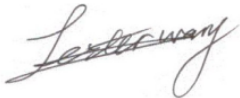





Test Report issued under the responsibility of



TEST REPORT IEC 60898-1 Circuit-breakers for over current protection for household and similar installations Part 1 - Circuit-breakers for a.c. operation	
Report Reference No.:	3307344.50
Date of issue	2015-02-04
Total number of pages.....	63 pages
Applicant's name:	GACIA Electrical Appliance Co., Ltd.
Address	545# Dongdajie, Baitawang Industrial Zone, Beibaixiang Yueqing Zhejiang, 325603, China
Test specification:	
Standard	<input checked="" type="checkbox"/> IEC 60 898-1:2002 (1st Edition) + A1:2002 + A2:2003
Test procedure	CB Scheme
Non-standard test method.....	N/A
Test Report Form No.:	IEC60898_1C
Test Report Form(s) Originator.....:	DEKRA
Master TRF	Dated 2014-03
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General disclaimer:	
The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.	
Test item description	Circuit-breakers for overcurrent protection
Trade Mark.....	GACIA
Manufacturer	GACIA Electrical Appliance Co., Ltd. 545# Dongdajie, Baitawang Industrial Zone, Beibaixiang Yueqing Zhejiang, 325603, China
Model/Type reference.....	PN8H, PN8HQ, PN8N, PN8NQ, PN8L, PN8LQ, M80N , M100N
Ratings.....	1P+N, Ue: 240 Vac, 50 / 60 Hz, In= 6, 10, 16, 20, 25, 32, 40 A, B, C type, Ics = Icn = 6 kA

Testing procedure and testing location:		
<input checked="" type="checkbox"/>	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
<input type="checkbox"/>	Associated CB Testing Laboratory:	N/A
Testing location/ address.....:		N/A
Tested by (name + signature)		Lester Wang 
Approved by (name + signature).....:		Eric Wang 
<input type="checkbox"/>	Testing procedure: TMP/CTF Stage 1:	N/A
Testing location/ address.....:		N/A
Tested by (name + signature)		N/A
Approved by (name + signature).....:		N/A
<input type="checkbox"/>	Testing procedure: WMT/CTF Stage 2:	N/A
Testing location/ address.....:		N/A
Tested by (name + signature)		N/A
Witnessed by (name + signature)		N/A
Approved by (name + signature).....:		N/A
<input type="checkbox"/>	Testing procedure: SMT/CTF Stage 3 or 4:	N/A
Testing location/ address.....:		N/A
Tested by (name + signature)		N/A
Witnessed by (name + signature)		N/A
Approved by (name + signature).....:		N/A
Supervised by (name + 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 C of IEC 60898-1			
Test sequence	number of samples/ rated current of sample	Remark	
	1P+N		
A	1 / C40	Test data is taken from report 3301074.50 except clause 6	
B	3 / C40	Test data is taken from report 3301074.50 except clause 9.8 for B40	
C	C1	3 / C40	Test data is taken from report 3301074.50
	C2	3 / C40	Test data is taken from report 3301074.50
D	D0+D1	3 / C40	Test data is taken from report 3301074.50
	D0	each 1pc /C6-32, each 1pc /B6-40	Test data is taken from report 3301074.50 except sequence D0 for B type
E1	3 / C6, 3 / C40 3 / B40*, 3 / B32*, 3 / B16*	Tested in this report	
E2	N/A	/	
E3	3 / C40	Test data is taken from report 3301074.50	
Note :			
<ol style="list-style-type: none"> 1. This report is based on test reports no. 3301074.50 issued on 2010-03-09 and 3303233.50 issued on 2012-05-02. 2. This report is issued due to that <ul style="list-style-type: none"> - B type MCB is added. - repeat sequence E1 to renew CB certificate which is more than 3 years. - Name of applicant/manufacturer/factory is changed. 3. The type references M80N and PN8H, PN8HQ, PN8N, PN8NQ, PN8L, PN8LQ, M100N are identical except model references, all test were conducted on M80N series, the tests for M80N series MCB cover the tests for PN8H, PN8HQ, PN8N, PN8NQ, PN8L, PN8LQ, M100N series MCB. 4. * Tests are subjected to determine the energy limiting class 3 according to annex ZD of EN 60898-1:2012. 			
Testing location:			
DEKRA Testing Services (Zhejiang) Co., Ltd.			
No.5, Changjiang Road, Great Bridge Industrial Park, North Baixiang, Wenzhou, Zhejiang, 325603, P. R. China			

Summary of compliance with National Differences:

List of countries addressed: N/A

The product fulfils the requirements of

EN 60898-1: 2003 + A1: 2004 + A11: 2005 + A12: 2008 + A13: 2012, the results are laid down in Annex 1 of this report.

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.




Note:

The markings for circuit breakers are same except the rated current, the tripping characteristic type and the number of poles maybe different.

Test item particulars	Circuit-breakers for overcurrent protection
Type of circuit-breaker	PN8H, PN8HQ, PN8N, PN8NQ, PN8L, PN8LQ, M80N , M100N
Number of poles	<input type="checkbox"/> 1-P <input checked="" type="checkbox"/> 1-P+N (The N pole is without protection) <input type="checkbox"/> 2-P <input type="checkbox"/> 3-P <input type="checkbox"/> 3-P+N <input type="checkbox"/> 4-P
Protection against external influences	<input type="checkbox"/> enclosed <input checked="" type="checkbox"/> unenclosed
Method of mounting	<input type="checkbox"/> surface <input checked="" type="checkbox"/> flush <input checked="" type="checkbox"/> panel board
Method of connection	<input checked="" type="checkbox"/> .not associated with the mechanical mounting <input type="checkbox"/> associated with the mechanical mounting
Type of terminal	<input checked="" type="checkbox"/> screw ^{a) b)} <input checked="" type="checkbox"/> pillar ^{a) b)} <input type="checkbox"/> cage ^{a) b)} <input type="checkbox"/> lug <input type="checkbox"/> screw less ^{a)} <input type="checkbox"/> flat quick connect ^{a)} <input type="checkbox"/> plug-in <input type="checkbox"/> screw-in ^{a)} copper conductors ^{b)} aluminium conductors
Instantaneous tripping current	<input checked="" type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/> D
I ² t characteristic	Energy limiting class 3 (according to EN 61009-1:2012)
Value of rated operational voltage (Ue).....	<input type="checkbox"/> 120 V <input type="checkbox"/> 230 V <input checked="" type="checkbox"/> 240 V <input type="checkbox"/> 120/240 V <input type="checkbox"/> 230/400 V <input type="checkbox"/> 400 V <input type="checkbox"/> 240/415 V <input type="checkbox"/> 415 V
Value of rated current (In)	6, 10, 16, 20, 25, 32, 40 A
Value of rated frequency	<input checked="" type="checkbox"/> 50 Hz <input checked="" type="checkbox"/> 60 Hz
Ambient air temperature (°C)	<input checked="" type="checkbox"/> 30°C <input type="checkbox"/> 40°C <input type="checkbox"/> Other _____°C
Rated short-circuit capacity (Icn)	<input type="checkbox"/> 1,5 kA <input type="checkbox"/> 3 kA <input type="checkbox"/> 4,5 kA <input checked="" type="checkbox"/> 6 kA <input type="checkbox"/> 10 kA <input type="checkbox"/> 15 kA <input type="checkbox"/> 20 kA <input type="checkbox"/> 25 kA
Rated impulse withstand voltage (Uimp)	<input type="checkbox"/> 2,5 kV <input checked="" type="checkbox"/> 4 kV <input type="checkbox"/> declared ___kV

Classification of installation and use : fixed	
Supply Connection : single phase or 3 phases system	
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 : 2014-12	
Date (s) of performance of tests : 2015-01 ~ 2015-01 and 2009-11 ~ 2010-03 (3301074.50)	
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 <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60335-1:	
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.....:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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. 545# Dongdajie, Baitawang Industrial Zone, Beibaixiang Yueqing, Zhejiang, 325603, China	
General product information:	
Refer to page 5 for technical data. The grid distance: "a" = 45 mm.	

IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

	TESTS „A“ 1 SAMPLE	A1': 240 V, C40 - cl. 6 A1: 240 V, C40 – test data taken from report 3301074.50 for other clauses	--
6	MARKING AND OTHER INFORMATION	A1'	--
	Circuit-breaker marked with:		P
	a) Manufacturer's name or trade mark	GACIA	P
	b) Type designation, catalogue number or other identification number	M80N	P
	c) Rated voltage (V).....	240 V	P
	d) Rated current (A)	40 A	P
	e) Rated frequency (Hz).....	50 / 60 Hz	P
	f) Rated short circuit capacity (A)	6000 in a rectangle	P
	g) Wiring diagram		P
	h) Ambient air temperature, if different from 30°C		N/A
	i) Degree of protection, if different from IP20		N/A
	j) For D-type circuit-breakers: the maximum instantaneous tripping current, if higher than 20 I _n (see table 2)		N/A
	k) Rated impulse withstand voltage U _{imp} if it is 2,5 kV		N/A
	Symbol for instantaneous tripping current	C	P
	Symbol for nature of supply	~	P
	Marking for rated current and for instantaneous tripping shall be readily visible when CB is installed		P
	Other marking shall be easily discernible		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
	Energy limiting class	3	P
	I ² t characteristic (documentation)		P
	Symbols on supply and load terminal		N/A
	Terminal for neutral conductor N		P
	Earthing terminal if any (IEC 60417-5019)		N/A
	On - off position shall be clearly indicated - 0 -	0 	P
	For push-button CB the off push-button shall either be red or be marked with the symbol '0'		N/A

IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Red not used for other push-button		N/A
	This symbol shall be easily discernible		P
	For CB with multiple current ratings, the maximum value is marked, the adjusted value indicated without ambiguity		N/A
	Marking shall be indelible and easily legible (not on removable parts), 15 s with water, 15 s with hexane (see cl. 8.3)		P
8.	REQUIREMENTS FOR CONSTRUCTION AND OPERATION	A1	P
8.1.1	General		P
8.1.2	Mechanism		P
	The moving contact shall be mechanically coupled so that all poles make and break together, whether operated manually or automatically, even if an overload occurs on one pole only		N/A
	The switched neutral shall close before and open after the protected pole (s)		P
	Neutral pole having adequate making and breaking capacity and CB with independent manual operation: all poles operate together including neutral pole		N/A
	CB shall have a trip free mechanism		P
	It shall be possible to switch the CB on and off by hand		P
	No intermediate position of the contacts		P
	Position of contacts shall be indicated		P
	Indication visible from the outside		P
	If the indication is on the actuating means, it shall, when released, automatically take up or stay in the position corresponding to that of the moving contacts; operating means shall have two different rest positions, except that, for automatic operation, a third distinct rest position may be provided		N/A
	If a separate mechanical indicator is used to indicate the position of the main contacts, colour red shall be used for the on position and green for the off position.		P
	The action of the mechanism shall not be influenced by the position of enclosures		P
	If the cover is used as a guiding means for push-button, it shall not be possible to remove this button from the outside		N/A

IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Operating means securely fixed, not possible to remove them without a tool		P
	For the up-down operating means the contacts shall be closed by the up movement.		P
8.1.3	Clearances and creepage distances		P
8.1.3	Clearances [mm] see table 4		P
	1.between live parts (of the main circuits) which are separated when the CB is in off position	5,1 mm > 4,0 mm	P
	2.between live parts of different polarity	5,2 mm > 3,0 mm	P
	3.between circuits supplied from different sources, one of which being PELV or SELV.....		N/A
	4. between live parts and		P
	- accessible surfaces of operating means	5,0 mm > 3,0 mm	P
	- screws or other means for fixing covers		N/A
	- surface on which the base is mounted	5,1 mm > 3,0 mm	P
	- screws or other means for fixing the circuit breaker		N/A
	- metal covers or boxes		N/A
	- other accessible metal parts		N/A
	- metal frames supporting the base (flush-type) ..	8,3 mm > 3,0 mm	P
	5.between metal parts of mechanism and:		N/A
	- accessible metal parts		N/A
	- screws or other means for fixing the circuit breaker		N/A
	- metal frames supporting the base (flush type) ..		N/A
8.1.3	Creepage distances [mm] (see table 4)		P
	Material group	<input checked="" type="checkbox"/> IIIa <input type="checkbox"/> II <input type="checkbox"/> I	P
	1.between live parts (of the main circuits) which are separated when the CB is in off position	5,1 mm > 4,0 mm	P
	2.between live parts of different polarity	6,3 mm > 3,0 mm	P
	3.between circuits supplied from different sources, one of which being PELV or SELV.....		N/A
	4. between live parts and		P
	- accessible surfaces of operating means	5,0 mm > 4,0 mm	P
	- screws or other means for fixing covers		N/A
	- surface on which the base is mounted	7,4 mm > 4,0 mm	P
	- screws or other means for fixing the circuit breaker		N/A
	- metal covers or boxes		N/A
	- other accessible metal parts		N/A

IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- metal frames supporting the base (flush-type) .:	8,3 mm > 4,0 mm	P
	5.between metal parts of mechanism and:		N/A
	- accessible metal parts.....:		N/A
	- screws or other means for fixing the circuit breaker.....:		N/A
	- metal frames supporting the base (flush type) .:		N/A
8.1.4	Screws, current-carrying parts and connections		P
8.1.4.1	Connections, withstand mechanical stresses occurring in normal use		P
	Screws for mounting of the CB not of the thread-cutting type		N/A
	Test according to cl. 9.4:		P
	- 10 times (screw Ø / torque Nm)		N/A
	- 5 times (screw Ø / torque Nm)	Ø 4,0 mm 1,2 Nm	P
	Plug in connections tested by plugging in and pulling out five times		N/A
	After test connections have not become loose nor electrical function impaired		N/A
8.1.4.2	Screws with a thread of insulating material ensured correct introduction		N/A
8.1.4.3	Electrical connection: contact pressure not transmitted through insulating material, unless there is sufficient resilience in the metallic parts		P
	- copper		P
	- alloy 58% copper for worked cold parts		N/A
	- alloy 50% copper for other parts		N/A
	- other metal		N/A
8.1.5	Terminals for external conductors		P
8.1.5.1	Terminals ensure correct connection of conductors (Test acc. to cl. 9.5 or annex J or K)	cl. 9.5	P
9.5	Torque Ø 4,0 mm 1,2 Nm max. sect. 16 mm ²		P
9.5.1	Pull test: max sect. 16 mm ² Pull 90 N for 1 min min sect. 1,0 mm ² Pull 50 N for 1 min During the test conductor does not move noticeably		P

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Clause	Requirement + Test	Result - Remark	Verdict																											
9.5.2	min sect. 1,0 mm ² max sect. 16 mm ² Torque (2/3)= 0,8 Nm The conductor shows no damage		P																											
9.5.3	Nominal cross-section from 1,0 to 16 mm ² No of wires 7 Ø of wires 2,14 mm Torque (2/3) = 0,8 Nm No of wires 7 Ø of wires 0,67 mm Torque (2/3) = 0,8 Nm After the test no wire escaped outside		P																											
8.1.5.2	Terminals allow the connection of conductors of the following cross-sectional areas: (table 5)		P																											
	<table border="1"> <thead> <tr> <th>Rated current (A)</th> <th colspan="2">Range of nominal cross sections to be clamped (mm²)</th> </tr> </thead> <tbody> <tr> <td>≤ 13</td> <td>1</td> <td>to 2,5</td> </tr> <tr> <td>> 13 ≤ 16</td> <td>1</td> <td>to 4</td> </tr> <tr> <td>> 16 ≤ 25</td> <td>1,5</td> <td>to 6</td> </tr> <tr> <td>> 25 ≤ 32</td> <td>2,5</td> <td>to 10</td> </tr> <tr> <td>> 32 ≤ 50</td> <td>4</td> <td>to 16</td> </tr> <tr> <td>> 50 ≤ 80</td> <td>10</td> <td>to 25</td> </tr> <tr> <td>> 80 ≤ 100</td> <td>16</td> <td>to 35</td> </tr> <tr> <td>> 100 ≤ 125</td> <td>25</td> <td>to 50</td> </tr> </tbody> </table>	Rated current (A)	Range of nominal cross sections to be clamped (mm ²)		≤ 13	1	to 2,5	> 13 ≤ 16	1	to 4	> 16 ≤ 25	1,5	to 6	> 25 ≤ 32	2,5	to 10	> 32 ≤ 50	4	to 16	> 50 ≤ 80	10	to 25	> 80 ≤ 100	16	to 35	> 100 ≤ 125	25	to 50	1 - 16 mm ²	P
Rated current (A)	Range of nominal cross sections to be clamped (mm ²)																													
≤ 13	1	to 2,5																												
> 13 ≤ 16	1	to 4																												
> 16 ≤ 25	1,5	to 6																												
> 25 ≤ 32	2,5	to 10																												
> 32 ≤ 50	4	to 16																												
> 50 ≤ 80	10	to 25																												
> 80 ≤ 100	16	to 35																												
> 100 ≤ 125	25	to 50																												
	It is required that, for current ratings up to and including 50 A terminals are designed to clamp solid conductors as well as rigid stranded conductors; the use of flexible conductors is permitted	The terminals of the circuit-breaker in this series (from 6 A to 40 A) are identical.	P																											
	Nevertheless, it is permitted that terminals for conductors having cross-sections from 1 mm ² up to 6 mm ² are designed to clamp solid conductors only.		N/A																											
8.1.5.3	Means for clamping the conductors in the terminals not serve to fix any other component (See test sub-clause 9.5)		P																											
8.1.5.4	Terminals for I _N ≤ 32 A allow the connection of conductors without special preparation	The terminals of the circuit-breaker in this series (from 6 A to 40 A) are identical.	P																											
8.1.5.5	Terminals shall have adequate mechanical strength; ISO thread or equivalent (See tests of sub-clause 9.4 and 9.5.1)		P																											
8.1.5.6	Clamping of conductor without damage to the conductor (See test of sub-clause 9.5.2)		P																											
8.1.5.7	Clamping of conductor between metal surfaces (See tests of sub-clause 9.4 and 9.5.1)		P																											

IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
8.1.5.8	Conductor shall not slip-out when the clamping screw or nuts are tightened (See test of sub-clause 9.5.3)		P
8.1.5.9	Terminals shall be properly fixed. No work loose when the clamping screws or nuts are tightened or loosened (See test of sub-clause 9.4)		P
8.1.5.10	Clamping screws or nuts of terminals for protective conductors adequately secured against accidental loosening		N/A
8.1.5.12	Screws and nuts of terminals for external conductors shall be in engagement with a metal thread, and the screws shall not be of tapping screw type		P
8.1.6	Non interchangeability		N/A
	For circuit-breakers intended to be mounted on bases forming a unit therewith (plug-in or screw-in type) it shall not be possible, without the aid of a tool, to replace a circuit-breaker when mounted as for normal use by another of the same make having a higher rated current, compliance is checked by inspection		N/A
8.1.7	Plug-in type circuit-breakers, the holding in position of which does not depend solely on their plug-in connection(s), shall be reliable and have adequate stability		N/A
8.1.7.1	Plug-in type circuit-breakers, the holding in position of which does not depend solely on their plug-in connection(s) Compliance of the mechanical mounting is checked by the relevant test 9.13		N/A
8.1.7.2	Plug-in type circuit-breakers, the holding in position of which does depend solely on their plug-in connection(s) Compliance of the mechanical mounting is checked by the relevant test 9.13		N/A
8.2	Protection against electric shock		P
	Live parts not accessible in normal use		P
	For CB, other than plug-in type, external parts, other than screws and other means for fixing covers, which are accessible shall be of insulating material		P
	Unless the live parts are within an internal enclosure of insulating material: Lining - reliable fixed, - adequate thickness and - mechanical strength		N/A

IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Inlet openings for cables shall be in insulating material or be provided with bushings or similar devices in insulating material Such device - shall be reliable fixed - shall have adequate mechanical strength		N/A
	For plug-in CB, external parts, other than screws and other means for fixing covers, which are accessible shall be in insulating material		N/A
	Metallic operating means insulated from live parts		N/A
	Metal parts of the mechanism not accessible and insulated from accessible metal parts, metal frames (for flush-type), screws or other means for fixing the base		P
	Replacement of plug-in CB possible without touching live parts		N/A
	Lacquer or enamel not considered		P
9.6	Test of protection against electric shock		P
	Use of test finger so designed that each jointed can be turned through an angle of 90° with respect to the finger		P
	Circuit-breaker with enclosures of thermoplastic material are additional tested at 35 °C for 1 min with a force of 75 N		P
7.10	Resistance to heat		P
	CB sufficiently resistant to heat		P
9.14	Test of resistance to heat		P
9.14.1	Test:		P
	- without removable covers..... 1 h (100 ± 2) °C		P
	- removable covers..... 1 h (70 ± 2) °C		N/A
	After the test no access to live parts, marking still legible		P
9.14.2	Ball pressure test for external parts of insulating material (parts retaining current-carrying parts and parts of the protective circuit in position) T = 125°C Ø of impression ≤ 2 mm	Housing body Impression: 1,0 mm	P
9.14.3	Ball pressure test for external parts of insulating material (parts not retaining current-carrying parts and parts of the protective circuit in position) T = (70 ± 2)°C Ø of impression ≤ 2 mm	Switch knob Impression: 0,8 mm	P

IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
8.11	Resistance to abnormal heat and to fire		P
	External parts of insulating material shall not ignite or spread fire under fault or overload conditions		P
9.15	Resistance to abnormal heat and to fire		P
	Glow wire test: No visible flame, no sustained glowing or flames and glowing extinguish within 30 s		P
	external parts retaining current-carrying parts and parts of the protective circuit in position (960 ± 15)°C	Housing body	P
	all other external parts (650 ± 10)°C	Switch knob	P
8.12	Resistance to rusting		P
	Ferrous parts adequately protected against rusting		P
9.16	Test of resistance to rusting:		P
	- 10 min immersed in a cold chemical degreaser such as methyl-chloroform or refined petrol		P
	- 10 min immersed in a 10% solution of chloride in water at 20°C		P
	- 10 min at 95% humidity at 20°C		P
	- 10 min at 100°C		P
	No sign of rust		P

IEC 60898-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TESTS „B“ 3 SAMPLES	B-1~3: C40 - test data taken from report 3301074.50.			--
8.3	Dielectric properties and isolating capability			P	
	CB shall have adequate dielectric properties and shall ensure isolation:				P
8.3.1	Dielectric strength at power frequency			P	
	Compliance is checked by the tests 9.7.1, 9.7.2 and 9.7.3 on circuit-breaker in new condition				P
8.3.2	Isolating capability			P	
	Circuit-breakers shall be suitable for isolation. Compliance is checked by the verification of compliance with the minimum clearances and creepage distances of item 1 of table 4 and by tests of 9.7.6.1 and 9.7.6.3.				P
8.3.3	Dielectric strength at rated impulse withstand voltage (U _{imp})			P	
	Circuit-breakers shall adequately withstand impulse voltages. Compliance is checked by the tests of 9.7.6.2.	U _{imp} = 4 kV		P	
9.7	Test of dielectric properties and isolating capability			P	
9.7.1	Resistance to humidity			P	
9.7.1.1	Preparation of the circuit-breaker for test			P	
	Inlet openings, if any, are left open; if knock-outs are provided, one of them is opened.				N/A
9.7.1.2	Test conditions			P	
	The humidity treatment is carried out in humidity cabinet 91% to 95% and the temperature of the air between 20 °C and 30 °C	R.H. = 95% T = 25 °C		P	
9.7.1.3	Test procedure:			P	
	The sample is kept in the cabinet for 48 h.				P
9.7.1.4	Condition of the circuit-breaker after the test			P	
	After this treat, the sample show no damage within the meaning of this standard and shall withstand the tests of 9.7.2 and 9.7.3				P
9.7.2	Insulation resistance of the main circuit			P	
9.7.2	After an interval between 30 min and 60 min flowing this treatment, the insulation resistance is measured 5 s after application of a d.c. voltage of approximately 500 V, consecutively as follows:			P	
	a) In off-position, between the terminals which are electrically connected together when the circuit-breaker is in the closed position ≥ 2 M Ω	B-1 ≥ 500 M Ω	B-2 ≥ 500 M Ω	B-3 ≥ 500 M Ω	P

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Clause	Requirement + Test	Result - Remark			Verdict
	b) in off-position, between each pole in turn and the others connected together $\geq 2 \text{ M}\Omega$	$\geq 500 \text{ M}\Omega$	$\geq 500 \text{ M}\Omega$	$\geq 500 \text{ M}\Omega$	P
	c) in on-position, between all poles connected together and the frame $\geq 5 \text{ M}\Omega$	$\geq 500 \text{ M}\Omega$	$\geq 500 \text{ M}\Omega$	$\geq 500 \text{ M}\Omega$	P
	d) between metal parts of mechanism and the frame $\geq 5 \text{ M}\Omega$	$\geq 500 \text{ M}\Omega$	$\geq 500 \text{ M}\Omega$	$\geq 500 \text{ M}\Omega$	P
	e) between the frame and metal foil in contact with the inner surface of the internal enclosure or lining of insulating material $\geq 5 \text{ M}\Omega$				N/A
9.7.3	Dielectric strength of the main circuit				P
	After the circuit-breakers have passed the tests of 9.7.2 the test voltage specified in 9.7.5 is applied for 1 min between the parts indicated in 9.7.2	2000 V			P
	a) 2000 V				P
	b) 2000 V				P
	c) 2000 V				P
	d) 2000 V				P
	e) 2500 V				N/A
9.7.4	Dielectric strength of the auxiliary and control circuits				N/A
	For these tests, the main circuit shall be connected to the frame. The test voltage specified in 9.7.5 shall be applied for 1 min as follows:				N/A
	1) Between all the auxiliary or control circuits and the frame $U = \text{---} \text{ V}$				N/A
	2) Between each part of the auxiliary or control circuits which may be isolated from the other parts of the auxiliary or control circuits and these other parts connected together $U = [1000 \text{ V if } U_i \leq 60 \text{ V or } 2U_i + 1000 \text{ V if } U_i > 60 \text{ V}]$				N/A
9.7.6	Verification of the impulse withstand voltage (across clearances and across solid insulation) and leakage current across open contacts				P
9.7.6.1	Verification of the impulse withstand voltage across open contacts (suitability for isolation)				P
	The 1,2/50 μs impulse voltage shall be applied three times for each polarity at intervals of 1s minimum				P
	- rated impulse withstand voltage (kV) :	4 kV			P
	- sea level of the laboratory:	Sea level			P
	- test U_{imp} on open main contacts (equipment suitable for isolating) (see table 13)	6,2 kV			P
	- no unintentional disruptive discharge during the test's				P
9.7.6.2	Verification of impulse withstand voltage for the parts not test in 9.7.6.1				P

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Clause	Requirement + Test	Result - Remark			Verdict
	Other external parts, including that face of the circuit-breaker is in direct contact with the mounting surface..... 60	26 K	22 K	26 K	P
9.8.5	Measurement of power losses				P
	Power loss do not exceed the values stated in table 15	7,5 W			P
	Test current: $I_N = \underline{\hspace{2cm}}$ A (reach the steady state value)	40 A			P
	Loaded one pole after the other				P
	Max. power loss : W	B-1	B-2	B-3	P
	L1	1,7 W	2,5 W	1,7 W	
	N	4,2 W	4,3 W	4,2 W	
8.5	Uninterrupted duty				P
	Circuit-breakers operate reliable even after long service				P
9.9	28 day test				P
	28 cycles - 21 h with current - 3 h without current cross sectional area. $\underline{\hspace{2cm}}$ mm ²	40 A 10 mm ²			P
	During the test no tripping during the last period, temperature rise shall be measured				P
	Ambient air temperature.....:	24,0 °C			P
	Parts Temperature rise [K]				P
	Terminals for external connections.....	B-1	B-2	B-3	P
	Terminal L1, up side	36 K	38 K	32 K	
	Terminal L1, down side	31 K	37 K	37 K	
	Terminal N, up side	33 K	39 K	35 K	
	Terminal N, down side	35 K	36 K	42 K	
	Test current $1,45 I_N$	58,0 A			P
	- Tripping within	B-1	B-2	B-3	P
	- 1h (≤ 63 A)	243 s	314 s	325 s	P
	- 2h (> 63 A)				N/A

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Clause	Requirement + Test	Result - Remark			Verdict
	TESTS „C“ 3 +3 samples	C1-1~3: C40 Test data taken from report 3301074.50 for other clauses.			--
8.7	Test C₁:.....Mechanical and electrical endurance				--
	Circuit-breaker shall be capable to perform an adequate number of cycles with rated current				P
9.11.1	General test conditions				P
	Test: Test Voltage _____V (rated voltage) Test Current _____A (rated current) Power factor _____(0,85-0,9) Cross sect. area ____mm ²	240,3 V 41,8 A 0,88 10 mm ²			P
9.11.2	Test procedure				P
	The circuit-breaker is submitted to 4000 operating cycles with rated current.	4000 cycles			P
	- I _N ≤ 32 A: 2 s on - 13 s off				N/A
	- I _N > 32 A: 2 s on - 28 s off				P
	During the test the circuit-breaker shall be operated as in normal use.				P
9.11.3	Condition of the circuit-breaker after the test				P
	Following the test 9.11.2 the sample shall not show:				P
	- undue wear				P
	- discrepancy between the position of the moving contacts and corresponding position of the Indicating device	No discrepancy			P
	- damage to the enclosure permitting access to live parts by test finger (see 9.6	No damage			P
	- loosening of electrical or mechanical connections	No loosen			P
	- seepage of sealing compound				N/A
	Moreover test current2,55 I _N _____A	102,0 A			P
	Opening time not less 1 s or more than	C1-1	C1-2	C1-3	P
	- 60 s (≤ 32 A)				N/A
	- 120 s (> 32 A)	18 s	23 s	19 s	P
	Dielectric strength reduced to 1500 V *)see Annex 1				P
9.12.11.2	Test at reduced short-circuit currents				P
9.12.11.2.1	Test on all circuit-breakers				P

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Clause	Requirement + Test	Result - Remark			Verdict
9.12.11.2.1	Test at reduced short-circuit currents: Fig. 3				P
	Test current:	Obtained			P
	- 500 A or 10 In	508,1 A			P
	Test voltage 1,1 Un	253,8 V			P
	Power factor 0,93-0,98	0,98			P
9.12.9.1	Test in free air copper wire F': <input checked="" type="checkbox"/> 0,12 mm / <input type="checkbox"/> 0,16 mm resistor R' : <input type="checkbox"/> 0,75 Ohm / <input checked="" type="checkbox"/> 1,5 Ohm	"a" = 35 mm			P
9.12.9.2	Test in enclosures copper wire F': <input type="checkbox"/> 0,12 mm / <input type="checkbox"/> 0,16 mm resistor R' : <input type="checkbox"/> 0,75 Ohm / <input type="checkbox"/> 1,5 Ohm				N/A
	I_{Peak} (A) max. value	C1-1	C1-2	C1-3	P
		0,67 kA	0,69 kA	0,69 kA	
	Sequence: 6 x "0" and 3x "CO"				P
	Max. $I^2t \leq 63 \text{ kA}^2\text{s}$ (according to EN60898-1)	C1-1	C1-2	C1-3	P
		1,68 kA^2s	1,59 kA^2s	1,71 kA^2s	
	- No permanent arcing				P
	- No flash-over between poles or between poles and frame				P
	- No blowing of the fuses F and F'				P
	- Polyethylene foil shows no holes				P
	After the test:				P
9.12.12	Verification of the circuit-breaker after short-circuit tests				P
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				P
	a) leakage current across open contacts, according to 9.7.6.3, each pole is supplied at a voltage 1,1 times $U_n = V$. The circuit-breaker is in the open position	U=264 V			P
	The leakage current shall not exceed 2 mA	C1-1	C1-2	C1-3	P
	L1 $\leq 0,1 \text{ mA}$	$\leq 0,1 \text{ mA}$	$\leq 0,1 \text{ mA}$	$\leq 0,1 \text{ mA}$	
	N $\leq 0,1 \text{ mA}$	$\leq 0,1 \text{ mA}$	$\leq 0,1 \text{ mA}$	$\leq 0,1 \text{ mA}$	
	Electric strength test:				P
	Test voltage 1500 V (see 8.7.2)	1500 V			P
	a)				P
	b)				P
	c)				P

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Clause	Requirement + Test	Result - Remark			Verdict
	d)				N/A
	e) 2000 V				N/A
9.12.11.2.2	Test C₂ :Short-circuit test on circuit-breakers rated 230 V, or 240 V or 230/400 V for verifying for use in IT systems				--
	Test current:	Obtained			P
	- 500 A or 1,2 times the upper limit of the standard	509,6 A			P
	Test voltage 1,1 Un	439,6 V			P
	Power factor 0,93-0,98	0,96			P
9.12.9.1	Test in free air copper wire F': <input checked="" type="checkbox"/> 0,12 mm / <input type="checkbox"/> 0,16 mm resistor R' : <input type="checkbox"/> 0,75 Ohm / <input checked="" type="checkbox"/> 1,5 Ohm	"a" = 35 mm			P
9.12.9.2	Test in enclosures copper wire F': <input type="checkbox"/> 0,12 mm / <input type="checkbox"/> 0,16 mm resistor R' : <input type="checkbox"/> 0,75 Ohm / <input type="checkbox"/> 1,5 Ohm				N/A
	I _{Peak} (A) max. value	C2-1	C2-2	C2-3	P
		0,62 kA	0,61 kA	0,61 kA	
	Sequence: "O" + "CO" on each protected pole				P
	Shifted point 30 ° on the other protected pole	C2-1	C2-2	C2-3	P
	Max. I ² t ≤ 63 kA ² s (according to EN60898-1)	1,66 kA ² s	1,51 kA ² s	1,54 kA ² s	P
	- No permanent arcing				P
	- No flash-over between poles or between poles and frame				P
	- No blowing of the fuses F and F'				P
	- Polyethylene foil shows no holes				P
	After the test:				P
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				P
	a) leakage current across open contacts, according to 9.7.6.3, each pole is supplied at a voltage 1,1 times Un. = V. The circuit –breaker is in the open position	U=264 V			P
	The leakage current shall not exceed 2 mA	C2-1	C2-2	C2-3	P
	L1 ≤ 0,1 mA	≤ 0,1 mA	≤ 0,1 mA	≤ 0,1 mA	
	N ≤ 0,1 mA	≤ 0,1 mA	≤ 0,1 mA	≤ 0,1 mA	
	Electric strength test:				P
	Test voltage 1500 V (see 8.7.2)	1500 V			P
	a)				P
	b)				P
	c)				P

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Clause	Requirement + Test	Result - Remark	Verdict
	d)		N/A
	e) 2000 V		N/A

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Clause	Requirement + Test	Result - Remark			Verdict
	TESTS „D“	D0+D1-1~3: C40 Test data taken from report 3301074.50 for other clauses.			--
8.6	Automatic operation				--
8.6.1	Standard time-current zone				P
	Tripping characteristic of CB ensures adequate protection of the circuit, without premature operation.				P
9.10	Tests: D₀				--
	I _N (A)	40 A			P
	Sect. (mm ²)	10 mm ²			P
	Instantaneous tripping current	<input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/> D			P
9.10.1	Test of time-current characteristic				P
9.10.1.1	Test current 1,13 I _N (A) starting from cold for:	45,2 A			P
	- 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 (A)	58,0 A			P
	- Tripping within	D0+D1-1	D0+D1-2	D0+D1-3	P
	- 1h (≤ 63 A)	276 s	10 s	98 s	P
	- 2h (> 63 A)				N/A
9.10.1.2	Test current 2,55 I _N (A) starting from cold for:	102 A			P
	opening time not less than 1 s or more than	D0+D1-1	D0+D1-2	D0+D1-3	P
	- 60 s				N/A
	- 120 s	13 s	13 s	12 s	P
9.10.2	Test of instantaneous tripping and of correct opening of the contacts				P
9.10.2.1	General test conditions				P
	For the lower values of the test current the test is made once, at any convenient voltage.				P
	For the upper values of the test current the test is made at rated voltage U _n (phase to neutral) with a power factor between 0,95 and 1.				P
	The sequence of operation is : O-CO-CO-CO Interval time: > 3 min				P
	The tripping time of the O operation is measured				P
	After each operation the indicating means shall show the open position of the contacts				P
9.10.2.2	<input type="checkbox"/> For circuit-breakers of the B – Type				N/A

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Clause	Requirement + Test	Result - Remark			Verdict
	Test current $3I_N$ (A), starting from cold				N/A
	Opening time:				N/A
	$\geq 0,1$ s				N/A
	Test current $5 I_N$ (A), starting from cold				N/A
	Tripping less than 0,1 s				N/A
9.10.2.3	<input checked="" type="checkbox"/> For circuit-breakers of the C – Type				P
	Test current $5I_N$ (A), starting from cold	200 A			P
	Opening time:	D0+D1-1	D0+D1-2	D0+D1-3	P
	$\geq 0,1$ s	2 s	2 s	2 s	P
	Test current $10 I_N$ (A), starting from cold	400 A			P
	Tripping less than 0,1 s	D0+D1-1	D0+D1-2	D0+D1-3	P
		9 ms	7 ms	8 ms	
9.10.2.4	<input type="checkbox"/> For circuit-breakers of the D – Type				N/A
	Test current $10I_N$ (A), starting from cold				N/A
	Opening time:				N/A
	$\geq 0,1$ s				N/A
	Test current $20 I_N$ (A) or to the maximum instantaneous tripping current(see cl. 6, item j), starting from cold				N/A
	Tripping less than 0,1 s				N/A
9.10.3	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) starting from cold				N/A
	Tripping within				N/A
	- 1h				N/A
	- 2h				N/A
9.10.4	Test of effect of ambient temperature on the tripping characteristics				P
	a) Ambient temperature of $(35 \pm 2)^\circ\text{C}$ below the ambient air reference temperature	-5 °C			P
	Test current $1,13 I_N$ (A)	45,2 A			P

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Clause	Requirement + Test	Result - Remark			Verdict
	- Passed for 1h				P
	- Passed for 2h				N/A
	Current is then steadily increased to 1,9 I _N (A) within 5s	76,0 A			P
	Tripping within	D0+D1-1	D0+D1-2	D0+D1-3	P
	- 1h	68 s	18 s	41 s	P
	- 2h				N/A
	b) Ambient temperature of (40 ± 2)°C	40 °C			P
	Test current I _N (A)	40 A			P
	No tripping within				P
	- 1h				P
	- 2h				N/A
	TESTS: D₁				--
8.9	Resistance to mechanical shock and impact				P
	CB shall have adequate mechanical behaviour so as to withstand the stresses imposed during installation and use				P
9.13.1	Mechanical shock				P
	- 50 falls on two sides of vertical board C				P
	- Vertical board turned 90°				P
	- 50 falls on two sides of vertical board C				P
	During the test the circuit-breakers shall not open				P
9.13.2	Mechanical impact				P
9.13.2.1	All types:				P
	- Impact test: 10 blows-height 10 cm, no damage				P
9.13.2.2	Screw-in types:				N/A
	- Torque 2,5 Nm for 1 min, no damage				N/A
9.13.2.3	CB intended to be mounted on a rail				P
	- downward vertical 50 N for 1 min				P
	- upward vertical 50 N for 1 min, no damage				P
9.13.2.4	Plug-in types				N/A
	The circuit-breaker are mounted in there normal position, complete with plug-in base but without cables and any cover plate				N/A
	A force of 20 N applied for 1min to the circuit-breaker (see fig 17).				N/A

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Clause	Requirement + Test	Result - Remark			Verdict
	During this test the circuit-breaker part shall not become loose from the base and shall not show damage impairing further use.				N/A
9.12.11.3	Test at 1500 A:				P
	Prospective current of 1500 A - power factor 0,93 to 0,98				P
	Prospective current obtained (A)	1550 A			P
	Power factor	0,97			P
	Test voltage 1,05 Un	253,8 V			P
	Test circuit: figure	Figure 4a for 6O + 3CO			P
	T (min)	3 min			P
9.12.9.1	Test in free air copper wire F': <input checked="" type="checkbox"/> 0,12 mm / <input type="checkbox"/> 0,16 mm resistor R' : <input type="checkbox"/> 0,75 Ohm / <input checked="" type="checkbox"/> 1,5 Ohm	"a" = 35 mm			P
9.12.9.2	Test in enclosures copper wire F': <input type="checkbox"/> 0,12 mm / <input type="checkbox"/> 0,16 mm resistor R' : <input type="checkbox"/> 0,75 Ohm / <input type="checkbox"/> 1,5 Ohm				N/A
	Sequence	6O + 3CO			P
	I _{Peak} (A) max. value L N	D0+D1-1	D0+D1-2	D0+D1-3	P
		1,77 kA	1,69 kA	1,73 kA	
		1,77 kA	1,69 kA	1,73 kA	
	I ² t ≤ 63 kA ² s Max. I ² t ≤ 63 kA ² s N	D0+D1-1	D0+D1-2	D0+D1-3	P
		L1 6,39 kA ² s	5,91 kA ² s	5,77 kA ² s	
		N 6,39 kA ² s	5,91 kA ² s	5,77 kA ² s	
	- No permanent arcing				P
	- No flash-over between poles or between poles and frame				P
	- No blowing of the fuses F and F'				P
	- Polyethylene foil shows no holes				P
	After the test:				P
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				P
	a) leakage current across open contacts, according to 9.7.6.3, each pole is supplied at a voltage 1,1 times Un.= 253 V. The circuit – breaker is in the open position	D0+D1-1	D0+D1-2	D0+D1-3	P
	The leakage current shall not exceed 2 mA L1	≤ 0,1 mA	≤ 0,1 mA	≤ 0,1 mA	P

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Clause	Requirement + Test	Result - Remark			Verdict	
		N	≤ 0,1 mA	≤ 0,1 mA	≤ 0,1 mA	
	Electric strength test:				P	
	Test voltage 1500 V (see 8.7.2)	1500 V			P	
	a)				P	
	b)				P	
	c)				P	
	d)				N/A	
	e) 2000 V				N/A	
	Test current 0,85x non tripping current (1,13 I _N)	38,4 A			P	
	- Passed for 1h				P	
	- Passed for 2h				N/A	
	Current is then steadily increased to 1,1 x tripping current (1,45 I _N) within 5s	63,8 A			P	
	Tripping within <input checked="" type="checkbox"/> 1 hour / <input type="checkbox"/> 2 hour	D0+D1-1	D0+D1-2	D0+D1-3	P	
		447 s	209 s	312 s		

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Clause	Requirement + Test	Result - Remark			Verdict
	TESTS „D“	C type, 1 for all other rated current - - Test data taken from report 3301074.50. B type, 1 for all rated current (only 9.10.2) - Test data taken from report 3301074.50.			--
8.6	Automatic operation				P
8.6.1	Standard time-current zone				P
	Tripping characteristic of CB ensures adequate protection of the circuit, without premature operation.				P
9.10	Tests: D₀				P
	I _N (A)	D0-1	D0-2	D0-3	P
		C6	C10	C16	
		D0-4	D0-5	D0-6	
		C20	C25	C32	
		D0-7	D0-8	D0-9	
		B6	B10	B16	
		D0-10	D0-11	D0-12	
		B20	B25	B32	
		D0-13			
		B40			
	Sect. (mm ²)	D0-1	D0-2	D0-3	P
		1 mm ²	1,5 mm ²	2,5 mm ²	
		D0-4	D0-5	D0-6	
		2,5 mm ²	4 mm ²	6 mm ²	
		D0-7	D0-8	D0-9	
		1 mm ²	1,5 mm ²	2,5 mm ²	
		D0-10	D0-11	D0-12	
		2,5 mm ²	4 mm ²	6 mm ²	
		D0-13			
		10 mm ²			
	Instantaneous tripping current	<input checked="" type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/> D			P
9.10.1	Test of time-current characteristic				P
9.10.1.1	Test current 1,13 I _N (A) starting from cold for:	D0-1	D0-2	D0-3	P
		6,78 A	11,3 A	18,1 A	
		D0-4	D0-5	D0-6	
		22,6 A	28,3 A	36,2 A	

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Clause	Requirement + Test	Result - Remark			Verdict
	- 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 $1,45 I_N$ (A)	D0-1	D0-2	D0-3	P
		8,7 A	14,5 A	22,4 A	
		D0-4	D0-5	D0-6	
		29,0 A	36,3 A	46,4 A	
	- Tripping within				P
	- 1h (≤ 63 A)	D0-1	D0-2	D0-3	P
		449 s	15 s	61 s	
		D0-4	D0-5	D0-6	
		20 s	44 s	86 s	
	- 2h (> 63 A)				N/A
9.10.1.2	Test current $2,55 I_N$ (A) starting from cold for:	D0-1	D0-2	D0-3	P
		15,3 A	25,5 A	40,8 A	
		D0-4	D0-5	D0-6	
		51,0 A	63,7 A	81,6 A	
	opening time not less than 1 s or more than				P
	- 60 s	D0-1	D0-2	D0-3	
		11 s	10 s	6 s	
		D0-4	D0-5	D0-6	
		8 s	8 s	11 s	
	- 120 s				N/A
9.10.2	Test of instantaneous tripping and of correct opening of the contacts				P
9.10.2.1	General test conditions				P
	For the lower values of the test current the test is made once, at any convenient voltage.				P
	For the upper values of the test current the test is made at rated voltage U_n (phase to neutral) with a power factor between 0,95 and 1.				P
	The sequence of operation is : O-CO-CO-CO Interval time: > 3 min				P
	The tripping time of the O operation is measured				P
	After each operation the indicating means shall show the open position of the contacts				P

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Clause	Requirement + Test	Result - Remark			Verdict
9.10.2.2	<input checked="" type="checkbox"/> For circuit-breakers of the B – Type				P
	Test current $3I_N$ (A), starting from cold	D0-7	D0-8	D0-9	P
		18 A	30 A	48 A	
		D0-10	D0-11	D0-12	
		60 A	75 A	96 A	
		D0-13			
		120 A			
	Opening time:				P
	$\geq 0,1s$	D0-7	D0-8	D0-9	P
		2 s	5 s	4 s	
		D0-10	D0-11	D0-12	
		4 s	3 s	7 s	
		D0-13			
		5 s			
	Test current $5 I_N$ (A), starting from cold	D0-7	D0-8	D0-9	P
		30,2 A	50,4 A	80,8 A	
		D0-10	D0-11	D0-12	
		100,5 A	125 A	160 A	
		D0-13			
		201 A			
	Tripping less than 0,1 s	D0-7	D0-8	D0-9	P
		27,1 ms	13,1 ms	24,8 ms	
		D0-10	D0-11	D0-12	
		24,0 ms	23,8 ms	16,0 ms	
		D0-13			
		16,4 ms			
9.10.2.2	<input checked="" type="checkbox"/> For circuit-breakers of the C – Type				P
	Test current $5I_N$ (A), starting from cold	D0-1	D0-2	D0-3	P
		30 A	50 A	80 A	
		D0-4	D0-5	D0-6	
		100 A	125 A	160 A	
	Opening time:				P
	$\geq 0,1s$	D0-1	D0-2	D0-3	P
		3 s	2 s	1 s	

IEC 60898-1					
Clause	Requirement + Test	Result - Remark			Verdict
		D0-4	D0-5	D0-6	
		1 s	2 s	2 s	
	Test current $10 I_N$ (A), starting from cold	D0-1	D0-2	D0-3	P
		60 A	100 A	160 A	
		D0-4	D0-5	D0-6	
		200 A	250 A	320 A	
	Tripping less than 0,1 s	D0-1	D0-2	D0-3	P
		7 ms	11 ms	9 ms	
		D0-4	D0-5	D0-6	
		7 ms	8 ms	9 ms	
	opening time not less than 1 s or more than				P
	- 60 s	D0-1	D0-2	D0-3	P
		10 s	7 s	8 s	
		D0-4	D0-5	D0-6	
		7 s	6 s	11 s	
	- 120 s				
9.10.2.4	<input type="checkbox"/> For circuit-breakers of the D – Type				N/A
	Test current $10I_N$ (A), starting from cold				N/A
	Opening time:				N/A
	$\geq 0,1s$				N/A
	Test current $20 I_N$ (A) or to the maximum instantaneous tripping current(see cl. 6, item j), starting from cold				N/A
	Tripping less than 0,1 s				N/A
9.10.3	Test of effect of single pole loading on the tripping characteristic of multipole circuit-breakers:				N/A
	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				N/A
	Tripping within				N/A
	-1h				N/A
	- 2h				N/A

IEC 60898-1						
Clause	Requirement + Test	Result - Remark			Verdict	
9.10.4	Test of effect of ambient temperature on the tripping characteristics				P	
	a) Ambient temperature of $(35 \pm 2)^\circ\text{C}$ below the ambient air reference temperature	-5 °C			P	
	Test current $1,13 I_N$ (A)	D0-1	D0-2	D0-3	P	
		6,78 A	11,3 A	18,1 A		
		D0-4	D0-5	D0-6		
		22,6 A	28,3 A	36,2 A		
	- Passed for 1h				P	
	- Passed for 2h				N/A	
	Current is then steadily increased to $1,9 I_N$ (A) within 5s	D0-1	D0-2	D0-3	P	
		11,4 A	19,0 A	30,4 A		
		D0-4	D0-5	D0-6		
		38,0 A	47,5 A	60,8 A		
	Tripping within				P	
	- 1h	D0-1	D0-2	D0-3	P	
		29 s	34 s	20 s		
		D0-4	D0-5	D0-6		
		16 s	16 s	30 s		
	- 2h				N/A	
	b) Ambient temperature of $(40 \pm 2)^\circ\text{C}$	40 °C			P	
	Test current I_N (A)	D0-1	D0-2	D0-3	P	
		6 A	10 A	16 A		
		D0-4	D0-5	D0-6		
		20 A	25 A	35 A		
	No tripping within				P	
	- 1h				P	
	- 2h				N/A	

IEC 60898-1						
Clause	Requirement + Test	Result - Remark			Verdict	
	TESTS „E1“ 3 SAMPLES	E1'-1~3: C40			--	
8.12.11.4.2	Test: E₁: Test at service short-circuit capacity				--	
	Service short-circuit capacity.....:	6 000 A			P	
	Test circuit: figure:	Figure 4a			P	
	Prospective current	6 000 A			P	
	Prospective current obtained	6 086 A			P	
	Test voltage 1,05 Un	253,9 V			P	
	Power factor:	0,65~0,70			P	
	Power factor obtained.....:	0,69			P	
	Sequence	Table 19 of IEC 60898-1			P	
	T (min)	3 min			P	
9.12.9.1	Test in free air copper wire F': <input checked="" type="checkbox"/> 0,12 mm / <input type="checkbox"/> 0,16 mm resistor R' : <input type="checkbox"/> 0,75 Ohm / <input checked="" type="checkbox"/> 1,5 Ohm	"a" = 45 mm			P	
9.12.9.2	Test in enclosures copper wire F': <input type="checkbox"/> 0,12 mm / <input type="checkbox"/> 0,16 mm resistor R' : <input type="checkbox"/> 0,75 Ohm / <input type="checkbox"/> 1,5 Ohm				N/A	
	I _{Peak} (kA) max. value.....:	E1'-1	E1'-2	E1'-3	P	
	L1	2,7 kA	3,0 kA	2,7 kA		
	N	2,7 kA	3,0 kA	2,7 kA		
	I ² t ≤ 63 kA ² s (according to EN60898-1)	E1'-1	E1'-2	E1'-3	P	
	Max. I ² t ≤ 63 kA ² s	L1	16,8 kA ² s	13,8 kA ² s		15,8 kA ² s
		N	16,8 kA ² s	13,8 kA ² s		15,8 kA ² s
	- No permanent arcing				P	
	- No flash-over between poles or between poles and frame				P	
	- No blowing of the fuses F and F'				P	
	- Polyethylene foil shows no holes				P	
	After the test:				P	
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				P	
	a) leakage current across open contacts, according to 9.7.6.3, each pole is supplied at a voltage 1,1 times Un.= 264 V. The circuit – breaker is in the open position	E1'-1	E1'-2	E1'-3	P	
	The leakage current shall not exceed 2 mA L1	0,006 mA	0,006 mA	0,006 mA		

IEC 60898-1						
Clause	Requirement + Test	Result - Remark			Verdict	
		N	0,006 mA	0,005 mA	0,006 mA	
	Electric strength test:					P
	Test voltage 1500 V (see 8.7.2)					P
	a)					P
	b)					P
	c)					P
	d)					N/A
	e) 2000 V					N/A
	Test current 0,85x non tripping current (1,13 I _N)	38,4 A				P
	- Passed for 1h					P
	- Passed for 2h					N/A
	Current is then steadily increased to 1,1 x tripping current (1,45 I _N) within 5s	63,8 A				P
	Tripping within <input checked="" type="checkbox"/> 1 hour / <input type="checkbox"/> 2 hour	E1'-1	E1'-2	E1'-3		P
		67 s	62 s	99 s		

IEC 60898-1						
Clause	Requirement + Test	Result - Remark			Verdict	
	TESTS „E1“ 3 SAMPLES	E1'-4~6: C6			--	
8.12.11.4.2	Test: E₁: Test at service short-circuit capacity				--	
	Service short-circuit capacity.....:	6 000 A			P	
	Test circuit: figure:	Figure 4a			P	
	Prospective current	6 000 A			P	
	Prospective current obtained.....:	6 086 A			P	
	Test voltage 1,05 Un	253,9 V			P	
	Power factor:	0,65~0,70			P	
	Power factor obtained.....:	0,69			P	
	Sequence	Table 19 of IEC 60898-1			P	
	T (min)	3 min			P	
9.12.9.1	Test in free air copper wire F': <input checked="" type="checkbox"/> 0,12 mm / <input type="checkbox"/> 0,16 mm resistor R' : <input type="checkbox"/> 0,75 Ohm / <input checked="" type="checkbox"/> 1,5 Ohm	"a" = 45 mm			P	
9.12.9.2	Test in enclosures copper wire F': <input type="checkbox"/> 0,12 mm / <input type="checkbox"/> 0,16 mm resistor R' : <input type="checkbox"/> 0,75 Ohm / <input type="checkbox"/> 1,5 Ohm				N/A	
	I _{Peak} (kA) max. value.....:	E1'-4	E1'-5	E1'-6	P	
	L1	2,1 kA	1,9 kA	2,2 kA		
	N	2,1 kA	1,9 kA	2,2 kA		
	I ² t ≤ 40 kA ² s (according to EN60898-1)	E1'-4	E1'-5	E1'-6	P	
	Max. I ² t ≤ 40 kA ² s	L1	9,4 kA ² s	7,1 kA ² s		8,4 kA ² s
		N	9,4 kA ² s	7,1 kA ² s		8,4 kA ² s
	- No permanent arcing				P	
	- No flash-over between poles or between poles and frame				P	
	- No blowing of the fuses F and F'				P	
	- Polyethylene foil shows no holes				P	
	After the test:				P	
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				P	
	a) leakage current across open contacts, according to 9.7.6.3, each pole is supplied at a voltage 1,1 times Un.= 264 V. The circuit – breaker is in the open position	E1'-4	E1'-5	E1'-6	P	

IEC 60898-1						
Clause	Requirement + Test	Result - Remark			Verdict	
	The leakage current shall not exceed 2 mA	L1	0,006 mA	0,006 mA	0,006 mA	
		N	0,006 mA	0,006 mA	0,006 mA	
	Electric strength test:					P
	Test voltage 1500 V (see 8.7.2)					P
	a)					P
	b)					P
	c)					P
	d)					N/A
	e) 2000 V					N/A
	Test current 0,85x non tripping current (1,13 I _N)		5,8 A			P
	- Passed for 1h					P
	- Passed for 2h					N/A
	Current is then steadily increased to 1,1 x tripping current (1,45 I _N) within 5s		9,6 A			P
	Tripping within <input checked="" type="checkbox"/> 1 hour / <input type="checkbox"/> 2 hour		E1'-4	E1'-5	E1'-6	P
			11 s	17 s	23 s	

	TESTS „E2“ 3 samples					N/A
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IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

Annex E			--
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Annex J			--
	Particular requirements for circuit-breakers with screw less type terminals for external copper conductors (In not exceeding 20 A, cross-sectional area up to 4 mm ²)		N/A

Annex K			--
	Particular requirements for circuit-breakers with flat quick-connect terminations		N/A

Annex L			--
	Specific requirements for circuit-breakers 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

IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

Annex1

ATTACHMENT TO TEST REPORT IEC 60898-1 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES Circuit-breakers for over current protection for household and similar installations	
PART 1 - CIRCUIT-BREAKERS FOR A.C. OPERATION	
Differences according to	EN 60898-1:2003+A1:2004+A11:2006+A12:2008+A13:2012
Attachment Form No.	EU_GD_IEC60898_1C
Attachment Originator	DEKRA
Master Attachment	2014-03
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GENELEC COMMON MODIFICATIONS (EN)		--
Test item particulars	Circuit-breakers for overcurrent protection	
Type of circuit-breaker	M80N, M100N	
Energy limiting class	<input type="checkbox"/> Class 1	<input checked="" type="checkbox"/> Class 3
Value of rated operational voltage (Ue)	<input type="checkbox"/> 230 V	<input checked="" type="checkbox"/> 240 V
	<input type="checkbox"/> 230/400 V	<input type="checkbox"/> 400 V
	<input type="checkbox"/> 240/415 V	<input type="checkbox"/> 415 V
Rated impulse withstand voltage (Uimp)	4 kV	

Requirements for construction and operation			--
9.6	Test of protection against electric shock		--
	In case of knock-outs the test finger is applied with a force of 10 N		N/A

GENERAL			--
9.12	Short-circuit tests		P
9.12.2	Value of the power frequency recovery voltage shall be equal to 110 % of the rated voltage.		P
9.12.3	Tolerances on test quantities		P
	voltage (including recovery voltage) : 0, -5%		P

IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
	TESTS „A“ 1 sample	See main part of this report	--
6	MARKING AND OTHER INFORMATION		--
6.1	Standard marking:		--
	f) Rated short circuit capacity in A within a rectangle, without symbol "A"		P
	h) calibration temperature, if different from 30°C		N/A
	j) Energy limiting class in a square in accordance with annex ZA.	3	P
	k) Making and breaking capacity on an individual protected pole of multipole circuit-breakers (Icn1), if different from Icn	Same as Icn	N/A
6.2	Additional marking		N/A
	Additional marking to other standards (EN or IEC or other) is allowed under the follow conditions:		--
	- the circuit-breaker shall comply with all the requirements of the additional standard;		--
	- the relevant standard to which the additional marking refers shall be indicated adjacent to this marking and shall be clearly differentiated or separated from the standard marking according to cl. 6.1		--
	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
6.3	Guidance table for marking		P
	EACH MCB SHALL BE MARKED IN A DURABLE MANNER WITH ALL OR, FOR SMALL APPARATUS, ACCORDING TABLE FOR MARKING		P

IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

	TESTS „C“ 3 + 3 SAMPLES	See main part of this report	--
9.11.3	Dielectric strength reduced to 900 V	Tested at 1500 V	P

9.12.11.2.2	Test C₂ : Short-circuit test on circuit-breakers for use in IT systems	See main part of this report	--
	Test voltage 105 % of 400 V	439,6 V	P

	TESTS „D“ 3 samples	D0+D1-1~3: C40			--
9.10	Tests: D₀	See main part of this report			P
	If the tests are made in a test chamber, it shall be made in still air; the volume of the chamber shall not affect the test results.				P
9.10.2.2	<input type="checkbox"/> For circuit-breakers of the B – Type	See main part of this report			N/A
	Test current 3I _N (A), starting from cold	_____ A			N/A
	Opening time:	[s]	[s]	[s]	N/A
	- 0,1s ≤ t ≤ 45s (≤ 32A)				N/A
	- 0,1s ≤ t ≤ 90s (> 32A)				N/A
	Moreover the CB shall perform following test:				N/A
9.10.1.2	Test current 2,55 I _N (A) starting from cold for:	_____ A			N/A
	opening time not less than 1 s or more than	[s]	[s]	[s]	N/A
	- 60 s (≤ 32 A)				N/A
	- 120 s (> 32 A)				N/A
9.10.2.3	<input checked="" type="checkbox"/> For circuit-breakers of the C – Type				P
	Test current 5I _N (A), starting from cold	_____ A			P
	Opening time:	[s]	[s]	[s]	P
	- 0,1s ≤ t ≤ 15 s (≤ 32A)				N/A
	- 0,1s ≤ t ≤ 30 s (> 32A)				P
	Moreover the CB shall perform following test:				P
9.10.1.2	Test current 2,55 I _N (A) starting from cold for:	102 A			P
	opening time not less than 1 s or more than	D0+D1-1	D0+D1-2	D0+D1-3	P
	- 60 s (≤ 32 A)				N/A
	- 120 s (> 32 A)	11 s	9 s	10 s	P
9.10.2.4	<input type="checkbox"/> For circuit-breakers of the D – Type				N/A
	Test current 10I _N (A), starting from cold	_____ A			N/A
	Opening time:	[s]	[s]	[s]	N/A

IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- $0,1s \leq t \leq 4s$ ($10 A < I_n \leq 32 A$)		N/A
	- $0,1s \leq t \leq 10s$ ($10 A \geq I_n > 32A$)		N/A
	Test current $20 I_N$ (A) starting from cold		N/A
	Tripping less than 0,1 s		N/A
	Moreover the CB shall perform following test:		N/A
9.10.1.2	Test current $2,55 I_N$ (A) starting from cold for:	_____ A	N/A
	opening time not less than 1 s or more than	[s] [s] [s]	N/A
	- 60 s ($\leq 32 A$)		N/A
	- 120 s ($> 32 A$)		N/A

IEC 60898-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TESTS „D“	C type, 1 for all other rated current - - Test data taken from report 3301074.50. B type, 1 for all rated current (only 9.10.2) - Test data taken from report 3301074.50.			--
8.6	Automatic operation				P
8.6.1	Standard time-current zone				P
	Tripping characteristic of CB ensures adequate protection of the circuit, without premature operation.				P
9.10	Tests: D₀				P
	I _N (A)	D0-1	D0-2	D0-3	P
		C6	C10	C16	
		D0-4	D0-5	D0-6	
		C20	C25	C32	
		D0-7	D0-8	D0-9	
		B6	B10	B16	
		D0-10	D0-11	D0-12	
		B20	B25	B32	
		D0-13			
		D0-7	D0-8	D0-9	
	Sect. (mm ²)	D0-1	D0-2	D0-3	P
		1 mm ²	1,5 mm ²	2,5 mm ²	
		D0-4	D0-5	D0-6	
		2,5 mm ²	4 mm ²	6 mm ²	
		D0-7	D0-8	D0-9	
		1 mm ²	1,5 mm ²	2,5 mm ²	
		D0-10	D0-11	D0-12	
		2,5 mm ²	4 mm ²	6 mm ²	
		D0-13			
		10 mm ²			
	Instantaneous tripping current	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> C	<input type="checkbox"/> D	P
9.10.1	Test of time-current characteristic				P
9.10.1.1	Test current 1,13 I _N (A) starting from cold for:	D0-1	D0-2	D0-3	P
		6,78 A	11,3 A	18,1 A	
		D0-4	D0-5	D0-6	
		22,6 A	28,3 A	36,2 A	

IEC 60898-1					
Clause	Requirement + Test	Result - Remark			Verdict
	- 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 $1,45 I_N$ (A)	D0-1	D0-2	D0-3	P
		8,7 A	14,5 A	22,4 A	
		D0-4	D0-5	D0-6	
		29,0 A	36,3 A	46,4 A	
	- Tripping within				P
	- 1h (≤ 63 A)	D0-1	D0-2	D0-3	P
		449 s	15 s	61 s	
		D0-4	D0-5	D0-6	
		20 s	44 s	86 s	
	- 2h (> 63 A)				N/A
9.10.1.2	Test current $2,55 I_N$ (A) starting from cold for:	D0-1	D0-2	D0-3	P
		15,3 A	25,5 A	40,8 A	
		D0-4	D0-5	D0-6	
		51,0 A	63,7 A	81,6 A	
	opening time not less than 1 s or more than				P
	- 60 s	D0-1	D0-2	D0-3	
		11 s	10 s	6 s	
		D0-4	D0-5	D0-6	
		8 s	8 s	11 s	
	- 120 s				N/A
9.10.2	Test of instantaneous tripping and of correct opening of the contacts				P
9.10.2.1	General test conditions				P
	For the lower values of the test current the test is made once, at any convenient voltage.				P
	For the upper values of the test current the test is made at rated voltage U_n (phase to neutral) with a power factor between 0,95 and 1.				P
	The sequence of operation is : O-CO-CO-CO Interval time: > 3 min				P
	The tripping time of the O operation is measured				P
	After each operation the indicating means shall show the open position of the contacts				P
9.10.2.2 *)	<input checked="" type="checkbox"/> For circuit-breakers of the B – Type				P

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Clause	Requirement + Test	Result - Remark			Verdict
	Test current $3I_N$ (A), starting from cold	D0-7	D0-8	D0-9	P
		18 A	30 A	48 A	
		D0-10	D0-11	D0-12	
		60 A	75 A	96 A	
		D0-13			
		120 A			
	Opening time:				P
	- $0,1s \leq t (\leq 45s (\leq 32A))$	D0-7	D0-8	D0-9	P
		2 s	5 s	4 s	
		D0-10	D0-11	D0-12	
		4 s	3 s	7 s	
	- $0,1s \leq t (\leq 90s (> 32A))$	D0-13			P
		5 s			
	Test current $5 I_N$ (A), starting from cold	D0-7	D0-8	D0-9	P
		30,2 A	50,4 A	80,8 A	
		D0-10	D0-11	D0-12	
		100,5 A	125 A	160 A	
		D0-13			
		201 A			
	Tripping less than 0,1 s	D0-7	D0-8	D0-9	P
		27,1 ms	13,1 ms	24,8 ms	
		D0-10	D0-11	D0-12	
		24,0 ms	23,8 ms	16,0 ms	
		D0-13			
		16,4s			
9.10.1.2	Test current $2,55 I_N$ (A) starting from cold for:	D0-7	D0-8	D0-9	P
		15,3 A	25,5 A	40,8 A	
		D0-10	D0-11	D0-12	
		51,0 A	63,7 A	81,6 A	
		D0-13			
		102 A			
	opening time not less than 1 s or more than				P
	- 60 s	D0-7	D0-8	D0-9	P
		9 s	7 s	11 s	
		D0-10	D0-11	D0-12	

IEC 60898-1					
Clause	Requirement + Test	Result - Remark			Verdict
		15 s	9 s	8 s	
	- 120 s	D0-13			P
		7 s			
9.10.2.2	<input checked="" type="checkbox"/> For circuit-breakers of the C – Type				P
	Test current $5I_N$ (A), starting from cold	D0-1	D0-2	D0-3	P
		30 A	50 A	80 A	
		D0-4	D0-5	D0-6	
		100 A	125 A	160 A	
	Opening time:				P
	- $0,1s \leq t \leq 15s (\leq 32A)$	D0-1	D0-2	D0-3	P
		3 s	2 s	1 s	
		D0-4	D0-5	D0-6	
		1 s	2 s	2 s	
	- $0,1s \leq t \leq 30s (> 32A)$				N/A
	Test current $10 I_N$ (A), starting from cold	D0-1	D0-2	D0-3	P
		60 A	100 A	160 A	
		D0-4	D0-5	D0-6	
		200 A	250 A	320 A	
	Tripping less than 0,1 s	D0-1	D0-2	D0-3	P
		7 ms	11 ms	9 ms	
		D0-4	D0-5	D0-6	
		7 ms	8 ms	9 ms	
9.10.1.2	Test current $2,55 I_N$ (A) starting from cold for:	D0-1	D0-2	D0-3	P
		15,3 A	25,5 A	40,8 A	
		D0-4	D0-5	D0-6	
		51,0 A	63,7 A	81,6 A	
	opening time not less than 1 s or more than				P
	- 60 s	D0-1	D0-2	D0-3	P
		10 s	7 s	8 s	
		D0-4	D0-5	D0-6	
		7 s	6 s	11 s	
	- 120 s				
9.10.2.4	<input type="checkbox"/> For circuit-breakers of the D – Type				N/A
	Test current $10I_N$ (A), starting from cold				N/A
	Opening time:				N/A

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Clause	Requirement + Test	Result - Remark			Verdict
	- $0,1s \leq t \leq 4s (\leq 32A)$				N/A
	- $0,1s \leq t \leq 8s (> 32A)$				N/A
	Test current $20 I_N$ (A) or to the maximum instantaneous tripping current(see cl. 6, item j), starting from cold				N/A
	Tripping less than 0,1 s				N/A
9.10.1.2	Test current $2,55 I_N$ (A) starting from cold for:				N/A
	opening time not less than 1 s or more than				N/A
	- 60 s				N/A
	- 120 s				N/A
9.10.3	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) starting from cold				N/A
	Tripping within				N/A
	- 1h				N/A
	1 L				N/A
	2 L				
	3 L				
	L4(N)				
	- 2h				N/A
9.10.4	Test of effect of ambient temperature on the tripping characteristics				P
	a) Ambient temperature of $(35 \pm 2)^\circ\text{C}$ below the ambient air reference temperature	-5 °C			P
	Test current $1,13 I_N$ (A)	D0-1	D0-2	D0-3	P
		6,78 A	11,3 A	18,1 A	
		D0-4	D0-5	D0-6	
		22,6 A	28,3 A	36,2 A	
	- Passed for 1h				P

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Clause	Requirement + Test	Result - Remark			Verdict
	- Passed for 2h				N/A
	Current is then steadily increased to 1,9 I _N (A) within 5s	D0-1	D0-2	D0-3	P
		11,4 A	19,0 A	30,4 A	
		D0-4	D0-5	D0-6	
		38,0 A	47,5 A	60,8 A	
	Tripping within				P
	- 1h	D0-1	D0-2	D0-3	P
		29 s	34 s	20 s	
		D0-4	D0-5	D0-6	
		16 s	16 s	30 s	
	- 2h				N/A
	b) Ambient temperature of (40 ± 2)°C	40 °C			P
	Test current I _N (A)	D0-1	D0-2	D0-3	P
		6 A	10 A	16 A	
		D0-4	D0-5	D0-6	
		20 A	25 A	35 A	
	No tripping within				P
	- 1h				P
	- 2h				N/A

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Clause	Requirement + Test	Result - Remark			Verdict	
	TESTS „E1“ 3 SAMPLES	E1'-7~9: B40			--	
8.12.11.4.2	Test: E₁: Test at service short-circuit capacity				--	
	Service short-circuit capacity	6 000 A			P	
	Test circuit: figure:	Figure 4a			P	
	Prospective current.....	6 000 A			P	
	Prospective current obtained.....	6 086 A			P	
	Test voltage 1,05 Un	253,9 V			P	
	Power factor:	0,65~0,70			P	
	Power factor obtained	0,69			P	
	Sequence	Table 19 of IEC 60898-1			P	
	T (min).....	3 min			P	
9.12.9.1	Test in free air copper wire F': <input checked="" type="checkbox"/> 0,12 mm / <input type="checkbox"/> 0,16 mm resistor R' : <input type="checkbox"/> 0,75 Ohm / <input checked="" type="checkbox"/> 1,5 Ohm	"a" = 45 mm			P	
9.12.9.2	Test in enclosures copper wire F': <input type="checkbox"/> 0,12 mm / <input type="checkbox"/> 0,16 mm resistor R' : <input type="checkbox"/> 0,75 Ohm / <input type="checkbox"/> 1,5 Ohm				N/A	
	I _{Peak} (kA) max. value	E1'-7	E1'-8	E1'-9	P	
	L1	2,9 kA	3,0 kA	3,0 kA		
	N	2,9 kA	3,0 kA	3,0 kA		
	I ² t ≤ 54 kA ² s	E1'-7	E1'-8	E1'-9	P	
	Max. I ² t ≤ 54 kA ² s	L1	18,5 kA ² s	13,0 kA ² s		16,2 kA ² s
		N	18,5 kA ² s	13,0 kA ² s		16,2 kA ² s
	- No permanent arcing				P	
	- No flash-over between poles or between poles and frame				P	
	- No blowing of the fuses F and F'				P	
	- Polyethylene foil shows no holes				P	
	After the test:				P	
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				P	

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Clause	Requirement + Test	Result - Remark			Verdict
	a) leakage current across open contacts, according to 9.7.6.3, each pole is supplied at a voltage 1,1 times $U_n = 264$ V. The circuit – breaker is in the open position	E1'-7	E1'-8	E1'-9	P

IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

	The leakage current shall not exceed 2 mA	0,006 mA	0,006 mA	0,006 mA	
	L1				
	N	0,006 mA	0,006 mA	0,006 mA	
	Electric strength test:				P
	Test voltage 1500 V (see 8.7.2)				P
	a)				P
	b)				P
	c)				P
	d)				N/A
	e) 2000 V				N/A
	Test current 0,85x non tripping current (1,13 I _N)	38,4 A			P
	- Passed for 1h				P
	- Passed for 2h				N/A
	Current is then steadily increased to 1,1 x tripping current (1,45 I _N) within 5s	63,8 A			P
	Tripping within <input checked="" type="checkbox"/> 1 hour / <input type="checkbox"/> 2 hour	E1'-7	E1'-8	E1'-9	P
		18 s	53 s	46 s	

IEC 60898-1						
Clause	Requirement + Test	Result - Remark			Verdict	
	TESTS „E1“ 3 SAMPLES	E1'-10~12: B32			--	
8.12.11.4.2	Test: E₁: Test at service short-circuit capacity				--	
	Service short-circuit capacity	6 000 A			P	
	Test circuit: figure:	Figure 4a			P	
	Prospective current.....	6 000 A			P	
	Prospective current obtained.....	6 086 A			P	
	Test voltage 1,05 Un	253,9 V			P	
	Power factor:	0,65~0,70			P	
	Power factor obtained	0,69			P	
	Sequence	Table 19 of IEC 60898-1			P	
	T (min).....	3 min			P	
9.12.9.1	Test in free air copper wire F': <input checked="" type="checkbox"/> 0,12 mm / <input type="checkbox"/> 0,16 mm resistor R' : <input type="checkbox"/> 0,75 Ohm / <input checked="" type="checkbox"/> 1,5 Ohm	"a" = 45 mm			P	
9.12.9.2	Test in enclosures copper wire F': <input type="checkbox"/> 0,12 mm / <input type="checkbox"/> 0,16 mm resistor R' : <input type="checkbox"/> 0,75 Ohm / <input type="checkbox"/> 1,5 Ohm				N/A	
	I _{Peak} (kA) max. value	E1'-10	E1'-11	E1'-12	P	
	L1	2,9 kA	3,0 kA	3,0 kA		
	N	2,9 kA	3,0 kA	3,0 kA		
	I ² t ≤ 45 kA ² s	E1'-10	E1'-11	E1'-12	P	
	Max. I ² t ≤ 45 kA ² s	L1	14,1 kA ² s	11,1 kA ² s		15,3 kA ² s
		N	14,1 kA ² s	11,1 kA ² s		15,3 kA ² s
	- No permanent arcing				P	
	- No flash-over between poles or between poles and frame				P	
	- No blowing of the fuses F and F'				P	
	- Polyethylene foil shows no holes				P	
	After the test:				P	
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintainance, withstand the following tests.				P	

IEC 60898-1					
Clause	Requirement + Test	Result - Remark			Verdict
	a) leakage current across open contacts, according to 9.7.6.3, each pole is supplied at a voltage 1,1 times $U_n = 264$ V. The circuit – breaker is in the open position	E1'-10	E1'-11	E1'-12	P

IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

	The leakage current shall not exceed 2 mA L1	0,006 mA	0,006 mA	0,006 mA	
	N	0,006 mA	0,006 mA	0,006 mA	
	Electric strength test:				P
	Test voltage 1500 V (see 8.7.2)				P
	a)				P
	b)				P
	c)				P
	d)				N/A
	e) 2000 V				N/A
	Test current 0,85x non tripping current (1,13 I _N)	30,7 A			P
	- Passed for 1h				P
	- Passed for 2h				N/A
	Current is then steadily increased to 1,1 x tripping current (1,45 I _N) within 5s	51,0 A			P
	Tripping within <input checked="" type="checkbox"/> 1 hour / <input type="checkbox"/> 2 hour	E1'-10	E1'-11	E1'-12	P
		20 s	19 s	38 s	

IEC 60898-1						
Clause	Requirement + Test	Result - Remark			Verdict	
	TESTS „E1“ 3 SAMPLES	E1'-13~15: B16			--	
8.12.11.4.2	Test: E₁: Test at service short-circuit capacity				--	
	Service short-circuit capacity	6 000 A			P	
	Test circuit: figure:	Figure 4a			P	
	Prospective current.....	6 000 A			P	
	Prospective current obtained.....	6 086 A			P	
	Test voltage 1,05 Un	253,9 V			P	
	Power factor:	0,65~0,70			P	
	Power factor obtained	0,69			P	
	Sequence	Table 19 of IEC 60898-1			P	
	T (min).....	3 min			P	
9.12.9.1	Test in free air copper wire F': <input checked="" type="checkbox"/> 0,12 mm / <input type="checkbox"/> 0,16 mm resistor R' : <input type="checkbox"/> 0,75 Ohm / <input checked="" type="checkbox"/> 1,5 Ohm	"a" = 45 mm			P	
9.12.9.2	Test in enclosures copper wire F': <input type="checkbox"/> 0,12 mm / <input type="checkbox"/> 0,16 mm resistor R' : <input type="checkbox"/> 0,75 Ohm / <input type="checkbox"/> 1,5 Ohm				N/A	
	I _{Peak} (kA) max. value	E1'-13	E1'-14	E1'-15	P	
	L1	2,8 kA	2,7 kA	2,7 kA		
	N	2,8 kA	2,7 kA	2,7 kA		
	I ² t ≤ 35 kA ² s	E1'-13	E1'-14	E1'-15	P	
	Max. I ² t ≤ 35 kA ² s	L1	11,4 kA ² s	9,5 kA ² s		9,8 kA ² s
		N	11,4 kA ² s	9,5 kA ² s		9,8 kA ² s
	- No permanent arcing				P	
	- No flash-over between poles or between poles and frame				P	
	- No blowing of the fuses F and F'				P	
	- Polyethylene foil shows no holes				P	
	After the test:				P	
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				P	
	a) leakage current across open contacts, according to 9.7.6.3, each pole is supplied at a voltage 1,1 times Un.= 264 V. The circuit – breaker is in the open position	E1'-13	E1'-14	E1'-15	P	

IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

	The leakage current shall not exceed 2 mA L1	0,005 mA	0,006 mA	0,005 mA	
	N	0,005 mA	0,006 mA	0,006 mA	
	Electric strength test:				P
	Test voltage 1500 V (see 8.7.2)				P
	a)				P
	b)				P
	c)				P
	d)				N/A
	e) 2000 V				N/A
	Test current 0,85x non tripping current (1,13 I _N)	15,4 A			P
	- Passed for 1h				P
	- Passed for 2h				N/A
	Current is then steadily increased to 1,1 x tripping current (1,45 I _N) within 5s	25,5 A			P
	Tripping within <input checked="" type="checkbox"/> 1 hour / <input type="checkbox"/> 2 hour	E1'-13	E1'-14	E1'-15	P
		40 s	57 s	61 s	

IEC 60898-1					
Clause	Requirement + Test	Result - Remark			Verdict
	TESTS „E₃“	E3-1~3: C40- test data taken from report 3301074.50.			--
9.12.11.4.4	Test: E₃ (Test at making and breaking capacity on a individual pole (Icn1))				P
	Service short-circuit capacity	6 000 A			P
	Test circuit: figure	Figure 3			P
	Prospective current.....	6 000 A			P
	Prospective current obtained.....	6 030 A			P
	Test voltage 1,1 Un	253,8 V			P
	Power factor	0,65~0,70			P
	Power factor obtained	0,67			P
	Sequence	Table 22 of IEC 60898-1			P
	T (min).....	3 min			P
9.12.9.1	Test in free air copper wire F': <input checked="" type="checkbox"/> 0,12 mm / <input type="checkbox"/> 0,16 mm resistor R' : <input type="checkbox"/> 0,75 Ohm / <input checked="" type="checkbox"/> 1,5 Ohm	"a" = 45 mm			P
9.12.9.2	Test in enclosures copper wire F': <input type="checkbox"/> 0,12 mm / <input type="checkbox"/> 0,16 mm resistor R' : <input type="checkbox"/> 0,75 Ohm / <input type="checkbox"/> 1,5 Ohm				N/A
	I _{Peak} (A) max. value	E3-1	E3-2	E3-3	P
		3,48 kA	2,93 kA	3,74 kA	
	I ² t ≤ 63 kA ² s	E3-1	E3-2	E3-3	P
	Max. I ² t ≤ 63 kA ² s L1	23,9 kA ² s	38,2 kA ² s	26,1 kA ² s	
		N			
	- No permanent arcing				P
	- No flash-over between poles or between poles and frame				P
	- No blowing of the fuses F and F'				P
	- Polyethylene foil shows no holes				P
	After the test:				P
9.12.12.1	The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.				P
	a) leakage current across open contacts, according to 9.7.6.3, each pole is supplied at a voltage 1,1 times Un.= 264 V. The circuit – breaker is in the open position	E3-1	E3-2	E3-3	P

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Clause	Requirement + Test	Result - Remark			Verdict

	The leakage current shall not exceed 2 mm L1	≤ 0,1 mA	≤ 0,1 mA	≤ 0,1 mA	P
		N ≤ 0,1 mA	≤ 0,1 mA	≤ 0,1 mA	P
	Electric strength test:				P
	Test voltage 900 V (see 9.7.3)				P
	a)				P
	b)				P
	c)				P
	d)				N/A
	e) 2000 V				N/A
	Test current 2,8 I _N	112 A			P
	Tripping within > 0,1 s up to	E3-1	E3-2	E3-3	P
	- 60 s				N/A
	- 120 s	19 s	24 s	15 s	P

IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

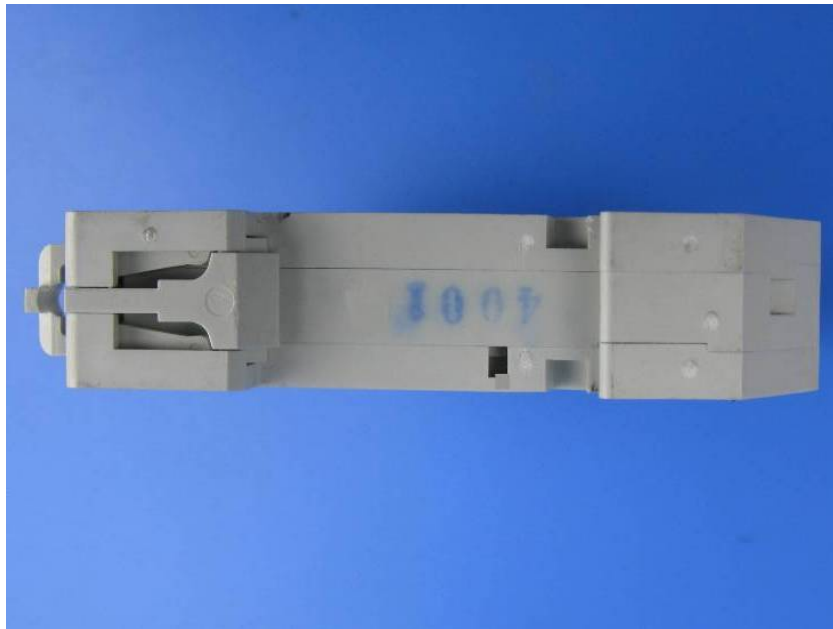
	Annex ZC (normative)		--
	EN 60898-1 Special national conditions		--
	For the countries in which the relevant special national conditions apply these provisions are normative, for other countries they are informative.		
J.1	Austria, Czech Republic, Denmark, Netherlands, Norway and Switzerland		
	The upper limit of current for use of screw less terminals is 16 A		
J.3.3	Austria, Belgium, Denmark, France, Germany, Italy, Portugal, Spain, Sweden, Switzerland, and United Kingdom		
	Only universal screwless type terminals are accepted.		
K1	BELGIUM, FRANCE, ITALY, PORTUGAL, SPAIN, AND UNITED KINGDOM		
	The use of circuit-breakers with flat quick-connect terminations for rated currents up to and including 20 A is accepted.		
K.8.2.2	BELGIUM, FRANCE, ITALY, PORTUGAL, SPAIN, AND UNITED KINGDOM		
	The use for rated currents up to and including 20 A		

IEC 60898-1			
Clause	Requirement + Test	Result - Remark	Verdict

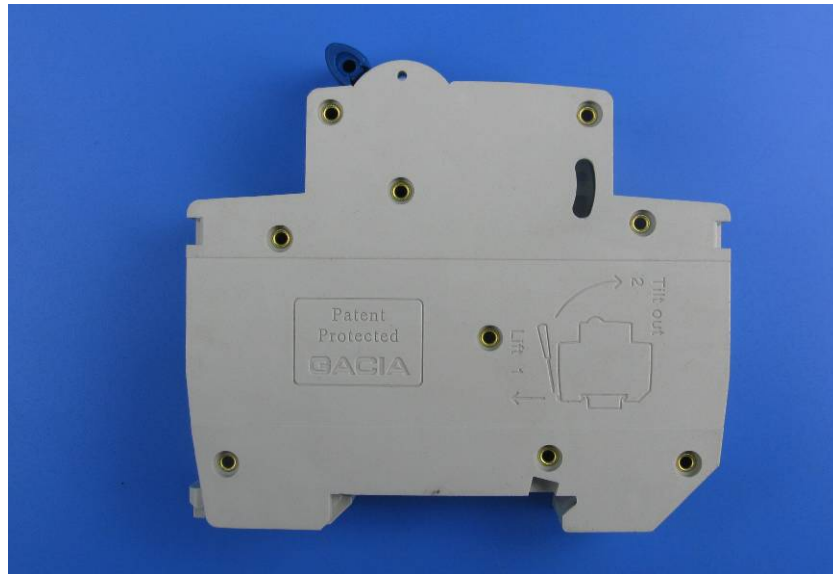
Photos:



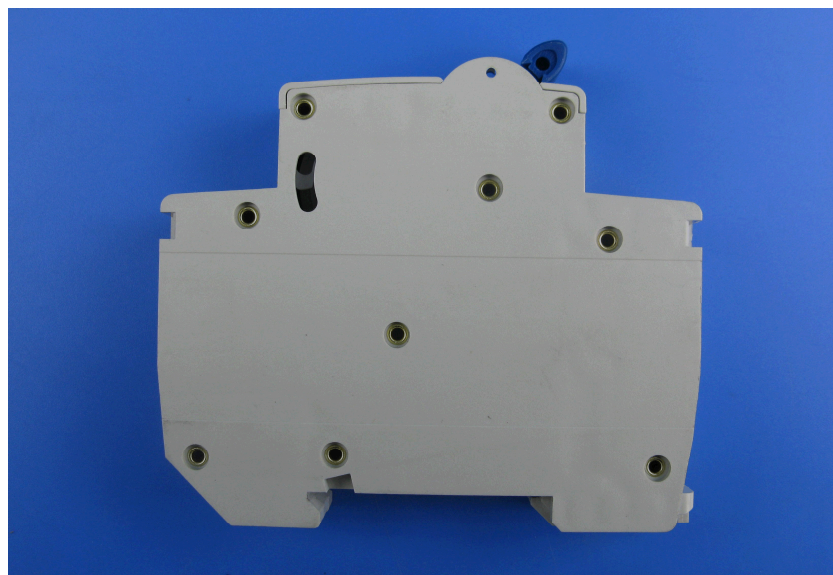
Front view



Back view



Side view



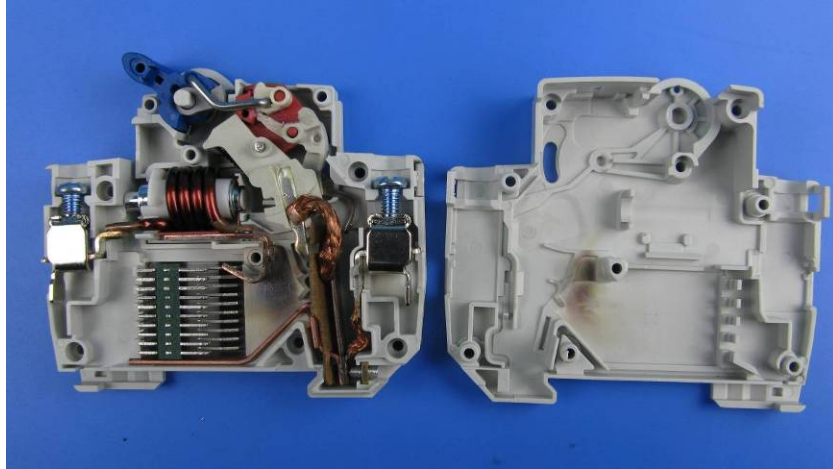
Side view



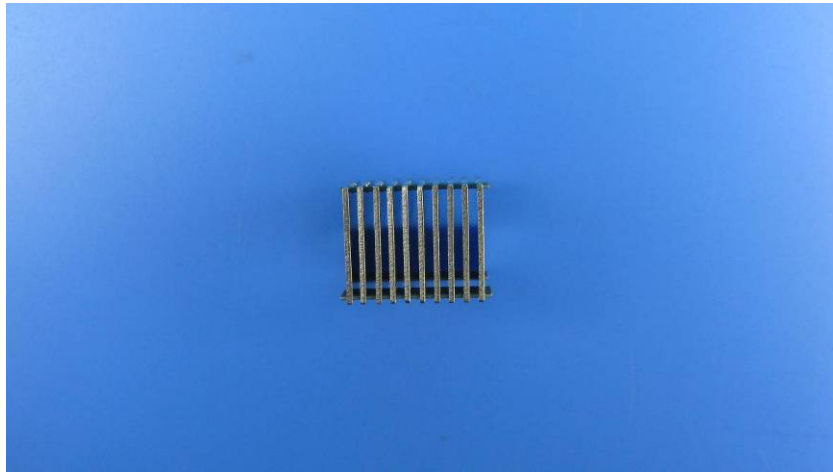
Top view



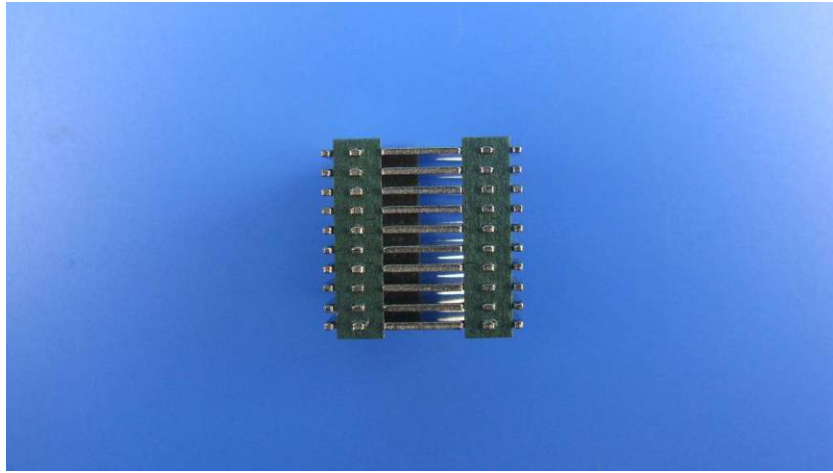
Bottom view



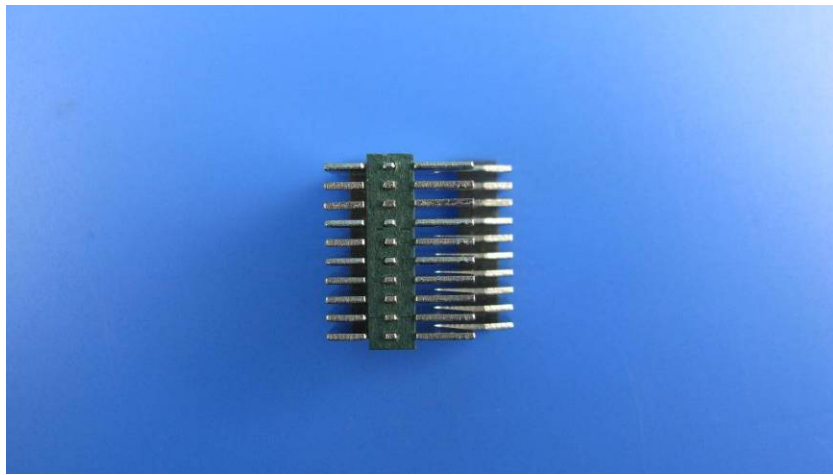
Internal view



Arc chamber view



Arc chamber view



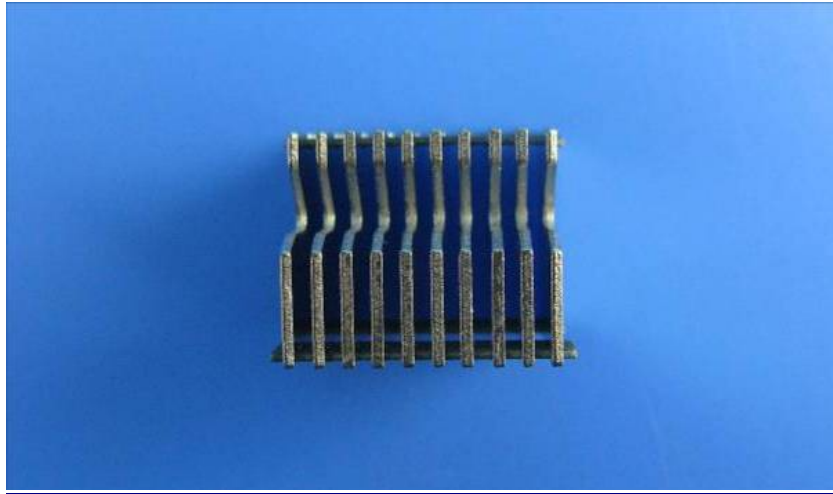
Arc chamber view



Arc chamber view



Arc chamber view



Arc chamber view