

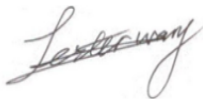


Test Report issued under the responsibility of:



TEST REPORT IEC 61009-1 Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) Part 1: General rules	
Report Number.....	3332228.50
Date of issue	2025-04-23
Total number of pages	255
Name of Testing Laboratory preparing the Report	DEKRA Testing Services (Zhejiang) Co., Ltd.
Applicant's name	GACIA ELECTRICAL APPLIANCE CO., LTD.
Address.....	No.1 Nanxijiang Road, Daqiao Industrial Zone, Beibaixiang Town, Yueqing, 325603 Zhejiang, China
Test specification:	
Standard	IEC 61009-1:2010, AMD1:2012, AMD2:2013 used in conjunction with IEC 61009-2-1:1991 or IEC 61009-2-2:1991
Test procedure	CB Scheme
Non-standard test method	N/A
TRF template used.....	IECEE OD-2020-F1:2021, Ed.1.4
Test Report Form No.	IEC61009_1G
Test Report Form(s) Originator	OVE
Master TRF	Dated 2021-10-07
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Test item description	Residual current operated circuit-breakers with integral overcurrent protection (RCBO)
Trade Mark	GACIA
Manufacturer	GACIA ELECTRICAL APPLIANCE CO., LTD. No.1 Nanxijiang Road, Daqiao Industrial Zone, Beibaixiang Town, Yueqing, 325603 Zhejiang, China
Model/Type reference	HL8M4, NL8M4, PL8M4, HL8M2, NL8M2 and PL8M2
Ratings	2P and 4P, Ue: 230 Vac for 2P, 400 Vac for 4P, 50 Hz In: 6, 10, 13, 16, 20, 25, 32, 40 A, B and C type I _{Δn} : 0,03, 0,1, 0,3 A, type A, without time-delay I _{cs} = 7,5 kA, I _{cn} = 10 kA or I _{cs} = I _{cn} = 6 kA for 6 - 20 A I _{cs} = I _{cn} = 6 kA for 25 - 40 A I _{Δm} = 3 kA Energy limiting class 3 according to EN 61009-1:2012+A1:2014+A2:2014+A11:2015+A12:2016+A13:2021

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒	CB Testing Laboratory:	DEKRA Testing Services (Zhejiang) Co., Ltd.
Testing location/ address		No.5, Changjiang Road, Great Bridge Industrial Park, North Baixiang, Wenzhou, Zhejiang, 325603, P.R. China
Tested by (name, function, signature)		
Approved by (name, function, signature) ..		
☐	Testing procedure: CTF Stage 1:	N/A
Testing location/ address		N/A
Tested by (name, function, signature)		N/A
Approved by (name, function, signature) ..		N/A
☒	Testing procedure: CTF Stage 2:	Test Center of GACIA Electrical Appliance Co., Ltd.
Testing location/ address		No.1 Nanxijiang Road, Daqiao Industrial Zone, BeibaixiangTown, Yueqing, 325603, Zhejiang, China
Tested by (name + signature)		Lester Wang 
Witnessed by (name, function, signature) ..		Baker Zhang (Engineer) 
Approved by (name, function, signature) ..		Eric Wang (Reviewer) 
☐	Testing procedure: CTF Stage 3:	N/A
☐	Testing procedure: CTF Stage 4:	N/A
Testing location/ address		N/A
Tested by (name, function, signature)		N/A
Witnessed by (name, function, signature) ..		N/A
Approved by (name, function, signature) ..		N/A
Supervised by (name, function, signature) :		N/A

List of Attachments (including a total number of pages in each attachment):							
N/A							
Summary of testing:							
The following samples were chosen for the type test according to annex A of IEC/EN 61009-1:							
Sample No.	Model	Current (A)	$I_{\Delta n}$ (mA)	Poles	Voltage (Vac)	d.c. components type	Test sequence
101#	PL8M2	C40	30	2P	230	A	A1
102# - 104#	PL8M2	C40	30	2P	230	A	A2
105# - 107#	PL8M2	C40	30	2P	230	A	B
108# - 110#	PL8M2	B40	30	2P	230	A	B (only cl. 9.8)
111# - 113#	PL8M2	C40	30	2P	230	A	C1
114# - 115#	PL8M2	C40	30	2P	230	A	C2
116# - 118#	PL8M2	C40	30	2P	230	A	D0+D1
119# - 121#	PL8M2	C40	30	2P	230	A	E0+E1
122# - 124#	PL8M2	C40	30	2P	230	A	F0 - 6 kA
125# - 127#	PL8M2	C25	300	2P	230	A	
128# - 130#	PL8M2	B40	30	2P	230	A	F0 - 6 kA - I^2t verification (according to EN 61009-1)
131# - 133#	PL8M2	C32	30	2P	230	A	
134# - 136#	PL8M2	B32	30	2P	230	A	
137# - 139#	PL8M2	C16	30	2P	230	A	
140# - 142#	PL8M2	B16	30	2P	230	A	
143# - 145#	PL8M4	C16	30	4P	400	A	
146# - 148#	PL8M4	B16	30	4P	400	A	
149# - 151#	PL8M2	C20	30	2P	230	A	F0 - 7,5 kA
152# - 154#	PL8M2	C6	300	2P	230	A	
155# - 157#	PL8M4	C20	30	4P	400	A	
158# - 160#	PL8M2	C20	30	2P	230	A	F1 - 10 kA
161# - 163#	PL8M2	C6	300	2P	230	A	
164# - 166#	PL8M4	C20	30	4P	400	A	
167# - 169#	PL8M2	B20	30	2P	230	A	F1 - 10 kA - I^2t verification (according to EN 61009-1)
170# - 172#	PL8M2	C16	30	2P	230	A	
173# - 175#	PL8M2	B16	30	2P	230	A	
176# - 178#	PL8M2	C40	30	2P	230	A	G0
Notes:							
1a. This report is based on test reports no. 3332226.50 issued on 2024-10-31.							
2a. This report is issued due to that:							
- Add 2P (HL8M2, NL8M2, PL8M2) of same fundamental design as 4P (HL8M4, NL8M4, PL8M4).							

- Increase the I_{cn} from 6 kA to 10 kA for I_n of 20 A. - For I_n of 6 A – 20 A, mark $I_{cs} = I_{cn} = 6$ kA as well, which is identical to $I_{cs} = I_{cn} = 10$ kA. 3a. The above tests are performed to verify the compliance.							
The following test result is taken from test report no. 3332226.50							
Sample No.	Model	Current (A)	$I_{\Delta n}$ (mA)	Poles	Voltage (Vac)	d.c. components type	Test sequence
1#	PL8M4	C40	30	4P	400	A	A1
2# - 4#	PL8M4	C40	30	4P	400	A	A2
5# - 7#	PL8M4	C40	30	4P	400	A	B
8# - 10#	PL8M4	B40	30	4P	400	A	B (only cl. 9.8)
11# - 13#	PL8M4	C40	30	4P	400	A	C1
14#, 89#, 90#	PL8M4	C40	30	4P	400	A	C2
15# - 17#	PL8M4	C40	30	4P	400	A	D0+D1
18# - 19#	PL8M4	C40	100	4P	400	A	D0
20# - 22#	PL8M4	C40	300	4P	400	A	E0+E1
23#	PL8M4	C32	30	4P	400	A	E0
24#	PL8M4	C25	30	4P	400	A	
25#	PL8M4	C20	30	4P	400	A	
26#	PL8M4	C16	30	4P	400	A	
27#	PL8M4	C13	30	4P	400	A	
28#	PL8M4	C10	30	4P	400	A	
29#	PL8M4	C6	30	4P	400	A	
30#	PL8M4	B40	30	4P	400	A	E0 - cl. 9.9.2.2
31#	PL8M4	B32	30	4P	400	A	
32#	PL8M4	B25	30	4P	400	A	
33#	PL8M4	B20	30	4P	400	A	
34#	PL8M4	B16	30	4P	400	A	
35#	PL8M4	B13	30	4P	400	A	
36#	PL8M4	B10	30	4P	400	A	
37#	PL8M4	B6	30	4P	400	A	F0 - 6 kA
38# - 40#	PL8M4	C40	30	4P	400	A	
41# - 43#	PL8M4	C20	300	4P	400	A	F0 - 6 kA - I^2t verification (according to EN 61009-1)
44# - 46#	PL8M4	B40	30	4P	400	A	
91# - 93#	PL8M4	C32	30	4P	400	A	
94# - 96#	PL8M4	B32	30	4P	400	A	F0 - 7,5 kA
47# - 49#	PL8M4	C16	30	4P	400	A	
50# - 52#	PL8M4	C6	300	4P	400	A	

Sample No.	PL8M4	Current (A)	$I_{\Delta n}$ (mA)	Poles	Voltage (Vac)	d.c. components type	Test sequence
53# - 55#	PL8M4	C16	30	4P	400	A	F1 - 10 kA
56# - 58#	PL8M4	C6	300	4P	400	A	
59# - 61#	PL8M4	B16	30	4P	400	B	F1 - 10 kA - I^2t verification (according to EN 61009-1)
62# - 64#	PL8M4	C40	30	4P	400	A	F2 (according to EN 61009-1)
65# - 67#	PL8M4	C40	30	4P	400	A	G0
68# - 70#	PL8M4	C40	30	4P	400	A	G1 (according to EN 61009-1)
71# - 73#	PL8M4	C6	300	4P	400	A	
74# - 76#	PL8M4	C40	30	4P	400	A	H
77# - 79#	PL8M4	C40	30	4P	400	A	I
80# - 82#	PL8M4	C40	30	4P	400	A	J
Notes from 3332226.50: 1. The product is a series of RCBOs with same fundamental design. 2. There are three models: PL8M4, NL8M4 and HL8M4, which are identical except the model marked on the label, all tests are conducted on PL8M4 to cover NL8M4 and HL8M4. 3. The energy limiting class 3 is determined according to Energy limiting class 3 according to EN 61009-1:2012+A1:2014+A2:2014+A11:2015+A12:2016+A13:2021.							
Testing location: 1. All tests except EMC were conducted in CTF: GACIA ELECTRICAL APPLIANCE CO., LTD. No.1 Nanxijiang Road, Daqiao Industrial Zone, Beibaixiang Town, Yueqing, 325603 Zhejiang, China 2. Sequence H- J (EMC) were subcontracted in: Zhejiang Fangyuan Test Group Co., Ltd. No.400, Guangqiong Rd, Jiaxing City, Zhejiang Province, P.R. China							
Summary of compliance with National Differences (List of countries addressed): N/A							

Use of uncertainty of measurement for decisions on conformity (decision rule):

☒ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").

☐ Other:... (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

Information on uncertainty of measurement:

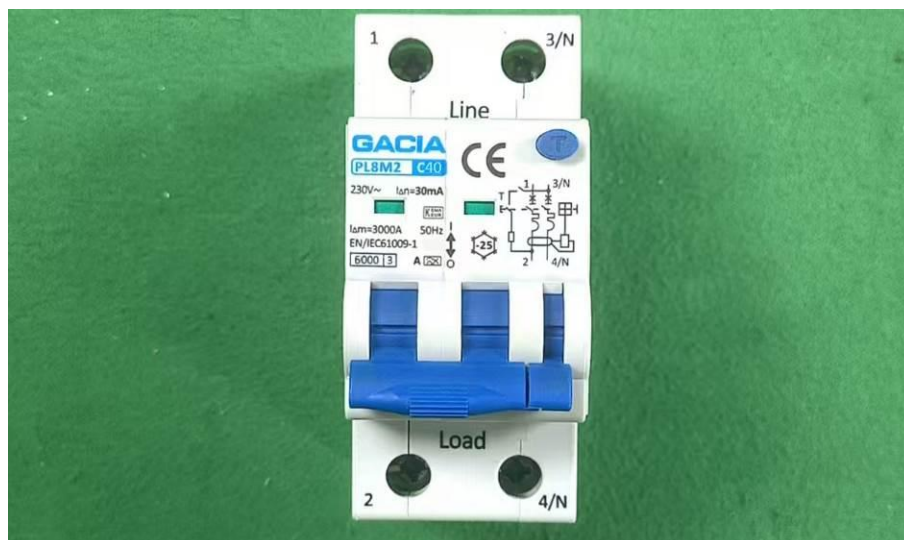
The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.

IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

Copy of marking plate

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



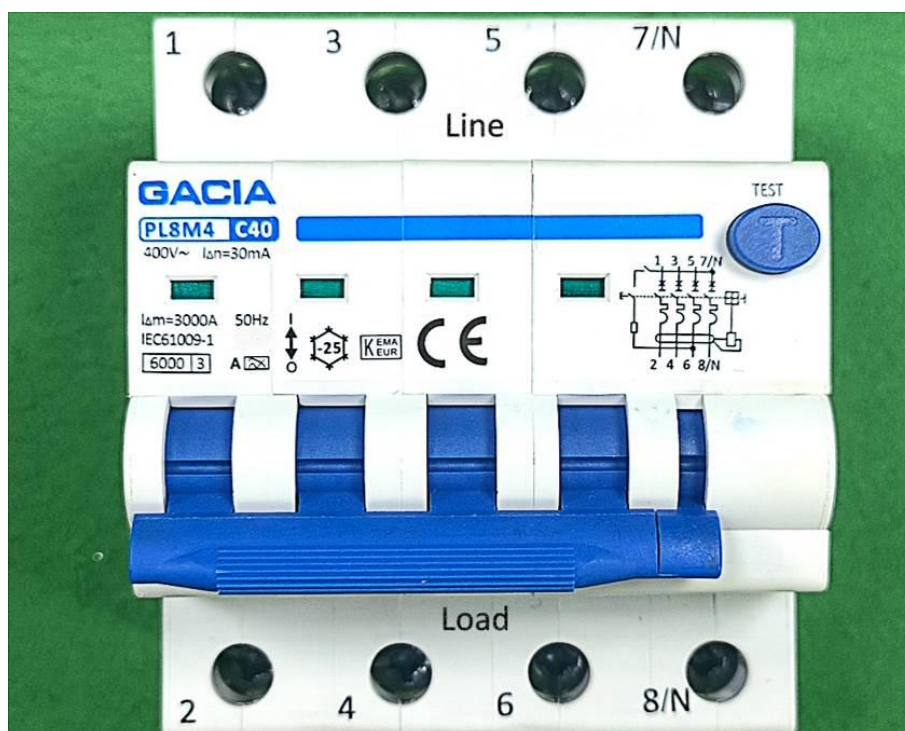
PL8M2, 2P, C40, 30 mA



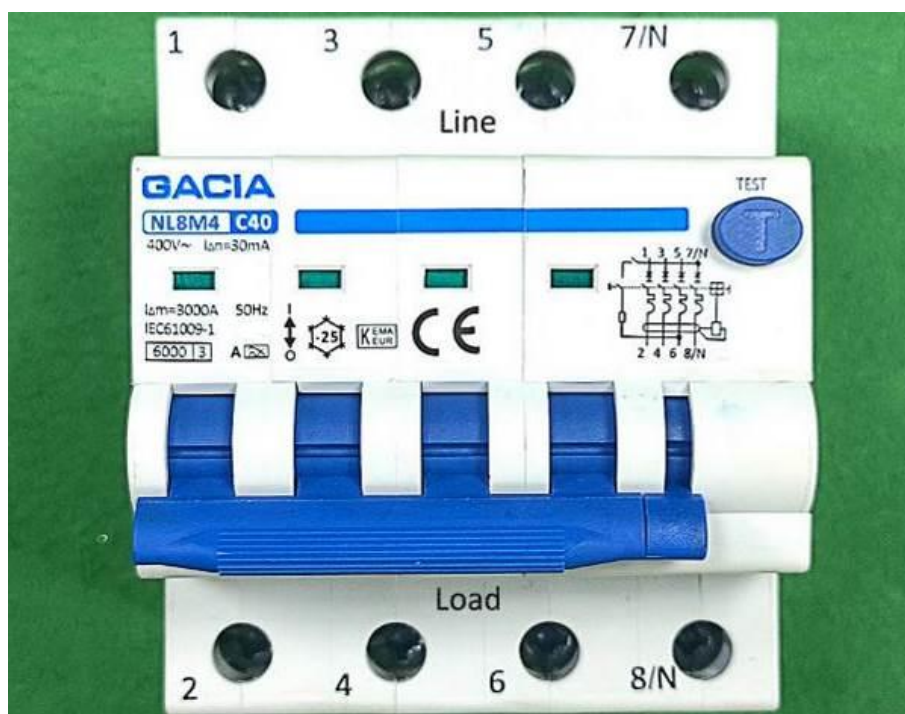
PL8M2, 2P, C16, 30 mA

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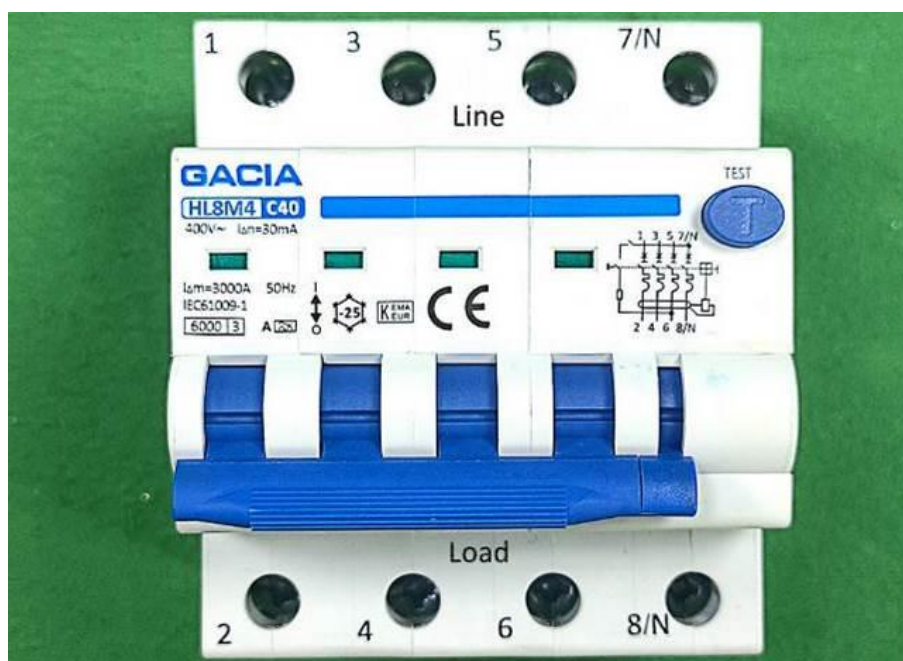
PL8M4, 4P, C40, 30 mA



NL8M4, 4P, C40, 30 mA

Copy of marking plate

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

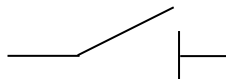


HL8M4, 4P, C40, 30mA

Test item particulars	Residual current operated circuit-breakers with integral overcurrent protection (RCBO)
Type of RCBO	A
Time delay	Without time-delay
Method of operating	Independent of line voltage
Type of installation	Fixed
Number of poles	2P and 4P
Protection against external influences	Unenclosed
Method of mounting	Surface / flush / panel board / distribution board
Method of connection	Not associated with the mechanical mounting
Instantaneous tripping current	B and C type
Rated current (I_N).....	6, 10, 13, 16, 20, 25, 32, 40 A
Rated residual operating current ($I_{\Delta N}$)	0,03, 0,1, 0,3 A
Rated voltage (U_N).....	230 Vac for 2P; 400 Vac for 4P
Rated impulse withstand voltage (U_{imp}).....	4 kV
Rated frequency (Hz)	50 Hz
Rated short-circuit capacity (I_{CN})	6 kA for 25 - 40 A 6 kA or 10 kA for 6 - 20 A
Rated residual making and breaking capacity ($I_{\Delta M}$) :	3 kA
Nature of supply	AC
Type of terminal	Screw
Classification of RCBOs functionally dependent on the line voltage:	No
Opening automatically in case of failure of the line voltage	-
- reclosing automatically when the line voltage is restored	-
- not reclosing automatically when the line voltage is restored.....	-
Not opening automatically in case of failure of the line voltage	-
- able to trip in a hazardous situation arising on failure of line voltage	-
- not able to trip in a hazardous situation arising on failure of line voltage	-
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.....	2024-08-06 (3332226.50) 2024-12-19
Date (s) of performance of tests	2024-08-06 - 2024-09-14 (3332226.50) 2024-12-19 - 2025-01-25
General remarks:	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. Throughout this report a ☒ comma / ☐ point is used as the decimal separator. The product fulfils the requirements of: IEC 61009-1:2010 + A1:2012 + A2:2013, IEC 61009-2-1:1991 EN 61009-1:2012 + A1:2014 + A2:2014 + A11:2015 + A12:2016 + A13:2021, EN 61009-2-1:1994 + A11:1998, the test results refer to annex 1 of this report.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC 61009-2-1:	
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.....	☐ Yes ☒ Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies)	GACIA ELECTRICAL APPLIANCE CO., LTD. No.1 Nanxijiang Road, Daqiao Industrial Zone, Beibaixiang Town, Yueqing, 325603 Zhejiang, China
General product information and other remarks:	
The grid distance "a": 45 mm.	

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	TEST SEQUENCE "A₁"	2P, C40, 30 mA, type A	--
		101#	
6.	MARKING (STANDARD MARKING)		--
	RCBO MARKED WITH:		--
	a) Manufacturer's name or trade mark..... :	GACIA	P
	b) Type designation, catalogue number or serial number	PL8M2	P
	c) Rated voltage(s) (V)	230 V~	P
	d) Rated current without symbol "A" preceded by symbol for instantaneous tripping	C40	P
	e) Rated frequency	50 Hz	P
	f) Rated residual operating current	30 mA	P
	g) Settings of residual operating current..... :		N/A
	h) Rated short-circuit capacity, in amperes	6000 in a rectangle	P
	j) Reference calibration temperature, if different from 30°C		N/A
	k) Degree of protection		N/A
	l) Position of use..... :		N/A
	m) Rated residual making and breaking capacity, if different from rated short-circuit capacity	3000 A	P
	n) Symbol S for type S		N/A
	p) Operating means of test device by letter T	T	P
	q) Wiring diagram..... :		P
	r) Operating characteristic in presence of residual currents with d.c. components		--
	- RCBOs of type AC with the symbol..... 		N/A
	- RCBOs of type A with the symbol..... 		P
	s) type D RCBOs, the max. instantaneous tripping current, if higher than 20 I _N		N/A
	Marking on the RCBO itself or on nameplate or nameplates attached to the RCBO and located so that for small devices at least d), f), n), p) and r) (only for type A) is legible when the RCBO is installed	d), f), p) and r) are marked on the front	P
	The information under a), b), c), h), l), r) (only for type AC) and s) may be marked on the side or the back of the device and be visible only before the device is installed	a), b), c) and h) are marked on the front	P

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The information under q) may be on the inside of any cover which has to be removed in order to connect the supply wires	q) is marked on the front	P
	Any remaining information not marked shall be given in the manufacturer's catalogues.		P
	The suitability for isolation, which is provided by all circuit-breakers of this standard, may be indicated by the symbol on the device		P
	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
	Open position indicated by "0" and closed position by "I"		P
	For push-buttons the OFF push-button shall either be red and/or marked with "0"		N/A
	If necessary to distinguish between supply and load terminals they shall be clearly marked	Line/Load are marked	P
	Terminals for neutral conductor N	N	P
	Terminal for protective conductor		N/A
	Marking indelible, easy legible and not on removable parts		P
	Labels not easy to remove and no curling. Test acc. to cl. 9.3: 15 s with water and 15 s with hexane		P
	For universal terminals (rigid-solid, rigid-stranded and flexible conductors:		P
	- no markings		P
	For non-universal terminals:		--
	- terminals for rigid-solid conductors only, marked by the letters "s" or "sol"		N/A
	- terminals for rigid (solid and stranded) conductors only, marked by the letter "r"		N/A
	marking on the RCBO or if the space available is not sufficient, on the smallest package unit or in technical information		P

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
8.	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 other than those specifically intended for changing the setting of the residual operating current.		P
	Changing from one setting to another shall not be possible without a tool. It shall not be possible to disable or inhibit the RCBO function by any means. NOTE In Australia, Germany, Denmark, Italy, the UK and Switzerland, multiple settings are not allowed.		P
	In case of an RCBO 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		N/A
	Switched neutral of four-pole RCBOs shall not close after and shall not open before the other poles		N/A
	Neutral pole having adequate making and breaking capacity and RCBO with independent manual operation:		N/A
	- all poles operate together including neutral pole		N/A
	Trip-free mechanism		P
	Possible to switch on and off by hand		P
	No intermediate position of the contacts		P
	RCBOs 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:		P
	- the position of the actuator (this being preferred)		P
	- a separate mechanical indicator		P

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	If a separate mechanical indicator is used to indicate the position of the main contacts, this shall show the colour:		P
	- red for the closed position (ON)		P
	- green for the opened position (OFF)		P
	The means of indication of the contact position shall be reliable (Compliance is checked by inspection and by the test of 9.9.2.2)		P
	RCBOs shall be designed so that the actuator, front plate or cover can only be correctly fitted in a manner which ensures correct indication of the contact position (Compliance is checked by inspection and by the tests of 9.12.12.1 and 9.12.12.2)		P
	When means are provided or specified by the manufacturer to lock the operating means in the open position, locking in that position shall only be possible when the main contacts are in the open position. (Compliance is checked by inspection, taking into account the instructions of the manufacturer)		N/A
	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		P
	When an indicator light is used this shall be lit when the RCBO 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.		P
	If the cover is used as a guiding means for push-buttons, it shall not possible to remove the buttons from the outside		P
	Operating means securely fixed, not possible to remove them without a tool.		P
	For "up-down" operating means the contacts are closed by the up movement.		P
9.11	Test:		--
	- The RCBO is mounted and wired as in normal use.		P

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- Test circuit according to figure 4.		P
9.11.2	A residual current equal to 1,5 I _{ΔN} is passed by closing S ₂ , the RCBO having been closed and the operating means being held in the closed position. The RCBO shall trip.	45 mA, tripped	P
	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.	45 mA, tripped	P
8.1.3	Clearances and creepage distances (external parts) --> see "Clearances and creepage distances internal and external parts"		--
8.1.4	Screws, current-carrying parts and connections		--
8.1.4.1	Connections withstand mechanical stresses occurring in normal use.		P
	Screws for mounting the RCBO are not of thread-cutting type.		P
	Screws and nuts which are operated when mounting and connecting		P
	Test according to cl. 9.4:		--
	- 10 times (screw Ø / torque Nm)		N/A
	- 5 times (screw Ø / torque Nm)	Ø 5 mm, 2 Nm	P
8.1.4.2	Screws with a thread of insulating material operated when mounting the RCBO; 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.		P
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:		--
	- copper		P
	- an alloy 58% copper for parts worked cold		N/A
	- 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).		N/A
	The requirements of this subclause do not apply to: contacts, magnetic circuits, heater elements,		P

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Clause	Requirement + Test		Verdict
	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		--
	Compliance is checked by inspection and by the tests as relevant for the type of connection:		P
	9.5 for screw-type terminals		P
	by specific tests for plug-in or bolt-on RCBOs 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		--
	Test see cl. 9.5		--
	Torque		
	Ø 5 mm	2,0 Nm	P
	Ø mm	Nm	N/A
	Ø mm	Nm	N/A
	Max. cross-sect.: ____mm ²		P
9.5	Test of reliability of screw-type terminals for external copper conductors		P
9.5.1	Pull test:		--
	Terminal shall be suitable for all types of conductors: rigid (solid or stranded) and flexible, unless otherwise specified by the manufacturer.		P
	Min. cross-section solid / stranded / flexible (mm ²):		--
	Solid: 1,0 mm ² Stranded: 1,5 mm ² Flexible: 1,0 mm ²		
	Max. cross-section solid / stranded / flexible (mm ²):		--
	Solid: 6,0 mm ² Stranded: 16 mm ² Flexible: 10 mm ²		
	Torque ² / ₃ (Nm)		--
	1,3 Nm		

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Clause	Requirement + Test	Result - Remark	Verdict
	Pull for 1 min solid / stranded / flexible (N) ... :	Solid max sect. 6 mm ² Pull 60 N for 1 min Stranded max sect. 16 mm ² Pull 90 N for 1 min Flexible max sect. 10 mm ² Pull 80 N for 1 min Solid min sect. 1,0 mm ² Pull 50 N for 1 min Stranded min sect. 1,5 mm ² Pull 50 N for 1 min Flexible min sect. 1,0 mm ² Pull 50 N for 1 min	--
	During the test no noticeable move of conductor		P
9.5.2	Min. cross-section (mm ²)	Solid: 1 mm ²	--
	Max. cross-section (mm ²)	Stranded: 16 mm ²	--
	Torque ² / ₃ (Nm)	1,3 Nm	--
	The conductor shows no damage		P
	Terminals not worked loose and no damage		P
9.5.3	Terminals fitted with the largest cross-section area specified in Table 8, for stranded and/or flexible copper conductor.		P
	Max. cross-section stranded (mm ²)	16 mm ²	P
	Max. cross-section flexible (mm ²)	10 mm ²	P
	Torque ² / ₃ (Nm)	1,3 Nm	--
	After the test no strand of conductor escaped outside		P
8.1.5.2	RCBOs shall be provided with:		--
	- terminals which shall allow the connection of copper conductors having nominal cross-sectional areas as shown in Table 8		P

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Clause	Requirement + Test			Verdict
Table 8	Rated current (A)	Range of nominal cross sections to be clamped* (mm ²)		Solid: 1 mm ² to 6 mm ² Stranded: 1,5 mm ² to 16 mm ² Flexible: 1 mm ² to 10 mm ²
		Rigid (solid or stranded) conductors	Flexible conductors	
	≤ 13	1 to 2,5	1 to 2,5	
	> 13 ≤ 16	1 to 4	1 to 4	
	> 16 ≤ 25	1,5 to 6	1,5 to 6	
	> 25 ≤ 32	2,5 to 10	2,5 to 6	
	> 32 ≤ 50	4 to 16	4 to 10	
	> 50 ≤ 80	10 to 25	10 to 16	
	> 80 ≤ 100	16 to 35	16 to 25	
	> 100 ≤ 125	24 to 50	25 to 35	
	*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 mm ² up to 6 mm ² be designed to clamp solid conductors only.			--
	- or terminals for external untreated aluminium conductors and with aluminium screw-type terminals for use with copper or with aluminium conductors according to Annex L.			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 sub-clause 9.5)			P
8.1.5.4	Terminals for $I_N \leq 32$ A allow the connection of conductors without special preparation.			The terminals of the RCBOs in this series (from 6 A to 40 A of B, C type) are same P
8.1.5.5	Terminals have adequate mechanical strength and metric ISO thread or equivalent. (See tests of sub-clauses 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)			P
8.1.5.7	Clamping of conductor reliably and between metal surfaces. (See tests of sub-clauses 9.4 and 9.5.1)			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 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)			P

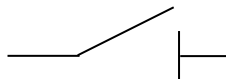
IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
8.1.5.10	Clamping screws or nuts of terminals for the protective conductors adequately secured against accidental loosening and not possible to unclamp without a tool.		N/A
8.1.5.11	Screws and nuts of terminals for external conductors shall be in engagement with a metal thread and not be of the tapping screw type.		P
8.1.6	Non interchangeability		--
	Plug-in or screw-in RCBOs must not be replaceable, without aid of a tool, by another of the same make, but having a higher rated current.		N/A
8.2	Protection against electric shock		--
	Live parts not accessible in normal use		P
	For RCBOs 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.		P
	Linings		--
	- 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		--
	- reliably fixed		N/A
	- adequate mechanical strength		N/A
	For plug-in RCBOs 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.		N/A
	Possible to replace plug-in RCBOs easily with-out touching live parts.		N/A
	Lacquer or enamel not considered to provide adequate insulation.		N/A
9.6	Test: Standard test finger		--

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Clause	Requirement + Test	Result - Remark	Verdict
	Straight test finger with a force of 75 N for 1 min at $35^{\circ}\text{C} \pm 2^{\circ}\text{C}$		P
	Enclosures or covers not deformed to such an extent that live parts can be touched.		P
8.9	Resistance to heat		--
	RCBO sufficiently resistant to heat		P
9.14.1	Test:		--
	- without removable covers.....1 h (100 ± 2) $^{\circ}\text{C}$		P
	- removable covers1 h (70 ± 2) $^{\circ}\text{C}$		N/A
	No change impairing further use and no flow of sealing compound that live parts are exposed		P
	No access to live parts even with test finger with a force not exceeding 5 N.		P
	The RCBO 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		P
	50 Hz	27 ms	P
	Marking still legible after test		P
9.14.2	Ball pressure test for external parts of insulating material necessary to retain current-carrying parts or parts of the protective circuit in position:		P
	- $T = 125 \pm 2^{\circ}\text{C}$	125 $^{\circ}\text{C}$	P
	After 1 h $\varnothing$ of impression ≤ 2 mm	Housing body: 1,0 mm	P
9.14.3	Ball pressure test for external parts of insulating material not necessary to retain current-carrying parts or parts of the protective circuit in position:		P
	☒ $T = 70 \pm 2^{\circ}\text{C}$	72 $^{\circ}\text{C}$ / 71 $^{\circ}\text{C}$ / 72 $^{\circ}\text{C}$	P
	☐ $T = \text{_____} \pm 2^{\circ}\text{C}$ (40 $^{\circ}\text{C}$ + max. temperature rise of sub-clause 9.8)		N/A
	$\varnothing$ of impression ≤ 2 mm	knob: 0,6 mm / Test Button: 0,5 mm / Clip: 0,6 mm	P
8.1.3	Clearances and creepage distances (internal and external parts)		--
	The minimum required clearances and creepage distances are based on the RCBO being designed for operating in an environment with pollution degree 2		P

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Clause	Requirement + Test	Result - Remark	Verdict
	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.		P
	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:		P
	- Tests according to 9.7.2 to 9.7.6 as applicable		P
	- Test according to 9.7.7.2 with test voltages acc. Table 19 with test arrangements of 9.7.2 items b), c), d), e)		P
	If measurement does not show any reduced clearance, test 9.7.7.2 is not applied		P
	Compliance for item 3, checked by measurement		P
	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_{imp}		--
	4kV (see table 5) 2,5kV(see table 5)	☒ ☐	--
		minimum clearances [mm]	--
	1. between live parts which are separated when the main contacts are in the open position	5,3 mm > 4 mm	P
	2. between live parts of different polarity	11,7 mm > 3 mm	P
	3. 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	14,5 mm > 3 mm	P
	- screws or other means for fixing covers which have to be removed when mounting the RCBO		N/A
	- surface on which the RCBO is mounted	22,1 mm > 3 mm	P
	- screws or other means for fixing the RCBO		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- metal covers or boxes		N/A
	- other accessible metal parts	4,3 mm > 3 mm	P
	- metal frames supporting flush-type RCBOs	3,8 mm > 3 mm	P
	Creepage distances [mm] (see table 5)		--
	Material group	IIIb ☐ IIIa ☒ II ☐ I ☐	P
		minimum creepage distances [mm]	--
	1. between live parts which are separated when the main contacts are in the open position	5,3 mm > 4 mm	P
	2. between live parts of different polarity	11,7 mm > 3 mm	P
	3. 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	19,4 mm > 4 mm	P
	- screws or other means for fixing covers which have to be removed when mounting the RCBO		N/A
	- surface on which the RCBO is mounted	23,6 mm > 4 mm	P
	- screws or other means for fixing the RCBO		N/A
	- metal covers or boxes		N/A
	- other accessible metal parts	4,3 mm > 4 mm	P
	- metal frames supporting flush-type RCBOs	9,7 mm > 4 mm	P
9.25	Test of resistance to rusting:	Terminal, Wire Frame, Spring, Iron core	--
	- 10 min immersed in a cold chemical degreaser such as methyl-chloroform or refined petrol		P
	- 10 min immersed in a 10% solution of ammonium chloride in water at 20°C±5°C	25 °C	P
	- 10 min in a box containing air saturated with moisture at 20°C±5°C	25 °C	P
	- 10 min at 100°C	100°C	P
	No sign of rust		P

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Clause	Requirement + Test	Result - Remark	Verdict
	TEST SEQUENCE "A₁"	4P, C40, 30 mA, type A	--
		1#	
6.	MARKING (STANDARD MARKING)		--
	RCBO MARKED WITH:		--
	a) Manufacturer's name or trade mark..... :	GACIA	P
	b) Type designation, catalogue number or serial number	PL8M4	P
	c) Rated voltage(s) (V)	400 V~	P
	d) Rated current without symbol "A" preceded by symbol for instantaneous tripping	C40	P
	e) Rated frequency	50 Hz	P
	f) Rated residual operating current	30 mA	P
	g) Settings of residual operating current..... :		N/A
	h) Rated short-circuit capacity, in amperes	6000 in a rectangle	P
	j) Reference calibration temperature, if different from 30°C		N/A
	k) Degree of protection		N/A
	l) Position of use..... :		N/A
	m) Rated residual making and breaking capacity, if different from rated short-circuit capacity	3000 A	P
	n) Symbol S for type S		N/A
	p) Operating means of test device by letter T	T	P
	q) Wiring diagram..... :		P
	r) Operating characteristic in presence of residual currents with d.c. components		--
	- RCBOs of type AC with the symbol..... 		N/A
	- RCBOs of type A with the symbol..... 		P
	s) type D RCBOs, the max. instantaneous tripping current, if higher than 20 I _N		N/A
	Marking on the RCBO itself or on nameplate or nameplates attached to the RCBO and located so that for small devices at least d), f), n), p) and r) (only for type A) is legible when the RCBO is installed	d), f), p) and r) are marked on the front	P
	The information under a), b), c), h), l), r) (only for type AC) and s) may be marked on the side or the back of the device and be visible only before the device is installed	a), b), c) and h) are marked on the front	P

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Clause	Requirement + Test	Result - Remark	Verdict
	The information under q) may be on the inside of any cover which has to be removed in order to connect the supply wires	q) is marked on the front	P
	Any remaining information not marked shall be given in the manufacturer's catalogues.		P
	The suitability for isolation, which is provided by all circuit-breakers of this standard, may be indicated by the symbol on the device		P
	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
	Open position indicated by "0" and closed position by "I"		P
	For push-buttons the OFF push-button shall either be red and/or marked with "0"		N/A
	If necessary to distinguish between supply and load terminals they shall be clearly marked	Line/Load are marked	P
	Terminals for neutral conductor N	N	P
	Terminal for protective conductor		N/A
	Marking indelible, easy legible and not on removable parts		P
	Labels not easy to remove and no curling. Test acc. to cl. 9.3: 15 s with water and 15 s with hexane		P
	For universal terminals (rigid-solid, rigid-stranded and flexible conductors:		P
	- no markings		P
	For non-universal terminals:		--
	- terminals for rigid-solid conductors only, marked by the letters "s" or "sol"		N/A
	- terminals for rigid (solid and stranded) conductors only, marked by the letter "r"		N/A
	marking on the RCBO or if the space available is not sufficient, on the smallest package unit or in technical information		P

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Clause	Requirement + Test	Result - Remark	Verdict
8.	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 other than those specifically intended for changing the setting of the residual operating current.		P
	Changing from one setting to another shall not be possible without a tool. It shall not be possible to disable or inhibit the RCBO function by any means. NOTE In Australia, Germany, Denmark, Italy, the UK and Switzerland, multiple settings are not allowed.		P
	In case of an RCBO 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		P
	Switched neutral of four-pole RCBOs shall not close after and shall not open before the other poles		P
	Neutral pole having adequate making and breaking capacity and RCBO with independent manual operation:		P
	- all poles operate together including neutral pole		P
	Trip-free mechanism		P
	Possible to switch on and off by hand		P
	No intermediate position of the contacts		P
	RCBOs 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:		P
	- the position of the actuator (this being preferred)		P
	- a separate mechanical indicator		P

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Clause	Requirement + Test	Result - Remark	Verdict
	If a separate mechanical indicator is used to indicate the position of the main contacts, this shall show the colour:		P
	- red for the closed position (ON)		P
	- green for the opened position (OFF)		P
	The means of indication of the contact position shall be reliable (Compliance is checked by inspection and by the test of 9.9.2.2)		P
	RCBOs shall be designed so that the actuator, front plate or cover can only be correctly fitted in a manner which ensures correct indication of the contact position (Compliance is checked by inspection and by the tests of 9.12.12.1 and 9.12.12.2)		P
	When means are provided or specified by the manufacturer to lock the operating means in the open position, locking in that position shall only be possible when the main contacts are in the open position. (Compliance is checked by inspection, taking into account the instructions of the manufacturer)		N/A
	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		P
	When an indicator light is used this shall be lit when the RCBO 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.		P
	If the cover is used as a guiding means for push-buttons, it shall not possible to remove the buttons from the outside		P
	Operating means securely fixed, not possible to remove them without a tool.		P
	For "up-down" operating means the contacts are closed by the up movement.		P
9.11	Test:		--
	- The RCBO is mounted and wired as in normal use.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- Test circuit according to figure 4.		P
9.11.2	A residual current equal to $1,5 I_{\Delta N}$ is passed by closing S_2 , the RCBO having been closed and the operating means being held in the closed position. The RCBO shall trip.	45 mA, tripped	P
	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.	45 mA, tripped	P
8.1.3	Clearances and creepage distances (external parts) --> see "Clearances and creepage distances internal and external parts"		--
8.1.4	Screws, current-carrying parts and connections		--
8.1.4.1	Connections withstand mechanical stresses occurring in normal use.		P
	Screws for mounting the RCBO are not of thread-cutting type.		P
	Screws and nuts which are operated when mounting and connecting		P
	Test according to cl. 9.4:		--
	- 10 times (screw $\varnothing$ / torque Nm)		N/A
	- 5 times (screw $\varnothing$ / torque Nm)	$\varnothing$ 5 mm, 2 Nm	P
8.1.4.2	Screws with a thread of insulating material operated when mounting the RCBO; 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.		P
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:		--
	- copper		P
	- an alloy 58% copper for parts worked cold		N/A
	- 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).		N/A
	The requirements of this subclause do not apply to: contacts, magnetic circuits, heater elements,		P

IEC 61009-1			
Clause	Requirement + Test		Verdict
	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		--
	Compliance is checked by inspection and by the tests as relevant for the type of connection:		P
	9.5 for screw-type terminals		P
	by specific tests for plug-in or bolt-on RCBOs 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		--
	Test see cl. 9.5		--
	Torque		
	Ø 5 mm	2,0 Nm	P
	Ø mm	Nm	N/A
	Ø mm	Nm	N/A
	Max. cross-sect.: ____mm ²		P
9.5	Test of reliability of screw-type terminals for external copper conductors		P
9.5.1	Pull test:		--
	Terminal shall be suitable for all types of conductors: rigid (solid or stranded) and flexible, unless otherwise specified by the manufacturer.		P
	Min. cross-section solid / stranded / flexible (mm ²):		--
	Solid: 1,0 mm ² Stranded: 1,5 mm ² Flexible: 1,0 mm ²		
	Max. cross-section solid / stranded / flexible (mm ²):		--
	Solid: 6,0 mm ² Stranded: 16 mm ² Flexible: 10 mm ²		
	Torque ² / ₃ (Nm)		--
	1,3 Nm		

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Clause	Requirement + Test	Result - Remark	Verdict
	Pull for 1 min solid / stranded / flexible (N) ... :	Solid max sect. 6 mm ² Pull 60 N for 1 min Stranded max sect. 16 mm ² Pull 90 N for 1 min Flexible max sect. 10 mm ² Pull 80 N for 1 min Solid min sect. 1,0 mm ² Pull 50 N for 1 min Stranded min sect. 1,5 mm ² Pull 50 N for 1 min Flexible min sect. 1,0 mm ² Pull 50 N for 1 min	--
	During the test no noticeable move of conductor		P
9.5.2	Min. cross-section (mm ²)	Solid: 1 mm ²	--
	Max. cross-section (mm ²)	Stranded: 16 mm ²	--
	Torque ² / ₃ (Nm)	1,3 Nm	--
	The conductor shows no damage		P
	Terminals not worked loose and no damage		P
9.5.3	Terminals fitted with the largest cross-section area specified in Table 8, for stranded and/or flexible copper conductor.		P
	Max. cross-section stranded (mm ²)	16 mm ²	P
	Max. cross-section flexible (mm ²)	10 mm ²	P
	Torque ² / ₃ (Nm)	1,3 Nm	--
	After the test no strand of conductor escaped outside		P
8.1.5.2	RCBOs shall be provided with:		--
	- terminals which shall allow the connection of copper conductors having nominal cross-sectional areas as shown in Table 8		P

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Clause	Requirement + Test			Verdict
Table 8	Rated current (A)	Range of nominal cross sections to be clamped* (mm ²)		Solid: 1 mm ² to 6 mm ² Stranded: 1,5 mm ² to 16 mm ² Flexible: 1 mm ² to 10 mm ²
		Rigid (solid or stranded) conductors	Flexible conductors	
	≤ 13	1 to 2,5	1 to 2,5	
	> 13 ≤ 16	1 to 4	1 to 4	
	> 16 ≤ 25	1,5 to 6	1,5 to 6	
	> 25 ≤ 32	2,5 to 10	2,5 to 6	
	> 32 ≤ 50	4 to 16	4 to 10	
	> 50 ≤ 80	10 to 25	10 to 16	
	> 80 ≤ 100	16 to 35	16 to 25	
	> 100 ≤ 125	24 to 50	25 to 35	
	*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 mm ² up to 6 mm ² be designed to clamp solid conductors only.			--
	- or terminals for external untreated aluminium conductors and with aluminium screw-type terminals for use with copper or with aluminium conductors according to Annex L.			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 sub-clause 9.5)			P
8.1.5.4	Terminals for $I_N \leq 32$ A allow the connection of conductors without special preparation.			The terminals of the RCBOs in this series (from 6 A to 40 A of B, C type) are same
8.1.5.5	Terminals have adequate mechanical strength and metric ISO thread or equivalent. (See tests of sub-clauses 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)			P
8.1.5.7	Clamping of conductor reliably and between metal surfaces. (See tests of sub-clauses 9.4 and 9.5.1)			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 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)			P

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Clause	Requirement + Test	Result - Remark	Verdict
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.		P
8.1.6	Non interchangeability		--
	Plug-in or screw-in RCBOs must not be replaceable, without aid of a tool, by another of the same make, but having a higher rated current.		N/A
8.2	Protection against electric shock		--
	Live parts not accessible in normal use		P
	For RCBOs 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.		P
	Linings		--
	- 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		--
	- reliably fixed		N/A
	- adequate mechanical strength		N/A
	For plug-in RCBOs 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.		N/A
	Possible to replace plug-in RCBOs easily with-out touching live parts.		N/A
	Lacquer or enamel not considered to provide adequate insulation.		N/A
9.6	Test: Standard test finger		--

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Clause	Requirement + Test	Result - Remark	Verdict
	Straight test finger with a force of 75 N for 1 min at $35^{\circ}\text{C} \pm 2^{\circ}\text{C}$		P
	Enclosures or covers not deformed to such an extent that live parts can be touched.		P
8.9	Resistance to heat		--
	RCBO sufficiently resistant to heat		P
9.14.1	Test:		--
	- without removable covers.....1 h (100 ± 2) $^{\circ}\text{C}$		P
	- removable covers1 h (70 ± 2) $^{\circ}\text{C}$		N/A
	No change impairing further use and no flow of sealing compound that live parts are exposed		P
	No access to live parts even with test finger with a force not exceeding 5 N.		P
	The RCBO 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		P
	50 Hz	30 ms	P
	Marking still legible after test		P
9.14.2	Ball pressure test for external parts of insulating material necessary to retain current-carrying parts or parts of the protective circuit in position:		P
	- $T = 125 \pm 2^{\circ}\text{C}$	126 $^{\circ}\text{C}$	P
	After 1 h $\varnothing$ of impression ≤ 2 mm	Housing body: 1,1 mm	P
9.14.3	Ball pressure test for external parts of insulating material not necessary to retain current-carrying parts or parts of the protective circuit in position:		P
	☒ $T = 70 \pm 2^{\circ}\text{C}$	71 $^{\circ}\text{C}$ / 70 $^{\circ}\text{C}$ / 71 $^{\circ}\text{C}$	P
	☐ $T = ____ \pm 2^{\circ}\text{C}$ (40 $^{\circ}\text{C}$ + max. temperature rise of sub-clause 9.8)		N/A
	$\varnothing$ of impression ≤ 2 mm	knob: 0,7 mm / Test Button: 0,5 mm / Clip: 0,5 mm	P
8.1.3	Clearances and creepage distances (internal and external parts)		--
	The minimum required clearances and creepage distances are based on the RCBO being designed for operating in an environment with pollution degree 2		P

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Clause	Requirement + Test	Result - Remark	Verdict
	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.		P
	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:		P
	- Tests according to 9.7.2 to 9.7.6 as applicable		P
	- Test according to 9.7.7.2 with test voltages acc. Table 19 with test arrangements of 9.7.2 items b), c), d), e)		P
	If measurement does not show any reduced clearance, test 9.7.7.2 is not applied		P
	Compliance for item 3, checked by measurement		P
	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_{imp}		--
	4kV (see table 5) 2,5kV(see table 5)	☒ ☐	--
		minimum clearances [mm]	--
	1. between live parts which are separated when the main contacts are in the open position	5,2 mm > 4 mm	P
	2. between live parts of different polarity	11,8 mm > 3 mm	P
	3. 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	14,4 mm > 3 mm	P
	- screws or other means for fixing covers which have to be removed when mounting the RCBO		N/A
	- surface on which the RCBO is mounted	22,3 mm > 3 mm	P
	- screws or other means for fixing the RCBO		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- metal covers or boxes		N/A
	- other accessible metal parts	4,3 mm > 3 mm	P
	- metal frames supporting flush-type RCBOs	3,7 mm > 3 mm	P
	Creepage distances [mm] (see table 5)		--
	Material group	IIIb ☐ IIIa ☒ II ☐ I ☐	P
		minimum creepage distances [mm]	--
	1. between live parts which are separated when the main contacts are in the open position	5,2 mm > 4 mm	P
	2. between live parts of different polarity	11,8 mm > 4 mm	P
	3. 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	19,6 mm > 4 mm	P
	- screws or other means for fixing covers which have to be removed when mounting the RCBO		N/A
	- surface on which the RCBO is mounted	23,5 mm > 4 mm	P
	- screws or other means for fixing the RCBO		N/A
	- metal covers or boxes		N/A
	- other accessible metal parts	4,3 mm > 4 mm	P
	- metal frames supporting flush-type RCBOs	9,8 mm > 4 mm	P
9.25	Test of resistance to rusting:	Terminal, Spring, Iron core	--
	- 10 min immersed in a cold chemical degreaser such as methyl-chloroform or refined petrol		P
	- 10 min immersed in a 10% solution of ammonium chloride in water at 20°C±5°C	25 °C	P
	- 10 min in a box containing air saturated with moisture at 20°C±5°C	25 °C	P
	- 10 min at 100°C	100°C	P
	No sign of rust		P

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Clause	Requirement + Test	Result - Remark	Verdict
	TEST SEQUENCE "A₂"	2P, C40, 30 mA, type A	--
		102# - 104#	
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.		P
9.15	GLOW-WIRE TEST		--
	Test performed on a complete RCBO		P
	Test made on three samples, points of application being different from one sample to another		P
	- External parts of insulating material necessary to retain current-carrying parts or parts of the protective circuit in position.....:	960 °C Housing body	P
	- All other external parts of insulating material	650 °C Knob, Test Button, Clip	P
	No visible flame and no sustained glowing	Visible flame is observed on housing body No visible flame on other parts	P
	Flames and glowing extinguish within 30 s after removal	Housing body 102#: 3 s 103#: 4 s 104#: 5 s	P
	No ignition of tissue paper or scorching of the pinewood board		P

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	TEST SEQUENCE "A₂"	4P, C40, 30 mA, type A	--
		2# - 4#	
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.		P
9.15	GLOW-WIRE TEST		--
	Test performed on a complete RCBO		P
	Test made on three samples, points of application being different from one sample to another		P
	- External parts of insulating material necessary to retain current-carrying parts or parts of the protective circuit in position.....:	960 °C Housing body	P
	- All other external parts of insulating material	650 °C Knob, Test Button, Clip	P
	No visible flame and no sustained glowing	Visible flame is observed on housing body No visible flame on other parts	P
	Flames and glowing extinguish within 30 s after removal	Housing body 2#: 6 s 3#: 8 s 4#: 5 s	P
	No ignition of tissue paper or scorching of the pinewood board		P

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Clause	Requirement + Test	Result - Remark	Verdict
	TEST SEQUENCE "B"	2P, C40, 30 mA, type A	--
		105# - 107#	
8	REQUIREMENTS FOR CONSTRUCTION AND OPERATION		--
8.3	dielectric properties and isolating capability		--
	RCBOs have adequate dielectric properties		P
9.7	test of dielectric properties and isolating capability		--
9.7.7.4	Verification of resistance of the insulation of open contact and basic insulation against an impulse voltage in normal conditions		P
	These tests are not preceded by the humidity treatment described in 9.7.1.		P
	The test is carried out on an RCBO fixed on a metal support		P
	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		P
	The shape of the impulses is adjusted with the RCBO under test connected to the impulse generator.		P
	For RCBOs with incorporated surge arresters that cannot be disconnected, the shape of the impulses is adjusted without connection of the RCBO to the impulse generator.	No surge arresters.	N/A
	rated impulse withstand voltage [kV]:	4 kV	--
	see level of test laboratory [m]	Sea level	--
	test voltage (acc. Table 28) [kV]:	6,2 kV	--
9.7.7.4.2	RCBO in open position (contacts in open position)		P
	The impulses are applied between:		P
	the line terminals connected together and the load terminals connected together		P
9.7.7.4.3	RCBO in closed position		P
	All components bridging the basic insulation disconnected	No components bridging the basic insulation.	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

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Clause	Requirement + Test	Result - Remark			Verdict
	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 RCBO				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.				P
	no disruptive discharges during the test				P
9.7.7.5	VERIFICATION OF THE BEHAVIOUR OF COMPONENTS BRIDGING THE BASIC INSULATION				--
	A new RCBO sample is tested				N/A
	Test only performed on RCBOs, where components bridging the basic insulation have been disconnected during the impulse voltage test of 9.7.7.4.3				N/A
	test voltage $1200V+U_0$				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
	Then, the equipment is connected to the mains acc. manufacturer's instruction				N/A
	The RCBO shall trip with a test current of $1,25 I_{AN}$		[ms]		--
	Test switch S_2 and RCBO in the closed position, test voltage established by closing the test switch S_1 .				N/A
9.7.1	RESISTANCE TO HUMIDITY				P
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.				P
9.7.1.2	Test conditions: 48 h in humidity cabinet RH = 91% to 95% T = 20 to 30°C ± 1°C	R.H. = 93% T = 25 °C			--
9.7.1.4	The samples show no damage				P
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:	105# [MΩ]	106# [MΩ]	107# [MΩ]	--

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Clause	Requirement + Test	Result - Remark			Verdict
	a) between the terminals which are electrically connected together when the RCBO is in the closed position $\geq 2 \text{ M}\Omega$	>500	>500	>500	P
	b) between each pole and the others connected together (electronic components, connected between current path being disconnected)..... $\geq 2 \text{ M}\Omega$	>500	>500	>500	P
	c) between all poles connected together and the frame $\geq 5 \text{ M}\Omega$	>500	>500	>500	P
	d) between metal parts of the mechanism and the frame $\geq 5 \text{ M}\Omega$				N/A
	e) 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) electronic components disconnected2000 V				P
	b) electronic components disconnected2000 V				P
	c) electronic components disconnected2000 V				P
	d) electronic components disconnected2000 V				N/A
	e) electronic components disconnected2500 V				N/A
	No flashover or breakdown				P
9.7.4	Insulation resistance of auxiliary circuits measured with 500 V DC after 1 min:				--
	1) between all auxiliary circuits and the frame $\geq 2 \text{ M}\Omega$				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 $\geq 2 \text{ M}\Omega$				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.)	Test voltage (V)			--
	≤ 30	600			V
	$> 30 \leq 50$	1000			
	$> 50 \leq 110$	1500			
	$> 110 \leq 250$	2000			
	$> 250 \leq 500$	2500			
	1) between all auxiliary circuits and the frame				N/A

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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				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 7 shows a reduction of the required length, this test applies.				--
	The test is carried out on an RCBO fixed on a metal support and being in the closed position				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 RCBO under test connected to the impulse generator.				N/A
	For RCBOs with incorporated surge arresters that cannot be disconnected, the shape of the impulses is adjusted without connection of the RCBO to the impulse generator.				N/A
	test performed with:				--
	- surge impedance of the test apparatus $\leq 500\Omega$ and surge protective devices disconnected before testing or				N/A
	- hybrid generator with an surge impedance of 2 Ω and surge protective devices not disconnected before testing				N/A
	rated impulse withstand voltage [kV]:				--
	see level of test laboratory [m]				--
	test voltage (acc. Table 19) [kV]:				--
	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				N/A
	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 RCBO				N/A

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Clause	Requirement + Test					Result - Remark				Verdict		
	A third series of tests is made applying the impulse voltage between (and not tested during the two first sequences described here above):									N/A		
	b) between each pole and the others connected together (electronic components, connected between current path being disconnected)									N/A		
	c) between all poles connected together and the frame									N/A		
	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									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.									N/A		
	no disruptive discharges during the test									N/A		
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.									N/A		
9.7.6	Capability of control circuits connected to the main circuit of withstanding high DC voltages due to insulation measurements					105#	106#	107#	--			
	RCBO fixed on metal support in closed position with all control circuits connected as in service.									P		
	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.								P			
	Type	I _N A	I _{ΔN} A	Standard values of break time and non-actuating time at a residual current equal to							--	
				I _{ΔN}	2 I _{ΔN}	5 I _{ΔN}	5 I _{ΔN} or 0,25A a)	5A-200A, 500A b)	I _{Δt} c)		--	
	General	Any value	<0,03	0,3	0,15	--	0,04	0,04	0,04	Max. break times	--	
			0,03	0,3	0,15	--	0,04	0,04	0,04		--	
			>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 times	--	

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Clause	Requirement + Test							Result - Remark			Verdict
				0,13	0,06	0,05	--	0,04	0,04	Min. non-actuating times	--
	a) value to be decided by the manufacturer for this test							150 mA			--
	b) The test are only made during verification of the correct operation as mentioned in 9.9.1.2 d) but in any case values exceeding the lower limit of the overcurrent instantaneous tripping range are not tested.										--
	c) The test is made with a current $I_{\Delta t}$ equal to the lower limit of the overcurrent instantaneous tripping range according to type B, C or D, as applicable. For the tests of 9.9.1.3 and 9.9.1.4b), the current $I_{\Delta t}$ is established so that the vector sum $I_{\Delta t} + I_n$ is equal to the lower limit of the overcurrent instantaneous tripping range, according to type B, C or D, as applicable.										--
9.9.1.2.c)	Verification of the correct operation in case of sudden appearance of residual current by closing S_1 , (S_2 and RCBO in closed position):										P
	Maximum break times at:							105# [ms]	106# [ms]	107# [ms]	--
	- $I_{\Delta N}$							89	94	95	P
	- $2 I_{\Delta N}$							39	37	35	P
	- $5 I_{\Delta N}$ or							16	16	16	P
	- $I_{\Delta t}$ <u>200</u> A							37	38	37	P
	No value exceeds the relevant specified limiting value										P
	Additional test for type S:										--
	Minimum non-actuating time at:							[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$ 0,13 s										N/A
	- $2 I_{\Delta N}$ 0,06 s										N/A
	- $5 I_{\Delta N}$ 0,05 s										N/A
	- $I_{\Delta t}$ 0,04 s										N/A
	The test switch S_1 and the RCBO 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

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Clause	Requirement + Test	Result - Remark			Verdict
8.4	Temperature rise				--
	Temperature rises do not exceed the limiting values stated in table 7.				P
	Cross-section (mm ²)	10 mm ²			--
9.8.1	Ambient air temperature (°C)	21,0 °C			--
9.8.2	Test current I _n (A) until steady state values are reached.	40 A			--
	Four pole RCBOs:				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 65	105#	106#	107#	P
	L1 up pole	42	42	41	P
	N up pole	41	38	39	P
	L1 down pole	37	40	35	P
	N down pole	40	41	35	P
	External parts liable to be touched during manual operation of the RCBO, including operating means of insulating material and metallic means for coupling insulated operating means of several poles 40	20	20	20	P
	External metallic parts of operating means 25				N/A
	Other external parts, including that face of the RCBO in direct contact with the mounting surface 60	39	39	39	P
8.16	Reliability				--
	RCBOs operate reliably even after long service.				P
9.22.2	Test with 28 cycles at 40 ± 2°C	40 °C			--
	Cross-section (mm ²)	10 mm ²			--
	Torque ² / ₃ (Nm)	1,3 Nm			--
	Test current I _n (A)	40 A			--
	- with current passing 21 h				P
	- without current 3 h				P
	For 4 pole RCBOs with 3 overcurrent protected poles only 3 poles loaded				N/A
	At the end of the last period of 21 h with current	105#	106#	107#	--

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Clause	Requirement + Test	Result - Remark			Verdict
	passing the temperature rise of the terminals shall not exceed 65K	[K]	[K]	[K]	
	L1 up pole	46	44	43	P
	N up pole	45	41	44	P
	L1 down pole	33	36	38	P
	N down pole	35	38	38	P
	After cool down the RCBO shall trip with a test current of 1,25 I _{ΔN} - break time not exceeding the value for I _{ΔN} in table 2	105# [ms]	106# [ms]	107# [ms]	--
	-1,25 I _{ΔN}	78	59	62	P
	Test switch S ₂ and RCBO in the closed position, test voltage established by closing the test switch S ₁ .				P
9.23	Verification of ageing of electronic components				--
	168 h at 40 ± 2°C :	40 °C			--
	Test current I _N (A)..... :	40 A			--
	Cross-section (mm²)..... :	10 mm²			--
	Electronic parts at 1,1 U _N :	253 V			--
	After cool down:				P
	- electronic parts show no damage				P
	The RCBO shall trip with a test current of 1,25 I _{ΔN} - break time not exceeding the value for I _{ΔN} in table 2	105# [ms]	106# [ms]	107# [ms]	--
	-1,25 I _{ΔN}	65	67	59	P
	Test switch S ₂ and RCBO in the closed position, test voltage established by closing the test switch S ₁				P

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Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "B" (clause 9.8)	2P, B40, 30 mA, type A			--
		108# - 110#			
	Temperature rises do not exceed the limiting values stated in table 7.				P
	Cross-section (mm²)	10 mm²			--
9.8.1	Ambient air temperature (°C)	21,5 °C			--
9.8.2	Test current I _N (A) until steady state values are reached.	40 A			--
	Four pole RCBOs:				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 65	108#	109#	110#	P
	L1 up pole	42	42	41	P
	N up pole	41	39	40	P
	L1 down pole	38	40	38	P
	N down pole	40	41	39	P
	External parts liable to be touched during manual operation of the RCBO, including operating means of insulating material and metallic means for coupling insulated operating means of several poles 40	37	36	37	P
	External metallic parts of operating means 25				N/A
	Other external parts, including that face of the RCBO in direct contact with the mounting surface 60	20	19	20	P

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Clause	Requirement + Test	Result - Remark	Verdict
	TEST SEQUENCE "B"	4P, C40, 30 mA, type A	--
		5# - 7#	
8	REQUIREMENTS FOR CONSTRUCTION AND OPERATION		--
8.3	dielectric properties and isolating capability		--
	RCBOs have adequate dielectric properties		P
9.7	test of dielectric properties and isolating capability		--
9.7.7.4	Verification of resistance of the insulation of open contact and basic insulation against an impulse voltage in normal conditions		P
	These tests are not preceded by the humidity treatment described in 9.7.1.		P
	The test is carried out on an RCBO fixed on a metal support		P
	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		P
	The shape of the impulses is adjusted with the RCBO under test connected to the impulse generator.		P
	For RCBOs with incorporated surge arresters that cannot be disconnected, the shape of the impulses is adjusted without connection of the RCBO to the impulse generator.	No surge arresters.	N/A
	rated impulse withstand voltage [kV]:	4 kV	--
	see level of test laboratory [m]	Sea level	--
	test voltage (acc. Table 28) [kV]:	6,2 kV	--
9.7.7.4.2	RCBO in open position (contacts in open position)		P
	The impulses are applied between:		P
	the line terminals connected together and the load terminals connected together		P
9.7.7.4.3	RCBO in closed position		P
	All components bridging the basic insulation disconnected	No components bridging the basic insulation.	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

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Clause	Requirement + Test	Result - Remark			Verdict	
	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 RCBO				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.				P	
	no disruptive discharges during the test				P	
9.7.7.5	VERIFICATION OF THE BEHAVIOUR OF COMPONENTS BRIDGING THE BASIC INSULATION				--	
	A new RCBO sample is tested				N/A	
	Test only performed on RCBOs, where components bridging the basic insulation have been disconnected during the impulse voltage test of 9.7.7.4.3				N/A	
	test voltage $1200V+U_0$				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	
	Then, the equipment is connected to the mains acc. manufacturer's instruction				N/A	
	The RCBO shall trip with a test current of $1,25 I_{AN}$	[ms]			--	
	Test switch S_2 and RCBO in the closed position, test voltage established by closing the test switch S_1 .				N/A	
9.7.1	RESISTANCE TO HUMIDITY				P	
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.				P	
9.7.1.2	Test conditions: 48 h in humidity cabinet RH = 91% to 95% T = 20 to 30°C ± 1°C	R.H. = 93% T = 25 °C			--	
9.7.1.4	The samples show no damage				P	
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:	5# [MΩ]	6# [MΩ]	7# [MΩ]	--	

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Clause	Requirement + Test	Result - Remark			Verdict
	a) between the terminals which are electrically connected together when the RCBO is in the closed position $\geq 2 \text{ M}\Omega$	>500	>500	>500	P
	b) between each pole and the others connected together (electronic components, connected between current path being disconnected)..... $\geq 2 \text{ M}\Omega$	>500	>500	>500	P
	c) between all poles connected together and the frame $\geq 5 \text{ M}\Omega$	>500	>500	>500	P
	d) between metal parts of the mechanism and the frame $\geq 5 \text{ M}\Omega$				N/A
	e) 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) electronic components disconnected2000 V				P
	b) electronic components disconnected2000 V				P
	c) electronic components disconnected2000 V				P
	d) electronic components disconnected2000 V				N/A
	e) electronic components disconnected2500 V				N/A
	No flashover or breakdown				P
9.7.4	Insulation resistance of auxiliary circuits measured with 500 V DC after 1 min:				--
	1) between all auxiliary circuits and the frame $\geq 2 \text{ M}\Omega$				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 $\geq 2 \text{ M}\Omega$				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.)	Test voltage (V)			--
	≤ 30	600			V
	$> 30 \leq 50$	1000			
	$> 50 \leq 110$	1500			
	$> 110 \leq 250$	2000			
	$> 250 \leq 500$	2500			
	1) between all auxiliary circuits and the frame				N/A

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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				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 7 shows a reduction of the required length, this test applies.				--
	The test is carried out on an RCBO fixed on a metal support and being in the closed position				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 RCBO under test connected to the impulse generator.				N/A
	For RCBOs with incorporated surge arresters that cannot be disconnected, the shape of the impulses is adjusted without connection of the RCBO to the impulse generator.				N/A
	test performed with:				--
	- surge impedance of the test apparatus $\leq 500\Omega$ and surge protective devices disconnected before testing or				N/A
	- hybrid generator with an surge impedance of 2 Ω and surge protective devices not disconnected before testing				N/A
	rated impulse withstand voltage [kV]:				--
	see level of test laboratory [m]				--
	test voltage (acc. Table 19) [kV]:				--
	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				N/A
	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 RCBO				N/A

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Clause	Requirement + Test					Result - Remark				Verdict		
	A third series of tests is made applying the impulse voltage between (and not tested during the two first sequences described here above):									N/A		
	b) between each pole and the others connected together (electronic components, connected between current path being disconnected)									N/A		
	c) between all poles connected together and the frame									N/A		
	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									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.									N/A		
	no disruptive discharges during the test									N/A		
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.									N/A		
9.7.6	Capability of control circuits connected to the main circuit of withstanding high DC voltages due to insulation measurements					5#	6#	7#	--			
	RCBO fixed on metal support in closed position with all control circuits connected as in service.									P		
	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.								P			
	Type	I _N A	I _{ΔN} A	Standard values of break time and non-actuating time at a residual current equal to							--	
				I _{ΔN}	2 I _{ΔN}	5 I _{ΔN}	5 I _{ΔN} or 0,25A a)	5A-200A, 500A b)	I _{Δt} c)		--	
	General	Any value	<0,03	0,3	0,15	--	0,04	0,04	0,04	Max. break times	--	
			0,03	0,3	0,15	--	0,04	0,04	0,04		--	
			>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 times	--	

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Clause	Requirement + Test							Result - Remark			Verdict
				0,13	0,06	0,05	--	0,04	0,04	Min. non-actuating times	--
	a) value to be decided by the manufacturer for this test							150 mA			--
	b) The test are only made during verification of the correct operation as mentioned in 9.9.1.2 d) but in any case values exceeding the lower limit of the overcurrent instantaneous tripping range are not tested.										--
	c) The test is made with a current $I_{\Delta t}$ equal to the lower limit of the overcurrent instantaneous tripping range according to type B, C or D, as applicable. For the tests of 9.9.1.3 and 9.9.1.4b), the current $I_{\Delta t}$ is established so that the vector sum $I_{\Delta t} + I_n$ is equal to the lower limit of the overcurrent instantaneous tripping range, according to type B, C or D, as applicable.										--
9.9.1.2.c)	Verification of the correct operation in case of sudden appearance of residual current by closing S_1 , (S_2 and RCBO in closed position):										P
	Maximum break times at:							5# [ms]	6# [ms]	7# [ms]	--
	- $I_{\Delta N}$							79	84	75	P
	- $2 I_{\Delta N}$							40	39	39	P
	- $5 I_{\Delta N}$ or							22	24	25	P
	- $I_{\Delta t}$ <u>200 A</u>							12	13	12	P
	No value exceeds the relevant specified limiting value										P
	Additional test for type S:										--
	Minimum non-actuating time at:							[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$ 0,13 s										N/A
	- $2 I_{\Delta N}$ 0,06 s										N/A
	- $5 I_{\Delta N}$ 0,05 s										N/A
	- $I_{\Delta t}$ 0,04 s										N/A
	The test switch S_1 and the RCBO 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

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Clause	Requirement + Test	Result - Remark			Verdict
8.4	Temperature rise				--
	Temperature rises do not exceed the limiting values stated in table 7.				P
	Cross-section (mm ²)	10 mm ²			--
9.8.1	Ambient air temperature (°C)	24,2 °C			--
9.8.2	Test current I _n (A) until steady state values are reached.	40 A			--
	Four pole RCBOs:				P
	Current passing through				P
	- 3 phase poles (1)	All poles in series			P
	- neutral and adjacent pole (2)				N/A
	Parts Temperature rise K	[K]	[K]	[K]	--
	Terminals for external connections 65	5#	6#	7#	P
	L1 up pole	47	43	44	P
	L2 up pole	49	54	52	P
	L3 up pole	50	57	54	P
	N up pole	43	47	46	P
	L1 down pole	44	44	42	P
	L2 down pole	52	53	51	P
	L3 down pole	57	59	56	P
	N down pole	54	54	54	P
	External parts liable to be touched during manual operation of the RCBO, including operating means of insulating material and metallic means for coupling insulated operating means of several poles 40	37	35	32	P
	External metallic parts of operating means 25				N/A
	Other external parts, including that face of the RCBO in direct contact with the mounting surface 60	41	50	43	P
8.16	Reliability				--
	RCBOs operate reliably even after long service.				P
9.22.2	Test with 28 cycles at 40 ± 2°C	40 °C			--
	Cross-section (mm ²)	10 mm ²			--
	Torque ² / ₃ (Nm)	1,3 Nm			--
	Test current I _n (A)	40 A			--
	- with current passing 21 h				P

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Clause	Requirement + Test	Result - Remark			Verdict
	- without current 3 h				P
	For 4 pole RCBOs with 3 overcurrent protected poles only 3 poles loaded				P
	At the end of the last period of 21 h with current passing the temperature rise of the terminals shall not exceed 65K	5# [K]	6# [K]	7# [K]	--
	L1 up pole	51	52	49	P
	L2 up pole	52	56	56	P
	L3 up pole	53	62	55	P
	L1 down pole	46	48	43	P
	L2 down pole	53	54	52	P
	L3 down pole	58	61	58	P
	After cool down the RCBO shall trip with a test current of 1,25 I _{ΔN} - break time not exceeding the value for I _{ΔN} in table 2	5# [ms]	6# [ms]	7# [ms]	--
	-1,25 I _{ΔN}	81	70	71	P
	Test switch S ₂ and RCBO in the closed position, test voltage established by closing the test switch S ₁ .				P
9.23	Verification of ageing of electronic components				--
	168 h at 40 ± 2°C	40 °C			--
	Test current I _N (A)	40 A			--
	Cross-section (mm ²)	10 mm ²			--
	Electronic parts at 1,1 U _N	440 V			--
	After cool down:				P
	- electronic parts show no damage				P
	The RCBO shall trip with a test current of 1,25 I _{ΔN} - break time not exceeding the value for I _{ΔN} in table 2	5# [ms]	6# [ms]	7# [ms]	--
	-1,25 I _{ΔN}	71	69	79	P
	Test switch S ₂ and RCBO in the closed position, test voltage established by closing the test switch S ₁				P

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Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "B" (clause 9.8)	4P, B40, 30 mA, type A			--
		8# - 10#			
	Temperature rises do not exceed the limiting values stated in table 7.				P
	Cross-section (mm²)	10 mm²			--
9.8.1	Ambient air temperature (°C)	24,1 °C			--
9.8.2	Test current I _N (A) until steady state values are reached.	40 A			--
	Four pole RCBOs:				P
	Current passing through				P
	- 3 phase poles (1)	All poles in series			P
	- neutral and adjacent pole (2)				N/A
	Parts Temperature rise K	[K]	[K]	[K]	--
	Terminals for external connections 65	8#	9#	10#	P
	L1 up pole	45	47	45	P
	L2 up pole	52	54	53	P
	L3 up pole	51	54	53	P
	N up pole	48	46	45	P
	L1 down pole	45	47	44	P
	L2 down pole	53	53	55	P
	L3 down pole	54	56	52	P
	N down pole	52	52	54	P
	External parts liable to be touched during manual operation of the RCBO, including operating means of insulating material and metallic means for coupling insulated operating means of several poles 40	36	38	35	P
	External metallic parts of operating means 25				N/A
	Other external parts, including that face of the RCBO in direct contact with the mounting surface 60	44	43	45	P

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Clause	Requirement + Test	Result - Remark		
	TEST SEQUENCE "C"	2P, C40, 30 mA, type A		
		111# - 113#		
	Tests C₁			
8	REQUIREMENTS FOR CONSTRUCTION AND OPERATION			
8.6	Mechanical and electrical endurance			
	RCBOs shall be capable of performing an adequate number of mechanical and electrical operations.			
9.10	Verification of Mechanical and electrical endurance			
	Test:			
	- $I_N \leq 25 \text{ A}$ 2s ON / 13s OFF			
	- $I_N > 25 \text{ A}$ 2s ON / 28s OFF			
	2000 operating cycles			
	Test voltage U_N (V)	240 V		
	Test current I_N (A)	40,2 A		
	Cos phi = 0,85 - 0,9	0,88		
	Cross-section (mm ²)	10 mm ²		
9.10.2	Test procedure			
	$I_{\Delta N} > 0,01 \text{ A}$:			
	- 1000 cycles manual operation			
	- 500 cycles test device			
	- 500 cycles $I_{\Delta N}$			
	$I_{\Delta N} \leq 0,01 \text{ A}$:			
	- 500 cycles manual operation			
	- 750 cycles test device			
	- 750 cycles $I_{\Delta N}$			
	Without load - manual operation			
	- $I_N \leq 25 \text{ A}$ 2000 cycles			
	- $I_N > 25 \text{ A}$ 1000 cycles			
9.10.3	After test:			
	No undue wear, no damage, no loosening of connections, no seepage of sealing compound			
	The RCBO 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	111# [ms]	112# [ms]	113# [ms]

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Clause	Requirement + Test	Result - Remark			Verdict
	-1,25 $I_{\Delta N}$	57	54	57	P
	Test switch S_2 and RCBO in the closed position, test voltage established by closing the test switch S_1 .				P
	Dielectric strength test with 900 V AC for 1 min:				--
	a)				P
	b)				P
	c)				P
	d)				N/A
	e)				N/A
	2,55 I_N through all poles:	102 A			P
		[s]	[s]	[s]	--
	- Opening time ≥ 1 s but ≤ 60 s for $I_N \leq 32$ A				N/A
	- Opening time ≥ 1 s but ≤ 120 s for $I_N > 32$ A	34	37	38	P
9.12.11.2.1	Test at reduced short-circuit current	Figure 7			P
	Test current:				--
	- 500 A	519,3 A / 250,8 V			P
	- 10 I_N				N/A
	Power factor 0,93 - 0,98	0,95			--
	Each overcurrent protected pole:				--
	Sequence: 6-0 and 3-CO I^2t max.	111# [kA ² s]	112# [kA ² s]	113# [kA ² s]	P
	L1	2,4	2,4	2,3	P
	N	2,8	2,7	2,6	
	I_{peak} (A) max. value	[A]	[A]	[A]	P
	L1	731	715	714	P
	N	735	720	719	
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of the fuse F				P
	No damage, polyethylene sheet shows no hole				P
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1	[mA]	[mA]	[mA]	--

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Clause	Requirement + Test	Result - Remark			Verdict
	times $U_n = \underline{253}$ V. The RCBO is in the open position				
	The leakage current shall not exceed 2 mA L1	< 1,4	< 1,4	< 1,4	P
	N	< 1,4	< 1,4	< 1,4	P
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P

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Clause	Requirement + Test	Result - Remark	Verdict
	TEST SEQUENCE "C"	4P, C40, 30 mA, type A	--
		11# - 13#	
	Tests C₁		--
8	REQUIREMENTS FOR CONSTRUCTION AND OPERATION		--
8.6	Mechanical and electrical endurance		--
	RCBOs shall be capable of performing an adequate number of mechanical and electrical operations.		P
9.10	Verification of Mechanical and electrical endurance		--
	Test:		P
	- $I_N \leq 25$ A 2s ON / 13s OFF		N/A
	- $I_N > 25$ A 2s ON / 28s OFF		P
	2000 operating cycles		P
	Test voltage U_N (V)	L1-L2: 414 V L2-L3: 416 V L1-L3: 413 V	--
	Test current I_N (A)	L1: 40,1 A L2: 40,2 A L3: 41,8 A	--
	Cos phi = 0,85 - 0,9	0,86	--
	Cross-section (mm ²)	10 mm ²	--
9.10.2	Test procedure		--
	$I_{\Delta N} > 0,01$ A:		P
	- 1000 cycles manual operation		P
	- 500 cycles test device		P
	- 500 cycles $I_{\Delta N}$		P
	$I_{\Delta N} \leq 0,01$ A:		N/A
	- 500 cycles manual operation		N/A
	- 750 cycles test device		N/A
	- 750 cycles $I_{\Delta N}$		N/A
	Without load - manual operation		P
	- $I_N \leq 25$ A 2000 cycles		N/A
	- $I_N > 25$ A 1000 cycles		P
9.10.3	After test:		--
	No undue wear, no damage, no loosening of connections, no seepage of sealing compound		P

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Clause	Requirement + Test	Result - Remark			Verdict
	The RCBO 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	11# [ms]	12# [ms]	13# [ms]	--
	-1,25 $I_{\Delta N}$	71	44	46	P
	Test switch S_2 and RCBO in the closed position, test voltage established by closing the test switch S_1 .				P
	Dielectric strength test with 900 V AC for 1 min:				--
	a)				P
	b)				P
	c)				P
	d)				N/A
	e)				N/A
	2,55 I_N through all poles:	102 A			P
		[s]	[s]	[s]	--
	- Opening time $\geq 1s$ but $\leq 60 s$ for $I_N \leq 32 A$				N/A
	- Opening time $\geq 1s$ but $\leq 120 s$ for $I_N > 32 A$	37	28	44	P
9.12.11.2.1	Test at reduced short-circuit current	Figure 7			P
	Test current:				--
	- 500 A	519,5 A / 249,9 V			P
	- 10 I_N				N/A
	Power factor 0,93 - 0,98	0,97			--
	Each overcurrent protected pole:				--
	Sequence: 6-0 and 3-CO I^2t max.	11# [kA ² s]	12# [kA ² s]	13# [kA ² s]	P
	L1	1,9	1,9	1,7	P
	L2	1,9	2,2	2,2	
	L3	2,3	2,2	2,2	
	N	1,8	2,0	2,0	
	I_{peak} (A) max. value	[A]	[A]	[A]	P
	L1	699	700	701	P
	L2	703	702	704	
	L3	696	701	702	
	N	703	704	702	
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P

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Clause	Requirement + Test	Result - Remark			Verdict
	No blowing of the fuse F				P
	No damage, polyethylene sheet shows no hole				P
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \underline{440}$ V. The RCBO is in the open position	[mA]	[mA]	[mA]	--
	The leakage current shall not exceed 2 mA L1	< 1,4	< 1,4	< 1,4	P
	L2	< 1,4	< 1,4	< 1,4	P
	L3	< 1,4	< 1,4	< 1,4	P
	N	< 1,4	< 1,4	< 1,4	P
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P

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Clause	Requirement + Test	Result - Remark		Verdict
	Tests C ₂	2P, C40, 30 mA, type A		--
		114#, 115#		
9.12.11.2.2	short circuit test on rcbos for verifying their suitability for use in it systems			P
	figure.....: Figure 8			--
	Test current:			--
	- 500A	516,3 A (L pole) 512,7 A (N pole)		P
	- 1,2 times the upper limit of the standard range of instantaneous tripping (not exceeding 2500 A)			N/A
	Power factor 0,93-0,98:	0,95 (L pole) 0,96 (N pole)		P
	test voltage 105% of the rated phase to phase voltage	433,3 V		P
	test voltage 105% of U ₀ for the pole marked N, if any	250,6 V		P
	Each pole of RCBO is subjected individually to a test in a circuit, the connection of which are shown in Figure 8.			P
	Sequence: O-t-CO..... I _t max.	114# [kA ² s]	115# [kA ² s]	P
	L1	2,1	1,7	P
	N	2,8	2,0	P
	I _{peak} (A) max. value	[A]	[A]	P
	L1	731	709	P
	N	716	696	P
	Sequence	O-t-CO		--
	Point of initiation of the O operation (protected poles): 0 ± 5° for the first tested pole, shifted by 30° for the other poles			P
	No flash-over between poles or between poles and frame			P
	No blowing of the fuse F			P
	No damage, polyethylene sheet shows no hole			P
	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:			P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times U _n = 253 V. The RCBO is in the open	[mA]	[mA]	--

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Clause	Requirement + Test	Result - Remark		Verdict
	position			
	The leakage current shall not exceed 2 mA L1	< 1,4	< 1,4	P
	N	< 1,4	< 1,4	P
9.12.12.1.b)	Dielectric strength test:			P
	Test voltage:			P
	a) 1500 V			P
	b) 1500 V			P
	c) 1500 V			P
	d) 1500 V			N/A
	e) 2000 V			N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position			P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	Tests C ₂	4P, C40, 30 mA, type A			--
		14#, 89#, 90#			
9.12.11.2.2	short circuit test on rcbos for verifying their suitability for use in it systems				P
	figure.....: Figure 8				--
	Test current:				--
	- 500A	510,3 A (L pole) 519,9 A (N pole)			P
	- 1,2 times the upper limit of the standard range of instantaneous tripping (not exceeding 2500 A)				N/A
	Power factor 0,93-0,98:	0,95 (L pole) 0,97 (N pole)			P
	test voltage 105% of the rated phase to phase voltage	427,6 V			P
	test voltage 105% of U ₀ for the pole marked N, if any	249,9 V			P
	Each pole of RCBO is subjected individually to a test in a circuit, the connection of which are shown in Figure 8.				P
	Sequence: O-t-CO..... I _t max.	14# [kA²s]	89# [kA²s]	90# [kA²s]	P
	L1	1,9	1,4	0,9	P
	L2	4,0	2,0	1,6	P
	L3	1,5	1,6	1,5	P
	N	1,8	1,7	1,7	P
	I _{peak} (A) max. value	[A]	[A]	[A]	P
	L1	630	622	559	P
	L2	640	627	635	P
	L3	619	624	615	P
	N	690	698	674	P
	Sequence	O-t-CO			--
	Point of initiation of the O operation (protected poles): 0 ± 5° for the first tested pole, shifted by 30° for the other poles				P
	No flash-over between poles or between poles and frame				P
	No blowing of the fuse F				P
	No damage, polyethylene sheet shows no hole				P
	The RCBO shall show no damage impairing their				P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	further use an shall be capable without maintenance to withstand the following tests:				
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \underline{440\text{ V}}$. The RCBO is in the open position	[mA]	[mA]	[mA]	--
	The leakage current shall not exceed 2 mA L1	< 1,4	< 1,4	< 1,4	P
	L2	< 1,4	< 1,4	< 1,4	P
	L3	< 1,4	< 1,4	< 1,4	P
	N	< 1,4	< 1,4	< 1,4	P
9.12.12.1.b)	Dielectric strength test:				P
	Test voltage:				P
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P

IEC 61009-1											
Clause	Requirement + Test						Result - Remark			Verdict	
	TEST SEQUENCE "D"						2P, C40, 30 mA, type A			--	
							116# ~ 118#				
	TEST D ₀									--	
8	requirements for construction and operation									--	
8.5	Operating characteristics									--	
9.9	Verification of the operating characteristic									--	
9.9.1	RCBO installed as for normal use, test circuit according to figure 4									P	
	For multiple settings of I _{ΔN} tests are made for each setting									N/A	
	RCBOs with more than one rated frequency, tests at the lowest and highest frequency, except for test in 9.9.1.2 e), test at only one frequency.						50 Hz			N/A	
	Tests performed with no load at 20 ± 5°C						23 °C			P	
9.9.1.4	For RCBOs functionally dependent on line voltage each test is made at:									N/A	
	- 1,1 U _N (V) and									--	
	- 0,85 U _N (V)									--	
Table 2	Type	I _N A	I _{ΔN} A	Limiting values of break time and non-actuating time (s) for type AC and A RCBOs in event of alternating residual currents (r.m.s. values) equal to						--	
				I _{ΔN}	2 I _{ΔN}	5 I _{ΔN}	5 I _{ΔN} or 0,25A a)	5A-200A, 500A b)	I _{Δt} c)		--
	General	Any value	<0,03	0,3	0,15	--	0,04	0,04	0,04	Max. break times	--
		Any value	0,03	0,3	0,15	--	0,04	0,04	0,04		--
		Any value	>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 times	--
				0,13	0,06	0,05	--	0,04	0,04	Min. non-actuating times	--

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Clause	Requirement + Test	Result - Remark			Verdict
	a) value to be decided by the manufacturer for this test	150 mA			--
	b) The test are only made during verification of the correct operation as mentioned in 9.9.1.2 d) but in any case values exceeding the lower limit of the overcurrent instantaneous tripping range are not tested.				--
	c) The test is made with a current $I_{\Delta t}$ equal to the lower limit of the overcurrent instantaneous tripping range according to type B, C or D, as applicable. For the tests of 9.9.1.3 and 9.9.1.4 b), the current $I_{\Delta t}$ is established so that the vector sum $I_{\Delta t} + I_n$ is equal to the lower limit of the overcurrent instantaneous tripping range, according to type B, C or D, as applicable.				--
9.9.1.2	Tests for all RCBOs				P
a)	Verification of the correct operation in case of a steady increase of residual current:	116# [mA]	117# [mA]	118# [mA]	--
	- Steady increase from $0,2 I_{\Delta N}$ to $I_{\Delta N}$ within 30s Tripping current between $I_{\Delta N0}$ and $I_{\Delta N}$	24,0~ 24,2	23,1~ 23,4	23,7~ 23,8	P
b)	Verification of the correct operation at closing on residual current (S_1 and S_2 closed) :	116# [ms]	117# [ms]	118# [ms]	--
	- The RCBO closes on $I_{\Delta N}$, no value exceeds the specified limiting value	102	87	92	P
c)	Verification of the correct operation in case of sudden appearance of residual current by closing S_1 , (S_2 and RCBO in closed position):	116# [ms]	117# [ms]	118# [ms]	--
	Maximum break times at:				--
	- $I_{\Delta N}$	96	82	79	P
	- $2 I_{\Delta N}$	36	33	33	P
	- $5 I_{\Delta N}$ or	22	19	19	P
	- 0,25 A				N/A
	- $I_{\Delta t}$ <u>200</u> A	38	38	38	P
	No value exceeds the relevant specified limiting value				P
	Additional test for type S:				N/A
	Minimum non-actuating time at:				--
	- $I_{\Delta N}$ 0,13 s				N/A
	- $2 I_{\Delta N}$ 0,06 s				N/A

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Clause	Requirement + Test	Result - Remark			Verdict
	- $5 I_{\Delta N}$ 0,05 s				N/A
	- $I_{\Delta t}$ 0,04 s				N/A
	The test switch S_1 and the RCBO 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
d)	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 RCBO in closed position):	116# [ms]	117# [ms]	118# [ms]	--
	- <u>5</u> A (value 1 between 5A and 200A)	22	26	19	P
	- <u>100</u> A (value 1 between 5A and 200A)	36	38	36	P
	No value exceeds the relevant specified limiting value				P
f) 1)	Tests repeated at -5°C:				P
	Verification of the correct operation in case of sudden appearance of residual current by closing S_1 , (S_2 and RCBO in closed position):	116# [ms]	117# [ms]	118# [ms]	--
	Maximum break times at:				--
	- $I_{\Delta N}$	90	80	76	P
	- $2 I_{\Delta N}$	40	39	36	P
	- $5 I_{\Delta N}$ or	24	21	23	P
	- 0,25 A				N/A
	- $I_{\Delta t}$ <u>200</u> A	37	38	38	P
	No value exceeds the relevant specified limiting value				P
	Additional test for type S:				N/A
	Minimum non-actuating time at:				--
	- $I_{\Delta N}$ 0,13 s				N/A
	- $2 I_{\Delta N}$ 0,06 s				N/A
	- $5 I_{\Delta N}$ 0,05 s				N/A
	- $I_{\Delta t}$ 0,04 s				N/A
	The test switch S_1 and the RCBO 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

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Clause	Requirement + Test	Result - Remark			Verdict
	No tripping during tests				N/A
e)	Tests repeated, with the pole under test and one other pole of the RCBO loaded with rated current, current being established shortly before the test.	$I_N = 40 \text{ A}$			P
	Cross-section (mm ²)	10 mm ²			--
	Verification of the correct operation at closing on residual current (S_1 and S_2 closed) :	116# [ms]	117# [ms]	118# [ms]	--
	-no value exceeds the specified limiting value	97	85	82	P
	Verification of the correct operation in case of sudden appearance of residual current by closing S_2 , (S_1 and RCBO in closed position):				P
	Maximum break times at:				--
	- $I_{\Delta N}$	98	84	84	P
	- $2 I_{\Delta N}$	37	34	39	P
	- $5 I_{\Delta N}$ or	21	22	20	P
	- 0,25 A				N/A
	- $I_{\Delta t}$ 200 A	39	38	38	P
	No value exceeds the relevant specified limiting value				P
	Additional test for type S:				N/A
	Minimum non-actuating time at:				--
	- $I_{\Delta N}$ 0,13 s				N/A
	- $2 I_{\Delta N}$ 0,06 s				N/A
	- $5 I_{\Delta N}$ 0,05 s				N/A
	- $I_{\Delta t}$ 0,04 s				N/A
	The test switch S_1 and the RCBO 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
f) 2)	Tests repeated with the RCBO loaded with rated current I_N at +40°C until steady-state conditions are reached	$I_N = 40 \text{ A}$			P
	Cross-section (mm ²)	10 mm ²			--
	Verification of the correct operation in case of sudden appearance of residual current by closing S_1 , (S_2 and RCBO in closed position):	116# [ms]	117# [ms]	118# [ms]	P
	Maximum break times at:				--

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Clause	Requirement + Test			Result - Remark		Verdict	
	- I _{ΔN}			92	79	80	P
	- 2 I _{ΔN}			39	31	32	P
	- 5 I _{ΔN} or			25	19	24	P
	- 0,25 A						N/A
	- I _{Δt} <u>200</u> A			37	38	38	P
	No value exceeds the relevant specified limiting value						P
	Additional test for type S:						N/A
	Minimum non-actuating time at:						--
	- I _{ΔN} 0,13 s						N/A
	- 2 I _{ΔN} 0,06 s						N/A
	- 5 I _{ΔN} 0,05 s						N/A
	- I _{Δt} 0,04 s						N/A
	The test switch S ₁ and the RCBO 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
8.15	BEHAVIOUR OF RCBOs IN CASE OF EARTH FAULT CURRENTS COMPRISING A DC COMPONENT						--
9.9.1.3	VERIFICATION OF THE CORRECT OPERATION AT RESIDUAL CURRENTS WITH DC COMPONENTS						--
	Type A residual current devices						--
	RCBO installed as for normal use, test circuits according to figures 5 and 6						P
	RCBOs with more than one rated frequency, tests at the lowest and highest frequency, except for test in 9.9.1.2 e), test at only one frequency.			50 Hz			N/A
	For RCBOs functionally dependent on line voltage each test is made at						P
a)	Verification of the correct operation in case of a continuous rise of the residual pulsating direct current (S ₁ , S ₂ and RCBO closed)			116# [ms]	117# [ms]	118# [ms]	P
	Test acc. figure 5			figure 5			--
	Angle α	Tripping current (A)					--
		Lower limit	Upper limit				--
	0°	0,35 I _{ΔN}	1,4 I _{ΔN} or 2 I _{ΔN}	10,5~42 mA			--
	90°	0,25 I _{ΔN}	(sub-clause	7,5~42 mA			--

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Clause	Requirement + Test							Result - Remark			Verdict	
	135°	0,11 I _{ΔN}		5.3.8)		3,3~42 mA					--	
	Steady increase from zero to:					116# [mA]	117# [mA]	118# [mA]	--			
	- 1,4 I _{ΔN} for I _{ΔN} > 0,01A with 1,4 I _{ΔN} /30 A/s										P	
	- 2 I _{ΔN} for I _{ΔN} ≤ 0,01 A with 2 I _{ΔN} /30 A/s										N/A	
	α = 0°	+/-				19,2~ 20,6	17,3~ 18,4	17,4~ 18,7	P			
	α = 90°	+/-				15,1~ 16,3	13,6~ 15,4	16,1~ 17,7	P			
	α = 135°	+/-				15,0~ 17,8	13,8~ 17,0	16,8~ 18,8	P			
	No value exceeds the relevant specified limiting values										P	
b)	Verification of the correct operation in case of suddenly appearing residual pulsating direct currents by closing S ₂ (S ₁ and RCBO in closed position)										P	
Table 3	Type	I _N A	I _{ΔN} A	Maximum values of break time and non-actuating time (s) for type A RCBOs in the event of half-wave pulsating residual currents (r.m.s. values) equal to							--	
				1,4 I _{ΔN}	2 I _{ΔN}	2,8 I _{ΔN}	4 I _{ΔN}	7 I _{ΔN}	0,35 A	0,5 A	350A a)	--
	General	Any value	<0,03		0,3		0,15			0,05	0,04	--
		Any value	0,03	0,3		0,15			0,04		0,04	--
		Any value	>0,03	0,3		0,15		0,04			0,04	--
	S	≥ 25	>0,03	0,5		0,2		0,15			0,15	--
	a) This value shall be limited to the lower limit of the overcurrent instantaneous tripping ranges according to type B, C or D, as applicable.											--
	Test acc. figure 5							figure 5			--	
	Angle α							α = 0°			--	
	RCBOs with I _{ΔN} < 0,03 A										N/A	
	Maximum break times at:										--	
	- 1,4 I _{ΔN} +/-										N/A	
	- 2,8 I _{ΔN} +/-										N/A	
	- 0,35 A +/-										N/A	

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Clause	Requirement + Test	Result - Remark			Verdict
	- 350A or +/-				N/A
	- $I_{\Delta t}$ ____ A +/-				N/A
	RCBOs with $I_{\Delta N} = 0,03$ A				P
	Maximum break times at:	116# [ms]	117# [ms]	118# [ms]	--
	- $1,4 I_{\Delta N}$ +/-	99	78	82	P
	- $2,8 I_{\Delta N}$ +/-	43	43	43	P
	- 0,35 A +/-	15	15	11	P
	- 350A or +/-				N/A
	- $I_{\Delta t}$ <u>200</u> A +/-	36	37	38	P
	RCBOs with $I_{\Delta N} > 0,03$ A				N/A
	Maximum break times at:				--
	- $1,4 I_{\Delta N}$ +/-				N/A
	- $2,8 I_{\Delta N}$ +/-				N/A
	- $7 I_{\Delta N}$ +/-				N/A
	- 350A or +/-				N/A
	- $I_{\Delta t}$ ____ A +/-				N/A
	No value exceeds the specified limiting values				P
c)	Verification of the correct operation with the pole under test and one other pole loaded with rated current I_N	$I_N = 40$ A			P
	Test acc. 9.9.1.3 a) repeated, pole under test and one other pole loaded with rated current				--
	Steady increase from zero to:	116# [mA]	117# [mA]	118# [mA]	--
	- $1,4 I_{\Delta N}$ for $I_{\Delta N} > 0,01$ A with $1,4 I_{\Delta N} / 30$ A/s				P
	- $2 I_{\Delta N}$ for $I_{\Delta N} \leq 0,01$ A with $2 I_{\Delta N} / 30$ A/s				N/A
	$\alpha = 0^\circ$ +/-	19,8~ 20,6	18,2~ 19,4	17,1~ 18,3	P
	$\alpha = 90^\circ$ +/-	14,3~ 15,4	14,0~ 15,3	16,0~ 16,9	P
	$\alpha = 135^\circ$ +/-	15,0~ 16,4	14,0~ 15,7	17,2~ 18,8	P
	No value exceeds the relevant specified limiting values				P

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Clause	Requirement + Test	Result - Remark			Verdict
d)	Verification of the correct operation in case of residual pulsating direct currents with $\alpha = 0^\circ$ superimposed by smooth direct current of 0,006 A				P
	Test acc. figure 6				--
	Steady increase of pulsating DC current from zero to:	116# [mA]	117# [mA]	118# [mA]	--
	- 1,4 $I_{\Delta N}$ for $I_{\Delta N} > 0,01A$ with 1,4 $I_{\Delta N}/30$ A/s				P
	- 2 $I_{\Delta N}$ for $I_{\Delta N} \leq 0,01$ A with 2 $I_{\Delta N} /30$ A/s				N/A
	Maximum break Currents at:				--
	(I_1) $\alpha = 0^\circ$ +/- (I_0) 6mA DC +/-	19,4	17,0	17,6	P
	No value exceeds the relevant specified limiting values	42 mA			P

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Clause	Requirement + Test	Result - Remark			Verdict
	Tests D ₁	2P, C40, 30 mA, type A			--
		116# ~ 118#			
8	REQUIREMENTS FOR CONSTRUCTION AND OPERATION				--
8.12	RCBOS FUNCTIONALLY DEPENDENT ON LINE VOLTAGE				--
	RCBOS FUNCTIONALLY DEPENDENT ON THE LINE VOLTAGE OPERATE CORRECTLY BETWEEN 0,85 AND 1,1 U _N				--
9.17	VERIFICATION OF THE BEHAVIOUR OF RCBOS OPENING AUTOMATICALLY IN CASE OF FAILURE OF THE LINE VOLTAGE				--
9.17.1	Limiting value of the line voltage U _x				--
	U _N applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs	[V]	[V]	[V]	--
	All values less than 0,85 U _N				N/A
	Tripping test:				N/A
	Test voltage (V)				--
	Residual current I _{ΔN}				--
	Time corresponding to value for I _{ΔN} in table 2	[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	Verification of automatic opening in case of failure of the line voltage				--
	RCBO 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)	RCBOs opening without delay				N/A
	- no value exceeds 0,5 s				N/A
b)	RCBOs opening with delay				N/A
	Values within the range indicated by manufacturer				N/A
9.17.3	Verification of the correct operation, in presence of a residual current, for RCBOs opening with delay in case of failure of the line voltage				--
	RCBO connected according to figure 4 at U _N				N/A
	All phases but one switched off by means of S ₃				N/A
9.9.1.2	During the delay: Off-load tests at 20 ± 5°C				--
a)	Verification of the correct operation in case of a steady increase of residual current:	[mA]	[mA]	[mA]	--

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Clause	Requirement + Test	Result - Remark			Verdict
	- Steady increase from 0,2 $I_{\Delta N}$ to $I_{\Delta N}$ within 30s Tripping current between $I_{\Delta N0}$ and $I_{\Delta N}$ (only if delay > 30s)				N/A
b)	Verification of the correct operation at closing on residual current (S_1 and S_2 closed) :	[ms]	[ms]	[ms]	--
	- The RCBO closes on $I_{\Delta N}$, no value exceeds the specified limiting value				N/A
c)	Verification of the correct operation in case of sudden appearance of residual current by closing S_1 , (S_2 and RCBO in closed position):				N/A
	Maximum break times at:	[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$				N/A
	- 2 $I_{\Delta N}$				N/A
	- 5 $I_{\Delta N}$ or				N/A
	- 0,25 A				N/A
	- $I_{\Delta t}$ _____ A				N/A
	No value exceeds the relevant specified limiting value				N/A
d)	Verification of the correct operation in case of sudden appearance of residual current between 5 $I_{\Delta N}$ and 500A by closing S_2 , (S_1 and RCBO in closed position):				N/A
	- ____ A (value 1 between 5A and 200A)				N/A
	- ____ A (value 1 between 5A and 200A)				N/A
	No value exceeds the relevant specified limiting value				N/A
	Additional test for type S:				--
	Minimum non-actuating time at:				--
	- $I_{\Delta N}$ 0,13 s				N/A
	- 2 $I_{\Delta N}$ 0,06 s				N/A
	- 5 $I_{\Delta N}$ 0,05 s				N/A
	- $I_{\Delta t}$ 0,04 s				N/A
	The test switch S_1 and the RCBO 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

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Clause	Requirement + Test	Result - Remark			Verdict
9.17.4	Verification of the correct operation of RCBOs with 3 or 4 current paths, neutral and one line terminal only being energized in turn				--
	RCBO connected according to figure 4				N/A
9.9.1.2.c)	Verification of the correct operation in case of sudden appearance of residual current by closing S_1 , (S_2 and RCBO in closed position):				--
	Maximum break times at:	[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$				N/A
	- $2 I_{\Delta N}$				N/A
	- $5 I_{\Delta N}$ or				N/A
	- 0,25 A				N/A
	- $I_{\Delta t}$ _____ A				N/A
	No value exceeds the relevant specified limiting value				N/A
	Additional test for type S:				--
	Minimum non-actuating time at:				--
	- $I_{\Delta N}$0,13 s				N/A
	- $2 I_{\Delta N}$0,06 s				N/A
	- $5 I_{\Delta N}$0,05 s				N/A
	- $I_{\Delta t}$0,04 s				N/A
	The test switch S_1 and the RCBO 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
8.14	behaviour of rcbos in case of current surges caused by impulse voltages				--
9.19.1	Current surge test for all RCBOs (0,5µs/100kHz ring wave test)				--
	One pole of the RCBO submitted to 10 surge current applications, polarity inverted after every two applications				P
	Peak value	200 A +10/-0%			--
	Virtual front time.....	0,5 µs ± 30%			--
	Period of following oscillatory wave.....	10 µs ±20%			--
	Each successive reverse peak	60% of preceding peak			--
	No tripping during tests	Not tripped	Not tripped	Not tripped	P

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Clause	Requirement + Test	Result - Remark			Verdict
	After the test the RCBO shall trip with a test current of $I_{\Delta N}$	116#	117#	118#	--
	Maximum break times at:				--
	- $I_{\Delta N}$	71 ms	76 ms	72 ms	P
	Test switch S_2 and RCBO in the closed position, test voltage established by closing the test switch S_1				P
	No value exceed the relevant specified limiting value	300 ms			P
9.19.2	Verification of behaviour at surge currents up to 3000A (8/20µs surge current test)				--
	One pole of the RCBO chosen at random, submitted to 10 surge current applications, polarity inverted after every two applications				P
	Peak value	3000 A +10/-0%			--
	Virtual front time.....	0,8 µs ± 20%			--
	Virtual time of half value	20 µs ± 20%			--
	Peak of reverse current	less than 30 % of peak value			--
9.19.2.2	Test results for S-type RCBOs: No tripping during tests				N/A
9.19.2.3	Test results for RCBOs of the general type: During the test the RCBO may trip. After any tripping, the RCBO shall be re-closed				P
	No tripping during tests	not tripped	not tripped	not tripped	P
	After the test the RCBO shall trip with a test current of $I_{\Delta N}$	116#	117#	118#	--
	Maximum break times at: $I_{\Delta N}$	75 ms	79 ms	76 ms	P
	Test switch S_2 and RCBO in the closed position, test voltage established by closing the test switch S_1				P
	No value exceed the relevant specified limiting value	300 ms			P
9.12.13	Verification of the rated residual making and breaking capacity $I_{\Delta m}$				P
	$I_{\Delta m}$ (A).....	3000 A			--
	Test circuit according to figure.....	figure 7			--
	Cross-section (mm²)	16 mm²			--
	Grid distance a (mm)	45 mm			--
	Test voltage 1,05 U_n (V).....	250,2 V			--

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Clause	Requirement + Test	Result - Remark			Verdict
	Prospective current (A)	3000 A			--
	Prospective current obtained (A)	3019 A			--
	Power factor.....	0,85~0,9			--
	Power factor obtained.....	0,86			--
	Sequence.....	O-t-CO-t-CO			--
	I _{peak} (A) max. value	116#	117#	118#	--
	L	3,5 kA	3,7 kA	3,6 kA	P
	I ² t max	116#	117#	118#	--
	L	52,8 kA ² s	56,8 kA ² s	57,2 kA ² s	P
	Phases which do not carry the short circuit current during this test shall be connected to the supply voltage at the line terminals				P
	On each pole in turn excluding the switched neutral pole				P
	RCBOs functionally dependent on the line voltage supplied with rated voltage.				N/A
	No permanent arcing				P
	No flashover				P
	No blowing of fuse F				P
	No damage, polyethylene sheet shows no holes				P
9.12.13.2	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				P
9.7.3	Dielectric strength test of the main circuit:				--
	2 U _N (V) for 1 min.....	460 V			--
	a)				P
	b)				P
	c)				P
	d)				N/A
	e)				N/A
	No flashover or breakdown				P
	Making and breaking I _N at U _N	231,7 V, 41,3 A			P
	The RCBO shall trip with a test current of 1,25 I _{ΔN} - break time not exceeding the value for I _{ΔN} in table 2	116#	117#	118#	--
	Maximum break times at:				--

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Clause	Requirement + Test	Result - Remark			Verdict
	- 1,25 I _{ΔN}	17 ms	7 ms	11 ms	P
	Test switch S ₂ and RCBO in the closed position, test voltage established by closing the test switch S ₁ .				P
	Additional tests for RCBOs functionally depending on line voltage if applicable:				N/A
9.17	VERIFICATION OF THE BEHAVIOUR OF RCBOs OPENING AUTOMATICALLY IN CASE OF FAILURE OF THE LINE VOLTAGE				--
9.17.1	Limiting value of the line voltage U _x				N/A
	U _N applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs	[V]	[V]	[V]	--
	All values less than 0,85 U _N				N/A
	Tripping test:				N/A
	Test voltage (V)				--
	Residual current I _{ΔN}				--
	Time corresponding to value for I _{ΔN} in table 2	[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	Verification of automatic opening in case of failure of the line voltage				--
	RCBO supplied with U _N and line voltage then switched off				N/A
	Time interval between switching off and opening of the main contacts:				N/A
	a) RCBOs opening without delay				N/A
	- no value exceeds 0,5 s				N/A
	b) RCBOs opening with delay				N/A
	values within the range indicated by manufacturer:				N/A
9.17.3	Verification of the correct operation, in presence of a residual current, for RCBOs opening with delay in case of failure of the line voltage				--
	RCBO connected according to figure 4 at U _N				N/A
	All phases but one switched off by means of S ₃				N/A
9.9.1.2	During the delay: Off-load tests at 20 ± 5°C				N/A
a)	Verification of the correct operation in case of a steady increase of residual current:	[mA]	[mA]	[mA]	--

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Clause	Requirement + Test	Result - Remark			Verdict
	- Steady increase from 0,2 $I_{\Delta N}$ to $I_{\Delta N}$ within 30s Tripping current between $I_{\Delta N0}$ and $I_{\Delta N}$ (only if delay > 30s)				N/A
b)	Verification of the correct operation at closing on residual current (S1 and S2 closed) :	[ms]	[ms]	[ms]	--
	- The RCBO closes on $I_{\Delta N}$, no value exceeds the specified limiting value				N/A
c)	Verification of the correct operation in case of sudden appearance of residual current by closing S1, (S2 and RCBO in closed position):				N/A
	Maximum break times at:	[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$				N/A
	- 2 $I_{\Delta N}$				N/A
	- 5 $I_{\Delta N}$ or				N/A
	- 0,25A				N/A
	- $I_{\Delta t}$ _____ A				N/A
	No value exceeds the relevant specified limiting value				N/A
d)	Verification of the correct operation in case of sudden appearance of residual current between 5 $I_{\Delta N}$ and 500A by closing S2, (S1 and RCBO in closed position):				N/A
	- ____ A (value 1 between 5A and 200A)				N/A
	- ____ A (value 1 between 5A and 200A)				N/A
	No value exceeds the relevant specified limiting value				N/A
	Additional test for type S:				--
	Minimum non-actuating time at:	[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$ 0,13 s				N/A
	- 2 $I_{\Delta N}$ 0,06 s				N/A
	- 5 $I_{\Delta N}$ 0,05 s				N/A
	- $I_{\Delta t}$ 0,04 s				N/A
	The test switch S1 and the RCBO being closed, the test voltage is suddenly established by closing switch S2 for min. non-operating times acc. table 2				N/A
	No tripping during tests				N/A

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Clause	Requirement + Test	Result - Remark			Verdict
9.17.4	Verification of the correct operation of RCBOs with 3 or 4 current paths, neutral and one line terminal only being energized in turn				N/A
	RCBO connected according to figure 4				N/A
9.9.1.2.c)	Maximum break times at:	[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$				N/A
	- $2 I_{\Delta N}$				N/A
	- $5 I_{\Delta N}$ or				N/A
	- 0,25 A				N/A
	- $I_{\Delta t}$ _____ A				N/A
	No value exceeds the relevant specified limiting value				N/A
	Additional test for type S:				N/A
	Minimum non-actuating time at:	[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$ 0,13 s				N/A
	- $2 I_{\Delta N}$ 0,06 s				N/A
	- $5 I_{\Delta N}$ 0,05 s				N/A
	- $I_{\Delta t}$ 0,04 s				N/A
	The test switch S_1 and the RCBO being closed, the test voltage is suddenly established by closing switch S_2 for min. non-operating times acc. table 2				N/A
	No tripping during tests				N/A
8.11	Test device				--
	RCBOs provided with a test device	116#	117#	118#	--
	Ampere-turns produced when operating the test device do not exceed 2,5 times the ampere turns produced by $I_{\Delta N}$	1,37 times	1,37 times	1,37 times	P
	Not possible to energize the circuit on the load side by operating the test device when the RCBO is in the open position				P
9.16	Verification of the operation of the test device at the limits of rated voltage				--
	a) RCBO at $0,85 U_N$, test device actuated 25 times at intervals of 5s	195,5 V			P
	b) Test a) repeated at $1,1 U_N$	253 V			P
	c) Test b) repeated, but only once, the operating means of the test device being held in the closed position for 30s	253 V			P
	RCBO operated at each test				P
	No change impairing further use				P

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Clause	Requirement + Test						Result - Remark			Verdict	
	TEST SEQUENCE "D"						4P, C40, 30 mA, type A			--	
							15# ~ 17#				
	TEST D ₀									--	
8	requirements for construction and operation									--	
8.5	Operating characteristics									--	
9.9	Verification of the operating characteristic									--	
9.9.1	RCBO installed as for normal use, test circuit according to figure 4									P	
	For multiple settings of I _{ΔN} tests are made for each setting									N/A	
	RCBOs with more than one rated frequency, tests at the lowest and highest frequency, except for test in 9.9.1.2 e), test at only one frequency.						50 Hz			N/A	
	Tests performed with no load at 20 ± 5°C						25 °C			P	
9.9.1.4	For RCBOs functionally dependent on line voltage each test is made at:									N/A	
	- 1,1 U _N (V) and									--	
	- 0,85 U _N (V)									--	
Table 2	Type	I _N A	I _{ΔN} A	Limiting values of break time and non-actuating time (s) for type AC and A RCBOs in event of alternating residual currents (r.m.s. values) equal to						--	
				I _{ΔN}	2 I _{ΔN}	5 I _{ΔN}	5 I _{ΔN} or 0,25A a)	5A-200A, 500A b)	I _{Δt} c)		--
	General	Any value	<0,03	0,3	0,15	--	0,04	0,04	0,04	Max. break times	--
		Any value	0,03	0,3	0,15	--	0,04	0,04	0,04		--
		Any value	>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 times	--
				0,13	0,06	0,05	--	0,04	0,04	Min. non-actuating times	--

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Clause	Requirement + Test	Result - Remark			Verdict
	a) value to be decided by the manufacturer for this test	150 mA			--
	b) The test are only made during verification of the correct operation as mentioned in 9.9.1.2 d) but in any case values exceeding the lower limit of the overcurrent instantaneous tripping range are not tested.				--
	c) The test is made with a current $I_{\Delta t}$ equal to the lower limit of the overcurrent instantaneous tripping range according to type B, C or D, as applicable. For the tests of 9.9.1.3 and 9.9.1.4 b), the current $I_{\Delta t}$ is established so that the vector sum $I_{\Delta t} + I_n$ is equal to the lower limit of the overcurrent instantaneous tripping range, according to type B, C or D, as applicable.				--
9.9.1.2	Tests for all RCBOs				P
a)	Verification of the correct operation in case of a steady increase of residual current:	15# [mA]	16# [mA]	17# [mA]	--
	- Steady increase from 0,2 $I_{\Delta N}$ to $I_{\Delta N}$ within 30s Tripping current between $I_{\Delta N0}$ and $I_{\Delta N}$	23,8~ 24,1	22,4~ 23,4	18,4~ 18,7	P
b)	Verification of the correct operation at closing on residual current (S_1 and S_2 closed) :	15# [ms]	16# [ms]	17# [ms]	--
	- The RCBO closes on $I_{\Delta N}$, no value exceeds the specified limiting value	77	66	60	P
c)	Verification of the correct operation in case of sudden appearance of residual current by closing S_1 , (S_2 and RCBO in closed position):	15# [ms]	16# [ms]	17# [ms]	--
	Maximum break times at:				--
	- $I_{\Delta N}$	68	100	54	P
	- 2 $I_{\Delta N}$	32	36	30	P
	- 5 $I_{\Delta N}$ or	18	22	19	P
	- 0,25 A				N/A
	- $I_{\Delta t}$ <u>200</u> A	11	13	13	P
	No value exceeds the relevant specified limiting value				P
	Additional test for type S:				N/A
	Minimum non-actuating time at:				--
	- $I_{\Delta N}$ 0,13 s				N/A
	- 2 $I_{\Delta N}$ 0,06 s				N/A

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Clause	Requirement + Test	Result - Remark			Verdict
	- $5 I_{\Delta N}$ 0,05 s				N/A
	- $I_{\Delta t}$ 0,04 s				N/A
	The test switch S_1 and the RCBO 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
d)	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 RCBO in closed position):	15# [ms]	16# [ms]	17# [ms]	--
	- <u>5</u> A (value 1 between 5A and 200A)	19	16	15	P
	- <u>100</u> A (value 1 between 5A and 200A)	17	14	14	P
	No value exceeds the relevant specified limiting value				P
f) 1)	Tests repeated at -5°C:				P
	Verification of the correct operation in case of sudden appearance of residual current by closing S_1 , (S_2 and RCBO in closed position):	15# [ms]	16# [ms]	17# [ms]	--
	Maximum break times at:				--
	- $I_{\Delta N}$	191	219	179	P
	- $2 I_{\Delta N}$	45	41	42	P
	- $5 I_{\Delta N}$ or	26	26	24	P
	- 0,25 A				N/A
	- $I_{\Delta t}$ <u>200</u> A	14	13	14	P
	No value exceeds the relevant specified limiting value				P
	Additional test for type S:				N/A
	Minimum non-actuating time at:				--
	- $I_{\Delta N}$ 0,13 s				N/A
	- $2 I_{\Delta N}$ 0,06 s				N/A
	- $5 I_{\Delta N}$ 0,05 s				N/A
	- $I_{\Delta t}$ 0,04 s				N/A
	The test switch S_1 and the RCBO 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

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Clause	Requirement + Test	Result - Remark			Verdict
	No tripping during tests				N/A
e)	Tests repeated, with the pole under test and one other pole of the RCBO loaded with rated current, current being established shortly before the test.	$I_N = 40 \text{ A}$			P
	Cross-section (mm ²)	10 mm ²			--
	Verification of the correct operation at closing on residual current (S_1 and S_2 closed) :	15# [ms]	16# [ms]	17# [ms]	--
	-no value exceeds the specified limiting value	158	96	70	P
	Verification of the correct operation in case of sudden appearance of residual current by closing S_2 , (S_1 and RCBO in closed position):				P
	Maximum break times at:				--
	- $I_{\Delta N}$	120	96	58	P
	- $2 I_{\Delta N}$	33	44	30	P
	- $5 I_{\Delta N}$ or	22	23	19	P
	- 0,25 A				N/A
	- $I_{\Delta t}$ 200 A	11	13	13	P
	No value exceeds the relevant specified limiting value				P
	Additional test for type S:				N/A
	Minimum non-actuating time at:				--
	- $I_{\Delta N}$ 0,13 s				N/A
	- $2 I_{\Delta N}$ 0,06 s				N/A
	- $5 I_{\Delta N}$ 0,05 s				N/A
	- $I_{\Delta t}$ 0,04 s				N/A
	The test switch S_1 and the RCBO 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
f) 2)	Tests repeated with the RCBO loaded with rated current I_N at +40°C until steady-state conditions are reached	$I_N = 40 \text{ A}$			P
	Cross-section (mm ²)	10 mm ²			--
	Verification of the correct operation in case of sudden appearance of residual current by closing S_1 , (S_2 and RCBO in closed position):	15# [ms]	16# [ms]	17# [ms]	P
	Maximum break times at:				--

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Clause	Requirement + Test	Result - Remark			Verdict
	- $I_{\Delta N}$	155	215	166	P
	- $2 I_{\Delta N}$	40	47	38	P
	- $5 I_{\Delta N}$ or	22	24	23	P
	- 0,25 A				N/A
	- $I_{\Delta t}$ <u>200</u> A	13	13	14	P
	No value exceeds the relevant specified limiting value				P
	Additional test for type S:				N/A
	Minimum non-actuating time at:				--
	- $I_{\Delta N}$ 0,13 s				N/A
	- $2 I_{\Delta N}$ 0,06 s				N/A
	- $5 I_{\Delta N}$ 0,05 s				N/A
	- $I_{\Delta t}$ 0,04 s				N/A
	The test switch S_1 and the RCBO 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
8.15	BEHAVIOUR OF RCBOs IN CASE OF EARTH FAULT CURRENTS COMPRISING A DC COMPONENT				--
9.9.1.3	VERIFICATION OF THE CORRECT OPERATION AT RESIDUAL CURRENTS WITH DC COMPONENTS				--
	Type A residual current devices				--
	RCBO installed as for normal use, test circuits according to figures 5 and 6				P
	RCBOs with more than one rated frequency, tests at the lowest and highest frequency, except for test in 9.9.1.2 e), test at only one frequency.	50 Hz			N/A
	For RCBOs functionally dependent on line voltage each test is made at				P
a)	Verification of the correct operation in case of a continuous rise of the residual pulsating direct current (S_1 , S_2 and RCBO closed)	15# [ms]	16# [ms]	17# [ms]	P
	Test acc. figure 5	figure 5			--
	Angle α	Tripping current (A)			--
		Lower limit	Upper limit		--
	0°	0,35 $I_{\Delta N}$	1,4 $I_{\Delta N}$ or 2 $I_{\Delta N}$		--
	90°	0,25 $I_{\Delta N}$	(sub-clause 7,5~42 mA		--

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Clause	Requirement + Test							Result - Remark				Verdict
	135°	0,11 I _{ΔN}		5.3.8)			3,3~42 mA					--
	Steady increase from zero to:							15# [mA]	16# [mA]	17# [mA]	--	
	- 1,4 I _{ΔN} for I _{ΔN} > 0,01A with 1,4 I _{ΔN} /30 A/s											P
	- 2 I _{ΔN} for I _{ΔN} ≤ 0,01 A with 2 I _{ΔN} /30 A/s											N/A
	α = 0°											

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Clause	Requirement + Test	Result - Remark			Verdict
	- 350A or +/-				N/A
	- $I_{\Delta t}$ ____ A +/-				N/A
	RCBOs with $I_{\Delta N} = 0,03$ A				P
	Maximum break times at:	15# [ms]	16# [ms]	17# [ms]	--
	- $1,4 I_{\Delta N}$ +/-	61	82	43	P
	- $2,8 I_{\Delta N}$ +/-	26	43	26	P
	- 0,35 A +/-	17	19	19	P
	- 350A or +/-				N/A
	- $I_{\Delta t}$ ____ A +/-	11	13	12	P
	RCBOs with $I_{\Delta N} > 0,03$ A				N/A
	Maximum break times at:				--
	- $1,4 I_{\Delta N}$ +/-				N/A
	- $2,8 I_{\Delta N}$ +/-				N/A
	- $7 I_{\Delta N}$ +/-				N/A
	- 350A or +/-				N/A
	- $I_{\Delta t}$ <u>200</u> A +/-				N/A
	No value exceeds the specified limiting values				P
c)	Verification of the correct operation with the pole under test and one other pole loaded with rated current I_N	$I_N = 40$ A			P
	Test acc. 9.9.1.3 a) repeated, pole under test and one other pole loaded with rated current				--
	Steady increase from zero to:	15# [mA]	16# [mA]	17# [mA]	--
	- $1,4 I_{\Delta N}$ for $I_{\Delta N} > 0,01$ A with $1,4 I_{\Delta N} / 30$ A/s				P
	- $2 I_{\Delta N}$ for $I_{\Delta N} \leq 0,01$ A with $2 I_{\Delta N} / 30$ A/s				N/A
	$\alpha = 0^\circ$ +/-	19,5~ 21,7	21,2~ 22,0	23,1~ 25,5	P
	$\alpha = 90^\circ$ +/-	16,1~ 17,9	19,5~ 20,6	17,8~ 25,4	P
	$\alpha = 135^\circ$ +/-	16,2~ 18,3	19,4~ 20,5	19,0~ 30,0	P
	No value exceeds the relevant specified limiting values				P

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Clause	Requirement + Test	Result - Remark			Verdict
d)	Verification of the correct operation in case of residual pulsating direct currents with $\alpha = 0^\circ$ superimposed by smooth direct current of 0,006 A				P
	Test acc. figure 6				--
	Steady increase of pulsating DC current from zero to:	15# [mA]	16# [mA]	17# [mA]	--
	- 1,4 $I_{\Delta N}$ for $I_{\Delta N} > 0,01A$ with 1,4 $I_{\Delta N}/30$ A/s				P
	- 2 $I_{\Delta N}$ for $I_{\Delta N} \leq 0,01$ A with 2 $I_{\Delta N} /30$ A/s				N/A
	Maximum break Currents at:				--
	(I_1) $\alpha = 0^\circ$ +/- (I_0) 6mA DC +/-	20,4	26,9	21,5	P
	No value exceeds the relevant specified limiting values	42 mA			P

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Clause	Requirement + Test	Result - Remark			Verdict
	Tests D ₁	4P, C40, 30 mA, type A			--
		15# ~ 17#			
8	REQUIREMENTS FOR CONSTRUCTION AND OPERATION				--
8.12	RCBOS FUNCTIONALLY DEPENDENT ON LINE VOLTAGE				--
	RCBOS FUNCTIONALLY DEPENDENT ON THE LINE VOLTAGE OPERATE CORRECTLY BETWEEN 0,85 AND 1,1 U _N				--
9.17	VERIFICATION OF THE BEHAVIOUR OF RCBOS OPENING AUTOMATICALLY IN CASE OF FAILURE OF THE LINE VOLTAGE				--
9.17.1	Limiting value of the line voltage U _x				--
	U _N applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs	[V]	[V]	[V]	--
	All values less than 0,85 U _N				N/A
	Tripping test:				N/A
	Test voltage (V)				--
	Residual current I _{ΔN}				--
	Time corresponding to value for I _{ΔN} in table 2	[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	Verification of automatic opening in case of failure of the line voltage				--
	RCBO 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)	RCBOs opening without delay				N/A
	- no value exceeds 0,5 s				N/A
b)	RCBOs opening with delay				N/A
	Values within the range indicated by manufacturer				N/A
9.17.3	Verification of the correct operation, in presence of a residual current, for RCBOs opening with delay in case of failure of the line voltage				--
	RCBO connected according to figure 4 at U _N				N/A
	All phases but one switched off by means of S ₃				N/A
9.9.1.2	During the delay: Off-load tests at 20 ± 5°C				--
a)	Verification of the correct operation in case of a steady increase of residual current:	[mA]	[mA]	[mA]	--

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Clause	Requirement + Test	Result - Remark			Verdict
	- Steady increase from 0,2 $I_{\Delta N}$ to $I_{\Delta N}$ within 30s Tripping current between $I_{\Delta N0}$ and $I_{\Delta N}$ (only if delay > 30s)				N/A
b)	Verification of the correct operation at closing on residual current (S_1 and S_2 closed) :	[ms]	[ms]	[ms]	--
	- The RCBO closes on $I_{\Delta N}$, no value exceeds the specified limiting value				N/A
c)	Verification of the correct operation in case of sudden appearance of residual current by closing S_1 , (S_2 and RCBO in closed position):				N/A
	Maximum break times at:	[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$				N/A
	- 2 $I_{\Delta N}$				N/A
	- 5 $I_{\Delta N}$ or				N/A
	- 0,25 A				N/A
	- $I_{\Delta t}$ _____ A				N/A
	No value exceeds the relevant specified limiting value				N/A
d)	Verification of the correct operation in case of sudden appearance of residual current between 5 $I_{\Delta N}$ and 500A by closing S_2 , (S_1 and RCBO in closed position):				N/A
	- ____ A (value 1 between 5A and 200A)				N/A
	- ____ A (value 1 between 5A and 200A)				N/A
	No value exceeds the relevant specified limiting value				N/A
	Additional test for type S:				--
	Minimum non-actuating time at:				--
	- $I_{\Delta N}$ 0,13 s				N/A
	- 2 $I_{\Delta N}$ 0,06 s				N/A
	- 5 $I_{\Delta N}$ 0,05 s				N/A
	- $I_{\Delta t}$ 0,04 s				N/A
	The test switch S_1 and the RCBO 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

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Clause	Requirement + Test	Result - Remark			Verdict
9.17.4	Verification of the correct operation of RCBOs with 3 or 4 current paths, neutral and one line terminal only being energized in turn				--
	RCBO connected according to figure 4				N/A
9.9.1.2.c)	Verification of the correct operation in case of sudden appearance of residual current by closing S_1 , (S_2 and RCBO in closed position):				--
	Maximum break times at:	[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$				N/A
	- $2 I_{\Delta N}$				N/A
	- $5 I_{\Delta N}$ or				N/A
	- 0,25 A				N/A
	- $I_{\Delta t}$ _____ A				N/A
	No value exceeds the relevant specified limiting value				N/A
	Additional test for type S:				--
	Minimum non-actuating time at:				--
	- $I_{\Delta N}$ 0,13 s				N/A
	- $2 I_{\Delta N}$ 0,06 s				N/A
	- $5 I_{\Delta N}$ 0,05 s				N/A
	- $I_{\Delta t}$ 0,04 s				N/A
	The test switch S_1 and the RCBO 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
8.14	behaviour of rcbos in case of current surges caused by impulse voltages				--
9.19.1	Current surge test for all RCBOs (0,5µs/100kHz ring wave test)				--
	One pole of the RCBO submitted to 10 surge current applications, polarity inverted after every two applications				P
	Peak value	200 A +10/-0%			--
	Virtual front time.....	0,5 µs ± 30%			--
	Period of following oscillatory wave.....	10 µs ±20%			--
	Each successive reverse peak	60% of preceding peak			--
	No tripping during tests	Not tripped	Not tripped	Not tripped	P

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Clause	Requirement + Test	Result - Remark			Verdict
	After the test the RCBO shall trip with a test current of $I_{\Delta N}$	15#	16#	17#	--
	Maximum break times at:				--
	- $I_{\Delta N}$	66 ms	96 ms	61 ms	P
	Test switch S_2 and RCBO in the closed position, test voltage established by closing the test switch S_1				P
	No value exceed the relevant specified limiting value	300 ms			P
9.19.2	Verification of behaviour at surge currents up to 3000A (8/20μs surge current test)				--
	One pole of the RCBO chosen at random, submitted to 10 surge current applications, polarity inverted after every two applications				P
	Peak value	3000 A +10/-0%			--
	Virtual front time.....	0,8 μs ± 20%			--
	Virtual time of half value	20 μs ± 20%			--
	Peak of reverse current	less than 30 % of peak value			--
9.19.2.2	Test results for S-type RCBOs: No tripping during tests				N/A
9.19.2.3	Test results for RCBOs of the general type: During the test the RCBO may trip. After any tripping, the RCBO shall be re-closed				P
	No tripping during tests	not tripped	not tripped	not tripped	P
	After the test the RCBO shall trip with a test current of $I_{\Delta N}$	15#	16#	17#	--
	Maximum break times at: $I_{\Delta N}$	65 ms	103 ms	60 ms	P
	Test switch S_2 and RCBO in the closed position, test voltage established by closing the test switch S_1				P
	No value exceed the relevant specified limiting value	300 ms			P
9.12.13	Verification of the rated residual making and breaking capacity $I_{\Delta m}$				P
	$I_{\Delta m}$ (A).....	3000 A			--
	Test circuit according to figure.....	figure 7			--
	Cross-section (mm²)	16 mm²			--
	Grid distance a (mm)	45 mm			--
	Test voltage 1,05 U_n (V).....	251,1 V			--

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Clause	Requirement + Test	Result - Remark			Verdict
	Prospective current (A)	3000 A			--
	Prospective current obtained (A)	3127 A			--
	Power factor	0,85~0,9			--
	Power factor obtained	0,87			--
	Sequence	O-t-CO-t-CO			--
	I_{peak} (A) max. value	15#	16#	17#	--
	L1	3,0 kA	3,0 kA	3,1 kA	P
	L2	3,2 kA	3,2 kA	3,2 kA	P
	L3	3,2 kA	3,0 kA	3,2 kA	P
	I^2t max	15#	16#	17#	--
	L1	19,2 kA ² s	22,4 kA ² s	21,3 kA ² s	P
	L2	25,5 kA ² s	29,1 kA ² s	29,8 kA ² s	P
	L3	27,3 kA ² s	19,2 kA ² s	32,6 kA ² s	P
	Phases which do not carry the short circuit current during this test shall be connected to the supply voltage at the line terminals				P
	On each pole in turn excluding the switched neutral pole				P
	RCBOs functionally dependent on the line voltage supplied with rated voltage.				N/A
	No permanent arcing				P
	No flashover				P
	No blowing of fuse F				P
	No damage, polyethylene sheet shows no holes				P
9.12.13.2	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.7.3	Dielectric strength test of the main circuit:				--
	$2 U_N$ (V) for 1 min	800 V			--
	a)				P
	b)				P
	c)				P
	d)				N/A
	e)				N/A

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Clause	Requirement + Test	Result - Remark			Verdict
	No flashover or breakdown				P
	Making and breaking I_N at U_N	414,3 V, 40,4 A			P
	The RCBO 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	15#	16#	17#	--
	Maximum break times at:				--
	- 1,25 $I_{\Delta N}$	48 ms	50 ms	41 ms	P
	Test switch S_2 and RCBO in the closed position, test voltage established by closing the test switch S_1 .				P
	Additional tests for RCBOs functionally depending on line voltage if applicable:				N/A
9.17	VERIFICATION OF THE BEHAVIOUR OF RCBOS OPENING AUTOMATICALLY IN CASE OF FAILURE OF THE LINE VOLTAGE				--
9.17.1	Limiting value of the line voltage U_x				N/A
	U_N applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs	[V]	[V]	[V]	--
	All values less than 0,85 U_N				N/A
	Tripping test:				N/A
	Test voltage (V)				--
	Residual current $I_{\Delta N}$				--
	Time corresponding to value for $I_{\Delta N}$ in table 2	[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	Verification of automatic opening in case of failure of the line voltage				--
	RCBO supplied with U_N and line voltage then switched off				N/A
	Time interval between switching off and opening of the main contacts:				N/A
	a) RCBOs opening without delay				N/A
	- no value exceeds 0,5 s				N/A
	b) RCBOs opening with delay				N/A
	values within the range indicated by manufacturer:				N/A
9.17.3	Verification of the correct operation, in presence of a residual current, for RCBOs opening with delay in case of failure of the line voltage				--
	RCBO connected according to figure 4 at U_N				N/A

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Clause	Requirement + Test	Result - Remark			Verdict
	All phases but one switched off by means of S ₃				N/A
9.9.1.2	During the delay: Off-load tests at 20 ± 5°C				N/A
a)	Verification of the correct operation in case of a steady increase of residual current:	[mA]	[mA]	[mA]	--
	- Steady increase from 0,2 I _{ΔN} to I _{ΔN} within 30s Tripping current between I _{ΔN0} and I _{ΔN} (only if delay > 30s)				N/A
b)	Verification of the correct operation at closing on residual current (S1 and S2 closed) :	[ms]	[ms]	[ms]	--
	- The RCBO closes on I _{ΔN} , no value exceeds the specified limiting value				N/A
c)	Verification of the correct operation in case of sudden appearance of residual current by closing S1, (S2 and RCBO in closed position):				N/A
	Maximum break times at:	[ms]	[ms]	[ms]	--
	- I _{ΔN}				N/A
	- 2 I _{ΔN}				N/A
	- 5 I _{ΔN} or				N/A
	- 0,25A				N/A
	- I _{Δt} _____ A				N/A
	No value exceeds the relevant specified limiting value				N/A
d)	Verification of the correct operation in case of sudden appearance of residual current between 5 I _{ΔN} and 500A by closing S ₂ , (S ₁ and RCBO in closed position):				N/A
	- ____A (value 1 between 5A and 200A)				N/A
	- ____A (value 1 between 5A and 200A)				N/A
	No value exceeds the relevant specified limiting value				N/A
	Additional test for type S:				--
	Minimum non-actuating time at:	[ms]	[ms]	[ms]	--
	- I _{ΔN} 0,13 s				N/A
	- 2 I _{ΔN} 0,06 s				N/A
	- 5 I _{ΔN} 0,05 s				N/A
	- I _{Δt} 0,04 s				N/A

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Clause	Requirement + Test	Result - Remark			Verdict
	The test switch S_1 and the RCBO being closed, the test voltage is suddenly established by closing switch S_2 for min. non-operating times acc. table 2				N/A
	No tripping during tests				N/A
9.17.4	Verification of the correct operation of RCBOs with 3 or 4 current paths, neutral and one line terminal only being energized in turn				N/A
	RCBO connected according to figure 4				N/A
9.9.1.2.c)	Maximum break times at:	[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$				N/A
	- $2 I_{\Delta N}$				N/A
	- $5 I_{\Delta N}$ or				N/A
	- 0,25 A				N/A
	- $I_{\Delta t}$ _____ A				N/A
	No value exceeds the relevant specified limiting value				N/A
	Additional test for type S:				N/A
	Minimum non-actuating time at:	[ms]	[ms]	[ms]	--
	- $I_{\Delta N}$ 0,13 s				N/A
	- $2 I_{\Delta N}$ 0,06 s				N/A
	- $5 I_{\Delta N}$ 0,05 s				N/A
	- $I_{\Delta t}$ 0,04 s				N/A
	The test switch S_1 and the RCBO being closed, the test voltage is suddenly established by closing switch S_2 for min. non-operating times acc. table 2				N/A
	No tripping during tests				N/A
8.11	Test device				--
	RCBOs provided with a test device	15#	16#	17#	--
	Ampere-turns produced when operating the test device do not exceed 2,5 times the ampere turns produced by $I_{\Delta N}$	1,37 times	1,37 times	1,37 times	P
	Not possible to energize the circuit on the load side by operating the test device when the RCBO is in the open position				P
9.16	Verification of the operation of the test device at the limits of rated voltage				--
	a) RCBO at $0,85 U_N$, test device actuated 25 times at intervals of 5s	340 V			P
	b) Test a) repeated at $1,1 U_N$	440 V			P

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Clause	Requirement + Test	Result - Remark	Verdict
	c) Test b) repeated, but only once, the operating means of the test device being held in the closed position for 30s	440 V	P
	RCBO operated at each test		P
	No change impairing further use		P

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Clause	Requirement + Test							Result - Remark		Verdict	
	TEST SEQUENCE "D"							4P, C40, 100 mA, type A		--	
								18#			
	TEST D ₀									--	
8	requirements for construction and operation									--	
8.5	Operating characteristics									--	
9.9	Verification of the operating characteristic									--	
9.9.1	RCBO installed as for normal use, test circuit according to figure 4								P		
	For multiple settings of I _{ΔN} tests are made for each setting								N/A		
	RCBOs with more than one rated frequency, tests at the lowest and highest frequency, except for test in 9.9.1.2 e), test at only one frequency.						50 Hz		P		
	Tests performed with no load at 20 ± 5°C						25 °C		P		
9.9.1.4	For RCBOs functionally dependent on line voltage each test is made at:								N/A		
	- 1,1 U _N (V) and								--		
	- 0,85 U _N (V)								--		
Table 2	Type	I _N A	I _{ΔN} A	Limiting values of break time and non-actuating time (s) for type AC and A RCBOs in event of alternating residual currents (r.m.s. values) equal to						--	
				I _{ΔN}	2 I _{ΔN}	5 I _{ΔN}	5 I _{ΔN} or 0,25A a)	5A-200A, 500A b)	I _{Δt} c)		--
	General	Any value	<0,03	0,3	0,15	--	0,04	0,04	0,04	Max. break times	--
		Any value	0,03	0,3	0,15	--	0,04	0,04	0,04		--
		Any value	>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 times	--
				0,13	0,06	0,05	--	0,04	0,04	Min. non-actuating times	--

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Clause	Requirement + Test	Result - Remark	Verdict
	a) value to be decided by the manufacturer for this test	500 mA	--
	b) The test are only made during verification of the correct operation as mentioned in 9.9.1.2 d) but in any case values exceeding the lower limit of the overcurrent instantaneous tripping range are not tested.		--
	c) The test is made with a current $I_{\Delta t}$ equal to the lower limit of the overcurrent instantaneous tripping range according to type B, C or D, as applicable. For the tests of 9.9.1.3 and 9.9.1.4 b), the current $I_{\Delta t}$ is established so that the vector sum $I_{\Delta t} + I_n$ is equal to the lower limit of the overcurrent instantaneous tripping range, according to type B, C or D, as applicable.		--
9.9.1.2	Tests for all RCBOs		P
a)	Verification of the correct operation in case of a steady increase of residual current:		--
	- Steady increase from $0,2 I_{\Delta N}$ to $I_{\Delta N}$ within 30s Tripping current between $I_{\Delta N0}$ and $I_{\Delta N}$	69,0~ 69,3 mA	P
b)	Verification of the correct operation at closing on residual current (S_1 and S_2 closed) :		--
	- The RCBO closes on $I_{\Delta N}$, no value exceeds the specified limiting value	92 ms	P
c)	Verification of the correct operation in case of sudden appearance of residual current by closing S_1 , (S_2 and RCBO in closed position):		--
	Maximum break times at:		--
	- $I_{\Delta N}$	89 ms	P
	- $2 I_{\Delta N}$	36 ms	P
	- $5 I_{\Delta N}$ or	30 ms	P
	- 0,25 A		N/A
	- $I_{\Delta t}$ <u>200 A</u>	21 ms	P
	No value exceeds the relevant specified limiting value		P
	Additional test for type S:		N/A
	Minimum non-actuating time at:		--
	- $I_{\Delta N}$ 0,13 s		N/A
	- $2 I_{\Delta N}$ 0,06 s		N/A

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Clause	Requirement + Test	Result - Remark			Verdict
	- $5 I_{\Delta N}$ 0,05 s				N/A
	- $I_{\Delta t}$ 0,04 s				N/A
	The test switch S_1 and the RCBO 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
d)	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 RCBO in closed position):				--
	- <u>5</u> A (value 1 between 5A and 200A)	25 ms			P
	- <u>100</u> A (value 1 between 5A and 200A)	22 ms			P
	No value exceeds the relevant specified limiting value				P
f) 1)	Tests repeated at -5°C:				P
	Verification of the correct operation in case of sudden appearance of residual current by closing S_1 , (S_2 and RCBO in closed position):				--
	Maximum break times at:				--
	- $I_{\Delta N}$	79 ms			P
	- $2 I_{\Delta N}$	46 ms			P
	- $5 I_{\Delta N}$ or	23 ms			P
	- 0,25 A				N/A
	- $I_{\Delta t}$ <u>200</u> A	14 ms			P
	No value exceeds the relevant specified limiting value				P
	Additional test for type S:				N/A
	Minimum non-actuating time at:				--
	- $I_{\Delta N}$ 0,13 s				N/A
	- $2 I_{\Delta N}$ 0,06 s				N/A
	- $5 I_{\Delta N}$ 0,05 s				N/A
	- $I_{\Delta t}$ 0,04 s				N/A
	The test switch S_1 and the RCBO 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

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Clause	Requirement + Test	Result - Remark	Verdict
	No tripping during tests		N/A
e)	Tests repeated, with the pole under test and one other pole of the RCBO loaded with rated current, current being established shortly before the test.	$I_N = 40 \text{ A}$	P
	Cross-section (mm ²) :	10 mm ²	--
	Verification of the correct operation at closing on residual current (S_1 and S_2 closed) :		--
	-no value exceeds the specified limiting value	84 ms	P
	Verification of the correct operation in case of sudden appearance of residual current by closing S_2 , (S_1 and RCBO in closed position):		P
	Maximum break times at:		--
	- $I_{\Delta N}$	79 ms	P
	- $2 I_{\Delta N}$	36 ms	P
	- $5 I_{\Delta N}$ or	26 ms	P
	- 0,25 A		N/A
	- $I_{\Delta t}$ 200 A	20 ms	P
	No value exceeds the relevant specified limiting value		P
	Additional test for type S:		N/A
	Minimum non-actuating time at:		--
	- $I_{\Delta N}$ 0,13 s		N/A
	- $2 I_{\Delta N}$ 0,06 s		N/A
	- $5 I_{\Delta N}$ 0,05 s		N/A
	- $I_{\Delta t}$ 0,04 s		N/A
	The test switch S_1 and the RCBO 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
f) 2)	Tests repeated with the RCBO loaded with rated current I_N at +40°C until steady-state conditions are reached	$I_N = 40 \text{ A}$	P
	Cross-section (mm ²) :	10 mm ²	--
	Verification of the correct operation in case of sudden appearance of residual current by closing S_1 , (S_2 and RCBO in closed position):		P
	Maximum break times at:		--

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Clause	Requirement + Test		Result - Remark	Verdict
	- $I_{\Delta N}$		81 ms	P
	- $2 I_{\Delta N}$		42 ms	P
	- $5 I_{\Delta N}$ or		30 ms	P
	- 0,25 A			N/A
	- $I_{\Delta t}$ 200 A		26 ms	P
	No value exceeds the relevant specified limiting value			P
	Additional test for type S:			N/A
	Minimum non-actuating time at:			--
	- $I_{\Delta N}$ 0,13 s			N/A
	- $2 I_{\Delta N}$ 0,06 s			N/A
	- $5 I_{\Delta N}$ 0,05 s			N/A
	- $I_{\Delta t}$ 0,04 s			N/A
	The test switch S_1 and the RCBO 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
8.15	BEHAVIOUR OF RCBOs IN CASE OF EARTH FAULT CURRENTS COMPRISING A DC COMPONENT			--
9.9.1.3	VERIFICATION OF THE CORRECT OPERATION AT RESIDUAL CURRENTS WITH DC COMPONENTS			--
	Type A residual current devices			--
	RCBO installed as for normal use, test circuits according to figures 5 and 6			P
	RCBOs with more than one rated frequency, tests at the lowest and highest frequency, except for test in 9.9.1.2 e), test at only one frequency.		50Hz	N/A
	For RCBOs functionally dependent on line voltage each test is made at			N/A
a)	Verification of the correct operation in case of a continuous rise of the residual pulsating direct current (S_1 , S_2 and RCBO closed)			P
	Test acc. figure 5		figure 5	--
	Angle α	Tripping current (A)		--
		Lower limit	Upper limit	--
	0°	0,35 $I_{\Delta N}$	1,4 $I_{\Delta N}$ or 2 $I_{\Delta N}$	35 - 140 mA
	90°	0,25 $I_{\Delta N}$	(sub-clause	25 - 140 mA

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Clause	Requirement + Test							Result - Remark				Verdict
	135°		0,11 I _{ΔN}		5.3.8)			15 - 140 mA				--
	Steady increase from zero to:											--
	- 1,4 I _{ΔN} for I _{ΔN} > 0,01A with 1,4 I _{ΔN} /30 A/s											P
	- 2 I _{ΔN} for I _{ΔN} ≤ 0,01 A with 2 I _{ΔN} /30 A/s											N/A
	α = 0°		+/-					87,1 - 88,2 mA				P
	α = 90°		+/-					80,3 - 83,0 mA				P
	α = 135°		+/-					85,3 - 88,5 mA				P
	No value exceeds the relevant specified limiting values											N/A
b)	Verification of the correct operation in case of suddenly appearing residual pulsating direct currents by closing S ₂ (S ₁ and RCBO in closed position)											P
Table 3	Type	I _N A	I _{ΔN} A	Maximum values of break time and non-actuating time (s) for type A RCBOs in the event of half-wave pulsating residual currents (r.m.s. values) equal to								--
				1,4 I _{ΔN}	2 I _{ΔN}	2,8 I _{ΔN}	4 I _{ΔN}	7 I _{ΔN}	0,35 A	0,5 A	350A a)	--
	General	Any value	<0,03		0,3		0,15			0,05	0,04	--
		Any value	0,03	0,3		0,15			0,04		0,04	--
		Any value	>0,03	0,3		0,15		0,04			0,04	--
	S	≥ 25	>0,03	0,5		0,2		0,15			0,15	--
	a) This value shall be limited to the lower limit of the overcurrent instantaneous tripping ranges according to type B, C or D, as applicable.											--
	Test acc. figure 5							figure 5				--
	Angle α							α = 0°				--
	RCBOs with I _{ΔN} < 0,03 A											N/A
	Maximum break times at:											--
	- 1,4 I _{ΔN}		+/-									N/A
	- 2,8 I _{ΔN}		+/-									N/A
	- 0,35 A		+/-									N/A
	- 350A or		+/-									N/A
	- I _{Δt} ____ A		+/-									N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	RCBOs with $I_{\Delta N} = 0,03 \text{ A}$		N/A
	Maximum break times at:		--
	- $1,4 I_{\Delta N}$ +/-		N/A
	- $2,8 I_{\Delta N}$ +/-		N/A
	- $0,35 \text{ A}$ +/-		N/A
	- 350 A or +/-		N/A
	- $I_{\Delta t}$ _____ A +/-		N/A
	RCBOs with $I_{\Delta N} > 0,03 \text{ A}$		P
	Maximum break times at:		--
	- $1,4 I_{\Delta N}$ +/-	78 ms	P
	- $2,8 I_{\Delta N}$ +/-	43 ms	P
	- $7 I_{\Delta N}$ +/-	30 ms	P
	- 350 A or +/-		N/A
	- $I_{\Delta t}$ <u>200</u> A +/-	22 ms	P
	No value exceeds the specified limiting values		P
c)	Verification of the correct operation with the pole under test and one other pole loaded with rated current I_N	$I_N = 40 \text{ A}$	P
	Test acc. 9.9.1.3 a) repeated, pole under test and one other pole loaded with rated current		--
	Steady increase from zero to:		--
	- $1,4 I_{\Delta N}$ for $I_{\Delta N} > 0,01 \text{ A}$ with $1,4 I_{\Delta N} / 30 \text{ A/s}$		P
	- $2 I_{\Delta N}$ for $I_{\Delta N} \leq 0,01 \text{ A}$ with $2 I_{\Delta N} / 30 \text{ A/s}$		N/A
	$\alpha = 0^\circ$ +/-	79,7 - 82,7 mA	P
	$\alpha = 90^\circ$ +/-	72,8 - 79,1 mA	P
	$\alpha = 135^\circ$ +/-	78,5 - 83,9 mA	P
	No value exceeds the relevant specified limiting values		P
d)	Verification of the correct operation in case of residual pulsating direct currents with $\alpha = 0^\circ$ superimposed by smooth direct current of $0,006 \text{ A}$		P
	Test acc. figure 6		--
	Steady increase of pulsating DC current from zero to:		--
	- $1,4 I_{\Delta N}$ for $I_{\Delta N} > 0,01 \text{ A}$ with $1,4 I_{\Delta N} / 30 \text{ A/s}$		P
	- $2 I_{\Delta N}$ for $I_{\Delta N} \leq 0,01 \text{ A}$ with $2 I_{\Delta N} / 30 \text{ A/s}$		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Maximum break Currents at:		--
	(I ₁) $\alpha = 0^\circ$ +/- (I ₀) 6mA DC +/-	88,0 mA	P
	No value exceeds the relevant specified limiting values	140 mA	P

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Clause	Requirement + Test							Result - Remark		Verdict	
	TEST SEQUENCE "D"							4P, C40, 300 mA, type A		--	
								19#			
	TEST D ₀									--	
8	requirements for construction and operation									--	
8.5	Operating characteristics									--	
9.9	Verification of the operating characteristic									--	
9.9.1	RCBO installed as for normal use, test circuit according to figure 4								P		
	For multiple settings of I _{ΔN} tests are made for each setting								N/A		
	RCBOs with more than one rated frequency, tests at the lowest and highest frequency, except for test in 9.9.1.2 e), test at only one frequency.						50 Hz		P		
	Tests performed with no load at 20 ± 5°C						25 °C		P		
9.9.1.4	For RCBOs functionally dependent on line voltage each test is made at:								N/A		
	- 1,1 U _N (V) and								--		
	- 0,85 U _N (V)								--		
Table 2	Type	I _N A	I _{ΔN} A	Limiting values of break time and non-actuating time (s) for type AC and A RCBOs in event of alternating residual currents (r.m.s. values) equal to						--	
				I _{ΔN}	2 I _{ΔN}	5 I _{ΔN}	5 I _{ΔN} or 0,25A a)	5A-200A, 500A b)	I _{Δt} c)		--
	General	Any value	<0,03	0,3	0,15	--	0,04	0,04	0,04	Max. break times	--
		Any value	0,03	0,3	0,15	--	0,04	0,04	0,04		--
		Any value	>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 times	--
				0,13	0,06	0,05	--	0,04	0,04	Min. non-actuating times	--

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Clause	Requirement + Test	Result - Remark		
	a) value to be decided by the manufacturer for this test	1500 mA		--
	b) The test are only made during verification of the correct operation as mentioned in 9.9.1.2 d) but in any case values exceeding the lower limit of the overcurrent instantaneous tripping range are not tested.			--
	c) The test is made with a current $I_{\Delta t}$ equal to the lower limit of the overcurrent instantaneous tripping range according to type B, C or D, as applicable. For the tests of 9.9.1.3 and 9.9.1.4 b), the current $I_{\Delta t}$ is established so that the vector sum $I_{\Delta t} + I_n$ is equal to the lower limit of the overcurrent instantaneous tripping range, according to type B, C or D, as applicable.			--
9.9.1.2	Tests for all RCBOs			P
a)	Verification of the correct operation in case of a steady increase of residual current:			--
	- Steady increase from $0,2 I_{\Delta N}$ to $I_{\Delta N}$ within 30s Tripping current between $I_{\Delta N0}$ and $I_{\Delta N}$	206 ~ 208 mA		P
b)	Verification of the correct operation at closing on residual current (S_1 and S_2 closed) :			--
	- The RCBO closes on $I_{\Delta N}$, no value exceeds the specified limiting value	63 ms		P
c)	Verification of the correct operation in case of sudden appearance of residual current by closing S_1 , (S_2 and RCBO in closed position):			--
	Maximum break times at:			--
	- $I_{\Delta N}$	54 ms		P
	- $2 I_{\Delta N}$	33 ms		P
	- $5 I_{\Delta N}$ or	33 ms		P
	- 0,25 A			N/A
	- $I_{\Delta t}$ <u>200 A</u>	14 ms		P
	No value exceeds the relevant specified limiting value			P
	Additional test for type S:			N/A
	Minimum non-actuating time at:			--
	- $I_{\Delta N}$ 0,13 s			N/A
	- $2 I_{\Delta N}$ 0,06 s			N/A

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Clause	Requirement + Test	Result - Remark			Verdict
	- $5 I_{\Delta N}$ 0,05 s				N/A
	- $I_{\Delta t}$ 0,04 s				N/A
	The test switch S_1 and the RCBO 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
d)	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 RCBO in closed position):				--
	- <u>5</u> A (value 1 between 5A and 200A)	26 ms			P
	- <u>100</u> A (value 1 between 5A and 200A)	12 ms			P
	No value exceeds the relevant specified limiting value				P
f) 1)	Tests repeated at -5°C:				P
	Verification of the correct operation in case of sudden appearance of residual current by closing S_1 , (S_2 and RCBO in closed position):				--
	Maximum break times at:				--
	- $I_{\Delta N}$	69 ms			P
	- $2 I_{\Delta N}$	41 ms			P
	- $5 I_{\Delta N}$ or	26 ms			P
	- 0,25 A				N/A
	- $I_{\Delta t}$ <u>200</u> A	16 ms			P
	No value exceeds the relevant specified limiting value				P
	Additional test for type S:				N/A
	Minimum non-actuating time at:				--
	- $I_{\Delta N}$ 0,13 s				N/A
	- $2 I_{\Delta N}$ 0,06 s				N/A
	- $5 I_{\Delta N}$ 0,05 s				N/A
	- $I_{\Delta t}$ 0,04 s				N/A
	The test switch S_1 and the RCBO 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

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Clause	Requirement + Test	Result - Remark	Verdict
	No tripping during tests		N/A
e)	Tests repeated, with the pole under test and one other pole of the RCBO loaded with rated current, current being established shortly before the test.	$I_N = 40 \text{ A}$	P
	Cross-section (mm ²) :	10 mm ²	--
	Verification of the correct operation at closing on residual current (S_1 and S_2 closed) :		--
	-no value exceeds the specified limiting value	59 ms	P
	Verification of the correct operation in case of sudden appearance of residual current by closing S_2 , (S_1 and RCBO in closed position):		P
	Maximum break times at:		--
	- $I_{\Delta N}$	51 ms	P
	- $2 I_{\Delta N}$	37 ms	P
	- $5 I_{\Delta N}$ or	33 ms	P
	- 0,25 A		N/A
	- $I_{\Delta t}$ 200 A	19 ms	P
	No value exceeds the relevant specified limiting value		P
	Additional test for type S:		N/A
	Minimum non-actuating time at:		--
	- $I_{\Delta N}$ 0,13 s		N/A
	- $2 I_{\Delta N}$ 0,06 s		N/A
	- $5 I_{\Delta N}$ 0,05 s		N/A
	- $I_{\Delta t}$ 0,04 s		N/A
	The test switch S_1 and the RCBO 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
f) 2)	Tests repeated with the RCBO loaded with rated current I_N at +40°C until steady-state conditions are reached	$I_N = 40 \text{ A}$	P
	Cross-section (mm ²) :	10 mm ²	--
	Verification of the correct operation in case of sudden appearance of residual current by closing S_1 , (S_2 and RCBO in closed position):		P
	Maximum break times at:		--

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Clause	Requirement + Test		Result - Remark	Verdict
	- $I_{\Delta N}$		56 ms	P
	- $2 I_{\Delta N}$		67 ms	P
	- $5 I_{\Delta N}$ or		38 ms	P
	- 0,25 A			N/A
	- $I_{\Delta t}$ 200 A		21 ms	P
	No value exceeds the relevant specified limiting value			P
	Additional test for type S:			N/A
	Minimum non-actuating time at:			--
	- $I_{\Delta N}$ 0,13 s			N/A
	- $2 I_{\Delta N}$ 0,06 s			N/A
	- $5 I_{\Delta N}$ 0,05 s			N/A
	- $I_{\Delta t}$ 0,04 s			N/A
	The test switch S_1 and the RCBO 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
8.15	BEHAVIOUR OF RCBOs IN CASE OF EARTH FAULT CURRENTS COMPRISING A DC COMPONENT			--
9.9.1.3	VERIFICATION OF THE CORRECT OPERATION AT RESIDUAL CURRENTS WITH DC COMPONENTS			--
	Type A residual current devices			--
	RCBO installed as for normal use, test circuits according to figures 5 and 6			P
	RCBOs with more than one rated frequency, tests at the lowest and highest frequency, except for test in 9.9.1.2 e), test at only one frequency.		50Hz	N/A
	For RCBOs functionally dependent on line voltage each test is made at			N/A
a)	Verification of the correct operation in case of a continuous rise of the residual pulsating direct current (S_1 , S_2 and RCBO closed)			P
	Test acc. figure 5		figure 5	--
	Angle α	Tripping current (A)		--
		Lower limit	Upper limit	--
	0°	0,35 $I_{\Delta N}$	1,4 $I_{\Delta N}$ or 2 $I_{\Delta N}$	105 - 420 mA
	90°	0,25 $I_{\Delta N}$	(sub-clause	75 - 420 mA

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Clause	Requirement + Test							Result - Remark				Verdict
	135°		0,11 I _{ΔN}		5.3.8)			33 - 420 mA				--
	Steady increase from zero to:											--
	- 1,4 I _{ΔN} for I _{ΔN} > 0,01A with 1,4 I _{ΔN} /30 A/s											P
	- 2 I _{ΔN} for I _{ΔN} ≤ 0,01 A with 2 I _{ΔN} /30 A/s											N/A
	α = 0° +/-							298 - 306 mA				P
	α = 90° +/-							212 - 221 mA				P
	α = 135° +/-							189 - 210 mA				P
	No value exceeds the relevant specified limiting values											N/A
b)	Verification of the correct operation in case of suddenly appearing residual pulsating direct currents by closing S ₂ (S ₁ and RCBO in closed position)											P
Table 3	Type	I _N A	I _{ΔN} A	Maximum values of break time and non-actuating time (s) for type A RCBOs in the event of half-wave pulsating residual currents (r.m.s. values) equal to								--
				1,4 I _{ΔN}	2 I _{ΔN}	2,8 I _{ΔN}	4 I _{ΔN}	7 I _{ΔN}	0,35 A	0,5 A	350A a)	--
	General	Any value	<0,03		0,3		0,15			0,05	0,04	--
		Any value	0,03	0,3		0,15			0,04		0,04	--
		Any value	>0,03	0,3		0,15		0,04			0,04	--
	S	≥ 25	>0,03	0,5		0,2		0,15			0,15	--
	a) This value shall be limited to the lower limit of the overcurrent instantaneous tripping ranges according to type B, C or D, as applicable.											--
	Test acc. figure 5							figure 5				--
	Angle α :							α = 0°				--
	RCBOs with I _{ΔN} < 0,03 A											N/A
	Maximum break times at:											--
	- 1,4 I _{ΔN} +/-											N/A
	- 2,8 I _{ΔN} +/-											N/A
	- 0,35 A +/-											N/A
	- 350A or +/-											N/A
	- I _{Δt} ____ A +/-											N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	RCBOs with $I_{\Delta N} = 0,03 \text{ A}$		N/A
	Maximum break times at:		--
	- $1,4 I_{\Delta N}$ +/-		N/A
	- $2,8 I_{\Delta N}$ +/-		N/A
	- $0,35 \text{ A}$ +/-		N/A
	- 350 A or +/-		N/A
	- $I_{\Delta t}$ _____ A +/-		N/A
	RCBOs with $I_{\Delta N} > 0,03 \text{ A}$		P
	Maximum break times at:		--
	- $1,4 I_{\Delta N}$ +/-	103 ms	P
	- $2,8 I_{\Delta N}$ +/-	78 ms	P
	- $7 I_{\Delta N}$ +/-	30 ms	P
	- 350 A or +/-		N/A
	- $I_{\Delta t}$ <u>200</u> A +/-	21 ms	P
	No value exceeds the specified limiting values		P
c)	Verification of the correct operation with the pole under test and one other pole loaded with rated current I_N	$I_N = 40 \text{ A}$	P
	Test acc. 9.9.1.3 a) repeated, pole under test and one other pole loaded with rated current		--
	Steady increase from zero to:		--
	- $1,4 I_{\Delta N}$ for $I_{\Delta N} > 0,01 \text{ A}$ with $1,4 I_{\Delta N} / 30 \text{ A/s}$		P
	- $2 I_{\Delta N}$ for $I_{\Delta N} \leq 0,01 \text{ A}$ with $2 I_{\Delta N} / 30 \text{ A/s}$		N/A
	$\alpha = 0^\circ$ +/-	271 - 287 mA	P
	$\alpha = 90^\circ$ +/-	193 - 208 mA	P
	$\alpha = 135^\circ$ +/-	176 - 194 mA	P
	No value exceeds the relevant specified limiting values		P
d)	Verification of the correct operation in case of residual pulsating direct currents with $\alpha = 0^\circ$ superimposed by smooth direct current of $0,006 \text{ A}$		P
	Test acc. figure 6		--
	Steady increase of pulsating DC current from zero to:		--
	- $1,4 I_{\Delta N}$ for $I_{\Delta N} > 0,01 \text{ A}$ with $1,4 I_{\Delta N} / 30 \text{ A/s}$		P
	- $2 I_{\Delta N}$ for $I_{\Delta N} \leq 0,01 \text{ A}$ with $2 I_{\Delta N} / 30 \text{ A/s}$		N/A

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Maximum break Currents at:		--
	(I ₁) $\alpha = 0^\circ$ +/- (I ₀) 6mA DC +/-	301 mA	P
	No value exceeds the relevant specified limiting values	420 mA	P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "E"	2P, C40, 30 mA, type A			--
		119# - 121#			
	Tests E ₀				--
9.9	verification of the Operating characteristics				--
9.9.2	Verification of the Operating characteristics under overcurrent conditions				--
	I _N (A)	40 A			--
	Cross-section (mm ²)	10 mm ²			--
	Instantaneous tripping current (B / C / D)	C			--
9.9.2.1	Test of time-current characteristic				P
a)	Test current 1,13 I _N starting from cold for	45,2 A			--
	- 1 h (I _N ≤ 63 A)				P
	- 2 h (I _N > 63 A)				N/A
	No tripping				P
	Then steadily increased within 5 s to 1,45 I _N	58 A			--
	Tripping within	119#	120#	121#	
	- 1h (< 63 A)	44 s	395 s	37 s	P
	- 2h (> 63 A)				N/A
b)	Test current 2,55 I _N starting from cold	102 A			--
	Opening time not less than 1 s or more than	119#	120#	121#	P
	- 60 s (≤ 32 A)				N/A
	- 120 s (> 32 A)	19 s	30 s	19 s	P
9.9.2.2	Test of instantaneous tripping:				P
a)	General test conditions				P
	For the lower values of the test current of 9.9.2.2.b), 9.9.2.2.c) and 9.9.2.2.d) respectively the test is made once, at any convenient voltage				P
	For the upper value of the test current, the two following tests are carried out:				P
	- At any convenient voltage, one opening operation on each combination of two poles connected in series . The tripping time is measured and shall be within the limits of Table 10. test results see b) or c) or d)				P
	- At rated voltage U ₀ (phase to neutral) with a power factor between 0,95 and 1 separately on each protected pole of the RCBO The sequence of operation is: O-t-CO-t-CO-t-CO Interval time: > 3 min.	240,7 V, 402,6 A, 0,97			P

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Clause	Requirement + Test	Result - Remark			Verdict	
	The tripping time of the O operation is measured		[ms]	[ms]	[ms]	--
	- Opening time not less than 0,1 s	L1	11	13	6	P
		N	9	14	6	P
	After each operation the indication means shall show the open position of the contacts				P	
b)	☐ B				N/A	
	Test current 3 I _N starting from cold..... :	3 I _N = A			--	
		[s]	[s]	[s]	--	
	- Opening time not less than 0,1 s				N/A	
	Test current 5 I _N starting from cold..... :	5 I _N = A			--	
		[s]	[s]	[s]	--	
	- Tripping time less than 0,1 s				N/A	
c)	☒ C				P	
	Test current 5 I _N starting from cold..... :	200 A	200 A	200 A	--	
		[s]	[s]	[s]	--	
	- Opening time not less than 0,1 s - 0,1 s < t [<30 s (> 32 A) *)acc. EN61009]	7	9	7	P	
	Test current 10 I _N starting from cold..... :	400 A			--	
		[ms]	[ms]	[ms]	--	
	- Opening time not less than 0,1 s	L1-N	9	9	8	P
d)	☐ D				N/A	
	Test current 10 I _N starting from cold..... :	10 I _N = A			--	
		[s]	[s]	[s]	--	
	- Opening time not less than 0,1 s				N/A	
	Test current 20 I _N starting from cold..... :	20 I _N = A			--	
		[s]	[s]	[s]	--	
	- Tripping time less than 0,1 s				N/A	
9.9.2.Z1 (acc. EN61009)	Test of effect of single pole loading on the tripping characteristic of multipole circuit-breakers:				N/A	
	Test current 1,1 I _t (A), (two pole) starting from cold				N/A	
	Tripping within				N/A	
	- 1h				N/A	
	- 2h				N/A	
	Test current 1,2 I _t (A), (three pole or four pole)				N/A	

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	starting from cold				
	Tripping within	[s]	[s]	[s]	N/A
	- 1h				N/A
	- 2h				N/A
9.9.2.3	Test of effect of ambient temperature on the tripping characteristics:				P
a)	Ambient temperature of $(-5 \pm 2)^\circ\text{C}$	- 5 °C			--
	Test current $1,13 I_N$	45,2 A			--
	- passed for 1 h				P
	- passed for 2 h				N/A
	Current is then steadily increased within 5s to $1,9 I_N$	76 A			--
	Tripping:	[s]	[s]	[s]	--
	- 1 h	32	91	32	P
	- 2 h				N/A
b)	Ambient temperature of $(40 \pm 2)^\circ\text{C}$	40 °C			--
	Test current I_N	40 A			--
	No tripping within				--
	- 1 h				P
	- 2 h				N/A

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Tests E ₁	2P, C40, 30 mA, type A	--
		119# - 121#	
8	REQUIREMENTS FOR CONSTRUCTION AND OPERATION		--
8.8	Resistance to mechanical shock and impact		--
	RCBO' shall have adequate mechanical behaviour so as to withstand stresses imposed during installation and use		P
9.13	Verification to resistance to mechanical shock and impact		--
9.13.1	Mechanical shock		--
9.13.1.2	Test procedure:		--
	- 50 falls of 40 mm on one side		P
	- 50 falls on opposite side		P
	C turned through 90°		P
	- 50 falls on one side		P
	- 50 falls on opposite side		P
	No opening of RCBO during test		P
9.13.2	Mechanical impact		--
	- 9.13.2.2 for RCBOs intended to be mounted on a rail		P
	- 9.13.2.3 for plug-in type RCBOs		N/A
9.13.2.1	Impact test:		P
	10 blows from a height of 10 cm		--
	No damage		P
9.13.2.2	RCBOs for rail mounting:		P
	- downward vertical force of 50 N for 1 min		P
	- upward vertical force of 50 N for 1 min		P
	RCBO shall not become loose during test and shall not show any damage impairing its further use		P
9.13.2.3	RCBOs of plug-in type		N/A
	Under consideration		--
9.12.11.3	Test at 1500 A:		P
	Prospective current of 1500 A		P
	Cross-section (mm ²).....	16 mm ²	--
	Grid distance a (mm).....	a = 35 mm	--
	Power factor 0,93 – 0,98	0,93 – 0,98	--

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	Prospective current obtained	1543 A			--
	Power factor	0,93			--
	Test circuit:	Figure 7			--
	I_{peak} (A) max. value	1,6 kA	1,7 kA	1,7 kA	--
	Sequence: 6-O and 3-CO I_{t2} max	8,0 kA ² s	6,5 kA ² s	6,1 kA ² s	--
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = 440$ V. The RCBO is in the open position	[mA]	[mA]	[mA]	--
	The leakage current shall not exceed 2 mA L1	< 1,4	< 1,4	< 1,4	P
	N	< 1,4	< 1,4	< 1,4	P
9.12.12.1.b)	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				--
	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
9.12.12.1	Test current equal to 0,85 times the conventional non-tripping current for:	38,4 A			--
	- 1h starting from cold				P

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Clause	Requirement + Test	Result - Remark			Verdict
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	63,8 A			--
	- tripping within	[s]	[s]	[s]	--
	- 1h (< 63 A)	17	22	12	P
	- 2h (> 63 A)				N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "E"	4P, C40, 30 mA, type A			--
		20# - 22#			
	Tests E ₀				--
9.9	verification of the Operating characteristics				--
9.9.2	Verification of the Operating characteristics under overcurrent conditions				--
	I _N (A): 40 A				--
	Cross-section (mm²).....: 10 mm²				--
	Instantaneous tripping current (B / C / D).....: C				--
9.9.2.1	Test of time-current characteristic				P
a)	Test current 1,13 I _N starting from cold for: 45,2 A				--
	- 1 h (I _N ≤ 63 A)				P
	- 2 h (I _N > 63 A)				N/A
	No tripping				P
	Then steadily increased within 5 s to 1,45 I _N: 58 A				--
	Tripping within	20#	21#	22#	
	- 1h (< 63 A)	48 s	105 s	94 s	P
	- 2h (> 63 A)				N/A
b)	Test current 2,55 I _N starting from cold.....: 102 A				--
	Opening time not less than 1 s or more than	20#	21#	22#	P
	- 60 s (≤ 32 A)				N/A
	- 120 s (> 32 A)	17 s	21 s	14 s	P
9.9.2.2	Test of instantaneous tripping:				P
a)	General test conditions				P
	For the lower values of the test current of 9.9.2.2.b), 9.9.2.2.c) and 9.9.2.2.d) respectively the test is made once, at any convenient voltage				P
	For the upper value of the test current, the two following tests are carried out:				P
	- At any convenient voltage, one opening operation on each combination of two poles connected in series . The tripping time is measured and shall be within the limits of Table 10. test results see b) or c) or d)				P
	- At rated voltage U ₀ (phase to neutral) with a power factor between 0,95 and 1 separately on each protected pole of the RCBO The sequence of operation is: O-t-CO-t-CO-t-CO Interval time: > 3 min.	234,8 V, 400,7 A, 0,97			P

IEC 61009-1						
Clause	Requirement + Test		Result - Remark			Verdict
	The tripping time of the O operation is measured - Opening time not less than 0,1 s		[ms]	[ms]	[ms]	--
		L1	6	7	11	P
		L2	9	6	7	P
		L3	6	8	6	P
		N	8	7	5	P
	After each operation the indication means shall show the open position of the contacts					P
b)	☐ B					N/A
	Test current 3 I _N starting from cold.....		3 I _N = A			--
			[s]	[s]	[s]	--
	- Opening time not less than 0,1 s					N/A
	Test current 5 I _N starting from cold.....		5 I _N = A			--
			[s]	[s]	[s]	--
	- Tripping time less than 0,1 s					N/A
c)	☒ C					P
	Test current 5 I _N starting from cold.....		200 A	200 A	200 A	--
			[s]	[s]	[s]	--
	- Opening time not less than 0,1 s - 0,1 s < t [<30 s (> 32 A) *)acc. EN61009]		15	19	22	P
	Test current 10 I _N starting from cold.....		402 A			--
			[ms]	[ms]	[ms]	--
	- Opening time not less than 0,1 s	L1-N	11	9	7	P
		L1-L2	8	10	7	P
		L1-L3	9	8	12	P
		L2-L3	10	6	8	P
		L2-N	10	11	9	P
		L3-N	11	12	9	P
d)	☐ D					N/A
	Test current 10 I _N starting from cold.....		10 I _N = A			--
			[s]	[s]	[s]	--
	- Opening time not less than 0,1 s					N/A
	Test current 20 I _N starting from cold.....		20 I _N = A			--
			[s]	[s]	[s]	--
	- Tripping time less than 0,1 s					N/A

IEC 61009-1						
Clause	Requirement + Test		Result - Remark			Verdict
9.9.2.Z1 (acc. EN61009)	Test of effect of single pole loading on the tripping characteristic of multipole circuit-breakers:					P
	Test current 1,1 It (A), (two pole) starting from cold					N/A
	Tripping within					N/A
	- 1h					N/A
	- 2h					N/A
	Test current 1,2 It (A), (three pole or four pole) starting from cold					P
	Tripping within		[s]	[s]	[s]	P
	- 1h	L1-N	126	66	48	P
		L2-N	98	225	214	P
		L3-N	213	35	312	P
	- 2h					N/A
9.9.2.3	Test of effect of ambient temperature on the tripping characteristics:					P
a)	Ambient temperature of $(-5 \pm 2)^\circ\text{C}$		- 5 °C			--
	Test current 1,13 I _N		45,2 A			--
	- passed for 1 h					P
	- passed for 2 h					N/A
	Current is then steadily increased within 5s to 1,9 I _N		76 A			--
	Tripping:		[s]	[s]	[s]	--
	- 1 h		45	8	34	P
	- 2 h					N/A
b)	Ambient temperature of $(40 \pm 2)^\circ\text{C}$		40 °C			--
	Test current I _N		40 A			--
	No tripping within					--
	- 1 h					P
	- 2 h					N/A

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Tests E ₁	4P, C40, 30 mA, type A	--
		20# - 22#	
8	REQUIREMENTS FOR CONSTRUCTION AND OPERATION		--
8.8	Resistance to mechanical shock and impact		--
	RCBO' shall have adequate mechanical behaviour so as to withstand stresses imposed during installation and use		P
9.13	Verification to resistance to mechanical shock and impact		--
9.13.1	Mechanical shock		--
9.13.1.2	Test procedure:		--
	- 50 falls of 40 mm on one side		P
	- 50 falls on opposite side		P
	C turned through 90°		P
	- 50 falls on one side		P
	- 50 falls on opposite side		P
	No opening of RCBO during test		P
9.13.2	Mechanical impact		--
	- 9.13.2.2 for RCBOs intended to be mounted on a rail		P
	- 9.13.2.3 for plug-in type RCBOs		N/A
9.13.2.1	Impact test:		P
	10 blows from a height of 10 cm		--
	No damage		P
9.13.2.2	RCBOs for rail mounting:		P
	- downward vertical force of 50 N for 1 min		P
	- upward vertical force of 50 N for 1 min		P
	RCBO shall not become loose during test and shall not show any damage impairing its further use		P
9.13.2.3	RCBOs of plug-in type		N/A
	Under consideration		--
9.12.11.3	Test at 1500 A:		P
	Prospective current of 1500 A		P
	Cross-section (mm ²).....	16 mm ²	--
	Grid distance a (mm).....	a = 35 mm	--
	Power factor 0,93 – 0,98	0,93 – 0,98	--

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	Prospective current obtained	1520 A			--
	Power factor	0,96			--
	Test circuit:	Figure 7			--
	I_{peak} (A) max. value	[kA]	[kA]	[kA]	--
	L1	1,8	1,9	1,8	--
	L2	1,8	1,8	1,9	--
	L3	1,8	1,9	1,8	--
	Sequence: 6-O and 3-CO I^2t max	[kA ² s]	[kA ² s]	[kA ² s]	--
	L1	10,5	10,0	8,2	--
	L2	7,8	8,0	8,5	--
	L3	7,9	10,6	7,8	--
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = 440$ V. The RCBO is in the open position	[mA]	[mA]	[mA]	--
	The leakage current shall not exceed 2 mA L1	< 1,4	< 1,4	< 1,4	P
	L2	< 1,4	< 1,4	< 1,4	P
	L3	< 1,4	< 1,4	< 1,4	P
	N	< 1,4	< 1,4	< 1,4	P
9.12.12.1.b)	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				--
	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
9.12.12.1	Test current equal to 0,85 times the conventional non-tripping current for:	38,4 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	63,8 A			--
	- tripping within	[s]	[s]	[s]	--
	- 1h (< 63 A)	18	11	33	P
	- 2h (> 63 A)				N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	Tests E0	C type, 1 for all other rated current			--
		23# - 29#			
9.9	verification of the Operating characteristics				--
9.9.2	Verification of the Operating characteristics under overcurrent conditions				--
	I_N (A)	23#	24#	25#	--
		C32	C25	C20	
		26#	27#	28#	
		C16	C13	C10	
		29#			
		C6			
	Cross-section (mm²).....	23#	24#	25#	--
		6 mm²	4 mm²	2,5 mm²	
		26#	27#	28#	
		2,5 mm²	1,5 mm²	1,5 mm²	
		29#			
		1 mm²			
	Instantaneous tripping current (B / C / D).....	C			--
9.9.2.1	Test of time-current characteristic	36,2 A			P
a)	Test current 1,13 I_N starting from cold for	23#	24#	25#	--
		36,2 A	28,2 A	22,6 A	
		26#	27#	28#	
		18,1 A	14,7 A	11,3 A	
		29#			
		6,8 A			
	- 1 h ($I_N \leq 63$ A)				P
	- 2 h ($I_N > 63$ A)				N/A
	No tripping				P
	Then steadily increased within 5 s to 1,45 I_N	23#	24#	25#	--
		46,4 A	36,2 A	29,0 A	
		26#	27#	28#	
		23,2 A	18,8 A	14,5 A	
		29#			
		8,7 A			

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Clause	Requirement + Test	Result - Remark			Verdict
	Tripping within				--
	- 1h (< 63 A)	23#	24#	25#	P
		26 s	9 s	132 s	
		26#	27#	28#	
		61 s	18 s	114 s	
		29#			
		42 s			
	- 2h (> 63 A)				N/A
b)	Test current 2,55 I _N starting from cold..... :	23#	24#	25#	--
		81,6 A	63,8 A	51,0 A	
		26#	27#	28#	
		40,8 A	33,2 A	25,5 A	
		29#			
		15,3 A			
	Opening time not less than 1 s or more than				--
	- 60 s ($\leq$ 32 A)	23#	24#	25#	P
		11 s	9 s	11 s	
		26#	27#	28#	
		12 s	13 s	15 s	
		29#			
		18 s			
	- 120 s (> 32 A)				N/A
9.9.2.2	Test of instantaneous tripping:				P
a)	General test conditions				P
	For the lower values of the test current of 9.9.2.2.b), 9.9.2.2.c) and 9.9.2.2.d) respectively the test is made once, at any convenient voltage				P
	For the upper value of the test current, the two following tests are carried out:				P
	- At any convenient voltage, one opening operation on each combination of two poles connected in series . The tripping time is measured and shall be within the limits of Table 10. test results see b) or c) or d)				P
	- At rated voltage U ₀ (phase to neutral) with a power factor between 0,95 and 1 separately on each protected pole of the RCBO	23#: 233,8 V, 320,6 A, 0,97 24#: 235,6 V, 252,8 A, 0,97 25#: 231,4 V, 203,7 A, 0,98			P

IEC 61009-1						
Clause	Requirement + Test		Result - Remark			Verdict
	The sequence of operation is: O-t-CO-t-CO-t-CO Interval time: > 3 min.		26#: 232,6 V, 160,3 A, 0,98 27#: 232,2 V, 131,1 A, 0,99 28#: 233,1 V, 102,6 A, 0,99 29#: 231,8 V, 60,1 A, 0,99			
	The tripping time of the O operation is measured - Opening time not less than 0,1 s		[ms]	[ms]	[ms]	--
			23#	24#	25#	P
		L1	7	9	14	
		L2	10	15	11	
		L3	13	14	16	
		N	13	8	14	
			26#	27#	28#	P
		L1	14	12	8	
		L2	6	12	14	
		L3	8	13	6	
		N	9	7	15	
			29#			P
		L1	9			
		L2	11			
		L3	12			
		N	9			
	After each operation the indication means shall show the open position of the contacts					P
b)	☐ B					N/A
	Test current 3 I _N starting from cold..... :					--
	- Opening time not less than 0,1 s					N/A
	Test current 5 I _N starting from cold..... :					--
	- Tripping time less than 0,1 s					N/A
c)	☒ C					P
	Test current 5 I _N starting from cold..... :		23#	24#	25#	--
			160 A	125 A	100 A	
			26#	27#	28#	
			80 A	65 A	50 A	
			29#			
			30 A			
	- Opening time not less than 0,1 s		23#	24#	25#	P

IEC 61009-1						
Clause	Requirement + Test		Result - Remark			Verdict
	- 0,1 s < t [<15 s ($\leq 32A$) *) acc. EN 61009-1]		10 s	10 s	8 s	
			26#	27#	28#	
			6 s	10 s	4 s	
			29#			
			6 s			
	Test current 10 I _N starting from cold..... :		23#	24#	25#	--
			323 A	252 A	203 A	
			26#	27#	28#	
			164 A	133 A	102 A	
			29#			
			61 A			
	- Opening time less than 0,1 s		[ms]	[ms]	[ms]	--
			23#	24#	25#	P
		L1-N	10	7	10	
		L1-L2	8	6	11	
		L1-L3	6	9	7	
		L2-L3	7	7	9	
		L2-N	8	9	9	
		L3-N	10	8	7	
			26#	27#	28#	P
		L1-N	9	13	7	
		L1-L2	9	9	6	
		L1-L3	12	8	8	
		L2-L3	7	7	9	
		L2-N	10	9	7	
		L3-N	11	10	7	
			29#			P
		L1-N	12			
		L1-L2	13			
		L1-L3	9			
		L2-L3	8			
		L2-N	9			
		L3-N	9			
d)	☐ D					N/A

IEC 61009-1							
Clause	Requirement + Test			Result - Remark		Verdict	
	Test current 10 I _N starting from cold..... :					--	
	- Opening time not less than 0,1 s					N/A	
	Test current 20 I _N starting from cold..... :						
	- Tripping time less than 0,1 s					N/A	
9.9.2.Z1 (acc. EN61009)	Test of effect of single pole loading on the tripping characteristic of multipole circuit-breakers:					P	
	Test current 1,1 I _t (A), (two pole) starting from cold					N/A	
	Tripping within					N/A	
	- 1h					N/A	
	- 2h					N/A	
	Test current 1,2 I _t (A), (three pole or four pole) starting from cold					P	
	Tripping within			[s]	[s]	[s]	P
	- 1h		23#	24#	25#	P	
		L1-N	25	82	61		
		L2-N	41	13	77		
		L3-N	93	10	39		
			26#	27#	28#	P	
		L1-N	5	49	6		
		L2-N	184	116	32		
		L3-N	105	231	55		
			29#			P	
		L1-N	16				
		L2-N	158				
		L3-N	24				
	- 2h					N/A	
9.9.2.3	Test of effect of ambient temperature on the tripping characteristics:					P	
a)	Ambient temperature of (- 5 ± 2)°C			- 5 °C		--	
	Test current 1,13 I _N			23#	24#	25#	--
				36,2 A	28,2 A	22,6 A	
				26#	27#	28#	
				18,1 A	14,7 A	11,3 A	
				29#			

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
		6,8 A			
	- passed for 1 h				P
	- passed for 2 h				N/A
	Current is then steadily increased within 5s to 1,9 I _N	23#	24#	25#	--
		60,8 A	47,5 A	38,0 A	
		26#	27#	28#	
		30,4 A	24,7 A	19,0 A	
		29#			
		11,4 A			
	Tripping:				--
	- 1 h	23#	24#	25#	P
		15 s	82 s	113 s	
		26#	27#	28#	
		92 s	20 s	36 s	
		29#			
		14 s			
	- 2 h				N/A
b)	Ambient temperature of (40 ± 2)°C :	40 °C			--
	Test current I _N	23#	24#	25#	--
		32 A	25 A	20 A	
		26#	27#	28#	
		16 A	13 A	10 A	
		29#			
		6 A			
	No tripping within				--
	- 1 h				P
	- 2 h				N/A

IEC 61009-1						
Clause	Requirement + Test		Result - Remark			Verdict
	Tests E0		B type, 1 for all rated current			--
			30# - 37#			
9.9	verification of the Operating characteristics					--
9.9.2	Verification of the Operating characteristics under overcurrent conditions					--
	I_N (A)		30#	31#	32#	--
			B40	B32	B25	
			33#	34#	35#	
			B20	B16	B13	
			36#	37#		
			B10	B6		
	Cross-section (mm²).....		30#	31#	32#	--
			10 mm²	6 mm²	4 mm²	
			33#	34#	35#	
			2,5 mm²	2,5 mm²	1,5 mm²	
			36#	37#		
			1,5 mm²	1 mm²		
	Instantaneous tripping current (B / C / D).....		B			--
9.9.2.2	Test of instantaneous tripping:					P
a)	General test conditions					P
	For the lower values of the test current of 9.9.2.2.b), 9.9.2.2.c) and 9.9.2.2.d) respectively the test is made once, at any convenient voltage					P
	For the upper value of the test current, the two following tests are carried out:					P
	- At any convenient voltage, one opening operation on each combination of two poles connected in series . The tripping time is measured and shall be within the limits of Table 10. test results see b) or c) or d)					P
	- At rated voltage U_0 (phase to neutral) with a power factor between 0,95 and 1 separately on each protected pole of the RCBO The sequence of operation is: O-t-CO-t-CO-t-CO Interval time: > 3 min.		30#: 231,4 V, 203,7 A, 0,98 31#: 232,6 V, 160,3 A, 0,98 32#: 232,9 V, 125,5 A, 0,98 33#: 233,1 V, 102,6 A, 0,99 34#: 233,6 V, 79,5 A, 0,99 35#: 230,6 V, 65,8 A, 0,99 36#: 233,4 V, 49,7 A, 0,99 37#: 231,8 V, 29,7 A, 0,99			P
	The tripping time of the O operation is measured		[ms]	[ms]	[ms]	--
			30#	31#	32#	P

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Clause	Requirement + Test	Result - Remark			Verdict	
	- Opening time not less than 0,1 s	L1	8	7	3	
		L2	12	12	4	
		L3	12	8	4	
		N	9	9	11	
			33#	34#	35#	P
		L1	23	19	8	
		L2	21	23	19	
		L3	9	17	6	
		N	24	23	8	P
			36#	37#		
		L1	22	38		
		L2	16	26		
		L3	19	22		
		N	26	11		
	After each operation the indication means shall show the open position of the contacts				P	
b)	☒ B				P	
	Test current 3 I _N starting from cold..... :	30#	31#	32#	--	
		160 A	125 A	100 A		
		33#	34#	35#		
		80 A	65 A	50 A		
		36#	37#			
		30 A	30 A			
	- Opening time not less than 0,1 s - 0,1 s < t [<45 s (≤ 32A) or <90 s (> 32A) *) acc. EN 61009-1]	30#	31#	32#	P	
		10 s	23 s	22 s		
		33#	34#	35#		
		14 s	21 s	9 s		
		36#	37#			
		17 s	5 s			
	Test current 5 I _N starting from cold..... :	30#	31#	32#	--	
		201 A	162 A	127 A		
		33#	34#	35#		
		102 A	81 A	66 A		
		36#	37#			

IEC 61009-1						
Clause	Requirement + Test		Result - Remark			Verdict
			51 A	31 A		
	- Opening time less than 0,1 s		[ms]	[ms]	[ms]	--
			30#	31#	32#	P
		L1-N	7	7	6	
		L1-L2	6	8	10	
		L1-L3	7	11	9	
		L2-L3	9	10	7	
		L2-N	8	9	7	
		L3-N	7	10	9	
			33#	34#	35#	P
		L1-N	12	5	9	
		L1-L2	10	8	9	
		L1-L3	9	7	11	
		L2-L3	11	6	7	
		L2-N	12	6	8	
		L3-N	11	9	9	
			36#	37#		P
		L1-N	7	12		
		L1-L2	9	11		
		L1-L3	7	9		
		L2-L3	7	11		
		L2-N	8	13		
		L3-N	12	11		
c)	☐ C					N/A
	Test current 5 I _N starting from cold..... :					--
	- Opening time not less than 0,1 s					N/A
	Test current 10 I _N starting from cold..... :					--
	- Opening time less than 0,1 s					N/A
d)	☐ D					N/A
	Test current 10 I _N starting from cold..... :					--
	- Opening time not less than 0,1 s					N/A
	Test current 20 I _N starting from cold..... :					
	- Tripping time less than 0,1 s					N/A
9.9.2.Z1	Test of effect of single pole loading on the tripping					P

IEC 61009-1						
Clause	Requirement + Test			Result - Remark		
(acc. EN 61009-1)	characteristic of multipole circuit-breakers:					
	Test current 1,1 It (A), (two pole) starting from cold					N/A
	Tripping within					N/A
	- 1h					N/A
	- 2h					N/A
	Test current 1,2 It (A), (three pole or four pole) starting from cold					P
	Tripping within			[s]	[s]	[s]
	- 1h			30#	31#	32#
		L1-N	123	105	204	P
		L2-N	216	189	192	
		L3-N	84	13	115	
			33#	34#	35#	P
		L1-N	152	158	152	
		L2-N	214	99	66	
		L3-N	322	134	43	P
			36#	37#		
		L1-N	150	95		
		L2-N	176	106		P
		L3-N	78	114		
	- 2h					N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F0"	2P, C40, 30 mA, type A			--
		122# - 124#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I _{CS}				P
	Service short-circuit capacity (A).....	6000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 Un	250,6 V			--
	Cross-section (mm²).....	16 mm²			--
	Grid distance a (mm).....	45 mm			--
	Prospective current (A).....	6000 A			--
	Prospective current obtained (A).....	6139 A			--
	Power factor	0,65~0,7			--
	Power factor obtained	0,67			--
	Sequence	O - O - CO			--
	I _{peak} (A) max. value	122#	123#	124#	--
		3,6 kA	3,5 kA	3,7 kA	P
	Max. I²t ≤ 63 kA²s, acc. EN 61009-1	122#	123#	124#	--
		27,4 kA²s	31,5 kA²s	20,3 kA²s	P
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times Un = ____ V. The RCBO is in the open position	253 V			--
	The leakage current shall not exceed 2 mA	122#	123#	124#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	38,4 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	63,8 A			--
	- tripping within	122#	123#	124#	--
	- 1h (< 63 A)	18 s	22 s	33 s	P
	- 2h (> 63 A)				N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F0"	2P, C25, 300 mA, type A			--
		125# - 127#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I _{CS}				P
	Service short-circuit capacity (A).....:	6000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 Un	250,6 V			--
	Cross-section (mm²).....:	6 mm²			--
	Grid distance a (mm).....:	45 mm			--
	Prospective current (A).....:	6000 A			--
	Prospective current obtained (A).....:	6139 A			--
	Power factor	0,65~0,7			--
	Power factor obtained	0,67			--
	Sequence	O - O - CO			--
	I _{peak} (A) max. value	125#	126#	127#	--
		3,0 kA	3,0 kA	3,1 kA	P
	Max. I²t ≤ 52 kA²s, acc. EN 61009-1	125#	126#	127#	--
		29,4 kA²s	21,4 kA²s	21,5 kA²s	P
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times Un = ____ V. The RCBO is in the open position	253 V			--
	The leakage current shall not exceed 2 mA	125#	126#	127#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	24 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	39,9 A			--
	- tripping within	125#	126#	127#	--
	- 1h (< 63 A)	23 s	16 s	30 s	P
	- 2h (> 63 A)				N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F0"	2P, C20, 30 mA, type A			--
		149# - 151#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I _{CS}				P
	Service short-circuit capacity (A).....:	7500 A			--
	Figure	Figure 7			--
	Test voltage 1,05 Un	250,8 V			--
	Cross-section (mm²).....:	6 mm²			--
	Grid distance a (mm).....:	45 mm			--
	Prospective current (A).....:	7500 A			--
	Prospective current obtained (A).....:	7844 A			--
	Power factor	0,45~0,5			--
	Power factor obtained	0,46			--
	Sequence	O - O - CO			--
	I _{peak} (A) max. value	149#	150#	151#	--
		3,4 kA	3,3 kA	3,2 kA	P
	Max. I²t ≤ 100 kA²s, acc. EN 61009-1	149#	150#	151#	--
		34,6 kA²s	25,8 kA²s	20,5 kA²s	P
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times Un = ____ V. The RCBO is in the open position	253 V			--
	The leakage current shall not exceed 2 mA	149#	150#	151#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	19,2 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	31,9 A			--
	- tripping within	149#	150#	151#	--
	- 1h (< 63 A)	12 s	15 s	9 s	P
	- 2h (> 63 A)				N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F0"	2P, C6, 300 mA, type A			--
		152# - 154#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I _{CS}				P
	Service short-circuit capacity (A).....:	7500 A			--
	Figure	Figure 7			--
	Test voltage 1,05 Un	250,8 V			--
	Cross-section (mm²).....:	6 mm²			--
	Grid distance a (mm).....:	45 mm			--
	Prospective current (A).....:	7500 A			--
	Prospective current obtained (A).....:	7844 A			--
	Power factor	0,45~0,5			--
	Power factor obtained	0,46			--
	Sequence	O - O - CO			--
	I _{peak} (A) max. value	152#	153#	154#	--
		1,5 kA	1,6 kA	1,6 kA	P
	Max. I²t ≤ 80 kA²s, acc. EN 61009-1	152#	153#	154#	--
		3,1 kA²s	3,3 kA²s	3,8 kA²s	P
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times Un = ____ V. The RCBO is in the open position	253 V			--
	The leakage current shall not exceed 2 mA	152#	153#	154#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	5,8 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	9,6 A			--
	- tripping within	152#	153#	154#	--
	- 1h (< 63 A)	15 s	18 s	12 s	P
	- 2h (> 63 A)				N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F0"	4P, C20, 30 mA, type A			--
		155# - 157#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I_{CS}				P
	Service short-circuit capacity (A).....:	7500 A			--
	Figure	Figure 7			--
	Test voltage 1,05 U_n	L1-L2: 431,2 V L2-L3: 432,4 V L1-L3: 431,8 V			--
	Cross-section (mm ²).....:	6 mm ²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A).....:	7500 A			--
	Prospective current obtained (A).....:	L1: 7565 A L2: 7503 A L3: 7587 A			--
	Power factor	0,45~0,5			--
	Power factor obtained	0,47			--
	Sequence	O - CO - CO			--
	I_{peak} (A) max. value	155#	156#	157#	--
	L1	3,6 kA	3,9 kA	3,8 kA	P
	L2	4,3 kA	4,7 kA	4,2 kA	
	L3	4,0 kA	3,2 kA	4,0 kA	
	Max. $I^2t \leq 100 \text{ kA}^2\text{s}$, acc. EN 61009-1	155#	156#	157#	--
	L1	35,0 kA ² s	15,4 kA ² s	47,3 kA ² s	P
	L2	46,0 kA ² s	49,2 kA ² s	23,3 kA ² s	
	L3	36,2 kA ² s	37,0 kA ² s	35,6 kA ² s	
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____ V}$. The RCBO is in the open position	440 V			--
	The leakage current shall not exceed 2 mA	155#	156#	157#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L2	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L3	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	19,2 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	31,9 A			--
	- tripping within	155#	156#	157#	--
	- 1h (< 63 A)	8 s	10 s	9 s	P
	- 2h (> 63 A)				N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F0"	4P, C40, 30 mA, type A			--
		38# - 40#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I _{CS}				P
	Service short-circuit capacity (A).....:	6000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 Un	L1-L2: 438,7 V L2-L3: 439,0 V L1-L3: 439,7 V			--
	Cross-section (mm²).....:	16 mm²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A).....:	6000 A			--
	Prospective current obtained (A).....:	L1: 6031 A L2: 6038 A L3: 6147 A			--
	Power factor	0,65~0,7			--
	Power factor obtained	0,67			--
	Sequence	O - CO - CO			--
	I _{peak} (A) max. value	38#	39#	40#	--
	L1	3,6 kA	4,2 kA	3,1 kA	P
	L2	4,3 kA	3,1 kA	4,3 kA	
	L3	4,2 kA	3,8 kA	4,4 kA	
	Max. I²t ≤ 63 kA²s, acc. EN 61009-1	38#	39#	40#	--
	L1	39,0 kA²s	39,4 kA²s	18,8 kA²s	P
	L2	62,7 kA²s	34,9 kA²s	42,3 kA²s	
	L3	39,0 kA²s	59,7 kA²s	62,0 kA²s	
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____ V}$. The RCBO is in the open position	440 V			--
	The leakage current shall not exceed 2 mA	38#	39#	40#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L2	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L3	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	38,4 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	63,8 A			--
	- tripping within	38#	39#	40#	--
	- 1h (< 63 A)	21 s	34 s	18 s	P
	- 2h (> 63 A)				N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F0"	4P, C20, 300 mA, type A			--
		41# - 43#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I _{CS}				P
	Service short-circuit capacity (A).....:	6000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 Un	L1-L2: 438,7 V L2-L3: 439,0 V L1-L3: 439,7 V			--
	Cross-section (mm²).....:	6 mm²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A).....:	6000 A			--
	Prospective current obtained (A).....:	L1: 6031 A L2: 6038 A L3: 6147 A			--
	Power factor	0,65~0,7			--
	Power factor obtained	0,67			--
	Sequence	O - CO - CO			--
	I _{peak} (A) max. value	41#	42#	43#	--
	L1	4,2 kA	3,6 kA	3,5 kA	P
	L2	4,2 kA	2,8 kA	3,2 kA	
	L3	5,1 kA	2,8 kA	4,3 kA	
	Max. I²t ≤ 52 kA²s, acc. EN 61009-1	41#	42#	43#	--
	L1	49,9 kA²s	32,1 kA²s	33,4 kA²s	P
	L2	30,2 kA²s	19,6 kA²s	25,1 kA²s	
	L3	50,4 kA²s	13,9 kA²s	38,2 kA²s	
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____ V}$. The RCBO is in the open position	440 V			--
	The leakage current shall not exceed 2 mA	41#	42#	43#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L2	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L3	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	19,2 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	31,9 A			--
	- tripping within	41#	42#	43#	--
	- 1h (< 63 A)	20 s	23 s	37 s	P
	- 2h (> 63 A)				N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F0"	4P, C16, 30 mA, type A			--
		47# - 49#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I_{cs}				P
	Service short-circuit capacity (A).....:	7500 A			--
	Figure	Figure 7			--
	Test voltage 1,05 U_n	L1-L2: 438,8 V L2-L3: 439,7 V L1-L3: 438,4 V			--
	Cross-section (mm ²).....:	4 mm ²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A).....:	7500 A			--
	Prospective current obtained (A).....:	L1: 7709 A L2: 7669 A L3: 7595 A			--
	Power factor	0,45~0,5			--
	Power factor obtained	0,47			--
	Sequence	O - CO - CO			--
	I_{peak} (A) max. value	47#	48#	49#	--
	L1	3,5 kA	4,1 kA	2,9 kA	P
	L2	4,3 kA	2,8 kA	3,2 kA	
	L3	3,7 kA	3,5 kA	3,9 kA	
	Max. $I^2t \leq 80 \text{ kA}^2\text{s}$, acc. EN 61009-1	47#	48#	49#	--
	L1	27,3 kA ² s	36,6 kA ² s	12,3 kA ² s	P
	L2	53,4 kA ² s	10,0 kA ² s	38,4 kA ² s	
	L3	18,9 kA ² s	25,4 kA ² s	39,3 kA ² s	
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____ V}$. The RCBO is in the open position	440 V			--
	The leakage current shall not exceed 2 mA	47#	48#	49#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L2	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L3	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	15,4 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	25,5 A			--
	- tripping within	47#	48#	49#	--
	- 1h (< 63 A)	43 s	13 s	84 s	P
	- 2h (> 63 A)				N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F0"	4P, C6, 300 mA, type A			--
		50# - 52#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I _{CS}				P
	Service short-circuit capacity (A).....:	7500 A			--
	Figure	Figure 7			--
	Test voltage 1,05 Un	L1-L2: 438,8 V L2-L3: 439,7 V L1-L3: 438,4 V			--
	Cross-section (mm²).....:	2,5 mm²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A).....:	7500 A			--
	Prospective current obtained (A).....:	L1: 7709 A L2: 7669 A L3: 7595 A			--
	Power factor	0,45~0,5			--
	Power factor obtained	0,47			--
	Sequence	O - CO - CO			--
	I _{peak} (A) max. value	50#	51#	52#	--
	L1	2,2 kA	2,6 kA	1,9 kA	P
	L2	2,6 kA	2,4 kA	2,5 kA	
	L3	2,0 kA	1,8 kA	2,6 kA	
	Max. I²t ≤ 80 kA²s, acc. EN 61009-1	50#	51#	52#	--
	L1	15,1 kA²s	12,6 kA²s	13,1 kA²s	P
	L2	15,0 kA²s	5,9 kA²s	16,2 kA²s	
	L3	7,0 kA²s	5,6 kA²s	14,4 kA²s	
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____ V}$. The RCBO is in the open position	440 V			--
	The leakage current shall not exceed 2 mA	50#	51#	52#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L2	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L3	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	5,8 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	9,6 A			--
	- tripping within	50#	51#	52#	--
	- 1h (< 63 A)	74 s	52 s	18 s	P
	- 2h (> 63 A)				N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F1"	2P, C20, 30 mA, type A			--
		158# - 160#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at rated short-circuit capacity I_{cn}				P
	Rated short-circuit capacity (A)	10000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 U_n	250,3 V			--
	Cross-section (mm ²)	6 mm ²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A)	10 kA			--
	Prospective current obtained (A)	10,4 kA			--
	Power factor	0,45~0,5			--
	Power factor obtained	0,49			--
	Sequence	O - CO			--
	I_{peak} (A) max. value	158#	159#	160#	--
		3,6 kA	3,7 kA	3,5 kA	P
	Max. $I^2t \leq 100 \text{ kA}^2\text{s}$, acc. EN 61009-1	158#	159#	160#	--
		39,4 kA ² s	25,6 kA ² s	25,9 kA ² s	P
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____ V}$. The RCBO is in the open position	253 V			--
	The leakage current shall not exceed 2 mA	158#	159#	160#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 900 V				P
	b) 900 V				P
	c) 900 V				P
	d) 900 V				N/A
	e) 900 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
9.12.12.2.c)	Test current $2,8 I_N$:	56 A			--
	Tripping within > 0,1 s up to	158#	159#	160#	--
	- 60 s	6 s	7 s	7 s	P
	- 120 s				N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F1"	2P, C6, 300 mA, type A			--
		161# - 163#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at rated short-circuit capacity I_{cn}				P
	Rated short-circuit capacity (A)	10000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 U_n	250,3 V			--
	Cross-section (mm ²)	2,5 mm ²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A)	10 kA			--
	Prospective current obtained (A)	10,4 kA			--
	Power factor	0,45~0,5			--
	Power factor obtained	0,49			--
	Sequence	O - CO			--
	I_{peak} (A) max. value	161#	162#	163#	--
		1,6 kA	1,8 kA	1,6 kA	P
	Max. $I^2t \leq 80 \text{ kA}^2\text{s}$, acc. EN 61009-1	161#	162#	163#	--
		3,8 kA ² s	5,0 kA ² s	3,5 kA ² s	P
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____}$ V. The RCBO is in the open position	253 V			--
	The leakage current shall not exceed 2 mA	161#	162#	163#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 900 V				P
	b) 900 V				P
	c) 900 V				P
	d) 900 V				N/A
	e) 900 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
9.12.12.2.c)	Test current $2,8 I_N$:	16,8 A			--
	Tripping within > 0,1 s up to	161#	162#	163#	--
	- 60 s	6 s	7 s	6 s	P
	- 120 s				N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F1"	4P, C20, 30 mA, type A			--
		164# - 166#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at rated short-circuit capacity I_{cn}				P
	Rated short-circuit capacity (A)	10000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 U_n	L1-L2: 431,3 V L2-L3: 432,2 V L1-L3: 431,0 V			--
	Cross-section (mm ²)	6 mm ²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A)	10 kA			--
	Prospective current obtained (A)	L1: 10,0 kA L2: 10,1 kA L3: 10,2 kA			--
	Power factor	0,45~0,5			--
	Power factor obtained	0,48			--
	Sequence	O - CO			--
	I_{peak} (A) max. value	164#	165#	166#	--
	L1	5,0 kA	5,5 kA	4,0 kA	P
	L2	5,2 kA	4,4 kA	5,5 kA	
	L3	4,3 kA	3,8 kA	3,9 kA	
	Max. $I^2t \leq 100 \text{ kA}^2\text{s}$, acc. EN 61009-1	164#	165#	166#	--
	L1	50,0 kA ² s	72,7 kA ² s	39,9 kA ² s	P
	L2	67,8 kA ² s	29,7 kA ² s	71,9 kA ² s	
	L3	32,2 kA ² s	31,1 kA ² s	53,0 kA ² s	
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____ V}$. The RCBO is in the open position	440 V			--
	The leakage current shall not exceed 2 mA	164#	165#	166#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L2	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L3	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 900 V				P
	b) 900 V				P
	c) 900 V				P
	d) 900 V				N/A
	e) 900 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
9.12.12.2.c)	Test current $2,8 I_N$:	56 A			--
	Tripping within > 0,1 s up to	164#	165#	166#	--
	- 60 s	6 s	7 s	6 s	P
	- 120 s				N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F1"	4P, C16, 30 mA, type A			--
		53# - 55#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at rated short-circuit capacity I_{cn}				P
	Rated short-circuit capacity (A)	10000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 U_n	L1-L2: 438,3 V L2-L3: 439,2 V L1-L3: 438,0 V			--
	Cross-section (mm ²)	4 mm ²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A)	10 kA			--
	Prospective current obtained (A)	L1: 10,0 kA L2: 10,1 kA L3: 10,2 kA			--
	Power factor	0,45~0,5			--
	Power factor obtained	0,48			--
	Sequence	O - CO			--
	I_{peak} (A) max. value	53#	54#	55#	--
	L1	4,2 kA	4,1 kA	4,4 kA	P
	L2	5,0 kA	4,1 kA	2,3 kA	
	L3	2,3 kA	3,9 kA	3,9 kA	
	Max. $I^2t \leq 80 \text{ kA}^2\text{s}$, acc. EN 61009-1	53#	54#	55#	--
	L1	33,9 kA ² s	37,4 kA ² s	59,8 kA ² s	P
	L2	43,6 kA ² s	40,6 kA ² s	6,4 kA ² s	
	L3	6,8 kA ² s	23,7 kA ² s	41,6 kA ² s	
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____ V}$. The RCBO is in the open position	440 V			--
	The leakage current shall not exceed 2 mA	53#	54#	55#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L2	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L3	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 900 V	1500 V			P
	b) 900 V	1500 V			P
	c) 900 V	1500 V			P
	d) 900 V				N/A
	e) 900 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
9.12.12.2.c)	Test current $2,8 I_N$:	44,8 A			--
	Tripping within > 0,1 s up to	53#	54#	55#	--
	- 60 s	17 s	9 s	15 s	P
	- 120 s				N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F1"	4P, C6, 300 mA, type A			--
		56# - 58#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at rated short-circuit capacity I_{cn}				P
	Rated short-circuit capacity (A)	10000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 U_n	L1-L2: 438,3 V L2-L3: 439,2 V L1-L3: 438,0 V			--
	Cross-section (mm ²)	2,5 mm ²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A)	10 kA			--
	Prospective current obtained (A)	L1: 10,0 kA L2: 10,1 kA L3: 10,2 kA			--
	Power factor	0,45~0,5			--
	Power factor obtained	0,48			--
	Sequence	O - CO			--
	I_{peak} (A) max. value	56#	57#	58#	--
	L1	3,6 kA	2,5 kA	2,8 kA	P
	L2	3,6 kA	2,7 kA	3,1 kA	
	L3	2,5 kA	1,6 kA	2,5 kA	
	Max. $I^2t \leq 80 \text{ kA}^2\text{s}$, acc. EN 61009-1	56#	57#	58#	--
	L1	40,0 kA ² s	14,5 kA ² s	19,0 kA ² s	P
	L2	58,7 kA ² s	14,5 kA ² s	17,6 kA ² s	
	L3	11,3 kA ² s	8,4 kA ² s	12,1 kA ² s	
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____ V}$. The RCBO is in the open position	440 V			--
	The leakage current shall not exceed 2 mA	56#	57#	58#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L2	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L3	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 900 V	1500 V			P
	b) 900 V	1500 V			P
	c) 900 V	1500 V			P
	d) 900 V				N/A
	e) 900 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
9.12.12.2.c)	Test current $2,8 I_N$:	16,8 A			--
	Tripping within > 0,1 s up to	56#	57#	58#	--
	- 60 s	16 s	47 s	18 s	P
	- 120 s				N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "G"	2P, C40, 30 mA, type A			--
		176# - 178#			
	Tests G0				--
9.22	VERIFICATION OF RELIABILITY				--
9.22.1	Climatic test				--
	Based on IEC 60068-2-30 taking into account IEC 60068-3-4				P
	28 cycles				P
	Upper temperature 55°C ± 2°C				P
	Initial verification:	176#	177#	178#	--
	Maximum break time at I _{ΔN}	63 ms	63 ms	71 ms	P
	Test switch S ₂ and RCBO in the closed position, test voltage established by closing the test switch S ₁ .				P
	No value exceeds the specified limiting value				P
	Additional test for type S:				N/A
	Maximum non-actuating time at I _{ΔN}				N/A
	No tripping				N/A
	The test switch S ₁ and the RCBO 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
	Climatic test:				--
	No tripping during 28 cycles				P
9.22.1.5	Final verification:				P
	The RCBO shall trip with a test current of 1,25 I _{ΔN} in the test chamber - break time not exceeding the value for I _{ΔN} in table 2	176#	177#	178#	--
	Maximum break time	82 ms	65 ms	157 ms	P
	Test switch S ₂ and RCBO in the closed position, test voltage established by closing the test switch S ₁ .				P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "G"	4P, C40, 30 mA, type A			--
		65# - 67#			
	Tests G0				--
9.22	VERIFICATION OF RELIABILITY				--
9.22.1	Climatic test				--
	Based on IEC 60068-2-30 taking into account IEC 60068-3-4				P
	28 cycles				P
	Upper temperature 55°C ± 2°C				P
	Initial verification:	65#	66#	67#	--
	Maximum break time at I _{ΔN}	79 ms	70 ms	79 ms	P
	Test switch S ₂ and RCBO in the closed position, test voltage established by closing the test switch S ₁ .				P
	No value exceeds the specified limiting value				P
	Additional test for type S:				N/A
	Maximum non-actuating time at I _{ΔN}				N/A
	No tripping				N/A
	The test switch S ₁ and the RCBO 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
	Climatic test:				--
	No tripping during 28 cycles				P
9.22.1.5	Final verification:				P
	The RCBO shall trip with a test current of 1,25 I _{ΔN} in the test chamber - break time not exceeding the value for I _{ΔN} in table 2	65#	66#	67#	--
	Maximum break time	67 ms	71 ms	69 ms	P
	Test switch S ₂ and RCBO in the closed position, test voltage established by closing the test switch S ₁ .				P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE H (3 samples)	4P, C40, 30 mA, type A			--
		74# - 76#			
IEC 61543:					P
table4-T1.1	Harmonics, interharmonics				N/A
table4-T1.2	Signalling voltage				N/A
table5-T2.3	Conducted unidirectional transients of the ms and μs time scale				P
	Test results of test sequence H:				P
	Voltage surge 1,2/50 μs (IEC 6100-4-5)				P
	Device under line voltage	400 V			P
	Differential mode (generator Z= 2 Ohms) on each possible combination of the current parts				P
	Peak voltage.....: impulses and polarity: 5+ /5-	4 kV			P
	The RCBOs may trip during the test, if the RCBO trips, then continue the test at lower voltage	74#: no trip 75#: no trip 76#: no trip			P
	Peak voltage.....: impulses and polarity: 5+ /5-				N/A
	The RCBOs shall not trip during the test				N/A
	Condition after tests: trip with I _{dn} (mA)	30 mA			P
	Sample no.:	74#	75#	76#	--
	Maximum break time (ms):	45 ms	44 ms	45 ms	P
	No value exceeds the specified limiting value.....:	300 ms			P
	Common mode (generator Z= 12 Ohms) between the earth terminal, the frame of the device and the terminals connected together				P
	Peak voltage.....: impulses and polarity: 5+ /5-	5 kV			P
	The RCBOs may trip during the test, if the RCBO trips, then continue the test at lower voltage	74#: no trip 75#: no trip 76#: no trip			P
	Peak voltage.....: impulses and polarity: 5+ /5-				N/A
	The RCBOs shall not trip during the test				N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	Condition after tests: trip with I_{dn} (mA)	30 mA			P
	Sample no.:	74#	75#	76#	--
	Maximum break time (ms):	44 ms	44 ms	44 ms	P
	No value exceeds the specified limiting value.....:	300 ms			P

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	TEST SEQUENCE I (3 samples)	4P, C40, 30 mA, type A	--
		77# - 79#	
IEC 61543:			P
table5-T2.1	Conducted sine-wave voltages or currents		P
2.1	Conducted sine-wave form voltages or currents		P
	Test level	10 V	P
	Frequency range.....	150 kHz – 80 MHz	P
	RCBOs were loaded with 0,3 I _{Δn} Sweeping the frequency rang, the RCBOs shall not trip.	77#: no trip 78#: no trip 79#: no trip	P
	Then RCBOs were loaded with 1,25I _{Δn}	37,5 mA	P
	First sample shall trip at spot frequency 0,15, 0,8, 3,2, 13,56, 48 MHz within 300 ms.....	77#: 43 ms, 41 ms, 44 ms, 40 ms, 41 ms	P
	Second sample shall trip at spot frequency 0,3, 1,2, 6,78, 20, 65 MHz within 300 ms.....	78#: 43 ms, 43 ms, 42 ms, 44 ms, 39 ms	P
	Third sample shall trip at spot frequency 0,5, 2,0, 8,0, 27,12, 80 MHz within 300 ms.....	79#: 41 ms, 40 ms, 41 ms, 43 ms, 43 ms	P
	No value exceeds the specified limiting value		P
table5-T2.5	Radiated high-frequency phenomena		P
2.5	Radiated electromagnetic field		P
	Test level	10 V/m	P
	Frequency range.....	80 MHz - 1 GHz, 1,4 - 2,0 GHz	P
	RCBOs were loaded with 0,3 I _{Δn} Sweeping the frequecney rang, the RCBOs shall not trip.	77#: no trip 78#: no trip 79#: no trip	P
	Then RCBOs were loadedwith 1,25I _{Δn}	37,5 mA	P
	First sample shall trip at spot frequency 80, 100,120, 160, 200 MHz within 300 ms.....	77#: 40 ms, 41 ms, 39 ms, 43 ms, 43 ms (Horizontal) 44 ms, 42 ms, 43 ms, 43 ms, 41 ms (Vertical)	P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	Second sample shall trip at spot frequency 240, 320, 400, 450, 600 MHz within 300 ms.....:	78#: 44 ms, 42 ms, 41 ms, 41 ms, 44 ms (Horizontal) 40 ms, 39 ms, 40 ms, 43 ms, 43 ms (Vertical)			P
	Third sample shall trip at spot frequency 720, 900, 1000, 1700, 2000 MHz within 300 ms.....:	79#: 40 ms, 41 ms, 40 ms, 44 ms, 39 ms (Horizontal) 42 ms, 41 ms, 39 ms, 42 ms, 45 ms (Vertical)			P
	No value exceeds the specified limiting value				P
table5-T2.2	Fast transients (burst)				P
2.2	Conducted unidirectional transients of the ns time scale (burst)				P
	Test level.....:	4 kV			P
	Tr/Th:5/50ns				P
	Repetition frequency.....:	2,5 kHz			P
	Test duration.....:	1 min			P
	The RCBOs shall not trip during the test	77#: no trip 78#: no trip 79#: no trip			P
	Condition after tests: trip with I _{dn} (mA)	30 mA			P
	Sample no.:	77#	78#	79#	--
	Maximum break time (ms):	44 ms	44 ms	44 ms	P
	No value exceeds the specified limiting value.....:	300 ms			P

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Clause	Requirement + Test	Result - Remark	Verdict
	TEST SEQUENCE J (3 samples)	4P, C40, 30 mA, type A	--
		80# - 82#	
IEC 61543:			P
table5-T2.6	Conducted common mode disturbances in the frequency range lower than 150 kHz		P
	Performance criteria: During the test referring to the performance criterion as specified in 5.1.1 of IEC 61543, the RCBO shall remain closed at continuously applied residual current of 0,3 I _{Δn} and shall trip at 1,25 I _{Δn} .		P
	Test method: -at 0,3I _{Δn} ; a frequency sweep shall be performed on a device -at 1,25I _{Δn} ; five tests are carried out on each sample at different frequencies selected at random over the frequency range and different from one sample to another.		P
	Test level : 1 kHz – 1,5 kHz..... 1,5 kHz – 15 kHz..... 15 kHz – 150 kHz.....	6,6 mA 6,6 - 66 mA 66 mA	P
	Frequency range.....:	1 kHz – 150 kHz	P
	RCBOs were loaded with 0,3 I _{Δn}: Sweeping the frequency rang, the RCBOs shall not trip.	80#: no trip 81#: no trip 82#: no trip	P
	Then RCBOs were loaded with 1,25I _{Δn}:	37,5 mA	P
	First sample shall trip at spot frequency 1, 1,5, 2, 2,5, 3 kHz within 300 ms.....:	80#: 44 ms, 40 ms, 39 ms, 41 ms, 44 ms	P
	Second sample shall trip at spot frequency 5, 10, 15, 20, 25 kHz within 300 ms.....:	81#: 40 ms, 40 ms, 43 ms, 43 ms, 43 ms	P
	Third sample shall trip at spot frequency 30, 50, 80, 100, 150 kHz within 300 ms.....:	82#: 44 ms, 41 ms, 41 ms, 41 ms, 44 ms	P
	No value exceeds the specified limiting value		P
table6-T3.1	Electrostatic discharges		P
	Electrostatic discharges		P

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Clause	Requirement + Test	Result - Remark			Verdict
	Test level.....:	8 kV / air discharge 6 kV / contact discharge			P
	10 positive and 10 negative discharge with interval time of 1s				P
	The RCBOs may trip during the tests	80#: no trip 81#: no trip 82#: no trip			P
	Condition after tests: trip with I_{dn} (mA)	30 mA			P
	Sample no.:	80#	81#	82#	--
	Maximum break time (ms):	43 ms	44 ms	44 ms	P
	No value exceeds the specified limiting value.....:	300 ms			P

IEC 61009-1				
Clause	Requirement + Test		Result - Remark	Verdict
ANNEX A (NORMATIVE)				
Test sequence and number of samples to be submitted for certification purposes Table A.1 - Test sequences				
Test sequence		Clause or subclause	Test (or inspection)	
A	A ₁	6 8.1.1 8.1.2 9.3 8.1.3 8.1.6 9.11 9.4 9.5 9.6 9.14 8.1.3 9.25	Marking General Mechanism Indelibility of marking Clearance and creepage distances (external parts only) Non-interchangeability 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 ₂	9.15	Resistance to abnormal heat and fire	
B		9.7.7.4 9.7.7.5 a) 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 Temperature-rise Reliability at 40°C Ageing of electronic components	
C	C ₁	9.10 9.12.11.2.1 (and 9.12.12)	Mechanical and electrical endurance Performance at reduced short-circuit currents (Verification of the RCBO after short-circuit tests)	
	C ₂	9.12.11.2.2 (and 9.12.12)	Short-circuit test for verifying the suitability of RCBOs for use in IT systems (Verification of the RCBO after short-circuit tests)	
D	D ₀	9.9.1	Operating characteristics under residual current conditions	
	D ₁	9.17 9.19 9.12.13 9.16	Behaviour in case of failure of the line voltage Behaviour in case of surge currents Performance at I _{Δm} Test device	
E	E ₀	9.9.2	Overcurrent operating characteristics	
	E ₁	9.13 9.12.11.3 (and 9.12.12)	Resistance to mechanical shock and impact Short-circuit performance at 1500 A	
F	F ₀	9.12.11.4 b) (and 9.12.12)	Performance at service short-circuit capacity	
	F ₁	9.12.11.4 c) (and 9.12.12.2)	Performance at rated short-circuit capacity	
G		9.22.1	Reliability (climatic tests)	
H a) b)		IEC 61543 Table 4-T1.1 IEC 61543 Table 4-T1.2 IEC 61543 Table 5-T2.3	Harmonics, inter harmonics Signalling voltages Conducted unidirectional transients of the ms and μs time scale	
I		IEC 61543 Table 5-T2.1 IEC 61543 Table 5-T2.5 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 IEC 61543 Table 6-T3.1	Conducted common mode disturbances in the frequency range lower than 150 kHz Electrostatic discharges	
a) This test may be done on separate samples.				
b) For devices containing a continuously operating oscillator, the test of CISPR 14-1 shall be carried out on the samples prior to the tests of this sequence.				

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict

Table A.2 - Number of samples for full test procedure			
Test sequence	Number of samples	Minimum number of accepted samples (a) (b)	number of samples for repeated tests (c)
A ₁	1	1	--
A ₂	3	2	3
B	3	2	3
C ₁	3	2 (d)	3
C ₂	3	2 (d)	3
D	3	2 (d)	3
E	3	2 (d)	3
F ₀	3	2 (d)	3
F ₁	3	2 (d)	3
G	3	2	3
H (e)	3	2	3
I (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) Except for test of 9.12.10, 9.12.11.2, 9.12.11.3, 9.12.11.4, 9.12.13 as appropriate, which all samples shall pass. e) At the manufacturer's request, the same set of samples may be subjected to more than one of these test sequences.			

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Clause	Requirement + Test	Result - Remark	Verdict

Table A.3 - Number of samples for simplified test procedure			
Test sequence	Number of samples according to the number of poles ^{a) g)}		
	2-poles ^{b) c)}	3-poles ^{d) f) i)}	4-poles ^{e)}
A ₁	1 max. rating I _N min. rating I _{ΔN}	1 max. rating I _N min. rating I _{ΔN}	1 max. rating I _N min. rating I _{ΔN}
A ₂	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
B	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
C	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
D ₀ + D ₁	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
D ₀	1 for all other ratings of I _{ΔN} with max. I _N		
E ₀ + E ₁	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
E ₀	1 ⁱ⁾ for all other ratings of I _N with min. I _{ΔN}		
F ₀	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
	3 min. rating I _N max. rating I _{ΔN}	3 min. rating I _N max. rating I _{ΔN}	3 min. rating I _N max. rating I _{ΔN}
F ₁	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
	3 min. rating I _N max. rating I _{ΔN}	3 min. rating I _N max. rating I _{ΔN}	3 min. rating I _N max. rating I _{ΔN}
G	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
H ^{k)}	3 ^{h)} samples of the same rating I _N chosen at random min. rating I _{ΔN}		
I	3 ^{h)} samples of the same rating I _N chosen at random min. rating I _{ΔN}		
J	3 ^{h)} samples of the same rating I _N chosen at random min. rating I _{ΔN}		
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 RCBOs are submitted, this column shall also apply to a set of samples with the smallest number of poles.		
c)	Also applicable to 1-pole RCBOs with uninterrupted neutral and 2-pole RCBOs with 1 protected pole.		
d)	Also applicable to 3-pole RCBOs with two protected poles		
e)	Also applicable to 3-pole RCBOs with uninterrupted neutral and 4-pole RCBOs with 3 protected poles.		
f)	This column is omitted when 4-pole RCBOs have been tested.		
g)	If only one value of I _{ΔN} is submitted, min. rating I _{ΔN} and max. rating I _{ΔN} are replaced by I _{ΔN} .		
h)	Only the highest number of current paths.		
i)	For this sequence only the test of 9.9.2 is required.		
j)	If a 3-pole RCBO with 4 current paths and a 4-pole RCBO are submitted, then only the 4-pole RCBO is tested, with exception of the test of 9.8 of test sequence B for which both types are submitted to the test.		
k)	If the requirement to test max. rating I _N and minimum rating I _{ΔN} does not cover all the possible range of RCBOs, the minimum I _{ΔN} shall in any case be chosen for the test.		

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Clause	Requirement + Test	Result - Remark	Verdict

Table A.4 - Test sequences for RCBOs having different instantaneous tripping currents			
RCBO type tested first	Test sequences for other RCBO types		
	B-type	C-type	D-type
B-type	---	$(E_0 + E_1) + F$	$(E_0 + E_1) + F$
C-type	$E_0^{a)} + B^{a)}$	---	$(E_0 + E_1) + F$
D-type	$E_0^{a)} + B^{a)}$	$E_0^{a)} + B^{a) b)}$	---

a) For this sequence only the tests of 9.8 and 9.9.2.2 are required.

b) When certification is requested at the same time for B-type, C-type and D-type RCBOs having the same rated short-circuit capacity, only test sequence E0 is required if B-type and D-type samples have been tested.

Table A.5 - Test sequences for RCBOs of different classification according to 4.6			
Test sequence	Number of samples according to the number of poles ^{a)}		
	2-pole ^{b) c)}	3-pole ^{d) f)}	4-pole ^{e)}
$D_0 + D_1$	1 max. rating I_N min. rating $I_{\Delta N}$	1 max. rating I_N min. rating $I_{\Delta N}$	1 max. rating I_N min. rating $I_{\Delta N}$
D_0	1 for all other ratings of $I_{\Delta N}$ with max. $I_{\Delta N}$		

- 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 RCBOs are submitted, this column shall also apply to a set of samples with the smallest number of poles.
- c) Also applicable to 1-pole RCBOs with uninterrupted neutral and to 2-pole RCBOs with 1 protected pole.
- d) Also applicable to 3-pole RCBOs with 2 protected poles
- e) Also applicable to 3-pole RCBOs with uninterrupted neutral and to 4-pole RCBOs with 3 protected poles.
- f) This column is omitted when 4-pole RCBOs have been tested.

IEC 61009-1			
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.		P
B.2	Orientation and location of a creepage distance		--
	If necessary, the manufacturer shall indicate the intended orientation of the equipment or component in order that creepage distances be not adversely affected by the accumulation of pollution for which they were not designed.		P
B.3	Creepage distances where more than one material is used		--
	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.		P
B.4	Creepage distances split by floating conductive part		--
	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. 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).		P
B.5	Measurement of creepage distances and clearances		--
	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.		P
	If the associated clearance is less than 3 mm, the minimum dimension X may be reduced to one third of this clearance.		P
	The methods of measuring creepage distances and clearances are indicated in Figure B.1. These cases do not differentiate between gaps and grooves or between types of insulation.		P
	The following assumptions are made:		P
	- 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);		P
	- 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 2);		P
	- 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.		P

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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.		P
	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 × 200 mm, is fixed and reasonably stretched in a frame, placed at a distance of 10 mm from		P
	– either the maximum projection of the operating means of a device without recess for the operating means;		P
	– or the rim of a recess for the operating means of a device with recess for the operating means.		P
	The sheet should have the following physical properties: Density at 23 °C: $0,92 \pm 0,05$ g/cm ³ Melting-point: 110 °C – 120 °C.		P
	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.		P
	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.		P
	The grid circuit (see figure C.3) shall be connected to the points B and C (see figures 7 or 8, as applicable).		P
	The parameters for the grid circuit are as follows:		P
	Resistor R': 1,5 Ω		P
	Copper wire F': length 50 mm, and diameter as required in 9.12.9.1.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	ANNEX D ROUTINE TESTS		--
	ANNEX E SPECIAL REQUIREMENTS FOR AUXILIARY CIRCUITS FOR SAFETY EXTRA-LOW VOLTAGE		--
	ANNEX F COORDINATION BETWEEN RCBOs AND SEPARATE FUSES ASSOCIATED IN THE SAME CIRCUIT		--
	ANNEX G Additional requirements and tests for RCBOs consisting of a circuit-breaker and a residual current unit designed for assembly on site		--
	ANNEX J Particular requirements for RCBOs with screwless type terminals for external copper conductors		--
	ANNEX K Particular requirements for RCBOs with flat quick-connect terminations		--
	ANNEX L Specific requirements for RCBOs with screw-type terminals for external untreated aluminium conductors and with aluminium screw-type terminals for use with copper or with aluminium conductors		--

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

Annex 1:

ATTACHMENT TO TEST REPORT IEC 61009-1 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs)			
Differences according to : EN 61009-1:2012+A1:2014+A2:2014+A11:2015+A12:2016 +A13:2021 used in conjunction with EN 61009-2-1:1994 + A11:1998			
Attachment Form No. : EU_GD_IEC61009_1G			
Attachment Originator : ÖVE			
Master Attachment..... : Dated 2021-10-07			
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	CENELEC COMMON MODIFICATIONS (EN)		--
	GENERAL		--
9.12	Short circuit tests	Refer to main part of this report	--
9.12.3	Value of power frequency recovery voltage shall be equal to 110% of the rated voltage		--
9.12.4	Tolerances and test quantities		--
	voltage (including recovery voltage): 0, -5%		--
	TEST SEQUENCE "A₁"		--
6	MARKING (REPLACE CLAUSE 6 BY)		--
6.Z1	STANDARD MARKING		--
	Each RCBO shall be marked in a durable manner according to the following Table Z3.		P
	RCBO MARKED WITH:		--
a)	The manufacturer's name or trademark	GACIA	P
b)	Type designation, catalogue number or serial number	PL8M4 (for 4P) PL8M2 (for 2P)	P
c)	Rated voltage(s) with the symbol ~	400 V~ (for 4P) 230 V~ (for 2P)	P
d)	Rated current without symbol "A", preceded by the symbol of overcurrent instantaneous tripping (B, C or D), for example B16	C40	P

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
e)	Rated frequency, if the RCBO is designed for frequencies other than 50Hz (see 5.3.5)	50 Hz	P
f)	Rated residual operating current ($I_{\Delta n}$) in A or in mA	30 mA	P
h)	Rated short circuit capacity, in amperes in a rectangle without symbol "A"	6000 in a rectangle	P
j)	Reference calibration temperature, if different from 30°C		N/A
k)	The degree of protection (only if different from IP20)		N/A
l)	The position of use, if necessary		N/A
m)	Rated residual making and breaking capacity ($I_{\Delta m}$), if different from rated short-circuit capacity (I_{cn})	3000 A	P
n)	The symbol S (S in a square) for type S devices		N/A
o)	symbol of the method of operation according to Table Z1 of 4.1 if the RCBO is functionally dependent on the line voltage		N/A
q)	Operating means of the test device, by the letter T	T	P
r)	Wiring diagram unless the correct mode of operation is evident		P
s)	Operating characteristic in presence of residual currents with d.c. components		--
	- RCBOs of type AC with the symbol 		P
	- RCBOs of type A with the symbol 		N/A
t)	Energy limiting class (e.g. 3) in a square in accordance with Annex ZD if applied	3 within a rectangle	P
u)	RCBOs according to 4 Z1 marked with the symbol (snowflake enclosing -25)	snowflake enclosing -25	P
v)	Indication of the terminal for the neutral with "N"	N	P
w)	Additional marking of performance to other standards or additional requirements according to 6.Z2		N/A
	RCBO's other than operated by means of push button, open position indicated by "0" and closed position by "I"		P
	Additional national symbols are allowed Provisionally the use of national indications only is allowed These indication visible when RCBO is installed		N/A

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	For push-buttons the OFF push-button shall either be red and/or marked with "O"		N/A
	RED shall not be used for any other push-button		N/A
	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	Line/Load are marked	P
	Terminals for neutral circuit N	N	P
	Terminal for protective conductor		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 suitability for isolation, which is provided by all circuit-breakers of this standard, may be indicated by the symbol on the device		P
	The base for plug-in RCBOs 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		P
	Labels not easy to remove and no curling. Test acc. to cl. 9.3: 15 s with water and 15 s with hexane		P
	For universal terminals (rigid-solid, rigid-stranded and flexible conductors):		P
	- no markings		P
	For non-universal terminals:		N/A
	- terminals for rigid-solid conductors only, marked by the letters "s" or "sol"		N/A

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	- terminals for rigid (solid and stranded) conductors only, marked by the letter "r"		N/A
	marking on the RCBO or if the space available is not sufficient, on the smallest package unit or in technical information		P
6.22	Additional marking		--
	Additional marking to other standards (EN or IEC or other) or additional requirements are allowed under the following conditions:		N/A
	- The RCBO 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
8.	REQUIREMENTS FOR CONSTRUCTION AND OPERATION		--
8.1	Mechanical design	Refer to main part of this report	--
8.1.1	General		--
modify:	Not possible to alter the operating characteristics by means of external interventions of the residual operating current.		P
modify:	It shall not be possible to disable or inhibit the RCBO function by any means. NOTE In Australia, Germany, Denmark, Italy, the UK and Switzerland, multiple settings are not allowed.		P
delete:	In case of an RCBO having multiple settings of residual operating current, the rating refers to the highest setting.		N/A
8.1.5	Terminals for external conductors		--
8.1.5.1	In this standard, only terminals for copper conductors are considered		N/A
modify:	Compliance is checked by inspection and by the tests as relevant for the type of connection:		P
	9.5 for screw-type terminals		P
	by specific tests for plug-in or bolt-on RCBOs included in the standard		N/A
	by the tests of Annexes J or K		N/A

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
8.1.5.2 delete:	or terminals for external untreated aluminium conductors and with aluminium screw type terminals for use with copper or with aluminium conductors according to Annex L.		N/A
8.1.Z1	Mechanical mounting of plug-in type RCBOs		N/A
	The mechanical mounting of plug-in type RCBOs shall be reliable and have adequate stability		N/A
8.1.Z1.1	Plug-in type RCBOs, the holding in position of which does not depend solely on their plug-in connection(s)		N/A
	Compliance of the mechanical mounting is checked by the relevant tests of 9.13		N/A
8.1.Z1.2	Plug-in type RCBOs, 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 9.13		N/A
	TEST SEQUENCE "A2"		--
9.14 add:	Small parts, where each surface lies completely within a circle of 15 mm diameter, or where any part of the surface lies outside a 15 mm diameter circle and it is not possible to fit a circle of 8 mm diameter on any of the surfaces, are not subjected to the test of this subclause (see Figure Z7 for diagrammatic representation).	Refer to main part of this report	P
	TEST SEQUENCE "B"		--
8	REQUIREMENTS FOR CONSTRUCTION AND OPERATION		--
8.3	Dielectric properties and isolating capability		--
	RCBOs have adequate dielectric properties	Refer to main part of this report	P
9.7	Test of dielectric properties and isolating capability		--
9.7.7.4.1 modify:	rated impulse withstand voltage [Kv]:	4 kV	P
	see level of test laboratory [m]	Sea level	P
	test voltage (acc. Table 28) [Kv]:	6,2 kV	--
9.7.1.4	The samples show no damage		P
9.7.7.4.3	RCBO in closed position		P
	All components bridging the basic insulation disconnected	No components bridging the basic insulation	N/A

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Clause	Requirement + Test	Result - Remark			Verdict
	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 RCBO				P
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:				--
	a) between the terminals which are electrically connected together when the RCBO is in the closed position $\geq 2 \text{ M}\Omega$				P
	b) between each pole and the others connected together (electronic components, connected between poles being disconnected) $\geq 2 \text{ M}\Omega$				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 housing of insulation material but with the terminal area kept free $\geq 5 \text{ M}\Omega$				P
	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				P
	b) (electronic components, connected between poles being disconnected).....2000 V				P
	c).....2000 V				P
	d)2500 V				N/A
	No flashover or breakdown				P
9.7.7.2	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				N/A
	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 RCBO				N/A
	TEST SEQUENCE "C"				--

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	TESTS C1		--
8	REQUIREMENTS FOR CONSTRUCTION AND OPERATION		--
8.6	Mechanical and electrical endurance		--
	RCBOs shall be capable of performing an adequate number of mechanical and electrical operations.	Refer to main part of this report	P
9.10.3 modify:	After test:		--
	a)		P
	b)		P
	c)		P
	d)		N/A
9.12.11.2	Test at reduced short-circuit current	Refer to main part of this report	--
9.12.11.2.1	Test on all RCBOs		P
modify:	Each overcurrent protected pole tested at a voltage of (105) 110% of the rated phase to neutral voltage		P
add:	Phases which do not carry the short circuit current during this test shall be connected to the supply voltage at the terminals		P
	The measurement of the breaking time shall be carried out at every test and the values shall comply with the values of Table 2.		P
9.12.12.1.b)	Dielectric strength test:		--
modify:	Test voltage:		--
	a) 1500 V		P
	b) 1500 V		P
	c) 1500 V		P
	d) 2000 V		N/A
	TESTS "C2"		--
9.12.11.2.2	Short circuit test on rcbos for verifying their suitability for use in it systems	Refer to main part of this report	P
modify:	test voltage 105% of 400V		P
	test voltage 105% of 230V for the pole marked N, if any		P
9.12.12.1.b)	Dielectric strength test:		--

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 2000 V				N/A
	TEST SEQUENCE "D"	Refer to main part of this report			--
	TEST D0				--
9.9.1 delete:	For multiple settings of I_{Δn} tests are made for each setting	Refer to main part of this report			P
	TEST D1				--
8	requirements for construction and operation				--
8.12	RCBOs functionally dependent on line voltage				--
	RCBOs functionally dependent on the line voltage operate correctly between 0,85 and 1,1 UN				N/A
9.17	Verification of the behaviour of RCBOs opening automatically in case of failure of the line voltage				--
9.17.1 replace by:	Limiting value of the line voltage U _x				N/A
	UN 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 UN				N/A
	Tripping test:				N/A
	Test voltage (V).....: V				--
	Residual current 1,25.I _{Δn}: 1,25I _{Δn} = A				--
	Time corresponding to value for I _{Δn} in table 2	[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 replace by:	Verification of behaviour in case of failure of the line voltage				N/A
	RCBO supplied with UN and line voltage, then switched off				N/A
	Time interval between switching off and opening of the main contacts:	[ms]	[ms]	[ms]	--

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test			Result - Remark	Verdict
a)	RCBOs 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)	RCBOs opening with delay				N/A
	Values within the range indicated by manufacturer				N/A
	RCBOs classified 4.1.2.1b): switch off at U_N				N/A
	Voltage off and on at the line side:				N/A
	No automatically closing				N/A
9.17.4 replace by:	Verification of the correct operation of RCBOs with 3 or 4 poles, neutral and one line terminal only being energized in turn (replace the title by)				N/A
9.12.13	DELETE				--
8.11 REPLACE BY:	Test device				--
	RCBOs provided with a test device				P
	RCBOs with rated residual current of 30Ma:				P
	Ampere-turns produced when operating the test device do not exceed 1,66 times the ampere turns produced by $I_{\Delta N}$			Refer to main part of this report	P
	RCBOs with rated residual current other than 30Ma:				P
	Ampere-turns produced when operating the test device do not exceed 2,5 times the ampere turns produced by $I_{\Delta N}$			Refer to main part of this report	P
	Not possible to energize the circuit on the load side by operating the test device when the RCBO is in the open position				P
	TEST SEQUENCE "E"				--
	Tests E0				--
9.9	VERIFICATION OF THE OPERATING CHARACTERISTICS				--
9.9.2.2 b)	☒ B			Refer to main part of this report	P
modify:	Test current 3 I_N starting from cold			3 I_N = A	--
	Opening time:			[s] [s] [s]	--
	- 0,1 < t < 45s ($I_N \leq 32A$)				P
	- 0,1 < t < 90s ($I_N > 32A$)				P
	Test current 5 I_N starting from cold			5 I_N = A	--

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
		[s]	[s]	[s]	--
	- Tripping time less than 0,1 s				P
c)	☒ C	Refer to main part of this report			P
	Test current 5 IN starting from cold	5 IN =	A		--
	Opening time:	[s]	[s]	[s]	--
	- 0,1 < t < 15s (IN≤32A)				P
	- 0,1 < t < 30s (IN>32A)				P
	Test current 10 IN starting from cold	10 IN =	A		--
		[s]	[s]	[s]	--
	- Tripping time less than 0,1 s				P
d)	☐ D				N/A
	Test current 10 IN starting from cold	10 IN =	A		--
	Opening time:	[s]	[s]	[s]	--
	0,1 < t < 4s**) (IN≤32A) **) for IN≤10A, t < 8s is permitted				N/A
	- 0,1 < t < 8s (IN>32A)				N/A
	Test current 20 IN starting from cold	20 IN =	A		--
		[s]	[s]	[s]	--
	- Tripping time less than 0,1 s				N/A
add: 9.9.2.Z1	Test of effect of single phase loading on the over-current tripping characteristic of RCBO with three or four current path	Refer to main part of this report			--
	The test does not apply to RCBOs obtained by assembly of an adaptable residual current unit on a circuit-breaker.				N/A
	RCBOs with three or four current paths are loaded on 2 current paths.				P
	Where a switched neutral pole exists, the test circuit shall include the neutral pole.				P
	Except for the neutral pole if applicable, the test is carried out on different poles for each sample.				P
	Test current 1,2 times the conventional tripping current, starting from cold				P
	Tripping:	[min]	[min]	[min]	--
	- 1 h				P
	- 2 h				N/A
	Tests E1				--

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
9.13 replace by:	Mechanical stresses (replace the title by)		--
9.13.2 replace by:	Resistance to mechanical stresses and impact (replace the title by)	Refer to main part of this report	--
	- 9.13.2.2 for RCBOs intended to be mounted on a rail and for all types of plug-in RCBOs designed for surface mounting		P
	- 9.13.2.3 for plug-in type RCBOs, the holding in position of which depends solely on their connections		N/A
9.13.2.2 add:	Plug-in RCBOs designed for surface mounting are mounted complete with the appropriate means for the plug-in connection but without cables being connected and without any cover-plate		N/A
	- downward vertical force of 50 N for 1 min		N/A
	- upward vertical force of 50 N for 1 min		N/A
	RCBO shall not become loose during test and shall not show any damage impairing its further use		N/A
9.13.2.3 replace by:	RCBOs of plug-in type (replace the note by)		N/A
	Plug-in type RCBOs, the holding in position of which depends solely on their connections, are mounted, complete with the appropriate plug-in base but without cables being connected and without any cover-plate, on a vertical rigid wall		N/A
	A force of 20N is applied to the RCBO portion at a point equidistant between the plug-in connections, without jerks for 1 min		N/A
	During this test the RCBO portion shall not become loose and shall not move from the base portion and after the test both portions shall show no damage impairing their further use		N/A
9.12.11.3	Test at 1500 A:	Refer to main part of this report	P
9.12.12.1.b) replace by:	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:		--
	Dielectric strength test:		--
	Test voltage:		--
	a) 1500 V		P
	b) 1500 V		P
	c) 1500 V		P
	d) 2000 V		N/A

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F0"	2P, B40, 30 mA, type A			--
		128# - 130#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I _{CS}				P
	Service short-circuit capacity (A).....	6000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 Un	250,6 V			--
	Cross-section (mm²)	16 mm²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A).....	6000 A			--
	Prospective current obtained (A).....	6139 A			--
	Power factor	0,65~0,7			--
	Power factor obtained	0,67			--
	Sequence	O - O - CO			--
	I _{peak} (A) max. value	128#	129#	130#	--
		3,7 kA	3,5 kA	3,1 kA	P
	Max. I²t ≤ 54 kA²s, acc. EN 61009-1	128#	129#	130#	--
		29,0 kA²s	34,9 kA²s	18,9 kA²s	P
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times Un = ____ V. The RCBO is in the open position	253 V			--
	The leakage current shall not exceed 2 mA	128#	129#	130#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	38,4 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	63,8 A			--
	- tripping within	128#	129#	130#	--
	- 1h (< 63 A)	34 s	18 s	21 s	P
	- 2h (> 63 A)				N/A

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F0"	2P, C32, 30 mA, type A			--
		131# - 133#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I _{CS}				P
	Service short-circuit capacity (A).....	6000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 Un	250,6 V			--
	Cross-section (mm²)	10 mm²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A).....	6000 A			--
	Prospective current obtained (A).....	6139 A			--
	Power factor	0,65~0,7			--
	Power factor obtained	0,67			--
	Sequence	O - O - CO			--
	I _{peak} (A) max. value	131#	132#	133#	--
		3,4 kA	3,2 kA	3,3 kA	P
	Max. I²t ≤ 52 kA²s, acc. EN 61009-1	131#	132#	133#	--
		51,3 kA²s	24,1 kA²s	20,4 kA²s	P
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times Un = ____ V. The RCBO is in the open position	253 V			--
	The leakage current shall not exceed 2 mA	131#	132#	133#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	30,7 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	51,0 A			--
	- tripping within	131#	132#	133#	--
	- 1h (< 63 A)	18 s	35 s	21 s	P
	- 2h (> 63 A)				N/A

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F0"	2P, B32, 30 mA, type A			--
		134# - 136#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I _{CS}				P
	Service short-circuit capacity (A).....	6000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 Un	250,6 V			--
	Cross-section (mm²)	10 mm²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A).....	6000 A			--
	Prospective current obtained (A).....	6139 A			--
	Power factor	0,65~0,7			--
	Power factor obtained	0,67			--
	Sequence	O - O - CO			--
	I _{peak} (A) max. value	134#	135#	136#	--
		3,1 kA	3,2 kA	3,2 kA	P
	Max. I²t ≤ 45 kA²s, acc. EN 61009-1	134#	135#	136#	--
		32,3 kA²s	23,8 kA²s	19,5 kA²s	P
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times Un = ____ V. The RCBO is in the open position	253 V			--
	The leakage current shall not exceed 2 mA	134#	135#	136#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	30,7 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	51,0 A			--
	- tripping within	134#	135#	136#	--
	- 1h (< 63 A)	38 s	12 s	26 s	P
	- 2h (> 63 A)				N/A

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F0"	2P, C16, 30 mA, type A			--
		137# - 139#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I _{CS}				P
	Service short-circuit capacity (A).....	6000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 Un	250,6 V			--
	Cross-section (mm²).....	4 mm²			--
	Grid distance a (mm).....	45 mm			--
	Prospective current (A).....	6000 A			--
	Prospective current obtained (A).....	6139 A			--
	Power factor	0,65~0,7			--
	Power factor obtained	0,67			--
	Sequence	O - O - CO			--
	I _{peak} (A) max. value	137#	138#	139#	--
		2,7 kA	2,5 kA	2,7 kA	P
	Max. I²t ≤ 40 kA²s, acc. EN 61009-1	137#	138#	139#	--
		11,3 kA²s	9,8 kA²s	11,2 kA²s	P
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times Un = ____ V. The RCBO is in the open position	253 V			--
	The leakage current shall not exceed 2 mA	137#	138#	139#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	15,4 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	25,5 A			--
	- tripping within	137#	138#	139#	--
	- 1h (< 63 A)	12 s	8 s	10 s	P
	- 2h (> 63 A)				N/A

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F0"	2P, B16, 30 mA, type A			--
		140# - 142#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I _{CS}				P
	Service short-circuit capacity (A).....	6000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 Un	250,6 V			--
	Cross-section (mm²)	4 mm²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A).....	6000 A			--
	Prospective current obtained (A).....	6139 A			--
	Power factor	0,65~0,7			--
	Power factor obtained	0,67			--
	Sequence	O - O - CO			--
	I _{peak} (A) max. value	140#	141#	142#	--
		2,7 kA	2,6 kA	2,7 kA	P
	Max. I²t ≤ 35 kA²s, acc. EN 61009-1	140#	141#	142#	--
		13,7 kA²s	10,3 kA²s	11,1 kA²s	P
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times Un = ____ V. The RCBO is in the open position	253 V			--
	The leakage current shall not exceed 2 mA	140#	141#	142#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	15,4 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	25,5 A			--
	- tripping within	140#	141#	142#	--
	- 1h (< 63 A)	17 s	9 s	11 s	P
	- 2h (> 63 A)				N/A

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test			Result - Remark	Verdict
	TEST SEQUENCE "F0"			4P, C16, 30 mA, type A	--
				143# - 145#	
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I_{cs}				P
	Service short-circuit capacity (A).....:			6000 A	--
	Figure			Figure 7	--
	Test voltage 1,05 U_n			L1-L2: 432,8 V L2-L3: 434,1 V L1-L3: 433,1 V	--
	Cross-section (mm ²)			4 mm ²	--
	Grid distance a (mm)			45 mm	--
	Prospective current (A).....:			6000 A	--
	Prospective current obtained (A).....:			L1: 6121 A L2: 6102 A L3: 6056 A	--
	Power factor			0,65-0,7	--
	Power factor obtained			0,68	--
	Sequence			O - CO - CO	--
	I_{peak} (A) max. value			143# 144# 145#	--
	L1	2,9 kA	3,1 kA	3,0 kA	P
	L2	3,3 kA	2,3 kA	2,3 kA	
	L3	2,8 kA	2,4 kA	3,1 kA	
	Max. $I^2t \leq 40 \text{ kA}^2\text{s}$, acc. EN 61009-1			143# 144# 145#	--
	L1	19,2 kA ² s	25,6 kA ² s	18,9 kA ² s	P
	L2	22,3 kA ² s	8,4 kA ² s	15,0 kA ² s	
	L3	18,0 kA ² s	13,0 kA ² s	25,3 kA ² s	
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____ V}$. The RCBO is in the open position	440 V			--
	The leakage current shall not exceed 2 mA	143#	144#	145#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L2	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L3	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	15,4 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	25,5 A			--
	- tripping within	143#	144#	145#	--
	- 1h (< 63 A)	17 s	6 s	8 s	P
	- 2h (> 63 A)				N/A

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F0"	4P, B16, 30 mA, type A			--
		146# - 148#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I _{cs}				P
	Service short-circuit capacity (A).....	6000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 Un	L1-L2: 432,8 V L2-L3: 434,1 V L1-L3: 433,1 V			--
	Cross-section (mm²).....	4 mm²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A).....	6000 A			--
	Prospective current obtained (A).....	L1: 6121 A L2: 6102 A L3: 6056 A			--
	Power factor	0,65~0,7			--
	Power factor obtained	0,68			--
	Sequence	O - CO - CO			--
	I _{peak} (A) max. value	146#	147#	148#	--
	L1	2,6 kA	3,2 kA	2,9 kA	P
	L2	3,1 kA	2,7 kA	2,2 kA	
	L3	2,8 kA	3,3 kA	2,9 kA	
	Max. I²t ≤ 35 kA²s, acc. EN 61009-1	146#	147#	148#	--
	L1	18,8 kA²s	29,7 kA²s	21,5 kA²s	P
	L2	20,9 kA²s	14,7 kA²s	8,3 kA²s	
	L3	14,4 kA²s	29,8 kA²s	19,6 kA²s	
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____ V}$. The RCBO is in the open position	440 V			--
	The leakage current shall not exceed 2 mA	146#	147#	148#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L2	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L3	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	15,4 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	25,5 A			--
	- tripping within	146#	147#	148#	--
	- 1h (< 63 A)	6 s	9 s	11 s	P
	- 2h (> 63 A)				N/A

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F0"	4P, B40, 30 mA, type A			--
		44# - 46#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I _{cs}				P
	Service short-circuit capacity (A).....	6000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 Un	L1-L2: 438,7 V L2-L3: 439,0 V L1-L3: 439,7 V			--
	Cross-section (mm²).....	16 mm²			--
	Grid distance a (mm).....	45 mm			--
	Prospective current (A).....	6000 A			--
	Prospective current obtained (A).....	L1: 6031 A L2: 6038 A L3: 6147 A			--
	Power factor	0,65~0,7			--
	Power factor obtained	0,67			--
	Sequence	O - CO - CO			--
	I _{peak} (A) max. value	44#	45#	46#	--
	L1	4,7 kA	3,9 kA	5,0 kA	P
	L2	4,3 kA	3,2 kA	4,0 kA	
	L3	3,5 kA	3,0 kA	4,3 kA	
	Max. I²t ≤ 54 kA²s, acc. EN 61009-1	44#	45#	46#	--
	L1	41,7 kA²s	36,8 kA²s	43,3 kA²s	P
	L2	52,7 kA²s	22,0 kA²s	50,0 kA²s	
	L3	39,6 kA²s	14,9 kA²s	52,3 kA²s	
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____ V}$. The RCBO is in the open position	440 V			--
	The leakage current shall not exceed 2 mA	44#	45#	46#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L2	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L3	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	38,4 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	63,8 A			--
	- tripping within	44#	45#	46#	--
	- 1h (< 63 A)	92 s	14 s	17 s	P
	- 2h (> 63 A)				N/A

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test			Result - Remark	
	TEST SEQUENCE "F0"			4P, C32, 30 mA, type A	
				91# - 93#	
9.12	Short-circuits test			--	
9.12.11.4	Test above 1500 A			P	
b)	Test at service short-circuit capacity I_{cs}			P	
	Service short-circuit capacity (A)			6000 A	
	Figure			Figure 7	
	Test voltage 1,05 U_n			L1-L2: 438,7 V L2-L3: 439,0 V L1-L3: 439,7 V	
	Cross-section (mm ²).....			10 mm ²	
	Grid distance a (mm).....			45 mm	
	Prospective current (A)			6000 A	
	Prospective current obtained (A)			L1: 6031 A L2: 6038 A L3: 6147 A	
	Power factor			0,65-0,7	
	Power factor obtained			0,67	
	Sequence			O - CO - CO	
	I_{peak} (A) max. value			91#	92#
				93#	
	L1	4,1 kA	3,8 kA	4,8 kA	P
	L2	4,2 kA	3,8 kA	4,5 kA	
	L3	5,0 kA	3,3 kA	4,2 kA	
	Max. $I^2t \leq 52 \text{ kA}^2\text{s}$, acc. EN 61009-1			91#	92#
				93#	--
	L1	42,0 kA ² s	33,4 kA ² s	35,6 kA ² s	P
	L2	51,3 kA ² s	35,7 kA ² s	35,3 kA ² s	
	L3	44,1 kA ² s	30,8 kA ² s	51,5 kA ² s	
	RCBOs functionally dependent on the line voltage supplied with rated voltage			N/A	
	No permanent arcing			P	
	No flash-over between poles or between poles and frame			P	
	No blowing of fuse			P	
	No damage, polyethylene sheet shows no holes			P	

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____ V}$. The RCBO is in the open position	440 V			--
	The leakage current shall not exceed 2 mA	91#	92#	93#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L2	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L3	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	30,7 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	51,0 A			--
	- tripping within	91#	92#	93#	--
	- 1h (< 63 A)	34 s	18 s	11 s	P
	- 2h (> 63 A)				N/A

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F0"	4P, B32, 30 mA, type A			--
		94# - 96#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I _{cs}				P
	Service short-circuit capacity (A)	6000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 Un	L1-L2: 438,7 V L2-L3: 439,0 V L1-L3: 439,7 V			--
	Cross-section (mm²).....	10 mm²			--
	Grid distance a (mm).....	45 mm			--
	Prospective current (A)	6000 A			--
	Prospective current obtained (A)	L1: 6031 A L2: 6038 A L3: 6147 A			--
	Power factor	0,65~0,7			--
	Power factor obtained	0,67			--
	Sequence	O - CO - CO			--
	I _{peak} (A) max. value	94#	95#	96#	--
	L1	3,0 kA	4,3 kA	3,8 kA	P
	L2	4,8 kA	3,5 kA	4,8 kA	
	L3	4,3 kA	2,9 kA	4,3 kA	
	Max. I²t ≤ 45 kA²s, acc. EN 61009-1	94#	95#	96#	--
	L1	24,4 kA²s	43,4 kA²s	34,4 kA²s	P
	L2	43,3 kA²s	28,1 kA²s	43,1 kA²s	
	L3	28,7 kA²s	12,4 kA²s	44,3 kA²s	
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____ V}$. The RCBO is in the open position	440 V			--
	The leakage current shall not exceed 2 mA	94#	95#	96#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L2	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L3	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	30,7 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	51,0 A			--
	- tripping within	94#	95#	96#	--
	- 1h (< 63 A)	18 s	22 s	31 s	P
	- 2h (> 63 A)				N/A

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F1"	2P, B20, 30 mA, type A			--
		167# - 169#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at rated short-circuit capacity I_{cn}				P
	Rated short-circuit capacity (A)	10000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 U_n	250,3 V			--
	Cross-section (mm ²)	6 mm ²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A)	10 kA			--
	Prospective current obtained (A)	10,4 kA			--
	Power factor	0,45~0,5			--
	Power factor obtained	0,49			--
	Sequence	O - CO			--
	I_{peak} (A) max. value	167#	168#	169#	--
		3,2 kA	3,3 kA	3,0 kA	P
	Max. $I^2t \leq 90 \text{ kA}^2\text{s}$, acc. EN 61009-1	167#	168#	169#	--
		17,0 kA ² s	16,9 kA ² s	12,7 kA ² s	P
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____ V}$. The RCBO is in the open position	253 V			--
	The leakage current shall not exceed 2 mA	167#	168#	169#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 900 V				P
	b) 900 V				P
	c) 900 V				P
	d) 900 V				N/A
	e) 900 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
9.12.12.2.c)	Test current $2,8 I_N$:	56 A			--
	Tripping within > 0,1 s up to	167#	168#	169#	--
	- 60 s	6 s	7 s	3 s	P
	- 120 s				N/A

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F1"	2P, C16, 30 mA, type A			--
		170# - 172#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at rated short-circuit capacity I_{cn}				P
	Rated short-circuit capacity (A)	10000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 U_n	250,3 V			--
	Cross-section (mm²)	4 mm²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A)	10 kA			--
	Prospective current obtained (A)	10,4 kA			--
	Power factor	0,45~0,5			--
	Power factor obtained	0,49			--
	Sequence	O - CO			--
	I_{peak} (A) max. value	170#	171#	172#	--
		2,9 kA	3,1 kA	2,8 kA	P
	Max. $I^2t \leq 80 \text{ kA}^2\text{s}$, acc. EN 61009-1	170#	171#	172#	--
		11,8 kA²s	13,8 kA²s	11,4 kA²s	P
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use an shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____}$ V. The RCBO is in the open position	253 V			--
	The leakage current shall not exceed 2 mA	170#	171#	172#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 900 V				P
	b) 900 V				P
	c) 900 V				P
	d) 900 V				N/A
	e) 900 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
9.12.12.2.c)	Test current $2,8 I_N$:	44,8 A			--
	Tripping within > 0,1 s up to	170#	171#	172#	--
	- 60 s	9 s	12 s	8 s	P
	- 120 s				N/A

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F1"	2P, B16, 30 mA, type A			--
		173# - 175#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at rated short-circuit capacity I_{cn}				P
	Rated short-circuit capacity (A)	10000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 U_n	250,3 V			--
	Cross-section (mm ²)	4 mm ²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A)	10 kA			--
	Prospective current obtained (A)	10,4 kA			--
	Power factor	0,45~0,5			--
	Power factor obtained	0,49			--
	Sequence	O - CO			--
	I_{peak} (A) max. value	173#	174#	175#	--
		3,0 kA	3,1 kA	2,7 kA	P
	Max. $I^2t \leq 70 \text{ kA}^2\text{s}$, acc. EN 61009-1	173#	174#	175#	--
		20,8 kA ² s	13,5 kA ² s	10,0 kA ² s	P
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____ V}$. The RCBO is in the open position	253 V			--
	The leakage current shall not exceed 2 mA	173#	174#	175#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 900 V				P
	b) 900 V				P
	c) 900 V				P
	d) 900 V				N/A
	e) 900 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
9.12.12.2.c)	Test current $2,8 I_N$:	44,8 A			--
	Tripping within > 0,1 s up to	173#	174#	175#	--
	- 60 s	12 s	8 s	13 s	P
	- 120 s				N/A

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "F1"	4P, B16, 30 mA, type A			--
		59# - 61#			
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at rated short-circuit capacity I _{cn}				P
	Rated short-circuit capacity (A)	10000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 Un	L1-L2: 438,3 V L2-L3: 439,2 V L1-L3: 438,0 V			--
	Cross-section (mm²).....	4 mm²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A).....	10 kA			--
	Prospective current obtained (A)	L1: 10,0 kA L2: 10,1 kA L3: 10,2 kA			--
	Power factor	0,45~0,5			--
	Power factor obtained	0,48			--
	Sequence	O - CO			--
	I _{peak} (A) max. value	59#	60#	61#	--
	L1	3,9 kA	3,9 kA	4,5 kA	P
	L2	4,5 kA	4,3 kA	3,7 kA	
	L3	3,8 kA	1,7 kA	3,7 kA	
	Max. I²t ≤ 70 kA²s, acc. EN 61009-1	59#	60#	61#	--
	L1	57,1 kA²s	39,9 kA²s	46,4 kA²s	P
	L2	41,4 kA²s	55,9 kA²s	30,9 kA²s	
	L3	27,6 kA²s	3,7 kA²s	27,1 kA²s	
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____ V}$. The RCBO is in the open position	440 V			--
	The leakage current shall not exceed 2 mA	59#	60#	61#	P
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L2	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L3	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 900 V	1500 V			P
	b) 900 V	1500 V			P
	c) 900 V	1500 V			P
	d) 900 V				N/A
	e) 900 V				N/A
	During these tests, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
9.12.12.2.c)	Test current $2,8 I_N$:	44,8 A			--
	Tripping within > 0,1 s up to	59#	60#	61#	--
	- 60 s	11 s	22 s	9 s	P
	- 120 s				N/A

IEC61009_1F - ATTACHMENT				
Clause	Requirement + Test	Result - Remark		
	TEST SEQUENCE "F2"	4P, C40, 30 mA, type A		
		62# - 64#		
9.12	Short-circuits test			
9.12.11.4	Test above 1500 A			
d)	Test at residual making and breaking capacity $I_{\Delta m}$			
	Verification of the rated residual making and breaking capacity $I_{\Delta m}$ (A).....:	3000 A		
	Figure.....:	Figure 7		
	Cross-section (mm ²)	16 mm ²		
	Grid distance a (mm)	45 mm		
	Prospective current (A)	3000 A		
	Prospective voltage obtained (V)	251,1 V		
	Prospective current obtained (A)	3127 A		
	Power factor	0,85 - 0,90		
	Power factor obtained	0,87		
	Sequence	O-t-CO		
	I_{peak} (A) max. value.....:	62#	63#	64#
	L1	3,1 kA		
	L2		3,1 kA	
	L3			2,5 kA
	I^2t max. :	219#	220#	221#
	L1	26,4 kA ² s		
	L2		21,2 kA ² s	
	L3			16,2 kA ² s
	One pole taken at random which shall not be the switched neutral pole or the overcurrent unprotected pole			
	RCBOs functionally dependent on the line voltage supplied with rated voltage			
	Phases which do not carry the short circuit current during this test shall be connected to the supply voltage at the line terminals			
	No permanent arcing			
	No flash-over between poles or between poles and frame			

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.2.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = 440$ V. The RCBO is in the open position	440 V			--
	The leakage current shall not exceed 2 mA	62#	63#	64#	--
	L1	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	L2	< 1,4 mA	< 1,4 mA	< 1,4 mA	
	L3	< 1,4 mA	< 1,4 mA	< 1,4 mA	
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	
9.12.12.2.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 900 V				P
	b) 900 V				P
	c) 900 V				P
	d) 900 V				N/A
	e) 900 V				N/A
	During these test, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
9.12.12.2.c)	Test current $2,8 I_N$	112 A			--
	Tripping within > 0,1 s up to	62#	63#	64#	--
	- 60 s				N/A
	- 120 s	14 s	8 s	10 s	P
9.12.12.Z1	The RCBO 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	62#	63#	64#	--
		23 ms	17 ms	23 ms	P

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

<i>modify:</i>	TEST SEQUENCE "G0"		--
9.22	VERIFICATION OF RELIABILITY	Refer to main part of this report.	P
9.22.1	Climatic test		P

IEC61009_1F - ATTACHMENT						
Clause	Requirement + Test		Result - Remark			Verdict
	TEST SEQUENCE "G ₁ " (add the new test sequence)		4P, C40, 30 mA, type A			--
			68# - 70#			
8	REQUIREMENTS FOR CONSTRUCTION AND OPERATION					--
add: 8.Z1	BEHAVIOUR OF RCBOs AT LOW AMBIENT AIR TEMPERATURE					--
	RCBOs for use between -25°C and +40°C operate reliably at low ambient air temperature					P
add: 9.Z1	VERIFICATION OF THE CORRECT OPERATION AT LOW AMBIENT AIR TEMPERATURE FOR RCBOs FOR USE AT TEMPERATURES BETWEEN -25° C AND +40° C					--
	RCBOs mounted in enclosure with degree of protection IP 55 and connected for normal use					P
	RCBOs in a test chamber at +23°C ± 2°C and rH 90% ± 3%					P
	RCBOs in ON-position without load					P
	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:		68#	69#	70#	--
	break time at 1,25 I _{ΔN} not exceeding the value for I _{ΔN} in table 2		56 ms	59 ms	49 ms	P
	- S-type:					--
	break time at 2,5 I _{ΔN} not exceeding the value for 2 I _{ΔN} in table 2					N/A
	Additionally for RCBOs of type A:					P
	Break time with pulsating d.c. residual currents of					P
	- 1,25 I _{ΔN} (general type)					P
	- 2,5 I _{ΔN} (S-type)					N/A
	Multiplied by:		68#	69#	70#	--
	1,4 for I _{ΔN} > 0,01 A		76 ms	82 ms	75 ms	P
	2 for I _{ΔN} ≤ 0,01 A					N/A
	at α = 0°el (test circuit figure 4b)					P
	After test possible to switch on the RCBO without presence of residual current					P

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
	TEST SEQUENCE "G ₁ " (add the new test sequence)	4P, C6, 300 mA, type A			--
		71# - 73#			
8	REQUIREMENTS FOR CONSTRUCTION AND OPERATION				--
add: 8.Z1	BEHAVIOUR OF RCBOS AT LOW AMBIENT AIR TEMPERATURE				--
	RCBOs for use between -25°C and +40°C operate reliably at low ambient air temperature				P
add: 9.Z1	VERIFICATION OF THE CORRECT OPERATION AT LOW AMBIENT AIR TEMPERATURE FOR RCBOS FOR USE AT TEMPERATURES BETWEEN -25° C AND +40° C				--
	RCBOs mounted in enclosure with degree of protection IP 55 and connected for normal use				P
	RCBOs in a test chamber at +23°C ± 2°C and rH 90% ± 3%				P
	RCBOs in ON-position without load				P
	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:	71#	72#	73#	--
	break time at 1,25 I _{ΔN} not exceeding the value for I _{ΔN} in table 2	58 ms	49 ms	48 ms	P
	- S-type:				--
	break time at 2,5 I _{ΔN} not exceeding the value for 2 I _{ΔN} in table 2				N/A
	Additionally for RCBOs of type A:				P
	Break time with pulsating d.c. residual currents of				P
	- 1,25 I _{ΔN} (general type)				P
	- 2,5 I _{ΔN} (S-type)				N/A
	Multiplied by:	71#	72#	73#	--
	1,4 for I _{ΔN} > 0,01 A	59 ms	68 ms	71 ms	P
	2 for I _{ΔN} ≤ 0,01 A				N/A
	at α = 0°el (test circuit figure 4b)				P
	After test possible to switch on the RCBO without presence of residual current				P

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

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 sequence		Clause or subclause	Test (or inspection)
A		6	Marking
		8.1.1	General
		8.1.2	Mechanism
		9.3	Indelibility of marking
		8.1.3	Clearance and creepage distances (external parts only)
		8.1.6	Non-interchangeability
		9.11	Trip free mechanism
		9.4	Reliability of screws, current-carrying parts and connections
		9.5	Reliability of terminals for external conductors
		9.6	Protection against electric shock
		9.14	Resistance to heat
		8.1.3	Clearances and creepage distances (internal parts)
		9.15	Resistance to abnormal heat and to fire
B		9.7.7.4	Resistance of the insulation of open contacts and basic insulation against an impulse voltage in normal conditions
		9.7.7.5 a)	Verification of the behaviour of components bridging the basic insulation
		9.7.1	Resistance to humidity
		9.7.2	Insulation resistance of the main circuit
		9.7.3	Dielectric strength of the main circuit
		9.7.4	Insulation resistance and dielectric strength of auxiliary circuits
		9.7.7.2	Verification of clearances with the impulse withstand voltage
		9.7.5	Secondary circuit of detection transformers
		9.7.6	Capability of control circuits connected to the main circuits
		9.8	Temperature-rise
		9.22.2	Reliability at 40°C
		9.23	Ageing of electronic components
C	C ₁	9.10 9.12.11.2.1 (and 9.12.12)	Mechanical and electrical endurance Performance at reduced short-circuit currents (Verification of RCBO after short-circuit test)
	C ₂	9.12.11.2.2 (and 9.12.12)	Short-circuit test for verifying the suitability of RCBOs for use in IT systems (Verification of the RCBO after short-circuit tests)
D	D ₀	9.9.1	Operating characteristics under residual current conditions
	D ₁	9.17 9.19 9.16	Behaviour in case of failure of the line voltage Behaviour in case of surge currents Test device
E	E ₀	9.9.2	Overcurrent operating characteristics
	E ₁	9.13 9.12.11.3 (and 9.12.12)	Resistance to mechanical stresses Short-circuit performance at 1500 A (Verification of RCBO after short-circuit test)
F	F ₀	9.12.11.4 b) (and 9.12.12)	Performance at service short-circuit capacity (Verification of RCBO after short-circuit test)
	F ₁	9.12.11.4 c) (and 9.12.12.2)	Performance at rated short-circuit capacity (Verification of RCBO after short-circuit test)
	F ₂	9.12.11.4 d) (and 9.12.12.2)	Performance at I _{AM} (Verification of RCBO after short-circuit test)
G ₀		9.22.1	Reliability (climatic tests)
G ₁		9.2.1	Verification of correct operation at low ambient air temperature of RCBOs operating at temperatures between -25°C and +40°C
H a) b)		IEC 61543 Table 4-T1.1 IEC 61543 Table 4-T1.2 IEC 61543 Table 5-T2.3	Harmonics, interharmonics Signalling voltage Conducted unidirectional transients of the ms and µs time scale
I		IEC 61543 Table 5-T2.1 IEC 61543 Table 5-T2.5 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
a) For devices containing a continuously operating oscillator, the test of CISPR 14-1 shall be carried out on the samples prior to the tests of this sequence.			
b) For devices containing a continuously operating oscillator, the test of CISPR 14-1 shall be carried out on the samples prior to the tests of this sequence.			

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

replace table A.2 by:

Table A.2 - Number of samples for full test procedure

Test sequence	Number of samples	Minimum number of samples which shall pass the test (a) (b)	Maximum number of samples for repeated tests (c)
A ₁	1	1	--
A ₂	3	2	3
B	3	2	3
C ₁	3	2 (d)	3
C ₂	3	2 (d)	3
D	3	2 (d)	3
E	3	2 (d)	3
F ₀	3	2 (d)	3
F ₁	3	2 (d)	3
F ₂	3	2 (d)	3
G ₀	3	2	3
G ₁	3	2	3
H (e)	3	2	3
I (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) Except for test of 9.12.10, 9.12.11.2, 9.12.11.3, 9.12.11.4 as appropriate, which all samples shall pass.
- e) At the manufacturer's request, the same set of samples may be subjected to more than one of these test sequences.

IEC61009_1F - ATTACHMENT

Clause	Requirement + Test	Result - Remark	Verdict
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replace table A.3 by:			
Table A.3 - Number of samples for simplified test procedure			
Test sequence	Number of samples according to the number of poles ^{a) g)}		
	2-poles ^{b) c)}	3-poles ^{f) j)}	4-poles ^{e)}
A ₁	1 max. rating I _N min. rating I _{ΔN}	1 max. rating I _N min. rating I _{ΔN}	1 max. rating I _N min. rating I _{ΔN}
A ₂	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
B	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
C ₁	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
C ₂	for 2 protected poles 2 max. rating I _N min. rating I _{ΔN} for one protected pole 3 max. rating I _N min. rating I _{ΔN}	1 max. rating I _N min. rating I _{ΔN}	1 max. rating I _N min. rating I _{ΔN}
D ₀ + D ₁	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
D ₀	1 for all other ratings of I _{ΔN} with max. I _N		
E ₀ + E ₁	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
E ₀	1 ^{h)} for all other ratings of I _N with min. I _{ΔN}		
F ₀	3 max. rating I _N min. rating I _{ΔN} 3 min. rating I _N max. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN} 3 min. rating I _N max. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN} 3 min. rating I _N max. rating I _{ΔN}
F ₁	3 max. rating I _N min. rating I _{ΔN} 3 min. rating I _N max. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN} 3 min. rating I _N max. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN} 3 min. rating I _N max. rating I _{ΔN}
F ₂	3 ^{h)} max. rating I _N min. rating I _{ΔN}	3 ^{h)} max. rating I _N min. rating I _{ΔN}	3 ^{h)} max. rating I _N min. rating I _{ΔN}
G ₀	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
G ₁ ^{h)}	3 max. rating I _N min. rating I _{ΔN} 3 min. rating I _N max. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN} 3 min. rating I _N max. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN} 3 min. rating I _N max. rating I _{ΔN}
H ^{k)}	3 ^{h)} samples of the same rating I _N chosen at random min. rating I _{ΔN}		
I	3 ^{h)} samples of the same rating I _N chosen at random min. rating I _{ΔN}		
J	3 ^{h)} samples of the same rating I _N chosen at random min. rating I _{ΔN}		
a) the	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 repeated test all test results must be acceptable.		
b)	If only 3-pole and/or 4-pole RCBOs are submitted, this column shall also apply to a set of samples with the smallest number of poles.		
c)	Also applicable to 2-pole RCBOs with 1 protected pole.		
d)	Void		
e)	Also applicable to 4-pole RCBOs with 3 protected poles.		
f)	This column is omitted when 4-pole RCBOs have been tested.		
g)	If only one value of I _{ΔN} is submitted, min. rating I _{ΔN} and max. rating I _{ΔN} are replaced by I _{ΔN} .		
h)	Only the highest number of current poles.		
i)	For this sequence only the test of 9.9.2 is required.		
j)	If a 4-pole RCBO with 3 protected poles and a 4-pole RCBO are submitted, then only the 4-pole RCBO is tested, with exception of the test of 9.8 of test sequence B for which both types are submitted to the test.		
k)	If the requirement to test max. rating I _N and minimum rating I _{ΔN} does not cover all the possible range of RCBOs, the minimum I _{ΔN} shall in any case be chosen for the test.		

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

<i>replace table A.4 by:</i>			
Table A.4 - Test sequences for RCBOs having different instantaneous tripping currents			
RCBO type tested first	Test sequences for other RCBO types		
	B-type	C-type	D-type
B-type	---	$(E_0 + E_1) + F$	$(E_0 + E_1) + F$
C-type	$E_0^a) + B^a)$	---	$(E_0 + E_1) + F$
D-type	$E_0^a) + B^a)$	$E_0^a) + B^a) b)$	---
a) For sequence B, only the test of 9.8 shall be performed on 3 samples of maximum rating I_n with minimum rating $I_{\Delta N}$. For sequence E_0, only the test 9.9.2.2 shall be performed on one sample of all ratings I_n with minimum rating $I_{\Delta N}$. b) When certification is requested at the same time for B-type, C-type and D-type RCBOs having the same rated short-circuit capacity, only test sequence E_0 is required if B-type and D-type samples have been tested.			
<i>replace table A.5 by:</i>			
Table A.5 - Test sequences for RCBOs of different classification according to 4.6			
Test sequence	Number of samples according to the number of poles ^{a)}		
	2-pole ^{b) c)}	3-pole ^{f)}	4-pole ^{e)}
$D_0 + D_1$	1 max. rating I_n min. rating $I_{\Delta N}$	1 max. rating I_n min. rating $I_{\Delta N}$	1 max. rating I_n min. rating $I_{\Delta N}$
D_0	1 for all other ratings of $I_{\Delta N}$ with max. $I_{\Delta N}$		
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 and/or 4-pole RCBOs are submitted, this column shall also apply to a set of samples with the smallest number of poles. c) Also applicable to 2-pole RCBOs with 1 protected pole. d) Void e) Also applicable to 4-pole RCBOs with 3 protected poles. f) This column is omitted when 4-pole RCBOs have been tested.			

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	ANNEX E SPECIAL REQUIREMENTS FOR AUXILIARY CIRCUITS FOR SAFETY EXTRA-LOW VOLTAGE*)		--
<i>add:</i> (additional)	*) For auxiliary contact units assembled or to be assembled separately to RCBO, see EN 62019		--
	replace ANNEX F by:		
	ANNEX F (INFORMATIVE) CO-ORDINATION UNDER SHORT CIRCUIT CONDITIONS BETWEEN A RCBO AND ANOTHER SHORT CIRCUIT PROTECTIVE DEVICE (SCPD) ASSOCIATED IN THE SAME CIRCUIT		--
	The information given in Annex D of IEC 60898-1:2002 to ensure coordination between circuit-breakers and separate fuses associated in the same circuit may also be applicable to ensure coordination between RCBOs and separate fuses associated in the same circuit.		N/A
	replace Annex G by:		N/A
G	ANNEX G Additional requirements and tests for RCBOs consisting of a circuit-breaker and a residual current unit designed for assembly on site		N/A
	ANNEX J Particular requirements for RCBOs with screwless type terminals for external copper conductors		N/A
	ANNEX K Particular requirements for RCBOs with flat quick-connect terminations		N/A
	ANNEX L Specific requirements for RCBOs with screw-type terminals for external untreated aluminium conductors and with aluminium screw-type terminals for use with copper or with aluminium conductors		N/A

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

	ANNEX ZB Special national conditions	N/A
Germany	The use of RCBOs of type AC is not permitted	N/A
Switzerland	The use of RCBOs of type AC is not permitted	N/A
Ireland	For RCBOs functionally dependant on line voltage IEC 61009-2-2 applies in conjunction with Part 1	N/A
	In Ireland, where neutrals are reliably at earth potential, RCBOs with unswitched neutral current paths are permitted for use in accordance with The National Rules For Electrical Installations. The requirements of these types of devices are given in the original text of IEC 61009-1.	N/A
United Kingdom	In the United Kingdom, where neutrals are reliably at earth potential, RCBOs with unswitched neutral current paths are permitted. The requirements of these types of devices are given in the original text of IEC 61009-1.	N/A

	ANNEX ZC A-deviations	N/A
Austria	Table Z1 is not valid in Austria	N/A

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

	ANNEX ZD	P																																																																																								
	Classification of RCBOs Type B and C up to and including 63A into energy limiting classes	P																																																																																								
	RCBOs of B-type and C-type up to and including 63A, shall be classified into energy limiting classes 1 or 3 in accordance with tables ZD.1 or ZD.2, as applicable, and be marked with the number of the energy limiting class in a square adjoining the symbol given in t) of clause 6. This classification shall not be applied to RCBOs type D and to RCBOs with rated current higher than 63A.	P																																																																																								
	<table><tr><td colspan="6">Table ZD.1 - Permissible I²t (let-through) values for RCBOs type B with rated current up to and including 63A</td></tr><tr><td colspan="6">Type B</td></tr><tr><td rowspan="2">Rated short-circuit capacity (A) I_{CN}</td><td>class 1</td><td colspan="4">class 3</td></tr><tr><td>≤63A</td><td>≤16A</td><td>20A, 25A, 32A</td><td>40A</td><td>50A, 63A</td></tr><tr><td>3 000</td><td rowspan="4">No limits specified</td><td>15 000</td><td>18 000</td><td>21 600</td><td>28 000</td></tr><tr><td>4 500</td><td>25 000</td><td>32 000</td><td>38 400</td><td>48 000</td></tr><tr><td>6 000</td><td>35 000</td><td>45 000</td><td>54 000</td><td>65 000</td></tr><tr><td>10 000</td><td>70 000</td><td>90 000</td><td>108 000</td><td>135 000</td></tr><tr><td colspan="6">Table ZD.2 - Permissible I²t (let-through) values for RCBOs type C with rated current up to and including 63A</td></tr><tr><td colspan="6">Type C</td></tr><tr><td rowspan="2">Rated short-circuit capacity (A) I_{CN}</td><td>class 1</td><td colspan="4">class 3</td></tr><tr><td>≤63A</td><td>≤16A</td><td>20A, 25A, 32A</td><td>40A</td><td>50A, 63A</td></tr><tr><td>3 000</td><td rowspan="4">No limits specified</td><td>17 000</td><td>20 000</td><td>24 000</td><td>30 000</td></tr><tr><td>4 500</td><td>28 000</td><td>37 000</td><td>45 000</td><td>55 000</td></tr><tr><td>6 000</td><td>40 000</td><td>52 000</td><td>63 000</td><td>75 000</td></tr><tr><td>10 000</td><td>80 000</td><td>100 000</td><td>120 000</td><td>145 000</td></tr></table>	Table ZD.1 - Permissible I²t (let-through) values for RCBOs type B with rated current up to and including 63A						Type B						Rated short-circuit capacity (A) I _{CN}	class 1	class 3				≤63A	≤16A	20A, 25A, 32A	40A	50A, 63A	3 000	No limits specified	15 000	18 000	21 600	28 000	4 500	25 000	32 000	38 400	48 000	6 000	35 000	45 000	54 000	65 000	10 000	70 000	90 000	108 000	135 000	Table ZD.2 - Permissible I²t (let-through) values for RCBOs type C with rated current up to and including 63A						Type C						Rated short-circuit capacity (A) I _{CN}	class 1	class 3				≤63A	≤16A	20A, 25A, 32A	40A	50A, 63A	3 000	No limits specified	17 000	20 000	24 000	30 000	4 500	28 000	37 000	45 000	55 000	6 000	40 000	52 000	63 000	75 000	10 000	80 000	100 000	120 000	145 000	P
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6 000		40 000	52 000	63 000	75 000																																																																																					
10 000		80 000	100 000	120 000	145 000																																																																																					
	The maximum I²t values measured during the test of I_{cn} (test sequence F₀ or F₁ as applicable), in accordance with 9.12.11.4 serve as reference values for the classification. Compliance with the requirements of tables ZD.1 and ZD.2 is checked on the RCBOs with the highest rated current available within the range covered by each of these tables. If these current ratings are not included in the samples submitted to test sequences F₀ or F₁ of annex A, the appropriate number of samples of these ratings shall be additionally submitted to that test sequence. None of the values measured shall exceed the permissible I²t value of the proposed energy limiting class in accordance with tables ZD.1 and ZD.2. If RCBOs rated 40 A are submitted with the range of RCBOs with rating exceeding 16 A and their measured I²t values are lower than those indicated in tables ZD.1 or ZD.2 for rating 32 A, no relevant test is necessary for the RCBOs rated 32 A. If RCBOs rated 50 A or 63 A are submitted with the range of RCBOs with rating exceeding 32 A and their measured I²t values are lower than those indicated in tables ZD.1 or ZD.2 for rating 40 A, no relevant test is necessary for the RCBOs rated 40 A	P																																																																																								

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE Z3 – REQUIREMENTS FOR MARKING

	Each RCBO shall be marked in a durable manner with all or, for small apparatus, part of the following data: The minimum requirements are indicated by the symbol "X"	Marking on the RCBO itself			Product information in the catalogue
		If, for small devices the space available does not allow all the data to be marked, at least the following information shall be marked and visible when the device is installed.	The following information may be marked on the side or on the back of the device and be visible only before the device is installed.	Alternatively the following information may be on the inside of any cover which has to be removed in order to connect the supply wires.	Any remaining information not marked shall be given in the manufacturer's catalogues .
a)	The manufacturer's name or trademark		X		
b)	Type designation, catalogue number or serial number		X		
c)	Rated voltage(s) with the symbol ~		X		
d)	Rated current without symbol "A", preceded by the symbol of overcurrent instantaneous tripping (B, C or D), for example B16	X			
e)	Rated frequency, if the RCBO is designed for frequencies other than 50Hz (see 5.3.5)		X		
f)	Rated residual operating current ($I_{\Delta n}$) in A or in mA	X			
h)	Rated short circuit capacity, in amperes in a rectangle without symbol "A"		X *)		
j)	Reference calibration temperature, if different from 30°C				X
k)	The degree of protection (only if different from IP20)				X
l)	The position of use (symbol according to IEC 60051), if necessary		X		
m)	Rated residual making and breaking capacity ($I_{\Delta m}$), if different from rated short-circuit capacity (I_{cn})				X
n)	The symbol S (S in a square) for type S devices	X			
o)	symbol of the method of operation according to Table Z1 of 4.1 if the RCBO is functionally dependent on the line voltage		X	X	
q)	Operating means of the test device, by the letter T (**)	X			
r)	Wiring diagram unless the correct mode of operation is evident		X	X	
s)	Operating characteristic in presence of residual currents with d.c. components - RCBOs of type AC with the symbol  - RCBOs of type A with the symbol 	X	X		
t)	Energy limiting class (e.g. 3) in a square in accordance with Annex ZD if applied (***)		X *)		
u)	RCBOs according to 4 Z1 marked with the symbol (snowflake enclosing -25)		X		
v)	Indication of the terminal for the neutral with "N"		X		
w)	Additional marking of performance to other standards or additional requirements according to 6.Z2		X		

*) I_{cn} and the energy limiting class, if applied, shall be on the device and combined together

**) It is recommended to advise the user to test the device regularly

***) If annex ZD is not applicable to the device, I^2t characteristics shall be available on request

List of test equipment used:

A completed list of used test equipment shall be provided in the Test Reports when a Customer's Testing Facility according to CTF stage 1 or CTF stage 2 procedure has been used.

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
8.1.3	Clearances and creepage distances (see Annex B)	Digital display vernier caliper GACIA-SYS-164	(0~150) mm	2024/5/16	2025/5/15
9.3	Test of indelibility of marking	electronic stopwatch GACIA-SYS-040	(0~3000) s	2024/10/10	2025/10/9
9.11	Verification of mechanical and electrical endurance	Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
9.4	Test of reliability of screws, current-carrying parts and connections	Digital torque screwdriver GACIA-SYS-167	(0.6~6)Nm	2024/10/8	2025/10/7
9.5	Tests of reliability of screw-type terminals for external copper conductors	Electronic stopwatch GACIA-SYS-040	(0~3000) s	2024/10/10	2025/10/9
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
		Weight GACIA-SYS-165	(200g-1kg)	2024/5/11	2025/5/10
9.6, 9.14	Test of protection against electric shock, Test of resistance to heat	Testing finger GACIA-SYS-134	(0~50) N	2024/5/16	2025/5/15
		High-low temperature box GACIA-SYS-038	(10~300) °C	2024/5/20	2025/5/19
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, 10%RH~99%RH	2025/2/28	2026/2/27
		Ball pressure test device GACIA-SYS-039	20N, 5mm	2024/10/9	2025/10/8
9.25	Resistance to rusting	Electronic stopwatch GACIA-SYS-040	(0~3000) s	2024/10/10	2025/10/9
		High and low temperature damp heat test chamber GACIA-SYS-149	(-40~+150) °C, 25%RH~98%RH	2024/5/13	2025/5/12
		Electric hot blast constant temperature drying oven GACIA-SYS-038	(10~300)°C	2024/5/20	2025/5/19
9.15	Resistance to abnormal heat and to fire	hot wire tester GACIA-SYS-017	550°C~1000°C	2024/5/13	2025/5/12
		Digital display vernier caliper GACIA-SYS-164	(0~150) mm	2024/5/16	2025/5/15
		Digital illuminance meter GACIA-SYS-155	/	2025/3/3	2026/3/2
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, 10%RH~99%RH	2025/2/28	2026/2/27
		Electronic stopwatch GACIA-SYS-040	(0~3000) s	2024/10/10	2025/10/9
		Tape measure GACIA-SYS-043	(0~3) m	2024/10/12	2025/10/11
9.7.7.4	Impulse voltage	Impulse voltage generator GACIA-SYS-026	(5~10) kV	2025/1/7	2026/1/6
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, 10%RH~99%RH	2025/2/28	2026/2/27

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
9.7.1	Resistance to humidity	High and low temperature damp heat test chamber GACIA-SYS-149	(-40~+150) °C, 25%RH~98%RH	2024/5/13	2025/5/12
		Digital temperature and humidity meter GACIA-SYS-171	(-20~+60) °C, 10%RH~99%RH	2025/2/28	2026/2/27
9.7.2	Insulation resistance of the main circuit	Megohmmeter GACIA-SYS-023	500V、500M Ω	2024/10/10	2025/10/9
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, 10%RH~99%RH	2025/2/28	2026/2/27
9.7.3	Dielectric strength of the main circuit	Voltage endurance tester GACIA-SYS-132	AC (0~5) kV	2025/3/3	2026/3/2
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60), 10%RH~99%RH	2025/2/28	2026/2/27
9.7.6	Capability of control circuits connected to the main circuit withstanding high d.c. voltages due to insulation measurements	Voltage endurance tester GACIA-SYS-168	AC/DC: (0~5) kV	2024/9/27	2025/9/26
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, 10%RH~99%RH	2025/2/28	2026/2/27
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
		Instantaneous test equipment for communication GACIA-SYS-065	(1~2500) A, (0~12) V	2025/1/24	2026/1/23
9.8	Temperature rise	Agilent temperature rise tester GACIA-SYS-150	(-40~200) °C	2024/10/9	2025/10/8
		Communication temperature rise/power consumption test equipment GACIA-SYS-066	(1~240) A, (30~40) V	2024/7/5	2025/7/4
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
		Digital temperature and humidity meter GACIA-SYS-158	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
9.22.2	Temperature rise	28 day testing equipment GACIA-SYS-063	(1~240) A, (0~36) V	2024/8/19	2025/8/18
		Agilent temperature rise tester GACIA-SYS-150	(-40~200) °C	2024/10/9	2025/10/8
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
		Digital temperature and humidity meter GACIA-SYS-158	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		Walk in environmental box GACIA-SYS-071	(+0~+70) °C	2025/3/3	2026/3/2
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
9.23	Ageing of electronic components	Anti aging test equipment for electronic components GACIA-SYS-069	(180~264) V, (5~125) A	2025/1/24	2026/1/23
		Walk in environmental box GACIA-SYS-071	(+0~+70) °C	2025/3/3	2026/3/2
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
		Digital temperature and humidity meter GACIA-SYS-158	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
9.10	Verification of mechanical and electrical endurance	125A AC reliability testing equipment GACIA-SYS-077	AC (120~440) V, AC (1~125) A, cosφ:0.8~0.98	2025/1/24	2026/1/23
		Digital temperature and humidity meter GACIA-SYS-051	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		B-type residual current circuit breaker tester GACIA-SYS-062	(6~10000) mA	2024/5/25	2025/5/24
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
9.10	Verification of mechanical and electrical endurance	Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
		Digital temperature and humidity meter GACIA-SYS-158	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		High-low temperature testing room GACIA-SYS-070	(-40~+70) °C	2025/3/4	2026/3/3
		Exchange multi station standard testing equipment GACIA-SYS-064	(1~350) A, (0~10) V	2025/1/24	2026/1/23
		Voltage endurance tester GACIA-SYS-132	AC (0~5) kV	2025/3/3	2026/3/2
9.12.11.2.1	Performance at reduced short-circuit currents	AC/DC short-circuit system GACIA-SYS-082	AC voltage: (120-690) V, AC current: (500-10000) A, Power factor: 0.4~1.0	2024/5/6	2025/5/5
		Digital temperature and humidity meter GACIA-SYS-159	(-20~+60) °C, (10~99%) %RH	2024/5/30	2025/5/29
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/9
		Vernier with watch GACIA-SYS-163	(0~150) mm	2024/5/16	2025/5/15
9.12.12.1	Verification of the circuit-breaker after short-circuit tests	Voltage endurance tester GACIA-SYS-168	AC/DC:(0~5) kV	2024/9/27	2025/9/26
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		Voltage endurance tester GACIA-SYS-132	AC (0~5) kV	2025/3/3	2026/3/2
9.12.11.2.2	Short-circuit test for verifying the suitability of circuit-breakers for use in IT systems)	AC/DC short-circuit system GACIA-SYS-082	AC voltage: (120-690) V, AC current: (500-10000) A, Power factor: 0.4~1.0	2024/5/6	2025/5/5
		Digital temperature and humidity meter GACIA-SYS-159	(-20~+60) °C, (10~99%) %RH	2024/5/30	2025/5/29
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
		Vernier with watch GACIA-SYS-163	(0~150) mm	2024/5/16	2025/5/15

Clause	Measurement / testing	B-Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
9.9.1	Verification of the operating characteristic under residual current conditions	C-type residual current circuit breaker tester GACIA-SYS-062	(6~10000) mA	2024/5/25	2025/5/24
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		Instantaneous test equipment for communication GACIA-SYS-065	(1~2500) A, (0~12) V	2025/1/24	2026/1/23
		Anti aging test equipment for electronic components GACIA-SYS-069	(180~264) V, (5~125) A	2025/1/24	2026/1/23
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
		Walk in environmental box GACIA-SYS-071	(+0~+70) °C	2025/3/3	2026/3/2
		High and low temperature damp heat test chamber GACIA-SYS-149	(-40~+150) °C, 25%RH~98%RH	2024/5/13	2025/5/12
		Digital temperature and humidity meter GACIA-SYS-158	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
9.9.2	Verification of the operating characteristic under overcurrent conditions	Exchange multi station standard testing equipment GACIA-SYS-064	(1~350) A, (0~10) V	2025/1/24	2026/1/23
		Digital torque screwdriver GACIA-SYS-167	(0.6~6)Nm	2024/10/8	2025/10/7
		Walk in environmental box GACIA-SYS-070	(-40~+70) °C	2025/3/4	2026/3/3
		Digital temperature and humidity meter GACIA-SYS-158	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
9.9.2	Verification of the operating characteristic under overcurrent conditions	Instantaneous test equipment for communication GACIA-SYS-065	(1~2500) A, (0~12) V	2025/1/24	2026/1/23
		AC/DC short-circuit system GACIA-SYS-082	AC voltage: (120-690) V, AC current: (500-10000) A, Power factor: 0.4~1.0	2024/5/6	2025/5/5
		Digital temperature and humidity meter GACIA-SYS-159	(-20~+60) °C, (10~99%) %RH	2024/5/30	2025/5/29
		Voltage endurance tester GACIA-SYS-132	AC (0~5) kV	2025/3/3	2026/3/2
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		Voltage endurance tester GACIA-SYS-168	AC/DC:(0~5) kV	2024/9/27	2025/9/26
9.19	Verification of behavior of RCBs in case of current surges caused by impulse voltages	Impulse current tester GACIA-SYS-138	(2.7~3.3) KA	2024/5/20	2025/5/19
		Ring wave impulse current tester GACIA-SYS-137	(22~27) A; (170~230) A	2025/3/4	2026/3/3
		type residual current circuit breaker tester GACIA-SYS-062	(6~10000) mA	2024/5/25	2025/5/24
		Digital temperature and humidity meter GACIA-SYS-050	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
9.12.13	I Δ m	AC/DC short-circuit system GACIA-SYS-082	AC voltage: (120-690) V, AC current: (500-10000) A, Power factor: 0.4~1.0	2024/5/6	2025/5/5
		Digital temperature and humidity meter GACIA-SYS-159	(-20~+60) °C, (10~99%) %RH	2024/5/30	2025/5/29
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
		Voltage endurance tester GACIA-SYS-132	AC (0~5) kV	2025/3/3	2026/3/2
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		125A AC reliability testing equipment GACIA-SYS-077	AC (120~440) V, AC (1~125) A, cos ϕ :0.8~0.98	2025/1/24	2026/1/23
		Digital temperature and humidity meter GACIA-SYS-051	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
9.16	Test device	Anti aging test equipment for electronic components GACIA-SYS-069	(180~264) V, (5~125) A	2025/1/24	2026/1/23
		Digital temperature and humidity meter GACIA-SYS-158	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		Multimeter GACIA-SYS-019	ACV:1mV~750V; DCV:1mV~1000V; ACI:1mA~10A, DCI:100uA~10A	2025/3/3	2026/3/2
9.13	Resistance to mechanical shock and impact	Circuit breaker vibration testing machine GACIA-SYS-032	/	2024/5/20	2025/5/19
		Pendulum impact test device GACIA-SYS-037	Pendulum length: 1000mm, Quality of impact components: 150g	2024/5/20	2025/5/19
		electronic stopwatch GACIA-SYS-040	(0~3000) s	2024/10/10	2025/10/9
		Weight GACIA-SYS-165	(200g-1kg)	2024/5/11	2025/5/10
		Digital temperature and humidity meter GACIA-SYS-047	(-20~+60) °C, (10~99%) %RH	2024/5/30	2025/5/29
9.12.11.3, 9.12.12	Short-circuit performance at 1500 A, Verification of the circuit-breaker after short-circuit tests	AC/DC short-circuit system GACIA-SYS-082	AC voltage: (120-690) V, AC current: (500-10000) A, Power factor: 0.4~1.0	2024/5/6	2025/5/5
		Digital temperature and humidity meter GACIA-SYS-159	(-20~+60) °C, (10~99%) %RH	2024/5/30	2025/5/29
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
		Voltage endurance tester GACIA-SYS-132	AC (0~5) kV	2025/3/3	2026/3/2
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		Voltage endurance tester GACIA-SYS-168	AC/DC:(0~5) kV	2024/9/27	2025/9/26
		Time delay characteristic testing table GACIA-SYS-064	(1~350) A, (0~10) V	2025/1/24	2026/1/23
		Walk in environmental box GACIA-SYS-070	(-40~+70) °C	2025/3/4	2026/3/3
		Vernier with watch GACIA-SYS-163	(0~150) mm	2024/5/16	2025/5/15

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
9.12.11.4b 9.12.12	Service short-circuit capacity (Ics) Verification of the circuit-breaker after short-circuit tests	AC/DC short-circuit system GACIA-SYS-082	AC voltage: (120-690) V, AC current: (500-10000) A, Power factor: 0.4~1.0	2024/5/6	2025/5/5
		Digital temperature and humidity meter GACIA-SYS-159	(-20~+60) °C, (10~99%) %RH	2024/5/30	2025/5/29
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
		Voltage endurance tester GACIA-SYS-132	AC (0~5) kV	2025/3/3	2026/3/2
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		Voltage endurance tester GACIA-SYS-168	AC/DC: (0~5) kV	2024/9/27	2025/9/26
		Time delay characteristic testing table GACIA-SYS-064	(1~350) A, (0~10) V	2025/1/24	2026/1/23
		Vernier with watch GACIA-SYS-163	(0~150) mm	2024/5/16	2025/5/15
		Digital temperature and humidity meter GACIA-SYS-158	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		Walk in environmental box GACIA-SYS-070	(-40~+70) °C	2025/3/4	2026/3/3
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
9.12.11.4c 9.12.12	Rated short-circuit capacity (Icn) Verification of the circuit-breaker after short-circuit tests	AC/DC short-circuit system GACIA-SYS-082	AC voltage: (120-690) V, AC current: (500-10000) A, Power factor: 0.4~1.0	2024/5/6	2025/5/5
		Digital temperature and humidity meter GACIA-SYS-159	(-20~+60) °C, (10~99%) %RH	2024/5/30	2025/5/29
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
		Voltage endurance tester GACIA-SYS-132	AC (0~5) kV	2025/3/3	2026/3/2
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		Voltage endurance tester GACIA-SYS-168	AC/DC: (0~5) kV	2024/9/27	2025/9/26
		Time delay characteristic testing table GACIA-SYS-064	(1~350) A, (0~10) V	2025/1/24	2026/1/23
		Vernier with watch GACIA-SYS-163	(0~150) mm	2024/5/16	2025-5-15
		Digital temperature and humidity meter GACIA-SYS-158	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		Walk in environmental box GACIA-SYS-070	(-40~+70) °C	2025/3/4	2026/3/3
		Exchange multi station standard testing equipment GACIA-SYS-064	(1~350) A, (0~10) V	2025/1/24	2026/1/23
9.22.1	Reliability (climate testing)	High and low temperature damp heat test chamber GACIA-SYS-149	(-40~+150) °C, 25%RH~98%RH	2024/5/13	2025/5/12
		Digital temperature and humidity meter GACIA-SYS-050	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
		Digital temperature and humidity meter GACIA-SYS-171	(-20~+60) °C, (10~99%) %RH	2025/2/28	2026/2/27
		B-type residual current circuit breaker tester GACIA-SYS-062	(6~10000) mA	2024/5/25	2025/5/24
		PH value detector GACIA-SYS-148	/	2024/9/27	2025/9/26

The following equipment information is taken from test report no. 3332226.50					
Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
8.1.3	Clearances and creepage distances (see Annex B)	Vernier with watch GACIA-SYS-163	(0~150)mm	2024/5/16	2025/5/15
9.3	Test of indelibility of marking	electronic stopwatch GACIA-SYS-040	(0~3000) s	2024/10/10	2025/10/9
9.11	Verification of mechanical and electrical endurance	Residual current circuit breaker teste GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
9.4	Test of reliability of screws, current-carrying parts and connections	Digital torque screwdriver GACIA-SYS-167	(0.6~6)Nm	2024/10/8	2025/10/7
9.5	Tests of reliability of screw-type terminals for external copper conductors	Electronic stopwatch GACIA-SYS-040	(0~3000) s	2024/10/10	2025/10/9
		Digital torque screwdriver GACIA-SYS-167	(0.6~6)Nm	2024/10/8	2025/10/7
		Weight GACIA-SYS-165	(200g-1kg)	2024/5/11	2025/5/10
9.6, 9.14	Test of protection against electric shock, Test of resistance to heat	Testing finger GACIA-SYS-134	(0~50) N	2024/5/16	2025/5/15
		High-low temperature box GACIA-SYS-038	(10~300) °C	2024/5/20	2025/5/19
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C , 10%RH~99%RH	2024/3/8	2025/3/7
		Ball pressure test device GACIA-SYS-039	20N,5mm	2024/10/9	2025/10/8
9.25	Resistance to rusting	Electronic stopwatch GACIA-SYS-040	(0~3000) s	2024/10/10	2025/10/9
		High and low temperature damp heat test chamber GACIA-SYS-149	(-40~+150)°C , 25%RH~98%RH	2024/5/13	2025/5/12
		Electric hot blast constant temperature drying oven GACIA-SYS-038	(10~300)°C	2024/5/20	2025/5/19
9.15	Resistance to abnormal heat and to fire	hot wire tester GACIA-SYS-017	550°C~1000°C	2024/5/13	2025/5/12
		Vernier with watch GACIA-SYS-163	(0~150) mm	2024/5/16	2025/5/15
		Digital illuminance meter GACIA-SYS-155	/	2024/3/7	2025/3/6
9.7.7.4	Impulse voltage	Impulse voltage generator GACIA-SYS-026	(5~10) kV	2024/1/29	2025/1/28
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C , 10%RH~99%RH	2024/3/8	2025/3/7
9.7.1	Resistance to humidity	High and low temperature damp heat test chamber GACIA-SYS-149	(-40~+150) °C , 25%RH~98%RH	2024/5/13	2025/5/12
		Digital temperature and humidity meter GACIA-SYS-171	(-20~+60) °C , 10%RH~99%RH	2024/3/8	2025/3/7
9.7.2	Insulation resistance of the main circuit	DC low resistance tester GACIA-SYS-021	(1uΩ~20kΩ)	2024/9/27	2025/9/26
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C , 10%RH~99%RH	2024/3/8	2025/3/7

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
9.7.3	Dielectric strength of the main circuit	Voltage endurance tester GACIA-SYS-168	AC/DC:(0~5) kV	2024/9/27	2025/9/26
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, 10%RH~99%RH	2024/3/8	2025/3/7
9.7.6	Capability of control circuits connected to the main circuit withstanding high d.c. voltages due to insulation measurements	Voltage endurance tester GACIA-SYS-168	AC/DC:(0~5) kV	2024/9/27	2025/9/26
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, 10%RH~99%RH	2024/3/8	2025/3/7
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
		Instantaneous test equipment for communication GACIA-SYS-065	(1~2500) A, (0~12) V	2024/1/29	2025/1/28
9.8	Temperature rise	Agilent temperature rise tester GACIA-SYS-150	(-40~200) °C	2024/10/9	2025/10/8
		Communication temperature rise/power consumption test equipment GACIA-SYS-066	(1~240) A, (30~40) V	2024/1/29	2025/1/28
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
		Digital temperature and humidity meter GACIA-SYS-158	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
9.22.2	Temperature rise	28 day testing equipment GACIA-SYS-063	(1~240) A, (0~36) V	2024/8/19	2025/8/18
		Agilent temperature rise tester GACIA-SYS-150	(-40~200) °C	2024/10/9	2025/10/8
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
		Digital temperature and humidity meter GACIA-SYS-158	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
		Walk in environmental box GACIA-SYS-071	(+0~+70) °C	2024/3/7	2025/3/6
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
9.23	Ageing of electronic components	Anti aging test equipment for electronic components GACIA-SYS-069	(180~264) V, (5~125) A	2024/1/29	2025/1/28
		Walk in environmental box GACIA-SYS-071	(+0~+70) °C	2024/3/7	2025/3/8
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
		Digital temperature and humidity meter GACIA-SYS-158	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
9.10	Verification of mechanical and electrical endurance	125A AC reliability testing equipment GACIA-SYS-077	AC (120~440) V, AC (1~125) A, cosφ:0.8~0.98	2024/1/30	2025/1/29
		Digital temperature and humidity meter GACIA-SYS-051	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
		Voltage endurance tester GACIA-SYS-132	AC (0~5) kV	2024/3/7	2025/3/6
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
		Exchange multi station standard testing equipment GACIA-SYS-064	(1~350) A, (0~10) V	2024/1/29	2025/1/28

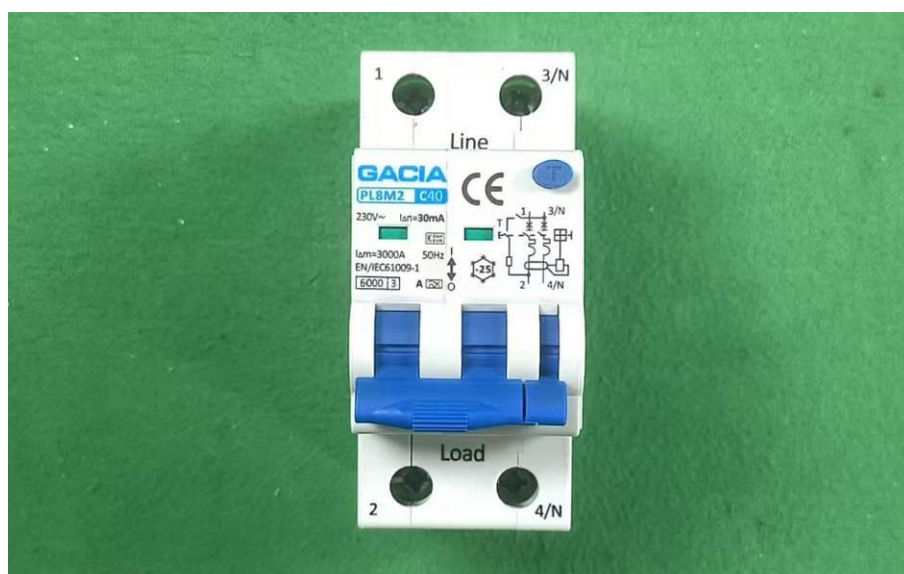
Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
9.10	Verification of mechanical and electrical endurance	Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
		Digital temperature and humidity meter GACIA-SYS-158	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
		High-low temperature testing room GACIA-SYS-070	(-40~+70) °C	2024/3/7	2025/3/6
9.12.11.2.1	Performance at reduced short-circuit currents	AC/DC short-circuit system GACIA-SYS-082	AC voltage: (120-690) V, AC current: (500-10000) A, Power factor: 0.4~1.0	2024/5/6	2025/5/5
		Digital temperature and humidity meter GACIA-SYS-159	(-20~+60) °C, (10~99%) %RH	2024/5/30	2025/5/29
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/9
9.12.12.1	Verification of the circuit-breaker after short-circuit tests	Voltage endurance tester GACIA-SYS-168	AC/DC:(0~5) kV	2024/9/27	2025/9/26
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
		Voltage endurance tester GACIA-SYS-132	AC (0~5) kV	2024/3/7	2025/3/6
		Voltage endurance tester GACIA-SYS-168	AC/DC:(0~5) kV	2024/9/27	2025/9/26
9.12.11.2.2	Short-circuit test for verifying the suitability of circuit-breakers for use in IT systems)	AC/DC short-circuit system GACIA-SYS-082	AC voltage: (120-690) V, AC current: (500-10000) A, Power factor: 0.4~1.0	2024/5/6	2025/5/5
		Digital temperature and humidity meter GACIA-SYS-159	(-20~+60) °C, (10~99%) %RH	2024/5/30	2025/5/29
		Digital torque screwdriver GACIA-SYS-167	(0.6~6)Nm	2024/10/8	2025/10/7
9.9.1	Verification of the operating characteristic under residual current conditions	D-type residual current circuit breaker tester GACIA-SYS-062	(6~10000) mA	2024/5/25	2025/5/24
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
		Instantaneous test equipment for communication GACIA-SYS-065	(1~2500) A, (0~12) V	2024/1/29	2025/1/28
		Anti aging test equipment for electronic components GACIA-SYS-069	(180~264) V, (5~125) A	2024/1/29	2025/1/28
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
		Digital temperature and humidity meter GACIA-SYS-160	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
		Walk in environmental box GACIA-SYS-071	(+0~+70) °C	2024/3/7	2025/3/6
		Digital temperature and humidity meter GACIA-SYS-051	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
		Walk in environmental box GACIA-SYS-072	(+0~+70) °C	2024/3/8	2025/3/6
9.9.2	Verification of the operating characteristic under overcurrent conditions	Exchange multi station standard testing equipment GACIA-SYS-064	(1~350) A, (0~10) V	2024/1/29	2025/1/28
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
		Walk in environmental box GACIA-SYS-070	(-40~+70) °C	2024/3/7	2025/3/6
		Digital temperature and humidity meter GACIA-SYS-158	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
9.9.2	Verification of the operating characteristic under overcurrent conditions	Instantaneous test equipment for communication GACIA-SYS-065	(1~2500) A, (0~12) V	2024/1/29	2025/1/28
		AC/DC short-circuit system GACIA-SYS-082	AC voltage: (120-690) V, AC current: (500-10000) A, Power factor: 0.4~1.0	2024/5/6	2025/5/5
		Digital temperature and humidity meter GACIA-SYS-159	(-20~+60) °C, (10~99%) %RH	2024/5/30	2025/5/29
		Voltage endurance tester GACIA-SYS-132	AC (0~5) kV	2024/3/7	2025/3/6
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
		Voltage endurance tester GACIA-SYS-168	AC/DC:(0~5) kV	2024/9/27	2025/9/26
9.19	Verification of behavior of RCBs in case of current surges caused by impulse voltages	Impulse current tester GACIA-SYS-138	(2.7~3.3) KA	2024/5/18	2025/5/19
		Ring wave impulse current tester GACIA-SYS-137	(22~27) A; (170~230) A	2024/3/7	2025/3/6
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
		Digital temperature and humidity meter GACIA-SYS-050	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
9.12.13	IΔm	AC/DC short-circuit system GACIA-SYS-082	AC voltage: (120-690) V, AC current: (500-10000) A, Power factor: 0.4~1.0	2024/5/6	2025/5/5
		Digital temperature and humidity meter GACIA-SYS-159	(-20~+60) °C, (10~99%) %RH	2024/5/30	2025/5/29
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
		Voltage endurance tester GACIA-SYS-132	AC (0~5) kV	2024/3/7	2025/3/6
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
		125A AC reliability testing equipment GACIA-SYS-077	AC (120~440) V, AC (1~125) A, cosφ:0.8~0.98	2024/1/30	2025/1/29
		Digital temperature and humidity meter GACIA-SYS-051	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
9.16	Test device	Anti aging test equipment for electronic components GACIA-SYS-069	(180~264) V, (5~125) A	2024/1/29	2025/1/28
		Digital temperature and humidity meter GACIA-SYS-158	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
9.13	Resistance to mechanical shock and impact	Circuit breaker vibration testing machine GACIA-SYS-032	/	2024/5/20	2025/5/19
		Pendulum impact test device GACIA-SYS-037	Pendulum length: 1000mm,Quality of impact components: 150g	2024/5/20	2025/5/19
		electronic stopwatch GACIA-SYS-040	(0~3000) s	2024/10/10	2025/10/9

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
9.12.11.3, 9.12.12	Short-circuit performance at 1500 A, Verification of the circuit-breaker after short-circuit tests	AC/DC short-circuit system GACIA-SYS-082	AC voltage: (120-690) V, AC current: (500-10000) A, Power factor: 0.4~1.0	2024/5/6	2025/5/5
		Digital temperature and humidity meter GACIA-SYS-159	(-20~+60) °C, (10~99%) %RH	2024/5/30	2025/5/29
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
		Voltage endurance tester GACIA-SYS-132	AC (0~5) kV	2024/3/7	2025/3/6
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
		Voltage endurance tester GACIA-SYS-168	AC/DC:(0~5) kV	2024/9/27	2025/9/26
		Time delay characteristic testing table GACIA-SYS-064	(1~350) A, (0~10) V	2024/1/29	2025/1/28
9.12.11.4b 9.12.12	Service short-circuit capacity (Ics) Verification of the circuit-breaker after short-circuit tests	AC/DC short-circuit system GACIA-SYS-082	AC voltage: (120-690) V, AC current: (500-10000) A, Power factor: 0.4~1.0	2024/5/6	2025/5/5
		Digital temperature and humidity meter GACIA-SYS-159	(-20~+60) °C, (10~99%) %RH	2024/5/30	2025/5/29
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2024/10/8	2025/10/7
		Voltage endurance tester GACIA-SYS-132	AC (0~5) kV	2024/3/7	2025/3/6
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
		Voltage endurance tester GACIA-SYS-168	AC/DC:(0~5) kV	2024/9/27	2025/9/26
		Time delay characteristic testing table GACIA-SYS-064	(1~350) A, (0~10) V	2024/1/29	2025/1/28
		Vernier with watch GACIA-SYS-163	(0~150) mm	2024/5/16	2025/5/15
		Digital temperature and humidity meter GACIA-SYS-158	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
		Walk in environmental box GACIA-SYS-070	(-40~+70) °C	2024/3/8	2025/3/6
		Instantaneous test equipment for communication GACIA-SYS-065	(1~2500) A, (0~12) V	2024/1/29	2025/1/28
9.12.11.4c 9.12.12	Rated short-circuit capacity (Icn) Verification of the circuit-breaker after short-circuit tests	AC/DC short-circuit system GACIA-SYS-082	AC voltage: (120-690) V, AC current: (500-10000) A, Power factor: 0.4~1.0	2024/5/6	2025/5/5
		Digital temperature and humidity meter GACIA-SYS-159	(-20~+60) °C, (10~99%) %RH	2024/5/30	2025/5/29
		Digital torque screwdriver GACIA-SYS-167	(0.6~6) Nm	2023/10/16	2024/10/15
		Voltage endurance tester GACIA-SYS-132	AC (0~5) kV	2024/3/7	2025/3/6
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
		Voltage endurance tester GACIA-SYS-168	AC/DC: (0~5) kV	2024/9/27	2025/9/26
		Time delay characteristic testing table GACIA-SYS-064	(1~350) A, (0~10) V	2024/1/29	2025/1/28
		Vernier with watch GACIA-SYS-163	(0~150) mm	2024/5/16	2025-5-15
		Digital temperature and humidity meter GACIA-SYS-158	(-20~+60) °C, (10~99%) %RH	2024/3/8	2025/3/7
		Walk in environmental box GACIA-SYS-070	(-40~+70) °C	2024/3/8	2025/3/6
		Exchange multi station standard testing equipment GACIA-SYS-064	(1~350) A, (0~10) V	2024/1/29	2025/1/28

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
9.22.1	Reliability (climate testing)	High and low temperature damp heat test chamber GACIA-SYS-149	(-40~+150) °C , 25%RH~98%RH	2024/5/13	2025/5/12
		Digital temperature and humidity meter GACIA-SYS-050	(-20~+60) °C , (10~99%) RH	2024/3/8	2025/3/7
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C , (10~99%) %RH	2024/3/8	2025/3/7
		B-type residual current circuit breaker tester GACIA-SYS-062	(6~10000) mA	2024/5/25	2025/5/24
9.12.11.4 d), 9.12.12.2, 9.12.12. Z1	Residual making and breaking capacity (Idm), Verification of the circuit-breaker after short-circuit tests	AC/DC short-circuit system GACIA-SYS-082	AC voltage: (120-690) V, AC current: (500-10000) A, Power factor: 0.4~1.0	2024/5/6	2025/5/5
		Vernier with watch GACIA-SYS-163	(0~150) mm	2024/5/16	2025/5/15
		Voltage endurance tester GACIA-SYS-132	AC(0~5) kV	2024/3/7	2025/3/6
		Voltage endurance tester GACIA-SYS-168	AC/DC: (0~5) kV	2024/9/27	2025/9/26
		Time delay characteristic testing table GACIA-SYS-064	(1~350) A, (0~10) V	2024/1/29	2025/1/28
		Walk in environmental box GACIA-SYS-070	(-40~+70) °C	2024/3/8	2025/3/6
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C , (10~99%) %RH	2024/3/8	2025/3/7
		Digital torque screwdriver GACIA-SYS-167	(0.6~6)Nm	2024/10/8	2025/10/7
		Digital temperature and humidity meter GACIA-SYS-159	(-20~+60) °C , (10~99%) %RH	2024/5/30	2025/5/29
9.Z1	Verification of the correct operation at low ambient air temperature for RCBs for use at temperatures between -25° C and +40° C	High and low temperature damp heat test chamber GACIA-SYS-149	(-40~+150) °C , 25%RH~98%RH	2024/5/13	2025/5/12
		Digital temperature and humidity meter GACIA-SYS-050	(-20~+60) °C , (10~99%) %RH	2024/3/8	2025/3/7
		Residual current circuit breaker tester GACIA-SYS-162	(2~500) mA	2024/5/13	2025/5/12
		Digital temperature and humidity meter GACIA-SYS-170	(-20~+60) °C , (10~99%) %RH	2024/3/8	2025/3/7
		B-type residual current circuit breaker tester GACIA-SYS-062	(6~10000) mA	2024/5/25	2025/5/24

Photographs



PL8M2, Front view, 2P / C40 / 30 mA / type A



PL8M4, Front view, 4P / C40 / 30 mA / type A



PL8M4, Front view, 4P / C6 / 300 mA / type A



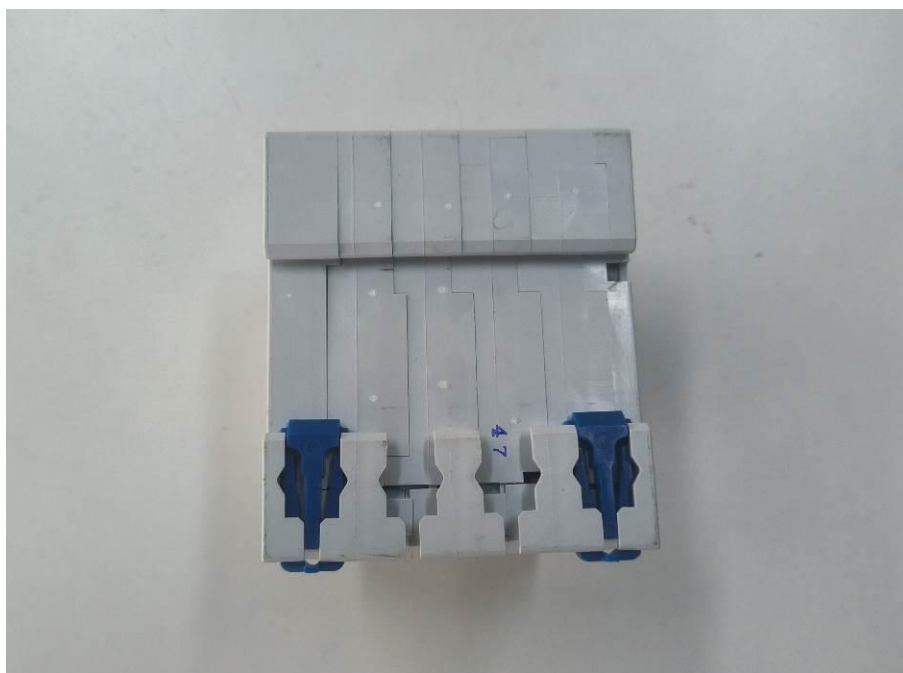
NL8M4, Front view, 4P / C40 / 30 mA / type A



HL8M4, Front view, 4P / C40 / 30 mA / type A



Back view, 2P / C40 / 30 mA / type A



Back view, 4P / C40 / 30 mA / type A



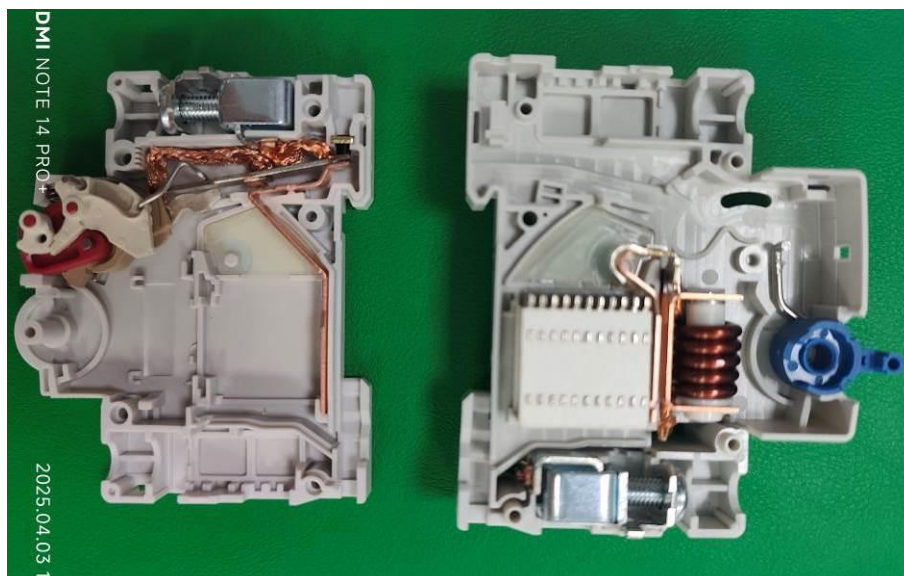
Side view, 4P / C40 / 30 mA / type A



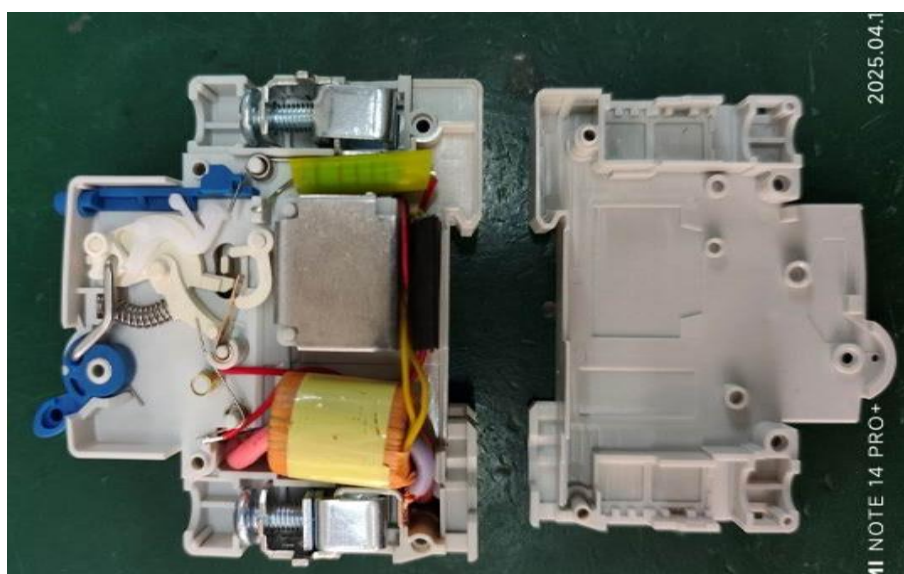
Top and bottom view, 2P / C40 / 30 mA / type A



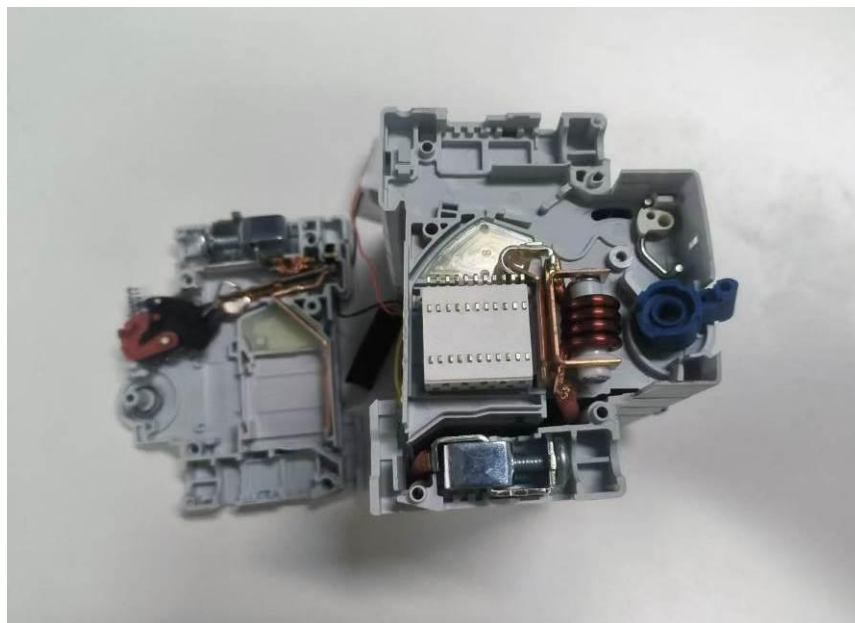
Top and bottom view, 4P / C40 / 30 mA / type A



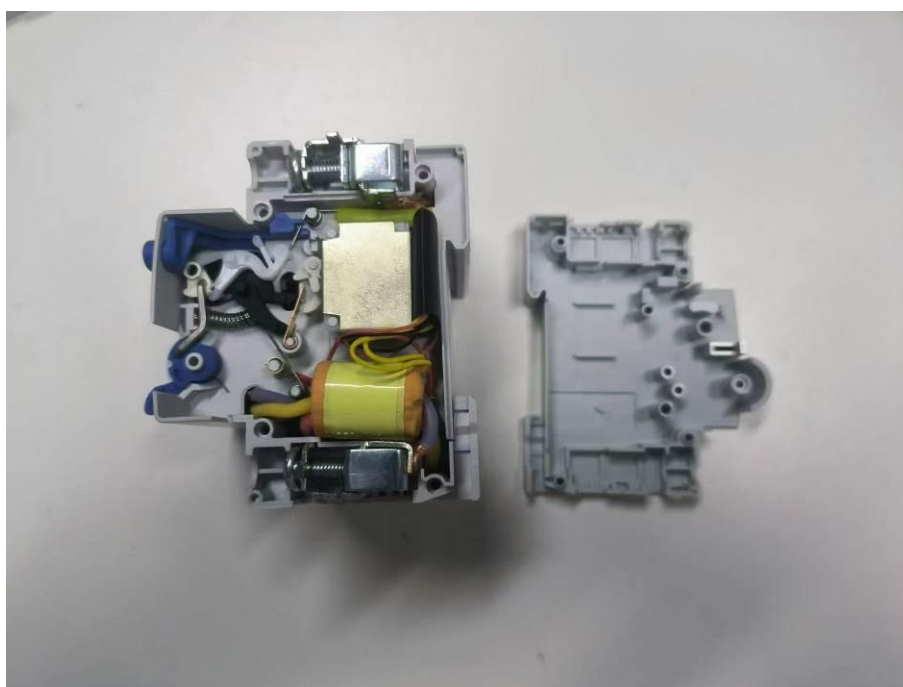
Internal view (Left pole), 2P / C40 / 30 mA / type A



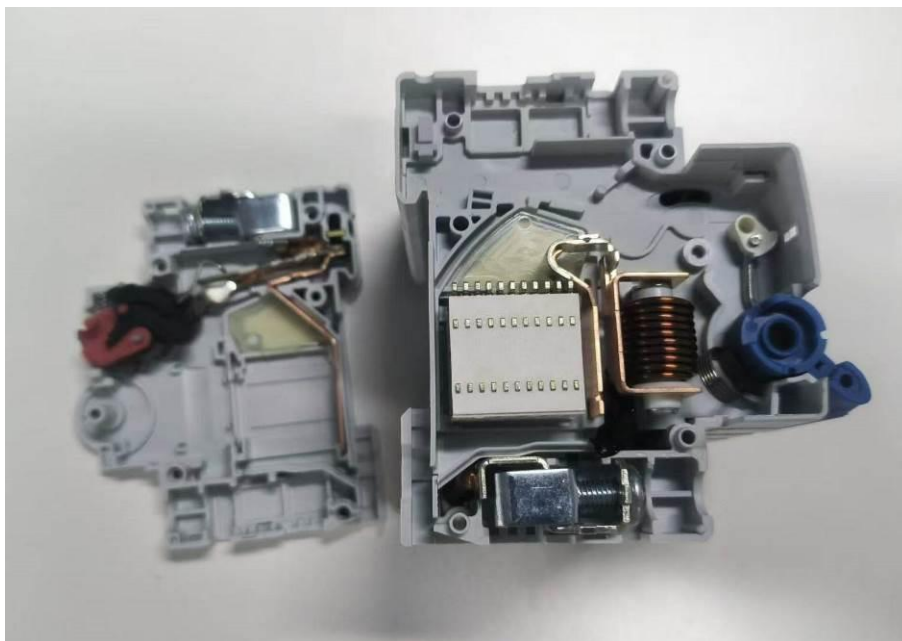
Internal view (Residual current circuit), 2P / C40 / 30 mA / type A



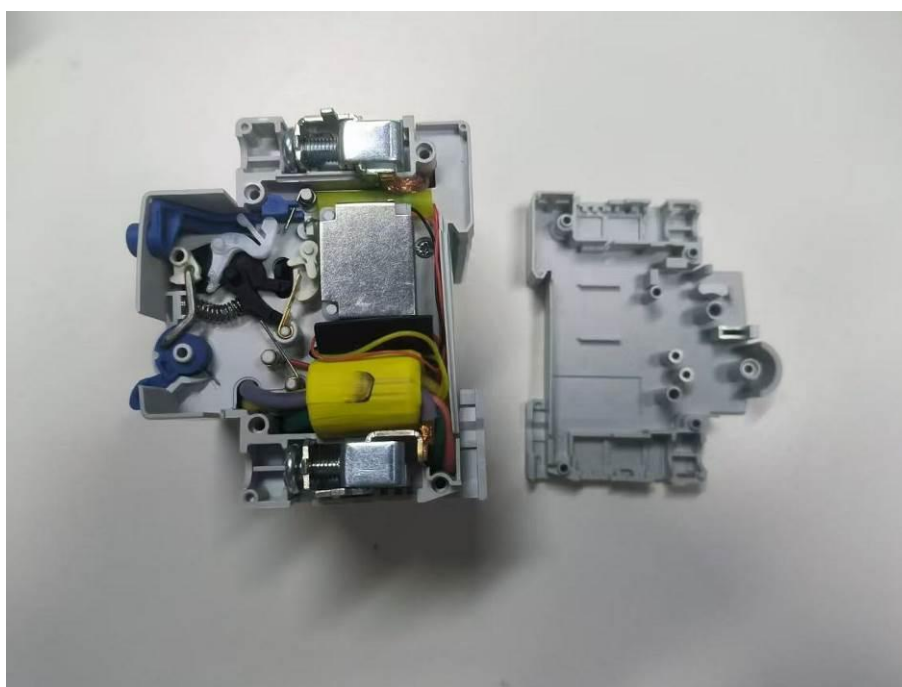
Internal view (Left pole), 4P / C40 / 30 mA / type A



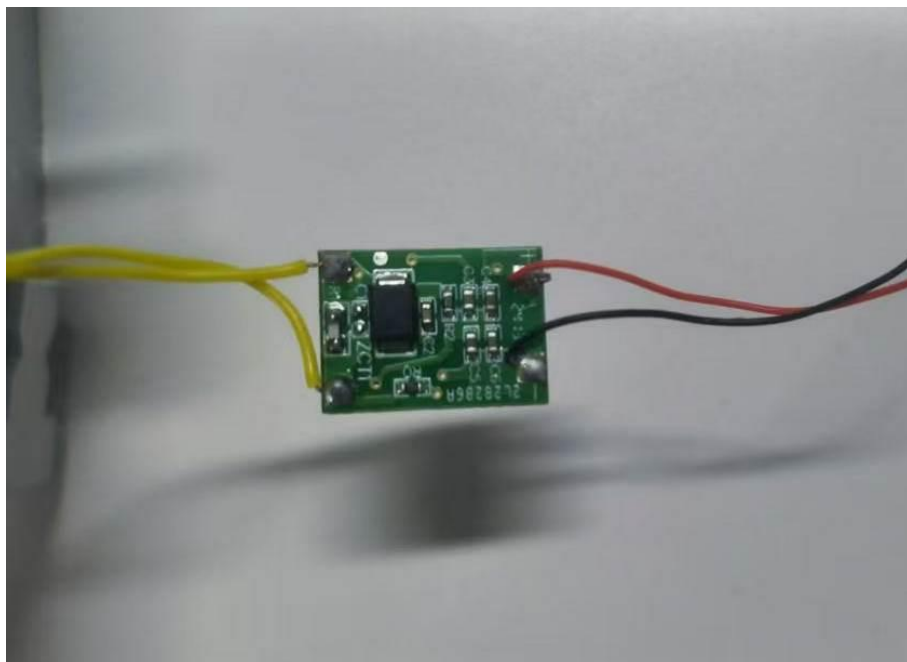
Internal view (Residual current circuit), 4P / C40 / 30 mA / type A



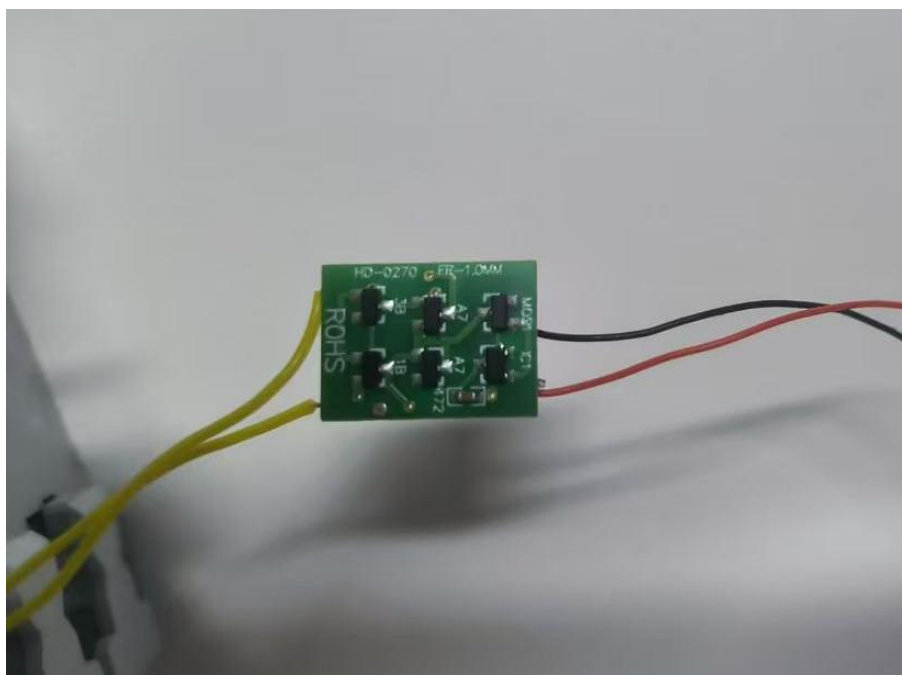
Internal view (Left pole), 4P / C6 / 300 mA / type A



Internal view (Residual current circuit), 4P / C6 / 300 mA / type A



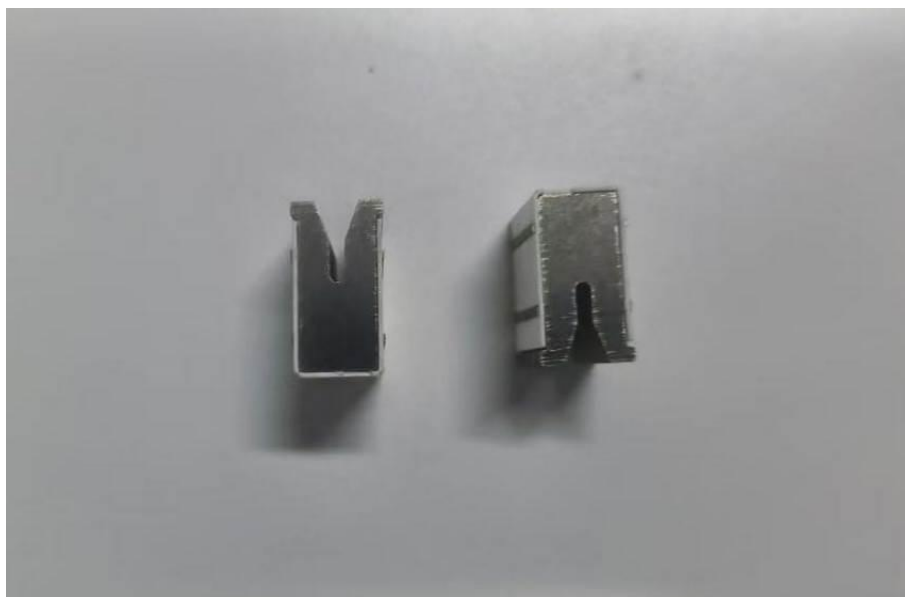
PCB top view



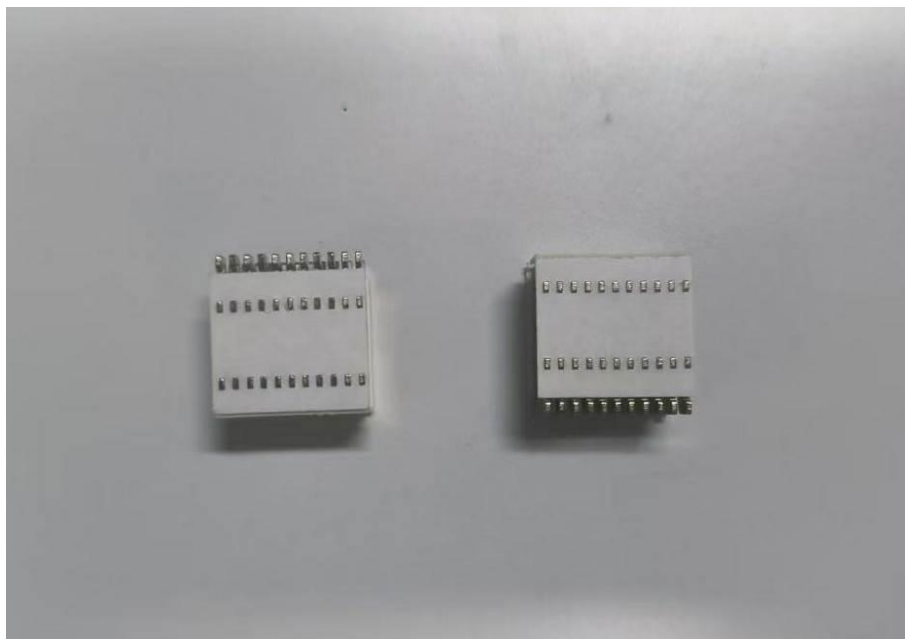
PCB bottom view



Arc chamber



Arc chamber



Arc chamber