Zhejiang Zhangzhou Electric Technology Co., Ltd

CE LVD REPORT

Prepared For:	Zhejiang Zhangzhou Electric Technology Co., Ltd No. 1166 Liujiang Road, Daxing Village, Beibaixiang Town, Yueqing City, Wenzhou City, Zhejiang Province
Product Name:	Photovoltaic circuit breaker
Trade Name:	N/A
Model:	CZMD-250 3P
Additional Model:	CZMD-63, CZMD-250, CZMD-400, AC: 800V/1140, Ui:400V, number of poles：2P, 3P; Ui:1000V number of poles：2P, 3P
Prepared By:	BST Testing (Shenzhen) Co.,Ltd. No.7,New Era Industrial Zone, Guantian, Bao’an District, Shenzhen, Guangdong, China
Test Date:	Oct.18,2024 - Oct.25,2024
Date of Report:	Oct.25,2024
Report No.:	XDX30243864102501FAR

TEST REPORT

EN 60947-2

Low-voltage switchgear and controlgear-
Part 2:Circuit-breakers

Testing Laboratory.....:	BST Testing (Shenzhen) Co.,Ltd.
Address.....:	No.7,New Era Industrial Zone, Guantian, Bao’an District, Shenzhen, Guangdong, China
Applicant’s name.....:	Zhejiang Zhangzhou Electric Technology Co., Ltd
Address.....:	No. 1166 Liujiang Road, Daxing Village, Beibaixiang Town, Yueqing City, Wenzhou City, Zhejiang Province
Manufacturer’s name……:	Zhejiang Zhangzhou Electric Technology Co., Ltd
Address.....:	No. 1166 Liujiang Road, Daxing Village, Beibaixiang Town, Yueqing City, Wenzhou City, Zhejiang Province
Test specification:	
Standard.....:	EN 60947-2:2017/A1:2020
Test procedure.....:	CE-LVD
Non-standard test method……:	N/A
Test Report Form No.....:	EN 60947-2:2017/A1:2020
Master TRF.....:	Dated Oct.25,2024
Trade Mark.....:	N/A
Manufacturer.....:	Zhejiang Zhangzhou Electric Technology Co., Ltd
Model/Type reference.....:	CZMD-250 3P
Ratings.....:	AC: 800V/1140, Ui:400V, number of poles：2P, 3P; Ui:1000V number of poles：2P, 3P

Copy of marking plate (take model CZMD-250 3P for example)

Product: Photovoltaic circuit breaker

Model: CZMD-250 3P

Input: AC: 800V/1140, Ui:400V, number of poles：2P, 3P; Ui:1000V number of poles：2P, 3P

Zhejiang Zhangzhou Electric Technology Co., Ltd
Made In China

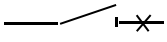
Test item particulars	:	
Equipment mobility	:	[x] movable [] hand-held [] transportable [] stationary [] for building-in [] direct plug-in
Connection to the mains	:	[] pluggable equipment [] type A [] type B [] permanent connection [] detachable power supply cord [] non-detachable power supply cord [x] not directly connected to the mains
Operating condition	:	[x] continuous [] rated operating / resting time:
Access location	:	[x] operator accessible [] restricted access location
Over voltage category (OVC)	:	[] OVC I [] OVC II [x] OVC III [] OVC IV [] other:
Mains supply tolerance (%) or absolute mains supply values	:	No direct connection with mains
Tested for IT power systems	:	[x] Yes [] No
IT testing, phase-phase voltage (V)	:	N/A
Class of equipment	:	[] Class I [] Class II [x] Class III [] Not classified
Considered current rating of protective device as part of the building installation (A)	:	
Pollution degree (PD)	:	[x] PD 1 [] PD 2 [] PD 3
IP protection class	:	IP21
Altitude during operation (m)	:	< 2000 m
Altitude of test laboratory (m)	:	Shenzhen of China < 2000 m
Mass of equipment (kg)	:	Approx. 0.25

General remarks: 1.”（see remark #）” refers to a remark appended to the report. 2. Throughout this report a point is used as the decimal separator. 3. The test results presented in this report relate only to the object tested.
Summary of testing: Tests performed (name of test and test clause): The sample(s) tested complies with the requirements of EN 61009-1 Heating test (4.5): Tma = 25 °C (Without declared by manufacturer) Tamb = 25.0°C – 25.3 °C
General product information:
Wireless N300 ADSL2+ / VDSL2 Modem Router, supplied by approved external AC adaptor.

Prepared by : Adam Chen
Engineer

Reviewer : Jady Zhang
Supervisor

Approved & Authorized Signer :
Manager

EN 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
5.2	MARKING		P
a)	The following data shall be marked on the circuit-breaker itself or on a name plate or nameplates attached to the circuit-breaker, and located in a place such that they are visible and legible when the circuit-breaker is installed.		P
	- rated current:	See marking	P
	- suitability for isolation, if applicable, with the symbol 		P
	- indication of the open and closed position: with ○ and I respectively, if symbols are used		P
b)	Marking on equipment not needed to be visible after mounting:		P
	- manufacturer's name or trademark		P
	- type designation or serial number		P
	- IEC 60947-2 if the manufacturer claims compliance with this standard.		P
	- utilization category		N
	- rated operational voltage(s) Ue		P
	- Circuit-breaker for use in IT systems: Circuit-breaker for which all values of rated voltage have not been tested according to annex H or are not covered by such testing, shall be identified by the symbol Ⓗ which shall be marked on the circuit-breaker immediately following these values of rated voltage		P
	- value (or range) of the rated frequency and/or the indication DC (or symbol)		N
	- rated service short-circuit breaking capacity. Ics		N
	- rated ultimate short-circuit breaking capacity. Icu		N
	- rated short-time withstand current, (Icw) and associated short-time delay, for utilization category B		N
	- line and load terminals, unless their connection is immaterial		N
	- neutral pole terminals, if applicable, by the letter N		P
	- protective earth terminal, where applicable, by the symbol acc. 7.1.9.3 of part 1		P
	- ref. temperature for non-compensated thermal releases, if different from 30°C		P

c)	Marked on the circuit-breaker as specified in item b), or shall be made available in the manufacturer's published information:		P
	- rated short-circuit making capacity (Icm) (if higher than specified in 4.3.5.1)		P
	- rated insulation voltage. (Ui) if higher than the maximum rated operational voltage)		P
	- rated impulse withstand voltage (Uimp), when declared.		P
	- pollution degree if other than 3		P
	- conventional enclosed thermal current (Ithe) if different from the rated current:		P
	- IP Code, where applicable:		N
	- minimum enclosure size and ventilation data (if any) to which marked ratings apply:		N
	- details of minimum distance between circuit-breaker and earthed metal parts for circuit-breaker intended for use without enclosure:		N
	- r.m.s sensing if applicable, according to F.4.1.1		P
	- suitability for environment A or B		N
d)	The following data concerning the opening and closing devices of the circuit-breaker shall be placed either on their own nameplates or on the nameplate of the circuit-breaker:		P
	- rated control circuit voltage of the closing device, and rated frequency for AC:		P
	- rated control circuit voltage of the shunt release and/or of the under-voltage release, and rated frequency:		P
	- rated current of indirect over-current releases:		P
	- number and type of auxiliary contacts and kind of current, rated frequency (if AC) and rated voltages of the auxiliary switches, if different from those of the main circuit.		P
e)	Terminal shall be clearly and permanently identified in acc. with IEC 60445 and annex L :		P
	- line terminal		P
	- load terminal		P
	- neutral pole terminal ”N”		P
	- protective earth terminal ⏚		P
	- terminal of coils (A/B)		P
	- terminal of shunt release (B)		P
	- terminals of under-voltage release (D)		P
	- terminals of interlocking electromagnets (E)		P

	- terminals of indicated light devices (X)		P
	- terminals of contact elements for switching devices (no)		P

7.1	CONSTRUCTION		--
7.1.1	Withdrawable circuit-breaker		P
	In the disconnected position (main- and auxiliary circuits)		P
	Isolating distances for circuit-breaker suitable for isolating warranted:		N
	Mechanism fitted with a reliable indicating device with indicates the position of the isolating contacts.		N
	Mechanism fitted with interlocks which only permit the isolating contacts to be separate or re-closed when main contacts are open		P
	Mechanism fitted with interlock, which only permit the main contacts to be closed when the isolating contacts are fully closed.		P
	Mechanism fitted with interlock, which only permit the main contacts to be closed when in disconnected position.		N
	The isolating distances between the isolating contacts cannot be inadvertently reduced.	The isolating contacts cannot be inadvertently reduced.	P
7.1.1.1 part 1	Resistance to abnormal heat and fire		P
7.1.2 part 1	Current-carrying parts and their connection		P
7.1.3	Clearances and creepage distances:		--
	For circuit-breakers for which the manufacturer has declared a value of rated impulse withstand voltage. (Uimp.)		P
	Clearances distances:		P
	- Uimp is given as:		N
	- max. value of rated operational voltage to earth		P
	- nominal voltage of supply system:		P
	- overvoltage category:		P
	- pollution degree:		P
	- field-in or homogeneous:		P
	- minimum clearances (mm):	1.5mm	P
	- measured clearances (mm):	2.8mm	P
	Creepage distances:		P
	- rated insulation voltage Ui (V)		N
	- pollution degree		P

	- comparative tracking index (V)		N
	- material group		P
	- minimum creepage distances (mm)	1.5mm	P
	- measured creepage distances (mm)	4.0mm	P
7.1.4 part 1	Actuator		--
7.1.4.1 part 1	Insulation		P
	The actuator of the equipment shall be insulated from the live parts for the rated insulation voltage and, if applicable, the rated impulse withstand voltage		P
	If it is made of metal, it shall be capable of being satisfactorily connected to a protective conductor unless it is provided with additional reliable insulation		N
	If it is made of or covered by insulating material, any internal metal part, which might become accessible in the event of insulation failure, shall also be insulated from live parts for the rated insulation voltage		P
7.1.4.2	Direction of movement		--
	The direction of operation for actuators of devices shall normally conform to IEC 60447.		N
	Where devices cannot conform to these requirements, e.g. due to special applications or alternative mounting positions, they shall be clearly marked such that there is no doubt as to the ”I” and ”O” positions and the direction of operation		N
7.1.5 part 1	Indication of contact position		P
7.1.5.1 part 1	Indicating means		P
	When an equipment is provided with means for indicating the closed and open positions, these positions shall be unambiguous and clearly indicated		P
	This is done by means of a position indicating device (see 2.3.18)		P
	If symbols are used, they shall indicate the closed and open position respectively, in accordance with IEC 60417-2:		P
	- 60417-2-IEC-50/6007 **I** On (power)		P
	- 60417-2-IEC-50/6007 **O** Off (power)		P
	For equipment operated by means of two push-buttons, only the push-button designated for the opening operation shall be red or marked with the symbol ”O”		P
	Red colour shall not be used for any other push-button		P

	The colours of other push-buttons, illuminated push-buttons and indicator lights shall be in accordance with IEC 60073		N
7.1.5.2 part 1	Indication by the actuator		N
	When the actuator is used to indicate the position of the contacts, it shall automatically take up or stay, when released, in the position corresponding to that of the moving contacts; in this case, the actuator shall have two distinct rest positions corresponding to those of the moving contacts, but for automatic opening a third distinct position of the actuator may be provided		N
7.1.6	Additional safety requirements for equipment suitable for isolation		--
7.1.6.1	Additional constructional requirements for equipment suitable for isolation (Ue > 50/60 V):		P
	Equipment suitable for isolation shall provide in the open position an isolation distance in acc. with the requirements necessary to satisfy the isolating function. Indication of the main contacts shall be provide by one or more of the following means:		P
	- the position of the actuator		P
	- a separate mechanical indicator		P
	- visibility of the moving contacts		N
	When means are provided or to lock the equipment in the open position, locking only be possible when contacts are in the open position		P
	Actuator front-plate fitted to the equipment in a manner which ensures correct contact position indication and locking		N
	The indicated open position is the only position in which the specified isolation distances between the contacts is ensured.		P
	- minimum clearances across open contacts (see Table XIII, Part 1) (mm) :		N
	- measured clearances (mm) :		N
	- test Uimp across gap (kV) :		--
7.1.6.2	Supplementary requirements for equipment with provision for electrical interlocking with contactors or circuit-breakers:		P
	auxiliary switch shall be rated according to IEC 60 947-5-1		P
	If equipment suitable for isolation is provided with an auxiliary switch for the purpose of electrical interlocking with contactor (s) or circuit-breaker(s) and intended to be used in motor circuits, the following requirements shall apply unless the equipment is rated for AC-23 utilization category		N

	The time interval between the opening of the contacts of the auxiliary switch and the contacts of the main poles shall be sufficient to ensure that the associated contactor or circuit-breaker interrupts the current before the main poles of the equipment open		N
	Unless otherwise stated in the manufacturer's technical literature, the time interval shall be not less than 20 ms when the equipment is operated according to the manufacturer instructions		N
	Compliance shall be verified by measuring the time interval between the instant of opening of the auxiliary switch and the instant of opening of the main poles under no-load conditions when the equipment is operated according to the manufacturer's instructions		N
	During the closing operation the contacts of the auxiliary switch shall close after or simultaneously with the contacts of the main poles		N
	A suitable opening time interval may also be provided by an intermediate position (between the ON and OFF position) at which the interlocking contact(s) is (are) open and the main poles remain closed		P
7.1.6.3	Supplementary requirements for equipment provided with means for padlocking the open position:		P
	the locking means shall be designed in such a way that it cannot be removed with the appropriate padlock(s) installed		N
	Alternatively, the design may provide padlockable means to prevent access to the actuator		P
	test force F applied to the actuator in an attempt to operate to the closed position (N) :		P
	rated impulse withstand voltage (kV) :		--
	test Uimp on open main contacts at the test force		--
7.1.7	Terminals		P
7.1.7.1	All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength		P
	Terminal connections shall be such that necessary contact pressure is maintained		P
	Terminals shall be so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal		P
	Terminal shall not allow the conductor to be displaced or to be displaced themselves in a manner detrimental to the operator of equipment and the insulation voltage shall not be reduced below the rated value		P
7.1.7.2	Connection capacity		P
	type of conductors :		P

	minimum cross-sectional area of conductor (mm²) :	0.5mm²	P
	maximum cross-sectional area of conductor (mm²) :	2.5mm²	P
	number of conductors simultaneously connectable to the terminal :		P
7.1.7.3	Connection		P
	terminals for connection to external conductors shall be readily accessible during installation		P
	clamping screws and nuts shall not serve to fix any other component		P
7.1.7.4	Terminal identification and marking		P
	terminal intended exclusively for the neutral conductor		P
	protective earth terminal		N
	other terminals		N
7.1.8 part 1	Additional requirements for equipment provided with a neutral pole		P
	When an equipment is provided with a pole intended only for connecting the neutral, this pole shall be clearly identified to that effect by the letter N (see 7.1.7.4.).		P
	A switched neutral pole shall break not before and shall make not after the other poles		P
	For equipment having a value of conventional thermal current (free air or enclosed, see 4.3.2.1 and 4.3.2.2) not exceeding 63 A, this value shall be identical for all poles		P
	For higher conventional thermal current values, the neutral pole may have a value of conventional thermal current different from that of the other poles, but not less than half that value or 63 A, whichever is the higher		P
	if a pole with a appropriate making and breaking capacity is used as a neutral pole, then all poles, incl. the neutral pole, shall operate substantially together.		P
7.1.9	Provisions for protective earthing		N
7.1.9.1	The exposed conductive parts (e.g. chassis, framework and fixed parts of metal enclosures) other than those which cannot constitute a danger shall be electrically interconnected and connected to a protective earth terminal for connection to an earth electrode or to an external protective conductor		N
part 1	This requirement can be met by the normal structural parts providing adequate electrical continuity and applies whether the equipment is used on its own or incorporated in an assembly		P

	Exposed conductive parts are considered not to constitute a danger if they cannot be touched on large areas or grasped with the hand or if they are of small size (approximately 60mm x 60mm) or are so located as to exclude any contact with live parts		P
7.1.9.2 part 1	Protective earth terminal		N
	The protective earth terminal shall be readily accessible and so placed that the connection of the equipment to the earth electrode or to the protective conductor is maintained when the cover or any other removable part is removed		N
	The protective earth terminal shall be suitably protected against corrosion		N
	In the case of equipment with conductive structures, enclosures, etc., means shall be provided, if necessary, to ensure electrical continuity between the exposed conductive parts the equipment and the metal sheathing of connecting conductors		N
	The protective earth terminal shall have no other function, except when it is intended to be connected to a PEN conductor (see 2.1.1.5 – Note). In this case, it shall also have the function of a neutral terminal in addition to meeting the requirements applicable to the protective earth terminal		N
7.1.9.3	Protective earth terminal marking and identification		N
	The protective earth terminal shall be clearly and permanently identified by its marking		N
	The identification shall be achieved by colour (green-yellow mark) or by the notation PE, or PEN, as applicable, in accordance with IEC 60445, subclause 5.3, or, in the case of PEN, by a graphical symbol for use on equipment		N
	Graphical symbol to be used: 60417-2-IEC-50/6019 Protective earth (ground) in accordance with IEC 60417-2		N
7.1.10	Enclosure for equipment		P
7.1.10.1	Design		P
	The enclosure, when it is opened: all parts requiring access for installation and maintenance are readily accessible		P
	Sufficient space shall be provided inside the enclosure		P
	The fixed parts of a metal enclosure shall be electrically connected to the other exposed conductive parts of the equipment and connected to a terminal which enables them to be earthed or connected to a protective conductor		P

	Under no circumstances shall a removable metal part of the enclosure be insulated from the part carrying the earth terminal when the removable part is in place		P
	The removable parts of the enclosure shall be firmly secured to the fixed parts by a device such that they cannot be accidentally loosened or detached owing to the effects of operation of the equipment or vibrations		N
	When an enclosure is so designed as to allow the covers to be opened without the use of tools, means shall be provided to prevent loss of the fastening devices		P
	If the enclosure is used for mounting push-buttons, it shall not be possible to remove the buttons from the outside of the enclosure		P
7.1.10.2	Insulation		P
	If, in order to prevent accidental contact between a metallic enclosure and live parts, the enclosure is partly or completely lined with insulating material, then this lining shall be securely fixed to the enclosure		P
7.1.11	Degree of protection of enclosed equipment		--
	Degree of protection.	IP21	P
	Test for first characteristic.	IP21	P
	Test for first numeral .....:	1 2 3 4 5 6	N
	Test for second characteristic	IP21	P
	Test for second numeral ..... :	1 2 3 4 5 6 7 8	N
7.1.12 part 1	Conduit pull-out, torque and bending with metallic conduits		N
	Polymeric enclosures of equipment, whether integral or not, provided with threaded conduit entries, intended for the connection of extra heavy duty, rigid threaded metal conduits complying with IEC 60981, shall withstand the stresses occurring during its installation such as pull-out, torque, bending		N

7.2	Performance requirements		N
7.2.1	Operating condition		N
7.2.1.1	Closing		--
	For a circuit-breaker to be closed safely on to the making current corresponding to its rated short-circuit making capacity, it is essential that it should be operated with the same speed and the same firmness as during the type test for proving the short-circuit making capacity		P
7.2.1.1.1	Dependent manual closing		
	For a circuit-breaker having a dependent manual closing mechanism, it is not possible to assign a short-circuit making capacity rating irrespective of the conditions of mechanical operation		P
	Such a circuit-breaker should not be used in circuits having a prospective peak making current exceeding 10 kA		P
	However, this does not apply in the case of a circuit-breaker having a dependent manual closing mechanism and incorporating an integral fast-acting opening release which causes the circuit-breaker to break safely, irrespective of the speed and firmness with which it is closed on to prospective peak currents exceeding 10 kA; in this case, a rated short-circuit making capacity can be assigned		P
7.2.1.1.2	Independent manual closing		N
	A circuit-breaker having an independent manual closing mechanism can be assigned a short-circuit making capacity rating irrespective of the conditions of mechanical operation		N
7.2.1.1.3	Dependent power closing		P
	At 110% of the rated control supply voltage, the closing operation performed on no-load shall not cause any damage to the circuit-breaker.		P
	At 85% of the rated control supply voltage, the closing operation shall be performed when the current established by the circuit-breaker is equal to its rated making capacity within the limits allowed by the operation of its relays or releases and, if a maximum time is stated for the closing operation, in a time not exceeding this maximum time limit.		P
7.2.1.1.4	Independent power closing		N
	A circuit-breaker having an independent power closing operation can be assigned a rated short-circuit making capacity irrespective of the conditions of power closing		P

	Means for charging the operating mechanism, as well as the closing control components, shall be capable of operating in accordance with the manufacturer's specification		N
7.2.1.1.5	Stored energy closing		N
	Capable ensuring closing of the circuit-breaker in any condition between no-load and its rated making capacity		N
	- when the stored energy is retained within the circuit-breaker, a device is provided which indicates when the storing mechanism is fully charged.		N
	- means for charging the operating mechanism and closing control components operates when auxiliary supply voltage is between 85% and 110% of the rated control supply voltage.		N
	- not possible for the moving contacts to move from the open position, unless the charge is sufficient for satisfactory completion of the closing operation.		N
	- by manually operated circuit-breaker is the direction of operation indicated. (not for circuit-breaker with an independent manual closing operation.)		N
	- For trip free circuit-breaker it shall not be possible to maintain the contacts in the touching or closed position when the release is in the position to trip the circuit-breaker.		N
7.2.1.2	Opening		P
7.2.1.2.1	Circuit-breakers which open automatically shall be trip-free and, unless otherwise agreed between manufacturer and user, shall have their energy for the tripping operation stored prior to the completion of the closing operation		P
7.2.1.2.2	Opening by undervoltage releases		P
7.2.1.3. a part 1	Operating voltage		P
	An under-voltage relay or release, when associated with a switching device, shall operate to open the equipment even on a slowly falling voltage within the range between 70% and 35% of its rated voltage		P
	An under-voltage relay or release shall prevent the closing of the equipment when the supply voltage is below 35% of the rated voltage of the relay or release; it shall permit closing of the equipment at supply voltages equal to or above 85% of its rated value		P
	Unless otherwise stated in the relevant product standard, the upper limit of the supply voltage shall be 110% of its rated value		P

7.2.1.3. b part 1	Operating time		P
	For a time-delay under-voltage relay or release, the time-lag shall be measured from the instant when the voltage reaches the operating value until the instant when the relay or release actuates the tripping device of the equipment		P
7.2.1.2.3	Opening by shunt releases		N
7.2.1.4 part 1	Limits of operation of shunt releases		N
	A shunt release for opening shall cause tripping under all operating conditions of an equipment when the supply voltage of the shunt release measured during the tripping operation remains between 70% and 110% of the rated control supply voltage and, if a.c., at the rated frequency		N
7.2.1.5 part 1	Limits of operation of current operated relays and released		N
	Limits of operation of current operated relays and releases shall be stated in the relevant product standard		N
7.2.1.2.4	Opening by over-current releases		--
a)	Opening under short-circuit conditions		P
	The short-circuit release shall cause tripping of the circuit-breaker with an accuracy of 20% of the tripping current value of the current setting for all values of the current setting of the short-circuit current release		P
	Where necessary for over-current co-ordination the manufacturer shall provide information (usually curves) showing		P
	- maximum cut-off (let-through) peak current as a function of prospective current (r.m.s. symmetrical)		P
	- I^2t characteristics for circuit-breakers of utilization category A and, if applicable, B for circuit-breakers with instantaneous override (see note to 8.3.5)		P
b)	Opening under overload conditions		N
1)	Instantaneous or definite time-delay operation		N
	The release shall cause tripping of the circuit-breaker with an accuracy of ± 10% of the tripping current value of the current setting for all values of current setting of the overload release		N

2)	Inverse time-delay operation		N
	At the reference temperature and at 1,05 times the current setting with the conventional non-tripping current, the opening release being energized on all poles, tripping shall not occur in less than the conventional time from the cold state, i.e. with the circuit-breaker at the reference temperature		N
	Moreover, when at the end of the conventional time the value of current is immediately raised to 1,30 times the current setting, i.e. with the conventional tripping current, tripping shall then occur in less than the conventional time later		N
	If a release is declared by the manufacturer as substantially independent of ambient temperature, the current values of table 6 shall apply within the temperature band declared by the manufacturer, within a tolerance of 0,3%/K		N
	The width of the temperature band shall be at least 10 K on either side of the reference temperature		N
7.2.4.2	Operational performance capability		N
7.2.4.2 part 1	The operational performance off-load for which the tests are made with the control circuits energized and the main circuit not energized, in order to demonstrate that the equipment meets the operating conditions specified at the upper and lower limits of supply voltage and/or pressure specified for the control circuit during closing and opening operations		N
	The operational performance on-load during which the equipment shall make and break the specified current corresponding, where relevant, to its utilization category for the number of operations stated in the relevant product standard		N

8	TESTS		--
8.2.4	Mechanical properties of terminals		P
	Mechanical strength of terminals		P
	maximum cross-sectional area of conductor (mm²) :		--
	diameter of thread (mm) :		--
	torque (Nm) :		--
	5 times on 2 separate clamping units		--
	Testing for damage to and accidental loosening of conductor (flexion test)		--
	conductor of the smallest cross-sectional area (mm²) :		--
	number of conductors of the smallest cross section :		--
	diameter of bushing hole (mm) :		--
	height between the equipment and the platen :		--

	mass at the conductor(s) (kg) :		--
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		--
	Pull-out test		P
	force (N) :		--
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	conductor of the largest cross-sectional area (mm²) :		P
	number of conductors of the largest cross section :		--
	diameter of bushing hole (mm) :		--
	height between the equipment and the platen :		--
	mass at the conductor(s) (kg) :		--
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		--
	Pull-out test		P
	force (N) :		--
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	conductor of the largest and smallest cross-sectional area (mm²) :		--
	number of conductors of the smallest cross section, number of conductors of the largest cross section :		P
	diameter of bushing hole (mm) :		--
	height between the equipment and the platen :		N
	mass at the conductor(s) (kg) :		N
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		N
	Pull-out test		N
	force (N) :		N
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		N

8.3.3	TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS		--
8.3.3.1	Tripping limits and characteristic		P
8.3.3.1.2	Opening under short-circuit conditions		P
	Manufacturer's name or trademark	See marking	P
	Type designation or serial number		N

	Sample no:		N
	Rated operational voltage: Ue (V)		N
	Rated current: In (A)		N
	Ambient temperature 10-40 °C :		P
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.		P
	Range of adjustable setting current. (A)		P
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N
	Electromagnetic overcurrent releases		P
	Test current: 80% of the rated, or **minimum** adjustable setting current: (A)		N
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3: N-Lx:		P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3: N-Lx:		P
	Test current: 120% of the rated, or **minimum** adjustable setting current: (A)		P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3: N-Lx:		N
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3: N-Lx:		P
	Test current: 80% of the **maximum** adjustable setting current: (A)		P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3: N-Lx:		P

	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3: N-Lx:		P
	Test current: 120% of the **maximum** adjustable setting current: (A)		P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3: N-Lx:		N
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3: N-Lx:		N
	For circuit-breakers with an electronic overcurrent release, the operation of the short-circuit releases shall be verified by one test only on each pole individually.		N
	Electronic overcurrent releases		P
	Test current: 80% of the rated, or **minimum** adjustable setting current: (A)		P
	Operating time: >0,2s in case of instantaneous releases: L1: L2: L3: N:		P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:		P
	Test current: 120% of the rated, or **minimum** adjustable setting current: (A)		P
	Operating time: <0,2s in case of instantaneous releases: L1: L2: L3: N:		P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:		P

	Test current: 80% of the **maximum** adjustable setting current: (A)		P
	Operating time: >0,2s in case of instantaneous releases: L1: L2: L3: N:		P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:		P
	Test current: 120% of the **maximum** adjustable setting current: (A)		P
	Operating time: <0,2s in case of instantaneous releases: L1: L2: L3: N:		P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:		P
	Test current: tripping current declared for single pole operation (A)		N
	Operating time: < 0,2 s in case of instantaneous release: L1: L2: L3: N:		N
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3: N:		N
8.3.3.1.3	Opening under overload conditions		--
a)	Instantaneous or definite time-delay releases		--
	Manufacturer's name or trademark		--
	Type designation or serial number		--
	Sample no:		--
	Rated operational voltage: Ue (V)		--
	Rated current: In (A)		--
	Ambient temperature 10-40 °C :		N

	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.		N
	Range of adjustable setting current. (A)		N
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N
	Test current: 90% of the rated, or minimum adjustable setting current: (A)		N
	Operating time: >0,2s in case of instantaneous releases:		N
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N
	Test current: 90% of the maximum adjustable setting current: (A)		N
	Operating time: >0,2s in case of instantaneous releases		N
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N
	Operating time: <0,2s in case of instantaneous releases:		N
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N
	Operating time: <0,2s in case of instantaneous releases		N
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N
b)	Inverse time delay releases		--
	Manufacturer's name or trademark		--
	Type designation or serial number		--
	Sample no:		--
	Rated operational voltage: Ue (V)		--
	Rated current: In (A)		--
	For releases dependent of ambient air temperature: Reference temperature		N

	Test ambient temperature (°C)		N
	For electronic releases, the operating characteristic shall be verified at the ambient temperature of the test room (see 6.1.1 of IEC 60947-1), the release being energised on all phase poles.		N
	For releases dependent on ambient air temperature, the operating characteristics shall be verified at the reference temperature, the release being energized on all phase poles. If the test made at a different ambient temperature, a correction shall be made in accordance with the manufacturer's correction temperature/current data		N
	Range of adjustable setting current: (A)		P
	For releases independent of ambient temperature: Tests shall be made at 30°C and 20°C or 40°C		P
	Test ambient air temperature:		N
	Releases, dependent of ambient air temperature: Reference temperature (°C)		P
	Releases, independent of ambient air temperature: at 30°C		P
	Test current: 105% of the rated, or minimum adjustable setting current: (A)		P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		P
	Test current: 130% of the rated, or minimum adjustable setting current: (A)		P
	For circuit-breakers having an identified neutral pole provided with an overload release (see 8.3.3.1.1), the test current at the conventional tripping current shall be multiplied by the factor 1,2.		P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	80A	P
	Test current: 105% of the maximum adjustable setting current: (A)		P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		P
	Test current: 130% of the maximum adjustable setting current: (A)		P
	For circuit-breakers having an identified neutral pole provided with an overload release (see 8.3.3.1.1), the test current at the conventional tripping current shall be multiplied by the factor 1,2.		P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		P
	Releases, independent of ambient air temperature: at 20°C or 40°C		P
	Test ambient air temperature:		P

	Test current: 105% of the rated, or minimum adjustable setting current: (A)		P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		P
	Test current: 130% of the rated, or minimum adjustable setting current: (A)		P
	For circuit-breakers having an identified neutral pole provided with an overload release (see 8.3.3.1.1), the test current at the conventional tripping current shall be multiplied by the factor 1,2.		P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		P
	Test current: 105% of the maximum adjustable setting current: (A)		P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		P
	Test current: 130% of the maximum adjustable setting current: (A)		P
	For circuit-breakers having an identified neutral pole provided with an overload release (see 8.3.3.1.1), the test current at the conventional tripping current shall be multiplied by the factor 1,2.		P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N
	An additional test, at a current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer		N
	Releases, dependent of ambient air temperature: Reference temperature (°C)		N
	Releases, independent of ambient air temperature: at 30°C		N
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. -% at the rated, or minimum adjustable setting current: (% or A)		N
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)		N
	Releases, independent of ambient air temperature: at 20°C or 40°C		--
	Test ambient air temperature:		P
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)		P

	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)		P
8.3.3.1.4	Additional test for definite time-delay releases		P
a)	Time delay		--
	Test is made at a current equal to 1,5 times the current setting		N
	overload releases: (all phase poles loaded)		N
	for circuit-breakers having an identified neutral pole provided with an overload release, the test current for this release shall be 1,5 times the current setting;		N
	short-circuit releases		N
	Electromagnetic release: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.		N
	Electronic releases: on one pole chosen at random.		N
	Test current: 1,5 times of the rated, or **minimum** adjustable setting current: (A)		N
	Operating time, overload releases: (s)		N
	Time-delay: between the limits stated by the manufacturer:		N
	Operating time, short-circuit releases (electromagnetic): (s) L1-L2: L1-L3: L2-L3:		N
	Time-delay: between the limits stated by the manufacturer:		N
	Operating time, short-circuit releases (electronic): (s) L1: L2: L3:		N
	Time-delay: between the limits stated by the manufacturer:		N
	Test current: 1,5 times of the **maximum** adjustable setting current: (A)		N
	Operating time, overload releases: (s)		N
	Time-delay: between the limits stated by the manufacturer:		N
	Operating time, short-circuit releases (electromagnetic): (s) L1-L2: L1-L3: L2-L3:		N
	Time-delay: between the limits stated by the manufacturer:		N

	Operating time, short-circuit releases (electronic): (s) L1: L2: L3:		N
	Time-delay: between the limits stated by the manufacturer:		N
b)	Non-tripping duration		--
	Firstly, the test current equal to 1,5 times the current setting is maintained for a time interval equal to the non-tripping duration stated by the manufacturer.		N
	overload releases: (all phase poles loaded)		N
	for circuit-breakers having an identified neutral pole provided with an overload release, the test current for this release shall be 1,5 times the current setting;		N
	short-circuit releases		N
	Electromagnetic release: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.		N
	Electronic releases: on one pole chosen at random.		N
	Test current: 1,5 times of the rated, or **minimum** adjustable setting current: (A)		N
	Time interval: non-tripping duration stated by the manufacturer: (s)		N
	Operating time, overload releases: the circuit-breaker does not trip:		N
	Operating time, short-circuit releases (electromagnetic): (s) L1-L2: L1-L3: L2-L3:		N
	Operating time, short-circuit releases (electronic): (s) L1: L2: L3:		N
	Test current: 1,5 times of **maximum** adjustable setting current: (A)		N
	Time interval: non-tripping duration stated by the manufacturer: (s)		N
	Operating time, overload releases: the circuit-breaker does not trip:		N
	Operating time, short-circuit releases (electromagnetic): (s) L1-L2: L1-L3: L2-L3:		N
	Operating time, short-circuit releases (electronic): (s) L1: L2: L3:		N

	Then, the current is reduced to the rated current and maintained at this value for twice the time-delay stated by the manufacturer. The circuit-breaker shall not trip.		N
	Test current: of the rated, or **minimum** adjustable setting current: (A)		N
	Time interval: twice the delay-time stated by the manufacturer: (s)		N
	Operating time, overload releases: the circuit-breaker does not trip:		N
	Operating time, short-circuit releases (electromagnetic): (s) L1-L2: L1-L3: L2-L3:		N
	Operating time, short-circuit releases (electronic): (s) L1: L2: L3:		N
	Test current: **maximum** adjustable setting current: (A)		N
	Operating time, overload releases: the circuit-breaker does not trip:		N
	Operating time, short-circuit releases (electromagnetic): (s) L1-L2: L1-L3: L2-L3:		N
	Operating time, short-circuit releases (electronic): (s) L1: L2: L3:		N
8.3.3.2	Test of dielectric properties, impulse withstand voltage (Uimp indicated):		P
8.3.3.4 part1	The 1,2/50/60µs impulse voltage shall be applied five times for each polarity at intervals of 1s minimum		P
	- rated impulse withstand voltage (kV) :		P
	- sea level of the laboratory:		P
	- test Uimp main circuits (kV) :		P
	- test Uimp auxiliary circuits (kV) :		P
	- test Uimp control circuits (kV) :		P
	- test Uimp on open main contacts (equipment suitable for isolating) (kV) :		P
a)	Application of test voltage		P
	i) Between all terminals of the main circuit connected together (incl. control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation.		P

	ii) Between all terminals of the main circuit and the other poles connected together and to the enclosure or mounting plate, with the contacts in all normal positions of operation.		P
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit		P
	- other circuits		P
	- exposed conductive parts		P
	- enclosure of mounting plate		P
	iv) equipment suitable for isolation		P
	equipment not suitable for isolation		P
	- no unintentional disruptive discharge during the test's		P
	Test of dielectric properties, dielectric withstand voltage (Uimp not indicated):		N
	- rated insulation voltage (V) :		N
	- main circuits, test voltage for 1 min (V)		P
	- auxiliary circuits, test voltage for 1 min (V)		P
	- control circuits, test voltage for 1 min (V)		P
8.3.3.2.2	Application of test voltage		P
1)	with circuit-breaker in the closed position		P
	- between all live parts of all poles connected together and the frame of the circuit-breaker .		P
	- between each pole and all the other poles connected to the frame of the circuit-breaker		P
2)	with the circuit-breaker in the open position and, additionally, in the tripped position, if any.		N
	- between all live parts of all poles connected together and the frame of the circuit-breaker.		N
	- between the terminals of one side connected together and the terminals of the other side connected together.		N
b)	Control and auxiliary circuits		N
1)	- between all the control and auxiliary circuits which are not normally connected to the main circuit, connected together, and the frame of the circuit-breaker.		N
2)	- where appropriate, between each part of the control an auxiliary circuits which may be isolated from the other parts during normal operation and all the other parts connected together.		N
	No unintentional disruptive discharge during the tests		N

8.3.3.2	For circuit-breaker suitable for isolation, the leakage current shall be measured through each pole with the contacts in the open position, at a test voltage of 1,1 Ue, and shall not exceed 0,5mA.		N
8.3.3.3	Mechanical operation and operational performance capability		P
8.3.3.3.2	Construction and mechanical operation		P
a)	Construction		P
	A withdrawable circuit-breaker shall be checked for the requirements stated in 7.1.1		P
	A circuit-breaker with stored energy operation shall be checked for compliance with 7.2.1.1.5, regarding the charge indicator and the direction of operation of manual energy storing		P
b)	Mechanical operation		P
	A circuit-breaker with dependent power operation shall comply with the requirements stated in 7.2.1.1.3		P
	A circuit-breaker with dependent power operation shall operate with the operating mechanism charged to the minimum and maximum limits stated by the manufacturer		P
	A circuit-breaker with stored energy operation shall comply with the requirements stated in 7.2.1.5 with the auxiliary supply voltage at 85% and 110% of the rated control supply voltage.		P
	It shall also be verified that the moving contacts cannot be moved from the open position when the operating mechanism is charged to slightly below the full charge as evidenced by the indicating device		P
	For a trip-free circuit-breaker it shall not be possible to maintain the contacts in the touching or closed position when the tripping release is in the position to trip the circuit-breaker		N
	If the closing and opening times of a circuit-breaker are stated by the manufacturer, such times shall comply with the stated values		N
c)	Undervoltage releases		N
	Undervoltage releases shall comply with the requirements of 7.2.1.3 of Part 1. For this purpose, the release shall be fitted to a circuit-breaker having the maximum current rating for which the release is suitable		N
i)	Drop out voltage		P
	It shall be verified that the release operates to open the circuit-breaker between the voltage limits specified		P
	The voltage shall be reduced from rated voltage at a rate to reach 0 V in approximately 30 s		P

	The test for the lower limit is made without current in the main circuit and without previous heating of the release coil		P
	In the case of a release with a range of rated voltages, this test applies to the maximum voltage of the range		P
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles of the circuit-breaker		N
	This test may be combined with the temperature-rise test of 8.3.3.6		N
	In the case of a release with a range of rated voltages, this test is made at both the minimum and maximum rated control supply voltages		P
ii)	Test for limits of operation		N
	Starting with the circuit-breaker open, at the temperature of the test room, and with the supply voltage at 30% rated maximum control supply voltage, it shall be verified that the circuit-breaker cannot be closed by the operation of the actuator		N
	When the supply voltage is raised to 85% of the minimum control supply voltage, it shall be verified that the circuit-breaker can be closed by the operation of the actuator		N
iii)	Performance under overvoltage conditions		N
	With the circuit-breaker closed and without current in the main circuit, it shall be verified that the undervoltage release will withstand the application of 110% rated control supply voltage for 4 h without impairing its functions		N
d)	Shunt releases		P
	Shunt releases shall comply with the requirements of 7.2.1.4 of Part 1. For this purpose, the release shall be fitted to a circuit-breaker having the maximum rated current for which the release is suitable		P
	It shall be verified that the release will operate to open the circuit-breaker at 70% rated control supply voltage when tested at an ambient temperature of + 55 °C ± 2 °C without current in the main poles of the circuit-breaker		P
	In the case of a release having a range of rated control supply voltages, the test voltage shall be 70% of the minimum rated control supply voltage		P
8.3.3.3.3	Operational performance capability without current.		N
	Type designation or serial number		N
	Sample no:		N

	Rated current In (A)		N
	Rated operational voltage: Ue (V)		N
	Rated control supply voltage of closing mechanism: Uc (V)		N
	Rated control supply voltage of shunt releases: Uc (V)		N
	Rated control supply voltage undervoltage releases: Uc (V)		N
	Ambient temperature 10-40 °C :		N
	Number of operating cycles per hour		N
	Number of cycles without current (total) (closing mechanism energized at the rated Uc)		N
	Number of cycles without current (without releases)		P
	Applied voltage: closing mechanism (V)		P
	10% of total cycles for circuit-breaker with fitted shunt release: (50/60% at the beginning- and 50/60% at the end of the test.) Energized at the rated Uc		P
	Applied voltage: shunt releases (V)		P
	10% of total cycles for circuit-breaker with undervoltage releases: (50/60% at the beginning- and 50/60% at the end of the test.) Energized at the minimum rated Uc		P
	10 cycles without applied voltage at the undervoltage releases. (Shall not possible to close the circuit-breaker.)		P
	Applied voltage: undervoltage releases (V)		P
	Electrical components do not exceed the value indicated in tab. 7.		P
8.3.3.3.4	Operational performance capability with current.		--
	Rated current: In (A)		--
	Maximum rated operational voltage: Ue (V)		--
	Conductor cross-sectional area (mm²) :		N
	Number of operating cycles per hour		N
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)		N
	Applied voltage: closing mechanism (V)		N
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.		N

	Conditions, make/break operations:		N
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:		N
	- test current I/Ie = 1,0 (A).....L1: ..... L2: L3:		N
	- power factor/time constant:		P
	- frequency: (Hz)		P
	- on-time (ms):	0.25	P
	- off-time (s):	0.85	P
	Electrical components do not exceed the value indicated in tab. 7.		P
8.3.3.3.5	Additional test of operational performance capability without current for withdrawable circuit-breaker.		N
	Number of operations cycles : 100		N
	After test, the isolating contacts, withdrawable mechanism and interlocks shall be suitable for further service.		N
8.3.3.4	Overload performance		N
	this test applies to circuit-breaker of rated current up to and including 630 A		N
	Type designation or serial number		N
	Sample no:		N
	Rated current In (A)		N
	Rated operational voltage: Ue (V)		N
	Rated control supply voltage of closing mechanism: Uc (V)		N
	Rated control supply voltage of shunt releases: Uc (V)		N
	Rated control supply voltage undervoltage releases: Uc (V)		N
	Ambient temperature 10-40 °C :		N
	Number of operating cycles per hour		N
	Maximum rated operational voltage: Ue (V)		N
	Number of operating cycles per hour		N
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)		N
	Applied voltage: closing mechanism (V)		N
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload/short-circuit settings at maximum.		N

	Conditions, overload operations:		N
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:		N
	- test current AC/DC: I/Ie = 6,0/2.5 (A) ..... L1: ..... L2: L3:		N
	- power factor/time constant:		N
	- Number of cycles manually opened: 9		N
	- Number of cycles automatically opened by an overload release: 3		N
	- frequency: (Hz)		N
	- on-time max 2s:		N
8.3.3.5	Verification of dielectric withstand		N
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds		P
	- no breakdown or flashover		P
8.3.3.6	Verification of temperature-rise		P
	- the values of temperature-rise do not exceed the those specified in tab. 7.		P
	Temperature rise of main circuit terminals ≤ 80 K (K) :		P
	conductor cross-sectional area (mm²) :		P
	test current Ie (A) :		P
8.3.3.7	Verification of overload releases		P
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)		P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		P
8.3.3.8	Verification of undervoltage and shunt releases		P
	Circuit-breaker fitted with undervoltage releases. The release shall not operate at 70% of the minimum control supply voltage -		P
	and shall operate at 35% of the maximum control supply voltage.		P
	Circuit-breaker fitted with shunt releases. The release shall operate at 70% of the minimum rated control supply voltage. Test made at room temperature.		P

8.3.3.9	Verification of the main contact position for circuit-breakers for isolation		P
	actuating force for opening (N) .....:		—

	test force with blocked main contacts for 10 s (N) . :		—
	Dependent power operation		P
	Supply voltage of 110% of rated voltage (V)…….:		P
	Three attempts of 5 s to operate the equipment at intervals of 5 min.		P
	Independent power operation		P
	Three attempts to operate the equipment by the stored energy.		P
	Lock ability of driving mechanism in OFF-position at test force and blocked main contacts ..... :		P
	Position indicator does not show OFF-position after capture of test force at blocked main contacts		P

8.3.4	TEST SEQUENCE II (Ics):		--
8.3.4.1	Test of rated service short-circuit breaking capacity		--
	Test sequence of operation: O – t – CO – t – CO		--
	Type designation or serial number		--
	Sample no:		--
	Rated current: In (A)		--
	Rated operational voltage: Ue (V)		--
	Rated service short-circuit breaking capacity: (kA)		--
	Rated control supply voltage of closing mechanism: Uc (V)		--
	Rated control supply voltage of shunt release: Uc (V)		--
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		N
	closing mechanism energized with 85% at the rated Uc: (V)		N
	The circuit-breaker is mounted complete on its own support or an equivalent support.		N
	Test made in free air:		N
	Distances of the metallic screen's: (all sides)		N
	The characteristics of the metallic screen:		N
	- woven wire mesh		N
	- perforated metal		N
	- expanded metal		N
	- ratio hole area/total area: 0,45-0,65		N
	- size of hole: <30mm^2		N

	- finish: bare or conductive plating		N
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		N
	Fuse ”F”: copper wire: diameter 0,8 mm, 60mm long		N

	Circuit is earthed at: (load-star- or supply-star point)		N
	Conductor cross-sectional area (mm²) :		N
	If terminals unmarked: line connected at: (underside/upside)		N
	Tightening torques: (Nm)		N
	Test sequence of operation: O – t – CO – t – CO		N
	- test voltage U/Ue = 1,05 (V)..... L1: ..... L2: L3:		N
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:		N
	power factor/time constant :		N
	- Factor ”n”		N
	- peak test current (A) :		N
	Test sequence ”O”		N
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:		N
	Pause, t: (min)		N
	Test sequence ”CO”		N
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:		N
	Pause, t: (min)		N
	Test sequence ”CO”		N
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N

	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:		N
	Melting of the fusible element		N
	Holes in the PE-sheet for test sequence ”O”		N
	Cracks observed		N
8.3.4.2	Operational performance capability with current.		P
	Rated current: In (A)		--
	Maximum rated operational voltage: Ue (V)		P
	Conductor cross-sectional area (mm²) :		P
	Number of operating cycles per hour		P
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)		P
	Applied voltage: closing mechanism (V)		P
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.		P
	Conditions, make/break operations:		P
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:		P
	- test current I/Ie = 1,0 (A).....L1: ..... L2: L3:		P
	- power factor/time constant:		P
	- frequency: (Hz)	50/60	P
	- on-time (ms):	0.28	P
	- off-time (s):	0.37	P
	Electrical components do not exceed the value indicated in tab. 7.		P
8.3.4.3	Verification of dielectric withstand		P
	- equal to twice the rated operational voltage with a minimum of 1000 V		P
	- no breakdown or flashover		P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1.1 Ue)		P
8.3.4.4	Verification of temperature-rise		P
	- the values of temperature-rise do not exceed the those specified in tab. 7.		P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	43.5K	P

	conductor cross-sectional area (mm²) :		P
	test current Ie (A) :		P
8.3.4.5	Verification of overload releases		P
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)		P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		P

8.3.4	TEST SEQUENCE II/III (Ics=Icu):		N
8.3.4.1	Test of rated service short-circuit breaking capacity		N
	Test sequence of operation: O – t – CO – t – CO		N
	Type designation or serial number		N
	Sample no:		N
	Rated current: In (A)		N
	Rated operational voltage: Ue (V)		N
	Rated service short-circuit breaking capacity: (kA)		N
	Rated control supply voltage of closing mechanism: Uc (V)		N
	Rated control supply voltage of shunt release: Uc (V)		N
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		N
	closing mechanism energized with 85% at the rated Uc: (V)		N
	The circuit-breaker is mounted complete on its own support or an equivalent support.		N
	Test made in free air:		N
	Distances of the metallic screen's: (all sides)		N
	The characteristics of the metallic screen:		N
	- woven wire mesh		N
	- perforated metal		N
	- expanded metal		N
	- ratio hole area/total area: 0,45-0,65		N
	- size of hole: <30mm^2		N
	- finish: bare or conductive plating		N
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		N

	Fuse ”F”: copper wire: diameter 0,8 mm, 60mm long		N
	Circuit is earthed at: (load-star- or supply-star point)		N
	Conductor cross-sectional area (mm²) :		N
	If terminals unmarked: line connected at: (underside/upside)		N
	Tightening torques: (Nm)		N
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		P
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		P
	Time specified by the manufacturer:		N
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :		N
8.3.4.1	Test of rated service short-circuit breaking capacity		N
	Test sequence of operation: O – t – CO – t – CO		N
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:		N
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:		N
	power factor/time constant :		N
	- Factor ”n”		N
	- peak test current (A) :		N
	Test sequence ”O”		N
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:		N
	Pause, t: (min)		N
	Test sequence ”CO”		N
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:		N

	Pause, t: (min)		N
	Test sequence ”CO”		N
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:		N
	Melting of the fusible element		N
	Holes in the PE-sheet for test sequence ”O”		N
	Cracks observed		N
8.3.4.2	Operational performance capability with current.		N
	Rated current: In (A)		N
	Maximum rated operational voltage: Ue (V)		N
	Conductor cross-sectional area (mm²) :		N
	Number of operating cycles per hour		N
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)		N
	Applied voltage: closing mechanism (V)		N
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.		N
	Conditions, make/break operations:		N
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:		N
	- test current I/Ie = 1,0 (A).....L1: ..... L2: L3:		N
	- power factor/time constant:		N
	- frequency: (Hz)		N
	- on-time (ms):		N
	- off-time (s):		N
	Electrical components do not exceed the value indicated in tab. 7.		N
8.3.4.3	Verification of dielectric withstand		N
	- equal to twice the rated operational voltage with a minimum of 1000 V		N
	- no breakdown or flashover		N

	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)		N
8.3.4.4	Verification of temperature-rise		N
	- the values of temperature-rise do not exceed the those specified in tab. 7.		N
	Temperature rise of main circuit terminals. ≤ 80 K (K) :		N
	conductor cross-sectional area (mm²) :		N
	test current Ie (A) :		N
8.3.4.5	Verification of overload releases		N
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)		N
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N
8.3.5.4	Verification of overload releases		N
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		N
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		N
	Time specified by the manufacturer:		N
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :		N

8.3.5	TEST SEQUENCE III (Icu)		--
	Rated ultimate short-circuit breaking		P
	Except where the combined test sequence applies, this test sequence applies to circuit-breaker of utilization category A and to circuit-breaker of utilization B having a rated ultimate short-circuit breaking capacity higher than the rated short-time withstand current.		P
	For circuit-breakers of utilization B having a rated short-time withstand current equal to their rated ultimate short-circuit breaking capacity, this test sequence need not be made, since, in this case, the ultimate short-circuit breaking capacity, is verified when carrying out test sequence IV.		P
	For integrally fused circuit-breakers, test sequence V applies in place of this sequence.		P
	Type designation or serial number		P
	Sample no:		P
	Rated current: In (A)		P
	Rated operational voltage: Ue (V)		P
	Rated ultimate short-circuit breaking capacity: (kA)		P

	Rated control supply voltage of closing mechanism: Uc (V)		P
	Rated control supply voltage of shunt release: Uc (V)		P
	This test sequence need not be made when Icu = Ics		P
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		P
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		P
	Time specified by the manufacturer:		P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :		P

7.1.4	TABLE: Clearance And Creepage Distance Measurements					P
clearance cl and creepage distance dcr at/of:	**Up (kV)**	**U r.m.s. (V)**	**Required cl (mm)**	**cl (mm)**	**required dcr (mm)**	**dcr (mm)**
Between open contact	4	800-1140	3,0	5,2	10,0	>15
Between different poles	4	800-1140	3,0	>6	10,0	>15
Supplementary information:						

9.3.3.2.4	**TABLE 1: Operation on loss of supply voltage**											
	Ambient (°)							20 °				
	Test case							Operating times				
Test No	Rated voltage	Control supply voltage	Frequency	Threshold	Ts	Number of phases	N connection	Tested phases	Step Disconnect/ Reconnect	CTT ms	TOT s	Verdict
	V	V	Hz	%	s		Yes/No	L1/L2/L3				
1	800	1140	60	95	9	2	N/A	L1	Disconnect	70	9,38	P
2	800	1140	60	95	9	2	N/A	L2	Disconnect	72	9,38	P
3	800	1140	60	95	9	2	N/A	L1	Reconnect	73	9,38	P
4	800	1140	60	95	9	2	N/A	L2	Reconnect	71	9,38	P
Supplementary information:												
CTT: Contact Transfer Time (I -II/II -I)												
TOT: Total operating time (including Ts)												

9.3.3.3 (9.3.3.6.2)	TABLE: Temperature-rise after clause 9.3.3.6.2			P
	Test sample..... :	I-1		–
	Main circuit / Auxiliary circuit.....:	Main circuit		–
	Ambient (oC) .....:	25.5		–
	Ithe / Ith (A).....:	25		–
Thermocouple Locations	dT (K) measured		dT (K) required	
Line terminal L1	55 .23		80	
Line terminal L2	55		80	
Load terminal L1	52		80	
Load terminal L2	53		80	
Enclosure	29		50	
Support base	20		50	

9.3.3.3 (9.3.4.4)	TABLE: Temperature-rise after clause 9.3.4.4		P
	Test sample..... :	I-1	–

	Main circuit / Auxiliary circuit.....:	Main circuit		–
	Ambient (oC) .....:	25.5		–
	Ithe / Ith (A).....:	360		–
	Test voltage (V) .....:	800-1140		–
Thermocouple Locations	dT (K) measured		dT (K) required	
Line terminal L1	53		80	
Line terminal L2	52		80	
Load terminal L1	51		80	
Load terminal L2	51		80	
Enclosure	21		50	
Support base	16		50	
Supplementary information:				

Annex 1: Photo docume

Photo 1 General Appearance of the EUT

Photo 2 General Appearance of the EUT

End of the report