No further adjustment of test<br>current for the remainder of the test |   | N/A     |
|        | Temperatures recorded for at least one cycle of each working day, and after approximately 25, 50, 75, 100, 125, 175, 225, 275, 350, 425 and 500 cycles   |   | N/A     |
|        | For each screw-type terminal:  |   | N/A     |
|        | - the temperature rise shall not exceed 110 K  |   | N/A     |
|        | - the stability factor Sf shall not exceed ± 10 °C   |   | N/A     |
|        |  |   |         |

ambient air temperature: °C

Page 121 of 164

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

|       | max. max temperature rise stability factor Sf [K] [°C] |
|-------|--|
| Termi | nal 1 N/A  |
| Termi | nal 2 N/A  |
| Termi | nal 3 N/A  |
| Termi | nal 4 N/A  |
| Termi | nal 5 N/A  |
| Termi | nal 6 N/A  |
| Termi | nal 7 N/A  |
| Termi | nal 8 N/A  |

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |

## ATTACHMENT TO TEST REPORT IEC 61008-1 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES

Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs)

Differences according to...... EN 61008-1:2012 used in conjunction with

EN 61008-2-1:1994 + A11:1998

Attachment Form No...... EU\_GD\_IEC61008\_1F

Attachment Originator .....: OVE

Master Attachment .....: Dated 2013-01

Copyright © 2013 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.

|              | CENELEC COMMON MODIFICATIONS (EN)  |                   | Р |
|--------------|--|-------------------|---|
|              |  |                   |   |
|              | GENERAL  |                   |   |
| 9.11         | Short circuit tests  |                   |   |
| 9.11.2.1 d)  | Value of power frequency recovery voltage shall be equal to 110% of the rated voltage    |                   |   |
| 9.11.2.1 b)  | Tolerances and test quantities   |                   |   |
|              | voltage (including recovery voltage): 0, -5%   |                   |   |
| _            | TEST SEQUENCE "A" replace the complete test sequences "A <sub>1</sub> , A <sub>2</sub> " | A <sub>1</sub> -2 | Р |
|              | (1 sample: In= 63A, IΔn= 0,03A, type A )   |                   |   |
| 6            | MARKING  |                   |   |
| 6. <b>Z1</b> | standard marking   |                   |   |
| _            | EACH RCCB SHALL BE MARKED IN A DURABLE MANNER ACCORDING TO THE FOLLOWING TABLE Z3.       |                   | Р |
|              | RCCB MARKED WITH:  |                   |   |
| a)           | The manufacturer's name or trademark   | ELMARK            | Р |
| b)           | Type designation, catalogue number or serial number                                      | JEL1              | Р |
| c)           | Rated voltage(s) with the symbol ~   | 415V~             | Р |
| d)           | Rated frequency, if the RCCB is designed for frequencies other than 50Hz                 | 50/60Hz           | Р |
| e)           | rated current  | 63A               | Р |
| f)           | Rated residual operating current (Ian) in A or in mA                                     | 30mA              | Р |

allowed

Additional national symbols are allowed

Provisionally the use of national indications only is

|        | IEC 61008-1  |                 |         |  |  |
|--------|--|-----------------|---------|--|--|
| Clause | Requirement + Test   | Result - Remark | Verdict |  |  |
|        |  |                 |         |  |  |
|        | These indication visible when RCCB is installed  |                 |         |  |  |
|        | For push-buttons the OFF push-button shall either be red and/or marked with "O"  |                 | N/A     |  |  |
|        | RED shall not be uses for any other push-button  |                 | Р       |  |  |
|        | If a push-button is used for closing the contacts and is evidently identified as such, its depressed position is sufficient to indicate the closed position.   |                 | N/A     |  |  |
|        | 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. |                 | N/A     |  |  |
|        | If necessary to distinguish between supply and load terminals they shall be clearly marked   |                 | N/A     |  |  |
|        | Terminals for neutral circuit N  |                 | P       |  |  |
|        | Terminal for protective conductor  |                 | N/A     |  |  |
|        | The suitability for isolation, which is provided by all RCCBs of this standard, may be indicated by the symbol on the device   |                 | Р       |  |  |
|        | The base for plug-in RCCBs shall be marked with the following:   |                 | N/A     |  |  |
|        | - rated current or maximum rated current   |                 | N/A     |  |  |
|        | - trade mark   |                 | N/A     |  |  |
|        | Marking indelible, easy legible and not on removable parts   |                 | Р       |  |  |
|        | Labels not easy to remove and no curling. Test acc. to cl. 9.3: 15 s with water and 15 s with hexane   |                 | Р       |  |  |
| 5.Z2   | additional marking   |                 |         |  |  |
|        | Additional marking to other standards (EN or IEC or other) or additional requirements are allowed under the following conditions:  |                 | N/A     |  |  |
|        | - The RCCB shall comply with all the requirements of the additional standard.  |                 | N/A     |  |  |
|        | - The relevant standards to which the additional   |                 | N/A     |  |  |

marking refers shall be indicated adjacent to this marking and shall be clearly differentiated or separated from the standard marking according

Compliance is checked by inspection and by

sequences need not be repeated.

carrying out all the test sequences required by the relevant standard. Equivalent or less severe test

to 6.Z.1.

|            | IEC 61008-1  |                 |         |
|------------|--|-----------------|---------|
| Clause     | Requirement + Test   | Result - Remark | Verdict |
| <b>8</b> . | Requirements for construction and operation  |                 |         |
| 8.1        | mechanical design  |                 |         |
| 8.1.1      | General  |                 |         |
|            | Not possible to alter the operating characteristics by means of external interventions   |                 | Р       |
|            | It shall not be possible to disable or inhibit the RCCB function by any means.   |                 | Р       |
|            | In case of an RCCB having multiple settings of residual operating current, the rating refers to the highest setting.                                     |                 | N/A     |
| 8.1.2      | Mechanism  |                 |         |
|            | Moving contacts of all poles so mechanically coupled that all poles except switched neutral make and break substantially together                        |                 | Р       |
|            | Switched neutral of four-pole RCCBs shall not close after and shall not open before the other poles  |                 | N/A     |
|            | Trip-free mechanism  |                 | P       |
|            | Possible to switch on and off by hand  |                 | P       |
|            | No intermediate position of the contacts   |                 | P       |
|            | RCCBs shall provide in the open position an isolating distance in accordance with the requirements necessary to satisfy the isolating function (see 8.3) |                 | Р       |
|            | Indication of the open and closed position of the main contacts shall be provided by one or both of the following means:                                 |                 | Р       |
|            | - the position of the actuator (this being preferred)  |                 | Р       |
|            | - a separate mechanical indicator  |                 | Р       |
|            | If a separate mechanical indicator is used to indicate the position of the main contacts, this shall show the colour:                                    |                 | Р       |
|            | - red for the closed position (ON)   |                 | P       |

| 8.<br>———— | Requirements for construction and operation   |     |
|------------|---|-----|
| 8.1        | mechanical design   |     |
| 8.1.1      | General   |     |
|            | Not possible to alter the operating characteristics by means of external interventions  | Р   |
|            | It shall not be possible to disable or inhibit the RCCB function by any means.  | Р   |
|            | In case of an RCCB having multiple settings of residual operating current, the rating refers to the highest setting.  | N/A |
| 8.1.2      | Mechanism   |     |
|            | Moving contacts of all poles so mechanically coupled that all poles except switched neutral make and break substantially together   | Р   |
|            | Switched neutral of four-pole RCCBs shall not close after and shall not open before the other poles   | N/A |
|            | Trip-free mechanism   | Р   |
|            | Possible to switch on and off by hand   | P   |
|            | No intermediate position of the contacts  | P   |
|            | RCCBs shall provide in the open position an isolating distance in accordance with the requirements necessary to satisfy the isolating function (see 8.3)  | Р   |
|            | Indication of the open and closed position of the main contacts shall be provided by one or both of the following means:  | Р   |
|            | - the position of the actuator (this being preferred)   | Р   |
|            | - a separate mechanical indicator   | Р   |
|            | If a separate mechanical indicator is used to indicate the position of the main contacts, this shall show the colour:   | Р   |
|            | - red for the closed position (ON)  | Р   |
|            | - green for the opened position (OFF)   | Р   |
|            | The means of indication of the contact position shall be reliable (Compliance is checked by inspection and by the test of 9.15  | Р   |
|            | RCCBs 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 9.9 and 9.11) | Р   |
|            | When means are provided or specified by the manufacturer to lock the operating means in the   | N/A |

| IEC 61008-1 |   |                 |         |  |  |  |  |
|-------------|---|-----------------|---------|--|--|--|--|
| Clause      | Requirement + Test  | Result - Remark | Verdict |  |  |  |  |
|             |   |                 |         |  |  |  |  |
| _           | open position, locking in that position shall only be possible when the main contacts are in the open position. (Compliance is checked by inspection, taking into account the instructions of the manufacturer)   |                 |         |  |  |  |  |
|             | If operating means is used for indication it shall, when released, automatically take up the position to that of the moving contacts; operating means shall have two rest positions except that for automatic opening a third distinct position may be provided, when necessary to reset before reclosing |                 | Р       |  |  |  |  |
|             | When an indicator light is used this shall be lit when the RCCB is in the closed position   |                 | N/A     |  |  |  |  |
|             | The indicator light shall not be the only means to indicate the closed position.  |                 | N/A     |  |  |  |  |
|             | The action of the mechanism shall not be influenced by the position of enclosures or covers and shall be independent of any removable part.   |                 | Р       |  |  |  |  |
|             | If the cover is used as a guiding means for push-<br>buttons, it shall not possible to remove the buttons<br>from the outside   |                 | P       |  |  |  |  |
|             | Operating means securely fixed, not possible to remove them without a tool.   |                 | Р       |  |  |  |  |
|             | For "up-down" operating means the contacts are closed by the up movement.   |                 | Р       |  |  |  |  |
| 9.15        | Test:   |                 |         |  |  |  |  |
|             | - The RCCB is mounted and wired as in normal use.   |                 | Р       |  |  |  |  |
|             | - Test circuit according to figure 4.   |                 | Р       |  |  |  |  |
|             | A residual current equal to 1,5 $I_{\Delta N}$ is passed by closing $S_2$ , the RCCB having been closed and the operating means being held in the closed position. The RCCB shall trip.   |                 | Р       |  |  |  |  |
|             | Test repeated by moving the operating means slowly (1 s) to a position where the current starts to flow. Tripping shall occur without further movement.   |                 | Р       |  |  |  |  |
| 8.1.3       | Clearances and creepage distances (internal and ex  | ternal parts)   |         |  |  |  |  |
|             | The minimum required clearances and creepage distances are based on the RCCB  |                 | Р       |  |  |  |  |
|             | being designed for operating in an environment with pollution degree 2  |                 |         |  |  |  |  |
|             | Compliance is checked by inspection and/or by measurement and in addition for item 1 by the test of 9.7.7.1.  |                 | P       |  |  |  |  |

|        | IEC 61008-1   |                                    |         |
|--------|---|------------------------------------|---------|
| Clause | Requirement + Test  | Result - Remark                    | Verdict |
| _      |   |                                    |         |
|        | However, the clearances of item 2 and 4 may be reduced provided that the tests at rated impulse voltage are withstood   |                                    | N/A     |
|        | The insulating materials are classified into Material Groups on the basis of their comparative tracking index (CTI) acc. to IEC 60664-1 and measured according to IEC 60112 |                                    | Р       |
|        | Clearances [mm] U <sub>imp</sub> 4kV  |                                    |         |
|        |   | minimum clearances [mm]            |         |
|        | between live parts which are separated when     the main contacts are in the open position  | 4,3mm                              | Р       |
|        | 2. between live parts of different polarity   | >5,0mm                             | Р       |
|        | between circuits supplied from different sources, one of which being PELV or SELV   |                                    | N/A     |
|        | 4. between live parts and:  |                                    |         |
|        | - accessible surfaces of operating means  | >5,0mm                             | Р       |
|        | - screws or other means for fixing covers which have to be removed when mounting the RCCB   |                                    | N/A     |
|        | - surface on which the RCCB is mounted  |                                    | N/A     |
|        | - screws or other means for fixing the RCCB   |                                    | N/A     |
| _      | - metal covers or boxes   |                                    | N/A     |
|        | - other accessible metal parts  | >10,0mm                            | Р       |
|        | - metal frames supporting flush-type RCCBs  | >10,0mm                            | Р       |
|        | Creepage distances [mm] (see table 5)   |                                    |         |
|        | Material group  | IIIb □ IIIa ⊠ II □ I               | Р       |
|        |   | minimum creepage distances<br>[mm] |         |
|        | between live parts which are separated when<br>the main contacts are in the open position   | >4,5mm                             | Р       |
|        | between live parts of different polarity  | >5,0mm                             | Р       |
|        | between circuits supplied from different sources, one of which being PELV or SELV   |                                    | N/A     |
|        | 4. between live parts and:  |                                    |         |
|        | - accessible surfaces of operating means  | >5,0mm                             | Р       |
|        | - screws or other means for fixing covers which   |                                    | N/A     |

|         | IEC 61008-1  | Report No.:1307 |         |
|---------|--|-----------------|---------|
| Clause  | Requirement + Test   | Result - Remark | Verdict |
|         |  |                 |         |
|         | have to be removed when mounting the RCCB  |                 |         |
|         | - surface on which the RCCB is mounted   |                 | N/A     |
|         | - screws or other means for fixing the RCCB  |                 | N/A     |
|         | - metal covers or boxes  |                 | N/A     |
|         | - other accessible metal parts   | >10,0mm         | Р       |
|         | - metal frames supporting flush-type RCCB  | >10,0mm         | Р       |
| 8.1.4   | Screws, current-carrying parts and connections   |                 |         |
| 8.1.4.1 | Connections withstand mechanical stresses occurring in normal use.   |                 | Р       |
|         | Screws for mounting the RCCB are not of thread-cutting type.   |                 | Р       |
|         | Screws and nuts which are operated when mounting and connecting  |                 | Р       |
| 9.4     | Test according to cl. 9.4:   |                 |         |
|         | - 10 times (screw Ø / torque Nm)   | Ø mm Nm         | N/A     |
|         | - 5 times (screw Ø / torque Nm)  | Ø5,9 mm; 2,5Nm  | P       |
|         | Plug-in connections are tested by plugging the RCCB in and pulling it out five times.  |                 | N/A     |
|         | After the test the connection shall not have become loose nor shall their electrical function be impaired.   |                 | Р       |
| 8.1.4.2 | Screws with a thread of insulating material operated when mounting the RCCB; correct introduction ensured.   |                 | N/A     |
| 8.1.4.3 | Electrical connections contact pressure not transmitted through insulating material unless there is sufficient resilience in the metallic parts.   |                 | Р       |
| 8.1.4.4 | Current carrying parts of  |                 |         |
|         | - copper   |                 | N/A     |
|         | - an alloy 58% copper for parts worked cold  |                 | Р       |
|         | - an alloy 50% copper for other parts  |                 | N/A     |
|         | - other metal  |                 | N/A     |
| 8.1.5   | Terminals for external conductors  |                 |         |
| 8.1.5.1 | Terminals ensure the necessary contact pressure  |                 |         |
|         | Compliance is checked by inspection and 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 J, as relevant for the type of connection |                 | P       |
|         | <u> </u>   |                 | -       |

Annex J:

RCCBs with screwless type terminals for external copper conductors

|         |  |  | IEC 610                                 | 008-1  |   |                |    |
|---------|--|--|---|--|---|----------------|----|
| Clause  | use Requirement + Test   |  | Result - Remark                         |  | Verdict   |                |    |
|         | 1000   |  |   |  |   |                |    |
|         | Torque   |  |   |  |   |                | ~~ |
|         | Ømm  | Nm   |   |  | Ø5,9mm  | 2,5 <b>N</b> m | Р  |
|         | Max. cross-sect.:  | mm²  |   |  |   |                | P  |
| 9.5.1   | Pull test:   |  |   |  |   |                |    |
|         | Min. cross-sectio  | n (mm²)  | •••••                                   |  | : 1,0mm²  |                |    |
|         | Max. cross-section   | on (mm²)   |   |  | : 16mm²   |                |    |
|         | Torque <sup>2</sup> / <sub>3</sub> (Nm)  |  | <u>.</u>                                |  | : 1,67Nm  |                |    |
|         | Pull (N) for 1 min   |  |   |  |   |                |    |
|         | During the test no   | noticeable move  | of con                                  | ductor   |   |                | Р  |
| 9.5.2   | Min. cross-sectio  | n (mm²)  |   | ,,,  | 1,0mm²  |                |    |
|         | Max. cross-section   | on (mm²)   |   |  | : 16mm²   |                |    |
|         | Torque <sup>2</sup> / <sub>3</sub> (Nm).   |  | • |  | : 1,67Nm  |                |    |
|         | The conductor sh   | nows no damage   |   |  |   |                | P  |
|         | Terminals not wo   | rked loose and n   | o dama                                  | ge   |   |                | P  |
| 9.5.3   | Nominal cross-se   | ections from   | : 1,0 to 16mm                           | 2  |   |                |    |
|         | Number of strand   | ls   | : 7                                     |  |   |                |    |
|         | Ø of strands (mn   | າ)   | ; 2,14mm                                |  |   |                |    |
|         | Torque <sup>2</sup> / <sub>3</sub> (Nm).   |  |   |  | : 1,67Nm  |                |    |
|         | After the test no soutside   | strand of conduct  |   | _  | Р   |                |    |
| _       | Rated current  | Range of nomin sections to be o  |   |  |   |                |    |
|         |  | Rigid (solid<br>or stranded)<br>conductors   | Flex                                    | ible<br>ductors  |   |                |    |
|         | ≤ 13<br>> 13 ≤ 16<br>> 16 ≤ 25<br>> 25 ≤ 32<br>> 32 ≤ 50<br>> 50 ≤ 80<br>> 80 ≤ 100<br>> 100 ≤ 125 | 1 to 2,5 1 to 4 1,5 to 6 2,5 to 10 4 to 16 10 to 25 16 to 35 24 to 50  | 2,5<br>4<br>10<br>16                    | to 2,5<br>to 4<br>to 6<br>to 6<br>to 10<br>to 16<br>to 25<br>to 35 | 1,0 to 25 mm conductors 1,0 to 16 mm conductors | ū              |    |
|         | solid conductors<br>conductors. Nev<br>terminals for cor   | erminals be designated as well as rigid so rertheless, it is per aductors having conformable of mm² be designated as the second of the second as the designated as the designa |   |  | _   |                |    |
| 3.1.5.3 | Means for clamp<br>do not serve to fi  |  |   |  |   |                | Р  |

|          | IEC 61008-1   |                 |         |
|----------|---|-----------------|---------|
| Clause   | Requirement + Test  | Result - Remark | Verdict |
|          |   |                 |         |
|          | of sub-clause 9.5)  |                 |         |
| 8.1.5.4  | Terminals for $I_N \le 32$ A allow the connection of conductors without special preparation.  |                 | N/A     |
| 8.1.5.5  | Terminals have adequate mechanical strength and metric ISO thread or equivalent. (See tests of subclauses 9.4 and 9.5.1)  |                 | Р       |
| 8.1.5.6  | Clamping of conductor without undue damage to conductor. (See tests of sub-clause 9.5.2)  |                 | Р       |
| 8.1.5.7  | Clamping of conductor reliably and between metal surfaces. (See tests of sub-clauses 9.4 and 9.5.1)   |                 | Р       |
| 8.1.5.8  | Terminals so designed or positioned that no conductor can slip out while the clamping screws or nuts are tightened. (See tests of sub-clause 9.5.3)   |                 | P       |
| 8.1.5.9  | Terminals so fixed or located that they do not work loose when the clamping screws or nuts are tightened or loosened. (See tests of sub-clause 9.4)   |                 | Р       |
| 8.1.5.10 | Clamping screws or nuts of terminals for the protective conductors adequately secured against accidental loosening and not possible to unclamp without a tool.  |                 | N/A     |
| 8.1.5.11 | Screws and nuts of terminals for external conductors shall be in engagement with a metal thread and not be of the tapping screw type.   |                 | Р       |
| 8.1.Z1   | Non-interchangeability  |                 | N/A     |
|          | 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. |                 | N/A     |
| 8.1.Z2   | Mechanical mounting of plug-in type RCCBs   |                 | N/A     |
|          | 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.   |                 | N/A     |
| 8.1.Z2.1 | Plug-in type RCCBs, the holding in position of which does not depend solely on their plug-in connection(s)  |                 | N/A     |
| 8.1.Z2.2 | Plug-in type RCCBs, the holding in position of which depends solely on their plug-in connection(s)  |                 | N/A     |
|          | Compliance of the mechanical mounting is checked by the relevant tests of 9.12.   |                 | N/A     |
| 8.2      | Protection against electric shock   |                 |         |
|          | Live parts not accessible in normal use   |                 | Р       |

|          | IEC 61008-1   |                   |         |  |  |  |  |
|----------|---|-------------------|---------|--|--|--|--|
| Clause   | Requirement + Test  | Result - Remark   | Verdict |  |  |  |  |
|          |   |                   |         |  |  |  |  |
|          | The RCCB shall trip with a test current of 1,25 $I_{\Delta N}$ - break time not exceeding the value for $I_{\Delta N}$ in table 1                           | 23ms              | Р       |  |  |  |  |
|          | Marking still legible after test  |                   | Р       |  |  |  |  |
| 9.13.2   | Ball pressure test for external parts of insulating material necessary to retain current-carrying parts or parts of the protective circuit in position:     |                   | Р       |  |  |  |  |
|          | - T = 125 ± 2°C   | 125°C             | Р       |  |  |  |  |
|          | After 1 h Ø of impression ≤ 2 mm  | 1,5mm             | Р       |  |  |  |  |
| 9.13.3   | Ball pressure test for external parts of insulating material not necessary to retain current-carrying parts or parts of the protective circuit in position: |                   | Р       |  |  |  |  |
|          | T = 70 ± 2°C  | 70°C              | Р       |  |  |  |  |
|          | ☐ T =± 2°C  | 1,0mm             | N/A     |  |  |  |  |
|          | (40°C + max. temperature rise of sub-clause 9.8)  |                   |         |  |  |  |  |
|          | Ø of impression ≤ 2 mm  |                   | Р       |  |  |  |  |
| 3.10     | Resistance to abnormal heat and to fire   |                   |         |  |  |  |  |
|          | External parts of insulating material are not liable to ignite and to spread fire under fault or overload conditions.                                       |                   | Р       |  |  |  |  |
| 9.14     | Glow-wire test  |                   |         |  |  |  |  |
|          | - External parts of insulating material necessary to retain current-carrying parts or parts of the protective circuit in position                           | 960(Enclosure)    | Р       |  |  |  |  |
|          | - All other external parts of insulating material:  | 650(Handle)       | Р       |  |  |  |  |
|          | No visible flame and no sustained glowing   | No flames(Handle) | Р       |  |  |  |  |
|          | Flames and glowing extinguish within 30 s after removal   | 5,6s(Enclosure)   | Р       |  |  |  |  |
|          | No ignition of tissue paper or scorching of the pinewood board  |                   | Р       |  |  |  |  |
| <u>-</u> |   |                   |         |  |  |  |  |
|          | TEST SEQUENCE "B" replace the complete test sequence "B"  | B4 B5 B6          | Р       |  |  |  |  |
|          | (3 samples: In= 63A, I <sub>Δn</sub> = 0,03A, type A)   |                   |         |  |  |  |  |
| 3        | requirements for construction and operation   |                   |         |  |  |  |  |
| 8.3      | dielectric properties and isolating capability  |                   |         |  |  |  |  |
|          | RCCBs have adequate dielectric properties   |                   | Р       |  |  |  |  |
| 9.7      | test of dielectric properties and isolating capabilit   | у                 |         |  |  |  |  |
| 9.7.1.1  | Parts which can be removed without a tool are removed, spring lids kept open, inlet openings are  |                   | N/A     |  |  |  |  |

|         | IEC 61008-1  |             |            |            |     |  |  |  |  |
|---------|--|-------------|------------|------------|-----|--|--|--|--|
| Clause  | Requirement + Test Result - Remark   |             |            |            |     |  |  |  |  |
|         |  |             |            |            |     |  |  |  |  |
|         | left open and if knock-outs one is opened.   |             |            |            |     |  |  |  |  |
| 9.7.1.2 | Test conditions: 48 h in humidity cabinet RH = 91% to 95% T = 20 to 30°C ± 1°C   | 92%<br>25°C |            |            |     |  |  |  |  |
| 9.7.1.4 | The samples show no damage   |             |            |            | Р   |  |  |  |  |
| 9.7.2   | Insulation resistance of the main circuit measured between 30 and 60 min after this treatment with 500 V DC after 5 s:   | B4<br>[MΩ]  | B5<br>[MΩ] | B6<br>[MΩ] |     |  |  |  |  |
|         | a) between the terminals which are electrically connected together when the RCCB is in the closed position $\geq$ 2 M $\Omega$   | >500MΩ      | >500MΩ     | > 500MΩ    | Р   |  |  |  |  |
|         | b) between each pole and the others connected together (electronic components, connected between poles being disconnected)≥ 2 MΩ   | >500MΩ      | >500MΩ     | > 500MΩ    | P   |  |  |  |  |
|         | c) with the RCCB in the closed position, between all poles connected together and the frame, including a metal foil in contact with the outer surface of the internal enclosure of insulating material, if any≥ 5 MΩ | >500ΜΩ      | >500MΩ     | > 500MΩ    | Р   |  |  |  |  |
|         | d) between the frame and a metal foil in contact with the inner surface of the lining of insulating material $\geq 5~\text{M}\Omega$   |             |            |            | N/A |  |  |  |  |
| 9.7.3   | Dielectric strength of the main circuit measured with an AC voltage (45-65Hz) for 1 min:   |             |            |            |     |  |  |  |  |
|         | a)2000 V   | 2000        | 2000       | 2000       | Р   |  |  |  |  |
|         | b) (electronic components, connected between poles being disconnected) 2000 V  | 2000        | 2000       | 2000       | P   |  |  |  |  |
|         | c)2000 V   | 2000        | 2000       | 2000       | P   |  |  |  |  |
|         | e)2500 V   |             |            |            | N/A |  |  |  |  |
|         | No flashover or breakdown  |             |            | 1          | P   |  |  |  |  |
| 0.7.4   | Insulation resistance of auxiliary circuits measured with 500 V DC after 1 min:  | B4<br>[MΩ]  | B5<br>[MΩ] | B6<br>[MΩ] |     |  |  |  |  |
|         | 1) between all auxiliary circuits and the frame≥ 2 MΩ  |             |            |            | N/A |  |  |  |  |
|         | 2) between each part of the auxiliary circuits which might be isolated from the other parts and the whole of the other parts connected together  |             |            |            | N/A |  |  |  |  |
|         | Dielectric strength of auxiliary circuits measured with an AC voltage at rated frequency for 1 min:  |             |            |            |     |  |  |  |  |
|         | Rated voltage of auxiliary circuits (a.c. or d.c.)   |             |            |            |     |  |  |  |  |
|         | ≤ 30 600   |             |            |            |     |  |  |  |  |

|         |  |   |  |            | IEC 61                       | 008-1       |                               |                     |                    |                                     | _   |
|---------|--|---|--|------------|------------------------------|-------------|-------------------------------|---------------------|--------------------|-------------------------------------|-----|
| Clause  | se Requirement + Test Result - Remark  |   |  |            |                              |             |                               | Verdict             |                    |                                     |     |
|         |  |   |  |            |                              |             |                               |                     |                    |                                     |     |
|         | > 30 \le 8<br>> 50 \le 1<br>> 110 \le 250 \le  | 110<br>250                                      |  |            | 1000<br>1500<br>2000<br>2500 |             | V                             |                     |                    |                                     |     |
|         | 1) betw  | een all a                                       | uxiliary c   | ircuits ar | nd the fra                   | me          |                               |                     |                    |                                     | N/A |
|         | which  | h might<br>the whol                             | h part of be isolated at the contract of the c | ed from t  | he other                     | parts       |                               |                     |                    |                                     | N/A |
|         | No flash   | nover or  | perforation  | on         |                              |             |                               |                     |                    |                                     | N/A |
| 9.7.5   | Second   | ary circu                                       | uit of dete  | ction tra  | nsformer                     | 'S          |                               |                     |                    |                                     |     |
|         | accessi  |   | st, provid<br>al parts o<br>sts.   |            |                              |             |                               |                     |                    |                                     | N/A |
| 9.7.6   | Capability of control circuits connected to the main circuit of withstanding high DC voltages due to insulation measurements |   |  |            |                              |             |                               |                     |                    |                                     |     |
|         | RCCB fixed on metal support in closed position with all control circuits connected as in service.                            |   |  |            |                              |             |                               |                     |                    |                                     |     |
|         | Maximu<br>Short-ci<br>Applied  | im ripple<br>ircuit cur<br>for 1 mi<br>n each p | rent 12 n<br>n<br>ole and t  | nA +2 / -  |                              |             |                               |                     | 600                | Р                                   |     |
| 9.9.1.2 | Verification of the correct operation in case of sudden appearance of residual current by closing S <sub>1</sub>             |   |  |            |                              |             |                               |                     |                    |                                     |     |
|         | Type I <sub>N</sub> A I <sub>ΔN</sub> A Standard values of break time and non-actuating time at a residual current equal to  |   |  |            |                              |             |                               |                     |                    |                                     |     |
|         |  |   |  | IAN        | 2 i <sub>ΔN</sub>            | 5 Ian       | 5 I <sub>AN</sub> or 0,25A a) | 5A-200A,<br>500A b) | l <sub>∆t</sub> c) |                                     |     |
|         | General  | Any<br>value                                    | <0,03  | 0,3        | 0,15                         |             | 0,04                          | 0,04                | 0,04               | Max.                                |     |
|         |  |   | 0,03   | 0,3        | 0,15                         | -           | 0,04                          | 0,04                | 0,04               | times                               |     |
|         |  |   | >0,03  | 0,3        | 0,15                         | 0,04        |                               | 0,04                | 0,04               |                                     |     |
|         | S  | ≥ 25  | >0,03  | 0,5        | 0,2                          | 0,15        |                               | 0,15                | 0,15               | Max.<br>break<br>times              |     |
|         |  |   |  | 0,13       | 0,06                         | 0,05        |                               | 0,04                | 0,04               | Min.<br>non-<br>actuatin<br>g times |     |
|         | a) value   | to be de  | ecided by  | the manu   | facturer fo                  | or this tes | t                             |                     |                    |                                     |     |
|         | corre  | ct opera  | only made<br>tion as me<br>les exceed  | entioned i | n 9.9.1.2 (                  | d) but in   |                               |                     |                    |                                     |     |

| Report | Nο | ·130 | 700 | 0239 | SHA. | -002 |
|--------|----|------|-----|------|------|------|
|        |    |      |     |      |      |      |

|         | IEC 61008-1  |            |            |           |             |  |  |  |  |
|---------|--|------------|------------|-----------|-------------|--|--|--|--|
| Clause  | Requirement + Test   | Result - F | Remark     |           | Verdict     |  |  |  |  |
|         | overcurrent instantaneous tripping range are not   | Ι          |            |           |             |  |  |  |  |
|         | tested.  |            |            |           |             |  |  |  |  |
|         | <ul> <li>c) The test is made with a current I<sub>Δt</sub> equal to the<br/>lower limit of the overcurrent instantaneous<br/>tripping range according to type B, C or D, as<br/>applicable</li> </ul>  |            |            |           |             |  |  |  |  |
| 9.9.2.3 | Verification of the correct operation in case of sudden appearance of residual current by closing $S_{1_1}$ ( $S_2$ and RCCB in closed position):  |            |            |           | Р           |  |  |  |  |
|         | Maximum break times at:  | [ms]       | [ms]       | [ms]      |             |  |  |  |  |
|         | - I <sub>ΔN</sub>  | 38         | 36         | 39        | Р           |  |  |  |  |
|         | - 2 I <sub>ΔN</sub>  | 29         | 30         | 29        | Р           |  |  |  |  |
|         | - 5 I <sub>ΔN</sub> or   | _          | -          | -         | N/A         |  |  |  |  |
|         | - 0,25 A   | 19         | 21         | 21        | Р           |  |  |  |  |
|         | - 500 A  | 8          | 7          | 7         | Р           |  |  |  |  |
|         | No value exceeds the relevant specified limiting value   |            |            |           | Р           |  |  |  |  |
|         | Additional test for type S:  |            |            |           |             |  |  |  |  |
|         | Minimum non-actuating time at:   | [ms]       | [ms]       | [ms]      |             |  |  |  |  |
|         | - I <sub>ΔN</sub> 0,13 s   |            |            |           | N/A         |  |  |  |  |
|         | - 2 I <sub>ΔN</sub>  |            |            |           | N/A         |  |  |  |  |
|         | - 5 I <sub>ΔN</sub>  |            |            |           | N/A         |  |  |  |  |
| _       | - 500 A  |            |            |           | N/A         |  |  |  |  |
|         | The test switch S <sub>1</sub> and the RCCB being in the closed position, the test voltage is suddenly established by closing the test switch S <sub>2</sub> for min. non-operating times acc. table 1 |            |            |           | N/A         |  |  |  |  |
| 9.7.7   | verification of impulse withstand voltages (across and of leakage current across open contacts   | clearance  | es and acr | oss solid | insulation) |  |  |  |  |
| 9.7.7.1 | verification of impulse withstand voltage across the open contacts (suitAbility for isolation)   |            |            |           |             |  |  |  |  |
|         | The test is carried out on an RCCB fixed on a metal support  |            |            |           | Р           |  |  |  |  |
|         | The impulses are given by a generator producing positive and negative impulses having a front time of 1,2µs, and a time to half-value of 50µs  |            |            |           | Р           |  |  |  |  |
|         | The shape of the impulses is adjusted with the RCCB under test connected to the impulse generator.   |            |            |           | Р           |  |  |  |  |
|         | The test voltage is applied between the line terminals connected together and the load terminals connected together with the contacts in the open position   |            |            |           | Р           |  |  |  |  |
|         | Three positive impulses and three negative impulses are applied, the interval between consecutive impulses being   |            |            |           | Р           |  |  |  |  |

|        | IEC 61008-1  |            |        |     |         |  |  |  |
|--------|--|------------|--------|-----|---------|--|--|--|
| Clause | Requirement + Test   | Result - F | Remark |     | Verdict |  |  |  |
| _      | No Advantage designs for the   | Τ          |        |     |         |  |  |  |
| 0.4    | No tripping during tests   |            |        |     | P       |  |  |  |
| 8.4    | Temperature rise   |            |        |     |         |  |  |  |
|        | Temperature rises do not exceed the limiting values stated in table 7.   |            |        |     | P       |  |  |  |
|        | Cross-section (mm²)  | 16mm²      |        |     |         |  |  |  |
| 9.8.1  | Ambient air temperature (°C)   | 22°C       |        |     |         |  |  |  |
| 9.8.2  | Test current $I_N$ (A) until steady state values are reached.  | 63A        |        |     |         |  |  |  |
|        | Four pole RCCBs:   |            | Р      |     |         |  |  |  |
|        | Current passing through  |            | Р      |     |         |  |  |  |
| •      | - 3 phase poles (1)  |            | Р      |     |         |  |  |  |
|        | - neutral and adjacent pole (2)  |            | Р      |     |         |  |  |  |
|        | PartsTemperature rise K  | [K]        | [K]    | [K] | <u></u> |  |  |  |
|        | Terminals for external connections65   | 52         | 53     | 53  | Р       |  |  |  |
|        | External parts liable to be touched during manual operation of the RCCB, including operating means of insulating material and metallic means for coupling insulated operating means of several poles | 8          | 10     | 10  | P       |  |  |  |
|        | External metallic parts of operating means25   | -          | -      | -   | N/A     |  |  |  |
|        | Other external parts, including that face of the RCCB in direct contact with the mounting surface  | 20         | 21     | 21  | Р       |  |  |  |
| 9.20   | Verification of resistance of the insulation against an impulse voltage  |            |        |     |         |  |  |  |
|        | RCCB fixed on metal support in closed position and wired as in normal use.   |            |        |     | Р       |  |  |  |
|        | Impulse voltage 1,2 / 50 µs with a peak value of:  |            |        | ·   |         |  |  |  |
|        | <ul> <li>6 kV between the phase pole(s) connected<br/>together and the neutral pole or, in absence of<br/>the neutral pole, on one pole taken at random</li> </ul>                                   |            |        |     | Р       |  |  |  |
|        | <ul> <li>8 kV between the metal support connected to<br/>terminal(s) for the protective conductor(s)<br/>and all poles connected together</li> </ul>   |            |        |     | Р       |  |  |  |
|        | No unintentional disruptive discharge  |            |        |     | P       |  |  |  |
| 3.16   | Reliability  |            |        |     |         |  |  |  |
|        | RCCBs operate reliably even after long service.  |            |        |     | Р       |  |  |  |
| 9.22.2 | Test with 28 cycles at 40 ± 2°C  |            |        |     |         |  |  |  |
|        | Cross-section (mm²)  | 16mm²      |        |     |         |  |  |  |
|        | _ 2,   |            |        |     |         |  |  |  |

Torque <sup>2</sup>/<sub>3</sub> (Nm).....

Test current I<sub>N</sub> (A) .....

1,67Nm

63A

| Report | No. 130 | 700023SH <i>A</i> | 4-002 |
|--------|---------|-------------------|-------|
|        |         |                   |       |

|        | IEC 61008-1   |            |        |      |         |
|--------|---|------------|--------|------|---------|
| Clause | Requirement + Test  | Result - F | Remark |      | Verdict |
|        |   |            |        |      |         |
|        | - with current passing21 h  |            |        |      | P       |
|        | - without current3 h  |            |        |      | Р       |
|        | For 4 pole RCCBs with 3 overcurrent protected poles only 3 poles loaded   |            |        |      | P<br>   |
|        | At the end of the last period of 21 h with current passing the temperature rise of the terminals shall not exceed 65K                             | [K]        | [K]    | [K]  |         |
|        |   | 52         | 55     | 54   | Р       |
|        | After cool down the RCCB shall trip with a test current of 1,25 $I_{\Delta N}$ - break time not exceeding the value for $I_{\Delta N}$ in table 1 | [ms]       | [ms]   | [ms] |         |
|        |   | 21         | 23     | 22   | Р       |
|        | Test switch $S_2$ and RCCB in the closed position, test voltage established by closing the test switch $S_1$ .                                    |            |        |      | Р       |
| 9.23   | Verification of ageing  |            |        | _    |         |
|        | 168 h at 40 ± 2°C   | 40°C       | _      |      |         |
|        | Test current I <sub>N</sub> (A)   | 63A        |        |      |         |
|        | Cross-section (mm²)   | 16mm²      |        |      |         |
|        | Electronic parts at 1,1 U <sub>N</sub>  | 457V       |        |      |         |
|        | After cool down:  |            |        |      | Р       |
|        | - electronic parts show no damage   |            |        |      | Р       |
|        | The RCCB shall trip with a test current of 1,25 $I_{\Delta N}$ - break time not exceeding the value for $I_{\Delta N}$ in table 1                 | [ms]       | [ms]   | [ms] |         |
|        |   | 26         | 27     | 23   | Р       |
|        | Test switch $S_2$ and RCCB in the closed position, test voltage established by closing the test switch $S_1$                                      |            |        |      | Р       |
|        |   |            |        |      |         |
|        | TEST SEQUENCE "C"   | C.4        | L C5   | C6   | l p     |

|                   | TEST SEQUENCE "C"  | C4   | C5   | C6   | Р |
|-------------------|--|------|------|------|---|
|                   | (3 samples: ln= 63A, $I_{\Delta n}$ = 0,03A, type A)   |      |      |      |   |
|                   | TESTS C <sub>1</sub>   |      |      |      |   |
| 8                 | requirements for construction and operation  |      |      | "    |   |
| 8.6               | Mechanical and electrical endurance  |      |      |      |   |
|                   | RCCBs shall be capable of performing an adequate number of mechanical and electrical operations. |      |      |      | Р |
| 9.10.3<br>modify: | After test:  |      |      |      |   |
|                   | a)   | 900V | 900V | 900V | Р |
|                   | b)   | 900V | 900V | 900V | P |

|                       | Page 139 of 164  |            | Report | No.:1307000 | )23SHA-  |
|-----------------------|--|------------|--------|-------------|----------|
|                       | IEC 61008-1  |            |        |             |          |
| Clause                | Requirement + Test   | Result - R | emark  |             | Verdict  |
|                       |  |            |        |             |          |
|                       | c)   | 900V       | 900V   | 900∨        | Р        |
|                       | d)   |            |        |             | N/A      |
| _                     | TEST SEQUENCE "D"  | D4         | D5     | D6          | P        |
|                       |  | 54         | D3     | D0          | r        |
|                       | (3 samples: In= 63A, I <sub>Δn</sub> = 0,03A, type A)  |            |        |             |          |
|                       | TEST D <sub>0</sub>  |            |        |             | <u>P</u> |
| 9.9.2.4<br>modify:    | Verification of the correct operation in case of sudden appearance of residual current between 5 I <sub>ΔN</sub> and 500A among the following list: 5A - 10A - 20A - 50A - 100A - 200A |            |        |             | Р        |
|                       | by closing S <sub>2</sub> , (S <sub>1</sub> and RCCB in closed position):  |            |        | _           |          |
|                       | - 5A (value 1 between 5A and 200A)   | 15ms       | 15ms   | 15ms        | P        |
|                       | - 10A (value 1 between 5A and 200A)  | 13ms       | 12ms   | 12ms        | Р        |
|                       | - 20A (value 1 between 5A and 200A)  | 11ms       | 10ms   | 10ms        | P        |
|                       | - 50A (value 1 between 5A and 200A)  | 10ms       | 9ms    | 7ms         | P        |
|                       | - 100A (value 1 between 5A and 200A)   | 9ms        | 9ms    | 8ms         | P        |
|                       | - 200A (value 1 between 5A and 200A)   | 7ms        | 8ms    | 7ms         | Р        |
|                       | No value exceeds the relevant specified limiting value   |            |        |             | P        |
|                       | TEST D₁  |            |        |             | P        |
| 8                     | requirements for construction and operation  |            |        |             |          |
| 8.12                  | RCCBs functionally dependent on line voltage   |            |        |             |          |
|                       | RCCBs functionally dependent on the line voltage operate correctly between 0,85 and 1,1 UN   |            |        |             | N/A      |
| 9.17                  | Verification of the behaviour of RCCBs opening automatically in case of failure of the line voltage  |            |        |             |          |
| 9.17.1<br>replace by: | Limiting value of the line voltage U <sub>x</sub>  |            |        |             |          |
|                       | U <sub>N</sub> applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs  | [V]        | [V]    | [V]         | -        |
|                       |  |            |        |             | N/A      |
|                       | All values less than 0,7 U <sub>N</sub>  |            |        |             | N/A      |
|                       | Tripping test:   |            |        |             | N/A      |
|                       | Test voltage (V)   | : V        |        | _           |          |
|                       |  |            |        |             |          |

Time corresponding to value for  $I_{\Delta N}$  in table 1

[ms]

[ms]

[ms]

Р

9.12.2

the open position

Mechanical impact

by operating the test device when the RCCB is in

| Report | No.:1307 | 700023SH | 1A-002 |
|--------|----------|----------|--------|
|--------|----------|----------|--------|

|                         | IEC 61008-1   |                 |         |  |  |  |  |
|-------------------------|---|-----------------|---------|--|--|--|--|
| Clause                  | Requirement + Test  | Result - Remark | Verdict |  |  |  |  |
|                         |   |                 |         |  |  |  |  |
|                         | test acc. 9.12.2.1 for all types, in addition by the tests of:  |                 | Р       |  |  |  |  |
|                         | - 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;   |                 | P       |  |  |  |  |
|                         | - 9.12.2.3 for plug-in type RCCBs, the holding in position of which depends solely on their connections.  |                 | N/A     |  |  |  |  |
| 9.12.2.2<br>replace by: | RCCBs for rail mounting downward vertical force of 50 N for 1 min, upward vertical force of 50 N for 1 min  |                 | Р       |  |  |  |  |
|                         | 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.  |                 | N/A     |  |  |  |  |
|                         | RCCB shall not become loose during test and no  | D4 -            | Р       |  |  |  |  |
|                         | damage impairing its further use:   | D5 -            |         |  |  |  |  |
|                         |   | D6 -            |         |  |  |  |  |
| 9.12.2.3<br>replace 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). |                 | N/A     |  |  |  |  |

|                    | TEST SEQUENCE "D"   |   | D8           |   | Р |
|--------------------|---|---|--------------|---|---|
|                    | (3 samples: In= 63A, I <sub>∆n</sub> = 0,03A, type AC)  |   |              |   |   |
|                    | TEST D₀   |   |              |   | Р |
| 9.9.2.4<br>modify: | Verification of the correct operation in case of sudden appearance of residual current between 5 I <sub>AN</sub> and 500A among the following list: 5A - 10A - 20A - 50A - 100A - 200A by closing S <sub>21</sub> (S <sub>1</sub> and RCCB in closed position): |   |              |   | Р |
|                    | - 5A (value 1 between 5A and 200A)  | - | 15ms         | _ | P |
|                    | - 10A (value 1 between 5A and 200A)   | - | 13ms         | - | Р |
|                    | - 20A (value 1 between 5A and 200A)   | - | 11ms         | - | Р |
|                    | - 50A (value 1 between 5A and 200A)   | - | 12ms         | - | Р |
|                    | - 100A (value 1 between 5A and 200A)  | - | 9ms          | - | Р |
|                    | - 200A (value 1 between 5A and 200A)  | - | 9ms          | _ | Р |
|                    | No value exceeds the relevant specified limiting  |   | <del>-</del> |   | Р |

|                       | IEC 61008-1   |                          |             |      |         |
|-----------------------|---|--------------------------|-------------|------|---------|
| Clause                | Requirement + Test  | Result - F               | Remark      |      | Verdict |
|                       |   |                          |             |      |         |
|                       | value   |                          |             |      |         |
|                       | TEST D <sub>1</sub>   |                          |             |      | Р       |
| 8                     | requirements for construction and operation   |                          |             |      |         |
| 8.12                  | RCCBs functionally dependent on line voltage  |                          |             |      |         |
|                       | RCCBs functionally dependent on the line voltage operate correctly between 0,85 and 1,1 UN  |                          |             |      |         |
| 9.17                  | Verification of the behaviour of RCCBs opening at failure of the line voltage   | utomatica                | lly in case | of   |         |
| 9.17.1<br>replace by: | Limiting value of the line voltage U <sub>x</sub>   |                          |             |      |         |
|                       | U <sub>N</sub> applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs | [V]                      | [V]         | [V]  |         |
|                       |   |                          |             |      | N/A     |
|                       | All values less than 0,7 U <sub>N</sub>   |                          |             |      | N/A     |
|                       | Tripping test:  |                          |             |      | N/A     |
|                       | Test voltage (V)  | V                        |             |      |         |
|                       | Residual current 1,25.l <sub>an</sub>   | 1,25.1 <sub>AN</sub> = A |             |      |         |
|                       | Time corresponding to value for I <sub>ΔN</sub> in table 1  | [ms]                     | [ms]        | [ms] |         |
|                       | No value exceeds the specified limiting values  |                          |             |      | N/A     |
|                       | Not possible to close the apparatus by manual operating means below U <sub>x</sub>  |                          |             |      | N/A     |
| 9.17.2<br>replace by: | Verification of behaviour in case of failure of the line  | voltage                  |             |      | N/A     |
|                       | RCCB supplied with U <sub>N</sub> and line voltage, then switched off   |                          |             |      | N/A     |
|                       | Time interval between switching off and opening of the main contacts:   | [ms]                     | [ms]        | [ms] |         |
| a)                    | RCCBs opening without delay   |                          |             |      | N/A     |
|                       | - no value exceeds 0,5 s  |                          |             |      | N/A     |
|                       | - no tripping shall occur if the voltage is switched off for a time not exceeding 0,03 s  |                          |             |      | N/A     |
| b)                    | RCCBs opening with delay  |                          |             |      | N/A     |
|                       | Values within the range indicated by manufacturer   | to                       |             | ms   | N/A     |
|                       | RCCBs classified 4.1.2.1b): switch off at U <sub>N</sub>  |                          |             |      | N/A     |
|                       | Voltage off and on at the line side:  |                          |             |      | N/A     |
|                       | No automatically closing  |                          |             |      | N/A     |

| IEC 61008-1 |  |                 |         |  |  |  |
|-------------|--|-----------------|---------|--|--|--|
| Clause      | Requirement + Test   | Result - Remark | Verdict |  |  |  |
|             |  |                 |         |  |  |  |
|             | is applied to the RCCB portion at a point equidistant between the plug-in connections, without jerks for 1 |                 |         |  |  |  |

| 9.11.2.3c) | Tests "D2"   | D2-4 | D2-5 | D2-6 | Р |
|------------|--|------|------|------|---|
|            | (3 samples: In= 63A, I <sub>∆n</sub> = 0,03A, type A)  |      |      |      |   |
| modify:    | Test voltage 110% of rated phase to neutral voltage for the pole exclusively for the neutral |      |      |      | Р |

|                       | TEST SEQUENCE E   | E4                            |        | FC      | Р     |
|-----------------------|---|-------------------------------|--------|---------|-------|
|                       | (3 samples: In= 63A, I <sub>Δn</sub> = 0,03A, type A)   | E4                            | E5     | E6      | "     |
| 9.11.2.4a)            | Verification of the coordination at the rated conditional short-circuit current (A): Inc  | 6000A                         |        |         | Р     |
| modify:               | After the tests no damage impairing further use   |                               |        |         | Р     |
| 9.7.3                 | Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:   |                               |        |         | Р     |
|                       | a)  | E4 - OK<br>E5 - OK<br>E6 - OK |        |         | Р     |
|                       | b):   | E4 - OK<br>E5 - OK<br>E6 - OK |        |         | Р     |
|                       | c):   | E4 - OK<br>E5 - OK<br>E6 - OK |        |         | Р     |
|                       | d):   | E4 -<br>E5 -<br>E6 -          |        |         | N/A   |
|                       | No flashover or breakdown   |                               |        |         | P     |
| 9.17                  | Verification of the behaviour of RCCBs opening a failure of the line voltage  | utomatically                  | in cas | se of   | gr to |
| 9.17.1<br>replace by: | Limiting value of the line voltage U <sub>x</sub>   |                               |        |         | N/A   |
|                       | U <sub>N</sub> applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs | [V]                           | [V]    | [\( \)] |       |
|                       |   |                               |        |         | N/A   |

|  | IEC 61008-1  |                        |       |      |  |
|--|--|------------------------|-------|------|--|
| Clause                                 | Requirement + Test   | Result - R             | emark |      | Verdict  |
|  |  |                        |       |      |  |
|  | All values less than 0,7 U <sub>N</sub>  |                        |       |      | N/A  |
|  | Tripping test:   |                        |       |      | N/A  |
|  | Test voltage (V)   | V                      |       |      | - Aller - Alle |
|  | Residual current 1,25.I <sub>ΔN</sub>  | 1,25.I <sub>ΔN</sub> = | Α     |      | week   |
|  | Time corresponding to value for I <sub>ΔN</sub> in table 1   | [ms]                   | [ms]  | [ms] |  |
|  | No value exceeds the specified limiting values   |                        |       |      | N/A  |
|  | Not possible to close the apparatus by manual operating means below U <sub>x</sub>   |                        |       |      | N/A  |
| 9.17.2<br>replace by:                  | Verification of behaviour in case of failure of the line voltage   |                        |       |      |  |
|  | RCCB supplied with $U_N$ and line voltage, then switched off   |                        |       |      | N/A  |
|  | Time interval between switching off and opening of the main contacts:  | [ms]                   | [ms]  | [ms] |  |
| a)                                     | RCCBs opening without delay  |                        |       | 2    | N/A  |
|  | - no value exceeds 0,5 s   |                        |       |      | N/A  |
|  | - no tripping shall occur if the voltage is switched off for a time not exceeding 0,03 s                                   |                        |       |      | N/A  |
| b)                                     | RCCBs opening with delay   |                        |       | _    | N/A  |
|  | Values within the range indicated by manufacturer  | to                     |       | ms   | N/A  |
|  | RCCBs classified 4.1.2.1b): switch off at U <sub>N</sub>   |                        |       |      | N/A  |
| · <del></del>                          | Voltage off and on at the line side:   |                        |       |      | N/A  |
|  | No automatically closing   |                        |       |      | N/A  |
| 9.17.4<br>replace by:                  | Verification of the correct operation of RCCBs with 3 residual current, the neutral and one line terminal on the title by) |                        |       |      | N/A  |
| 9.11.2.2                               | Verification of the rated making and breaking capacity (A): Im   | 630A                   |       |      | Р  |
| modify:                                | After the tests no damage impairing further use  |                        |       |      | ————<br>Р  |
| 9.7.3                                  | Dielectric strength test of the main circuit at test   |                        |       |      | <u>'</u>   |
|  | voltage of 2 Un for 1 min:   |                        |       |      |  |
|  | a):  | E4 - OK                |       |      | Р  |
|  |  | E5 - OK                |       |      |  |
| ··-··································· |  | E6 - OK                |       |      |  |
|  | b):  | E4 - OK                |       |      | Р  |
|  |  | E5 - OK                |       |      |  |
|  |  | E6 - OK                |       |      |  |

|                       | IEC 61008-1   |                                 |       |          |         |
|-----------------------|---|---------------------------------|-------|----------|---------|
| Clause                | Requirement + Test  | Result - Re                     | emark |          | Verdict |
|                       | c):   | E4 - OK                         |       |          | P       |
|                       |   | E5 - OK<br>E6 - OK              |       |          |         |
|                       | d):   | E4 -                            |       |          | N/A     |
|                       | No flashover or breakdown:  | E6 -<br>E4 -<br>E5 -            |       |          | Р       |
| 9.17                  | Verification of the behaviour of RCCBs opening at failure of the line voltage   | E6 -<br>utomatically in case of |       |          |         |
| 9.17.1<br>replace by: |   |                                 |       |          | N/A     |
|                       | U <sub>N</sub> applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs | [V]                             | [V]   | [\( \)]  | -       |
|                       |   |                                 |       |          | N/A     |
|                       | All values less than 0,7 U <sub>N</sub>   |                                 |       |          | N/A     |
|                       | Tripping test:  |                                 |       |          | N/A     |
|                       | Test voltage (V)  | V                               |       |          |         |
|                       | Residual current 1,25.l <sub>AN</sub>   | 1,25.I <sub>ΔN</sub> =          | A     |          |         |
|                       | Time corresponding to value for $I_{\Delta N}$ in table 1   | [ms]                            | [ms]  | [ms]     |         |
|                       | No value exceeds the specified limiting values  |                                 |       |          | N/A     |
|                       | Not possible to close the apparatus by manual operating means below $U_x$   |                                 |       |          | N/A     |
| 9.17.2<br>replace by: | Verification of behaviour in case of failure of the line voltage  |                                 |       |          |         |
|                       | RCCB supplied with U <sub>N</sub> and line voltage, then switched off   |                                 |       |          | N/A     |
|                       | Time interval between switching off and opening of the main contacts:   | [ms]                            | [ms]  | [ms]     |         |
| a)                    | RCCBs opening without delay   |                                 |       |          | N/A     |
|                       | - no value exceeds 0,5 s  |                                 |       | <u> </u> | N/A     |
|                       | - no tripping shall occur if the voltage is switched off for a time not exceeding 0,03 s  |                                 |       |          | N/A     |
| b)                    | RCCBs opening with delay  |                                 |       |          | N/A     |
|                       | Values within the range indicated by manufacturer   | to                              |       | ms       | N/A     |
|                       | RCCBs classified 4.1.2.1b): switch off at U <sub>N</sub>  |                                 |       |          | N/A     |

|                       | Page 1                               | 47 of 164 | Report No.:130700023SH |         |
|-----------------------|--------------------------------------|-----------|------------------------|---------|
|                       | IEC (                                | 51008-1   |                        |         |
| Clause                | Requirement + Test                   |           | Result - Remark        | Verdict |
|                       |                                      |           |                        |         |
|                       | Voltage off and on at the line side: |           |                        | N/A     |
|                       | No automatically closing             |           |                        | N/A     |
| 9.17.4<br>replace by: |                                      |           |                        |         |

|                       | TEST SEQUENCE F   |              |           |          | Р   |
|-----------------------|---|--------------|-----------|----------|-----|
|                       | (3 samples: ln= 63A, l∆n= 0,03A, type A)  | F7           | F8 F9     | <u> </u> | r   |
| 9.11.2.4b)            | Verification of the coordination at the rated making  | 630A         |           |          | P   |
|                       | and breaking capacity (A): Im:  |              |           |          |     |
| modify:               | After the tests no damage impairing further use   |              |           |          | P   |
| 9.7.3                 | Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:   |              |           |          | Р   |
|                       | a):   | F7 - OK      |           |          | P   |
|                       | a)  | F8 - OK      |           |          |     |
|                       |   | F9 - OK      |           |          |     |
|                       | b):   | F7 - OK      |           |          | Р   |
|                       | 0)  | F8 - OK      |           |          |     |
| _                     |   | F9 - OK      |           |          |     |
|                       | c):   | F7 - OK      |           |          | P   |
|                       | (5)   | F8 - OK      |           |          |     |
|                       |   | F9 - OK      |           |          |     |
|                       |   | F7 -         |           |          | N/A |
|                       | d):   | F8 -         |           |          |     |
|                       |   | F9 -         |           |          |     |
|                       | No flashover or breakdown:  |              |           |          | Р   |
| 9.17                  | Verification of the behaviour of RCCBs opening at failure of the line voltage   | utomatically | / in case | of       |     |
| 9.17.1<br>replace by: | Limiting value of the line voltage U <sub>x</sub>   |              |           | N/A      |     |
|                       | U <sub>N</sub> applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs | [V]          | [V]       | [V]      |     |
|                       |   |              |           | 1        | N/A |
|                       | All values less than 0,7 U <sub>N</sub>   |              |           |          | N/A |
|                       | Tripping test:  |              |           |          | N/A |
|                       | Test voltage (V)  | V            |           |          |     |

|                       | IEC 61008-1  |  |                                 |                   |            |
|-----------------------|--|--|---------------------------------|-------------------|------------|
| Clause                | Requirement + Test   | Result - Re                              | emark                           |                   | Verdict    |
|                       |  |  |                                 |                   |            |
|                       | Residual current 1,25.I <sub>ΔN</sub>  | 1,25.l <sub>△N</sub> =                   | Α                               |                   | <b>-</b> - |
|                       | Time corresponding to value for I <sub>ΔN</sub> in table 1   | [ms]                                     | [ms]                            | [ms]              |            |
|                       | No value exceeds the specified limiting values   |  |                                 |                   | N/A        |
|                       | Not possible to close the apparatus by manual operating means below $U_x$  |  |                                 |                   | N/A        |
| 9.17.2<br>replace by: | Verification of behaviour in case of failure of the line   | voltage                                  |                                 |                   | N/A        |
|                       | RCCB supplied with $U_N$ and line voltage, then switched off   |  |                                 |                   | N/A        |
|                       | Time interval between switching off and opening of the main contacts:  | [ms]                                     | [ms]                            | [ms]              |            |
| э)                    | RCCBs opening without delay  |  |                                 |                   | N/A        |
|                       | - no value exceeds 0,5 s   |  |                                 |                   | N/A        |
|                       | - no tripping shall occur if the voltage is switched off for a time not exceeding 0,03 s                                   |  |                                 |                   | N/A        |
| b)                    | RCCBs opening with delay   |  |                                 |                   | N/A        |
|                       | Values within the range indicated by manufacturer  | to ms                                    |                                 | ms                | N/A        |
|                       | RCCBs classified 4.1.2.1b): switch off at U <sub>N</sub>   |  |                                 |                   | N/A        |
|                       | Voltage off and on at the line side:   |  |                                 |                   | N/A        |
|                       | No automatically closing   |  |                                 |                   | N/A        |
| 9.17.4<br>replace by: | Verification of the correct operation of RCCBs with 3 residual current, the neutral and one line terminal on the title by) | or 4 poles,<br>ly being en               | in presen<br>ergized <i>(re</i> | ce of a<br>eplace | N/A        |
| 9.11.2.4c)            | Verification of the coordination at the rated  | 6000A                                    |                                 |                   | Р          |
|                       | conditional residual short-circuit current (A): IΔc .:   |  | _                               |                   |            |
| nodify:               | After the tests no damage impairing further use  |  |                                 |                   | Р          |
| 9.7.3                 | Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:  |  |                                 |                   | Р          |
|                       | a):  | F7 - OK<br>F8 - OK<br>F9 - OK            |                                 |                   | Р          |
|                       | b):  | F7 - OK<br>F8 - OK                       |                                 |                   | P          |
|                       | c):  | F9 - OK<br>F7 - OK<br>F8 - OK<br>F9 - OK |                                 |                   | P          |

|                       | IEC 61008-1   |                        |           |      |         |
|-----------------------|---|------------------------|-----------|------|---------|
| Clause                | Requirement + Test  | Result - Re            | emark     |      | Verdict |
|                       |   |                        |           |      |         |
|                       | d):   | F7 -                   |           |      | N/A     |
|                       | ,   | F8 -                   |           |      |         |
|                       |   | F9 -                   |           |      |         |
|                       | No flashover or breakdown:  | F7-                    |           |      | Р       |
|                       |   | F8 -                   |           |      |         |
|                       | F9 -  |                        |           |      |         |
| 9.17                  | Verification of the behaviour of RCCBs opening at failure of the line voltage   | ıtomaticall            | y in case | of   |         |
| 9.17.1<br>replace by: | Limiting value of the line voltage U <sub>x</sub>   |                        |           |      | N/A     |
|                       | U <sub>N</sub> applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs | [V]                    | [V]       | [V]  |         |
|                       |   |                        |           |      | N/A     |
|                       | All values less than 0,7 U <sub>N</sub>   |                        |           |      | N/A     |
|                       | Tripping test:  |                        |           |      | N/A     |
|                       | Test voltage (V)  | V                      |           |      |         |
|                       | Residual current 1,25.l <sub>ΔN</sub>   | 1,25.1 <sub>4N</sub> = | Α         |      |         |
|                       | Time corresponding to value for $I_{\Delta N}$ in table 1   | [ms]                   | [ms]      | [ms] |         |
|                       | No value exceeds the specified limiting values  |                        |           |      | N/A     |
|                       | Not possible to close the apparatus by manual operating means below $U_x$   |                        |           |      | N/A     |
| 9.17.2<br>replace by: | Verification of behaviour in case of failure of the line  | voltage                |           |      | N/A     |
|                       | RCCB supplied with U <sub>N</sub> and line voltage, then switched off   |                        |           |      | N/A     |
|                       | Time interval between switching off and opening of the main contacts:   | [ms]                   | [ms]      | [ms] | w to .  |
| a)                    | RCCBs opening without delay   |                        |           |      | N/A     |
|                       | - no value exceeds 0,5 s  |                        |           |      | N/A     |
|                       | - no tripping shall occur if the voltage is switched off for a time not exceeding 0,03 s  |                        |           |      | N/A     |
| )                     | RCCBs opening with delay  |                        |           |      | N/A     |
|                       | Values within the range indicated by manufacturer   | to                     |           | ms   | N/A     |
|                       | RCCBs classified 4.1.2.1b): switch off at U <sub>N</sub>  |                        |           |      | N/A     |
|                       | Voltage off and on at the line side:  |                        |           |      | N/A     |
|                       | No automatically closing  |                        |           |      | N/A     |

| Report N | No.:130700023SHA-00 | 2 |
|----------|---------------------|---|
|----------|---------------------|---|

|                       | IEC 610  | 08-1            |         |
|-----------------------|--|-----------------|---------|
| Clause                | Requirement + Test   | Result - Remark | Verdict |
| 9.17.4<br>replace by: | Verification of the correct operation of RCC residual current, the neutral and one line te the title by) |                 | N/A     |

|                       | TEST SEQUENCE F   | F10                    | F11 I     | F12      | Р   |
|-----------------------|---|------------------------|-----------|----------|-----|
|                       | (3 samples: In=10A, IΔn= 0,3A, type AC)   |                        |           |          |     |
| 9.11.2.4b)            | Verification of the coordination at the rated making  | 500A                   |           |          | Р   |
|                       | and breaking capacity (A): Im:  |                        |           |          |     |
| modify:               | After the tests no damage impairing further use   |                        |           |          | Р   |
| 9.7.3                 | Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:   |                        |           |          | Р   |
|                       | a):   | F10 - OK               |           |          | P   |
|                       | a)  | F11 - OK               |           |          |     |
|                       |   | F12 - OK               |           |          |     |
|                       | b):   | F10 - OK               |           |          | Р   |
|                       | 0)  | F11 - OK               |           |          |     |
|                       |   | F12 - OK               |           |          |     |
|                       | c)  | F10 - OK               |           |          | Р   |
|                       | ()  | F11 - OK               |           |          |     |
|                       |   | F12 - OK               |           |          |     |
|                       | d)  | F10 -                  |           |          | N/A |
|                       | (1)   | F11 -                  |           |          |     |
|                       |   | F12 -                  |           |          |     |
|                       | No flashover or breakdown   |                        | _         |          | P   |
| 9.17                  | Verification of the behaviour of RCCBs opening a failure of the line voltage  | utomaticall            | y in case | of       |     |
| 9.17.1<br>replace by: | Limiting value of the line voltage U <sub>x</sub>   | _                      |           |          | N/A |
|                       | U <sub>N</sub> applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs | [V]                    | [V]       | [V]      | *** |
|                       |   |                        |           |          | N/A |
|                       | All values less than 0,7 U <sub>N</sub>   |                        |           | <u>'</u> | N/A |
|                       | Tripping test:  |                        |           |          | N/A |
|                       | Test voltage (V)  | V                      |           |          |     |
|                       | Residual current 1,25.l <sub>an</sub>   | 1,25.I <sub>AN</sub> = | A         |          |     |
|                       | Time corresponding to value for I <sub>3N</sub> in table 1  | [ms]                   | [ms]      | [ms]     |     |
|                       |   |                        |           |          |     |

| Report | No.:1307 | 700023SHA-0 | 02 |
|--------|----------|-------------|----|
|--------|----------|-------------|----|

|                       | IEC 61008-1   |           |      |      |     |
|-----------------------|---|-----------|------|------|-----|
| <br>Clause            | Requirement + Test Result - Remark  |           |      |      |     |
|                       |   |           |      |      |     |
|                       | No value exceeds the specified limiting values  |           |      |      | N/A |
|                       | Not possible to close the apparatus by manual operating means below U <sub>x</sub>                                      |           |      |      | N/A |
| 9.17.2<br>replace by: | Verification of behaviour in case of failure of the line  | e voltage | _    |      | N/A |
|                       | RCCB supplied with U <sub>N</sub> and line voltage, then switched off   |           |      |      | N/A |
|                       | Time interval between switching off and opening of the main contacts:   | [ms]      | [ms] | [ms] |     |
| a)                    | RCCBs opening without delay   |           |      |      | N/A |
|                       | - no value exceeds 0,5 s  |           |      |      | N/A |
|                       | - no tripping shall occur if the voltage is switched off for a time not exceeding 0,03 s                                |           |      |      | N/A |
| b)                    | RCCBs opening with delay  |           |      |      | N/A |
|                       | Values within the range indicated by manufacturer   | r to ms   |      | N/A  |     |
|                       | RCCBs classified 4.1.2.1b): switch off at U <sub>N</sub>  |           |      | N/A  |     |
|                       | Voltage off and on at the line side:  |           | ·    | _    | N/A |
|                       | No automatically closing  |           |      |      | N/A |
| 9.17.4<br>replace by: | Verification of the correct operation of RCCBs with residual current, the neutral and one line terminal o the title by) |           |      |      | N/A |
| 9.11.2.4c)            | Verification of the coordination at the rated   | 6000A     |      | Р    |     |
|                       | conditional residual short-circuit current (A): I∆c ∴   |           |      |      |     |
| modify:               | After the tests no damage impairing further use   |           |      |      | Р   |
| 9.7.3                 | Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:   |           |      |      | Р   |
|                       | a)  | F10 - OK  |      |      | P   |
|                       | <u> </u>  | F11 - OK  |      |      |     |
|                       |   | F12 - OK  |      |      |     |
|                       | b)  | F10 - OK  |      |      | Р   |
|                       | <i>-</i> ,  | F11 - OK  |      |      |     |
|                       |   | F12 - OK  |      |      |     |
|                       | c)  | F10 - OK  |      |      | P   |
|                       | -7  | F11 - OK  |      |      |     |
|                       |   | F12 - OK  |      |      |     |
|                       | d):   | F10 -     |      |      | N/A |
|                       | W/  | F11 -     |      |      |     |
|                       |   | F12 -     |      |      |     |

Report No.:130700023SHA-002 Page 152 of 164 IEC 61008-1 Result - Remark Verdict Clause Requirement + Test F10 -Р No flashover or breakdown ..... F11 -F12 -Verification of the behaviour of RCCBs opening automatically in case of 9.17 failure of the line voltage N/A 9.17.1 Limiting value of the line voltage Ux replace by: U<sub>N</sub> applied to the line terminals and progressively [V][V][V]lowered to attain zero within about 30s until automatic opening occurs N/A N/A All values less than 0,7 U<sub>N</sub> N/A Tripping test: Test voltage (V) ..... [ms] [ms] [ms] Time corresponding to value for  $I_{\Delta N}$  in table 1 No value exceeds the specified limiting values N/A Not possible to close the apparatus by manual N/A operating means below Ux 9.17.2 Verification of behaviour in case of failure of the line voltage N/A replace by: N/A RCCB supplied with U<sub>N</sub> and line voltage, then switched off Time interval between switching off and opening of [ms] [ms] [ms] the main contacts: a) RCCBs opening without delay N/A - no value exceeds 0,5 s N/A N/A - no tripping shall occur if the voltage is switched off for a time not exceeding 0,03 s N/A b) RCCBs opening with delay Values within the range indicated by manufacturer N/A to ms RCCBs classified 4.1.2.1b): switch off at U<sub>N</sub> N/A Voltage off and on at the line side: N/A N/A No automatically closing

| modify: TEST SEQUENCE "G" G7 G8 G9 P |
|--------------------------------------|
|--------------------------------------|

Verification of the correct operation of RCCBs with 3 or 4 poles, in presence of a

residual current, the neutral and one line terminal only being energized (replace

N/A

the title by)

9.17.4

replace by:

| Report | No.:130700023SHA- | -002 |
|--------|-------------------|------|
|--------|-------------------|------|

|        |                    | IEC 61008-1 |                 |         |
|--------|--------------------|-------------|-----------------|---------|
| Clause | Requirement + Test |             | Result - Remark | Verdict |
|        |                    |             |                 |         |

|         | (3 samples: In= 63A, I <sub>∆n</sub> = 0,03A, type AC) |     |     |     |   |
|---------|--|-----|-----|-----|---|
| 9.22    | Verification of reliability                            |     |     |     | Р |
| 9.22.1  | Climatic test  |     | _   |     | Р |
| modify: | TEST SEQUENCE "G"                                      | G10 | G11 | G12 | Р |
|         | (3 samples: In= 10A, I <sub>∆n</sub> = 0,3A, type A)   |     |     |     |   |
| 9.22    | Verification of reliability                            |     |     |     | Р |
| 9.22.1  | Climatic test  |     |     |     | Р |

|              | TEST SEQUENCE "H" (add the new test sequence)  | H1          | H2         | Н3      | Р   |
|--------------|--|-------------|------------|---------|-----|
|              | (3 samples: In= 63A, I <sub>∆n</sub> = 0,03A, type A)  |             |            |         |     |
| 8            | requirements for construction and operation  |             |            |         |     |
| add:<br>8.Z1 | Behaviour of RCCBs at low ambient air temperatur   | re          | _          |         |     |
|              | RCCBs for use between -25°C and +40°C operate reliably at low ambient air temperature                      |             |            |         | Р   |
| add:<br>9.Z1 | Verification of the correct operation at low ambient for use at temperatures between -25° C and +40° C     | t air tempe | erature fo | r RCCBs |     |
|              | RCCBs mounted in enclosure with degree of protection IP 55 and connected for normal use                    |             |            |         | Р   |
|              | RCCBs in a test chamber at +23°C ± 2°C and rH 90% ± 3%   |             |            |         | Р   |
|              | RCCBs in ON-position without load  |             |            |         | Р   |
|              | Five test cycles performed acc. to figure Z6   |             |            |         | P   |
|              | No tripping during cycles  |             |            |         | P   |
|              | At the end of last 6 h period at -25°C an a.c. residual current is passed through one pole (see figure 4a) |             |            |         | P   |
|              | - general type:  | [ms]        | [ms]       | [ms]    |     |
|              | break time at 1,25 $I_{\Delta N}$ not exceeding the value for $I_{\Delta N}$ in table 1                    | 31          | 24         | 26      | P   |
|              | - S-type:  | [ms]        | [ms]       | [ms]    |     |
|              | break time at 2,5 $I_{\Delta N}$ not exceeding the value for 2 $I_{\Delta N}$ in table 1                   |             |            |         | N/A |
|              | Additionally for RCCBs of type A:  |             |            |         | P   |
|              | Break time with pulsating d.c. residual currents of  |             |            |         | Р   |
|              | - 1,25 l <sub>ΔN</sub> (general type)  |             |            |         | Р   |

| Report | No :130 | 700023SHA- | กกว |
|--------|---------|------------|-----|
|        |         |            |     |

|              | IEC 61008-1   |              |            |        |         |
|--------------|---|--------------|------------|--------|---------|
| Clause       | Requirement + Test  | Result - Re  | emark      |        | Verdict |
|              |   |              |            |        |         |
|              | - 2,5 I <sub>ΔN</sub> (S-type)  | La constant  |            |        | N/A     |
|              | Multiplied by:  | [ms]         | [ms]       | [ms]   |         |
|              | 1,4 for I <sub>∆N</sub> > 0,01 A  | 25           | 28         | 21     | P       |
|              | 2 for $I_{\Delta N} \le 0.01 \text{ A}$   |              | _          |        | N/A     |
|              | at $\alpha = 0$ °el (test circuit figure 4b)  |              |            |        | Р       |
|              | After test possible to switch on the RCCB without presence of residual current                              |              |            |        | Р       |
|              | TEST SEQUENCE "H"   | H4           | H5         | <br>H6 | P       |
|              | (add the new test sequence)   |              |            |        |         |
|              | (3 samples: ln= 10A, I <sub>Δn</sub> = 0,3A, type AC)   |              |            |        |         |
| 8            | requirements for construction and operation   |              |            |        |         |
| add:<br>8.Z1 | Behaviour of RCCBs at low ambient air temperatu   | re           |            |        |         |
|              | RCCBs for use between -25°C and +40°C operate reliably at low ambient air temperature                       |              | _          |        | Р       |
| add:<br>9.Z1 | Verification of the correct operation at low ambien<br>for use at temperatures between<br>-25° C and +40° C | it air tempe | rature for | RCCBs  |         |
|              | RCCBs mounted in enclosure with degree of protection IP 55 and connected for normal use                     |              |            |        | Р       |
|              | RCCBs in a test chamber at +23°C $\pm$ 2°C and rH 90% $\pm$ 3%  |              |            | _      | Р       |
|              | RCCBs in ON-position without load   |              |            |        | Р       |
|              | Five test cycles performed acc. to figure Z6  |              |            |        | Р       |
|              | No tripping during cycles   |              |            |        | Р       |
|              | At the end of last 6 h period at -25°C an a.c. residual current is passed through one pole (see figure 4a)  |              |            |        | Р       |
|              | - general type:   | [ms]         | [ms]       | [ms]   |         |
|              | break time at 1,25 $I_{\Delta N}$ not exceeding the value for $I_{\Delta N}$ in table 1                     | 26           | 30         | 24     | Р       |
|              | - S-type:   | [ms]         | [ms]       | [ms]   |         |
|              | break time at 2,5 $I_{\Delta N}$ not exceeding the value for 2 $I_{\Delta N}$ in table 1                    |              |            |        | N/A     |
|              | Additionally for RCCBs of type A:   |              |            |        | N/A     |
|              | Break time with pulsating d.c. residual currents of   |              |            |        | N/A     |
|              | - 1,25 l <sub>∆N</sub> (general type)   |              |            |        | N/A     |
|              | - 2,5 I <sub>ΔN</sub> (S-type)  |              |            |        | N/A     |

| Report No.:130700023S |
|-----------------------|
|-----------------------|

N/A

|        | IEC 610                                      | 08-1       |       |      |         |
|--------|--|------------|-------|------|---------|
| Clause | Requirement + Test                           | Result - R | emark |      | Verdict |
|        | Multiplied by:                               | [ms]       | [ms]  | [ms] |         |
|        | 1,4 for I <sub>ΔN</sub> > 0,01 A             |            |       |      | N/A     |
|        | 2 for $I_{\Delta N} \le 0.01 \text{ A}$      |            |       |      | N/A     |
|        | at $\alpha = 0$ °el (test circuit figure 4b) |            |       |      | N/A     |

After test possible to switch on the RCCB without presence of residual current

#### EN 61008-1

#### replace table A.1 by: ANNEX A (NORMATIVE) Test sequence and number of samples to be submitted for certification purposes Table A.1 - Test sequences Test (or inspection) Clause or subclause Test sequence 8.1.1 General 8.1.2 Mechanism Indelibility of marking 9.3 Clearance and creepage distances (external parts only) 813 Trip free mechanism 9.15 Reliability of screws, current-carrying parts and connections 9.4 9.5 Reliability of terminals for external conductors 9.6 Protection against electric shock 9.13 Resistance to heat 8.1.3 Clearances and creepage distances (internal parts) 9.14 Resistance to abnormal heat and to fire В 9.7 Dielectric properties 9.8 Temperature-rise 9.20 Resistance of insulation against impulse voltages Reliability at 40°C 9.22.2 Ageing of electronic components С 9.10 Mechanical and electrical endurance 9.9 Residual operating characteristics $D_0$ D٩ 9 17 Behaviour in case of failure of the line voltage Unwanted tripping 9.19 D Behaviour in case of surge currents 9.21 D.C. components Performance at I<sub>am</sub> 9.11.2.3 a)b) 9.16 9.12 Resistance to mechanical shock and impact 9,18 Non-operating current under overcurrent conditions 9.11.2.3 c) Verification of the suitability of RCCBs for use in IT-systems Ε 9.11.2.4 a) Coordination at Inc 9.11.2.2 Performance at 1-F 9.11.2.4 b) Coordination at Im 9.11.2.4 c) Coordination at Iac 9.22.1 Go Reliability (climatic tests) Verification of correct operation at low Ambient air temperature of RCCBs for use of -25°C to +40°C 9.Z1 G۱ H 8) IEC 61543 Table 4 -T1.1 Harmonics, interharmonics IEC 61543 Table 4 -T1.2 Signalling voltage IEC 61543 Table 5 -T2.3 Surges 1 IEC 61543 Table 5 -T2.1 Conducted sine-wave voltages or currents IEC 61543 Table 5 -T2.5 Radiated high-frequency phenomena IEC 61543 Table 5 -T2.2 Fast transients (burst) J IEC 61543 Table 5 - T2.6 Conducted common mode disturbances in the frequency range lower than 150 kHz IEC 61543 Table 6 -T3.1 Electrostatic discharges For devices containing a continuously operating oscillator, the test of CISPR 14-1 shall be carried out on the samples prior to the tests of this sequence.

#### EN 61008-1

|                            | replace tai               | ble A.2 by:                                     |  |
|----------------------------|---------------------------|---|--|
|                            | Table A.2 - Number of sam | ples for full test procedure                    |  |
| Test sequence <sup>a</sup> | Number of samples         | Minimum number of accepted samples <sup>b</sup> | Maximum number of samples for repeated tests c |
| A                          | 1+3 <sup>f</sup>          | 1+3 1   |  |
| В                          | 3                         | 2   | 3  |
| С                          | 3                         | 2   | 3  |
| D                          | 3                         | 2 <sup>d</sup>                                  | 3  |
| D <sub>2</sub>             | 3                         | 3   | 3  |
| E                          | 3                         | 2 <sup>d</sup>                                  | 3  |
| F                          | 3                         | 2 <sup>d</sup>                                  | 3  |
| G <sub>0</sub>             | 3                         | 2   | 3  |
| G <sub>1</sub>             | 3                         | 2   | 3  |
| He                         | 3                         | 2   | 3  |
| l e                        | 3                         | 2   | 3  |
| J e                        | 3                         | 2   | 3  |

- a) In total a maximum of three test sequences may be repeated.
- b) It is assumed that a sample which has not passed a test has not met the requirements due to workmanship or assembly defects which are not representative of the design.
- c) In the case of repeated tests, all test results must be acceptable.
- d) All samples shall meet the requirements in 9.9.2, 9.9.3, and 9.11.2.3, as appropriate. In addition, permanent arcing or flashover between poles or between poles and frame shall not occur in any sample during tests of 9.11.2.2, 9.11.2.4 a), 9.11.2.4 b) or 9.11.2.4 c).
- e) At the manufacturer's request, the same set of samples may be subjected to more than one of these test sequences.
- f) Test 9.14 shall applied to 3 additional new samples

#### EN 61008-1

|                                 | replace   | table A.3 by:   |  |
|---------------------------------|---|---|--|
|                                 | Table A.3 - Number of sam                                   | ples for simplified test procedure                          |  |
| Test sequence                   | Number of s   | amples according to the number of                           | f poles <sup>a) g)</sup>   |
|                                 | 2-poles b) c)   | 3-poles d) f) i)  | 4-poles <sup>e)</sup>  |
| A i)                            | 1 max. rating $I_N$ min. rating $I_{\Delta N}$              | 1 max. rating I <sub>N</sub> min. rating I <sub>AN</sub>    | 1 max. rating I <sub>N</sub> min. rating I <sub>AN</sub>   |
| В                               | 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 $I_{\Delta N}$   |
| С                               | 3 max. rating $I_N$ min. rating $I_{\Delta N}$              | 3 max. rating I <sub>N</sub> min. rating I <sub>AN</sub>    | 3 max, rating $I_N$ min, rating $I_{\Delta N}$   |
| D <sub>0</sub> + D <sub>1</sub> | 3 max. rating $l_N$ min. rating $l_{\Delta N}$              | 3 max, rating I <sub>N</sub><br>min. rating I <sub>AN</sub> | 3 max. rating $l_N$ min. rating $l_{\Delta N}$   |
| D <sub>0</sub>                  |   | 1 for all other ratings of I <sub>ΔN</sub>                  |  |
| D <sub>2</sub>                  | 3 max. rating I <sub>N</sub> min. rating I <sub>AN</sub>    | 3 max. rating $I_N$ min. rating $I_{\Delta N}$              | 3 max. rating $I_N$ min. rating $I_{\Delta N}$   |
| E                               | 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 $I_{\Delta N}$   |
| F                               | 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 $I_{\Delta N}$   |
|                                 | 3 min. rating $I_N$ max. rating $I_{\Delta N}$              | 3 min. rating $I_N$ max. rating $I_{\Delta N}$              | 3 min. rating $I_N$ max. rating $I_{\Delta N}$   |
| G <sub>0</sub>                  | 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 $I_{\Delta N}$   |
| G <sub>1</sub> h)               | 3 max. rating l <sub>N</sub><br>min. rating l <sub>AN</sub> | 3 max. rating I <sub>N</sub><br>min. rating I <sub>AN</sub> | 3 max. rating $I_N$ min. rating $I_{\Delta N}$   |
|                                 | 3 min. rating $I_N$ max. rating $I_{\Delta N}$              | 3 min. rating $I_N$ max. rating $I_{\Delta N}$              | 3 min. rating I <sub>N</sub><br>max. rating I <sub>AN</sub>  |
| Н                               |   |   | 3 <sup>h)</sup> samples of the sam<br>rating<br>I <sub>N</sub> chosen at random<br>min. rating I <sub>AN</sub> |
| ı                               |   |   | 3 <sup>h)</sup> samples of the sam<br>rating<br>I <sub>N</sub> chosen at random<br>min. rating I <sub>AN</sub> |
| J                               |   |   | 3 h) samples of the sam<br>rating<br>I <sub>N</sub> chosen at random<br>min. rating I <sub>AN</sub>            |

- a) If a test is to be repeated according to the minimum performance criteria of clause A.2, a new set of samples is used for the relevant test. In the repeated test all test results must be acceptable.
- b) If only 3-pole or 4-pole RCCBs are submitted, this column shall also apply to a set of samples with the smallest number of poles.
- g) deleted
- deleted
- e) f) deleted
- This column is omitted when 4-pole RCCBs have been tested.
- If only one value of  $I_{\Delta N}$  is submitted, min. rating  $I_{\Delta N}$  and max. rating  $I_{\Delta N}$  are replaced by  $I_{\Delta N}$ .
- h) Only the highest number of pole.
- i) deleted
- Three additional samples of the minimum number of poles, with ratings  $I_n$  and  $I_{\Delta N}$  chosen at random, shall be used for the j) test of 9.14.

| Page 159 of 164 Report No.:130700023SHA-00 |                    |            |                 | 3SHA-002 |         |
|--|--------------------|------------|-----------------|----------|---------|
|  |                    | EN 61008-1 |                 |          |         |
| Clause                                     | Requirement + Test |            | Result - Remark |          | Verdict |

|                 | ANNEX J Particular requirements for RCCBs with screwless type terminals for external copper conductors                          | N/A |
|-----------------|---|-----|
|                 |   | N/A |
| J.6<br>replace: | Marking   |     |
|                 | In addition to Clause 6, the following requirements apply:  | N/A |
|                 | Marking on the RCCB or  | N/A |
|                 | if the space available is not sufficient on the smallest package unit or in technical information                               | N/A |
|                 | Marking indicating the length of insulation to be removed before insertion of the conductor into the terminal shown on the RCCB | N/A |
|                 | Manufacturer shall provide information in his literature, on the maximum number of conductors which may be clamped.             | N/A |

|         | ANNEX ZB                                     | N/A |
|---------|--|-----|
|         | Special national conditions                  |     |
| Germany | The use of RCCBs of type AC is not permitted | N/A |

|      | ANNEX ZC<br>A-deviations                        | N/A |
|------|---|-----|
| Aust | subclause 4.1, Table Z1 is not valid in Austria | N/A |

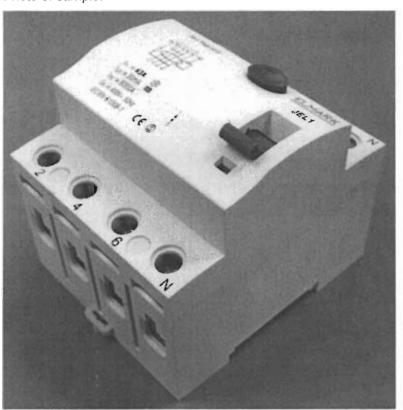
| IEC 61008-1 |                    |                 |         |  |  |
|-------------|--------------------|-----------------|---------|--|--|
| Clause      | Requirement + Test | Result - Remark | Verdict |  |  |

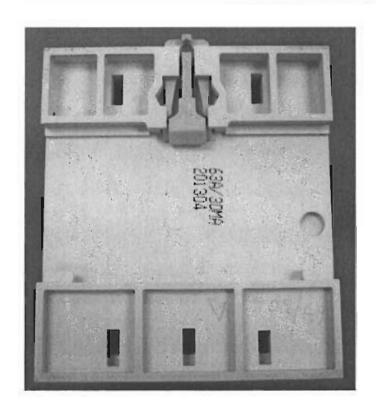
Table Z3 - Requirements for marking

|    | l able 23 - Require  | ements for mar   | King  |   |   |
|----|--|--|---|---|---|
|    |  | 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 ail 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 <u>side</u> 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 manufacture r's name or trademark  |  | X   |   |   |
| b) | Type designation, catalogue number or serial number  |  | Х   |   |   |
| c) | Rated voltage(s) with the symbol ~   |  | Х   |   |   |
| ď) | Rated frequency, if the RCCB is designed for frequencies other than 50Hz   |  | ×   |   |   |
| e) | rated current  | X  |   |   |   |
| f) | Rated residual operating current (I <sub>Δn</sub> ) in A or in mA  | Х  |   |   |   |
| h) | rated making and breaking capacity (l <sub>m</sub> )   |  |   |   | X (*)   |
| j) | The degree of protection (only if different from IP20)   |  |   |   | X   |
| k) | The position of use (symbol according to IEC 60051), if necessary  |  | ×   |   |   |
| 1) | 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  | Х  |   |   |   |
| n) | symbol of the method of operation according to Table Z1 of 4.1 if the RCCB is functionally dependent on the line voltage   |  | ×   | ×   |   |
| 0) | Operating means of the test device, by the letter T (**)   | Х  |   |   |   |
| p) | Wiring diagram unless the correct mode of operation is evident   |  | ×   | Х   |   |
| 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  |   |   |   |
| s) | RCCBs according to 4 Z2 marked with the symbol (snowflake enclosing -25)   |  | Х   |   |   |
| t) | Indication of the terminal for the neutral with "N"  |  | Х   |   |   |
| u) | Additional marking of performance to other standards or additional requirements according to 6.Z2  |  | Х   |   |   |
|    |  |  |   |   |   |

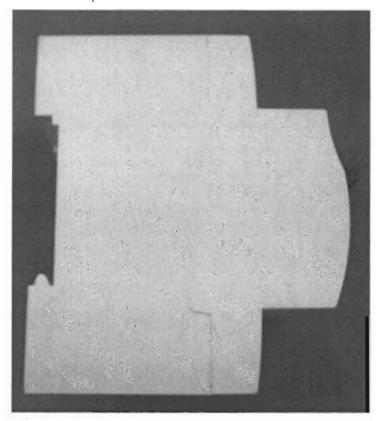
 $I_{\Delta m}$  and  $I_m$  (if different of  $I_{\Delta m}$ ) may be anywhere on the device or in the catalogue but shall be together it is recommended to advise the user to test the device regularly

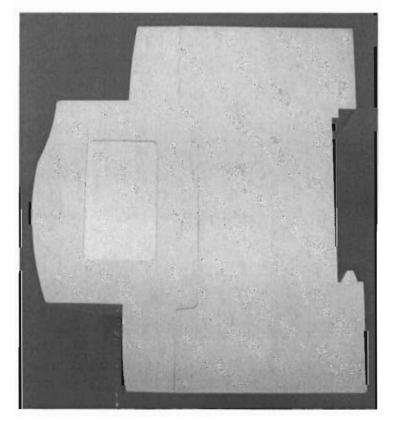
| IEC 61008-1 |                    |  |                 |         |  |
|-------------|--------------------|--|-----------------|---------|--|
| Clause      | Requirement + Test |  | Result - Remark | Verdict |  |





| IEC 61008-1 |                    |  |                 |  |         |
|-------------|--------------------|--|-----------------|--|---------|
| Clause      | Requirement + Test |  | Result - Remark |  | Verdict |



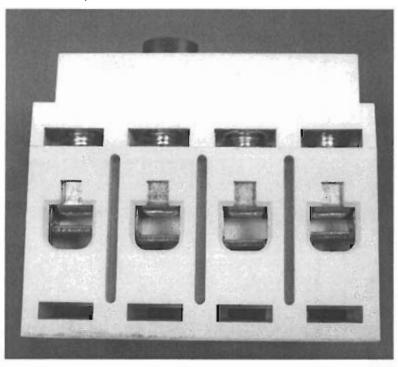


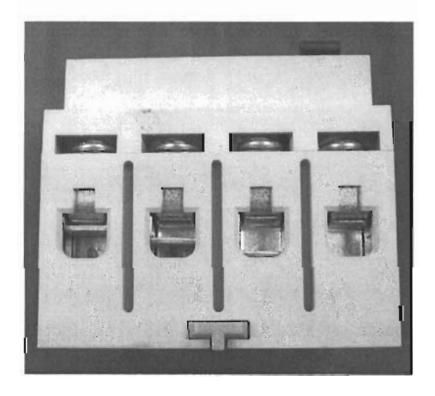
TRF No. IEC61008\_1F

Page 163 of 164

Report No. 130700023SHA-002

| IEC 61008-1 |                    |  |                 |         |
|-------------|--------------------|--|-----------------|---------|
| Clause      | Requirement + Test |  | Result - Remark | Verdict |





|        | IEC 61008-1        |  |                 |  |         |
|--------|--------------------|--|-----------------|--|---------|
| Clause | Requirement + Test |  | Result - Remark |  | Verdict |

