Prüfbericht - Produkte
Test Report - Products

TÜVRheinland®

Prüfbericht-Nr.: *Test report no.:*	**CN26N4CH 001**	**Auftrags-Nr.:** *Order no.:*	**326198797**	Seite 1 von 60 *Page 1 of 60*
Kunden-Referenz-Nr.: *Client reference no.:*	**2028101**	**Auftragsdatum:** *Order date:*	2026-07-23	
Auftraggeber: *Client:*	**Ginlong technologies Co., Ltd.** No.90 Zijin Rd., New District, Suzhou, 215011, P.R. China			
Prüfgegenstand: *Test item:*	**RDC-MD**			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	**GW7K-HCA-G30, GW11K-HCA-G30, GW22K-HCA-G30**			
Auftrags-Inhalt: *Order content:*	**Acceptance test according to IEC 62955: 2018**			
Prüfgrundlage: *Test specification:*	**IEC 62955: 2018 - Partial testing items**			
Wareneingangsdatum: *Date of sample receipt:*	**2026-07-28**			
Prüfmuster-Nr.: *Test sample no:*	**326198797#1 to #18**			
Prüfzeitraum: *Testing period:*	**2026.07.28-2026.09.02**			
Ort der Prüfung: *Place of testing:*	**Zhejiang Testing and Inspection Institute for Mechanical and Electrical Products Quality**			
Prüflaboratorium: *Testing laboratory:*	**TÜV Rheinland (Shanghai) Co., Ltd.**			
Prüfergebnis*: *Test result*:*	Pass			



geprüft von: tested by:	Ye Ding	**genehmigt von:** *authorized by:*	Wencai Zhang
Datum: *Date:* 2026-10-12		**Ausstelldatum:** *Issue date:* 2026-10-12	
Stellung / Position:	Project Engineer	**Stellung** / Position:	Authorizer

Sonstiges / *Other:*

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	P(ass) =	F(ail) = entspricht	N/A = nicht anwendbar	N/T = nicht getestet	* Legende:
* Legend:	P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested	

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Prüfbericht-Nr.: CN26N4CH 001
Test report no.:

Anmerkungen
Remarks

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Test Report issued under the responsibility of:

TÜVRheinland®

TEST REPORT
IEC 62955
Residual direct current detecting device (RDC-DD) to be used for mode 3 charging of electric vehicles (RDC-MD)

Report Number. ..... :	**CN26N4CH 001**
Date of issue ..... :	**See cover page**
Total number of pages ..... :	**See cover page**
Name of Testing Laboratory preparing the Report ..... :	**TÜV Rheinland (Shanghai) Co., Ltd.**
Applicant's name ..... :	**GoodWe Technologies Co., Ltd.**
Address ..... :	No.90 Zijin Rd., New District, Suzhou, 215011, P.R. China
Test specification:	
Standard ..... :	IEC 62955:2018
Test procedure ..... :	Acceptance test
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IEC62955A
Test Report Form(s) Originator .... :	TÜV Rheinland InterCert Kft., MEEI Division
Master TRF ..... :	Dated 2018-11

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General disclaimer:

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Test item description ..... :	**RDC-MD**
Trade Mark ..... :	GOODWE
Manufacturer ..... :	Same as applicant
Model/Type reference ..... :	**GW7K-HCA-G30, GW11K-HCA-G30, GW22K-HCA-G30**
Ratings ..... :	**Un=400VAC(3P+N), In=32A, IΔdc=6mA, Ui=500V, Uimp=4kV, Im=500A, Inc=IΔc=1,5kA**

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):

☒	**~~CB~~ Testing Laboratory:**	**Zhejiang Testing & Inspection Institute for Mechanical and Electrical Products Quality Co.,Ltd. (ZTME)**	
Testing location/ address.....:		**No 125 Miaohouwang Road Binjiang District Hangzhou Zhejiang CHINA**	
Tested by (name, function, signature).....:		See cover page	
Approved by (name, function, signature)...:		See cover page	
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 2:**		
Testing location/ address.....:			
Tested by (name + signature) .....:			
Witnessed by (name, function, signature) .:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 3:**		
☐	**Testing procedure: CTF Stage 4:**		
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Witnessed by (name, function, signature) .:			
Approved by (name, function, signature)...:			
Supervised by (name, function, signature) :			

List of Attachments (including a total number of pages in each attachment):

N/A

Summary of testing:

This report is created for acceptance tests, the functional of RDC-MD in EV charge station performed the acceptance test as partial test items of IEC 62955: 2018.

So model GW22K-HCA-G30 was selected as samples to perform the partial test items to cover the other type.

All test items passed.

Tests performed (name of test and test clause):

Test sequence B	page 8
Test sequence C	page 15
Test sequence D	page 17
Test sequence E	page 27
Test sequence F	page 30
Test sequence G	page 32

Testing location:

Zhejiang Testing & Inspection Institute for Mechanical and Electrical Products Quality Co.,Ltd. (ZTME)

Summary of compliance with National Differences (List of countries addressed):

N/A

☐ **The product fulfils the requirements of _____ (insert standard number and edition and delete the text in parenthesis, leave it blank or delete the whole sentence, if not applicable)**

Copy of marking plate:

See the final appliance report CN26FHWJ 001

Test item particulars .....:	
Classification of RDC-DD .....:	RDC-MD
- RDC-MD with mechanical switching in one unit.....:	☐ Yes / ☒ No
- RDC-MD consisting of RDC-M-unit mechanically coupled to a separate protective device .....:	☐ Yes / ☒ No
a) RCBO .....:	☐ Type A (IEC 61009) / ☐ Type F (IEC 62423)
b) RCCB .....:	☐ Type A (IEC 61008) / ☐ Type F (IEC 62423)
c) Circuit breaker .....:	☐ IEC 60898-1
- RDC-MD consisting of RDC-M-module electrically coupled to a separate protective or switching device..:	☒ Yes / ☐ No
a) RCBO .....:	☐ Type A (IEC 61009) / ☐ Type F (IEC 62423)
b) RCCB .....:	☐ Type A (IEC 61008) / ☐ Type F (IEC 62423)
c) Circuit breaker .....:	☐ IEC 60898-1
d) remotely operated switch.....:	☐ contactor / ☒ relay
enclosed.....:	☒ Yes / ☐ No
unenclosed.....:	☐ Yes / ☐ No
IP number.....:	IP depends on final appliance
Number of poles.....:	☒ 2 / ☐ 3 / ☒ 4
Ambient air temperature (°C) .....:	☐ −5 °C to 40 °C / ☒ −25 °C to 40 °C / ☐ ___
Method of mounting .....:	☐ surface-type ☐ flush-type ☒ panel board type ☐ on rail
Method of connection .....:	☒ not associated with the mechanical mounting / ☐ associated with the mechanical mounting
Type of terminal .....:	☒ screw-type (for copper) ☐ screwless type (for copper) ☐ flat quick-connect (for copper) ☐ screw-type (for aluminium)
Rated voltage U_n (V) .....:	400V
Rated operational voltage U_e (V) .....:	400V
Rated insulation voltage U_i (V).....:	500
Rated impulse withstand voltage U_{imp} (V) .....:	4,0kV
Rated current I_n (A).....:	☒ 16A ☐ 20A ☒ 32A ☐63A ☐80A ☐___
Rated DC residual operating current $I_{\Delta dc}$ (A) .....:	0,006A
Rated DC residual on- operating current $I_{\Delta ndc}$ (A).....:	0,003A
Nature of supply.....:	☒ AC ☐ DC
Nature of supply of control circuit .....:	☒ AC ☐ DC
Rated frequency (Hz).....:	☐ 50Hz ☐ 60Hz ☒ 50/60Hz
Rated making and breaking capacity I_m (A).....:	☒ 500A ☐ 10 I_n:____ ☐
Rated conditional short-circuit current I_{nc} (A).....:	☐ 3kA ☐ 4,5kA ☐ 6kA ☐10kA ☐20kA ☒1,5kA Declared by client

Rated conditional residual short-circuit current $I_{\Delta c}$(A)..:	☐ 3kA ☐ 4,5kA ☐ 6kA ☐10kA ☐20kA ☒1,5kA Declared by client
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 .....:	2026.07.28
Date (s) of performance of tests.....:	2026.07.28-2026.09.02
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.**	
Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:	
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).....:	**GoodWe (GuangDe) Power Supply Technology Co., Ltd.** No. 208, Tong Rui East Road, Guangde, Anhui, P.R. China
General product information and other remarks: Refer to report **CN26FHWJ 001**	

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	TEST SEQUENCE B (3 SAMPLES)		—
8	**REQUIREMENTS FOR CONSTRUCTION AND OPERATION**		—
8.3	**Dielectric properties**		—
	RDC-DDs have adequate dielectric properties		P
9.7	**Test of dielectric properties**		—
9.7.7.3	Verification of resistance of the insulation of open contact and basic insulation against an impulse voltage in normal conditions		—
	These tests are not preceded by the humidity treatment described in 9.7.1.		P
	The test is carried out on an RDC-DD 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 RDC-DD under test connected to the impulse generator.		P
	For RDC-DDs with incorporated surge arresters that cannot be disconnected, the shape of the impulses is adjusted without connection of the RDC-DD to the impulse generator.		P
	rated impulse withstand voltage [kV]:	4,0kV	—
	see level of test laboratory [m]	20m	—
	test voltage (acc. Table 22) [kV]:	4,9kV	—
9.7.7.3.2	RDC-DD in opened position (contacts in opened position)		P
	The impulses are applied between:		P
	the line terminals connected together and the load terminals connected together		P
9.7.7.3.3	RDC-DD in closed position		P
	All components bridging the basic insulation disconnected		P
	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

IEC 62955			
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 RDC-DD		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
9.7.7.4	Verification of the behaviour of components bridging the basic insulation		—
	A new RDC-DD sample is tested		P
	Test only performed on RDC-DDs, where components bridging the basic insulation have been disconnected during the impulse voltage test of 9.7.7.3.3		P
	test voltage 1200V+U_0	1600V	P
	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		P
	after test, no component bridging the basic insulation should show a visible alteration.		P
	Then, the equipment is connected to the mains acc. manufacturer's instruction		P
	The RDC-DD shall trip with a test current of 1,25 $I_{\Delta dc}$	[ms]	—
		B1 – 684ms B2 – 683ms B3 – 686ms	P
	Test switch S_2 and RDC-DD in the closed position, test voltage established by closing the test switch S_1.		P
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 9.7.1.3	Test conditions: 48 h in humidity cabinet RH = 91% to 95% T = 20 to 30°C ± 1°C	48h 92-94% 23,1-23,9°C	—
9.7.1.4	The samples show no damage		P

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
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 RDC-DD is in the closed position ..... ≥ 2 MΩ	B1 - B2 - B3 -	N/A
	b) between each pole and the others connected together (electronic components, connected between current path being disconnected)..... ≥ 2 MΩ	B1 - B2 - B3 -	N/A
	c) between all poles connected together and the frame ..... ≥ 5 MΩ	B1 - B2 - B3 -	N/A
	d) between metal parts of the mechanism and the frame ..... ≥ 5 MΩ	B1 - B2 - B3 -	N/A
	e) between the frame and a metal foil in contact with the inner surface of the lining of insulating material ..... ≥ 5 MΩ	B1 - B2 - B3 -	N/A
9.7.3	Dielectric strength of the main circuit measured with an AC voltage (45-65Hz) for 1 min:		—
	a) electronic components disconnected ..... 2000 V	B1 - B2 - B3 -	N/A
	b) electronic components disconnected ..... 2000 V	B1 - B2 - B3 -	N/A
	c) electronic components disconnected ..... 2000 V	B1 - B2 - B3 -	N/A
	d) electronic components disconnected ..... 2000 V	B1 - B2 - B3 -	N/A
	e) electronic components disconnected ..... 2500 V	B1 - B2 - B3 -	N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	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 ..... ≥ 2 MΩ	B1 - ≥550MΩ B2 - ≥550MΩ B3 - ≥550MΩ	P
	2) between each part of the auxiliary circuits which might be isolated from the other parts and the whole of the other parts connected together ..... ≥ 2 MΩ	B1 - ≥550MΩ B2 - ≥550MΩ B3 - ≥550MΩ	P
	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 > 30 ≤ 50 — 1000 > 50 ≤ 110 — 1500 **> 110 ≤ 250 — 2000** > 250 ≤ 500 — 2500	2000V	—
	1) between all auxiliary circuits and the frame	B1 – 2000V B2 – 2000V B3 – 2000V	P
	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	B1 – 2000V B2 – 2000V B3 – 2000V	P
	No flashover or perforation		P
9.7.7.2	**Verification of clearances with the impulse withstand voltage**		—
	If the measurement of clearances of items 2 and 4 in Table 6 shows a reduction of the required length, this test applies.		—
	The test is carried out on an RDC-DD 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 RDC-DD under test connected to the impulse generator.		N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	For RDC-DDs with incorporated surge arresters that cannot be disconnected, the shape of the impulses is adjusted without connection of the RDC-DD to the impulse generator.		N/A
	test performed with:		—
	- surge impedance of the test apparatus ≤500Ω 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 14) [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 RDC-DD		N/A
	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)	B1 - B2 - B3 -	N/A
	c) between all poles connected together and the frame	B1 - B2 - B3 -	N/A
	d) between metal parts of the mechanism and the frame	B1 - B2 - B3 -	N/A
	e) between the frame and a metal foil in contact with the inner surface of the lining of insulating material	B1 - B2 - B3 -	N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	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.		P
9.7.6	**Capability of control circuits connected to the main circuit of withstanding high DC voltages due to insulation measurements**		—
	RDC-DD fixed on metal support in closed position with all control circuits connected as in service.		P
	Open test voltage 600 V_0^{+25} V Maximum ripple 5% Short-circuit current 12 mA_0^{+2}mA Applied for 1 min between each pole and the other poles connected together to the frame.	B1 – 612V B2 – 612V B3 – 612V	P
Table 2	Standard values of maximum break time at a residual direct current equal to s		—
	6 mA / 60 mA / 200 mA		—
	10,0 / 0,3 / 0,1		—
9.9.2.3	Verification of correct operation in case of sudden appearance of smooth DC residual current:		P
	Maximum break times (ms) at:		—
	- 6mA dc ($I_{\Delta dc}$)	B1 – 685ms B2 – 684ms B3 – 681ms	P
	- 60mA dc (10 $I_{\Delta dc}$)	B1 – 128ms B2 – 126ms B3 – 127ms	P
	- 200mA dc	B1 – 76ms B2 – 78ms B3 – 79ms	P
	No value exceeds the relevant specified limiting value		P

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
8.4	**Temperature rise**		—
	Temperature rises do not exceed the limiting values stated in table 8.		P
	Cross-section (mm²)	6mm² (for external conductor)	—
9.8	**Test of temperature-rise**		—
9.8.1	Ambient air temperature (°C)	21,3°C	—
9.8.2	Test current I_n (A) until steady state values are reached.	32A	—
	Four pole RDC-DDs:		N/A
	Current passing through		N/A
	- 3 phase poles (1)		N/A
	- neutral and adjacent pole (2)		N/A
	Parts .....Temperature rise K		—
	Terminals for external connections 65K	B1 – 40,1 B2 – 41,2 B3 – 40,3	P
	External parts liable to be touched during manual operation of the RDC-DD, including operating means of insulating material and metallic means for coupling insulated operating means of several poles 40K	B1 – B2 – B3 –	N/A
	External metallic parts of operating means 25K	B1 - B2 - B3 -	N/A
	Other external parts, including that face of the RDC-DD in direct contact with the mounting surface.....60K	B1 – 15,8K B2 – 16,9K B3 – 17,1K	P
8.13	**Reliability**		—
	RDC-DDs operate reliably even after long service.		P
9.19.3	**Test with 28 cycles at 40 ± 2°C**		—
	Cross-section (mm²).....:	6mm² (for external conductor)	—
	Torque $^2/_3$ (Nm).....:	Nm	—
	Test current I_n (A) .....:	32A	—
	- with current passing .....21 h	21h	P
	- without current .....3 h	3h	P

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	For 4 pole RDC-DDs with 3 overcurrent protected poles only 3 poles loaded		N/A
	At the end of the last period of 21 h with current passing the temperature rise of the terminals shall not exceed 65K	B1 – 47,0K B2 – 48,2K B3 – 49,2K	P
	After cool down the RDC-DD shall trip with a test current of 1,25 $I_{\Delta dc}$	B1 – 652ms B2 – 657ms B3 – 652ms	P
	Test switch S_2 and RDC-DD in the closed position, test voltage established by closing the test switch S_1.		P
9.20	**Verification of ageing of electronic components**		—
	168 h at 40 ± 2°C .....:	40,3°C	—
	Test current I_n (A) .....:	32A(for external conductor)	—
	Cross-section (mm²).....:	6,0mm²	—
	Electronic parts at 1,1 U_n.....:	440V	—
	After cool down:		P
	- electronic parts show no damage		P
	The RDC-DD shall trip with a test current of 1,25 $I_{\Delta dc}$	B1 – 650ms B2 – 651ms B3 – 649ms	P
	Test switch S_2 and RDC-DD in the closed position, test voltage established by closing the test switch S_1		P
	TEST SEQUENCE C (3 samples)		—
8.6	**Electrical endurance**		—
	RDC-DDs shall be capable of performing an adequate number of mechanical and electrical operations		P
9.10	**Verification of mechanical and electrical endurance**		—
	Test is made:		P
	- $I_n \leq 25$ A; 2 s on; 13 s off ..... :		N/A
	- $I_n > 25$ A; 2 s on; 28 s off ..... :	2s on; 28s off	P
	Number of operating cycles: 2000	2000 cycles	P

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	Test voltage Un (V); test current In (A); cos phi 0,85-0,9 ..... :	0,87	—
	Cross-sectional area (mm²) ..... :	6mm² (for external conductor)	—
	RDC-DDs tested at:		—
	- 1000 cycles for manual operation ..... :	C1 – 1000 cycles C2 – 1000 cycles C3 – 1000 cycles	P
	- 500 cycles by using the test device ..... :	C1 – 500 cycles C2 – 500 cycles C3 – 500 cycles	P
	- 500 or 1000 cycles at a current of 60mA ..... :	C1 – 500 cycles C2 – 500 cycles C3 – 500 cycles	P
	After the test:		—
	- no undue wear		P
	- no damage		P
	- no loosening of connections		P
	- no seepage of sealing compound		P
	The RDC-DDs shall trip with a test current of 1,25 $I_{\Delta dc}$ ..... :	C1 – 630ms C2 – 640ms C3 – 636ms	P
	Dielectric strength test at a voltage of 900 V a.c. for 1 min:		—
	a) ..... :	C1 – 900V C2 – 900V C3 – 900V	P
	b) ..... :	C1 – 900V C2 – 900V C3 – 900V	P
	c) ..... :	C1 – 900V C2 – 900V C3 – 900V	P
	d) ..... :	C1 - C2 - C3 -	N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	e) ..... :	C1 - C2 - C3 -	N/A
	TEST SEQUENCE D_0 (3 SAMPLES)		—
	TESTS "D_0"		—
8.5	**Operating characteristics**		—
	For multiple settings of I∆n tests are made for each setting		P
9.9.1	RDC-DD installed as for normal use, test circuit according to fig. 2 or 3		P
	each test is made at 1,1 and 0,85 times the rated line voltage; voltage (V) ..... :	340V, 457V All the relevant tests are done at 50/60Hz. Choose 50Hz as representative frequency.	P
	Unless otherwise specified, the tests are performed with no load at the reference temperature of 20 °C ± 5 °C.	20,5°C	P
Table 2	Standard values of maximum break time at a residual direct current equal to s		—
	6 mA / 60 mA / 200 mA		—
	10,0 / 0,3 / 0,1		—
9.9.2	operation in case of smooth d.c. residual current		P
9.9.2.1	Verification of the correct operation in case of a steady increase of smooth DC residual current:		—
	- steady increase from 2 mA to 6 mA DC within 30 s (mA) ..... :	D1 – 2mA to 6mA D2 – 2mA to 6mA D3 – 2mA to 6mA	P
	- tripping current between 3 mA and 6 mA DC (mA) ..... : **340V**	D1 – 4,5mA – 4,8mA D2 – 4,6mA – 4,8mA D3 – 4,6mA – 4,8mA	P
	440V	D1 – 4,5mA – 4,6mA D2 – 4,6mA – 4,6mA D3 – 4,5mA – 4,6mA	P
9.9.2.2	Verification of the correct operation at closing on a smooth DC residual current		—

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	- the RDC-DD closes on 6 mA DC: no value exceeds the specified limiting value of Table 2 (ms) ..... : **340V**	D1 – 664ms D2 – 668ms D3 – 666ms	P
	440V	D1 – 681ms D2 – 682ms D3 – 682ms	P
9.9.2.3	The test circuit being successively calibrated at each of the values of residual current specified in Table 2, the test switch S2 and the RDC-DD being in the closed position, the test voltage is suddenly established by closing the test switch S1		—
	- maximum break time (ms) at: 6 mA ..... : **340V**	D1 – 658ms D2 – 668ms D3 – 664ms	P
	440V	D1 – 672ms D2 – 665ms D3 – 666ms	P
	- maximum break time (ms) at: 60 mA ..... : **340V**	D1 – 129ms D2 – 127ms D3 – 127ms	P
	440V	D1 – 129ms D2 – 127ms D3 – 129ms	P
	- maximum break time (ms) at: 200mA ..... : **340V**	D1 – 77ms D2 – 77ms D3 – 75ms	P
	440V	D1 – 77ms D2 – 78ms D3 – 76ms	P
	No value exceeds the relevant specified limiting value		P
9.9.2.4	Verification of correct operation with load:		P
	- test current (A): In, the pole under test and one other pole loaded with rated current, the current being established shortly before the test ..... :	32A (for external conductor)	—
	- cross-sectional area (mm²) ..... :	6 mm²	—
	- the RDC-DD closes on 6 mA DC: no value exceeds the specified limiting value of Table 2 (ms) ..... : **340V**	D1 – 655ms D2 – 658ms D3 – 657ms	P

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	440V	D1 – 654ms D2 – 656ms D3 – 659ms	P
	the test switch S2 and the RDC-DD being in the closed position, the test voltage is suddenly established by closing the test switch S1:		—
	- maximum break time (ms) at: 6 mA ..... : **340V**	D1 – 662ms D2 – 669ms D3 – 666ms	P
	440V	D1 – 664ms D2 – 668ms D3 – 664ms	P
	- maximum break time (ms) at: 60 mA ..... : **340V**	D1 – 127ms D2 – 129ms D3 – 129ms	P
	440V	D1 – 127ms D2 – 129ms D3 – 127ms	P
	- maximum break time (ms) at: 200mA ..... : **340V**	D1 – 75ms D2 – 76ms D3 – 78ms	P
	440V	D1 – 78ms D2 – 76ms D3 – 78ms	P
9.9.2.5	Tests at the temperature limits		—
	The RDC-DD shall perform the tests specified in 9.9.2.3 at 1,1 Un under the following conditions, successively:		—
	a) Tests repeated at a temperature of -5 °C or -25 °C: **-25 °C**		—
	The test circuit being successively calibrated at each of the values of residual current specified in Table 2, the test switch S2 and the RDC-DD being in the closed position, the test voltage is suddenly established by closing the test switch S1		P
	-5 °C or -25 °C:	**-25,1 °C**	P
	- maximum break time (ms) at: 6 mA ..... : **340V**	D1 – 667ms D2 – 669ms D3 – 663ms	P
	- maximum break time (ms) at: 6 mA ..... : **440V**	D1 – 660ms D2 – 663ms D3 – 664ms	P

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	- maximum break time (ms) at: 60 mA ..... : **340V**	D1 – 127ms D2 – 129ms D3 – 127ms	P
	- maximum break time (ms) at: 60 mA ..... : **440V**	D1 – 127ms D2 – 124ms D3 – 124ms	P
	- maximum break time (ms) at: 200mA ..... : **340V**	D1 – 76ms D2 – 79ms D3 – 73ms	P
	- maximum break time (ms) at: 200mA ..... : **440V**	D1 – 76ms D2 – 77ms D3 – 72ms	P
	No value exceeds the relevant specified limiting value		P
	b) Tests repeated at a temperature of +40 °C:		—
	The test circuit being successively calibrated at each of the values of residual current specified in Table 2, the test switch S2 and the RDC-DD being in the closed position, the test voltage is suddenly established by closing the test switch S1		
	- test current (A): In at a temperature of +40 °C: until steady state conditions are reached ..... :	55,1°C	—
	- cross-sectional area (mm²) ..... :	6mm² (for external conductor)	—
	- maximum break time (ms) at: 6 mA ..... : **340V**	D1 – 665ms D2 – 666ms D3 – 665ms	P
	- maximum break time (ms) at: 6 mA ..... : **440V**	D1 – 664ms D2 – 665ms D3 – 664ms	P
	- maximum break time (ms) at: 60 mA ..... : **340V**	D1 – 127ms D2 – 129ms D3 – 127ms	P
	- maximum break time (ms) at: 60 mA ..... : **440V**	D1 – 124ms D2 – 125ms D3 – 124ms	P
	- maximum break time (ms) at: 200mA ..... : **340V**	D1 – 75ms D2 – 77ms D3 – 76ms	P
	- maximum break time (ms) at: 200mA ..... : **440V**	D1 – 73ms D2 – 76ms D3 – 76ms	P

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	No value exceeds the relevant specified limiting value		P
9.9.2.6	Verification of the correct operation in case of a residual direct currents which may result from rectifying circuits supplied from two phases		—
	Test acc. figure 4		N/A
a)	Test switch S1 and S2 and RDC-DD in closed position		N/A
	Residual pulsating direct current:		N/A
	- steady increase from max. 2 mA to 7 mA DC within 30 s (mA) :	D1 - D2 - D3 -	N/A
	-tripping current between 3.5 mA and 7 mA DC :	D1 - D2 - D3 -	N/A
b)	The test circuit being successively calibrated at current values of 60 mA and 200 mA, the test switch S1 and the RDC-DD being in the closed position, residual current suddenly establish by closing test switch S2, S3 in position I and II		—
	RDC-DD connected at two-line terminals chosen at random		N/A
	- maximum break time (ms) at: 6 mA ..... :	D1 - D2 - D3 -	N/A
	- maximum break time (ms) at: 60 mA ..... :	D1 - D2 - D3 -	N/A
	- maximum break time (ms) at: 300mA ..... :	D1 - D2 - D3 -	N/A
	No value exceeds the relevant specified limiting value		N/A
9.9.2.7	Verification of the correct operation in case of a residual direct currents which may result from rectifying circuits supplied from three phases		—
	Test acc. figure 5		N/A
a)	Test switch S1 and S2 and RDC-DD in closed position		N/A
	Residual pulsating direct current:		N/A
	- steady increase from max. 2 mA to 6.2 mA within 30 s (mA)..... :	D1 – D2 – D3 –	N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	-tripping current between 3.1 mA and 6.2 mA.....: **340V**	D1 – D2 – D3 –	N/A
	-tripping current between 3.1 mA and 6.2 mA.....: **440V**	D1 – D2 – D3 –	N/A
b)	The test circuit being successively calibrated at current values of 60 mA and 200 mA, the test switch S1 and the RDC-DD being in the closed position, residual current suddenly establish by closing test switch S2, S3 in position I and II		—
	- maximum break time (ms) at: 6 mA .....: **340V**	D1 – D2 – D3 –	N/A
	- maximum break time (ms) at: 6 mA .....: **440V**	D1 – D2 – D3 –	N/A
	- maximum break time (ms) at: 60 mA .....: **340V**	D1 – D2 – D3 –	N/A
	- maximum break time (ms) at: 60 mA .....: **440V**	D1 – D2 – D3 –	N/A
	- maximum break time (ms) at: 200mA .....: **340V**	D1 – D2 – D3 –	N/A
	- maximum break time (ms) at: 200mA .....: **440V**	D1 – D2 – D3 –	N/A
9.9.3	**Verification of non-operating time for alternating residual currents**		—
	A first test is made with switches S1 and S2 and the RDC-MD in the closed position.		—
	Alternating residual current:	30mA	P
	- steady increase from max. 6 mA to 30 mA AC within 30 s, The current of 30 mA shall be kept for 10 s. The RDC-DD shall not trip.....:	D1 – No trip D2 – No trip D3 – No trip	P
	Test circuit being successively calibrated at each of the remaining values of the alternating residual current specified in Table 3., the test switch S_1 and the RDC-DD being in the closed position, residual current suddenly establish by closing test switch S_2,		—

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	- minimum non-operating time (ms) at: 60mA ..... :	D1 – >300ms D2 – >300ms D3 – >300ms	P
	- minimum non-operating time (ms) at: 150mA ... :	D1 - >80ms D2 - >80ms D3 - >80ms	P
	- minimum non-operating time (ms) at: 5A ..... :	D1 - >80ms D2 - >80ms D3 - >80ms	P
	The RDC-MD shall not trip during any of the tests.	D1 – not trip D2 – not trip D3 – not trip	P
	TEST SEQUENCE D1 (3 samples)		—
8.15	Behaviour of the correct operation for three- and four- pole RDC-DD powered on two poles only		—
9.17	Verification of the correct operation in case of three- and four- pole RDC-DDs powered on two poles only		—
	tests acc. 9.9.2.1 and 9.9.2.3		P
	RDC-DD only supplied between neutral terminal and one-phase terminal chosen at random for four-pole devices or		P
	RDC-DD only supplied between 2-phase terminals chosen at random for 3-pole devices		P
	Tests at rated frequency and without load		P
	each test is made at 1,1 and 0,85 times the rated line voltage; voltage (V) ..... :		P
9.9.2.1	Verification of the correct operation in case of a steady increase of smooth DC residual current:		—
	- steady increase from 2 mA to 6 mA DC within 30 s (mA) ..... : 196V	D1 – 4,5-4,6 D2 – 4,3-4,5 D3 - 4,2-4,6	P
	253V	D1 – 4,1-4,2 D2 – 4,2-4,6 D3 – 4,4-4,6	P

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	- tripping current between 3 mA and 6 mA DC (mA)	D1 - D2 - D3 -	N/A
9.9.2.3	The test circuit being successively calibrated at each of the values of residual current specified in Table 2, the test switch S2 and the RDC-DD being in the closed position, the test voltage is suddenly established by closing the test switch S1		—
	- maximum break time (ms) at: 6 mA ..... : 196V	D1 – 152 D2 - 155 D3 - 153	P
	253V	D1 - 148 D2 - 149 D3 - 149	P
	- maximum break time (ms) at: 60 mA ..... : 196V	D1 - 65 D2 - 68 D3 - 67	P
	253V	D1 - 64 D2 - 63 D3 - 61	P
	- maximum break time (ms) at: 200mA ..... : 196V	D1 - 23 D2 - 25 D3 - 22	P
	253V	D1 - 25 D2 - 26 D3 - 22	P
	No value exceeds the relevant specified limiting value		N/A
8.12	Behaviour of RDC-DDs in the case of current surges caused by impulse voltages		—
9.18	Verification of behaviour of RDC-DDs in case of current surges caused by impulse voltages		—
9.18.1	Current surge test for all RDC-DDs (0,5µs/100kHz ring wave test)		P
	One pole of the RDC-DD is submitted to 10 applications of a surge current according to the following requirements:		P
	- peak value: 200 A + 10/0%		P
	- virtual front time: 0,5 µs ± 30%		P
	- period of the following oscillatory wave: 10 µs ± 20%		P
	- each successive reverse peak: about 60% of the preceding peak		P

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	The polarity shall be inverted after every two applications		P
	The interval between two consecutive applications shall be about 30 s		P
	During the test the RDC-DD shall not trip ..... :	D1 – 203A D2 – 203A D3 – 203A	P
	- break time (ms) at: IΔdc ..... :	D1 – 659ms D2 – 645ms D3 – 643ms	P
9.18.2	Verification of behaviour at surge currents up to 3000A (8/20μs surge current)		—
9.18.2.1	Test conditions		P
	One pole of the RDC-DD is submitted to 10 applications of a surge current according to the following requirements:		P
	Peak value: 3000A +10/-0%		P
	Virtual front time: 0,8μs ± 20%		P
	Virtual time of half value: 20μs ± 20%		P
	Peak of reverse current: less than 30 % of peak value		P
	The polarity shall be inverted after every two applications		P
	The interval between two consecutive applications shall be about 30 s		P
9.18.2.2	During the test the RDC-DD shall not trip	D1 – 1,5kA D2 – 1,5kA D3 – 1,5kA	P
	- break time (ms) at IΔdc ..... :	D1 – 646ms D2 – 648ms D3 – 647ms	P
8.11	Test device		—
	An RDC-DD shall be provided with a manual or an automatically initiated test function or both that checks the residual DC detection circuit.		P
	Where provided the automatic test function shall be performed at every switch on and at intervals not exceeding at least once a day.		P
	During automatic testing, it is not required to open the contacts.		P

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	In the event that a malfunction is detected during automatic testing, the RDC-DD shall cause disconnection of the supply to the EV.		P
	The protective conductor of the installation shall not become live when the test function is initiated and it shall not be possible to energize the circuit on the load side when the RDC-DD is in the open position and connected as in normal use.		P
9.16	Verification of the operation of the test device at the limits of rated voltage:		—
	a) RDC-DD at 0,85 times the rated voltage, test device actuated 25 times at intervals of 5 s ..... :	D1 – 340V D2 – 340V D3 – 340V	P
	b) test a) repeated at 1,1 times the rated voltage :	D1 – 440V D2 – 440V D3 – 440V	P
	c) test b) repeated, but only once, the operating means of the test device being held in the closed position for 30 s ..... :	D1 – 30s D2 – 30s D3 – 30s	P
	RDC-DD operated at each test ..... :	D1 - D2 - D3 -	P
	No change impairing further use ..... :	D1 - D2 - D3 -	P
	In order to check that the ampere-turns due to the operations of the test device are less than 10 times the ampere-turns produced by a residual current equal to IΔdc, at 0,85 times the rated voltage, the impedance of the circuit of the test device is measured and the test current is calculated, taking into account the configuration of the circuit of the test device.		P
	If, for such verification, the dismantling of the RDC-DD is necessary, a separate sample shall be used.		P
8.8	Resistance to mechanical shock and impact		—
	RDC-DDs shall have adequate mechanical behaviour so as to withstand the stresses imposed during installation and use		P
9.12.1	Mechanical shock		P
	Mechanical shock: 50 falls of 40 mm on one side; 50 falls on opposite side C turned through 90°; 50 falls on one side; 50 falls on opposite side		P

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	No opening of RDC-DD during the test ..... :	D1 - OK D2 - OK D3 - OK	P
9.12.2	Mechanical impact		—
9.12.2.2	Impact test (10 blows, height 10 cm): no damage :	D1 – 10 blows, 10cm D2 – 10 blows, 10cm D3 – 10 blows, 10cm	P
9.12.2.3	RDC-DD s for rail mounting downward vertical force of 50 N for 1 min, upward vertical force of 50 N for 1 min		P
	RDC-DD shall not become loose during test and no damage impairing its further use ..... :	D1 – No damage D2 – No damage D3 – No damage	P
	TEST SEQUENCE E (3 SAMPLES)		
8.7	**Performance at short-circuit currents**		—
9.11.2.3	Verification of the coordination between the RDC-DD and the SCPD		—
	a) Verification of the coordination at the rated conditional short-circuit current (I_{nc})		—
	Verification of the coordination at the rated conditional short-circuit current (A): I_{nc} ..... :	1,5kA	—
	Test circuit according to figure ..... :	figure 6	—
	Point of test circuit which is directly earthed ..... :		—
	Grid distance "a" (mm) ..... :	50mm	—
	Silver wire diameter (mm) or fuse ..... :	0,1mm	—
	Prospective current (A) ..... :	1,5kA	—
	Prospective current obtained (A) ..... :	1,51kA	—
	Power factor ..... :	0,93-0,98	—
	Power factor obtained ..... :	0,96	—
	Point of initiation: 45° ± 5°	45°	P
	Verification of I^2t (kA^2s) and Ip (kA) prior to testing ((≥1x ≤1,1x values of table 16), RDC-DD replaced by a connection having negligible impedance	I^2t = 1,48 kA^2s Ip = 0,92 kA	P
	Test sequence: O-t-CO		P

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	I^2t (kA²s); I_p (kA) ..... :	E1 – 1,45 kA²s, 0,92kA E2 – 1,22 kA²s, 0,86kA E3 – 1,48 kA²s, 0,92kA	P
	During tests no endangering of operator, no permanent arcing, no flashover and no melting of fuse F		P
	After the tests no damage impairing further use		P
9.7.3	Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:		—
	a) ..... :	E1 – 800V, 1min E2 – 800V, 1min E3 – 800V, 1min	P
	b) ..... :	E1 – 800V, 1min E2 – 800V, 1min E3 – 800V, 1min	P
	c) ..... :	E1 – 800V, 1min E2 – 800V, 1min E3 – 800V, 1min	P
	d) ..... :	E1 - E2 - E3 -	N/A
	e) ..... :	E1 - E2 - E3 -	N/A
	No flashover or breakdown ..... :	E1 – OK E2 – OK E3 – OK	P
	Making and breaking In at Un .....:(for MCB)	E1 – 400V, E2 – 400V, E3 – 400V,	P
	The RDC-DD shall trip with a test current of 1,25 $I_{\Delta dc}$ (ms) ..... :	E1 – 636ms E2 – 635ms E3 – 632ms	P
	The polyethylene sheet shows no holes		P
9.11.2.2	Verification of the rated making and breaking capacity (A): I_m ..... :	500A	—

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	Test circuit according to figure ..... :	figure 6	—
	Residual operating current (A): 10 $I\Delta n$ ..... :	60mA	—
	Point of test circuit which is directly earthed ..... :		—
	Grid distance "a" (mm) ..... :	50mm	—
	Prospective current (A) ..... :	500A	—
	Prospective current obtained (A) ..... :	515A	—
	Power factor ..... :	0,93-0,98	—
	Power factor obtained ..... :	0,96	—
	Point of initiation: 45° ± 5°	45°	P
	Test sequence: CO-t-CO-t-CO		P
	During tests no endangering of operator, no permanent arcing, no flashover and no melting of fuse F		P
	After the tests no damage impairing further use		P
9.7.3	Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:		—
	a) ..... :	E1 – 800V, 1min E2 – 800V, 1min E3 – 800V, 1min	P
	b) ..... :	E1 – 800V, 1min E2 – 800V, 1min E3 – 800V, 1min	P
	c) ..... :	E1 – 800V, 1min E2 – 800V, 1min E3 – 800V, 1min	P
	d) ..... :	E1 - E2 - E3 -	N/A
	e) ..... :	E1 - E2 - E3 -	N/A
	No flashover or breakdown	E1 – OK E2 – OK E3 – OK	P

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	Making and breaking *I*n at *U*n .....: (for MCB)	E1 – 400V, 32A E2 – 400V, 32A E3 – 400V, 32A	P
	The RDC-DD shall trip with a test current of 1,25 $I_{\Delta dc}$ (ms) ..... :	E1 – 636ms E2 – 635ms E3 – 635ms	P
	The polyethylene sheet shows no holes		P
	TEST SEQUENCE F (3 SAMPLES)		
8.7	**Performance at short-circuit currents**		—
9.11.2.3	Verification of the coordination between the RDC-DD and the SCPD		—
	b) Verification of the coordination at the rated making and breaking capacity (A): Im ..... :	500A	—
	Test circuit according to figure ..... :	figure 6	—
	Point of test circuit which is directly earthed ..... :	60mA	—
	Grid distance "a" (mm) ..... :		—
	Silver wire diameter (mm) or fuse ..... :	50mm	—
	Prospective current (A) ..... :	500A	—
	Prospective current obtained (A) ..... :	515A	—
	Power factor ..... :	0,93-0,98	—
	Power factor obtained ..... :	0,96	—
	Point of initiation: 45° ± 5°	45°	P
	Test sequence: O-t-CO-t-CO		P
	During tests no endangering of operator, no permanent arcing, no flashover and no melting of fuse F		P
	After the tests no damage impairing further use		P
9.7.3	Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:		—
	a) ..... :	F1 – 800V, 1min F2 – 800V, 1min F3 – 800V, 1min	P
	b) ..... :	F1 – 800V, 1min F2 – 800V, 1min F3 – 800V, 1min	P

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	c) ..... :	F1 – 800V, 1min F2 – 800V, 1min F3 – 800V, 1min	P
	d) ..... :	F1 - F2 - F3 -	N/A
	e) ..... :	F1 - F2 - F3 -	N/A
	No flashover or breakdown ..... :	F1 – OK F2 – OK F3 – OK	P
	Making and breaking In at Un ..... :	F1 – 400A, 32A F2 – 400A, 32A F3 – 400A, 32A	P
	The RDC-DD shall trip with a test current of 1,25 $I_{\Delta dc}$ (ms) ..... :	F1 – 638ms F2 – 639ms F3 – 638ms	P
	The polyethylene sheet shows no holes		P
9.11.2.3	c) Verification of the coordination at the rated conditional residual short-circuit current (A): IΔc . :	1,5kA	—
	Test circuit according to figure ..... :	figure 6	—
	Point of test circuit which is directly earthed ..... :		—
	Grid distance "a" (mm) ..... :	50mm	—
	Silver wire diameter (mm) or fuse ..... :	0,12mm	—
	Prospective current (A) ..... :	1,5kA	—
	Prospective current obtained (A) ..... :	1,51kA	—
	Power factor ..... :	0,93-0,98	—
	Power factor obtained ..... :	0,96	—
	Point of initiation: 45° ± 5°	45°	P
	Verification of I^2t (kA^2s) and Ip (kA) prior to testing (≥1x ≤1,1x values of table 15), RDC-DD replaced by a connection having negligible impedance	I^2t = 3,74 kA^2s Ip = 1,25 kA	P
	Test sequence: O-t-CO-t-CO		P
	I^2t (kA^2s); Ip (kA) ..... :	F1 – 3,04 kA^2s, 0,98kA F2 – 3,19 kA^2s, 1,01kA F3 – 2,91 kA^2s, 0,96kA	P

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	During tests no endangering of operator, no permanent arcing, no flashover and no melting of fuse F		P
	After the tests no damage impairing further use		P
9.7.3	Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:		—
	a) ..... :	F1 – 800V, 1min F2 – 800V, 1min F3 – 800V, 1min	P
	b) ..... :	F1 – 800V, 1min F2 – 800V, 1min F3 – 800V, 1min	P
	c) ..... :	F1 – 800V, 1min F2 – 800V, 1min F3 – 800V, 1min	P
	d) ..... :	F1 - F2 - F3 -	N/A
	e) ..... :	F1 - F2 - F3 -	N/A
	No flashover or breakdown ..... :	F1 – OK F2 – OK F3 – OK	P
	Making and breaking In at Un ..... :	F1 – 400V, 32A F2 – 400V, 32A F3 – 400V, 32A	P
	The RDC-DD shall trip with a test current of 1,25 $I_{\Delta dc}$ (ms) ..... :	F1 – 638ms F2 – 639ms F3 – 638ms	P
	The polyethylene sheet shows no holes		P
	TEST SEQUENCE G (3 SAMPLES)		
9.19	**Verification of reliability**		—
9.19.2	Climatic test based on Clause 4 of IEC 60068-2-3:2000 and IEC 60068-3-4:		—
	- number of cycles: 28		P
	- test temperature: upper temperature 55 °C ± 2 °C	55,6°C	P
	Initial verification:		P

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
9.9.2.3	- maximum break time at $I_{\Delta dc}$ (ms) ..... :	G1 – 38ms G2 – 36ms G3 – 39ms	P
	No value exceeds the specified limiting value		P
	No tripping during tests		P
	Climatic test: no tripping during 28 cycles test .... :	G1 – No tripping G2 – No tripping G3 – No tripping	P
	Final verification: the RDC-DD shall trip with a test current of 1,25 $I_{\Delta dc}$ (ms) ..... :	G1 – 639ms G2 – 635ms G3 – 639ms	P

IEC 62955			
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_1	6 8.1.1 8.1.2 9.3 8.1.3 9.15 9.4 9.5 9.6 9.13 8.1.3 9.25	Marking General Mechanism Indelibility of marking Clearance and creepage distances (external parts only) Trip free mechanism Reliability of screws, current-carrying parts and connections Reliability of terminals for external conductors Protection against electric shock Resistance to heat Clearances and creepage distances (internal parts) Resistance to rusting
A_2	9.14	Resistance to abnormal heat and to fire
B	9.7.7.3 9.7.7.4 b) 9.7.1 9.7.2 9.7.3 9.7.4 9.7.7.2 9.7.5 9.7.6 9.8 9.19.3 9.20	Resistance of the insulation of open contacts and basic insulation against an impulse voltage in normal conditions Verification of the behaviour of components bridging the basic insulation Resistance to humidity Insulation resistance of the main circuit Dielectric strength of the main circuit Insulation resistance an dielectric strength of auxiliary circuits Verification of clearances with the impulse withstand voltage Secondary circuit of detection transformers Capability of control circuits connected to the main circuits etc. Temperature-rise Reliability at 40°C Ageing of electronic components
C	9.10	Mechanical and electrical endurance
D D_0	9.9	Residual operating characteristics
D D_1	9.17 9.18 9.16 9.12	Three- and four- pole RDC-DD powered on two poles only Behaviour in the case of surge currents. Test device Resistance to mechanical shock and impact
E	9.11.2.3 a)	Coordination at I_{nc}
	9.11.2.2	Performance at I_m
F	9.11.2.3 b)	Coordination at I_m
	9.11.2.3 c)	Coordination at $I_{\Delta c}$
G	9.19.2	Reliability (climatic tests)
H a)	IEC 61543 Table 4 -T1.1 IEC 61543 Table 4 -T1.2 IEC 61543 Table 5 -T2.3	Harmonics, interharmonics Signalling voltage Surges

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict

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) 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) This test may be done on separate samples.		

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict

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

Test sequence [a]	Number of samples	Minimum number of accepted samples [b]	Maximum number of samples for repeated tests [c]
A_1	1	1	--
A_2	3	2	3
B	3	2	3
C	3	2	3
D	3	2 [d]	3
E	3	2 [d]	3
F	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) All samples shall meet the requirements in 9.9.2.1, 9.9.2.2, 9.9.2.3, 9.9.2.4 and 9.9.3, as appropriate. In addition, permanent arcing or flashover between poles or between poles and frame shall not occur in any sample during tests of 9.11.2.2, 9.11.2.3 a), 9.11.2.3 b) or 9.11.2.3 c).

e) At the manufacturer's request, the same set of samples may be subjected to more than one of these test sequences.

IEC 62955			
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	1 max. rating I_n	1 max. rating I_n
A_2	3 max. rating I_n	3 max. rating I_n	3 max. rating I_n
B	3 max. rating I_n	3 max. rating I_n	3 max. rating I_n
C	3 max. rating I_n	3 max. rating I_n	3 max. rating I_n
D_0 + D_1	3 max. rating I_n	3 max. rating I_n	3 max. rating I_n
D_0		1 with rated $I_{\Delta dc}$	
E	3 max. rating I_n	3 max. rating I_n	3 max. rating I_n
F	3 max. rating I_n 3 min. rating I_n	3 max. rating I_n 3 min. rating I_n	3 max. rating I_n 3 min. rating I_n
G	3 max. rating I_n 3 min. rating I_n	3 max. rating I_n 3 min. rating I_n	3 max. rating I_n 3 min. rating I_n
H			3 [g] samples of the same I_n chosen at random
I			3 [g] samples of the same I_n chosen at random
J			3 [g] samples of the same I_n chosen at random

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 shall be acceptable.
b If only 3-pole or 4-pole RDC-DDs are submitted, this column shall also apply to a set of samples with the smallest number of poles.
c Also applicable to 1-pole RDC-DDs with uninterrupted neutral and to 2-pole RDC-DDs with 1 protected pole.
d Also applicable to 3-pole RDC-DDs with 2 protected poles.
e Also applicable to 3-pole RDC-DDs with uninterrupted neutral and to 4-pole RDC-DDs with 3 protected poles.
f This column is omitted when 4-pole RDC-DDs have been tested.
g Only the highest number of current paths.
h If a 3-pole RDC-DD with 4 current paths and a 4-pole RDC-DD are submitted, then only the 4-pole RDC-DD is tested, with exception of the test of 9.8 of test sequence B, for which both types are submitted to the test.

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict

	ANNEX B (NORMATIVE) **DETERMINATION OF CLEARANCES AND CREEPAGE DISTANCES**	—
B.1	**General**	P
	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**	P
	If necessary, the manufacturer shall indicate the intended orientation of the equipment or component in order that creepage distances are not adversely affected by the accumulation of pollution for which they were not designed.	P
B.3	**Creepage distances where more than one material is used**	N/A
	A creepage distance may be split in several portions of different materials and/or have different pollution degrees if one of the creepage distances is dimensioned to withstand the total voltage or if the total distance is dimensioned according to the material having the lowest CTI.	N/A
B.4	**Creepage distances split by floating conductive part**	N/A
	A creepage distance may be split into several parts, made with insulation material having the same CTI, including or separated by floating conductors as long as the sum of the distances across each individual part is equal or greater than the creepage distance required if the floating part did not exist. 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).	N/A
B.5	**Measurement of creepage distances and clearances**	P
	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 Example 1 to 11. These cases do not differentiate between gaps and grooves or between types of insulation.	P
	The following assumptions are made:	P
	- 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 3);	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 62955			
Clause	Requirement + Test	Result - Remark	Verdict

	ANNEX C (NORMATIVE) 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 ± 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 ± 0,05 g/cm³ 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 in accordance with 9.11.2.1 f 1).	P

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict

	ANNEX D (NORMATIVE) ROUTINE TESTS				—
D.1	**General**				—
	The tests specified in this standard are intended to reveal, as far as safety is concerned, unacceptable variations in material or manufacture.				P
	In general, further tests have to be made to ensure that every RDC-DD conforms with the samples that withstood the tests of this standard, according to the experience gained by the manufacturer.				P
D.2	**Tripping test**				—
	A DC residual current is passed through the RDC-DD. The RDC-DD shall trip at a DC residual current chosen from Table 2 within the specified time.	[ms]	[ms]	[ms]	P
	The test current shall be applied once on each RDC-DD.				P
D.3	**Electric strength test**				—
	A voltage of substantially sine-wave form of 1 500 V having a frequency of 50 Hz/60 Hz is applied for 1 s as follows:				P
	- with the RDC-DD in the open position, between each pair of terminals which are electrically connected together when the RDC-DD is in the closed position;				P
	- with the RDC-DD in the open position, either between all incoming terminals of poles in turn or between all outgoing terminals at poles in turn, depending on the position of the incorporated electronic components.				P
	No flashover or breakdown shall occur				P
D.4	**Performance of the test device**				—
	With the RDC-DD provided with a manual test device in the closed position, and connected to a supply at the appropriate voltage, the test device, when operated, shall open the RDC-DD.				P
	RDC-DD provided with an automatic test device the manufacturer shall give a convenient method of verification.				P

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict

	ANNEX I (NORMATIVE) PARTICULAR REQUIREMENTS FOR RDC-DDS WITH SCREWLESS TYPE TERMINALS FOR EXTERNAL COPPER CONDUCTORS		
I.1	**Scope**		—
	This annex applies to RDC-DDs within the scope of Clause 1, equipped with screwless terminals, for current not exceeding 20 A primarily suitable for connecting unprepared (see I.3.6) copper conductors of cross-section up to 4 mm^2.		—
I.6	**Marking and other product information**		—
	In addition to clause 6:		N/A
	Universal terminals:		N/A
	– no markings		N/A
	Non-universal terminals:		N/A
	– terminals for rigid-solid conductors marked by “sol”		N/A
	– terminals for rigid (solid and stranded) conductors marked by “r”		N/A
	– terminals for flexible conductors marked by “f”		N/A
	Marking on the RDC-DD or		N/A
	if the space available is not sufficient on the smallest package unit or in technical information		N/A
	Marking indicating the length of insulation to be removed before insertion of the conductor into the terminal shown on the RDC-DD		N/A
	Manufacturer shall provide information in his literature, on the maximum number of conductors which may be clamped.		N/A
I.7	**Standard conditions for operating in service and for installation**		—
I.8	**Requirements for construction and operation**		—
I.8.1	clause 8 applies with the following modifications: in 8.1.5, only 8.1.5.1, 8.1.5.2, 8.1.5.3, 8.1.5.6 and 8.1.5.7 apply		N/A
	Compliance is checked by inspection and by the tests of I.9.1 and I.9.2 of this annex, instead of 9.4 and 9.5.		N/A
I.8.2	**Connection or disconnection of conductors**		N/A
	The connection or disconnection of conductors shall be made:		N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	- by the use of a general purpose tool or by a convenient device integral with the terminal to open it and to assist the insertion or the withdrawal of the conductors (e.g. for universal terminals)		N/A
	- or, for rigid conductors by simple insertion. For the disconnection of the conductors an operation other than a pull on the conductor shall be necessary (e.g. for push-wire terminals).		N/A
	Universal terminals shall accept rigid (solid or stranded) and flexible unprepared conductors.		N/A
	Non-universal terminals shall accept the types of conductors declared by the manufacturer.		N/A
	Compliance is checked by inspection and by the tests of I.9.2 and I.9.3.		N/A
I.8.3	**Dimensions of connectable conductors**		N/A
	The dimensions of connectable conductors are given in Table I.1.		N/A
	The ability to connect these conductors shall be checked by inspection and by the tests of I.9.2 and I.9.3.		N/A
I.8.4	**Connectable cross-sectional areas**		N/A
	nominal cross-sections to be clamped acc. table I.2		N/A
	compliance checked by inspection and tests of I.9.2 and I.9.3.		N/A
I.8.5	**Insertion and disconnection of conductors**		N/A
	The insertion and disconnection of the conductors shall be made in accordance with the manufacturer's instructions.		N/A
	Compliance is checked by inspection.		N/A
I.8.6	**Design and construction of terminals**		N/A
	terminals so designed and constructed that:		—
	- each conductor clamped individually		N/A
	- during operation of connection or disconnection the conductors can be connected or disconnected either at the same time or separately		N/A
	- inadequate insertion of the conductor is avoided		N/A
	It shall be possible to clamp securely any number of conductors up to the maximum provided for		N/A
	compliance checked by inspection and tests of I.9.2 and I.9.3.		N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
I.8.7	**Resistance to ageing**		N/A
	compliance checked by the test of I.9.4.		N/A
I.9	**Tests**		—
I.9.1	Clause 9 applies, by replacing 9.4 and 9.5 by the by the tests in I.9.2, I.9.3 and I.9.4.		N/A
I.9.2	**Test of reliability of screwless terminals**		—
I.9.2.1	**Reliability of screwless system**		N/A
	three terminals of poles of new samples, with copper conductors of the rated cross sectional area in accordance with Table I.2, types of conductors in accordance with I.8.2.		N/A
	The connection and subsequent disconnection shall be made five times with:		N/A
	Min. cross-section (mm²).....:	mm²	N/A
	Max. cross-section (mm²).....:	mm²	N/A
	new conductors used each time, except for the fifth time, when the conductor used for the fourth insertion is clamped at the same place. Before insertion into the terminal, wires of stranded rigid conductors re-shaped and wires of flexible conductors twisted to consolidate the ends.		N/A
	After each insertion, the conductor being inserted rotated 90 ° along its axis at the level of the clamped section and subsequently disconnected.		N/A
	After tests, the terminal not damaged in such a way as to impair its further use.		N/A
I.9.2.2	**Test of reliability of connection**		N/A
	three terminals of poles of new samples, with copper conductors of the rated cross sectional area in accordance with Table I.2, types of conductors in accordance with I.8.2.		N/A
	Before insertion into the terminal, wires of stranded rigid conductors and flexible conductors reshaped and wires of flexible conductors twisted to consolidate the ends.		N/A
	possible to fit the conductor into the terminal without undue force in the case of universal terminals and with the force necessary by hand in the case of push-wire terminals.		N/A
	conductor pushed as far as possible into the terminal or inserted so that adequate connection is obvious.		N/A
	Min. cross-section (mm²).....:	mm²	N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict

	Max. cross-section (mm²) ..... :	mm²			N/A
	After the test, no wire of the conductor shall have escaped outside the terminal.				N/A
I.9.3	**Tests of reliability of terminals for external conductors: mechanical strength**				N/A
	three terminals of poles of new samples fitted with new conductors of the type and of the minimum and maximum cross-sectional areas acc. Table I.2.				N/A
	Min. cross-section (mm²) ..... :	mm²			N/A
	Max. cross-section (mm²) ..... :	mm²			N/A
	wires of stranded rigid conductors and flexible conductors reshaped and wires of flexible conductors twisted to consolidate the ends.				N/A
	Pull for 1 min, min. cross-section (N) ..... :	N			N/A
	Pull for 1 min, max. cross-section (N) ..... :	N			N/A
	During the test, the conductor shall not slip out of the terminal.				N/A
I.9.4	**Cycling test**				N/A
	Universal, rigid conductors - 3 samples Universal, flexible conductors - 3 samples				N/A
	Non-universal, solid conductors - 3 samples				N/A
	Non-universal, rigid (solid) stranded conductors - 3 samples Non-universal, rigid (stranded) stranded conductors - 3 samples				N/A
	Non-universal, flexible conductors - 3 samples				N/A
	Cross-section (mm²) ..... :	mm²			N/A
	Test current I_N (A) ..... :	A			N/A
	samples subjected to 192 temperature cycles				N/A
	Voltage drop after 192 cycles:				—
	voltage drop, measured at each terminal, at the end of the 192nd cycle, exceeded not the smaller of the two following values:				N/A
	– 22,5 mV				N/A
	– 1,5 times the value measured after the 24th cycle				N/A
		sample 1	sample 2	sample 3	—
		[mV]	[mV]	[mV]	—
	- rigid solid conductors ..... :				N/A

IEC 62955					
Clause	Requirement + Test	Result - Remark			Verdict
	- rigid stranded conductors..... :				N/A
	- flexible conductors ..... :				N/A
	Voltage drop after 24th cycle:				—
		sample 1	sample 2	sample 3	—
		[mV]	[mV]	[mV]	—
	- rigid solid conductors ..... :				N/A
	- rigid stranded conductors..... :				N/A
	- flexible conductors ..... :				N/A
	after this test: no changes evidently impairing further use, such as cracks, deformations or the like.				N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict

	ANNEX J (NORMATIVE) PARTICULAR REQUIREMENTS FOR RDC-DD S WITH FLAT QUICK-CONNECT TERMINATIONS		
J.1	**Scope**		—
	This annex applies to RDC-DDs within the scope of Clause 1, equipped with flat quickconnect terminations consisting of a male tab (see J.3.2) with nominal width 6,3 mm and thickness 0,8 mm, to be used with a mating female connector for connecting electrical copper conductors according to the manufacturer's instructions, for rated currents up to and including 16 A.		—
J.6	**Marking and other product information**		—
	in addition to clause 6, addition after the lettered item k):		—
	Information regarding the female connector acc. to IEC 61210 and type of conductor to be used shall be given in the manufacturers' instructions:		N/A
	i) manufacturer´s name or trade mark		N/A
	m) type reference		N/A
	n) information on cross-sections of conductors and colour code of insulated female connectors (see Table J.1)		N/A
	o) the use of only silver or tin-plated copper alloys		N/A
J.8	**Requirements for construction and operation**		—
J.8.1	Clause 8 applies, with the following exceptions:		N/A
	Replace the contents of 8.1.3 with the text in J.8.2.		N/A
J.8.2	**Clearances and creepage distances (see Annex B)**		N/A
	Subclause 8.1.3 applies, the female connectors being fitted to the male tabs of the RDC-DD.		N/A
	Replace the contents of 8.1.5 by the following text:		N/A
J.8.3	**Terminals for external conductors**		N/A
J.8.3.1	Male tabs and female connectors shall be of a metal having mechanical strength, electrical conductivity and resistance to corrosion adequate for their intended use.		N/A
J.8.3.2	The nominal width of the male tab is 6,3 mm and the thickness 0,8 mm, applicable to rated currents up to and including 16 A. NOTE 1:The use for rated currents up to and including 20 A is accepted in BE, FR, IT, PT, ES and US		N/A
	The dimensions of the male tab shall comply with those specified in Table J.3 and in figures J.2, J.3,		N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict

	J.4 and J.5						
J.8.3.3	Male tabs shall be securely retained						N/A
	Compliance is checked by the mechanical overload test of J.9.2.						N/A
		Dimensions of tabs according Table J.3		Measured in mm			—
		Minimum [mm]	Maximum [mm]				—
A	Dimple	0,7	1,0				N/A
	Hole	0,5	1,0				N/A
B	Dimple	7,8 min					N/A
	Hole	7,8 min					N/A
C	Dimple	0,77	0,84				N/A
	Hole	0,77	0,84				N/A
D	Dimple	6,20	6,40				N/A
	Hole	6,20	6,40				N/A
E	Dimple	3,6	4,1				N/A
	Hole	4,3	4,7				N/A
F	Dimple	1,6	2,0				N/A
	Hole	1,6	2,0				N/A
J	Dimple	8°	12°				N/A
	Hole	8°	12°				N/A
M	Dimple	2,2	2,5				N/A
	Hole	---	---				—
N	Dimple	1,8	2,0				N/A
	Hole	---	---				—
P	Dimple	0,7	1,8				N/A
	Hole	0,7	1,8				N/A
Q	Dimple	8,9 min	---				N/A
	Hole	8,9 min	---				N/A
	Dimensions of the female connector which may be fitted-on are given in Figure J.6 and in Table J.4.						N/A
				--	request acc. table K.3	measured value	—
				B_3 max	7,8mm		N/A
				L_2 max	3,5mm		N/A
J.9	**Tests**						—

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
J.9.1	clause 9 applies with the following modifications:		N/A
	replace the contents of 9.5 by the following text:		N/A
J.9.2	**Mechanical overload-force**		N/A
	Test done on 10 terminals of RDC-DDs, mounted as in normal use when wiring takes place.		N/A
	Axial push force, and successively the axial pull force gradually applied to the male tab integrated in the RDC-DD		N/A
	Push 96N		N/A
	Pull 88N		N/A
	No damage occurred to the tab or to the RDC-DD in which the tab is integrated.		N/A
	addition to 9.8.3:		N/A
	Fine -wire thermocouples shall be placed in such a way as not to influence the contact or the connection area. An example of placement is shown in fig J.1		N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict

	ANNEX K (NORMATIVE) SPECIFIC REQUIREMENTS FOR RDC-DD S WITH SCREW-TYPE TERMINALS FOR EXTERNAL UNTREATED ALUMINIUM CONDUCTORS AND WITH ALUMINIUM SCREW-TYPE TERMINALS FOR USE WITH COPPER OR WITH ALUMINIUM CONDUCTORS		
K.6	**Marking and other product information**		—
	In addition to clause 6 the following apply:		N/A
	Terminal marking according table K.1, on the RDC-DD, near the terminals		N/A
	Conductor types accepted:		N/A
	Copper only	☐ None	N/A
	Aluminium only	☐ “Al”	N/A
	Aluminium and copper	☐ “Al/Cu”	N/A
	Other information concerning the number of conductors, screw torque (if different from table 11) and cross-section shall be indicated on the RDC-DD	Nm mm²	N/A
K.7	**Standard conditions for operation in service**		—
	Clause 7 applies		N/A
K.8	**Constructional requirements**		—
	Clause 8 applies with the following exceptions:		N/A
8.1.5.2	add the following text at the end of 8.1.5.2:		N/A
	For connection of aluminium conductors, RDC-DD s shall be provided with screw-type terminals allowing the connection of conductors having nominal cross-sections as shown in table K.2		N/A
	Terminals for the connection of aluminium conductors and terminals of aluminium for the connection of copper or aluminium conductors shall have mechanical strength adequate to withstand the tests of 9.4, with the test conductors tightened with the torque indicated in table 11, or with the torque specified by the manufacturer, which shall never be lower than that specified in table 11.		N/A
	Compliance is checked by inspection, by measurement and by fitting in turn one conductor of the smallest and one of the largest cross-section areas as specified		N/A
8.1.5.4	replace the text of 8.1.5.4 by the following:		N/A
	Terminals shall allow the conductors to be connected without special preparation		N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	Compliance is checked by inspection and by the tests of K.9		N/A
K.9	**Tests**		—
K.9.1	Clause 9 applies with the following modifications/additions:		N/A
	For the tests which are influenced by the material of the terminal and the type of conductor that can be connected, the test conditions of table K.3 are applied		N/A
	Additionally the test of K.9.2 is carried out on terminals separated from the RDC-DD		N/A
K.9.2	**Test conditions**		N/A
	Subclause 9.1 applies, except that the Al conductors to be connected are taken from Table K.5.		N/A
K.9.3	**Current cycling test**		N/A
	This test is carried out on separate terminals		N/A
K.9.3.3	Test arrangement		N/A
	The general arrangement of the samples shall be as shown in figure K.1		N/A
	90 % of torque stated by the manufacturer or selected in Table 11 used for the specimens	torque: Nm	N/A
	The test is carried out with conductors according to Table K.5. The length of the test conductor from the point of entry to the screw-type terminal specimens to the equalizer (see K.3.3) shall be as in Table K.6.	cross-section: mm^2 minimum conductor length: mm	N/A
	Cross section of equalizer not greater than that given in table K.7	max. cross-section: mm^2	N/A
K.9.3.5	Test method and acceptance criteria		N/A
	Test loop subjected to 500 cycles of 1h current-on and 1h current-off, starting at an a.c. current value of 1,12 times the test current value determined in table K.8	test current: A	N/A
	Near the end of each current-on period of the first 24 cycles, the current shall subsequently be adjusted to raise the temperature of the reference conductor to 75°C		N/A
	At the end of the 25^{th} cycle the test current shall be adjusted the last time and the stable temperature shall be recorded as the first measurement. No further adjustment of test current for the remainder of the test		N/A

IEC 62955				
Clause	Requirement + Test	Result - Remark		Verdict
	Temperatures recorded for at least one cycle of each working day, and after approximately 25, 50, 75, 100, 125, 175, 225, 275, 350, 425 and 500 cycles			N/A
	For each screw-type terminal:			N/A
	- the temperature rise shall not exceed 110 K			N/A
	- the stability factor Sf shall not exceed ± 10 °C			N/A
	ambient air temperature: °C			N/A
		max. temperature rise [K]	max. stability factor Sf [°C]	—
	Terminal 1			N/A
	Terminal 2			N/A
	Terminal 3			N/A
	Terminal 4			N/A
	Terminal 5			N/A
	Terminal 6			N/A
	Terminal 7			N/A
	Terminal 8			N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict

	ANNEX M (NORMATIVE) ADDITIONAL REQUIREMENTS AND TESTS FOR RDC-MDS ACCORDING TO CLASSIFICATION 4.1.1.2 CONSISTING OF AN RDC-M-UNIT DESIGNED TO BE ASSEMBLED ON SITE TOGETHER TO A SEPARATE SWITCHING PROTECTIVE DEVICE		
M.1	**Scope**		—
	This annex applies to RDC-MDs consisting of a residual direct current monitoring unit (RDCM- unit), with 6 mA DC detection and evaluation, designed for being mechanically assembled on site in accordance with the manufacturer's instructions to one or more declared protective device(s), which can be either a circuit breaker in compliance with IEC 60898-1, or a RCD in compliance with IEC 61008-1 or IEC 61009-1 or IEC 62423.		—
	For RDC-MDs according to classification 4.1.1.2 the separate units shall be from the same manufacturer, being affixed with the same trade mark or all parts shall be declared suitable for use together with the other units by the individual manufacturer.		—
	The main body of this document applies in all respects to devices covered by this annex, unless otherwise specified.		—
M.5.1	**Summary of characteristics**		—
Replace	– rated current In (see 5.2.2);		—
by	– maximum rated current of the circuit-breaker or RCD with which it may be assembled.		—
M.6	**Marking and other product information**		—
M.6.1	**Manufacturer's name or trademark**		N/A
	With reference to Clause 6 item a) of this document, the circuit-breaker and/or the RCD and the RDC-M- unit with which it is to be assembled shall bear the same manufacturer's name or trademark.		N/A
M.6.2	**Marking**		N/A
M.6.2.1	**Marking of the RDC-M-unit**		N/A
	The RDC-M-unit shall be marked with the following items, with reference to Clause 6 of this document:		N/A
	a) manufacturer’s name or trademark .....:		N/A
	b) type designation, catalogue number or serial number .....:		N/A
	c) rated voltage(s) (V) .....:		N/A
	e) rated current (A) .....:		N/A
	f) rated residual DC operating current (A) .....:		N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	g) marking with lowest temperature value.....:		N/A
	j) degree of protection .....:	IP	N/A
	k) position of use .....:		N/A
	l) rated residual making and breaking capacity (A) :	(if necessary)	N/A
	m) operating means of test device .....:	T	N/A
	n) wiring diagram .....:		N/A
	In addition, the RDC-M- unit shall be marked with		N/A
	the maximum rated current of the circuit-breaker or RCD with which it may be assembled.....:		N/A
	the symbol see figure M.1. .....:		N/A
	It is recommended to mark the references of the circuit-breakers with which the RDC-M-unit can be assembled.		N/A
M.6.2.2	**Marking of the assembled circuit-breaker or RCD and RDC-M-unit (RDC-MD)**		N/A
	The following marking on the RDC-M-unit specified in M.6.2.1 shall not be visible after assembly:		N/A
	c) rated voltage(s) (V) .....:		N/A
	maximum rated current of the protective device with which the RDC-M-unit may be assembled. :		N/A
	Marking k) of the RDC-M-unit, if applicable, shall remain visible after assembly.		N/A
M.6.3	**Instructions for assembly and operation**		N/A
	The manufacturer shall provide adequate instructions with the RDC-M-unit. These instructions shall cover at least the following:		N/A
	– reference to the type(s) and catalogue number(s), covering current and voltage ratings, number of poles, etc. of the circuit-breakers or RCDs with which the RDC-M-unit is designed to be assembled; the number of paths of the circuit breaker or RCD corresponds to the number of paths of the RDC-M-unit. A neutral terminal or link may take the place of the neutral pole of a circuit-breaker or RCD.		N/A
	– this RDC-M-unit is intended to be used with an RCD of at least type A, if applicable;		N/A
	– de-rating factor, if any;		N/A
	– method of assembly;		N/A
	– need for checking operation after assembly to verify the mechanical operation.		N/A
M.7	**Constructional requirements**		—

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
M.7.1	**General**		N/A
	The design shall be such that it shall be possible to assemble the RDC-MD on site. Design may be such that the device may be disassembled on site in accordance with the manufacturer's instructions.		N/A
	For devices declared not suitable for disassembling, the disassembly shall leave permanent visible damage.		N/A
	Compliance is checked according to M.8.3.		N/A
M.7.3	**Mechanical requirements**		N/A
	The circuit-breaker or RCD and the RDC-M-unit shall fit together readily in the correct manner, and the design shall be such as to prevent an incorrect assembly.		N/A
	There shall be no loose parts for coupling the tripping mechanisms.		N/A
	Fixing means for assembly shall be captive.		N/A
	Terminal covers, if any, are not covered by this requirement.		N/A
M.7.4	**Electrical compatibility**		N/A
	It shall not be possible to use a circuit-breaker or an RCD of a given rated voltage with an RDC-M-unit of a lower rated voltage.		N/A
	It shall not be possible to associate a circuit-breaker or an RCD of a given rated current with a RDC-M- unit of a lower maximum current (see M.6.2.2).		N/A
	The terminals of the RDC-M- unit shall be able to clamp the range of nominal cross-sections of conductors specified in Table 5 of IEC 60898-1:2015 or in Table 6 of IEC 61008-1:2013 or in Table 6 of IEC 61009-1:2010 with which it is designed to be assembled.		N/A
	It shall not be possible to associate a circuit-breaker or an RCD of a given rated short-circuit capacity with an RDC-M-unit so as to result in a lower short-circuit performance.		N/A
	Compliance is checked by inspection and manual test.		N/A
M.8	**Type tests and verifications**		—
M.8.1	**Tests on RDC-M-units**		N/A
	The RDC-M- units shall comply with the following type tests specified in Table 9: tests of 9.3, 9.4, 9.5, 9.13, 9.14 and 9.15 (if applicable).		N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
M.8.2	**Tests on assembled RDC-MDs**		N/A
	In case of RDC-M-units intended to be assembled with several protective devices, the testing procedure has to be		N/A
	- either repeated with each protective device declared by the manufacturer		N/A
	- or the most stringent tests among all applicable standards shall be applied only once but the acceptance criteria combines any acceptance criteria of any applicable standard.		N/A
	The type tests specified in Table 9 apply to RDC-MDs covered by this annex except as follows:		N/A
	– 9.3, 9.5, 9.13 and 9.14 do not apply;		N/A
	– 9.4: tests shall be made on the interconnections between the circuit-breaker or RCD and the RDC-M-unit.		N/A
M.8.3	**Verification of marking and constructional requirements of RDC-MDs**		N/A
	Compliance with the requirements of M.6.1, M.6.2, M.6.3, M.7.1, M.7.2, M.7.3 and M.7.4 shall be checked by inspection and manual test, as applicable.		N/A
	For devices declared suitable to be disassembled, compliance with the requirements of M.7.1 is checked by the following test to be performed at the beginning of test sequence D_0 in Table A.1.		N/A
	The number of samples shall be in accordance with test sequence D_0 + D_1 in Table A.3.		N/A
	The RDC-M-unit and compatible circuit-breakers or RCDs, as declared by the manufacturer, have to be assembled and disassembled 5 times. The RDC-M-unit and the compatible circuit breaker or RCDs are then reassembled and used for the test of test sequence D_0. After each assembly, the correct operation of the combination shall be verified for RCDs by using the test button and for circuit breakers with the upper limit of the instantaneous tripping current.		N/A
	The RDC-MD shall trip each time.		N/A
M.9	**Routine tests on the RDC-M-unit**		N/A
	Annex D applies, but the tests shall be made on the RDC-M-units in association with a test circuit breaker or RCD adjusted to the most onerous conditions.		N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict

	ANNEX N (NORMATIVE) ADDITIONAL REQUIREMENTS AND TESTS FOR RDC-MDS ACCORDING TO CLASSIFICATION 4.1.1.3 CONSISTING OF AN RDC-MD MODULE ELECTRICALLY COUPLED TO A SEPARATE SWITCHING DEVICE OR A PROTECTIVE DEVICE		
N.1	**Scope**		—
	This annex applies to RDC-MDs consisting of residual direct current detection and monitoring module electrically coupled to a separate switching or protective device.		—
	The manufacturer shall declare which detection, monitoring and switching or protective device(s) are suitable to be connected together.		—
	The main body of this document applies in all respects to devices covered by this annex, unless otherwise specified.		—
N.5	**Characteristics**		—
	Clause 5 of this document applies with the following modification:		—
N.5.1	**Summary of characteristics**		—
Replace	– rated current In (see 5.2.2);		—
by	– maximum rated current of the monitored circuit.		—
N.6	**Marking and other product information**		—
N.6.1	**Marking of the RDC-M Module**		**N/A**
	Clause 6 applies with the following specifications together with Table N.1:		N/A
	– The RDC-M module shall be marked with the following items, with reference to Clause 6 of this standard:		N/A
	a) manufacturer's name or trademark .....:		N/A
	b) type designation, catalogue number or serial number .....:		N/A
	c) rated voltage(s) (V) .....:		N/A
	e) rated current (A) .....:		N/A
	f) rated residual DC operating current (A) .....:		N/A
	g) marking with lowest temperature value.....:		N/A
	j) degree of protection .....:		N/A
	k) position of use .....:		N/A
	m) operating means of test device .....:		N/A
	n) wiring diagram .....:		N/A
	– If the detection module and the monitoring module of a RDC-M modules are separate, both shall be marked with the following items, with reference to Clause 6 of this document:		N/A
	a) manufacturer's name or trademark :		N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	b) type designation, catalogue number or serial number :		N/A
	c) rated voltage(s) (V) :		N/A
	e) rated current (A) :		N/A
	g) marking with lowest temperature value :		N/A
	j) degree of protection :		N/A
	Furthermore, the monitoring module of a RDC-MD in separate modules module shall be marked with the items f), m) and n).		N/A
	f) rated residual DC operating current (A) :		N/A
	m) operating means of test device :		N/A
	n) wiring diagram :		N/A
	k) position of use .....:		N/A
	It is recommended to mark the references of the circuit-breakers with which the RDC-MD can be assembled.		N/A
N.6.2	**Instructions for assembly and operation**		N/A
	The manufacturer of the RDC-MD shall provide adequate instructions. These instructions shall cover at least the following:		N/A
	– reference to the type(s) and catalogue number(s), covering current and voltage ratings, number of poles, etc. of the switching or protective devices with which the RDC-MD is designed to be connected;		N/A
	– for RDC-MD in separate modules, reference to the type(s) and catalogue number(s) of the required current transformer (CT) and monitoring module, as applicable;		N/A
	– method of connection/assembly;		N/A
	– need for checking operation after connection/assembly to verify operation.		N/A
	The manufacturer of the modular RDC-MD shall provide adequate instructions. These instructions shall cover at least the following:		N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	– reference to the type(s) and catalogue number(s), covering current and voltage ratings, number of poles, etc. of the switching or protective devices with which the modular RDC-M module is designed to be connected;		N/A
	– the conditions to be observed for the connection between the monitoring module and the switching or protective device, as applicable;		N/A
	– for RDC-M modules in separate modules, reference to the type(s) and catalogue number(s) of the required detection module and monitoring module, as applicable;		N/A
	– for a separate detection module, the details of the current transformer (CT) including the conditions for connection to the monitoring module (cable type, length etc.);		N/A
	– for a through-conductor type modular RDC-MD, the dimensions of the conductor aperture and the position of the through-conductors relative to the detection unit;		N/A
	– distances to be respected with regard to nearby conductors, as applicable;		N/A
	– the SCPDs to be associated with the Modular RDC-MD, as applicable, to achieve the rated conditional short-circuit current or rated residual short-circuit current;		N/A
	– de-rating factor, if any;		N/A
	– need for checking operation after connection/assembly to verify operation.		N/A
N.7	**Constructional requirements**		—
N.7.1	**Degree of protection**		
	The degree of protection of the RDC-MD detection and monitoring modules shall be not less than that of the switching or protective device with which they are to be assembled.		N/A
N.7.2	**Electrical compatibility**		N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	The detection, monitoring and switching or protective device shall be electrically compatible. Terminals shall be suitable for the associated current rating of the assembly.		N/A
	Compliance is checked by inspection and manual test.		N/A
N.8	**Type tests and verifications**		—
N.8.1	**Tests on RDC-M-module**		N/A
	The tests specified in Table 9 shall be applied in order to show conformity to this document.		N/A
	In case of RDC-M-module intended to be assembled with several switching or protective devices, the testing procedure has to be		N/A
	– either repeated with each device declared by the manufacturer		N/A
	– or the most stringent tests among all applicable standards shall be applied only once but the acceptance criteria combines any acceptance criteria of any applicable standard.		N/A
	The type tests specified in Table 9 apply to RDC-M-module covered by this annex as follows:		N/A
	– 9.3, 9.4, 9.5, 9.6, 9.7, 9.8, 9.13, 9.14 and 9.22 apply only to the RDC-M-module, however, where applicable, the switching or protective device is connected as in normal use;		N/A
	– 9.9, 9.10, 9.11, 9.16, 9.18, 9.19, 9.20 and 9.21 apply to the RDC-M-module and switching or protective devices connected as in normal use; additionally 9.17, only if applicable;		N/A
	– 9.12 shall be performed on each RDC-M-module;		N/A
	– 9.15 do not apply.		N/A
N.8.2	**Verification of marking and constructional requirements of RDC-M-module**		N/A
	Compliance with the requirements of N.6.1, N.6.2, N.7.1 and N.7.2 shall be checked by inspection and manual test, as applicable.		N/A
N.8.3	**Verification of behaviour in case of disconnection of the external detection module**		N/A
	This test is only applicable to M-module with facility for connection of an external detection module.		N/A
	The external detection module is connected to the monitoring module as in normal use as prescribed by the manufacturer.		N/A
	The M-module is connected as for normal use and supplied with rated supply voltage.		N/A

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
	There shall be no smooth DC residual current flowing in the external detection.		N/A
	The external detection module is then disconnected and the M-module shall cause opening of the switching or protective device within 10 s.		N/A
N.9	**Routine tests on the RDC-M-module**		N/A
	Annex D applies, but the tests shall be made on the M-module in association with a test switching or protective device adjusted to the most unfavourable conditions.		N/A

END of TEST REPORT