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Test Report issued under the responsibility of:

KEMA

TEST REPORT
IEC/EN 60947-2
Low-voltage switchgear and controlgear - Part 2: Circuit-breakers

Report Reference No. ..... :	2120024.80
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CB/CCA Testing Laboratory ..... :	KEMA Quality B.V.
Address ..... :	Utrechtseweg 310, 6812 AR Arnhem, The Netherlands
Applicant's name ..... :	LS Industrial Systems Co., Ltd.
Address ..... :	1026-6, Hogye-dong, Dong-an-gu Anyang-si, Gyeonggi-do, Korea
Test specification:	
Standard ..... :	☒ IEC 60 947-2:2006 (4th Edition) and/or ☐ EN 60 947-2:2006 (4th Edition)
Test procedure ..... :	CB / CCA
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IECEN60947_2A
Test Report Form(s) Originator ..... :	KEMA
Master TRF ..... :	Dated 2007-04

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.
This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

If this Test Report Form is used by non-CCA members, the CIG logo and the reference to the CCA Procedure shall be removed.
This report is not valid as a CCA Test Report unless signed by an approved CCA Testing Laboratory and appended to a CCA Test Certificate issued by an NCB in accordance with CCA

Test item description ..... :	
Trade Mark ..... :	LS
Manufacturer ..... :	LS Industrial Systems Co., Ltd.
Model/Type reference ..... :	TE100E/S/N, TE160E/S/N
Ratings ..... :	16-20-25-32-40-50-63-80-100-125-160 A

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Testing procedure and testing location:	
☐ **CB/CCA Testing Laboratory:**	
Testing location/ address.....:	
☐ **Associated CB Laboratory:**	
Testing location/ address.....:	
Tested by (name + signature).....:	
Approved by (+ signature) .....:	
☐ Testing procedure: TMP	
Tested by (name + signature).....:	
Approved by (+ signature) .....:	
Testing location/ address.....:	
☒ Testing procedure: WMT	
Tested by (name + signature).....:	Mr. Oh
Witnessed by (+ signature).....:	H.G.M. Kormelink
Approved by (+ signature) .....:	H.L. Schendstok
Testing location/ address.....:	LS Industrial Systems Co., Ltd. CheongJu Plant 1, Songjeong-dong, Heungdeok-gu Cheongju-si, Chungcheongbuk-do, Korea
☐ Testing procedure: SMT	
Tested by (name + signature).....:	
Approved by (+ signature) .....:	
Supervised by (+ signature).....:	
Testing location/ address.....:	
☐ Testing procedure: RMT	
Tested by (name + signature).....:	
Approved by (+ signature) .....:	
Supervised by (+ signature).....:	
Testing location/ address.....:	

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Particulars: test item vs. test requirements	
3. Classification	
3.1. Utilization category: (A or B) :	A
3.2. Interruption medium: (air, vacuum, gas Break) :	Air
3.3. Design: (open construction, moulded case) :	Moulded case
3.4. Method of controlling the operation mechanism: (dependent manual, independent manual, dependent power, independent power) :	Independent manual
3.5. Suitability for insulation: (suitable, not -suitable) :	Suitable
3.6. Provision for maintenance: (maintainable, non maintainable) :	maintainable
3.7. Method of installation: (fixed, plug in, withdrawable:	Fixed
3.8. Degree of protection: (IP code) :	IP20
4.8. Integral fuses (integrally fused circuit-breakers) Type and characteristics of SCPD :	N/A
4.9. Switching overvoltages: (when Uimp. is declared) :	N/A
7.3 Electromagnetic compatibility (EMC) Environment A or B :	N/A
Circuit-breaker for use on phase-earthed systems :	N/A
Circuit-breaker for use in IT systems :	N/A
Rated and limiting values, main circuit :	
- rated operational voltage: Ue (V) :	220, 240 and 415 V
- rated insulation voltage: Ui (V) :	750 V
- rated impulse withstand voltage: Uimp (kV) :	8 kV
- rated operational current: Ie (A) :	16-20-25-32-40-50-63-80-100-125-160 A
- kind of current :	a.c.
- conventional free air thermal current: Ith (A) :	160 A
- conventional enclosed thermal current: Ithe (A) :	N/A
- current rating for four-pole circuit-breakers: (A) :	160 A
- number of poles :	3 and 4
- rated frequency: (Hz) :	50/60 Hz
- integral fuses (rated values) :	N/A
Rated duty :	
- eight-hour duty :	N/A
- uninterrupted duty: Iu (A) :	160 A
Short-circuit characteristic :	

rated short-time making capacity: Icm (kA) ..... :	187 kA
rated ultimate short-circuit breaking capacity: Icu (kA).. ..... :	85 kA-220 & 240 V, 50 kA-415 V
rated service short-circuit breaking capacity: Ics (kA) ..... :	100% Icu
rated short-time withstand current: Icw (kA/s) ..... :	N/A
Control circuits :	
Electrical control circuits :	
- kind of current: (AC, DC)..... :	N/A
- rated frequency: (Hz)..... :	N/A
- rated control circuit voltage: Uc (nature, frequency, V) ... :	N/A
- rated control supply voltage: Us (nature, frequency V) ... :	N/A
Air supply control circuits: (pneumatic or electro-pneumatic) :	
- rated pressure and its limit..... :	N/A
- volumes of air, at atmospheric pressure, required for each closing and each opening operation ..... :	N/A
Auxiliary circuits :	
Rated and limiting values, auxiliary circuits..... :	
- rated operational voltage Ue (V) ..... :	N/A
- rated insulation voltage: Ui (V) ..... :	N/A
- rated operational current: Ie (A) ..... :	N/A
- kind of current..... :	N/A
- rated frequency: (Hz)..... :	N/A
- number of circuits..... :	N/A
- number and kind of contact elements ..... :	N/A
- rated uninterrupted current: Iu (A)..... :	N/A
- utilization category: (AC, DC, current and voltage)..... :	N/A
Short-circuit characteristic :	
- Rated conditional short-circuit current (kA) ..... :	N/A
- Co-ordination of short-circuit protective devices..... :	N/A
- kind of protective device..... :	N/A

Releases :	
1) shunt release	N/A
2) Over-current release	
a) instantaneous	P
b) definite time delay	N/A
c) inverse time delay	
- independent of previous load	N/A
- dependent on previous load; (for example thermal type release)	P
3) Undervoltage release (for opening)	N/A
4) Other releases	N/A
Characteristics :	
1) Shunt release and undervoltage release (for opening)	
- rated control circuit voltage: Uc (nature, frequency, V)	N/A
- kind of current	N/A
- rated frequency: (if AC)	N/A
2) Over-current release	
- rated current	16-20-25-32-40-50-63-80-100-125-160 A
- kind of current	AC
- rated frequency: (if AC)	50-60 Hz
- current setting (or range of settings)	0,8 – 1 *In
- time settings (or range of settings)	N/A

Summary of testing:	
Tests performed (name of test and test clause): Sequence I Sequence II&III : 8.3.5.1 Verification of overload releases 8.3.4.1 Rated service short-circuit breaking capacity 8.3.4.2 Operational performance capability 8.3.4.3 Verification of dielectric withstand 8.3.4.4 Verification of temperature-rise 8.3.4.5 Verification of overload releases 8.3.5.4 Verification of overload releases Sequence III: T-N only **After verification of the characteristics of the test station, some calibrations are conducted and accepted at 50% of the required current. Actual tests are done at 100 %.** **Test program has been based upon testing the 4 pole breaker according table 10 with an additional test on the 3 pole at the highest current, to cover the 3 pole breakers.**	**Testing location:** LS Industrial Systems Co., Ltd. CheongJu Plant 1, Songjeong-dong, Heungdeok-gu Cheongju-si, Chungcheongbuk-do, Korea
Summary of compliance with National Differences: -	

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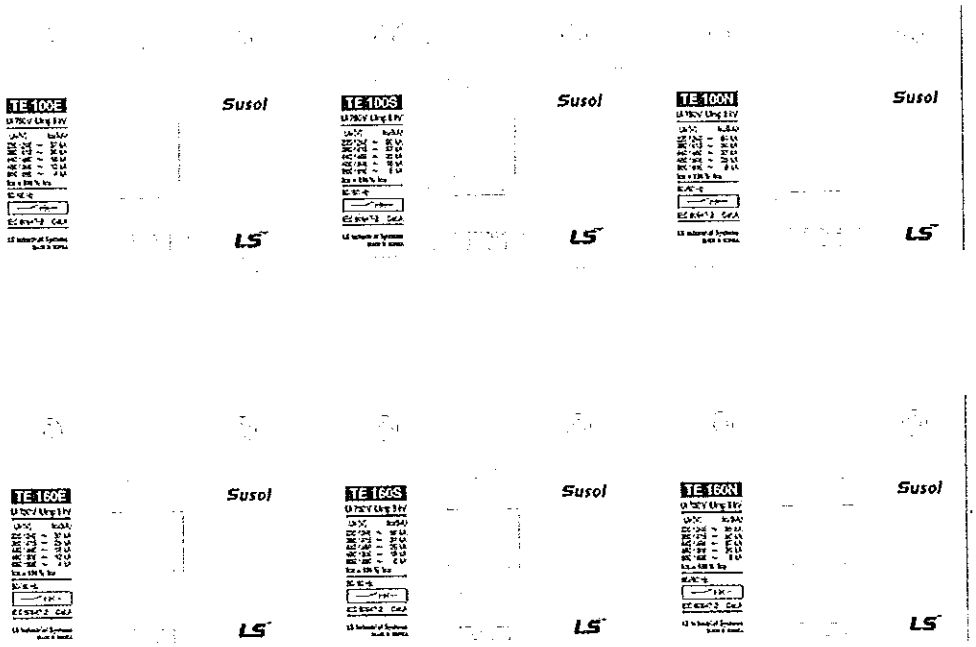
Copy of marking plate



Test item particulars ..... :	
Classification of installation and use ..... :	
Supply Connection..... :	
..... :	
..... :	
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 ..... :	23 October 2008
Date (s) of performance of tests ..... :	27 October 2008 ~ 08 December 2008

General remarks:

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 testing laboratory.
"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Note: This TRF includes EN Group Differences together with National Differences and Special National Conditions, if any. All Differences are located in the Appendix to the main body of this TRF.

Throughout this report a comma (point) is used as the decimal separator.

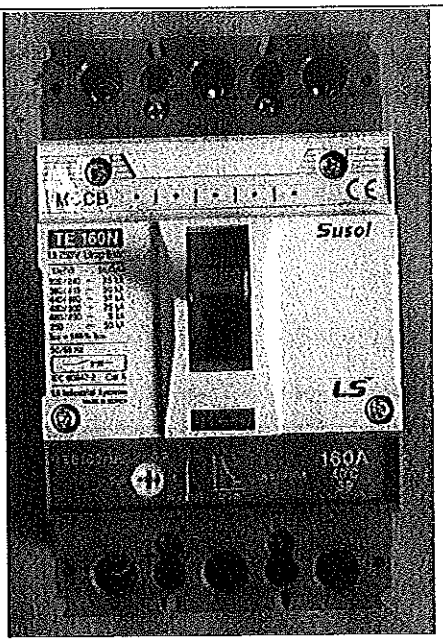
General product information:

Rated short circuit Breaking Capacity Icu

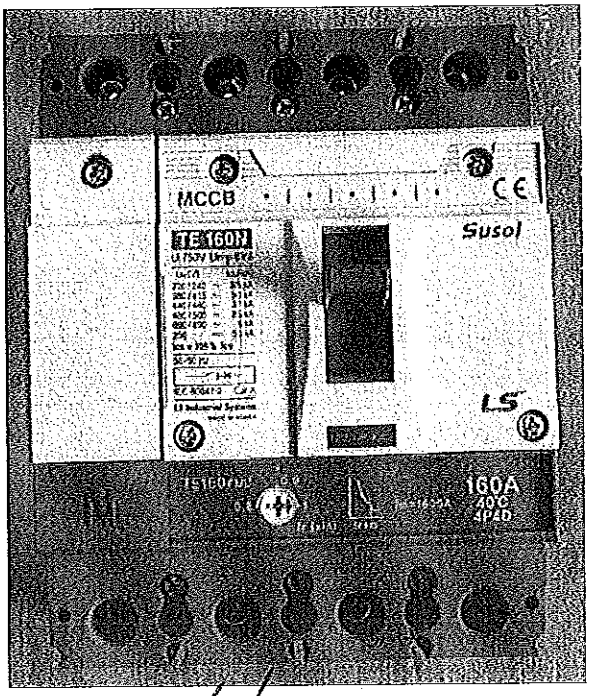
Type		TE100E TE160E	TE100S TE160S	TE160N TE160N
Rated Voltage	AC 220/240V	37kA	50 kA	85 kA
Rated Voltage	AC 380/415V	25 kA	37 kA	50 kA

Rated service short circuit Breaking Capacity(Ics) : 100% Icu

E/S/N are identical products. Except for the marking plates: short circuit ratings as listed in the table above.
This report describes the tests on the N model.



3 pole breaker



4 pole breaker

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
5.2	MARKING		
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.		
	- rated current:	16-20-25-32-40-50-63-80-100-125 and 160 A	P
	- suitability for isolation, if applicable, with the symbol	Compliance	P
	- indication of the open and closed position: with O and I respectively, if symbols are used	Compliance	P
b)	Marking on equipment not needed to be visible after mounting:		
	- manufacturer's name or trademark	LS	P
	- type designation or serial number	TE100 E/S/N TE160 E/S/N	P
	- IEC 60947-2 if the manufacturer claims compliance with this standard.	Compliance	P
	- utilization category	A	P
	- rated operational voltage(s) Ue	220, 240, and 415 V	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	Compliance	P
	- value (or range) of the rated frequency and/or the indication DC (or symbol)	50/60 Hz	P
	- rated service short-circuit breaking capacity. Ics	85 kA / 240 V 50 kA / 415 V	P
	- rated ultimate short-circuit breaking capacity. Icu	85 kA / 240 V 50 kA / 415 V	P
	- rated short-time withstand current, (Icw) and associated short-time delay, for utilization category B	-	N/A
	- line and load terminals, unless their connection is immaterial	Compliance	P
	- neutral pole terminals, if applicable, by the letter N	Compliance	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- protective earth terminal, where applicable, by the symbol acc. 7.1.9.3 of part 1	-	N/A
	- ref. temperature for non-compensated thermal releases, if different from 30°C	40 °C	P
c)	Marked on the circuit-breaker as specified in item b), or shall be made available in the manufacturer's published information:		
	- rated short-circuit making capacity (Icm) (if higher than specified in 4.3.5.1)	187 kA	P
	- rated insulation voltage. (Ui) if higher than the maximum rated operational voltage)	750 V	P
	- rated impulse withstand voltage (Uimp), when declared.	8 kV	P
	- pollution degree if other than 3	3	P
	- conventional enclosed thermal current (Ithe) if different from the rated current:	-	N/A
	- IP Code, where applicable:	IP20	P
	- minimum enclosure size and ventilation data (if any) to which marked ratings apply:	-	N/A
	- details of minimum distance between circuit-breaker and earthed metal parts for circuit-breaker intended for use without enclosure:	Compliance	P
	- r.m.s sensing if applicable, according to F.4.1.1	-	N/A
	- suitability for environment A or B	A	P
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:		
	- rated control circuit voltage of the closing device, and rated frequency for AC:	-	N/A
	- rated control circuit voltage of the shunt release and/or of the under-voltage release, and rated frequency:	-	N/A
	- rated current of indirect over-current releases:	-	N/A
	- 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.	-	N/A
e)	Terminal shall be clearly and permanently identified in acc. with IEC 60445 and annex L :		
	- line terminal	-	N/A

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IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- load terminal	-	N/A
	- neutral pole terminal "N"	Compliance	P
	- protective earth terminal ⏚	-	N/A
	- terminal of coils (A/B)	-	N/A
	- terminal of shunt release (B)	-	N/A
	- terminals of under-voltage release (D)	-	N/A
	- terminals of interlocking electromagnets (E)	-	N/A
	- terminals of indicated light devices (X)	-	N/A
	- terminals of contact elements for switching devices (no)	-	N/A
7.1	CONSTRUCTION		
7.1.1	Withdrawable circuit-breaker	-	N/A
	In the disconnected position (main- and auxiliary circuits)		
	Isolating distances for circuit-breaker suitable for isolating warranted:	-	N/A
	Mechanism fitted with a reliable indicating device with indicates the position of the isolating contacts.	-	N/A
	Mechanism fitted with interlocks which only permit the isolating contacts to be separate or re-closed when main contacts are open	-	N/A
	Mechanism fitted with interlock, which only permit the main contacts to be closed when the isolating contacts are fully closed.	-	N/A
	Mechanism fitted with interlock, which only permit the main contacts to be closed when in disconnected position.	-	N/A
	The isolating distances between the isolating contacts cannot be inadvertently reduced.	-	N/A
7.1.1.1 part 1	Resistance to abnormal heat and fire	650 °C 960 °C	P
7.1.2 part 1	Current-carrying parts and their connection	Compliance	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.)		
	Clearances distances:		

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IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- Uimp is given as:	8 kV	
	- max. value of rated operational voltage to earth	240 V	
	- nominal voltage of supply system:	415 V	
	- overvoltage category:	III a	
	- pollution degree:	3	
	- field-in or homogeneous:	Inhomogeneous	
	- minimum clearances (mm):	8 mm	
	- measured clearances (mm):	8,5 mm	P
	Creepage distances:		
	- rated insulation voltage Ui (V)	750 V	
	- pollution degree	3	
	- comparative tracking index (V)	≥ 600 V	
	- material group	III a	
	Minimum creepage distances (mm)	12,5 mm	
	Measured creepage distances (mm)	12,9 mm	P
7.1.4 part 1	Actuator		
7.1.4.1 part 1	Insulation		
	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	Compliance	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/A
	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	Compliance	P
7.1.4.2	Direction of movement		
	The direction of operation for actuators of devices shall normally conform to IEC 60447.	Compliance	P
	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	Compliance	N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
7.1.5 part 1	Indication of contact position		
7.1.5.1 part 1	Indicating means		
	When an equipment is provided with means for indicating the closed and open positions, these positions shall be unambiguous and clearly indicated	Compliance	P
	This is done by means of a position indicating device (see 2.3.18)	Compliance	P
	If symbols are used, they shall indicate the closed and open position respectively, in accordance with IEC 60417-2:		
	- 60417-2-IEC-5007 **I** On (power)	Compliance	P
	- 60417-2-IEC-5007 **O** Off (power)	Compliance	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"	-	N/A
	Red colour shall not be used for any other push-button	-	N/A
	The colours of other push-buttons, illuminated push-buttons and indicator lights shall be in accordance with IEC 60073	-	N/A
7.1.5.2 part 1	Indication by the actuator		
	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	On position Off position Trip position	P
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 V):		
	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:		
	- the position of the actuator	Compliance	P
	- a separate mechanical indicator	-	N/A
	- visibility of the moving contacts	-	N/A
	When means are provided or to lock the equipment in the open position, locking only be possible when contacts are in the open position	-	N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Actuator front-plate fitted to the equipment in a manner which ensures correct contact position indication and locking	-	N/A
	The indicated open position is the only position in which the specified isolation distances between the contacts is ensured.	Compliance	P
	- minimum clearances across open contacts (see Table XIII, Part 1) (mm) :	8 mm	
	- measured clearances (mm) :	8,5 mm	P
	- test Uimp across gap (kV) :	12,3 kV	P
7.1.6.2	Supplementary requirements for equipment with provision for electrical interlocking with contactors or circuit-breakers:		
	auxiliary switch shall be rated according to IEC 60 947-5-1	-	N/A
	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/A
	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/A
	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/A
	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/A
	During the closing operation the contacts of the auxiliary switch shall close after or simultaneously with the contacts of the main poles	-	N/A
	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	-	N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
7.1.6.3	Supplementary requirements for equipment provided with means for padlocking the open position:		
	the locking means shall be designed in such a way that it cannot be removed with the appropriate padlock(s) installed	-	N/A
	Alternatively, the design may provide padlockable means to prevent access to the actuator	-	N/A
	test force F applied to the actuator in an attempt to operate to the closed position (N) :	-	N/A
	rated impulse withstand voltage (kV) :	-	N/A
	test Uimp on open main contacts at the test force	-	N/A
7.1.7	Terminals		
7.1.7.1	All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength	Compliance	P
	Terminal connections shall be such that necessary contact pressure is maintained	Compliance	P
	Terminals shall be so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal	Compliance	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	Compliance	P
7.1.7.2	Connection capacity		
	type of conductors :	Flexible and stranded type	P
	minimum cross-sectional area of conductor (mm²) :	2,5 mm^2 or 12 AWG [16 A]	P
	maximum cross-sectional area of conductor (mm²) :	70 mm^2 or 2/0 AWG [160 A]	P
	number of conductors simultaneously connectable to the terminal :	1	P
7.1.7.3	Connection		
	terminals for connection to external conductors shall be readily accessible during installation	Compliance	P
	clamping screws and nuts shall not serve to fix any other component	Compliance	P
7.1.7.4	Terminal identification and marking		
	terminal intended exclusively for the neutral conductor	-	P
	protective earth terminal	-	N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	other terminals	line / load	P
7.1.8 part 1	Additional requirements for equipment provided with a neutral pole		
	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.).	Compliance	P
	A switched neutral pole shall break not before and shall make not after the other poles	Compliance	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	-	N/A
	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	-	N/A
	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.	-	N/A
7.1.9	Provisions for protective earthing		
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/A
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	-	N/A
	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 50 mm x 50 mm) or are so located as to exclude any contact with live parts	-	N/A
7.1.9.2 part 1	Protective earth terminal		
	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/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	The protective earth terminal shall be suitably protected against corrosion	-	N/A
	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/A
	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/A
7.1.9.3	Protective earth terminal marking and identification		
	The protective earth terminal shall be clearly and permanently identified by its marking	-	N/A
	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/A
	Graphical symbol to be used: 60417-2-IEC-5019 ⏚ Protective earth (ground) in accordance with IEC 60417-2	-	N/A
7.1.10	Enclosure for equipment		
7.1.10.1	Design		
	The enclosure, when it is opened: all parts requiring access for installation and maintenance are readily accessible	-	N/A
	Sufficient space shall be provided inside the enclosure	-	N/A
	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	-	N/A
	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	-	N/A
	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/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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	-	N/A
	If the enclosure is used for mounting push-buttons, it shall not be possible to remove the buttons from the outside of the enclosure	-	N/A
7.1.10.2	Insulation		
	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	-	N/A
7.1.11	Degree of protection of enclosed equipment		
	Degree of protection.	IPXX	
	Test for first characteristic.	IPXX	
	Test for first numeral .....:	1 2 3 4 5 6	
	Test for second characteristic	IPXX	
	Test for second numeral .....:	1 2 3 4 5 6 7 8	N/A
7.1.12 part 1	Conduit pull-out, torque and bending with metallic conduits		
	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/A

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Clause	Requirement + Test	Result - Remark	Verdict
7.2	Performance requirements		
7.2.1	Operating condition		
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	Compliance	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	-	N/A
	Such a circuit-breaker should not be used in circuits having a prospective peak making current exceeding 10 kA	-	N/A
	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	-	N/A
7.2.1.1.2	Independent manual closing		
	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	Compliance	P
7.2.1.1.3	Dependent power closing		
	At 110% of the rated control supply voltage, the closing operation performed on no-load shall not cause any damage to the circuit-breaker.	-	N/A
	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.	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
7.2.1.1.4	Independent power closing		
	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	-	N/A
	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/A
7.2.1.1.5	Stored energy closing		
	Capable ensuring closing of the circuit-breaker in any condition between no-load and its rated making capacity	-	N/A
	- when the stored energy is retained within the circuit-breaker, a device is provided which indicates when the storing mechanism is fully charged.	-	N/A
	- 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/A
	- 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/A
	- by manually operated circuit-breaker is the direction of operation indicated. (not for circuit-breaker with an independent manual closing operation.)	-	N/A
	- 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/A
7.2.1.2	Opening		
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		
7.2.1.2.2	Opening by undervoltage releases		
7.2.1.3. a part 1	Operating voltage		
	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	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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	-	N/A
	Unless otherwise stated in the relevant product standard, the upper limit of the supply voltage shall be 110% of its rated value	-	N/A
7.2.1.3. b part 1	Operating time		
	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	-	N/A
7.2.1.2.3	Opening by shunt releases	-	N/A
7.2.1.4 part 1	Limits of operation of shunt releases		
	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/A
7.2.1.5 part 1	Limits of operation of current operated relays and released		
	Limits of operation of current operated relays and releases shall be stated in the relevant product standard	-	N/A
7.2.1.2.4	Opening by over-current releases		
a)	Opening under short-circuit conditions		
	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	Compliance	P
	Where necessary for over-current co-ordination the manufacturer shall provide information (usually curves) showing	Compliance	P
	- maximum cut-off (let-through) peak current as a function of prospective current (r.m.s. symmetrical)	Compliance	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)	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
b)	Opening under overload conditions		
1)	Instantaneous or definite time-delay operation	-	N/A
	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/A
2)	Inverse time-delay operation		
	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	Compliance	P
	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	Compliance	P
	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/A
	The width of the temperature band shall be at least 10 K on either side of the reference temperature	-	N/A
7.2.4.2	Operational performance capability		
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/A
	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	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
8	TESTS		
8.2.4	Mechanical properties of terminals		
	Mechanical strength of terminals		
	maximum cross-sectional area of conductor (mm²) :	-	
	diameter of thread (mm) :	-	
	torque (Nm) :	8,8Nm	
	5 times on 2 separate clamping units	-	P
	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	Cable lugs	N/A
	Pull-out test		
	force (N) :	-	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	Cable lugs	N/A
	conductor of the largest cross-sectional area (mm²) :	-	
	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	Cable lugs	N/A
	Pull-out test		
	force (N) :	-	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	Cable lugs	N/A
	conductor of the largest and smallest cross-sectional area (mm²) :	-	

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Clause	Requirement + Test	Result - Remark	Verdict
	number of conductors of the smallest cross section, 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	Cable lugs	N/A
	Pull-out test		
	force (N) :	-	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	Cable lugs	N/A
8.3.3	TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS		
8.3.3.1	Tripping limits and characteristic		
8.3.3.1.2	Opening under short-circuit conditions		
	Manufacturer's name or trademark	LS	
	Type designation or serial number	TE 160 4P	
	Sample no:	S1-3	
	Rated operational voltage: Ue (V)	415 V	
	Rated current: In (A)	160 A	
	Ambient temperature 10-40 °C :	22 °C	P
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	2 080 A	P
	Range of adjustable setting current. (A)	-	N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 80% of the rated, or minimum adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3: N-Lx:	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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/A
	Test current: 80% of the maximum adjustable setting current: (A)	1 280 A	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3: N-Lx:	L1-L2: >0,2s L1-L3: >0,2s L2-L3: >0,2s N–L1: >0,2s	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:	-	N/A
	Test current: 120% of the rated, or minimum adjustable setting current: (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3: N-Lx:	-	N/A
	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/A
	Test current: 120% of the maximum adjustable setting current: (A)	1 920 A	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3: N-Lx:	L1-L2: 42,1 ms L1-L3: 24,2 ms L2-L3: 32,6 ms N–L1: 50,4 ms	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:	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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/A
	Test current: tripping current declared for single pole operation (A)	2 080 A	P
	Operating time: < 0,2 s in case of instantaneous release: L1: L2: L3: N:	 L1-L2: 21,5 ms L1-L3: 21,7 ms L2-L3: 22,5 ms N–L1: 34,7 ms	P
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases .....L1: L2: L3: N:	-	N/A
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/A
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	-	N/A
	Range of adjustable setting current. (A)	-	N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 90% of the rated, or minimum adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases:	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 90% of the maximum adjustable setting current: (A)	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time: >0,2s in case of instantaneous releases	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases:	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
b)	Inverse time delay releases		
	Manufacturer's name or trademark	LS	
	Type designation or serial number	TE 160 4P	
	Sample no:	S1-3	
	Rated operational voltage: Ue (V)	415 V	
	Rated current: In (A)	160 A	
	For releases dependent of ambient air temperature: Reference temperature	40 °C	P
	Test ambient temperature (°C)	22 °C	P
	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/A
	If test made at a difference ambient temperature: Acc. manufacturer's correction temperature/current data:	-	N/A
	Range of adjustable setting current: (A)	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For releases independent of ambient temperature: Test made at 30°C and/or at 20/40°C	-	N/A
	Test ambient air temperature:	22 °C	P
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40 °C	P
	Releases, independent of ambient air temperature: at 30°C	-	N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	146,5 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	2 h	P
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	181,4 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.	217,7 A / 363 s	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	82 s	P
	Test current: 105% of the maximum adjustable setting current: (A)	183,1 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	2 h	P
	Test current: 130% of the maximum adjustable setting current: (A)	226,7 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.	272,1 A / 233 s	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	203 s	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:	-	N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	-	N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	-	N/A
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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.	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A
	Test current: 105% of the maximum adjustable setting current: (A)	-	N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	-	N/A
	Test current: 130% of the maximum adjustable setting current: (A)	-	N/A
	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.	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A
	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		
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40 °C	P
	Releases, independent of ambient air temperature: at 30°C	-	N/A
	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)	417 A (min) / 521 A (max) (300 %)	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	L3: 64 s (min)/ 56 s (max) N : 85 s (min) / 74 s (max)	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:	-	N/A
	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/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	-	N/A
8.3.3.1.4	Additional test for definite time-delay releases		
a)	Time delay		
	Test is made at a current equal to 1,5 times the current setting		
	overload releases: (all phase poles loaded)	-	N/A
	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/A
	short-circuit releases: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.	-	N/A
	in the case of electronic short-circuit releases, on one pole chosen at random.	-	N/A
	Test current: 1,5 times of the rated, or minimum adjustable setting current: (A)	-	N/A
	Operating time, overload releases: (s)	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Operating time, short-circuit releases: (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Test current: 1,5 times of the maximum adjustable setting current: (A)	-	N/A
	Operating time, overload releases: (s)	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Operating time, short-circuit releases: (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
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.		
	overload releases: (all phase poles loaded)	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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/A
	short-circuit releases: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.	-	N/A
	Test current: 1,5 times of the rated, or minimum adjustable setting current: (A)	-	N/A
	Time interval: non-tripping duration stated by the manufacturer: (s)	-	N/A
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:	-	N/A
	Test current: 1,5 times of maximum adjustable setting current: (A)	-	N/A
	Time interval: non-tripping duration stated by the manufacturer: (s)	-	N/A
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:	-	N/A
	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.		
	Test current: of the rated, or minimum adjustable setting current: (A)	-	N/A
	Time interval: twice the delay-time stated by the manufacturer: (s)	-	N/A
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:	-	N/A
	Test current: maximum adjustable setting current: (A)	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:	-	N/A
8.3.3.2	Test of dielectric properties, impulse withstand voltage (Uimp indicated):		
8.3.3.4 part1	The 1,2/50µs impulse voltage shall be applied five times for each polarity at intervals of 1s minimum		
	- rated impulse withstand voltage (kV) :	8 kV	P
	- sea level of the laboratory:	sea level	P
	- test Uimp main circuits (kV) :	9,8 kV	P
	- test Uimp auxiliary circuits (kV) :	-	N/A
	- test Uimp control circuits (kV) :	-	N/A
	- test Uimp on open main contacts (equipment suitable for isolating) (kV) :	12,3 kV	P
a)	Application of test voltage	-	N/A
	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.	Compliance	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.	Compliance	P
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit	-	N/A
	- other circuits	-	N/A
	- exposed conductive parts	-	N/A
	- enclosure of mounting plate	-	N/A
	iv) equipment suitable for isolation	Compliance	P
	equipment not suitable for isolation	-	N/A
	- no unintentional disruptive discharge during the test's	Compliance	P
	Test of dielectric properties, dielectric withstand voltage (Uimp not indicated):		
	- rated insulation voltage (V) :	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- main circuits, test voltage for 1 min (V)	-	N/A
	- auxiliary circuits, test voltage for 1 min (V)	-	N/A
	- control circuits, test voltage for 1 min (V)	-	N/A
8.3.3.2.2	Application of test voltage		
1)	with circuit-breaker in the closed position		
	- between all live parts of all poles connected together and the frame of the circuit-breaker .	-	N/A
	- between each pole and all the other poles connected to the frame of the circuit-breaker	-	N/A
2)	with the circuit-breaker in the open position and, additionally, in the tripped position, if any.	-	N/A
	- between all live parts of all poles connected together and the frame of the circuit-breaker.	-	N/A
	- between the terminals of one side connected together and the terminals of the other side connected together.	-	N/A
b)	Control and auxiliary circuits		
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/A
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/A
	No unintentional disruptive discharge during the tests	-	N/A
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.	< 0,01 mA / 457 V	P
8.3.3.3	Mechanical operation and operational performance capability		
8.3.3.3.2	Construction and mechanical operation		
a)	Construction		
	A withdrawable circuit-breaker shall be checked for the requirements stated in 7.1.1	-	N/A
	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	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
b)	Mechanical operation		
	A circuit-breaker with dependent power operation shall comply with the requirements stated in 7.2.1.1.3	-	N/A
	A circuit-breaker with dependent power operation shall operate with the operating mechanism charged to the minimum and maximum limits stated by the manufacturer	-	N/A
	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.	-	N/A
	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	-	N/A
	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/A
	If the closing and opening times of a circuit-breaker are stated by the manufacturer, such times shall comply with the stated values	-	N/A
c)	Undervoltage releases		
	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/A
i)	Drop out voltage		
	It shall be verified that the release operates to open the circuit-breaker between the voltage limits specified	-	N/A
	The voltage shall be reduced from rated voltage at a rate to reach 0 V in approximately 30 s	-	N/A
	The test for the lower limit is made without current in the main circuit and without previous heating of the release coil	-	N/A
	In the case of a release with a range of rated voltages, this test applies to the maximum voltage of the range	-	N/A
	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/A

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Clause	Requirement + Test	Result - Remark	Verdict
	This test may be combined with the temperature-rise test of 8.3.3.6	-	N/A
	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	-	N/A
ii)	Test for limits of operation		
	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/A
	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/A
iii)	Performance under overvoltage conditions		
	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/A
d)	Shunt releases		
	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	-	N/A
	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	-	N/A
	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	-	N/A
8.3.3.3.3	Operational performance capability without current.		
	Type designation or serial number	TE 160 4P	
	Sample no:	S1-3	
	Rated current In (A)	160 A	
	Rated operational voltage: Ue (V)	415 V	
	Rated control supply voltage of closing mechanism: Uc (V)	-	

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Clause	Requirement + Test	Result - Remark	Verdict
	Rated control supply voltage of shunt releases: Uc (V)	-	
	Rated control supply voltage undervoltage releases: Uc (V)	-	
	Ambient temperature 10-40 °C :	22 °C	P
	Number of operating cycles per hour	120 cycles per hour	P
	Number of cycles without current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Number of cycles without current (without releases)	7 000 cycles	P
	Applied voltage: closing mechanism (V)	-	N/A
	10% of total cycles for circuit-breaker with fitted shunt release: (50% at the beginning- and 50% at the end of the test.) Energized at the rated Uc	-	N/A
	Applied voltage: shunt releases (V)	-	N/A
	10% of total cycles for circuit-breaker with undervoltage releases: (50% at the beginning- and 50% at the end of the test.) Energized at the minimum rated Uc	-	N/A
	10 cycles without applied voltage at the undervoltage releases. (Shall not possible to close the circuit-breaker.)	-	N/A
	Applied voltage: undervoltage releases (V)	-	N/A
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.3.3.4	Operational performance capability with current.		
	Rated current: In (A)	160 A	
	Maximum rated operational voltage: Ue (V)	415 V	
	Conductor cross-sectional area (mm²) :	70 mm²	P
	Number of operating cycles per hour	120	P
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	1 000	P
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A
	Conditions, make/break operations:	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- test voltage U/Ue = 1,0 (V) .....L1: .....L2: L3:	423,4 V 420,2 V 420,7 V	P
	- test current I/Ie = 1,0 (A).....L1: .....L2: L3:	162,4 A 163,2 A 164,1 A	P
	- power factor/time constant:	0,74	P
	- frequency: (Hz)	60	P
	- on-time (ms):	1 s	P
	- off-time (s):	29 s	P
	Electrical components do not exceed the value indicated in tab. 7.	Compliance	P
8.3.3.3.5	Additional test of operational performance capability without current for withdrawable circuit-breaker.		
	Number of operations cycles : 100	-	N/A
	After test, the isolating contacts, withdrawable mechanism and interlocks shall be suitable for further service.	-	N/A
8.3.3.4	Overload performance		
	this test applies to circuit-breaker of rated current up to and including 630 A		
	Type designation or serial number	TE 160 4P	
	Sample no:	S1-3	
	Rated current In (A)	160 A	
	Rated operational voltage: Ue (V)	415 V	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt releases: Uc (V)	-	
	Rated control supply voltage undervoltage releases: Uc (V)	-	
	Ambient temperature 10-40 °C :	22 °C	P
	Number of operating cycles per hour	120 cycles per hour	P
	Maximum rated operational voltage: Ue (V)	415 V	P
	Number of operating cycles per hour	-	N/A
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	15 cycles	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload/short-circuit settings at maximum.	-	N/A
	Conditions, overload operations:	-	N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	443.2 V 440.1 V 443.2 V	P
	- test current AC/DC: I/Ie = 6,0/2.5 (A) ..... L1: ..... L2: L3:	 965 A 963 A 966 A	P
	- power factor/time constant:	0,44	P
	- Number of cycles manually opened: 9	12 cycles	P
	- Number of cycles automatically opened by an overload release: 3	3 cycles	P
	- frequency: (Hz)	60 Hz	P
	- on-time max 2s:	1 s	P
8.3.3.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1 000 V	P
	- no breakdown or flashover	Compliance	P
8.3.3.6	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	Compliance	P
	Temperature rise of main circuit terminals ≤ 80 K (K) :	58,6 K	P
	conductor cross-sectional area (mm²) :	70 mm²	P
	test current Ie (A) :	160 A	N/A
8.3.3.7	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	256 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	1 min 10 sec	P
8.3.3.8	Verification of undervoltage and shunt releases		
	Circuit-breaker fitted with undervoltage releases. The release shall not operate at 70% of the minimum control supply voltage -	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	and shall operate at 35% of the maximum control supply voltage.	-	N/A
	Circuit-breaker fitted with shunt releases. The release shall operate at 70% of the minimum rated control supply voltage. Test made at room temperature.	-	N/A
8.3.3.9	Verification of the main contact position for circuit-breakers for isolation		
	actuating force for opening (N) .....:	61,7 N	—
	test force with blocked main contacts for 10 s (N) .:	185,1 N	—
	Dependent power operation		
	Supply voltage of 110% of rated voltage (V).....:	-	N/A
	Three attempts of 5 s to operate the equipment at intervals of 5 min.	-	N/A
	Independent power operation		
	Three attempts to operate the equipment by the stored energy.	-	N/A
	Lock ability of driving mechanism in OFF-position at test force and blocked main contacts .....:	-	N/A
	Position indicator does not show OFF-position after capture of test force at blocked main contacts	Compliance	P
8.3.4	TEST SEQUENCE II (Ics):		N/A
8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
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	TE 160	
	Sample no:	S2-1 (3 poles)	
	Rated current: In (A)	160 A	
	Rated operational voltage: Ue (V)	240 V	
	Rated service short-circuit breaking capacity: (kA)	85 kA	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	

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Clause	Requirement + Test	Result - Remark	Verdict
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	141(W)×200(H)×86(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	N/A
	- size of hole: <30mm^2	<30 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm^2) :	70 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)	upside	P
	Tightening torques: (Nm)	8 Nm	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.		
	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.		
	Time specified by the manufacturer:	60 ~ 600 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	155 s 236 s 187 s	P
	Test sequence of operation: O – t – CO – t – CO	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- test voltage U/Ue = 1,05 (V) .....L1: .....L2: .....L3: .....N :	L1: 252.3 V L2: 252.2 V L3: 252.3 V	P
	- r.m.s. test current AC/DC: (A) .....L1: .....L2: .....L3: .....N :	L1: 42.0 kA(50%) L2: 43.1 kA(50%) L3: 42.5 kA(50%)	P
	power factor/time constant :	0,20	P
	- Factor "n"	2,2	P
	- peak test current (A) :	94.3 kA(50%)	P
	Test sequence "O"		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:	L1: 12.0 kA L2: 13.5 kA L3: 11.9 kA	P
	- Joule integral I^2dt (A^2s) .....L1: .....L2: L3:	L1: 110.5 kA^2s L2: 119.9 kA^2s L3: 166.1 kA^2s	P
	Pause, t: (min)	3	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:	L1: 13.4 kA L2: 11.3kA L3: 4.2 kA	P
	- Joule integral I^2dt (A^2s) .....L1: .....L2: L3:	L1: 129.0 kA^2s L2: 79.6 kA^2s L3: 9.5 kA^2s	P
	Pause, t: (min)	3	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:	L1: 7.1 kA L2: 14.2 kA L3: 8.0 kA	P
	- Joule integral I^2dt (A^2s) .....L1: .....L2: L3:	L1: 36.5 kA^2s L2: 141.3 kA^2s L3: 39.4 kA^2s	P
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	Compliance	P
	Cracks observed	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	160 A	
	Maximum rated operational voltage: Ue (V)	240 V	
	Conductor cross-sectional area (mm²) :	70 mm²	
	Number of operating cycles per hour	120	P
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	50	P
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	246,1 V 244,0 V 244,4 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	166,8 A 167,6 A 163,0 A	P
	- power factor/time constant:	0,73	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1 s	P
	- off-time (s):	29 s	P
	Electrical components do not exceed the value indicated in tab. 7.	Compliance	P
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1 000 V	P
	- no breakdown or flashover	Compliance	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	<0,01 mA / 264 V	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	Compliance	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	73,9 K	P
	conductor cross-sectional area (mm²) :	70 mm²	P

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Clause	Requirement + Test	Result - Remark	Verdict
	test current Ie (A) :	160 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	251 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	47 sec	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	60~600 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	86 s 112 s 93 s	P
8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
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	TE 160	
	Sample no:	S2-1 (4 poles)	
	Rated current: In (A)	160 A	
	Rated operational voltage: Ue (V)	240 V	
	Rated service short-circuit breaking capacity: (kA)	85 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.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Distances of the metallic screen's: (all sides)	141(W)×200(H)×86(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	N/A
	- size of hole: <30mm^2	<30 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm²) :	70 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)	upside	P
	Tightening torques: (Nm)	8.0 Nm	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.		
	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.		
	Time specified by the manufacturer:	60 ~ 600 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	253 s 227 s 252 s	P
	Test sequence of operation: O – t – CO – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: ..... L3: ..... N :	L1: 253.1 V L2: 252.8 V L3: 253.7 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: ..... L3: ..... N :	L1: 42.0 kA(50%) L2: 43.1 kA(50%) L3: 42.5 kA(50%)	P
	power factor/time constant :	0,2	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- Factor "n"	2,2	P
	- peak test current (A) :	94.3 kA(50%)	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 4.7 kA L2: 14.0 kA L3: 10.4 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 13.9 kA^2s L2: 129.6 kA^2s L3: 63.4 kA^2s	P
	Pause, t: (min)	960	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 12.5 kA L2: 12.5 kA L3: 12.5 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 98.1 kA^2s L2: 119.4 kA^2s L3: 119.4 kA^2s	P
	Pause, t: (min)	7	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 15.0 kA L2: 12.5 kA L3: 12.4kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 160.4 kA^2s L2: 151.2 kA^2s L3: 145.6 kA^2s	P
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	Compliance	P
	Cracks observed	Compliance	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	160 A	
	Maximum rated operational voltage: Ue (V)	240 V	
	Conductor cross-sectional area (mm^2) :	70 mm^2	
	Number of operating cycles per hour	120	P
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	50	P
	Applied voltage: closing mechanism (V)	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	246,1 V 244,0 V 244,4 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	166,8 A 167,6 A 163,0 A	P
	- power factor/time constant:	0,73	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1 s	P
	- off-time (s):	29 s	P
	Electrical components do not exceed the value indicated in tab. 7.	Compliance	P
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1 000 V	P
	- no breakdown or flashover	Compliance	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	<0,01 mA / 264 V	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	Compliance	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	60.5 K	P
	conductor cross-sectional area (mm²) :	70 mm²	P
	test current Ie (A) :	160 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	251 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	42 sec	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	60~600 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	99 s 104 s 105 s	P
8.3.5	TEST SEQUENCE III (Icu)		
	Rated ultimate short-circuit breaking		
	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.		
	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.		
	For integrally fused circuit-breakers, test sequence V applies in place of this sequence.		
	Type designation or serial number	TE 160	
	Sample no:	S2-2 (T-N)	
	Rated current: In (A)	160 A	
	Rated operational voltage: Ue (V)	139 V	
	Rated ultimate short-circuit breaking capacity: (kA)	51 kA	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	60~600 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	- - 186 s 256 s	P
8.3.5.2	Test of rated ultimate short-circuit breaking capacity		
	The test sequence of operations is O – t – CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	N/A
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	141X200X86 mm	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	<30 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm²) :	70 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)	upside	P
	Tightening, torques: (Nm)	8 Nm	P
	Test sequence of operation: O – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: ..... L3: ..... N:	- - L3: 148,2 V N: 148,2 V	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- r.m.s. test current AC/DC: (A) .....L1: .....L2: ..... L3: ..... N:	- - L3: 51.0 kA N: 51.0 kA	P
	power factor/time constant :	0,19	P
	- Factor "n"	2,2	P
	- peak test current (A) :	113.1 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) .....L1: .....L2: .....L3: .....N:	- - L3: 5.8 kA N: 5.8 kA	P
	94 Joule integral I^2dt (A^2s) .....L1: .....L2: .....L3: .....N:	- - L3: 116.0 kA^2s N: 116.0 kA^2s	P
	Pause, t: (min)	3	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) .....L1: .....L2: .....L3: .....N:	- - L3: 6.1 kA N: 6.1 kA	P
	- Joule integral I^2dt (A^2s) .....L1: .....L2: .....L3: .....N:	- - L3: 102.0 kA^2s N: 102.0 kA^2s	P
	Melting of the fusible element	-	P
	Holes in the PE-sheet for test sequence "O"	-	P
	Cracks observed	-	P
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1 000 V	P
	- no breakdown or flashover	Compliance	P
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	< 0.01 mA / 264 V	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	60~600 s	P
	- Operation time: (s) .....L1: .....L2: .....L3: ..... N :	- - 66 s 78 s	P
8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
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	TE 160	
	Sample no:	S2-3 (4 poles)	
	Rated current: In (A)	16 A	
	Rated operational voltage: Ue (V)	240 V	
	Rated service short-circuit breaking capacity: (kA)	85 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.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	141(W)×200(H)×86(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	N/A
	- size of hole: <30mm^2	<30 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm²) :	2.5 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)	upside	P
	Tightening torques: (Nm)	8 Nm	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.		
	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.		
	Time specified by the manufacturer:	60 ~ 600 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	100 s 119 s 105 s	P
	Test sequence of operation: O – t – CO – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: ..... L3: ..... N :	L1: 252.4 V L2: 252.1 V L3: 253.1 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: ..... L3: ..... N :	L1: 42.0 kA(50%) L2: 43.1 kA(50%) L3: 42.5 kA(50%)	P
	power factor/time constant :	0,2	P
	- Factor "n"	2,2	P
	- peak test current (A) :	94.3 kA(50%)	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 4.3 kA L2: 7.5 kA L3: 6.1 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 17.1 kA^2s L2: 62.6 kA^2s L3: 25.8 kA^2s	P
	Pause, t: (min)	3	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 5.3 kA L2: 7.7 kA L3: 4.5 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 70.3 kA^2s L2: 56.0 kA^2s L3: 42.4 kA^2s	P
	Pause, t: (min)	3	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 7.7 kA L2: 5.0 kA L3: 5.1 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 70.1 kA^2s L2: 66.3 kA^2s L3: 83.1 kA^2s	P
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	Compliance	P
	Cracks observed	Compliance	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	-	
	Maximum rated operational voltage: Ue (V)	-	
	Conductor cross-sectional area (mm^2) :	-	
	Number of operating cycles per hour	-	N/A
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) .....L1: .....L2: L3:	-	N/A
	- test current I/Ie = 1,0 (A).....L1: .....L2: L3:	-	N/A
	- power factor/time constant:	-	N/A
	- frequency: (Hz)	-	N/A
	- on-time (ms):	-	N/A
	- off-time (s):	-	N/A
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1 000 V	P
	- no breakdown or flashover	Compliance	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	<0,01 mA / 264 V	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm²) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	25.1 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	636 sec	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	60~600 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	101 s 88 s 68 s	P
8.3.5	TEST SEQUENCE III (Icu)		
	Rated ultimate short-circuit breaking		
	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.		
	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.		
	For integrally fused circuit-breakers, test sequence V applies in place of this sequence.		
	Type designation or serial number	TE 160	
	Sample no:	S2-4 (T-N)	
	Rated current: In (A)	16 A	
	Rated operational voltage: Ue (V)	139 V	
	Rated ultimate short-circuit breaking capacity: (kA)	51 kA	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	-	N/A
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	155 s - - 135 s -	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.5.2	Test of rated ultimate short-circuit breaking capacity		
	The test sequence of operations is O – t – CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	N/A
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	141X200X86 mm	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	<30 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm²) :	2.5 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)	upside	P
	Tightening, torques: (Nm)	8 Nm	P
	Test sequence of operation: O – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: ..... L3: ..... N:	- - L3: 148.7 V N: 148.7 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: ..... L3: ..... N:	- - L3: 51.0 kA N: 51.0 kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
	power factor/time constant :	0,19	P
	- Factor "n"	2,2	P
	- peak test current (A) :	113.1 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) .....L1: .....L2: .....L3: .....N:	- - L3: 3.5 kA N: 3.5 kA	P
	95 Joule integral I^2dt (A^2s) .....L1: .....L2: .....L3: .....N:	- - L3: 45.5 kA^2s N: 45.5 kA^2s	P
	Pause, t: (min)	3	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) .....L1: .....L2: .....L3: .....N:	- - L3: 4.7 kA N: 4.7 kA	P
	- Joule integral I^2dt (A^2s) .....L1: .....L2: .....L3: .....N:	- - L3: 60.2 kA^2s N: 60.2 kA^2s	P
	Melting of the fusible element	-	P
	Holes in the PE-sheet for test sequence "O"	-	P
	Cracks observed	-	P
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1 000 V	P
	- no breakdown or flashover	Compliance	P
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	< 0.01 mA / 264 V	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	60~600 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	116 s - - 339 s	P
8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
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	TE 160	
	Sample no:	S2-8 (4 poles, Reverse)	
	Rated current: In (A)	160 A	
	Rated operational voltage: Ue (V)	415 V	
	Rated service short-circuit breaking capacity: (kA)	50 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.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	141(W)×200(H)×86(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	N/A
	- size of hole: <30mm^2	<30 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm²) :	70 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)	upside	P
	Tightening torques: (Nm)	8 Nm	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.		
	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.		
	Time specified by the manufacturer:	60 ~ 600 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	167 s 245 s 205 s	P
	Test sequence of operation: O – t – CO – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: ..... L3: ..... N :	L1: 437.8 V L2: 438.2 V L3: 438.2 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: ..... L3: ..... N :	L1: 51.6 kA L2: 50.9 kA L3: 50.7 kA	P
	power factor/time constant :	0,24	P
	- Factor "n"	2,16	P
	- peak test current (A) :	111.7 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 7.0 kA L2: 15.5 kA L3: 12.0 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 105.4 kA^2s L2: 358.1 kA^2s L3: 133.3 kA^2s	P
	Pause, t: (min)	3	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 14.3 kA L2: 11.0 kA L3: 16.3kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 593.0 kA^2s L2: 144.4 kA^2s L3: 945.0 kA^2s	P
	Pause, t: (min)	3	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 13.4 kA L2: 17.1 kA L3: 9.7 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 258.7 kA^2s L2: 450.7 kA^2s L3: 88.9 kA^2s	P
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	Compliance	P
	Cracks observed	Compliance	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	160 A	
	Maximum rated operational voltage: Ue (V)	415 V	
	Conductor cross-sectional area (mm^2) :	70 mm^2	
	Number of operating cycles per hour	120	P
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	50	P
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	420,4 V 417,2 V 417,9 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	163,2 A 164,5 A 162,7 A	P
	- power factor/time constant:	0,73	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1 s	P
	- off-time (s):	29 s	P
	Electrical components do not exceed the value indicated in tab. 7.	Compliance	P
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1 000 V	P
	- no breakdown or flashover	Compliance	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	< 0,01 mA / 457 V	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	Compliance	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	69,4 K	P
	conductor cross-sectional area (mm²) :	70 mm²	P
	test current Ie (A) :	160 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	251 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	49 sec	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	60~600 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	89 s 133 s 92 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.5	TEST SEQUENCE III (Icu)		
	Rated ultimate short-circuit breaking		
	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.		
	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.		
	For integrally fused circuit-breakers, test sequence V applies in place of this sequence.		
	Type designation or serial number	TS 160	
	Sample no:	S2-9 (T-N, Reverse)	
	Rated current: In (A)	160 A	
	Rated operational voltage: Ue (V)	240 V	
	Rated ultimate short-circuit breaking capacity: (kA)	30 kA	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	60~600 s	N/A
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	235 s - - 331 s	N/A
8.3.5.2	Test of rated ultimate short-circuit breaking capacity		
	The test sequence of operations is O – t – CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	N/A
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	141X200X86 mm	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	<30 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm^2) :	70 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)	upside	P
	Tightening, torques: (Nm)	8 Nm	P
	Test sequence of operation: O – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: ..... L3: ..... N:	- - L3: 252.5 V N: 252.5 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: ..... L3: ..... N:	- - L3: 30.1 kA N: 30.1 kA	P
	power factor/time constant :	0,23	P
	- Factor "n"	2,15	P
	- peak test current (A) :	65.1 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: ..... L3: ..... N:	- - L3: 6.9 kA N: 6.9 kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
	96 Joule integral I^2dt (A^2s) .....L1: .....L2: .....L3: .....N:	 - - L3: 125.4 kA^2s N: 125.4 kA^2s	P
	Pause, t: (min)	5	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) .....L1: .....L2: .....L3: .....N:	 - - L3: 8.3 kA N: 8.3 kA	P
	- Joule integral I^2dt (A^2s) .....L1: .....L2: .....L3: .....N:	 - - L3: 101.9 kA^2s N: 101.9 kA^2s	P
	Melting of the fusible element	-	P
	Holes in the PE-sheet for test sequence "O"	-	P
	Cracks observed	-	P
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1 000 V	P
	- no breakdown or flashover	Compliance	P
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	< 0.01 mA / 457 V	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	60~600 s	P
	- Operation time: (s) .....L1: .....L2: .....L3: ..... N :	81 s - - 109 s	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
8.3.5	TEST SEQUENCE III (Icu)		N/A
8.3.6	TEST SEQUENCE IV		N/A
8.3.7	TEST SEQUENCE V		N/A
8.3.8	Combined test sequence		N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
Annex B	Circuit-breakers incorporating residual current protection		N/A
Annex C	Individual pole short-circuit test sequence		N/A
Annex F	Additional tests for circuit-breakers with electronic over-current protection		N/A
Annex H	Individual pole short-circuit test sequence		N/A
Annex J	Electromagnetic compatibility (EMC) – Requirements and test methods for circuit-breakers		N/A
Annex L	Circuit-breakers not fulfilling the requirements for overcurrent protection		N/A
Annex M	Modular residual current devices (without integral current breaking device)		N/A
Annex N	Electromagnetic compatibility (EMC) – Additional requirements and test methods for devices not covered by Annexes B, F and M		N/A
Annex O	Instantaneous trip circuit-breakers (ICB)		N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict

8.3.3.6	**TABLE: Heating Test**		S1-3
	Test voltage (V):		—
	Ambient (°C):	19,3	—

Thermocouple Locations	max. temperature measured, (°C)	max. temperature limit, (°C)
LINE L1	57,6	80
LINE L2	58,0	80
LINE L3	57,6	80
LOAD L1	54,5	80
LOAD L2	58,6	80
LOAD L3	54,7	80
Manual operating means: non-metallic	12,1	35
Parts intended to be touched but not hand-held: non-metallic	24,6	50
Parts which need not be touched during no rmal operation	50,9	60

8.3.4.4	**TABLE: Heating Test**		S2-1 3P
	Test voltage (V):		—
	Ambient (°C):	22,8	—

Thermocouple Locations	max. temperature measured, (°C)	max. temperature limit, (°C)
LINE L1	65,7	80
LINE L2	73,9	80
LINE L3	62,0	80
LOAD L1	65,2	80
LOAD L2	65,4	80
LOAD L3	55,0	80

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict

8.3.4.4	**TABLE: Heating Test**		S2-1 4P
	Test voltage (V):		—
	Ambient (°C):	23,3	—

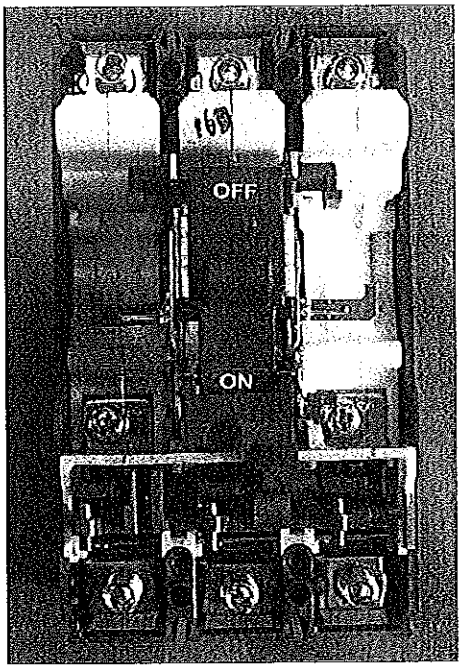
Thermocouple Locations	max. temperature measured, (°C)	max. temperature limit, (°C)
LINE L1	51,5	80
LINE L2	57,8	80
LINE L3	54,4	80
LOAD L1	57,7	80
LOAD L2	60,5	80
LOAD L3	50,6	80

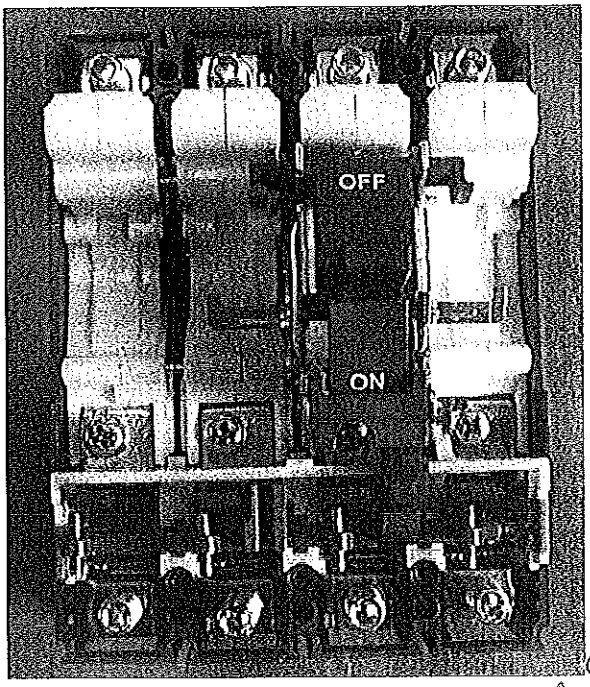
8.3.4.4	**TABLE: Heating Test**		S2-8 4P
	Test voltage (V):		—
	Ambient (°C):	22,9	—

Thermocouple Locations	max. temperature measured, (°C)	max. temperature limit, (°C)
LINE L1	61,5	80
LINE L2	66,8	80
LINE L3	66,1	80
LOAD L1	58,7	80
LOAD L2	69,4	80
LOAD L3	63,7	80

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict

Internal product:





Type Approval Certificate

This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.

Certificate No.	44 990 - 07 HH
Company	LSIS Co., Ltd. 1, Song Jung-dong, Hung Duk-gu Cheong Ju, Choongbuk 361-720, KOREA, REPUBLIC OF
Product Description	Molded Case Circuit Breaker SUSOL
Type	TD100, TD160 E\ N\ S\ H\ P\ L
Environmental Category	C
Technical Data / Range of Application	Number of poles : 3 Rated operational current Ie : 16 - 160 A Rated operational voltage Ue : 500 V AC Rated insulation voltage Ui : 750 V AC Rated impulse voltage Uimp : 8 kV Rated frequency fe : 50/60 Hz Utilization category : A

Rated short circuit capacity Performance at :

		E	N	S	H	P	L
500V	Icm	130	187	187	220	330	440 kA
240V	Ics = Icu	65	85	85	100	150	200 kA
415V	Ics = Icu	35	50	65	85	130	150 kA
460V	Ics = Icu	35	50	65	70	100	130 kA
500V	Ics = Icu	18	30	42	50	60	65 kA

Release system : Thermal, Magnetic (INST)

Test Standard	Guidelines for the Performance of Type Approvals Part 2, Edition 2003 IEC 60947-2 (2003) incl. Annex H
Documents	Test report : KEMA 208602900.50 dated 2006-03-23 PT&T R36-0770 dated 2006-08-19
Remarks	None
Valid until	2017-01-17

Page 1 of 1

File No. I.K.01

Hamburg, 2012-01-18

Type Approval Symbol GL

Germanischer Lloyd

i.A. Thomas Hartmann

i.A. Harald Amberger

This certificate is issued on the basis of "Guidelines for the Performance of Type Approvals Part 1 Procedure".

KEMA

TEST REPORT

IEC 60 947-2

Low-voltage switchgear and controlgear

Part 2: Circuit - breakers

Report reference No. ..... :	2086029.50
Compiled by (+ signature) ..... :	H.H.M. Versteegen
Approved by (+ signature) ..... :	H.L. Schendstok
Date of issue ..... :	12 December 2005
	19 December, 2006 revised due to editorial change in report number
CB Testing Laboratory ..... :	KEMA Quality B.V.
Address ..... :	Utrechtseweg 310, 6812 AR Arnhem, The Netherlands
Testing location/procedure ..... :	CBTL ☐ SMT ☐ WMT ☒
Address ..... :	LS Industrial Systems Co., Ltd. CheongJu Plant
	1, Songjeong-dong, Heungdeok-gu Cheongju-si, Chungcheongbuk-do, Korea
Applicant's Name ..... :	LS Industrial Systems Co., Ltd.
Address ..... :	84-11, Namdaemunno5(o)-ga, Jung-gu, Seoul, Korea
Test specification	
Standard ..... :	IEC 60 947-2:2003 see also IEC 60 947-1:2004
Test procedure ..... :	CB
Non-standard test method ..... :	N/A
Test Report Form	IEC60947_2B
TRF originator ..... :	SEV
Master TRF ..... :	Dated 2002-11

Test item description ..... :	Moulded-case circuit-breaker
Trade Mark	LS
Model Type reference	TD100 E, TD100 N, TD100 S, TD100 H, TD100 P, TD100 L, TD160 E, TD160 N, TD160 S, TD160 H, TD160 P, TD160 L
Ratings ..... :	TD100 E/N/S/H/P/L : 16, 20, 25, 32, 40, 50, 63, 80 and 100A TD160 E/N/S/H/P/L : 16, 20, 25, 32, 40, 50, 63, 80, 100, 125 and 160 A

Particulars: test item vs. test requirements	
3. Classification	
3.1. Utilization category: (A or B) :	A
3.2. Interruption medium: (air, vacuum, gas Break) :	Air
3.3. Design: (open construction, moulded case) :	Moulded case
3.4. Method of controlling the operation mechanism: (dependent manual operation, independent manual operation, dependent power operation, independent power operation) :	Independent manual operation
3.5. Suitability for insulation: (suitable, not -suitable) :	Suitable
3.6. Provision for maintenance: (maintainable, non maintainable) :	Maintainable
3.7. Method of installation: (fixed, plug in, withdrawable:	Fixed
3.8. Degree of protection: (IP code) :	IP20
4.8. Integral fuses (integrally fused circuit-breakers) Type and characteristics of SCPD :	N/A
4.9. Switching overvoltages: (when Uimp. is declared) :	8 kV
7.3 Electromagnetic compatibility (EMC) Environment A or B :	B
Circuit-breaker for use on phase-earthed systems :	N/A
Circuit-breaker for use in IT systems :	P
Rated and limiting values, main circuit :	
- rated operational voltage: Ue (V) :	AC 220, 240, 380, 415, 440, 460, 480 and 500 V
- rated insulation voltage: Ui (V) :	AC 750 V
- rated impulse withstand voltage: Uimp (kV) :	8 kV
- rated operational current: Ie (A) :	16,20,25,32,40,50,63,80,100,125 and 160 A
- kind of current :	AC
- conventional free air thermal current: Ith (A) :	16,20,25,32,40,50,63,80,100,125 and 160 A
- conventional enclosed thermal current: Ithe (A) :	N/A
- current rating for four-pole circuit-breakers: (A) :	N/A
- number of poles :	3
- rated frequency: (Hz) :	50/60 Hz
- integral fuses (rated values) :	N/A
- suitability for environment (A or B) :	A
Rated duty :	
- eight-hour duty :	N/A
- uninterrupted duty: Iu (A) :	160 A
Short-circuit characteristic :	
rated short-time making capacity: Icm (kA) :	440 kA
rated ultimate short-circuit breaking capacity: Icu (kA) :	200 kA-220&240V, 150 kA-380&415 V, 130 kA-440&460V, 65 kA-480&500 V
rated service short-circuit breaking capacity: Ics (kA) :	100% Icu
rated short-time withstand current: Icw (kA/s) :	N/A

Control circuits :	
Electrical control circuits :	
- kind of current: (AC, DC) :	N/A
- rated frequency: (Hz) :	N/A
- rated control circuit voltage: Uc (nature, frequency, V) ... :	N/A
- rated control supply voltage: Us (nature, frequency V):	N/A
Air supply control circuits: (pneumatic or electro-pneumatic) :	
- rated pressure and its limit :	N/A
- volumes of air, at atmospheric pressure, required for each closing and each opening operation :	N/A
Auxiliary circuits :	
Rated and limiting values, auxiliary circuits :	N/A
- rated operational voltage Ue (V) :	N/A
- rated insulation voltage: Ui (V) :	N/A
- rated operational current: Ie (A) :	N/A
- kind of current :	N/A
- rated frequency: (Hz) :	N/A
- number of circuits :	N/A
- number and kind of contact elements :	N/A
- rated uninterrupted current: Iu (A) :	N/A
- utilization category: (AC, DC, current and voltage) :	N/A
Short-circuit characteristic :	
Rated conditional short-circuit current: Icn (kA) :	N/A
Co-ordination of short-circuit protective devices :	
- kind of protective device :	N/A
Releases :	
1) shunt release :	N/A
2) Over current release :	See Remarks
a) instantaneous :	P
b) definite time delay :	N/A
c) inverse time delay :	P
- independent of previous load :	N/A
- dependent on previous load; (for example thermal type release) :	P
3) Undervoltage release (for opening) :	N/A
4) Other releases :	N/A
Characteristics :	
1) Shunt release and undervoltage release (for opening) ... :	
- rated control circuit voltage: Uc (nature, frequency, V) ... :	N/A
- kind of current :	N/A
-rated frequency: (if AC) :	N/A

2) Overcurrent release ..... :	
- rated current ..... :	16,20,25,32,40,50,63,80,100,125 and 160 A
- kind of current..... :	AC
- rated frequency: (if AC) ..... :	50/60 Hz
- current setting (or range of settings)..... :	0,8 ~ 1,0 In
- time settings (or range of settings) ..... :	N/A

Test case verdicts	
Test case does not apply to the test object :	N/A
Test item does meet the requirement :	P(ass)
Test item does not meet the requirement :	F(ail)
Testing	
Date of receipt of test item :	August 18, 2005
Date(s) of performance of test :	August 22, 2005 ~ October

General remarks

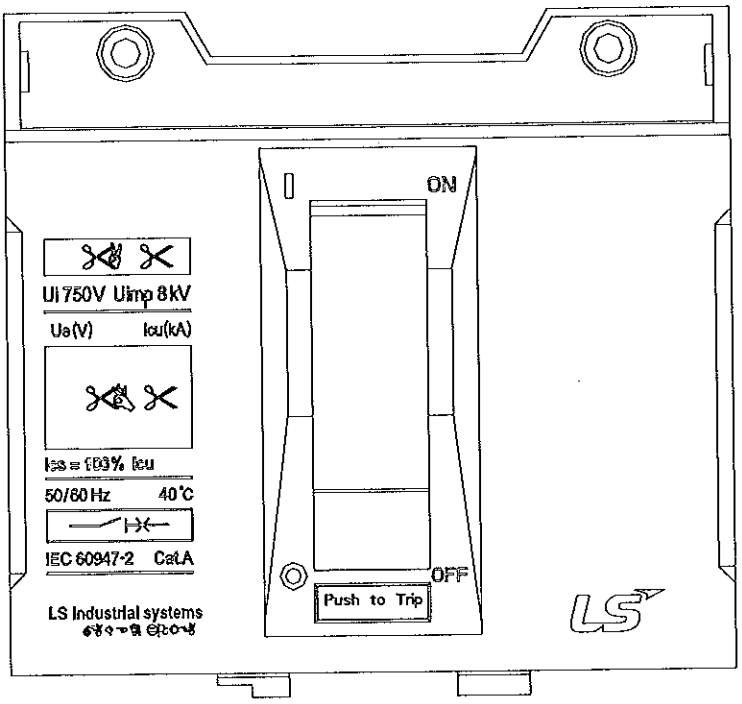
This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

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 testing laboratory.

"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a comma (point) is used as the decimal separator.

Copy of marking plate and summary of test results (information/comments):



도번	"A"부 인쇄사방	"B"부 인쇄사방
6462 1171 003	TD100E	220/240~ 65kA 380/415~ 35kA 440/460~ 35kA 480/500~ 18kA 250 – 25kA
6462 1171 004	TD160E	
6462 1171 005	TD100N	220/240~ 85kA 380/415~ 50kA 440/460~ 50kA 480/500~ 30kA 250 – 42kA
6462 1171 006	TD160N	
6462 1171 007	TD100S	220/240~ 85kA 380/415~ 65kA 440/460~ 65kA 480/500~ 42kA 250 – 42kA
6462 1171 008	TD160S	
6462 1171 009	TD100H	220/240~ 100kA 380/415~ 85kA 440/460~ 70kA 480/500~ 50kA 250 – 65kA
6462 1171 010	TD160H	
6462 1171 011	TD100P	220/240~ 150kA 380/415~ 130kA 440/460~ 100kA 480/500~ 60kA 250 – 85kA
6462 1171 012	TD160P	
6462 1171 013	TD100L	220/240~ 200kA 380/415~ 150kA 440/460~ 130kA 480/500~ 65kA 250 – 100kA
6462 1171 014	TD160L	

Summary of testing:

Sequence I

S1-1 : 500 V 160 A : Passed

Sequence II & III

S2-1 : 240 V 160 A 200 kA : Passed

S2-2 : 240 V 16 A 200 kA : Passed

S2-3 : 415 V 160 A 150 kA : Passed

S2-4-1 : 500 V 160 A 65 kA, connections reversed : Passed

AnnexH

H-1 : 500 V 160 A 2,3 kA : Passed

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
5.2	MARKING		
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.		
	- rated current:	16, 20, 25, 32, 40, 50, 63, 80, 100, 125 and 160 A	P
	- suitability for isolation, if applicable, with the symbol	Compliance	P
	- indication of the open and closed position: with Od I respectively, if symbols are used	Compliance	P
b)	Marking on equipment not needed to be visible after mounting:		
	- manufacturer's name or trademark	LS	P
	- type designation or serial number	TD100 E, TD100 N, TD100 S, TD100 H, TD100 P, TD100 L, TD160 E, TD160 N, TD160 S, TD160 H, TD160 P, TD160 L	P
	- IEC 60947-2 if the manufacturer compliance with this standard.	IEC 60947-2	P
	- utilization category	A	P
	- rated operational voltage(s) Ue	500 V	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 (21) which shall be market on the circuit-breaker immediately following these values of rated voltage	Compliance	P
	- value (or range) of the rated frequency and/or the indication DC (or symbol)	50/60 Hz	P
	- rated service short-circuit breaking capacity. Ics	200 kA	P
	- rated ultimate short-circuit breaking capacity. Icu	200 kA	P
	- rated short-time withstand current, (Icw) and associated short-time delay, for utilization category B	-	N/A
	- line and load terminals, unless their connection is immaterial	-	N/A
	- neutral pole terminals, if applicable, by the letter N	-	N/A
	- protective earth terminal, where applicable, by the symbol acc. 7.1.9.3 of part 1	-	N/A
	- ref. temperature for non-compensated thermal releases, if different from 30°C	40 °C	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
c)	Marked on the circuit-breaker as specified in item b), or shall be made available in the manufacturer's published information:		
	- rated short-circuit making capacity (Icm) (if higher than specified in 4.3.5.1	440 kA	P
	- rated insulation voltage. (Ui) if higher than the maximum rated operational voltage)	750 V	P
	- rated impulse withstand voltage (Uimp), when declared.	8 kV	P
	- pollution degree if other than 3	-	N/A
	- conventional enclosed thermal current (Ithe) if different from the rated current:	-	N/A
	- IP Code, where applicable:	IP20	P
	- minimum enclosure size and ventilation data (if any) to which marked ratings apply:	-	N/A
	- details of minimum distance between circuit-breaker and earthed metal parts for circuit-breaker intended for use without enclosure:	Compliance	P
	- r.m.s sensing if applicable, according to F.4.1.1	-	N/A
	- suitability for environment A or B	A	P
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:		
	- rated control circuit voltage of the closing device, and rated frequency for AC:	-	N/A
	- rated control circuit voltage of the shunt release and/or of the under-voltage release, and rated frequency:	-	N/A
	- rated current of indirect over-current releases:	-	N/A
	- 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.	-	N/A
e)	Terminal shall be clearly and permanently identified in acc. with IEC 60445 and annex L :		
	- line terminal	-	N/A
	- load terminal	-	N/A
	- neutral pole terminal "N"	-	N/A
	- protective earth terminal ⏚	-	N/A
	- terminal of coils (A/B)	-	N/A
	- terminal of shunt release (B)	-	N/A
	- terminals of under-voltage release (D)	-	N/A
	- terminals of interlocking electromagnets (E)	-	N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	- terminals of indicated light devices (X)	-	N/A
	- terminals of contact elements for switching devices (no)	-	N/A

7.1	CONSTRUCTION		
7.1.1	Withdrawable circuit-breaker	-	N/A
	In the disconnected position (main- and auxiliary circuits)		
	Isolating distances for circuit-breaker suitable for isolating warranted:	-	N/A
	Mechanism fitted with a reliable indicating device with indicates the position of the isolating contacts.	-	N/A
	Mechanism fitted with interlocks witch only permit the isolating contacts to be separate or re-closed when main contacts are open	-	N/A
	Mechanism fitted with interlock witch only permit the main contacts to be closed when the isolating contacts are fully closed.	-	N/A
	Mechanism fitted with interlock witch only permit the main contacts to be closed when in disconnected position.	-	N/A
	The isolating distances between the isolating contacts cannot be inadvertently reduced.	-	N/A
7.1.1.1	Resistance to abnormal heat and fire	650 ℃ 960 ℃	P
7.1.2	Current-carrying parts and their connection	Compliance	P
7.1.3	Clearences and creepage distances:		
	For circuit-breakers for which the manufacturer has declared a value of rated impulse withstand voltage. (Uimp.)		
	Clearances distances:		
	- Uimp is given as:	8 kV	
	- max. value of rated operational voltage to earth	289 V	
	- nominal voltage of supply system:	500 V	
	- overvoltage category:	IV	
	- pollution degree:	3	
	- field-in or homogeneous:	Inhomogeneous	
	- minimum clearances (mm):	8mm	
	- measured clearances (mm):	8,5 mm	P
	Creepage distances:		

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	- rated insulation voltage Ui (V)	750 V	
	- pollution degree	3	
	- comparative tracking index (V)	≥ 600 V	
	- material group	IIIa	
	Minimum creepage distances (mm)	12,5 mm	
	Measured creepage distances (mm)	13,1 mm	P
7.1.4 part 1	Actuator		
7.1.4.1 part 1	Insulation		
	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	Compliance	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/A
	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	Compliance	P
7.1.4.2	Direction of movement		
	The direction of operation for actuators of devices shall normally conform to IEC 60447.	Compliance	P
	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	Compliance	P
7.1.5 part 1	Indication of contact position		
7.1.5.1 part 1	Indicating means		
	When an equipment is provided with means for indicating the closed and open positions, these positions shall be unambiguous and clearly indicated	Compliance	P
	This is done by means of a position indicating device (see 2.3.18)	Compliance	P
	If symbols are used, they shall indicate the closed and open position respectively, in accordance with IEC 60417-2:		
	- 60417-2-IEC-5007 I On (power)	Compliance	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	- 60417-2-IEC-5007 O Off (power)	Compliance	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"	-	N/A
	Red colour shall not be used for any other push-button	-	N/A
	The colours of other push-buttons, illuminated push-buttons and indicator lights shall be in accordance with IEC 60073	-	N/A
7.1.5.2 part 1	Indication by the actuator		
	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	On position Off position Trip position	P
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 V):		
	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:		
	- the position of the actuator	Compliance	P
	- a separate mechanical indicator	-	N/A
	- visibility of the moving contacts	-	N/A
	When means are provided or to lock the equipment in the open position, locking only be possible when contacts are in the open position	-	N/A
	Actuator front-plate fitted to the equipment in a manner witch ensures correct contact position indication and locking	-	N/A
	The indicated open position is the only position in witch the specified isolation distances between the contacts is ensured.	Compliance	P
	- minimum clearances across open contacts (see Table XIII, Part 1) (mm) :	8 mm	
	- measured clearances (mm) :	8,5 mm	P
	- test Uimp across gap (kV) :	12,1 kV	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
7.1.6.2	Supplementary requirements for equipment with provision for electrical interlocking with contactors or circuit-breakers:		
	auxiliary switch shall be rated according to IEC 60 947-5-1	-	N/A
	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/A
	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/A
	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/A
	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/A
	During the closing operation the contacts of the auxiliary switch shall close after or simultaneously with the contacts of the main poles	-	N/A
	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	-	N/A
7.1.6.3	Supplementary requirements for equipment provided with means for padlocking the open position:		
	the locking means shall be designed in such a way that it cannot be removed with the appropriate padlock(s) installed	-	N/A
	Alternatively, the design may provide padlockable means to prevent access to the actuator	-	N/A
	test force F applied to the actuator in an attempt to operate to the closed position (N) :	-	N/A
	rated impulse withstand voltage (kV) :	-	N/A
	test Uimp on open main contacts at the test force	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
7.1.7	Terminals		
7.1.7.1	All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength	Compliance	P
	Terminal connections shall be such that necessary contact pressure is maintained	Compliance	P
	Terminals shall be so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal	Compliance	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	Compliance	P
7.1.7.2	Connection capacity		
	type of conductors :	Flexible and stranded type	P
	minimum cross-sectional area of conductor (mm^2) :	2,5mm^2 or 12AWG [16A]	P
	maximum cross-sectional area of conductor (mm^2) :	70mm^2 or 2/0AWG [160A]	P
	number of conductors simultaneously connectable to the terminal :	1	P
7.1.7.3	Connection		
	terminals for connection to external conductors shall be readily accessible during installation	Compliance	P
	clamping screws and nuts shall not serve to fix any other component	Compliance	P
7.1.7.4	Terminal identification and marking		
	terminal intended exclusively for the neutral conductor	-	N/A
	protective earth terminal	-	N/A
	other terminals	-	N/A
7.1.8 part 1	Additional requirements for equipment provided with a neutral pole		
	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.).	-	N/A
	A switched neutral pole shall break not before and shall make not after the other poles	-	N/A
	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	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	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	-	N/A
	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.	-	N/A
7.1.9	Provisions for protective earthing		
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/A
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	-	N/A
	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 50 mm x 50 mm) or are so located as to exclude any contact with live parts	-	N/A
7.1.9.2 part 1	Protective earth terminal		
	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/A
	The protective earth terminal shall be suitably protected against corrosion	-	N/A
	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/A
	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/A

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Clause	Requirement – Test	Result – Remark	Verdict
7.1.9.3	Protective earth terminal marking and identification		
	The protective earth terminal shall be clearly and permanently identified by its marking	-	N/A
	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/A
	Graphical symbol to be used: 60417-2-IEC-5019 ⏚ Protective earth (ground) in accordance with IEC 60417-2	-	N/A
7.1.10	Enclosure for equipment		
7.1.10.1	Design		
	The enclosure, when it is opened: all parts requiring access for installation and maintenance are readily accessible	-	N/A
	Sufficient space shall be provided inside the enclosure	-	N/A
	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	-	N/A
	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	-	N/A
	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/A
	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	-	N/A
	If the enclosure is used for mounting push-buttons, it shall not be possible to remove the buttons from the outside of the enclosure	-	N/A
7.1.10.2	Insulation		
	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	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
7.1.11	Degree of protection of enclosed equipment		
	Degree of protection.	IP20	
	Test for first characteristic.	IPXX	
	Test for first numeral .....:	1 2 3 4 5 6	N/A
	Test for second characteristic	IPXX	
	Test for second numeral .....:	1 2 3 4 5 6 7 8	N/A
7.1.12 part 1	Conduit pull-out, torque and bending with metallic conduits		
	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/A
7.2	Performance requirements		
7.2.1	Operating condition		
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	Compliance	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	-	N/A
	Such a circuit-breaker should not be used in circuits having a prospective peak making current exceeding 10 kA	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	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	-	N/A
7.2.1.1.2	Independent manual closing		
	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	Compliance	P
7.2.1.1.3	Dependent power closing		
	At 110% of the rated control supply voltage, the closing operation performed on no-load shall not cause any damage to the circuit-breaker.	-	N/A
	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.	-	N/A
7.2.1.1.4	Independent power closing		
	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	-	N/A
	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/A
7.2.1.1.5	Stored energy closing		
	Capable ensuring closing of the circuit-breaker in any condition between no-load and its rated making capacity	-	N/A
	- when the stored energy is retained within the circuit-breaker, a device is provided witch indicates when the storing mechanism is fully charged.	-	N/A
	- 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/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- 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/A
	- by manually operated circuit-breaker is the direction of operation indicated. (not for circuit-breaker with an independent manual closing operation.)	-	N/A
	- 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/A
7.2.1.2	Opening		
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		
7.2.1.2.2	Opening by undervoltage releases		
7.2.1.3. a part 1	Operating voltage		
	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	-	N/A
	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	-	N/A
	Unless otherwise stated in the relevant product standard, the upper limit of the supply voltage shall be 110% of its rated value	-	N/A
7.2.1.3. b part 1	Operating time		
	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	-	N/A
7.2.1.2.3	Opening by shunt releases	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
7.2.1.4 part 1	Limits of operation of shunt releases		
	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/A
7.2.1.5 part 1	Limits of operation of current operated relays and released		
	Limits of operation of current operated relays and releases shall be stated in the relevant product standard	-	N/A
7.2.1.2.4	Opening by over-current releases		
a)	Opening under short-circuit conditions		
	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	Compliance	P
	Where necessary for over-current co-ordination the manufacturer shall provide information (usually curves) showing	-	N/A
	- maximum cut-off (let-through) peak current as a function of prospective current (r.m.s. symmetrical)	Compliance	P
	- I^2t characteristics for circuit-breakers of utilization category A and, if applicable, B for circuit-breakers with instantaneous override (see not to 8.3.5)	Compliance	P
b)	Opening under overload conditions		
1)	Instantaneous or definite time-delay operation	-	N/A
	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/A
2)	Inverse timer-delay operation		
	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	Compliance	P
	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	Compliance	P

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Clause	Requirement – Test	Result – Remark	Verdict
	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	Compliance	P
	The width of the temperature band shall be at least 10 K on either side of the reference temperature	Compliance	P
7.2.4.2	Operational performance capability		
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	Compliance	P
	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	Compliance	P

8	TESTS		
8.2.4	Mechanical properties of terminals		
	Mechanical strength of terminals		
	maximum cross-sectional area of conductor (mm^2) :	-	
	diameter of thread (mm) :	8	
	torque (Nm) :	6	
	5 times on 2 separate clamping units Nm	6, 6	P
	Testing for damage to and accidental loosening of conductor (flexion test)		
	conductor of the smallest cross-sectional area (mm^2) :	-	
	number of conductor 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	-	N/A
	Pull-out test		
	force (N) :	-	

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Clause	Requirement – Test	Result – Remark	Verdict
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A
	conductor of the largest cross-sectional area (mm^2) :	-	
	number of conductor 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	-	N/A
	Pull-out test		
	force (N) :	-	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A
	conductor of the largest and smallest cross-sectional area (mm^2) :	-	
	number of conductor of the smallest cross section, number of conductor 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	-	N/A
	Pull-out test		
	force (N) :	-	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A

8.3.3	TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS		
8.3.3.1	Tripping limits and characteristic		
8.3.3.1.2	Opening under short-circuit conditions		
	Manufacturer's name or trademark	LS	
	Type designation or serial number	TD160L	
	Sample no:	S1-1	
	Rated operational voltage: Ue (V)	500 V	

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Clause	Requirement – Test	Result – Remark	Verdict
	Rated current: In (A)	160 A	
	Ambient temperature 10-40 °C :	24 °C	P
	Value of the tripping current declared by the manufacturer for a single pole, at witch value they shall operate.	2080 A	P
	Range of adjustable setting current. (A)	-	N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 80% of the rated, or minimum adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:	-	N/A
	Test current: 80% of the maximum adjustable setting current: (A)	1280 A	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	L1-L2: >0,2 s L1-L3: >0,2 s L2-L3: >0,2 s	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/A
	Test current: 120% of the rated, or minimum adjustable setting current: (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:	-	N/A
	Test current: 120% of the maximum adjustable setting current: (A)	1920 A	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	L1-L2: 0,0201 s L1-L3: 0,0201 s L2-L3: 0,0197 s	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/A
	Test current: tripping current declared for single pole operation (A)	2080 A	P
	Operating time: < 20 ms in case of instantaneous release: L1: L2: L3:	L1: 0,0195 s L2: 0,0153 s L3: 0,0221 s	P
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3:	-	N/A
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/A
	Value of the tripping current declared by the manufacturer for a single pole, at witch value they shall operate.	-	N/A
	Range of adjustable setting current. (A)	-	N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 90% of the rated, or minimum adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases:	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 90% of the maximum adjustable setting current: (A)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Operating time: >0,2s in case of instantaneous releases	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases:	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
b)	Inverse time delay releases		
	Manufacturer's name or trademark	LS	
	Type designation or serial number	TD160L	
	Sample no:	S1-1	
	Rated operational voltage: Ue (V)	500 V	
	Rated current: In (A)	160 A	
	For releases dependent of ambient air temperature: Reference temperature	40 °C	P
	Test ambient temperature (°C)	25 °C	P
	If test made at a difference ambient temperature: Acc. manufacturer's correction temperature/current data:	See Remarks	P
	Range of adjustable setting current: (A)	0,8/ 0,9/ 1,0 x In	N/A
	For releases independent of ambient temperature: Test made at 30°C and/or at 20/40°C	-	N/A
	Test ambient air temperature:	-	N/A
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40 °C	P
	Releases, independent of ambient air temperature: at 30°C	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	144,5 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	2h	P
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	178,9 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	1324 s	P
	Test current: 105% of the maximum adjustable setting current: (A)	180,6 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	2 h	P
	Test current: 130% of the maximum adjustable setting current: (A)	223,6 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	259 s	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:	-	N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	-	N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	-	N/A
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A
	Test current: 105% of the maximum adjustable setting current: (A)	-	N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	-	N/A
	Test current: 130% of the maximum adjustable setting current: (A)	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A
	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		
	Releases, dependent of ambient air temperature: Reference temperature (°C)	25 °C	P
	Releases, independent of ambient air temperature: at 30°C	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	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)	412,8 A (0,8 In) 516,0 A (1,0 In)	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolorances)	107 s (0,8 In) 75 s (1,0 In)	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:	-	N/A
	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/A
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolorances)	-	N/A
8.3.3.1.4	Additional test for definite time-delay releases		
a)	Time delay		
	Test is made at a current equal to 1,5 times the current setting		
	overload releases: (all phase poles loaded)	-	N/A
	short-circuit releases: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.	-	N/A
	Test current: 1,5 times of the rated, or minimum adjustable setting current: (A)	-	N/A
	Operating time, overload releases: (s)	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Operating time, short-circuit releases: (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Test current: 1,5 times of the maximum adjustable setting current: (A)	-	N/A
	Operating time, overload releases: (s)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Operating time, short-circuit releases: (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
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.		
	overload releases: (all phase poles loaded)	-	N/A
	short-circuit releases: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.	-	N/A
	Test current: 1,5 times of the rated, or minimum adjustable setting current: (A)	-	N/A
	Time interval: non-tripping duration stated by the manufacturer: (s)	-	N/A
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:	-	N/A
	Test current: 1,5 times of maximum adjustable setting current: (A)	-	N/A
	Time interval: non-tripping duration stated by the manufacturer: (s)	-	N/A
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:	-	N/A
	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.		
	Test current: of the rated, or minimum adjustable setting current: (A)	-	N/A
	Time interval: twice the delay-time stated by the manufacturer: (s)	-	N/A
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:	-	N/A
	Test current: maximum adjustable setting current: (A)	-	N/A
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:	-	N/A
8.3.3.2	Test of dielectric properties, impulse withstand voltage (Uimp indicated):		
8.3.3.4 part1	The 1,2/50µs impulse voltage shall be applied five times for each polarity at intervals of 1s minimum		
	- rated impulse withstand voltage (kV) :	8 kV	P
	- sea level of the laboratory:	200 m	P
	- test Uimp main circuits (kV) :	9,6 kV	P
	- test Uimp auxiliary circuits (kV) :	-	N/A
	- test Uimp control circuits (kV) :	-	N/A
	- test Uimp on open main contacts (equipment suitable for isolating) (kV) :	12,1 kV	P
a)	Application of test voltage		
	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.	Compliance	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.	compliance	P
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit	Compliance	P
	- other circuits	-	N/A
	- exposed conductive parts	-	N/A
	- enclosure of mounting plate	-	N/A
	iv) equipment suitable for isolation	Compliance	P
	equipment not suitable for isolation	-	N/A
	- no unintentional disruptive discharge during the test's	Compliance	P

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Clause	Requirement – Test	Result – Remark	Verdict
	Test of dielectric properties, dielectric withstand voltage (Uimp not indicated):		
	- rated insulation voltage (V) :	-	N/A
	- main circuits, test voltage for 1 min (V)	-	N/A
	- auxiliary circuits, test voltage for 1 min (V)	-	N/A
	- control circuits, test voltage for 1 min (V)	-	N/A
8.3.3.2.2	Application of test voltage		
1)	with circuit-breaker in the closed position		
	- between all live parts of all poles connected together and the frame of the circuit-breaker .	-	N/A
	- between each pole and all the other poles connected to the frame of the circuit-breaker	-	N/A
2)	with the circuit-breaker in the open position and, additionally, in the tripped position, if any.	-	N/A
	- between all live parts of all poles connected together and the frame of the circuit-breaker.	-	N/A
	- between the terminals of one side connected together and the terminals of the other side connected together.	-	N/A
b)	Control and auxiliary circuits		
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/A
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/A
	No unintentional disruptive discharge during the test's	-	N/A
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/A
8.3.3.3	Mechanical operation and operational performance capability		
8.3.3.3.2	Construction and mechanical operation		
a)	Construction		
	A withdrawable circuit-breaker shall be checked for the requirements stated in 7.1.1	-	N/A
	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	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
b)	Mechanical operation		
	A circuit-breaker with dependent power operation shall comply with the requirements stated in 7.2.1.1.3	-	N/A
	A circuit-breaker with dependent power operation shall operate with the operating mechanism charged to the minimum and maximum limits stated by the manufacturer	-	N/A
	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.	-	N/A
	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	-	N/A
	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/A
	If the closing and opening times of a circuit-breaker are stated by the manufacturer, such times shall comply with the stated values	-	N/A
c)	Undervoltage releases		
	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/A
i)	Drop out voltage		
	It shall be verified that the release operates to open the circuit-breaker between the voltage limits specified	-	N/A
	The voltage shall be reduced from rated voltage at a rate to reach 0 V in approximately 30 s	-	N/A
	The test for the lower limit is made without current in the main circuit and without previous heating of the release coil	-	N/A
	In the case of a release with a range of rated voltages, this test applies to the maximum voltage of the range	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	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/A
	This test may be combined with the temperature-rise test of 8.3.3.6	-	N/A
	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	-	N/A
ii)	Test for limits of operation		
	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/A
	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/A
iii)	Performance under overvoltage conditions		
	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/A
d)	Shunt releases		
	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	-	N/A
	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	-	N/A
	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	-	N/A
8.3.3.3.3	Operational performance capability without current.		
	Type designation or serial number	TD160L	
	Sample no:	S1-1	
	Rated current In (A)	160 A	
	Rated operational voltage: Ue (V)	500 V	

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Clause	Requirement – Test	Result – Remark	Verdict
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt releases: Uc (V)	-	
	Rated control supply voltage undervoltage releases: Uc (V)	-	
	Ambient temperature 10-40 °C :	25 °C	P
	Number of operating cycles per hour	120 cycles per hour	P
	Number of cycles without current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Number of cycles without current (without releases)	7000 cycles	P
	Applied voltage: closing mechanism (V)	-	N/A
	10% of total cycles for circuit-breaker with fitted shunt release: (50% at the beginning- and 50% at the end of the test.) Energized at the rated Uc	-	N/A
	Applied voltage: shunt releases (V)	-	N/A
	10% of total cycles for circuit-breaker with undervoltage releases: (50% at the beginning- and 50% at the end of the test.) Energized at the minimum rated Uc	-	N/A
	10 cycles without applied voltage at the undervoltage releases. (Shall not possible to close the circuit-breaker.)	-	N/A
	Applied voltage: undervoltage releases (V)	-	N/A
	Electrical components do not exceed the value indicated in tab. 7.	Compliance	P
8.3.3.3.4	Operational performance capability with current.		
	Rated current: In (A)	160 A	
	Maximum rated operational voltage: Ue (V)	500 V	
	Conductor cross-sectional area (mm²) :	70 mm² (2/0 AWG)	P
	Number of operating cycles per hour	120 cycles per hour	P
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	1000 cycles	P
	Applied voltage: closing mechanism (V)	500 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.	-	N/A
	Conditions, make/break operations:		

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Clause	Requirement – Test	Result – Remark	Verdict
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	L1 : 513,0 V L1 : 514,6 V L2 : 515,6 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	L1 : 162,2 A L1 : 161,2 A L2 : 163,4 A	P
	- power factor/time constant:	0,69	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1000 ms	P
	- off-time (s):	29 s	P
	Electrical components do not exceed the value indicated in tab. 7.	Compliance	P
8.3.3.3.5	Additional test of operational performance capability without current for withdrawable circuit-breaker.		
	Number of operations cycles : 100	-	N/A
	After test, the isolating contacts, withdrawable mechanism and interlocks shall be suitable for further service.	-	N/A
8.3.3.4	Overload performance		
	this test applies to circuit-breaker of rated current up to and including 630 A		
	Type designation or serial number	TD160L	
	Sample no:	S1-1	
	Rated current In (A)	160 A	
	Rated operational voltage: Ue (V)	500 V	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt releases: Uc (V)	-	
	Rated control supply voltage undervoltage releases: Uc (V)	-	
	Ambient temperature 10-40 °C :	25 °C	P
	Number of operating cycles per hour	120 cycles per hour	P
	Maximum rated operational voltage: Ue (V)	500 V	P
	Number of operating cycles per hour	-	N/A
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Applied voltage: closing mechanism (V)	-	N/AP

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Clause	Requirement – Test	Result – Remark	Verdict
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload/short-circuit settings at maximum.	-	N/A
	Conditions, overload operations:		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1 : 568,1 V L1 : 571,4 V L2 : 568,1 V	P
	- test current AC/DC: I/Ie = 6,0/2.5 (A) ..... L1: ..... L2: L3:	L1 : 956 A L1 : 967 A L2 : 960 A	P
	- power factor/time constant:	0,46	P
	- Number of cycles manually opened: 9	12	P
	- Number of cycles automatically opened by an overload release: 3	3 (at the lower voltage)	P
	- frequency: (Hz)	60 Hz	P
	- on-time max 2s:	1 s	P
8.3.3.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1.1 Ue)	< 5uA / 550 V	P
8.3.3.6	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	See table	P
	Temperature rise of main circuit terminals ≤ 80 K (K) :	47,2 K	P
	conductor cross-sectional area (mm²) :	70 mm^2 (2/0 AWG)	P
	test current Ie (A) :	160 A	P
8.3.3.7	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	251,7 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	207 s	P
8.3.3.8	Verification of undervoltage and shunt releases		
	Circuit-breaker fitted with undervoltage releases. The release shall not operate at 70% of the minimum control supply voltage -	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	and shall operate at 35% of the maximum control supply voltage.	-	N/A
	Circuit-breaker fitted with shunt releases. The release shall operate at 70% of the minimum rated control supply voltage. Test made at room temperature.	-	N/A
8.3.3.9	Verification of the main contact position for circuit-breakers for isolation		
	actuating force for opening (N) .....:	58,8 N	—
	test force with blocked main contacts for 10 s (N) .:	176,4 N	—
	Dependent power operation		
	Supply voltage of 110% of rated voltage (V).....:	--	N/A
	Three attempts of 5 s to operate the equipment at intervals of 5 min.	--	N/A
	Independent power operation		
	Three attempts to operate the equipment by the stored energy.	-	N/A
	Lockability of driving mechanism in OFF-position at test force and blocked main contacts .....:	-	N/A
	Position indicator does not show OFF-position after capture of test force at blocked main contacts	Compliance	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/A
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	-	N/A
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm^2) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	-	N/A
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V)..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	-	N/A
	power factor/time constant :	-	N/A
	- Factor "n"	-	N/A
	- peak test current (A) :	-	N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^{2}dt (A^{2}s) ..... L1: ..... L2: L3:	-	N/A
	Pause, t: (min)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Pause, t: (min)	-	N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Melting of the fusible element	-	N/A
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	-	N/A
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	-	
	Maximum rated operational voltage: Ue (V)	-	
	Conductor cross-sectional area (mm^2) :	-	
	Number of operating cycles per hour	-	N/A
	Number (5% of the number given in columm 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	-	N/A
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	-	N/A
	- power factor/time constant:	-	N/A
	- frequency: (Hz)	-	N/A
	- on-time (ms):	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- off-time (s):	-	N/A
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	-	N/A
	- no breakdown or flashover	-	N/A
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1.1 Ue)	-	N/A
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm²) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.4.5	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A

8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
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	TD160L	
	Sample no:	S2-1	
	Rated current: In (A)	160 A	
	Rated operational voltage: Ue (V)	240 V	
	Rated service short-circuit breaking capacity: (kA)	200 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.	Compliance	P

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Clause	Requirement – Test	Result – Remark	Verdict
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	130(W) x 210(H) x 86(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,55	P
	- size of hole: <30mm^2	28 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm²) :	70 mm^2 (2/0 AWG)	P
	If terminals unmarked: line connected at: (underside/upside)	upside	P
	Tightening torques: (Nm)	6,0 Nm	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.		
	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.		
	Time specified by the manufacturer:	60~600 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 342 s L2 : 234 s L3 : 260 s	P
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1 : 258,4 V L2 : 258,4 V L3 : 258,4 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	L1 : 205200 A L2 : 203800 A L3 : 207600 A	P
	power factor/time constant :	0,18	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- Factor "n"	2,2	P
	- peak test current (A) :	457800 A	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 1,9 kApeak L2 : 21,4 kA peak L3 : 21,4 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 30,9 kA^2s L2 : 208,5 kA^2s L3 : 208,5 kA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : not recorded L2 : not recorded L3 : not recorded	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : not recorded L2 : not recorded L3 : not recorded	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 17,8 kApeak L2 : 17,8 kA peak L3 : 17,3 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 162,3 kA^2s L2 : 162,3 kA^2s L3 : 149,1 kA^2s	P
	Melting of the fusible element	No	P
	Holes in the PE-sheet for test sequence "O"	No	P
	Cracks observed	No	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	160 A	
	Maximum rated operational voltage: Ue (V)	240 V	
	Conductor cross-sectional area (mm^2) :	70 mm^2 (2/0 AWG)	
	Number of operating cycles per hour	120 cycles per hour	P
	Number (5% of the number given in columm 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	50 cycles	P
	Applied voltage: closing mechanism (V)	240 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.	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	L1 : 249,9 V L2 : 247,7 V L3 : 251,6 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	L1 : 162 A L2 : 160 A L3 : 161 A	P
	- power factor/time constant:	0,72	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1000 ms	P
	- off-time (s):	29 s	P
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	< 5 uA / 264 V	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	See Remarks	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	54,6 K	P
	conductor cross-sectional area (mm²) :	70 mm² (2/0 AWG)	P
	test current Ie (A) :	160 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	249,4 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	124 s	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	60~600 s	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 139 s L2 : 120 s L3 : 111 s	P
8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
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	TD160L	
	Sample no:	S2-2	
	Rated current: In (A)	16 A	
	Rated operational voltage: Ue (V)	240 V	
	Rated service short-circuit breaking capacity: (kA)	200 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.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	130(W) x 210(H) x 86(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,55	P
	- size of hole: <30mm^2	28 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm^2) :	2,5 mm^2 (12 AWG)	P

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Clause	Requirement – Test	Result – Remark	Verdict
	If terminals unmarked: line connected at: (underside/upside)	upside	P
	Tightening torques: (Nm)	6,0 Nm	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.		
	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.		
	Time specified by the manufacturer:	60~600 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 294 s L2 : 233 s L3 : 249 s	P
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1 : 258,4 V L2 : 258,4 V L3 : 258,4 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	 L1 : 205200 A L2 : 203800 A L3 : 207600 A	P
	power factor/time constant :	0,18	P
	- Factor "n"	2,2	P
	- peak test current (A) :	457800 A	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 7,8 kApeak L2 : 10,5 kA peak L3 : 7,8 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 77,5 kA^2s L2 : 64,8 kA^2s L3 : 77,6 kA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 8,0 kApeak L2 : 7,9 kA peak L3 : 4,9 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 127,0 kA^2s L2 : 64,5 kA^2s L3 : 58,7 kA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 8,3 kApeak L2 : 8,5 kA peak L3 : 8,6 kApeak	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 69,9 kA^2s L2 : 74,2 kA^2s L3 : 76,5 kA^2s	P
	Melting of the fusible element	No	P
	Holes in the PE-sheet for test sequence "O"	No	P
	Cracks observed	No	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	-	
	Maximum rated operational voltage: Ue (V)	-	
	Conductor cross-sectional area (mm^2) :	-	
	Number of operating cycles per hour	-	N/A
	Number (5% of the number given in columm 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	-	N/A
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	-	N/A
	- power factor/time constant:	-	N/A
	- frequency: (Hz)	-	N/A
	- on-time (ms):	-	N/A
	- off-time (s):	-	N/A
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	10 uA / 264 V	P

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Clause	Requirement – Test	Result – Remark	Verdict
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm²) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	24,9 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	2472 s	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	60~600 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 118 s L2 : 104 s L3 : 109 s	P
8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
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	TD160L	
	Sample no:	S2-3	
	Rated current: In (A)	160 A	
	Rated operational voltage: Ue (V)	415 V	
	Rated service short-circuit breaking capacity: (kA)	150 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.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	130(W) x 210(H) x 86(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,55	P
	- size of hole: <30mm^2	28 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm²) :	70 mm^2 (2/0 AWG)	P
	If terminals unmarked: line connected at: (underside/upside)	upside	P
	Tightening torques: (Nm)	6,0 Nm	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.		
	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.		
	Time specified by the manufacturer:	60~600 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 264 s L2 : 240 s L3 : 246 s	P
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1 : not recorded L2 : not recorded L3 : not recorded	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	 L1 : 151800 A L2 : 151800 A L3 : 148400 A	P
	power factor/time constant :	0,19	P
	- Factor "n"	2,2	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- peak test current (A) :	333400 A	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 12,0 kApeak L2 : 26,7 kA peak L3 : 17,8 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 80,8 kA^2s L2 : 412,2 kA^2s L3 : 176,6 kA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 24,0 kApeak L2 : 0,3 kA peak L3 : 23,0 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 348,1 kA^2s L2 : 2,2 kA^2s L3 : 304,6 kA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 23,2 kApeak L2 : 0,2 kA peak L3 : 22,0 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 323,4 kA^2s L2 : 2,0 kA^2s L3 : 283,8 kA^2s	P
	Melting of the fusible element	No	P
	Holes in the PE-sheet for test sequence "O"	No	P
	Cracks observed	No	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	160 A	
	Maximum rated operational voltage: Ue (V)	415 V	
	Conductor cross-sectional area (mm^2) :	70 mm^2 (2/0 AWG)	
	Number of operating cycles per hour	120 cycles per hour	P
	Number (5% of the number given in columm 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	50 cycles	P
	Applied voltage: closing mechanism (V)	415 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.	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	L1 : 426,0 V L2 : 429,4 V L3 : 436,9 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	L1 : 162 A L2 : 160 A L3 : 160 A	P
	- power factor/time constant:	0,72	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1000 ms	P
	- off-time (s):	29 s	P
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	30 uA / 457 V	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	See Remarks	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	48,0 K	P
	conductor cross-sectional area (mm²) :	70 mm² (2/0 AWG)	P
	test current Ie (A) :	160 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	249,4 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	187 s	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	60~600 s	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 136 s L2 : 129 s L3 : 104 s	P
8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
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	TD160L	
	Sample no:	S2-4-1	
	Rated current: In (A)	160 A	
	Rated operational voltage: Ue (V)	500 V	
	Rated service short-circuit breaking capacity: (kA)	65 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.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	130(W) x 210(H) x 86(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,55	P
	- size of hole: <30mm^2	28 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm^2) :	70 mm^2 (2/0 AWG)	P

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Clause	Requirement – Test	Result – Remark	Verdict
	If terminals unmarked: line connected at: (underside/upside)	underside	P
	Tightening torques: (Nm)	6,0 Nm	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.		
	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.		
	Time specified by the manufacturer:	60~600 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 231 s L2 : 206 s L3 : 159 s	P
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1 : not recorded L2 : not recorded L3 : not recorded	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	 L1 : 65600 A L2 : 65300 A L3 : 66200 A	P
	power factor/time constant :	0,18	P
	- Factor "n"	2,2	P
	- peak test current (A) :	145900 A	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 11,0 kApeak L2 : 21,0 kA peak L3 : 12,7 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 126,1 kA^2s L2 : 421,6 kA^2s L3 : 134,3 kA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 14,9 kApeak L2 : 11,0 kA peak L3 : 19,2 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 177,2 kA^2s L2 : 122,4 kA^2s L3 : 401,8 kA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 15,1 kApeak L2 : 19,3 kA peak L3 : 10,0 kApeak	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 379,9 kA^2s L2 : 357,9 kA^2s L3 : 176,3 kA^2s	P
	Melting of the fusible element	No	P
	Holes in the PE-sheet for test sequence "O"	No	P
	Cracks observed	No	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	160 A	
	Maximum rated operational voltage: Ue (V)	500 V	
	Conductor cross-sectional area (mm^2) :	70 mm^2 (2/0 AWG)	
	Number of operating cycles per hour	120 cycles per hour	P
	Number (5% of the number given in columm 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	50 cycles	P
	Applied voltage: closing mechanism (V)	500 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.	-	N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	L1 : 514,9 V L2 : 519,9 V L3 : 519,9 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	L1 : 165 A L2 : 163 A L3 : 163 A	P
	- power factor/time constant:	0,72	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1000 ms	P
	- off-time (s):	29 s	P
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	500 uA / 550 V	P

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Clause	Requirement – Test	Result – Remark	Verdict
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	See Remarks	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	68,1 K	P
	conductor cross-sectional area (mm²) :	70 mm² (2/0 AWG)	P
	test current Ie (A) :	160 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	248,2 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	95 s	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	60~600 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 135 s L2 : 127 s L3 : 118 s	P

8.3.5	TEST SEQUENCE III (Icu)		
	Rated ultimate short-circuit breaking		
	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.		
	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.		
	For integrally fused circuit-breakers, test sequence V applies in place or this sequence.		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current: In (A)	-	
	Rated operational voltage: Ue (V)	-	
	Rated ultimate short-circuit breaking capacity: (kA)	-	
	Rated control supply voltage of closing mechanism: Uc (V)	-	

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Clause	Requirement – Test	Result – Remark	Verdict
	Rated control supply voltage of shunt release: Uc (V)	-	
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	-	N/A
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A
8.3.5.2	Test of rated ultimate short-circuit breaking capacity		
	The test sequence of operations is O – t – CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	N/A
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	-	N/A
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm²) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening, torques: (Nm)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence of operation: O – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	-	N/A
	power factor/time constant :	-	N/A
	- Factor "n"	-	N/A
	- peak test current (Amax) :	-	N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Pause, t: (min)	-	N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Melting of the fusible element	-	N/A
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	-	N/A
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	-	N/A
	- no breakdown or flashover	-	N/A
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	-	N/A
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A

8.3.6	TEST SEQUENCE IV		
	Rated short-time withstand current		
	Except where the combined test sequence applies, this test sequence applies to circuit-breakers of utilization category B and to those circuit-breaker of category A covered by note 3 of table 4, and comprises the following tests:		
	Where integrally fused circuit-breaker are of utilization category B, they shall meet the requirements of this sequence.		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current: In (A)	-	
	Rated operational voltage: Ue (V)	-	
	Rated short-time withstand current: (kA/s)	-	
	Rated frequency: (Hz)	-	
8.3.6.1	Verification of overload releases		
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	-	N/A
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A
8.3.6.2	Test of rated short-time withstand current.		
	For this test, any over-current release, including the instantaneous override, if any, likely to operate during the test, shall be rendered inoperative.		
	- test frequency: (Hz)	-	N/A
	- duration of the test: (s)	-	N/A
	- test frequency: (Hz)	-	N/A
	- power factor / time constant (ms):	-	N/A
	- factor "n"	-	N/A
	- test voltage: (V) ..... L1: ..... L2: L3:	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- r.m.s. test current: (kA) ..... L1: ..... L2: L3:	-	N/A
	- highest peak current: (kA)	-	N/A
8.3.6.3	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm²) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.6.4	Test of short-circuit breaking capacity at the max. short-time withstand current.		
	Rated short-time withstand current: (kA/s)		
	Test sequence: O – t - CO		
	max. available time setting of the short–time delay short-circuit release. (s)	-	N/A
	- test frequency: (Hz)	-	N/A
	- power factor / time constant (ms):	-	N/A
	- factor "n"	-	N/A
	Test sequence "O"		
	- test voltage: (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current: (kA) ..... L1: ..... L2: L3:	-	N/A
	- highest peak current: (kA)	-	N/A
	- the circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short–time delay short-circuit release and -	-	N/A
	- the instantaneous override, if any, shall not operate.	-	N/A
	-pause: t (s)	-	N/A
	Test sequence "CO"		
	- test voltage: (V) ..... L1: ..... L2: L3:	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- r.m.s. test current: (kA) ..... L1: ..... L2: L3:	-	N/A
	- highest peak current: (kA)	-	N/A
	- the circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short–time delay short-circuit release and -	-	N/A
	- the instantaneous override, if any, shall not operate.	-	N/A
	- if the circuit-breaker has a making current release, this requirement does not apply to the CO operation, if the prospective current exceeds the pre-determined value, since it will then operate.	-	N/A
8.3.6.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	-	
	- no breakdown or flashover	-	N/A
8.3.6.6	Verification of overload releases	-	N/A
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A

8.3.7	TEST SEQUENCE V		
	Performance of integrally fused circuit-breakers		
	STAGE 1		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current: In (A)	-	
	Rated operational voltage: Ue (V)	-	
	Value of prospective current equal to the selectivity limit current, as declared by the manufacturer. (kA)	-	
	Type of integrated fuses (all details)	-	

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Clause	Requirement – Test	Result – Remark	Verdict
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	
8.3.7.1	Short-circuit at the selectivity limit current		
	Test sequences "O"		
	Fuses shall be fitted	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	-	N/A
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm²) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	-	N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	power factor/time constant :	-	N/A
	- factor "n"	-	N/A
	- peak test current (Amax) :	-	N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	- fuses shall still intact ..... L1: ..... L2: L3:	-	N/A
8.3.7.2	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm^2) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.7.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	-	N/A
	- no breakdown or flashover	-	N/A

	STAGE 2		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current: In (A)	-	
	Rated operational voltage: Ue (V)	-	
	1.1 time the value of prospective current equal to the selectivity limit current, as declared by the manufacturer. (kA)	-	
	Type of integrated fuses (all details)	-	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	
8.3.7.4	Verification of overload releases	-	N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A
8.3.7.5	Short-circuit at 1,1 times the take-over current		
8.3.7.1	Short-circuit at the selectivity limit current		
	Test sequences "O"		
	Fuses shall be fitted	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0.8 mm, 50 mm long	-	N/A
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm²) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	1.1 time the value of prospective current equal to the selectivity limit current, as declared by the manufacturer. (kA)		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	-	N/A
	power factor/time constant :	-	N/A
	- factor "n"	-	N/A
	- peak test current (Amax) :	-	N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	- at least two of the fuses shall have blown ..... L1: ..... L2: L3:	-	N/A
8.3.7.6	Short-circuit at ultimate short-circuit breaking capacity		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current: In (A)	-	
	Rated operational voltage: Ue (V)	-	
	Rated ultimate short-circuit breaking capacity. (kA)	-	
	Type of integrated fuses (all details)	-	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	
	Test sequences: O – t – CO		
	Fuses shall be fitted	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	-	N/A
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm²) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	-	N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	-	N/A
	power factor/time constant :	-	N/A
	- factor "n"	-	N/A
	- peak test current (A) :	-	N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:	-	N/A
	Pause: t (s)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	new fitted fuses	-	N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
8.3.7.7	Verification of dielectric withstand		
	- equal twice time rated operational voltage with a minimum of 1000 V (new fuses fitted)	-	N/A
	- no breakdown or flashover	-	N/A
8.3.7.8	Verification of overload releases		
	The operation of overload releases shall be verified at 2.5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A

8.3.8	Combined test sequence		
	At the discretion of, or in agreement with the manufacturer, this sequence may be applied to circuit-breaker of utilization cat. B:		
	Type designation or serial number	-	N/A
	Sample no:	-	N/A
	Rated current: In (A)	-	N/A
	Rated operational voltage: Ue (V)	-	N/A
	Rated short-time withstand current: (kA/s)	-	N/A
	Rated frequency: (Hz)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
8.3.8.1	Verification of overload releases		
	The operation of overload releases shall be verified twice times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A
8.3.8.2	Test of rated short-time withstand current.		
	For this test, any over-current release, including the instantaneous override, if any, likely to operate during the test, shall be rendered inoperative.		
	- test frequency: (Hz)	-	N/A
	- duration of the test: (s)	-	N/A
	- test frequency: (Hz)	-	N/A
	- power factor / time constant (ms):	-	N/A
	- factor "n"	-	N/A
	- test voltage: (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current: (kA) ..... L1: ..... L2: L3:	-	N/A
	- highest peak current: (kA)	-	N/A
8.3.8.3	Test of rated service short-circuit breaking capacity		
	At the highest voltage applicable to the rated short-time current.		
	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)	-	

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Clause	Requirement – Test	Result – Remark	Verdict
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	-	N/A
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm²) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	-	N/A
	Test sequence of operation: O – t – CO – t – CO		
	The highest voltage applicable to the rated short-time current.	-	N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	-	N/A
	power factor/time constant :	-	N/A
	- Factor "n"	-	N/A
	- peak test current (A) :	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence "O"		
	- max. let-through current: (kApeak ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Pause, t: (min)	-	N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Pause, t: (min)	-	N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	The circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short-time delay short-circuit release.	-	N/A
	During this test the instantaneous override shall not operate	-	N/A
	- and the making current release shall operate	-	
8.3.8.4	Operational performance capability with current.		
	Rated current: In (A)	-	N/A
	Maximum rated operational voltage: Ue (V)	-	N/A
	Conductor cross-sectional area (mm^2) :	-	N/A
	Number of operating cycles per hour	-	N/A
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Conditions, make/break operations:	-	N/A
	- test voltage U/Ue = 1,0 (V)..... L1: ..... L2: L3:	-	N/A
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	-	N/A
	- power factor/time constant:	-	N/A
	- frequency: (Hz)	-	N/A
	- on-time (ms):	-	N/A
	- off-time (s):	-	N/A
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.8.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	-	
	- no breakdown or flashover	-	N/A
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	-	N/A
8.3.8.7	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm²) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.8.7	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
Annex C	Individual pole short-circuit test sequence		
	Circuit-breaker for use on phase-earthed systems		
C.2	Test of individual pole short-circuit breaking capacity		
	A short-circuit test is made with a value of prospective current (Isu) equal to 25% of the ultimate rated short-circuit breaking capacity (Icu)		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current: In (A)	-	
	Rated operational voltage: Ue (V)	-	
	Rated ultimate short-circuit breaking capacity: (kA)	-	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	
	The test sequence of operations is O – t – CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	N/A
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm²) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	-	N/A
	Test sequence of operation: O – t – CO		
	Test circuit according figure: 9	-	N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A
	short-circuit test current (Isu): equal to 25% of the ultimate rated short-circuit breaking capacity (Icu)	-	N/A
	- r.m.s. test current AC/DC: (A):	-	N/A
	power factor/time constant :	-	N/A
	- Factor "n"	-	N/A
	- peak test current (Amax) :	-	N/A
	Test sequence "O" L1		
	- max. let-through current: (kApeak) L1:	-	N/A
	- Joule integral I²dt (A²s) L1:	-	N/A
	Pause, t: (min)	-	N/A
	Test sequence "CO" L1		
	- max. let-through current: (kApeak) L1:	-	N/A
	- Joule integral I²dt (A²s) L1:	-	N/A
	Test sequence "O" L2		
	- max. let-through current: (kApeak) L2:	-	N/A
	- Joule integral I²dt (A²s) L2:	-	N/A
	Pause, t: (min)	-	N/A
	Test sequence "CO" L2		
	- max. let-through current: (kApeak) L2:	-	N/A
	- Joule integral I²dt (A²s) L2:	-	N/A
	Test sequence "O" L3		
	- max. let-through current: (kApeak) L3:	-	N/A
	- Joule integral I²dt (A²s) L3:	-	N/A
	Pause, t: (min)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence "CO" L3		
	- max. let-through current: (kApeak) L3:	-	N/A
	- Joule integral I^2dt (A^2s) L3:	-	N/A
	Melting of the fusible element	-	N/A
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	-	N/A
C.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	-	N/A
	- no breakdown or flashover	-	N/A
C.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2.5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A

Annex H	Individual pole short-circuit test sequence		
	Circuit-breaker for use in IT systems		
H.2	Test of individual pole short-circuit breaking capacity		
	A short-circuit test is made on the individual poles of a multipole circuit-breaker at a value of prospective current (I_{IT}) equal to 1,2 times the max. setting of the short-time delay release tripping current or, in the absence of such a release, 1,2 time the max. setting of the tripping current of the instantaneous release, or, where relevant 1,2 times the max. setting of the definite time delay release tripping current, but not exceeding 50kA.		
	Type designation or serial number	TD160L	
	Sample no:	H-1	
	Rated current: In (A)	160 A	
	Rated operational voltage: Ue (V)	500 V	
	Rated ultimate short-circuit breaking capacity: (kA)	2,3 kA	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	The test sequence of operations is O – t - CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	130(W) × 210(L) × 86(H)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,55	P
	- size of hole: <30mm^2	28 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm²) :	70 mm^2 (2/0 AWG)	P
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	6,0 Nm	P
	Test sequence of operation: O – t – CO	Compliance	P
	Test circuit according figure: 9	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	544,0 V	P
	Short-circuit test current (I_{nf}): equal to 1,2 times the max. setting of the short-time delay release tripping current,	-	N/A
	or, in the absence of such a release, 1,2 time the max. setting of the tripping current of the instantaneous release,	2,3 kA	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	or, where relevant 1,2 times the max. setting of the definite time delay release tripping current, but not exceeding 50kA.	-	N/A
	- r.m.s. test current AC/DC: (A)	2,3 kA	P
	power factor/time constant :	0,86	P
	- Factor "n"	1,48	P
	- peak test current (Amax) :	3,4 kA	P
	Test sequence "O" L1		
	- max. let-through current: (kApeak) L1:	3,3 kApeak	P
	- Joule integral I^2dt (A^2s) L1:	80,9 kA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L1		
	- max. let-through current: (kApeak) L1:	3,1 kApeak	P
	- Joule integral I^2dt (A^2s) L1:	73,8 kA^2s	P
	Test sequence "O" L2		
	- max. let-through current: (kApeak) L2:	3,3 kApeak	P
	- Joule integral I^2dt (A^2s) L2:	78,9 kA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L2		
	- max. let-through current: (kApeak) L2:	3,5 kApeak	P
	- Joule integral I^2dt (A^2s) L2:	65,8 kA^2s	P
	Test sequence "O" L3		
	- max. let-through current: (kApeak) L3:	3,4 kApeak	P
	- Joule integral I^2dt (A^2s) L3:	81,9 kA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L3		
	- max. let-through current: (kApeak) L3:	3,4 kApeak	P
	- Joule integral I^2dt (A^2s) L3:	72,8 kA^2s	P
	Melting of the fusible element	No	P
	Holes in the PE-sheet for test sequence "O"	No	P
	Cracks observed	No	P
H.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	< 5 uA / 550 V	P
H.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2.5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	60 ~ 600 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 104 s L2 : 120 s L3 : 97 s	P
H.5	Marking		
	Circuit-breaker for which all values of rated voltage have not been tested according to this annex or are not covered by such testing, shall be identified by the symbol which shall be market on the circuit-breaker immediately following these values of rated voltage	Compliance	P

IEC 60 947-2				
	TABLE: temperature rise measurements			
temperature rise dT of part:		phase	dT (K)	required dT (K)
1	Terminals of line side	L1	47,2	80
2	Terminals of line side	L2	45,8	80
3	Terminals of line side	L3	46,3	80
4	Terminals of load side	L4	44,1	80
5	Terminals of load side	L5	44,0	80
6	Terminals of load side	L6	42,7	80
7	Parts, which need not to be touched (non-metallic)		44,2	60
8	Parts intended to be touched (non-metallic)		21,3	50
9	Manual operating means (non-metallic)		16,8	35
10	Ambient temperature			23,6 ℃

Sequence Ⅰ : S1-1 [500 V, 160 A]

IEC 60 947-2				
	TABLE: temperature rise measurements			
temperature rise dT of part:		phase	dT (K)	required dT (K)
1	Terminals of line side	L1	54,6	80
2	Terminals of line side	L2	53,2	80
3	Terminals of line side	L3	48,9	80
4	Terminals of load side	L4	45,4	80
5	Terminals of load side	L5	48,9	80
6	Terminals of load side	L6	46,2	80
7	Ambient temperature			25,1 ℃
8				
9				
10				

Sequence Ⅱ : S2-1 [240 V, 160 A]

IEC 60 947-2				
TABLE: temperature rise measurements				
temperature rise dT of part:		phase	dT (K)	required dT (K)
1	Terminals of line side	L1	47,2	80
2	Terminals of line side	L2	48,0	80
3	Terminals of line side	L3	46,5	80
4	Terminals of load side	L4	41,8	80
5	Terminals of load side	L5	43,9	80
6	Terminals of load side	L6	43,2	80
7	Ambient temperature			25,5 ℃
8				
9				
10				

Sequence Ⅱ : S2-3 [415 V, 160 A]

IEC 60 947-2				
TABLE: temperature rise measurements				
temperature rise dT of part:		phase	dT (K)	required dT (K)
1	Terminals of line side	L1	54,6	80
2	Terminals of line side	L2	68,1	80
3	Terminals of line side	L3	51,0	80
4	Terminals of load side	L4	46,3	80
5	Terminals of load side	L5	54,2	80
6	Terminals of load side	L6	45,4	80
7	Ambient temperature			26,3 ℃
8				
9				
10				

Sequence Ⅱ : S2-4-1 [500 V, 160 A]

TABLE: Resistance to head (Ball pressure test)						
no.	Specimen					Verdict
	Description	Colour	Temp. °C	Impress diam. mm	Result	
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

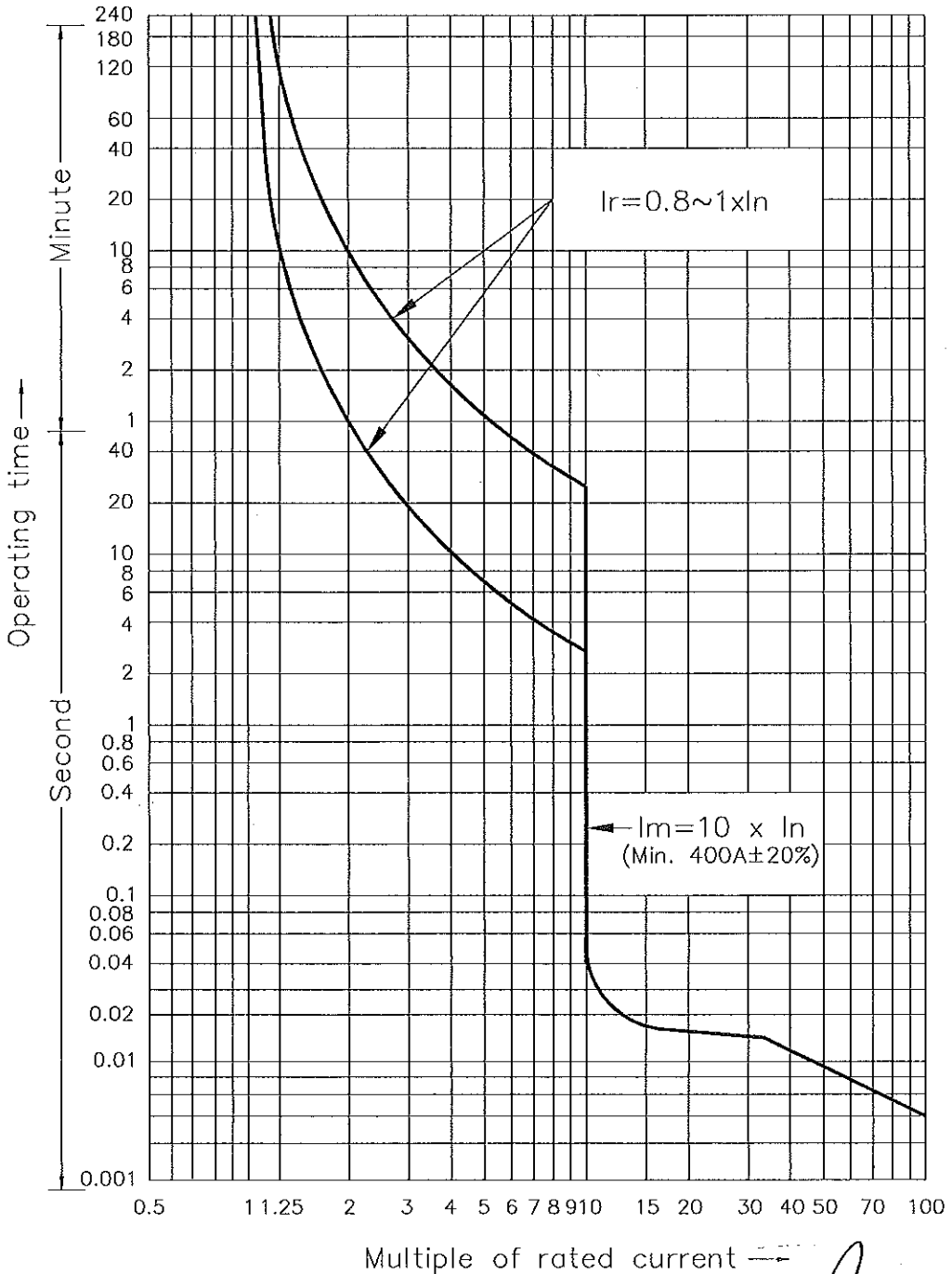
TABLE: Resistance to fire (Glow wire test)								
no.	Specimen							Verdict
	Description	Colour	Thick (mm)	Temp. °C	burning after t (s)	drops	support burning	
1	PA66 2413GW	Grey	3.0	960	< 1 s	No	No	P
2	PC GN 2101F	Grey	3.0	960	8.0 s	No	No	P
3	BMC PREMIX	White	4.0	960	< 1 s	No	No	P
4	PPS RYTON R-7	Grey	3.5	960	6.3 s	No	No	P
5								
6								
7								
8								
9								
10								

TABLE: Resistance to tracking (tracking test)								
no.	Specimen							Verdict
	Description	Colour	Drops (no.)	Impress (mm)	Burning	Current (A)	Result	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

IEC 60 947-2

Remarks

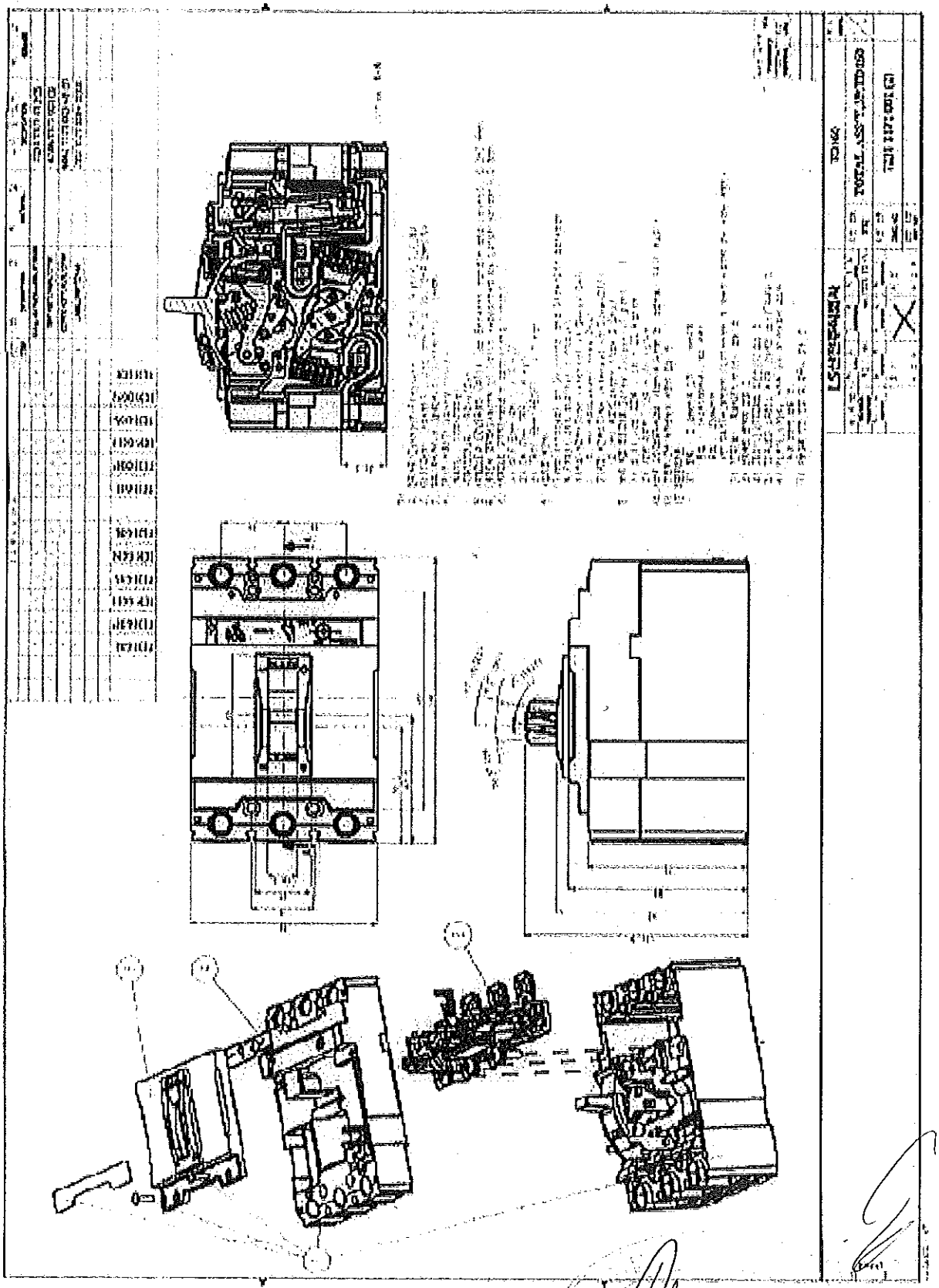
TD160 (16~160A)

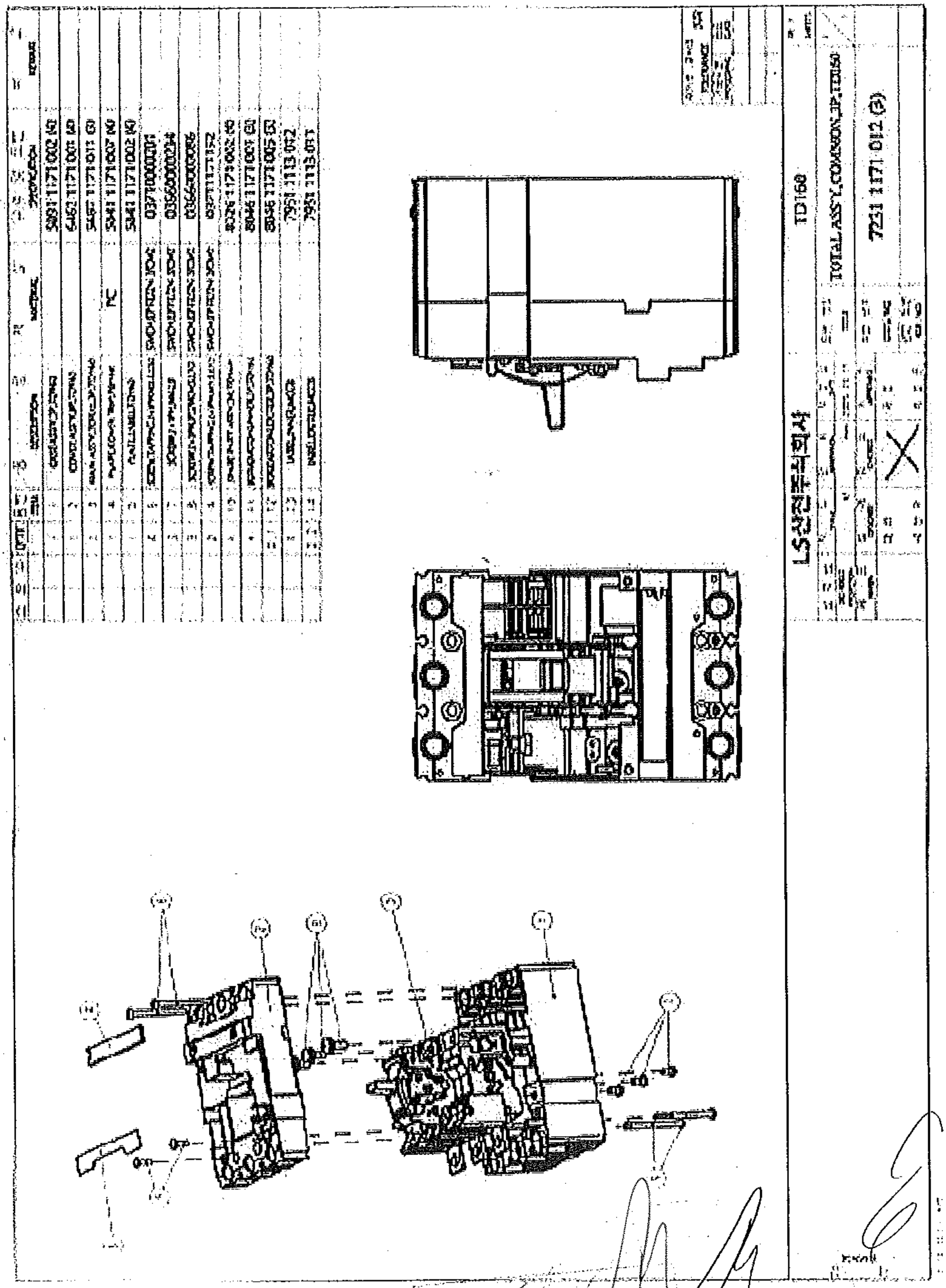


Compensation ratio for ambient temperature

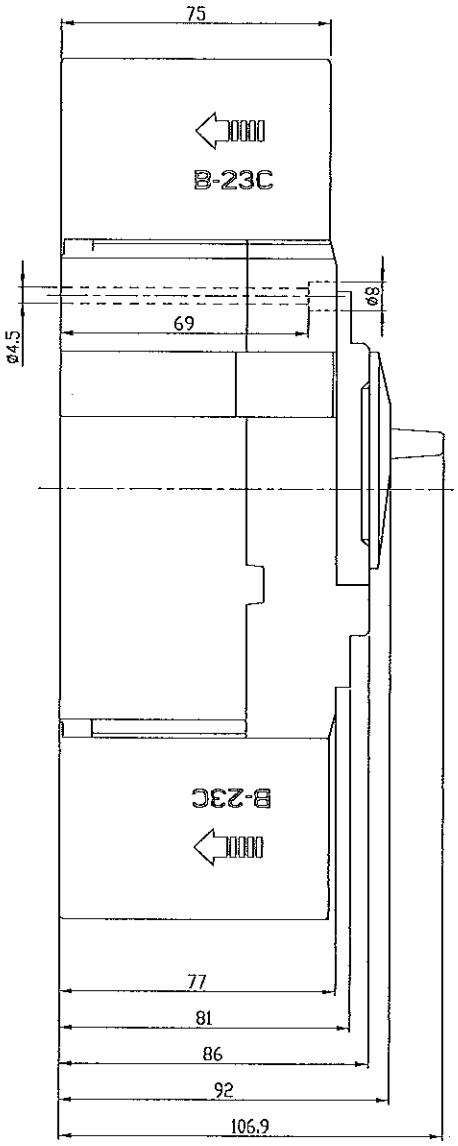
Temperature (℃)	Compensation ratio	Note
10	1.150	
11	1.145	
12	1.140	
13	1.135	
14	1.130	
15	1.125	
16	1.120	
17	1.115	
18	1.110	
19	1.105	
20	1.100	
21	1.095	
22	1.090	
23	1.085	
24	1.080	
25	1.075	
26	1.070	
27	1.065	
28	1.060	
29	1.055	
30	1.050	
31	1.045	
32	1.040	
33	1.035	
34	1.030	
35	1.025	
36	1.020	
37	1.015	
38	1.010	
39	1.005	
40	1.000	

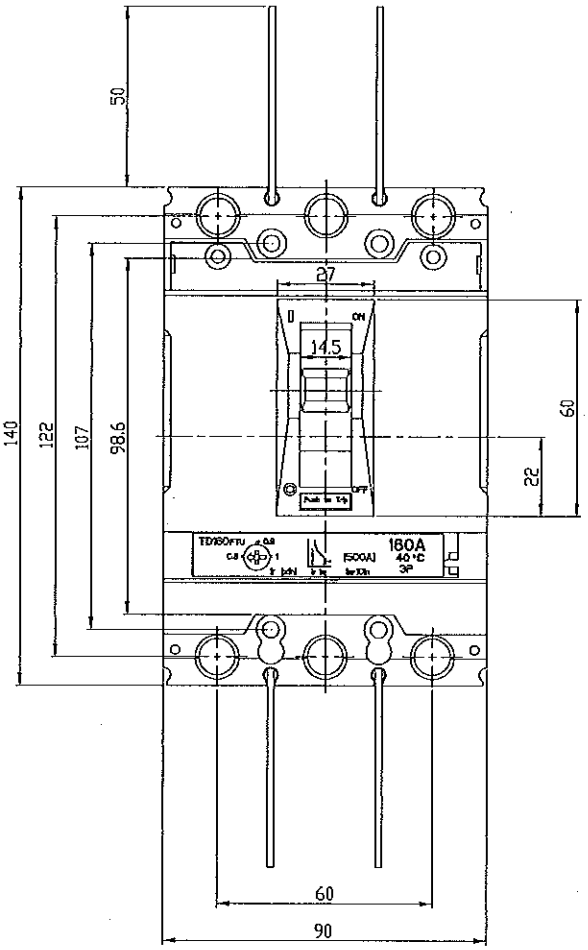
Drawings



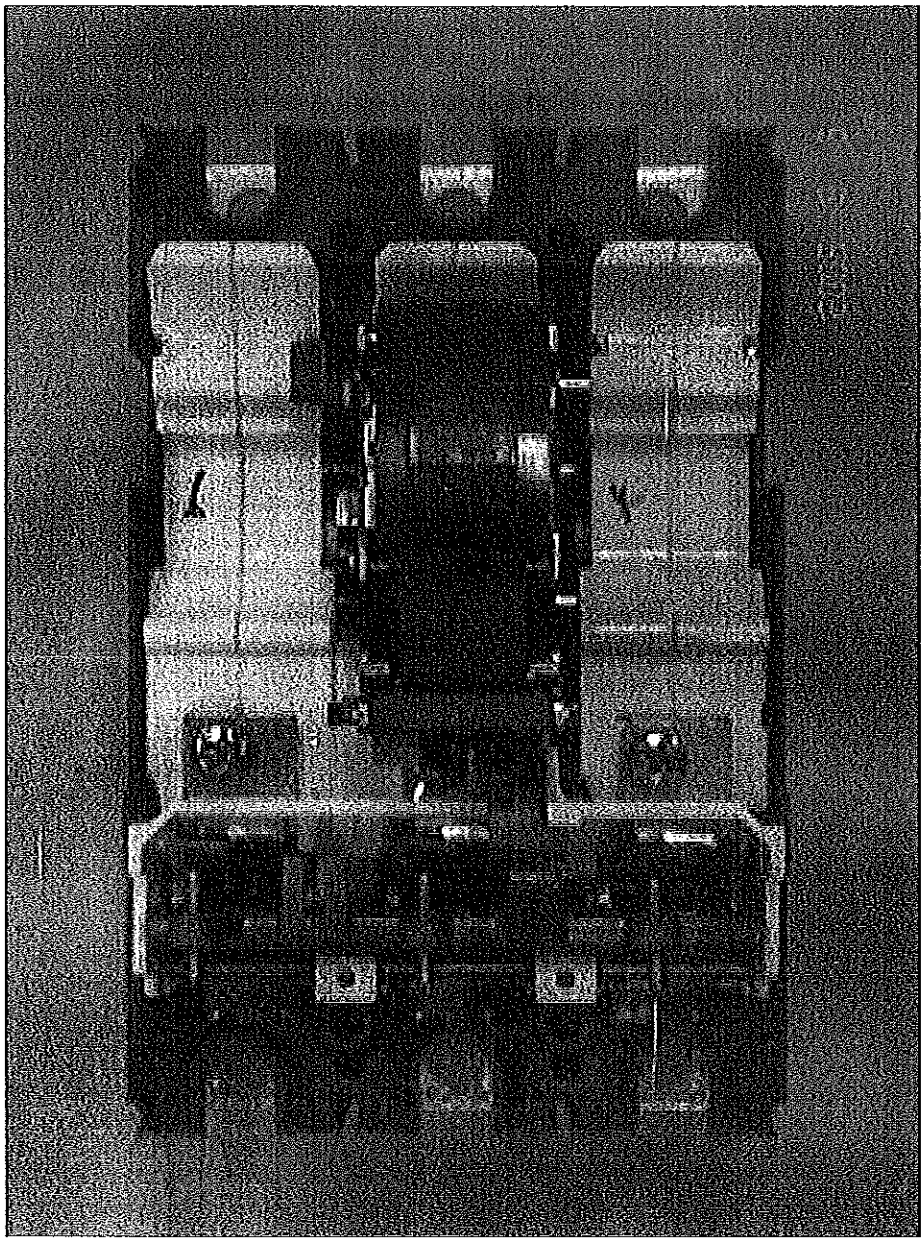

LS산전주식회사
TD160
TOTAL ASS'Y, COMMON, 3P, TD160
7231 1171 012 (3)

Dimensions

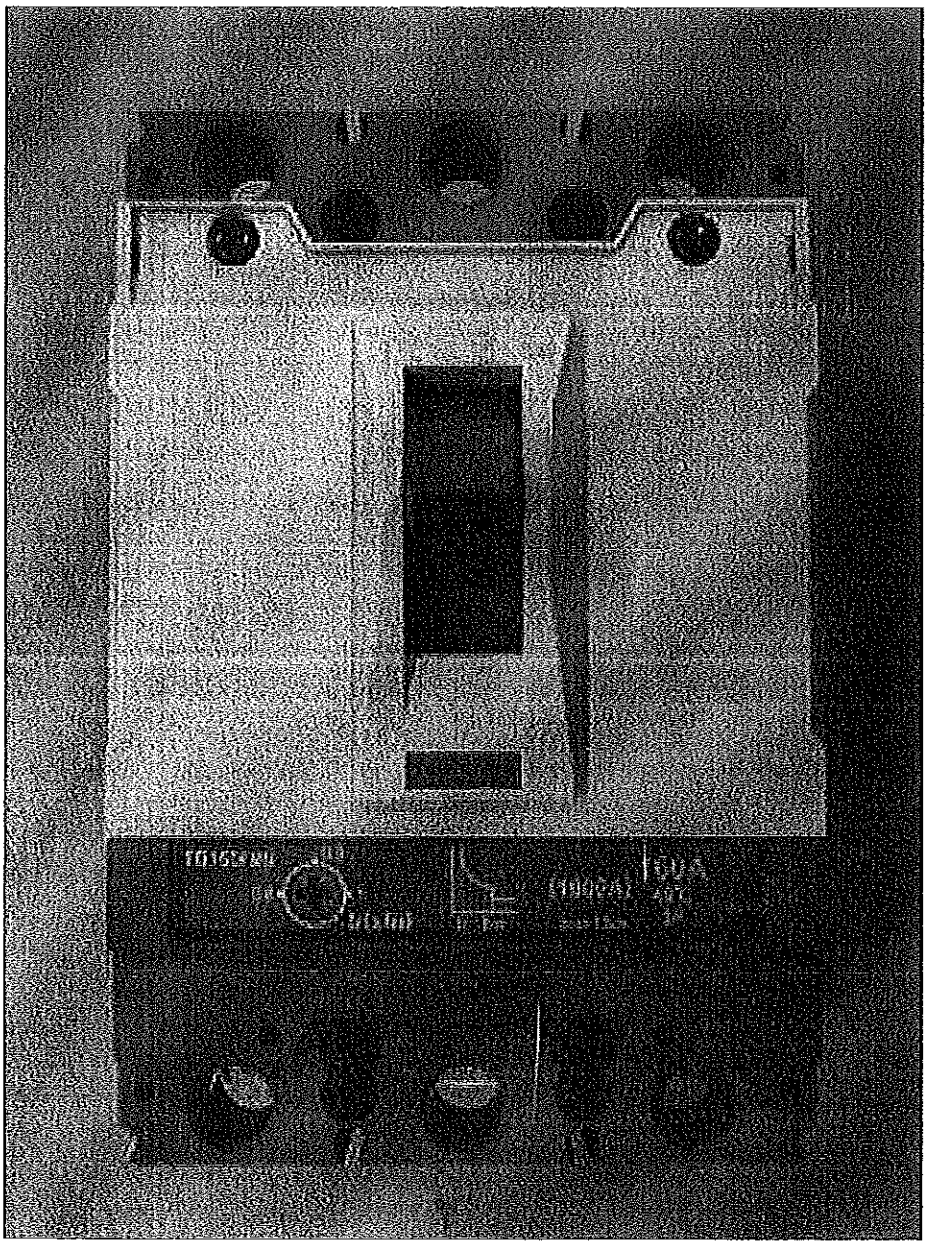

75
B-23C
ø8
ø4.5
69
77
81
86
92
106.9


50
27
14.5
140
122
107
98.6
60
22
180A
60
90

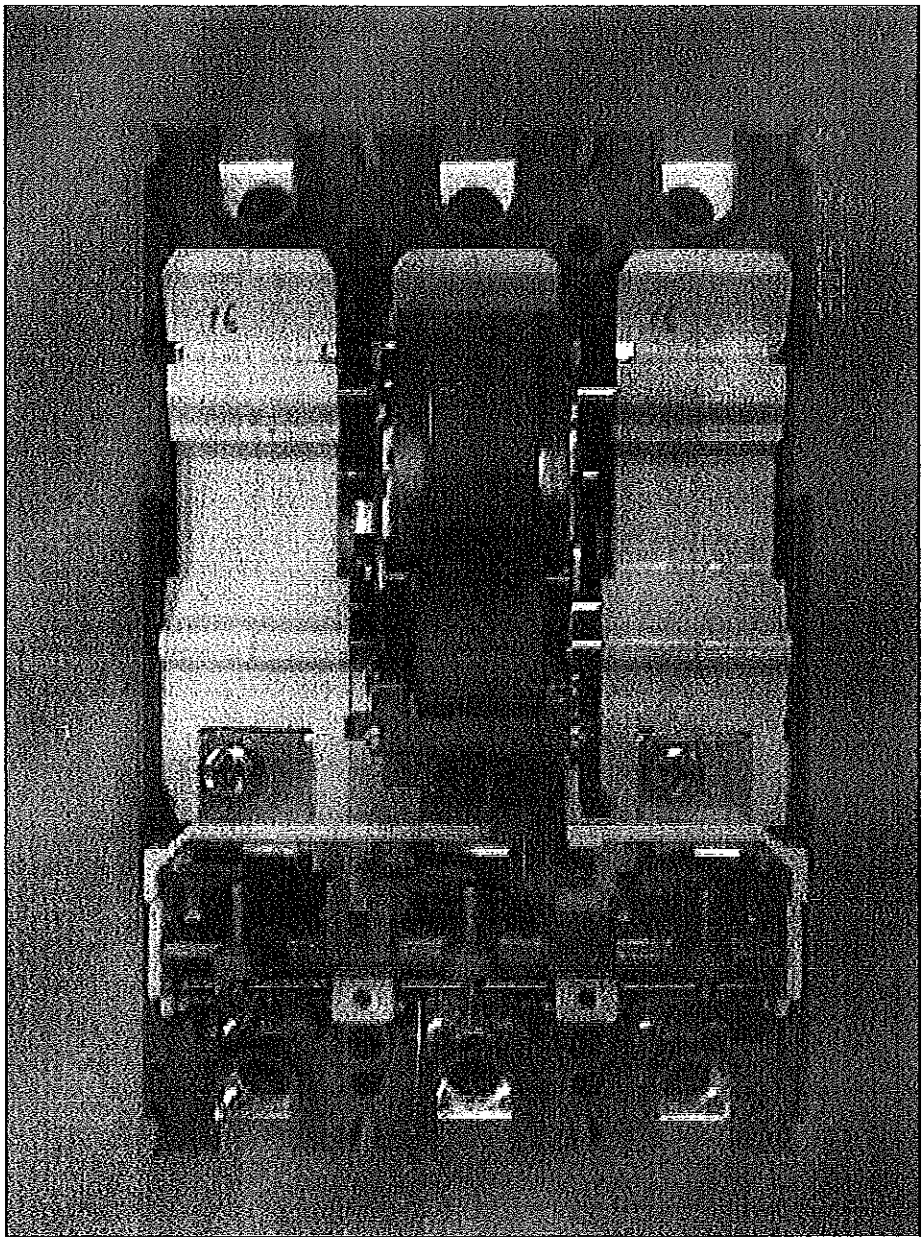
TD160 maximum current inside



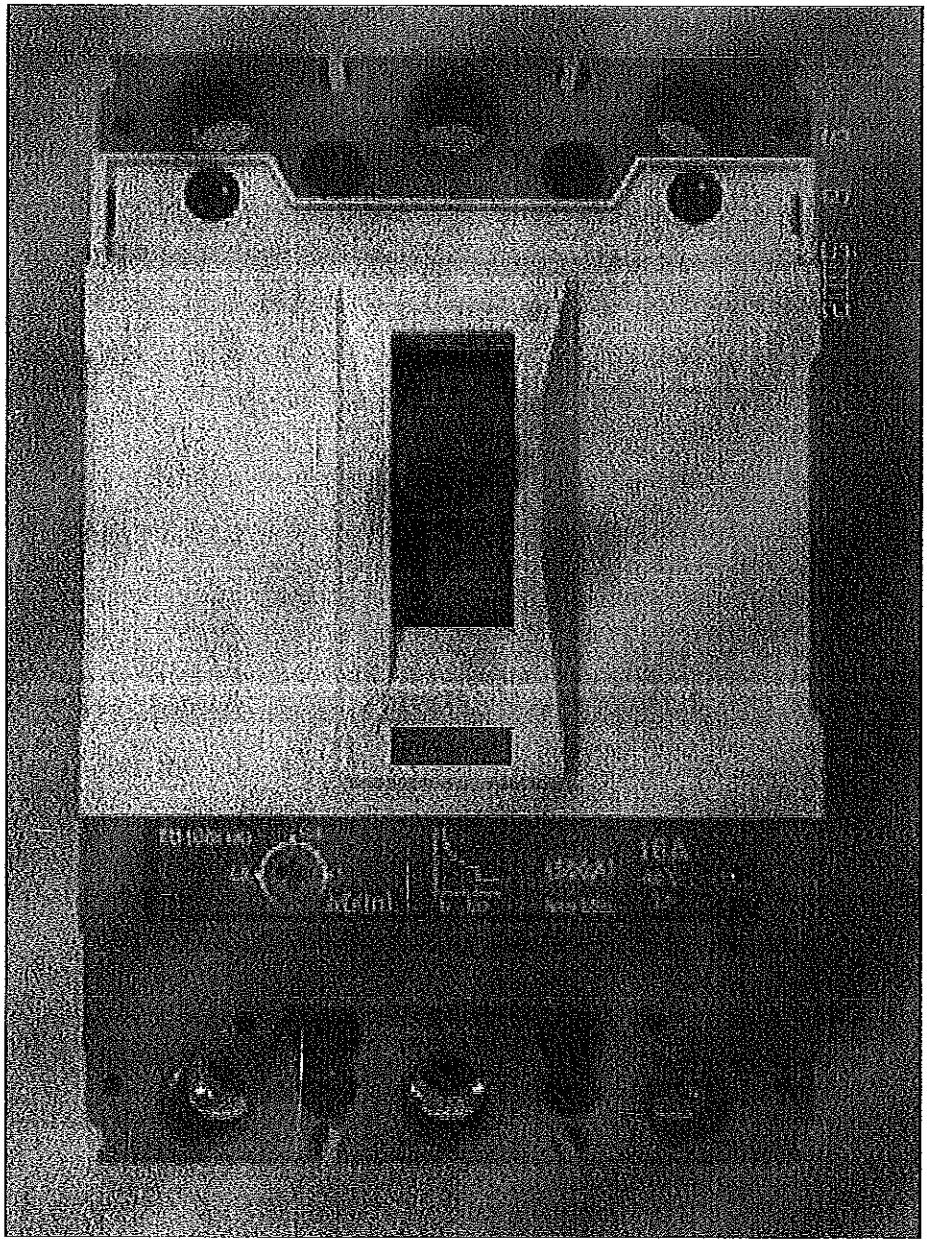
TD160 maximum current outside



TD160 minimum current inside



TD160 minimum current outside



Type Approval Certificate

This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.

Certificate No.	44 991 - 07 HH
Company	LSIS Co., Ltd. 1, Song Jung-dong, Hung Duk-gu Cheong Ju, Choongbuk 361-720, KOREA, REPUBLIC OF
Product Description	Molded Case Circuit Breaker SUSOL
Type	TS100, TS160, TS250 E\ N\ S\ H\ P\ L, ETS
Environmental Category	C
Technical Data / Range of Application	Number of poles : 3 Rated operational current Ie : 40 - 250 A Rated operational voltage Ue : 500 V AC Rated insulation voltage Ui : 750 V AC Rated impulse voltage Uimp : 8 kV Rated frequency fe : 50/60 Hz Utilization category : A

Rated short circuit capacity Performance at :

		E	N	S	H	P	L
500V	Icm	187	220	264	264	330	440 kA
240V	Ics = Icu	85	100	120	120	150	200 kA
415V	Ics = Icu	42	50	65	85	130	150 kA
460V	Ics = Icu	42	50	65	70	100	130 kA
500V	Ics = Icu	25	42	50	65	70	85 kA

Release system : Thermal, Magnetic, Electronic (INST, STD)

Test Standard	Guidelines for the Performance of Type Approvals Part 2, Edition 2003 IEC 60947-2 (2003) incl. Annex F, H
Documents	Test report : KEMA 208602900.51 dated 2006-03-23 KEMA 208602900.54 dated 2006-03-23 KEMA 2087087-QUA/EMC 05-4961 dated 2005-10-27 PT&T R36-0771 (2006-08-14), R36-0774 (2006-07-24)
Remarks	None
Valid until	2017-01-17

Page 1 of 1

File No. I.K.01

Hamburg, 2012-01-18

Type Approval Symbol GL

Germanischer Lloyd

Thomas Hartmann

Harald Amberger

This certificate is issued on the basis of "Guidelines for the Performance of Type Approvals Part 1 Procedure"

CB TEST CERTIFICATE

Ref. Certificate No.
NL-15383

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

Issued by:	KEMA Quality B.V.		
Product:	Moulded case circuit breaker		
Applicant:	LS Industrial Systems Co., Ltd.	1026-6, Hogye-dong, Dong-an-gu Anyang-si, Gyeonggi-do	Korea, Republic of
Manufacturer:	LS Industrial Systems Co., Ltd.	1026-6, Hogye-dong, Dong-an-gu Anyang-si, Gyeonggi-do	Korea, Republic of
Factory:	LS Industrial Systems Co., Ltd.	CheongJu Plant 1, Songjeong-dong, Heungdeok-gu Cheongju-si, Chungcheongbuk-do	Korea, Republic of

Rating and principal characteristics:
4 pole MCCB with Neutral on right side
Ue = 220, 240, 380, 415, 440, 460, 480 and 500 V
Ui = 750 Vac
Uimp = 8 kV
Ics = Icu
Rated frequency = 50/60 Hz
Cat A,
See also first pages of test reports

Trade mark (if any): LS

Model/Type reference: TS100 E/N/S/H/P/L, TS160 E/N/S/H/P/L, TS250 E/N/S/H/P/L, TS400 E/N/S/H/P/L, TS630 E/N/S/H/P/L, TS800 E/N/S/H/P/L

Additional information: WMT procedure.

Sample of product tested to be in conformity with IEC: 60947-2(ed.4)

Test Report Ref. No: 2120024.50, -51, -52 and 2088503.55, -56, -57 (dated 2006-02-08).

This CB Test Certificate is issued by the National Certification Body:

KEMA Quality B.V.
Utrechtseweg 310
P.O. Box 5185
6802 ED Arnhem
The Netherlands

Signed by: F.S.Strikwerda

Date of issue: 2009-01-27

KEMA

София

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Test Report issued under the responsibility of:

KEMA

TEST REPORT
IEC/EN 60947-2
Low-voltage switchgear and controlgear - Part 2: Circuit-breakers

Report Reference No. ..... :	2120024.50
Date of issue ..... :	2009-01-26
Total number of pages	35
CB/CCA Testing Laboratory ..... :	KEMA Quality B.V.
Address ..... :	Utrechtseweg 310, 6812 AR Arnhem, The Netherlands
Applicant's name ..... :	LS Industrial Systems Co., Ltd.
Address ..... :	1026-6, Hogye-dong, Dong-an-gu Anyang-si, Gyeonggi-do, Korea
Test specification:	
Standard ..... :	☒ IEC 60 947-2:2006 (4th Edition) and/or ☐ EN 60 947-2:2006 (4th Edition)
Test procedure ..... :	CB / CCA
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IECEN60947_2A
Test Report Form(s) Originator ..... :	KEMA
Master TRF ..... :	Dated 2007-04

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.
This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

If this Test Report Form is used by non-CCA members, the CIG logo and the reference to the CCA Procedure shall be removed.
This report is not valid as a CCA Test Report unless signed by an approved CCA Testing Laboratory and appended to a CCA Test Certificate issued by an NCB in accordance with CCA

Test item description ..... :	
Trade Mark ..... :	LS
Manufacturer ..... :	LS Industrial Systems Co., Ltd.
Model/Type reference ..... :	TS100 E/N/S/H/P/L, TS160 E/N/S/H/P/L, TS250 E/N/S/H/P/L,
Ratings ..... :	40-50-63-80-100-125-160-200-250 A

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Testing procedure and testing location:	
☐ **CB/CCA Testing Laboratory:**	
Testing location/ address.....:	
☐ **Associated CB Laboratory:**	
Testing location/ address.....:	
Tested by (name + signature).....:	
Approved by (+ signature) .....:	
☐ Testing procedure: TMP	
Tested by (name + signature).....:	
Approved by (+ signature) .....:	
Testing location/ address.....:	
☒ Testing procedure: WMT	
Tested by (name + signature).....:	Mr. Oh
Witnessed by (+ signature).....:	H.G.M. Kormelink
Approved by (+ signature) .....:	H.L. Schendstok
Testing location/ address.....:	LS Industrial Systems Co., Ltd. Cheongju Plant 1, Songjeong-dong, Heungdeok-gu Cheongju-si, Chungcheongbuk-do, Korea
☐ Testing procedure: SMT	
Tested by (name + signature).....:	
Approved by (+ signature) .....:	
Supervised by (+ signature).....:	
Testing location/ address.....:	
☐ Testing procedure: RMT	
Tested by (name + signature).....:	
Approved by (+ signature) .....:	
Supervised by (+ signature).....:	
Testing location/ address.....:	

Particulars: test item vs. test requirements 3. Classification	
3.1. Utilization category: (A or B).. .....:	A
3.2. Interruption medium: (air, vacuum, gas Break).....:	Air
3.3. Design: (open construction, moulded case)..... .....:	Moulded case
3.4. Method of controlling the operation mechanism: (dependent manual, independent manual, dependent power, independent power) .....:	Independent manual
3.5. Suitability for insulation: (suitable, not -suitable)..... .....:	Suitable
3.6. Provision for maintenance: (maintainable, non maintainable).....:	maintainable
3.7. Method of installation: (fixed, plug in, withdrawable:	Fixed
3.8. Degree of protection: (IP code) .....:	IP20
4.8. Integral fuses (integrally fused circuit-breakers) Type and characteristics of SCPD.....:	N/A
4.9. Switching overvoltages: (when Uimp. is declared). .....:	N/A
7.3 Electromagnetic compatibility (EMC) Environment A or B.....:	N/A
Circuit-breaker for use on phase-earthed systems.....:	P
Circuit-breaker for use in IT systems.....:	P
Rated and limiting values, main circuit ....:	
- rated operational voltage: Ue (V).....:	220,240,380,415,440,460,480 and 500 V
- rated insulation voltage: Ui (V).....:	750 V
- rated impulse withstand voltage: Uimp (kV).....:	8 kV
- rated operational current: Ie (A).....:	40-50-63-80-100-125-160-200 and 250 A
- kind of current.....:	a.c.
- conventional free air thermal current: Ith (A).....:	250 A
- conventional enclosed thermal current: Ithe (A) .....:	N/A
- current rating for four-pole circuit-breakers: (A).....:	250 A
- number of poles.....:	4
- rated frequency: (Hz).....:	50/60 Hz
- integral fuses (rated values).....:	N/A

Rated duty :	
- eight-hour duty ..... :	N/A
- uninterrupted duty: Iu (A) ..... :	250 A
Short-circuit characteristic :	
rated short-time making capacity: Icm (kA)..... :	440 kA
rated ultimate short-circuit breaking capacity: Icu (kA) . ..... :	200 kA-220&240 V, 150 kA-380&415 V 130 kA-440&460 V, 85 kA-480&500 V
rated service short-circuit breaking capacity: Ics (kA)..... :	100% Icu
rated short-time withstand current: Icw (kA/s)..... :	N/A
Control circuits :	
Electrical control circuits :	
- kind of current: (AC, DC) ..... :	N/A
- rated frequency: (Hz) ..... :	N/A
- rated control circuit voltage: Uc (nature, frequency, V) .... :	N/A
- rated control supply voltage: Us (nature, frequency V) .... :	N/A
Air supply control circuits: (pneumatic or electro-pneumatic) :	
- rated pressure and its limit ..... :	N/A
- volumes of air, at atmospheric pressure, required for each closing and each opening operation..... :	N/A
Auxiliary circuits :	
Rated and limiting values, auxiliary circuits ..... :	
- rated operational voltage Ue (V)..... :	N/A
- rated insulation voltage: Ui (V)..... :	N/A
- rated operational current: Ie (A)..... :	N/A
- kind of current ..... :	N/A
- rated frequency: (Hz) ..... :	N/A
- number of circuits ..... :	N/A
- number and kind of contact elements ..... :	N/A
- rated uninterrupted current: Iu (A) ..... :	N/A
- utilization category: (AC, DC, current and voltage) ..... :	N/A
Short-circuit characteristic :	
- Rated conditional short-circuit current (kA)..... :	N/A
- Co-ordination of short-circuit protective devices ..... :	N/A
- kind of protective device ..... :	N/A

page modified March 24, 2009

Releases	
1) shunt release	N/A
2) Over-current release	
a) instantaneous	P
b) definite time delay	N/A
c) inverse time delay	
- independent of previous load	N/A
- dependent on previous load; (for example thermal type release)	P
3) Undervoltage release (for opening)	N/A
4) Other releases	N/A
Characteristics :	
1) Shunt release and undervoltage release (for opening)...	
- rated control circuit voltage: Uc (nature, frequency, V) ...	N/A
- kind of current	N/A
- rated frequency: (if AC)	N/A
2) Over-current release	
- rated current	N/A
- kind of current	N/A
- rated frequency: (if AC)	N/A
- current setting (or range of settings)	N/A
- time settings (or range of settings)	N/A

Summary of testing:	
Tests performed (name of test and test clause): Sequence I ; 8.3.3.3 Mechanical operation and operational performance capability 8.3.3.9 Verification of main contact Sequence II&III ; 8.3.5.1 Verification of overload releases 8.3.4.1 Rated service short-circuit breaking capacity 8.3.4.2 Operational performance capability 8.3.4.3 Verification of dielectric withstand 8.3.4.4 Verification of temperature-rise 8.3.4.5 Verification of overload releases 8.3.5.4 Verification of overload releases This test report is written in conjuction with CB NL-10144 with report number 2088503.55 (dated 2006-02-08). Under that CB certificate the 3 and 4 pole versions have been tested (Neutral on the left side of the product). In this report the tests conducted on the product with the Neutral on the right side of the project are described. The tests focus is on the mechanical aspects of the product.	**Testing location:** LS Industrial Systems Co., Ltd. CheongJu Plant 1, Songjeong-dong, Heungdeok-gu Cheongju-si, Chungcheongbuk-do, Korea
Summary of compliance with National Differences:	
Copy of marking plate See report 2088503.55.	

Test item particulars	:
Classification of installation and use	:
Supply Connection	:
	:
	:
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	: 23 October, 2008
Date (s) of performance of tests	: 25 October, 2008 ~ 12 November, 2008

General remarks:

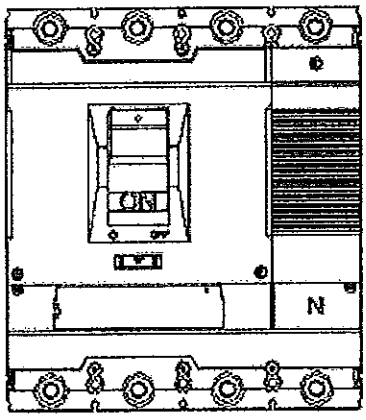
The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

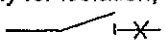
Note: This TRF includes EN Group Differences together with National Differences and Special National Conditions, if any. All Differences are located in the Appendix to the main body of this TRF.

Throughout this report a comma (point) is used as the decimal separator.

General product information:

The products are identical to the products tested under CB NL-10144 and test report 2088503.55. The only difference is that the Neutral is now located on the right hand side.



IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
5.2	MARKING		
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.		
	- rated current:	40, 50, 63, 80, 100, 125, 160, 200 and 250 A	P
	- suitability for isolation, if applicable, with the symbol 	Compliance	P
	- indication of the open and closed position: with O and I respectively, if symbols are used	Compliance	P
b)	Marking on equipment not needed to be visible after mounting:		
	- manufacturer's name or trademark	LS	P
	- type designation or serial number	TS100 E/N/S/H/P/L TS160 E/N/S/H/P/L TS250 E/N/S/H/P/L	P
	- IEC 60947-2 if the manufacturer claims compliance with this standard.	Compliance	P
	- utilization category	A	P
	- rated operational voltage(s) Ue	220, 240, 380, 415, 440, 460, 480 and 500 V	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	Compliance	P
	- value (or range) of the rated frequency and/or the indication DC (or symbol)	50/60 Hz	P
	- rated service short-circuit breaking capacity. Ics	200 kA	P
	- rated ultimate short-circuit breaking capacity. Icu	200 kA	P
	- rated short-time withstand current, (Icw) and associated short-time delay, for utilization category B	-	N/A
	- line and load terminals, unless their connection is immaterial	Compliance	P
	- neutral pole terminals, if applicable, by the letter N	-	N/A
	- protective earth terminal, where applicable, by the symbol acc. 7.1.9.3 of part 1	-	N/A

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IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- ref. temperature for non-compensated thermal releases, if different from 30°C	40 °C	P
c)	Marked on the circuit-breaker as specified in item b), or shall be made available in the manufacturer's published information:		
	- rated short-circuit making capacity (Icm) (if higher than specified in 4.3.5.1)	440 kA	P
	- rated insulation voltage. (Ui) if higher than the maximum rated operational voltage)	750 V	P
	- rated impulse withstand voltage (Uimp), when declared.	8 kV	P
	- pollution degree if other than 3	3	P
	- conventional enclosed thermal current (Ithe) if different from the rated current:	-	N/A
	- IP Code, where applicable:	IP20	P
	- minimum enclosure size and ventilation data (if any) to which marked ratings apply:	-	N/A
	- details of minimum distance between circuit-breaker and earthed metal parts for circuit-breaker intended for use without enclosure:	Compliance	P
	- r.m.s sensing if applicable, according to F.4.1.1	-	N/A
	- suitability for environment A or B	A	P
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:		
	- rated control circuit voltage of the closing device, and rated frequency for AC:	-	N/A
	- rated control circuit voltage of the shunt release and/or of the under-voltage release, and rated frequency:	-	N/A
	- rated current of indirect over-current releases:	-	N/A
	- 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.	-	N/A
e)	Terminal shall be clearly and permanently identified in acc. with IEC 60445 and annex L :		
	- line terminal	-	N/A
	- load terminal	-	N/A
	- neutral pole terminal "N"	Compliance	P

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IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- protective earth terminal ⏚	-	N/A
	- terminal of coils (A/B)	-	N/A
	- terminal of shunt release (B)	-	N/A
	- terminals of under-voltage release (D)	-	N/A
	- terminals of interlocking electromagnets (E)	-	N/A
	- terminals of indicated light devices (X)	-	N/A
	- terminals of contact elements for switching devices (no)	-	N/A
7.1	CONSTRUCTION		
7.1.1	Withdrawable circuit-breaker	-	N/A
	In the disconnected position (main- and auxiliary circuits)		
	Isolating distances for circuit-breaker suitable for isolating warranted:	-	N/A
	Mechanism fitted with a reliable indicating device with indicates the position of the isolating contacts.	-	N/A
	Mechanism fitted with interlocks which only permit the isolating contacts to be separate or re-closed when main contacts are open	-	N/A
	Mechanism fitted with interlock, which only permit the main contacts to be closed when the isolating contacts are fully closed.	-	N/A
	Mechanism fitted with interlock, which only permit the main contacts to be closed when in disconnected position.	-	N/A
	The isolating distances between the isolating contacts cannot be inadvertently reduced.	-	N/A
7.1.1.1 part 1	Resistance to abnormal heat and fire	650 °C 960 °C	P
7.1.2 part 1	Current-carrying parts and their connection	Compliance	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.)		
	Clearances distances:		
	- Uimp is given as:	8 kV	
	- max. value of rated operational voltage to earth	289 V	

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IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- nominal voltage of supply system:	500 V	
	- overvoltage category:	IV	
	- pollution degree:	3	
	- field-in or homogeneous:	Inhomogeneous	
	- minimum clearances (mm):	8 mm	
	- measured clearances (mm):	11,5 mm	P
	Creepage distances:		
	- rated insulation voltage Ui (V)	750 V	
	- pollution degree	3	
	- comparative tracking index (V)	≥600 V	
	- material group	III a	
	Minimum creepage distances (mm)	12,5 mm	
	Measured creepage distances (mm)	12,5 mm	P
7.1.4 part 1	Actuator		
7.1.4.1 part 1	Insulation		
	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	Compliance	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/A
	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	Compliance	P
7.1.4.2	Direction of movement		
	The direction of operation for actuators of devices shall normally conform to IEC 60447.	Compliance	P
	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	Compliance	P

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IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
7.1.5 part 1	Indication of contact position		
7.1.5.1 part 1	Indicating means		
	When an equipment is provided with means for indicating the closed and open positions, these positions shall be unambiguous and clearly indicated	Compliance	P
	This is done by means of a position indicating device (see 2.3.18)	Compliance	P
	If symbols are used, they shall indicate the closed and open position respectively, in accordance with IEC 60417-2:		
	- 60417-2-IEC-5007 I On (power)	Compliance	P
	- 60417-2-IEC-5007 O Off (power)	Compliance	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"	-	N/A
	Red colour shall not be used for any other push-button	-	N/A
	The colours of other push-buttons, illuminated push-buttons and indicator lights shall be in accordance with IEC 60073	-	N/A
7.1.5.2 part 1	Indication by the actuator		
	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	On position Off position Trip position	P
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 V):		
	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:		
	- the position of the actuator	Compliance	P
	- a separate mechanical indicator	-	N/A
	- visibility of the moving contacts	-	N/A
	When means are provided or to lock the equipment in the open position, locking only be possible when contacts are in the open position	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Actuator front-plate fitted to the equipment in a manner which ensures correct contact position indication and locking	-	N/A
	The indicated open position is the only position in which the specified isolation distances between the contacts is ensured.	Compliance	P
	- minimum clearances across open contacts (see Table XIII, Part 1) (mm) :	8 mm	
	- measured clearances (mm) :	11,5 mm	P
	- test Uimp across gap (kV) :	12,1 kV	P
7.1.6.2	Supplementary requirements for equipment with provision for electrical interlocking with contactors or circuit-breakers:		
	auxiliary switch shall be rated according to IEC 60 947-5-1	-	N/A
	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/A
	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/A
	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/A
	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/A
	During the closing operation the contacts of the auxiliary switch shall close after or simultaneously with the contacts of the main poles	-	N/A
	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	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
7.1.6.3	Supplementary requirements for equipment provided with means for padlocking the open position:		
	the locking means shall be designed in such a way that it cannot be removed with the appropriate padlock(s) installed	-	N/A
	Alternatively, the design may provide padlockable means to prevent access to the actuator	-	N/A
	test force F applied to the actuator in an attempt to operate to the closed position (N) :	-	N/A
	rated impulse withstand voltage (kV) :	-	N/A
	test Uimp on open main contacts at the test force	-	N/A
7.1.7	Terminals		
7.1.7.1	All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength	Compliance	P
	Terminal connections shall be such that necessary contact pressure is maintained	Compliance	P
	Terminals shall be so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal	Compliance	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	Compliance	P
7.1.7.2	Connection capacity		
	type of conductors :	Flexible and stranded type	P
	minimum cross-sectional area of conductor (mm²) :	10 mm^2 or 8 AWG [40 A]	P
	maximum cross-sectional area of conductor (mm²) :	120 mm^2 or 250 kcmil [250 A]	P
	number of conductors simultaneously connectable to the terminal :	1	P
7.1.7.3	Connection		
	terminals for connection to external conductors shall be readily accessible during installation	Compliance	P
	clamping screws and nuts shall not serve to fix any other component	Compliance	P
7.1.7.4	Terminal identification and marking		
	terminal intended exclusively for the neutral conductor	-	N/A
	protective earth terminal	-	N/A

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IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	other terminals	line / load	P
7.1.8 part 1	Additional requirements for equipment provided with a neutral pole		
	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.).	Compliance	P
	A switched neutral pole shall break not before and shall make not after the other poles	Compliance	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	-	N/A
	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	-	N/A
	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.	-	N/A
7.1.9	Provisions for protective earthing		
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/A
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	-	N/A
	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 50 mm x 50 mm) or are so located as to exclude any contact with live parts	-	N/A
7.1.9.2 part 1	Protective earth terminal		
	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/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The protective earth terminal shall be suitably protected against corrosion	-	N/A
	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/A
	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/A
7.1.9.3	Protective earth terminal marking and identification		
	The protective earth terminal shall be clearly and permanently identified by its marking	-	N/A
	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/A
	Graphical symbol to be used: 60417-2-IEC-5019 ⏚ Protective earth (ground) in accordance with IEC 60417-2	-	N/A
7.1.10	Enclosure for equipment		
7.1.10.1	Design		
	The enclosure, when it is opened: all parts requiring access for installation and maintenance are readily accessible	-	N/A
	Sufficient space shall be provided inside the enclosure	-	N/A
	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	-	N/A
	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	-	N/A
	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/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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	-	N/A
	If the enclosure is used for mounting push-buttons, it shall not be possible to remove the buttons from the outside of the enclosure	-	N/A
7.1.10.2	Insulation		
	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	-	N/A
7.1.11	Degree of protection of enclosed equipment		
	Degree of protection.	IPXX	
	Test for first characteristic.	IPXX	
	Test for first numeral .....:	1 2 3 4 5 6	
	Test for second characteristic	IPXX	
	Test for second numeral .....:	1 2 3 4 5 6 7 8	N/A
7.1.12 part 1	Conduit pull-out, torque and bending with metallic conduits		
	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/A

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IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
7.2	Performance requirements		
7.2.1	Operating condition		
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	Compliance	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	-	N/A
	Such a circuit-breaker should not be used in circuits having a prospective peak making current exceeding 10 kA	-	N/A
	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	-	N/A
7.2.1.1.2	Independent manual closing		
	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	Compliance	P
7.2.1.1.3	Dependent power closing		
	At 110% of the rated control supply voltage, the closing operation performed on no-load shall not cause any damage to the circuit-breaker.	-	N/A
	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.	-	N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
7.2.1.1.4	Independent power closing		
	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	-	N/A
	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/A
7.2.1.1.5	Stored energy closing		
	Capable ensuring closing of the circuit-breaker in any condition between no-load and its rated making capacity	-	N/A
	- when the stored energy is retained within the circuit-breaker, a device is provided which indicates when the storing mechanism is fully charged.	-	N/A
	- 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/A
	- 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/A
	- by manually operated circuit-breaker is the direction of operation indicated. (not for circuit-breaker with an independent manual closing operation.)	-	N/A
	- 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/A
7.2.1.2	Opening		
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		
7.2.1.2.2	Opening by undervoltage releases		
7.2.1.3. a part 1	Operating voltage		
	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	-	N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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	-	N/A
	Unless otherwise stated in the relevant product standard, the upper limit of the supply voltage shall be 110% of its rated value	-	N/A
7.2.1.3. b part 1	Operating time		
	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	-	N/A
7.2.1.2.3	Opening by shunt releases	-	N/A
7.2.1.4 part 1	Limits of operation of shunt releases		
	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/A
7.2.1.5 part 1	Limits of operation of current operated relays and released		
	Limits of operation of current operated relays and releases shall be stated in the relevant product standard	-	N/A
7.2.1.2.4	Opening by over-current releases		
a)	Opening under short-circuit conditions		
	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	Compliance	P
	Where necessary for over-current co-ordination the manufacturer shall provide information (usually curves) showing	Compliance	P
	- maximum cut-off (let-through) peak current as a function of prospective current (r.m.s. symmetrical)	Compliance	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)	Compliance	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
b)	Opening under overload conditions		
1)	Instantaneous or definite time-delay operation	-	N/A
	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/A
2)	Inverse time-delay operation		
	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	Compliance	P
	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	Compliance	P
	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	Compliance	P
	The width of the temperature band shall be at least 10 K on either side of the reference temperature	Compliance	P
7.2.4.2	Operational performance capability		
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/A
	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	Compliance	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
8	TESTS		
8.2.4	Mechanical properties of terminals		
	Mechanical strength of terminals		
	maximum cross-sectional area of conductor (mm^2) :	-	
	diameter of thread (mm) :	-	
	torque (Nm) :	-	
	5 times on 2 separate clamping units	-	N/A
	Testing for damage to and accidental loosening of conductor (flexion test)		
	conductor of the smallest cross-sectional area (mm^2) :	-	
	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	-	N/A
	Pull-out test		
	force (N) :	-	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A
	conductor of the largest cross-sectional area (mm^2) :	-	
	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	-	N/A
	Pull-out test		
	force (N) :	-	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A
	conductor of the largest and smallest cross-sectional area (mm^2) :	-	

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Clause	Requirement + Test	Result - Remark	Verdict
	number of conductors of the smallest cross section, 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	-	N/A
	Pull-out test		
	force (N) :	-	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A
8.3.3	TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS		
8.3.3.1	Tripping limits and characteristic		N/A
8.3.3.2	Test of dielectric properties, impulse withstand voltage (Uimp indicated):		N/A
8.3.3.3	Mechanical operation and operational performance capability		
8.3.3.3.2	Construction and mechanical operation		N/A
8.3.3.3.3	Operational performance capability without current.		
	Type designation or serial number	TS 250	
	Sample no:	S1-1	
	Rated current In (A)	250 A	
	Rated operational voltage: Ue (V)	500 V	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt releases: Uc (V)	-	
	Rated control supply voltage undervoltage releases: Uc (V)	-	
	Ambient temperature 10-40 °C :	23 °C	P
	Number of operating cycles per hour	120 cycles per hour	P
	Number of cycles without current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Number of cycles without current (without releases)	8 000 cycles	P
	Applied voltage: closing mechanism (V)	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	10% of total cycles for circuit-breaker with fitted shunt release: (50% at the beginning- and 50% at the end of the test.) Energized at the rated Uc	-	N/A
	Applied voltage: shunt releases (V)	-	N/A
	10% of total cycles for circuit-breaker with undervoltage releases: (50% at the beginning- and 50% at the end of the test.) Energized at the minimum rated Uc	-	N/A
	10 cycles without applied voltage at the undervoltage releases. (Shall not possible to close the circuit-breaker.)	-	N/A
	Applied voltage: undervoltage releases (V)	-	N/A
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.3.3.4	Operational performance capability with current.		N/A
8.3.3.3.5	Additional test of operational performance capability without current for withdrawable circuit-breaker.		N/A
8.3.3.4	Overload performance		N/A
8.3.3.5	Verification of dielectric withstand		N/A
8.3.3.6	Verification of temperature-rise		N/A
8.3.3.7	Verification of overload releases		N/A
8.3.3.8	Verification of undervoltage and shunt releases		N/A
8.3.3.9	Verification of the main contact position for circuit-breakers for isolation		
	actuating force for opening (N) ..... :	93 N	—
	test force with blocked main contacts for 10 s (N) . :	279 N	—
	Dependent power operation		
	Supply voltage of 110% of rated voltage (V).....:	-	N/A
	Three attempts of 5 s to operate the equipment at intervals of 5 min.	-	N/A
	Independent power operation		
	Three attempts to operate the equipment by the stored energy.	-	N/A
	Lock ability of driving mechanism in OFF-position at test force and blocked main contacts ..... :	-	N/A
	Position indicator does not show OFF-position after capture of test force at blocked main contacts	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.4	TEST SEQUENCE II (Ics):		N/A
8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
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	TS 250	
	Sample no:	S2-1	
	Rated current: In (A)	250 A	
	Rated operational voltage: Ue (V)	240 V	
	Rated service short-circuit breaking capacity: (kA)	200 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.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	185(W) X 230(H) X 86(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	N/A
	- size of hole: <30mm^2	<30 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm²) :	120 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)	upside	P
	Tightening torques: (Nm)	6 Nm	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.		
	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.		
	Time specified by the manufacturer:	80 ~ 600 s	P
	- Operation time: (s) .....L1: .....L2: .....L3: .....N :	308 s 218 s 284 s	P
	Test sequence of operation: O – t – CO – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) .....L1: .....L2: .....L3: .....N :	L1: - V L2: 252.4 V L3: 252.1 V	P
	- r.m.s. test current AC/DC: (A) .....L1: .....L2: .....L3: .....N :	L1: 50.1 kA (25%) L2: 50.0 kA (25%) L3: 50.5 kA (25%)	P
	power factor/time constant :	0,18	P
	- Factor "n"	2,2	P
	- peak test current (A) :	110.7 kA (25%)	P
	Test sequence "O"		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:	L1: kA L2: 25.3 kA L3: 23.3 kA	P
	- Joule integral I^2dt (A^2s) .....L1: .....L2: L3:	L1: kA^2s L2: 365.2 kA^2s L3: 287.9 kA^2s	P
	Pause, t: (min)	4	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:	L1: 23.3 kA L2: 23.1kA L3: kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- Joule integral I²dt (A²s) .....L1: .....L2: L3:	L1: 311.0 kA²s L2: 321.6 kA²s L3: kA²s	P
	Pause, t: (min)	3	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:	L1: 15.8 kA L2: 15.7 kA L3: 13.6kA	P
	- Joule integral I²dt (A²s) .....L1: .....L2: L3:	L1: 137.7 kA²s L2: 249.3 kA²s L3: 102.1 kA²s	P
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	Compliance	P
	Cracks observed	Compliance	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	250 A	
	Maximum rated operational voltage: Ue (V)	240 V	
	Conductor cross-sectional area (mm²) :	120 mm²	
	Number of operating cycles per hour	120	P
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	50	P
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) .....L1: .....L2: L3:	242,5 V 246,1 V 245,3 V	P
	- test current I/Ie = 1,0 (A) .....L1: .....L2: L3:	252,4 A 254,5 A 251,9 A	P
	- power factor/time constant:	0,72	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1 s	P
	- off-time (s):	29 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Electrical components do not exceed the value indicated in tab. 7.	Compliance	P
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1 000 V	P
	- no breakdown or flashover	Compliance	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	< 0,01 mA / 264 V	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	Compliance	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	74,8 K	P
	conductor cross-sectional area (mm²) :	120 mm²	P
	test current Ie (A) :	250 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	390 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	5 min 48 sec	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	80~600 s	P
	- Operation time: (s) .....L1: .....L2: .....L3: .....N :	135 s 113 s 182 s	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict

8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
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	TS 250(TN)	
	Sample no:	S2-4	
	Rated current: In (A)	250 A	
	Rated operational voltage: Ue (V)	139 V	
	Rated service short-circuit breaking capacity: (kA)	120 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/A
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	185X230X86 mm	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	<30 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Conductor cross-sectional area (mm²) :	120 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)	upside	P
	Tightening torques: (Nm)	6 Nm	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.		
	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.		
	Time specified by the manufacturer:	80~600 s	P
	- Operation time: (s) .....L1: .....L2: .....L3: .....N :	- - 254 s 347 s	P
	Test sequence of operation: O – t – CO – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) .....L1: .....L2: .....L3: ..... N:	- - L3: 186.6 V N: 186.6 V	P
	- r.m.s. test current AC/DC: (A) .....L1: .....L2: ..... L3: ..... N:	 - - L3: 61.4 kA (50%) N: 61.4 kA (50%)	P
	power factor/time constant :	0,18	P
	- Factor "n"	2,2	P
	- peak test current (A) :	137.4 kA (50%)	P
	Test sequence "O"		
	- max. let-through current: (kApeak) .....L1: .....L2: .....L3: .....N:	- - L3: 9.8 kA N: 9.8 kA	P
	94 Joule integral I^2dt (A^2s) .....L1: .....L2: .....L3: .....N:	 - - L3: 186.4 kA^2s N: 186.4kA^2s	P
	Pause, t: (min)	5	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) .....L1: .....L2: .....L3: .....N:	- - L3: 14.9 kA N: 14.9 kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- Joule integral I^2dt (A^2s) .....L1: .....L2: .....L3: .....N:	- - L3: 150.4 kA^2s N: 150.4 kA^2s	P
	Pause, t: (min)	-	N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) .....L1: .....L2: L3:	-	N/A
	Melting of the fusible element	-	N/A
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	-	N/A
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	-	
	Maximum rated operational voltage: Ue (V)	-	
	Conductor cross-sectional area (mm^2) :	-	
	Number of operating cycles per hour	-	N/A
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) .....L1: .....L2: L3:	-	N/A
	- test current I/Ie = 1,0 (A) .....L1: .....L2: L3:	-	N/A
	- power factor/time constant:	-	N/A
	- frequency: (Hz)	-	N/A
	- on-time (ms):	-	N/A
	- off-time (s):	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1 000 V	P
	- no breakdown or flashover	Compliance	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	< 0.01 mA / 264 V	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm²) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	80~600 s	P
	- Operation time: (s) .....L1: .....L2: .....L3: .....N :	- - 123 s 150 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.5	TEST SEQUENCE III (Icu)		N/A
	Rated ultimate short-circuit breaking		
8.3.6	TEST SEQUENCE IV		N/A
	Rated short-time withstand current		
8.3.7	TEST SEQUENCE V		N/A
	Performance of integrally fused circuit-breakers		
8.3.8	Combined test sequence		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Annex B	Circuit-breakers incorporating residual current protection		N/A
Annex C	Individual pole short-circuit test sequence		N/A
Annex F	Additional tests for circuit-breakers with electronic over-current protection		
Annex H	Individual pole short-circuit test sequence		N/A
Annex J	Electromagnetic compatibility (EMC) – Requirements and test methods for circuit-breakers		N/A
Annex L	Circuit-breakers not fulfilling the requirements for overcurrent protection		N/A
Annex M	Modular residual current devices (without integral current breaking device)		N/A
Annex N	Electromagnetic compatibility (EMC) – Additional requirements and test methods for devices not covered by Annexes B, F and M		N/A
Annex O	Instantaneous trip circuit-breakers (ICB)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

8.3.4.4	**TABLE: Heating Test**		S2-1
	Test voltage (V):.....		—
	Ambient (°C):.....	25,2	—

Thermocouple Locations	max. temperature measured, (°C)	max. temperature limit, (°C)
LINE L1	57,6	80
LINE L2	74,8	80
LINE L3	68,1	80
LOAD L1	48,3	80
LOAD L2	51,6	80
LOAD L3	44,8	80

Type Approval Certificate

This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.

Certificate No.	44 992 - 07 HH
Company	LSIS Co., Ltd. 1, Song Jung-dong, Hung Duk-gu Cheong Ju, Choongbuk 361-720, KOREA, REPUBLIC OF
Product Description	Molded Case Circuit Breaker SUSOL
Type	TS400, TS630 E\ N\ S\ H\ P\ L, ETS, ETM
Environmental Category	C

Technical Data / Range of Application

Number of poles	: 3
Rated operational current Ie	: 160 - 630 A
Rated operational voltage Ue	: 500 V AC
Rated insulation voltage Ui	: 750 V AC
Rated impulse voltage Uimp	: 8 kV
Rated frequency fe	: 50/60 Hz
Utilization category	: A

Rated short circuit capacity Performance at :

		E	N	S	H	P	L
500V	Icm	187	220	264	264	330	440 kA
240V	Ics = Icu	85	100	120	120	150	200 kA
415V	Ics = Icu	50	65	70	85	130	150 kA
460V	Ics = Icu	50	65	70	85	100	130 kA
500V	Ics = Icu	35	42	50	65	70	85 kA

Release system : Thermal, Magnetic, Electronic, INST, STD

Test Standard	Guidelines for the Performance of Type Approvals Part 2, Edition 2003 IEC 60947-2 (2003) Incl. Annex F, H
Documents	Test report : KEMA 208602900.52 dated 2006-03-23 KEMA 208602900.55 dated 2006-03-23 KEMA 2087087-QUA/EMC 05-4964 dated 2005-10-27 PT&T R36-0772 (2006-08-14), R36-0776 (2006-07-24)
Remarks	None
Valid until	2017-01-17
Page	1 of 1
File No.	I.K.01
Hamburg,	2012-01-18

Type Approval Symbol GL

Germanischer Lloyd

Thomas Hartmann

Harald Amberger

This certificate is issued on the basis of "Guidelines for the Performance of Type Approvals Part 1, Procedure"

KEMA

TEST REPORT

IEC 60 947-2

Low-voltage switchgear and controlgear

Part 2: Circuit - breakers

Report reference No. ..... :	2086029.52
Compiled by (+ signature)..... :	H.H.M. Versteegen
Approved by (+ signature)..... :	H.L. Schendstok
Date of issue ..... :	12 December 2005
	19 December, 2006 revised due to editorial change in address
CB Testing Laboratory..... :	KEMA Quality B.V.
Address..... :	Utrechtseweg 310, 6812 AR Arnhem, The Netherlands
Testing location/procedure ..... :	CBTL ☐ SMT ☐ WMT ☒
Address..... ..... :	LS Industrial Systems Co., Ltd. CheongJu Plant
	1, Songjeong-dong, Heungdeok-gu Cheongju-si, Chungcheongbuk-do, Korea
Applicant's Name ..... :	LS Industrial Systems Co., Ltd.
Address ..... :	84-11, Namdaemunno5(o)-ga, Jung-gu, Seoul, Korea
Test specification	
Standard .... :	IEC 60 947-2:2003 see also IEC 60 947-1:2004
Test procedure .... :	CB
Non-standard test method ..... :	N/A
Test Report Form	IEC60947_2B
TRF originator. ..... :	SEV
Master TRF .... :	Dated 2002-11

Test item description .... :	Moulded-case circuit-breaker
Trade Mark ..... :	LS
Model Type reference .... :	TS400 E, TS400 N, TS400 S, TS400 H, TS400 P, TS400 L, TS630 E, TS630 N, TS630 S, TS630 H, TS630 P, TS630 L
Ratings ..... :	TS400 E/N/S/H/P/L : 300 and 400 A TS630 E/N/S/H/P/L : 300, 400, 500 and 630 A

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Particulars: test item vs. test requirements	
3. Classification	
3.1. Utilization category: (A or B) :	A
3.2. Interruption medium: (air, vacuum, gas Break) :	Air
3.3. Design: (open construction, moulded case) :	Moulded case
3.4. Method of controlling the operation mechanism: (dependent manual operation, independent manual operation, dependent power operation, independent power operation) :	Independent manual operation
3.5. Suitability for insulation: (suitable, not -suitable) :	Suitable
3.6. Provision for maintenance: (maintainable, non maintainable) :	Maintainable
3.7. Method of installation: (fixed, plug in, withdrawable:	Fixed
3.8. Degree of protection: (IP code) :	IP20
4.8. Integral fuses (integrally fused circuit-breakers) Type and characteristics of SCPD :	N/A
4.9. Switching overvoltages: (when Uimp. is declared). :	8 kV
7.3 Electromagnetic compatibility (EMC) Environment A or B :	B
Circuit-breaker for use on phase-earthed systems :	N/A
Circuit-breaker for use in IT systems :	P
Rated and limiting values, main circuit :	
- rated operational voltage: Ue (V) :	AC 220, 240, 380, 415, 440, 460, 480 and 500 V
- rated insulation voltage: Ui (V) :	AC 750 V
- rated impulse withstand voltage: Uimp (kV) :	8 kV
- rated operational current: Ie (A) :	300, 400, 500 and 630 A
- kind of current :	A.C.
- conventional free air thermal current: Ith (A) :	300, 400, 500 and 630 A
- conventional enclosed thermal current: Ithe (A) :	N/A
- current rating for four-pole circuit-breakers: (A) :	N/A
- number of poles :	3
- rated frequency: (Hz) :	50/60 Hz
- integral fuses (rated values) :	N/A
- suitability for environment (A or B) :	A
Rated duty :	
- eight-hour duty :	N/A
- uninterrupted duty: Iu (A) :	250 A
Short-circuit characteristic :	
rated short-time making capacity: Icm (kA) :	440 kA
rated ultimate short-circuit breaking capacity: Icu (kA).. :	200 kA–220&240V, 150 kA–380&415 V, 130 kA–440&460V, 85 kA–480&500 V
rated service short-circuit breaking capacity: Ics (kA) :	100% Icu
rated short-time withstand current: Icw (kA/s) :	N/A

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Control circuits :	
Electrical control circuits :	
- kind of current: (AC, DC) ..... :	N/A
- rated frequency: (Hz) ..... :	N/A
- rated control circuit voltage: Uc (nature, frequency, V) ... :	N/A
- rated control supply voltage: Us (nature, frequency V):	N/A
Air supply control circuits: (pneumatic or electro-pneumatic) :	
- rated pressure and its limit ..... :	N/A
- volumes of air, at atmospheric pressure, required for each closing and each opening operation ..... :	N/A
Auxiliary circuits :	
Rated and limiting values, auxiliary circuits ..... :	N/A
- rated operational voltage Ue (V) ..... :	N/A
- rated insulation voltage: Ui (V) ..... :	N/A
- rated operational current: Ie (A) ..... :	N/A
- kind of current ..... :	N/A
- rated frequency: (Hz) ..... :	N/A
- number of circuits ..... :	N/A
- number and kind of contact elements ..... :	N/A
- rated uninterrupted current: Iu (A) ..... :	N/A
- utilization category: (AC, DC, current and voltage) ..... :	N/A
Short-circuit characteristic :	
Rated conditional short-circuit current: Icn (kA) ..... :	N/A
Co-ordination of short-circuit protective devices :	
- kind of protective device ..... :	N/A
Releases :	
1) shunt release ..... :	N/A
2) Over current release ..... :	See Remarks
a) instantaneous ..... :	P
b) definite time delay ..... :	N/A
c) inverse time delay ..... :	P
- independent of previous load ..... :	N/A
- dependent on previous load; (for example thermal type release) ..... :	P
3) Undervoltage release (for opening) ..... :	N/A
4) Other releases ..... :	N/A
Characteristics :	
1) Shunt release and undervoltage release (for opening) ... :	
- rated control circuit voltage: Uc (nature, frequency, V) ... :	N/A
- kind of current ..... :	N/A
-rated frequency: (if AC) ..... :	N/A

2) Overcurrent release	:	
- rated current	:	300, 400, 500 and 630 A
- kind of current	:	A.C.
- rated frequency: (if AC)	:	50/60 Hz
- current setting (or range of settings)	:	0,8 ~ 1,0 In
- time settings (or range of settings)	:	N/A

Test case verdicts	
Test case does not apply to the test object :	N/A
Test item does meet the requirement :	P(ass)
Test item does not meet the requirement :	F(ail)
Testing	
Date of receipt of test item :	August 18, 2005
Date(s) of performance of test :	August 22, 2005 ~ October

General remarks

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

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 testing laboratory.

"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a comma (point) is used as the decimal separator.

General product information:

Subject	Moulded-case circuit-breaker
Manufacturer	LS Industrial Systems Co., Ltd.
Type designation	TS400 E/N/S/H/P/L, TS630 E/N/S/H/P/L
Frame size	630 AF
Number of poles	3
Rated frequency	50/60 Hz
Rated operational voltage	AC 220, 240, 380, 415, 440, 460, 480 and 500 V
Rated insulation voltage	AC 750 V
Rated impulse withstand voltage	8 kV
Suitability for isolation	Yes
Rated current	300, 400, 500 and 630 A

Rated ultimate short-circuit breaking capacity	200kA-220/240V, 150 kA-380/415 V, 130kA-440/460V, 85 kA-480/500 V
Rated service short-circuit breaking capacity	Ics=100% Icu
Utilization category	A
Type of tripping device	Thermal Magnetic
Instantaneous releases:	Magnetic
Current setting (or range of settings)	5~10 In
Time setting (or range of setting)	N/A
Inverse time-delay release:	Thermal magnetic(Bi-metal)
Current setting (or range of settings)	0.8~1.0 In
Time setting (or range of setting)	N/A
Release dependent on ambient air temperature	Yes
Reference temperature	40℃
Dimension of specimen	140(W) x 260(H) x 110(D)
Dimension of metal screen	180(W) x 380(H) x 110(D)

Breaking Capacities

Rated short circuit Breaking Capacity Icu

Type		TS400E TS630E	TS400N TS630N	TS400S TS630S	TS400H TS630H	TS400P TS630P	TS400L TS630L
Rated Voltage	AC 220/240V	85kA	100kA	120kA	120kA	150kA	200kA
Rated Voltage	AC 380/415V	50kA	65kA	70kA	85kA	130kA	150kA
Rated Voltage	AC 440/460V	50kA	65kA	70kA	85kA	100kA	130kA
Rated Voltage	AC 480/500V	35kA	42kA	50kA	65kA	70kA	85kA

Rated service short circuit Breaking Capacity(Ics) : 100% Icu

Additional ratings assigned by manufacturer

Construction break	N/A
Contact material	AgNiC(Fixed),AgWC(Moving)
Earthing system	Phase-earthed system / IT system
Normal ambient temperature	-5 ~ 40 ℃
Relative humidity	45~85%RH
IP code	IP20
Pollution degree	3
Suitable for environment	A

Field conditions	Inhomogeneous(Case A)	
Accessory	N/A	
Tripping current for a single pole	13×In	
Operating time for 200% of In	80~720 s	
Overload test option	12(Manual)+3(Auto at any convenient voltage)	

Terminals/Connection :

Rated current	300, 400, 500 and 630 A
Type of terminals	Screw
Materials of terminals	Copper
Plating of terminals	Line terminal : Ag, Load terminal : Sn
Connectable conductors ISO(㎟) or AWG number metric equivalent(㎟)	IEC-185 ㎟(300A)~IEC-185 ㎟ X 2 (630A)
Number of conductors per terminal	1(300A) and 2(630A)
Type of terminal screw	Hex. Socket bolt (M10)
Tightening Torque	Hex.Socket bolt (M10) : 10 N.m
Type of conductors	Flexible / stranded / Bus bar
Specification of cable Lug	IEC: KRT185

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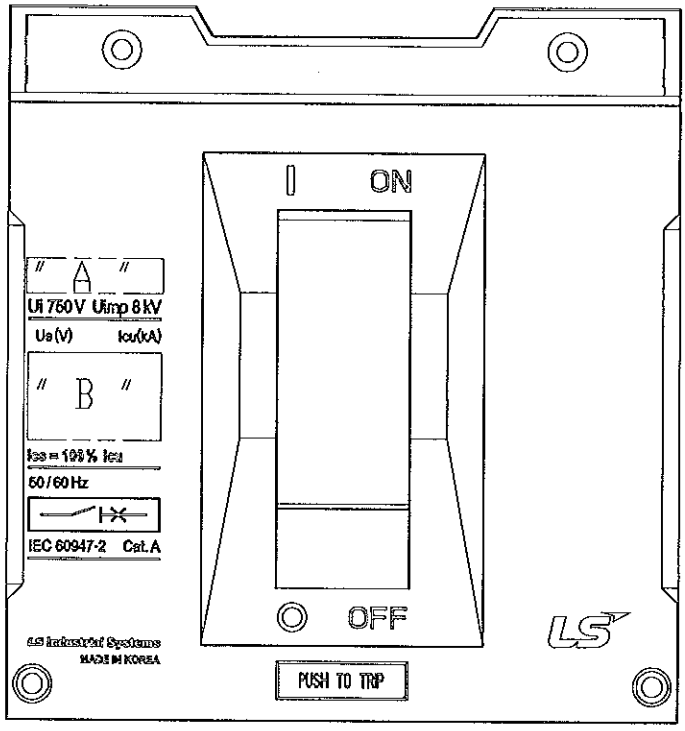
Copy of marking plate and summary of test results (information/comments):



Drawing Number	'A' Printing Contents	'B' Printing Contents
6462 1173 001	TS400E	220/240~ 85kA 380/415~ 50kA 440/460~ 50kA 480/500~ 35kA 250 - 42kA
6462 1173 011	TS630E	
6462 1173 002	TS400N	220/240~ 100kA 380/415~ 65kA 440/460~ 65kA 480/500~ 42kA 250 - 50kA
6462 1173 012	TS630N	
6462 1173 003	TS400S	220/240~ 120kA 380/415~ 70kA 440/460~ 70kA 480/500~ 50kA 250 - 65kA
6462 1173 013	TS630S	
6462 1173 004	TS400H	220/240~ 120kA 380/415~ 85kA 440/460~ 85kA 480/500~ 65kA 250 - 85kA
6462 1173 014	TS630H	
6462 1173 005	TS400P	220/240~ 150kA 380/415~ 130kA 440/460~ 100kA 480/500~ 70kA 250 - 85kA
6462 1173 015	TS630P	
6462 1173 006	TS400L	220/240~ 200kA 380/415~ 150kA 440/460~ 130kA 480/500~ 85kA 250 - 100kA
6462 1173 016	TS630L	

Summary of testing:

Sequence I

S1-1 : 500 V 630 A : Passed

Sequence II & III

S2-1N : 240 V 630 A 200 kA : Passed

S2-2 : 240 V 300 A 200 kA : Passed

S2-3 : 415 V 630 A 150 kA : Passed

S2-4-1 : 500 V 630 A 85 kA, connections reversed : Passed

AnnexH

H-1 : 500 V 630 A 9,1 kA : Passed

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IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
5.2	MARKING		
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.		
	- rated current:	300, 400, 500 and 630 A	P
	- suitability for isolation, if applicable, with the symbol	Compliance	P
	- indication of the open and closed position: with O and I respectively, if symbols are used	Compliance	P
b)	Marking on equipment not needed to be visible after mounting:		
	- manufacturer's name or trademark	LS	P
	- type designation or serial number	TS400 E, TS400 N, TS400 S, TS400 H, TS400 P, TS400 L, TS630 E, TS630 N, TS630 S, TS630 H, TS630 P, TS630 L	P
	- IEC 60947-2 if the manufacturer compliance with this standard.	IEC 60947-2	P
	- utilization category	A	P
	- rated operational voltage(s) Ue	500 V	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 (IT) which shall be market on the circuit-breaker immediately following these values of rated voltage	Compliance	P
	- value (or range) of the rated frequency and/or the indication DC (or symbol)	50/60 Hz	P
	- rated service short-circuit breaking capacity. Ics	200 kA	P
	- rated ultimate short-circuit breaking capacity. Icu	200 kA	P
	- rated short-time withstand current, (Icw) and associated short-time delay, for utilization category B	-	N/A
	- line and load terminals, unless their connection is immaterial	-	N/A
	- neutral pole terminals, if applicable, by the letter N	-	N/A
	- protective earth terminal, where applicable, by the symbol acc. 7.1.9.3 of part 1	-	N/A
	- ref. temperature for non-compensated thermal releases, if different from 30°C	40 °C	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
c)	Marked on the circuit-breaker as specified in item b), or shall be made available in the manufacturer's published information:		
	- rated short-circuit making capacity (Icm) (if higher than specified in 4.3.5.1	440 kA	P
	- rated insulation voltage. (Ui) if higher than the maximum rated operational voltage)	750 V	P
	- rated impulse withstand voltage (Uimp), when declared.	8 kV	P
	- pollution degree if other than 3	-	N/A
	- conventional enclosed thermal current (Ithe) if different from the rated current:	-	N/A
	- IP Code, where applicable:	IP20	P
	- minimum enclosure size and ventilation data (if any) to which marked ratings apply:	-	N/A
	- details of minimum distance between circuit-breaker and earthed metal parts for circuit-breaker intended for use without enclosure:	Compliance	P
	- r.m.s sensing if applicable, according to F.4.1.1	-	N/A
	- suitability for environment A or B	A	P
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:		
	- rated control circuit voltage of the closing device, and rated frequency for AC:	-	N/A
	- rated control circuit voltage of the shunt release and/or of the under-voltage release, and rated frequency:	-	N/A
	- rated current of indirect over-current releases:	-	N/A
	- 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.	-	N/A
e)	Terminal shall be clearly and permanently identified in acc. with IEC 60445 and annex L :		
	- line terminal	-	N/A
	- load terminal	-	N/A
	- neutral pole terminal "N"	-	N/A
	- protective earth terminal ⏚	-	N/A
	- terminal of coils (A/B)	-	N/A
	- terminal of shunt release (B)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- terminals of under-voltage release (D)	-	N/A
	- terminals of interlocking electromagnets (E)	-	N/A
	- terminals of indicated light devices (X)	-	N/A
	- terminals of contact elements for switching devices (no)	-	N/A

7.1	CONSTRUCTION		
7.1.1	Withdrawable circuit-breaker	-	N/A
	In the disconnected position (main- and auxiliary circuits)		
	Isolating distances for circuit-breaker suitable for isolating warranted:	-	N/A
	Mechanism fitted with a reliable indicating device with indicates the position of the isolating contacts.	-	N/A
	Mechanism fitted with interlocks witch only permit the isolating contacts to be separate or re-closed when main contacts are open	-	N/A
	Mechanism fitted with interlock witch only permit the main contacts to be closed when the isolating contacts are fully closed.	-	N/A
	Mechanism fitted with interlock witch only permit the main contacts to be closed when in disconnected position.	-	N/A
	The isolating distances between the isolating contacts cannot be inadvertently reduced.	-	N/A
7.1.1.1	Resistance to abnormal heat and fire	650 ℃ 960 ℃	P
7.1.2	Current-carrying parts and their connection	Compliance	P
7.1.3	Clearences and creepage distances:		
	For circuit-breakers for which the manufacturer has declared a value of rated impulse withstand voltage. (Uimp.)		
	Clearances distances:		
	- Uimp is given as:	8 kV	
	- max. value of rated operational voltage to earth	289 V	
	- nominal voltage of supply system:	500 V	
	- overvoltage category:	IV	
	- pollution degree:	3	
	- field-in or homogeneous:	Inhomogeneous	
	- minimum clearances (mm):	8 mm	

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	- measured clearances (mm):	14,5 mm	P
	Creepage distances:		
	- rated insulation voltage Ui (V)	750 V	
	- pollution degree	3	
	- comparative tracking index (V)	≥ 600 V	
	- material group	IIIa	
	Minimum creepage distances (mm)	12,5 mm	
	Measured creepage distances (mm)	14,5 mm	P
7.1.4 part 1	Actuator		
7.1.4.1 part 1	Insulation		
	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	Compliance	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/A
	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	Compliance	P
7.1.4.2	Direction of movement		
	The direction of operation for actuators of devices shall normally conform to IEC 60447.	Compliance	P
	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	Compliance	P
7.1.5 part 1	Indication of contact position		
7.1.5.1 part 1	Indicating means		
	When an equipment is provided with means for indicating the closed and open positions, these positions shall be unambiguous and clearly indicated	Compliance	P
	This is done by means of a position indicating device (see 2.3.18)	Compliance	P

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Clause	Requirement – Test	Result – Remark	Verdict
	If symbols are used, they shall indicate the closed and open position respectively, in accordance with IEC 60417-2:		
	- 60417-2-IEC-5007 I On (power)	Compliance	P
	- 60417-2-IEC-5007 O Off (power)	Compliance	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"	-	N/A
	Red colour shall not be used for any other push-button	-	N/A
	The colours of other push-buttons, illuminated push-buttons and indicator lights shall be in accordance with IEC 60073	-	N/A
7.1.5.2 part 1	Indication by the actuator		
	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	On position Off position Trip position	P
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 V):		
	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:		
	- the position of the actuator	Compliance	P
	- a separate mechanical indicator	-	N/A
	- visibility of the moving contacts	-	N/A
	When means are provided or to lock the equipment in the open position, locking only be possible when contacts are in the open position	-	N/A
	Actuator front-plate fitted to the equipment in a manner witch ensures correct contact position indication and locking	-	N/A
	The indicated open position is the only position in witch the specified isolation distances between the contacts is ensured.	Compliance	P
	- minimum clearances across open contacts (see Table XIII, Part 1) (mm) :	8 mm	

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	- measured clearances (mm) :	14,5 mm	P
	- test Uimp across gap (kV) :	12,1 kV	P
7.1.6.2	Supplementary requirements for equipment with provision for electrical interlocking with contactors or circuit-breakers:		
	auxiliary switch shall be rated according to IEC 60 947-5-1	-	N/A
	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/A
	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/A
	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/A
	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/A
	During the closing operation the contacts of the auxiliary switch shall close after or simultaneously with the contacts of the main poles	-	N/A
	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	-	N/A
7.1.6.3	Supplementary requirements for equipment provided with means for padlocking the open position:		
	the locking means shall be designed in such a way that it cannot be removed with the appropriate padlock(s) installed	-	N/A
	Alternatively, the design may provide padlockable means to prevent access to the actuator	-	N/A
	test force F applied to the actuator in an attempt to operate to the closed position (N) :	-	N/A
	rated impulse withstand voltage (kV) :	-	N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	test Uimp on open main contacts at the test force	-	N/A
7.1.7	Terminals		
7.1.7.1	All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength	Compliance	P
	Terminal connections shall be such that necessary contact pressure is maintained	Compliance	P
	Terminals shall be so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal	Compliance	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	Compliance	P
7.1.7.2	Connection capacity		
	type of conductors :	Flexible and stranded type	P
	minimum cross-sectional area of conductor (mm²) :	185mm^2 or 350 kcmil [300 A]	P
	maximum cross-sectional area of conductor (mm²) :	185mm^2 or 350 kcmil [630 A]	P
	number of conductors simultaneously connectable to the terminal :	1 [300 A] 2 [630 A]	P
7.1.7.3	Connection		
	terminals for connection to external conductors shall be readily accessible during installation	Compliance	P
	clamping screws and nuts shall not serve to fix any other component	Compliance	P
7.1.7.4	Terminal identification and marking		
	terminal intended exclusively for the neutral conductor	-	N/A
	protective earth terminal	-	N/A
	other terminals	-	N/A
7.1.8 part 1	Additional requirements for equipment provided with a neutral pole		
	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.).	-	N/A
	A switched neutral pole shall break not before and shall make not after the other poles	-	N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	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	-	N/A
	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	-	N/A
	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.	-	N/A
7.1.9	Provisions for protective earthing		
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/A
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	-	N/A
	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 50 mm x 50 mm) or are so located as to exclude any contact with live parts	-	N/A
7.1.9.2 part 1	Protective earth terminal		
	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/A
	The protective earth terminal shall be suitably protected against corrosion	-	N/A
	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/A

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Clause	Requirement – Test	Result – Remark	Verdict
	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/A
7.1.9.3	Protective earth terminal marking and identification		
	The protective earth terminal shall be clearly and permanently identified by its marking	-	N/A
	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/A
	Graphical symbol to be used: 60417-2-IEC-5019 ⏚ Protective earth (ground) in accordance with IEC 60417-2	-	N/A
7.1.10	Enclosure for equipment		
7.1.10.1	Design		
	The enclosure, when it is opened: all parts requiring access for installation and maintenance are readily accessible	-	N/A
	Sufficient space shall be provided inside the enclosure	-	N/A
	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	-	N/A
	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	-	N/A
	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/A
	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	-	N/A
	If the enclosure is used for mounting push-buttons, it shall not be possible to remove the buttons from the outside of the enclosure	-	N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
7.1.10.2	Insulation		
	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	-	N/A
7.1.11	Degree of protection of enclosed equipment		
	Degree of protection.	IP20	
	Test for first characteristic.	IPXX	
	Test for first numeral .....:	1 2 3 4 5 6	N/A
	Test for second characteristic	IPXX	
	Test for second numeral .....:	1 2 3 4 5 6 7 8	N/A
7.1.12 part 1	Conduit pull-out, torque and bending with metallic conduits		
	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/A
7.2	Performance requirements		
7.2.1	Operating condition		
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	Compliance	P

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IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
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	-	N/A
	Such a circuit-breaker should not be used in circuits having a prospective peak making current exceeding 10 kA	-	N/A
	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	-	N/A
7.2.1.1.2	Independent manual closing		
	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	Compliance	P
7.2.1.1.3	Dependent power closing		
	At 110% of the rated control supply voltage, the closing operation performed on no-load shall not cause any damage to the circuit-breaker.	-	N/A
	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.	-	N/A
7.2.1.1.4	Independent power closing		
	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	-	N/A
	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/A
7.2.1.1.5	Stored energy closing		
	Capable ensuring closing of the circuit-breaker in any condition between no-load and its rated making capacity	-	N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	- when the stored energy is retained within the circuit-breaker, a device is provided witch indicates when the storing mechanism is fully charged.	-	N/A
	- 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/A
	- 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/A
	- by manually operated circuit-breaker is the direction of operation indicated. (not for circuit-breaker with an independent manual closing operation.)	-	N/A
	- 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/A
7.2.1.2	Opening		
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		
7.2.1.2.2	Opening by undervoltage releases		
7.2.1.3. a part 1	Operating voltage		
	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	-	N/A
	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	-	N/A
	Unless otherwise stated in the relevant product standard, the upper limit of the supply voltage shall be 110% of its rated value	-	N/A
7.2.1.3. b part 1	Operating time		
	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	-	N/A
7.2.1.2.3	Opening by shunt releases	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
7.2.1.4 part 1	Limits of operation of shunt releases		
	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/A
7.2.1.5 part 1	Limits of operation of current operated relays and released		
	Limits of operation of current operated relays and releases shall be stated in the relevant product standard	-	N/A
7.2.1.2.4	Opening by over-current releases		
a)	Opening under short-circuit conditions		
	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	Compliance	P
	Where necessary for over-current co-ordination the manufacturer shall provide information (usually curves) showing	-	N/A
	- maximum cut-off (let-through) peak current as a function of prospective current (r.m.s. symmetrical)	Compliance	P
	- I^2t characteristics for circuit-breakers of utilization category A and, if applicable, B for circuit-breakers with instantaneous override (see not to 8.3.5)	Compliance	P
b)	Opening under overload conditions		
1)	Instantaneous or definite time-delay operation	-	N/A
	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/A
2)	Inverse timer-delay operation		
	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	Compliance	P
	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	Compliance	P

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Clause	Requirement – Test	Result – Remark	Verdict
	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	Compliance	P
	The width of the temperature band shall be at least 10 K on either side of the reference temperature	Compliance	P
7.2.4.2	Operational performance capability		
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	Compliance	P
	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	Compliance	P

8	TESTS		
8.2.4	Mechanical properties of terminals		
	Mechanical strength of terminals		
	maximum cross-sectional area of conductor (mm^2) :	-	
	diameter of thread (mm) :	12	
	torque (Nm) :	14	
	5 times on 2 separate clamping units Nm	15,4	P
	Testing for damage to and accidental loosening of conductor (flexion test)		
	conductor of the smallest cross-sectional area (mm^2) :	-	
	number of conductor 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	-	N/A
	Pull-out test		
	force (N) :	-	

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Clause	Requirement – Test	Result – Remark	Verdict
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A
	conductor of the largest cross-sectional area (mm²) :	-	
	number of conductor 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	-	N/A
	Pull-out test		
	force (N) :	-	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A
	conductor of the largest and smallest cross-sectional area (mm²) :	-	
	number of conductor of the smallest cross section, number of conductor 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	-	N/A
	Pull-out test		
	force (N) :	-	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A

8.3.3	TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS		
8.3.3.1	Tripping limits and characteristic		
8.3.3.1.2	Opening under short-circuit conditions		
	Manufacturer's name or trademark	LS	
	Type designation or serial number	TS630L	
	Sample no:	S1-1	
	Rated operational voltage: Ue (V)	500 V	

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Clause	Requirement – Test	Result – Remark	Verdict
	Rated current: In (A)	630 A	
	Ambient temperature 10-40 °C :	24 °C	P
	Value of the tripping current declared by the manufacturer for a single pole, at witch value they shall operate.	4095 A (Im=5×Ir) 8190 A (Im=10×Ir)	P
	Range of adjustable setting current. (A)	3150 ~ 6300 A (Im=5~10×Ir)	P
	Time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 80% of the rated, or minimum adjustable setting current: (A)	2520 A (Im=5×Ir)	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 L1-L2: >0,2 s L1-L3: >0,2 s L2-L3: >0,2 s	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/A
	Test current: 80% of the maximum adjustable setting current: (A)	5040 A (Im=10×Ir)	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 L1-L2: >0,2 s L1-L3: >0,2 s L2-L3: >0,2 s	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/A
	Test current: 120% of the rated, or minimum adjustable setting current: (A)	3780 A (Im=5×Ir)	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 L1-L2: 0,0254 s L1-L3: 0,0271 s L2-L3: 0,0278 s	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/A
	Test current: 120% of the maximum adjustable setting current: (A)	7560 A (Im=10×Ir)	P

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Clause	Requirement – Test	Result – Remark	Verdict
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	L1-L2: 0,0296 s L1-L3: 0,0239 s L2-L3: 0,0286 s	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/A
	Test current: tripping current declared for single pole operation (A)	4095 A (Im=5×Ir) 8190 A (Im=10×Ir)	P
	Operating time: < 20 ms in case of instantaneous release: L1: L2: L3:	Min / Max adjustable setting L1: 0,0280 s / 0,0261 s L2: 0,0277 s / 0,0229 s L3: 0,0288 s / 0,0240 s	P
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3:	-	N/A
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/A
	Value of the tripping current declared by the manufacturer for a single pole, at witch value they shall operate.	-	N/A
	Range of adjustable setting current. (A)	-	N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 90% of the rated, or minimum adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases:	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Test current: 90% of the maximum adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases:	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
b)	Inverse time delay releases		
	Manufacturer's name or trademark	LS	
	Type designation or serial number	TS630L	
	Sample no:	S1-1	
	Rated operational voltage: Ue (V)	500 V	
	Rated current: In (A)	630 A	
	For releases dependent of ambient air temperature: Reference temperature	40 °C	P
	Test ambient temperature (°C)	24 °C	P
	If test made at a difference ambient temperature: Acc. manufacturer's correction temperature/current data:	See Remarks	P
	Range of adjustable setting current: (A)	0,8 / 0,9 / 1,0 x In	P
	For releases independent of ambient temperature: Test made at 30°C and/or at 20/40°C	-	N/A
	Test ambient air temperature:	-	N/A
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40 °C	P

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Clause	Requirement – Test	Result – Remark	Verdict
	Releases, independent of ambient air temperature: at 30°C	-	N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	551 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	2h	P
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	683 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	886 s	P
	Test current: 105% of the maximum adjustable setting current: (A)	689 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	2 h	P
	Test current: 130% of the maximum adjustable setting current: (A)	853 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	670 s	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:	-	N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	-	N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	-	N/A
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A
	Test current: 105% of the maximum adjustable setting current: (A)	-	N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	-	N/A
	Test current: 130% of the maximum adjustable setting current: (A)	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A
	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		
	Releases, dependent of ambient air temperature: Reference temperature (°C)	25 °C	P

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Clause	Requirement – Test	Result – Remark	Verdict
	Releases, independent of ambient air temperature: at 30°C	-	N/A
	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)	1576 A (0,8 In) 1969 A (1,0 In)	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolorances)	184 s (0,8 In) 135 s (1,0 In)	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:	-	N/A
	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/A
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolorances)	-	N/A
8.3.3.1.4	Additional test for definite time-delay releases		
a)	Time delay		
	Test is made at a current equal to 1,5 times the current setting		
	overload releases: (all phase poles loaded)	-	N/A
	short-circuit releases: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.	-	N/A
	Test current: 1,5 times of the rated, or minimum adjustable setting current: (A)	-	N/A
	Operating time, overload releases: (s)	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Operating time, short-circuit releases: (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Test current: 1,5 times of the maximum adjustable setting current: (A)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Operating time, overload releases: (s)	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Operating time, short-circuit releases: (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
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.		
	overload releases: (all phase poles loaded)	-	N/A
	short-circuit releases: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.	-	N/A
	Test current: 1,5 times of the rated, or minimum adjustable setting current: (A)	-	N/A
	Time interval: non-tripping duration stated by the manufacturer: (s)	-	N/A
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:	-	N/A
	Test current: 1,5 times of maximum adjustable setting current: (A)	-	N/A
	Time interval: non-tripping duration stated by the manufacturer: (s)	-	N/A
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:	-	N/A
	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.		
	Test current: of the rated, or minimum adjustable setting current: (A)	-	N/A
	Time interval: twice the delay-time stated by the manufacturer: (s)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:	-	N/A
	Test current: maximum adjustable setting current: (A)	-	N/A
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:	-	N/A
8.3.3.2	Test of dielectric properties, impulse withstand voltage (Uimp indicated):		
8.3.3.4 part1	The 1,2/50µs impulse voltage shall be applied five times for each polarity at intervals of 1s minimum		
	- rated impulse withstand voltage (kV) :	8 kV	P
	- sea level of the laboratory:	200 m	P
	- test Uimp main circuits (kV) :	9,6 kV	P
	- test Uimp auxiliary circuits (kV) :	-	N/A
	- test Uimp control circuits (kV) :	-	N/A
	- test Uimp on open main contacts (equipment suitable for isolating) (kV) :	12,1 kV	P
a)	Application of test voltage		
	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.	Compliance	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.	compliance	P
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit	Compliance	P
	- other circuits	-	N/A
	- exposed conductive parts	-	N/A
	- enclosure of mounting plate	-	N/A
	iv) equipment suitable for isolation	Compliance	P
	equipment not suitable for isolation	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- no unintentional disruptive discharge during the test's	Compliance	P
	Test of dielectric properties, dielectric withstand voltage (Uimp not indicated):		
	- rated insulation voltage (V) :	-	N/A
	- main circuits, test voltage for 1 min (V)	-	N/A
	- auxiliary circuits, test voltage for 1 min (V)	-	N/A
	- control circuits, test voltage for 1 min (V)	-	N/A
8.3.3.2.2	Application of test voltage		
1)	with circuit-breaker in the closed position		
	- between all live parts of all poles connected together and the frame of the circuit-breaker .	-	N/A
	- between each pole and all the other poles connected to the frame of the circuit-breaker	-	N/A
2)	with the circuit-breaker in the open position and, additionally, in the tripped position, if any.	-	N/A
	- between all live parts of all poles connected together and the frame of the circuit-breaker.	-	N/A
	- between the terminals of one side connected together and the terminals of the other side connected together.	-	N/A
b)	Control and auxiliary circuits		
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/A
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/A
	No unintentional disruptive discharge during the test's	-	N/A
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/A
8.3.3.3	Mechanical operation and operational performance capability		
8.3.3.3.2	Construction and mechanical operation		
a)	Construction		
	A withdrawable circuit-breaker shall be checked for the requirements stated in 7.1.1	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	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	-	N/A
b)	Mechanical operation		
	A circuit-breaker with dependent power operation shall comply with the requirements stated in 7.2.1.1.3	-	N/A
	A circuit-breaker with dependent power operation shall operate with the operating mechanism charged to the minimum and maximum limits stated by the manufacturer	-	N/A
	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.	-	N/A
	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	-	N/A
	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/A
	If the closing and opening times of a circuit-breaker are stated by the manufacturer, such times shall comply with the stated values	-	N/A
c)	Undervoltage releases		
	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/A
i)	Drop out voltage		
	It shall be verified that the release operates to open the circuit-breaker between the voltage limits specified	-	N/A
	The voltage shall be reduced from rated voltage at a rate to reach 0 V in approximately 30 s	-	N/A
	The test for the lower limit is made without current in the main circuit and without previous heating of the release coil	-	N/A
	In the case of a release with a range of rated voltages, this test applies to the maximum voltage of the range	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	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/A
	This test may be combined with the temperature-rise test of 8.3.3.6	-	N/A
	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	-	N/A
ii)	Test for limits of operation		
	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/A
	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/A
iii)	Performance under overvoltage conditions		
	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/A
d)	Shunt releases		
	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	-	N/A
	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	-	N/A
	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	-	N/A
8.3.3.3.3	Operational performance capability without current.		
	Type designation or serial number	TS630L	
	Sample no:	S1-1	
	Rated current In (A)	630 A	
	Rated operational voltage: Ue (V)	500 V	

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Clause	Requirement – Test	Result – Remark	Verdict
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt releases: Uc (V)	-	
	Rated control supply voltage undervoltage releases: Uc (V)	-	
	Ambient temperature 10-40 °C :	25 °C	P
	Number of operating cycles per hour	120 cycles per hour	P
	Number of cycles without current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Number of cycles without current (without releases)	4000 cycles	P
	Applied voltage: closing mechanism (V)	-	N/A
	10% of total cycles for circuit-breaker with fitted shunt release: (50% at the beginning- and 50% at the end of the test.) Energized at the rated Uc	-	N/A
	Applied voltage: shunt releases (V)	-	N/A
	10% of total cycles for circuit-breaker with undervoltage releases: (50% at the beginning- and 50% at the end of the test.) Energized at the minimum rated Uc	-	N/A
	10 cycles without applied voltage at the undervoltage releases. (Shall not possible to close the circuit-breaker.)	-	N/A
	Applied voltage: undervoltage releases (V)	-	N/A
	Electrical components do not exceed the value indicated in tab. 7.	Compliance	P
8.3.3.3.4	Operational performance capability with current.		
	Rated current: In (A)	630 A	
	Maximum rated operational voltage: Ue (V)	500 V	
	Conductor cross-sectional area (mm²) :	185 mm² X2 (350 kcmil X2)	P
	Number of operating cycles per hour	60 cycles per hour	P
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	1000 cycles	P
	Applied voltage: closing mechanism (V)	500 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.	-	N/A
	Conditions, make/break operations:		

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Clause	Requirement – Test	Result – Remark	Verdict
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	L1 : 511,9 V L1 : 510,0 V L2 : 511,5 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	L1 : 628 A L1 : 621 A L2 : 649 A	P
	- power factor/time constant:	0,73	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1000 ms	P
	- off-time (s):	59 s	P
	Electrical components do not exceed the value indicated in tab. 7.	Compliance	P
8.3.3.3.5	Additional test of operational performance capability without current for withdrawable circuit-breaker.		
	Number of operations cycles : 100	-	N/A
	After test, the isolating contacts, withdrawable mechanism and interlocks shall be suitable for further service.	-	N/A
8.3.3.4	Overload performance		
	this test applies to circuit-breaker of rated current up to and including 630 A		
	Type designation or serial number	TS630L	
	Sample no:	S1-1	
	Rated current In (A)	630 A	
	Rated operational voltage: Ue (V)	500 V	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt releases: Uc (V)	-	
	Rated control supply voltage undervoltage releases: Uc (V)	-	
	Ambient temperature 10-40 °C :	25 °C	P
	Number of operating cycles per hour	60 cycles per hour	P
	Maximum rated operational voltage: Ue (V)	500 V	P
	Number of operating cycles per hour	-	N/A
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Applied voltage: closing mechanism (V)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload/short-circuit settings at maximum.	-	N/A
	Conditions, overload operations:		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1 : 546,1 V L1 : 545,5 V L2 : 549,2 V	P
	- test current AC/DC: I/Ie = 6,0/2.5 (A) ..... L1: ..... L2: L3:	L1 : 3810 A L1 : 3880 A L2 : 3840 A	P
	- power factor/time constant:	0,47	P
	- Number of cycles manually opened: 9	12	P
	- Number of cycles automatically opened by an overload release: 3	3 (at the lower voltage)	P
	- frequency: (Hz)	60 Hz	P
	- on-time max 2s:	1 s	P
8.3.3.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1.1 Ue)	< 5uA / 550 V	P
8.3.3.6	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	See table	P
	Temperature rise of main circuit terminals ≤ 80 K (K) :	63,5 K	P
	conductor cross-sectional area (mm²) :	185 mm^2 X2 (350 kcmil X2)	P
	test current Ie (A) :	630 A	P
8.3.3.7	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	952 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	299 s	P
8.3.3.8	Verification of undervoltage and shunt releases		
	Circuit-breaker fitted with undervoltage releases. The release shall not operate at 70% of the minimum control supply voltage -	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	and shall operate at 35% of the maximum control supply voltage.	-	N/A
	Circuit-breaker fitted with shunt releases. The release shall operate at 70% of the minimum rated control supply voltage. Test made at room temperature.	-	N/A
8.3.3.9	Verification of the main contact position for circuit-breakers for isolation		
	actuating force for opening (N) .....:	117,6 N	—
	test force with blocked main contacts for 10 s (N) .:	352,8 N	—
	Dependent power operation		
	Supply voltage of 110% of rated voltage (V).....:	-	N/A
	Three attempts of 5 s to operate the equipment at intervals of 5 min.	-	N/A
	Independent power operation		
	Three attempts to operate the equipment by the stored energy.	-	N/A
	Lockability of driving mechanism in OFF-position at test force and blocked main contacts .....:	-	N/A
	Position indicator does not show OFF-position after capture of test force at blocked main contacts	Compliance	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/A
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	-	N/A
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm²) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	-	N/A
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	-	N/A
	power factor/time constant :	-	N/A
	- Factor "n"	-	N/A
	- peak test current (A) :	-	N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:	-	N/A
	Pause, t: (min)		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Pause, t: (min)	-	N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Melting of the fusible element	-	N/A
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	-	N/A
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	-	
	Maximum rated operational voltage: Ue (V)	-	
	Conductor cross-sectional area (mm^2) :	-	
	Number of operating cycles per hour	-	N/A
	Number (5% of the number given in columm 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	-	N/A
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	-	N/A
	- power factor/time constant:	-	N/A
	- frequency: (Hz)	-	N/A
	- on-time (ms):	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- off-time (s):	-	N/A
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	-	N/A
	- no breakdown or flashover	-	N/A
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1.1 Ue)	-	N/A
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm²) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.4.5	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A

8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
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	TS630L	
	Sample no:	S2-1N	
	Rated current: In (A)	630 A	
	Rated operational voltage: Ue (V)	240 V	
	Rated service short-circuit breaking capacity: (kA)	200 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.	Compliance	P

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Clause	Requirement – Test	Result – Remark	Verdict
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	180(W) x 380(H) x 110(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,55	P
	- size of hole: <30mm^2	28 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm²) :	185 mm^{2}X2 (250 kcmil X2)	P
	If terminals unmarked: line connected at: (underside/upside)	upside	P
	Tightening torques: (Nm)	10,0 Nm	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.		
	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.		
	Time specified by the manufacturer:	80~720 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 499 s L2 : 406 s L3 : 374 s	P
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1 : 258,4 V L2 : 258,4 V L3 : 258,4 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	 L1 : 205200 A L2 : 203800 A L3 : 207600 A	P
	power factor/time constant :	0,18	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- Factor "n"	2,2	P
	- peak test current (A) :	457800 A	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 21,3 kApeak L2 : 45,1 kA peak L3 : 27,2 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,3 MA^2s L2 : 1,6 MA^2s L3 : 0,5 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 8,6 kApeak L2 : 31,9 kA peak L3 : 38,7 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,0 MA^2s L2 : 0,9 MA^2s L3 : 1,2 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 31,9 kApeak L2 : 40,0 kA peak L3 : 10,5 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,9 MA^2s L2 : 1,3 MA^2s L3 : 0,1 MA^2s	P
	Melting of the fusible element	No	P
	Holes in the PE-sheet for test sequence "O"	No	P
	Cracks observed	No	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	630 A	
	Maximum rated operational voltage: Ue (V)	240 V	
	Conductor cross-sectional area (mm^2) :	185 mm^2X2 (250 kcmil X2)	
	Number of operating cycles per hour	60 cycles per hour	P
	Number (5% of the number given in columm 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	50 cycles	P
	Applied voltage: closing mechanism (V)	240 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.	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) .....L1: .....L2: L3:	L1 : 248,2 V L2 : 244,9 V L3 : 242,1 V	P
	- test current I/Ie = 1,0 (A).....L1: .....L2: L3:	L1 : 626 A L2 : 615 A L3 : 648 A	P
	- power factor/time constant:	0,73	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1000 ms	P
	- off-time (s):	59 s	P
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	10 uA / 264 V	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	See Remarks	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	57,3 K	P
	conductor cross-sectional area (mm²) :	185 mm²X2 (250 kcmil X2)	P
	test current Ie (A) :	630 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	950 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	594 s	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	80~720 s	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 250 s L2 : 195 s L3 : 211 s	P
8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
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	TS630L	
	Sample no:	S2-2	
	Rated current: In (A)	300 A	
	Rated operational voltage: Ue (V)	240 V	
	Rated service short-circuit breaking capacity: (kA)	200 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.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	180(W) x 380(H) x 110(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,55	P
	- size of hole: <30mm^2	28 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm^2) :	185 mm^2 (250 kcmil)	P

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Clause	Requirement – Test	Result – Remark	Verdict
	If terminals unmarked: line connected at: (underside/upside)	Upside	P
	Tightening torques: (Nm)	10,0 Nm	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.		
	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.		
	Time specified by the manufacturer:	80~720 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 487 s L2 : 555 s L3 : 362 s	P
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1 : 258,4 V L2 : 258,4 V L3 : 258,4 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	 L1 : 205200 A L2 : 203800 A L3 : 207600 A	P
	power factor/time constant :	0,18	P
	- Factor "n"	2,2	P
	- peak test current (A) :	457800 A	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 20,2 kApeak L2 : 40,4 kA peak L3 : 24,2 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,3 MA^2s L2 : 1,4 MA^2s L3 : 0,4 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 36,2 kApeak L2 : 28,0 kA peak L3 : 16,3 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 1,2 MA^2s L2 : 0,6 MA^2s L3 : 0,2 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 35,4 kApeak L2 : 6,1 kA peak L3 : 32,1 kApeak	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 1,1 MA^2s L2 : 0,0 MA^2s L3 : 1,0 MA^2s	P
	Melting of the fusible element	No	P
	Holes in the PE-sheet for test sequence "O"	No	P
	Cracks observed	No	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	-	
	Maximum rated operational voltage: Ue (V)	-	
	Conductor cross-sectional area (mm^2) :	-	
	Number of operating cycles per hour	-	N/A
	Number (5% of the number given in columm 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	-	N/A
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	-	N/A
	- power factor/time constant:	-	N/A
	- frequency: (Hz)	-	N/A
	- on-time (ms):	-	N/A
	- off-time (s):	-	N/A
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	10 uA / 264 V	P

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Clause	Requirement – Test	Result – Remark	Verdict
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm²) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	452 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	2308 s	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	80~720 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 174 s L2 : 171 s L3 : 154 s	P
8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
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	TS630L	
	Sample no:	S2-3	
	Rated current: In (A)	630 A	
	Rated operational voltage: Ue (V)	415 V	
	Rated service short-circuit breaking capacity: (kA)	150 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.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	180(W) x 380(H) x 110(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,55	P
	- size of hole: <30mm^2	28 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm²) :	185 mm^{2}X2 (250 kcmilX2)	P
	If terminals unmarked: line connected at: (underside/upside)	upside	P
	Tightening torques: (Nm)	10,0 Nm	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.		
	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.		
	Time specified by the manufacturer:	80~720 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 345 s L2 : 330 s L3 : 395 s	P
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1 : not recorded L2 : not recorded L3 : not recorded	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	 L1 : 151800 A L2 : 151800 A L3 : 148400 A	P
	power factor/time constant :	0,19	P
	- Factor "n"	2,0	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- peak test current (A) :	333400 A	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 26,6 kApeak L2 : 52,9 kA peak L3 : 29,2 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,6 MA^2s L2 : 2,4 MA^2s L3 : 0,7 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 24,2 kApeak L2 : 50,2 kA peak L3 : 28,7 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,5 MA^2s L2 : 2,1 MA^2s L3 : 0,7 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 16,7 kApeak L2 : 35,4 kA peak L3 : 49,4 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,3 MA^2s L2 : 1,2 MA^2s L3 : 2,2 MA^2s	P
	Melting of the fusible element	No	P
	Holes in the PE-sheet for test sequence "O"	No	P
	Cracks observed	No	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	630 A	
	Maximum rated operational voltage: Ue (V)	415 V	
	Conductor cross-sectional area (mm^2) :	185 mm^2X2 (250 kcmil X2)	
	Number of operating cycles per hour	60 cycles per hour	P
	Number (5% of the number given in columm 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	50 cycles	P
	Applied voltage: closing mechanism (V)	415 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.	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	L1 : 426,3 V L2 : 418,3 V L3 : 422,8 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	L1 : 624 A L2 : 625 A L3 : 640 A	P
	- power factor/time constant:	0,71	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1000 ms	P
	- off-time (s):	59 s	P
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	550 uA / 457 V	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	See Remarks	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	56,7 K	P
	conductor cross-sectional area (mm²) :	185 mm²X2 (250 kcmil X2)	P
	test current Ie (A) :	630 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	950 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	421 s	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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:		
	Time specified by the manufacturer:	80~720 s	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 248 s L2 : 199 s L3 : 220 s	P
8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
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	TS630L	
	Sample no:	S2-4-1	
	Rated current: In (A)	630 A	
	Rated operational voltage: Ue (V)	500 V	
	Rated service short-circuit breaking capacity: (kA)	85 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.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	180(W) x 380(H) x 110(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,55	P
	- size of hole: <30mm^2	28 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm²) :	185 mm^{2}X2 (250 kcmil X2)	P

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Clause	Requirement – Test	Result – Remark	Verdict
	If terminals unmarked: line connected at: (underside/upside)	Underside	P
	Tightening torques: (Nm)	10,0 Nm	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.		
	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.		
	Time specified by the manufacturer:	80~720 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 455 s L2 : 360 s L3 : 401 s	P
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1 : not recorded L2 : not recorded L3 : not recorded	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	 L1 : 86400 A L2 : 85400 A L3 : 86400 A	P
	power factor/time constant :	0,18	P
	- Factor "n"	2,2	P
	- peak test current (A) :	189600 A	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 26,5 kApeak L2 : 43,8 kA peak L3 : 20,9 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,9 MA^2s L2 : 2,2 MA^2s L3 : 0,5 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 25,1 kApeak L2 : 40,7 kA peak L3 : 20,8 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,8 MA^2s L2 : 2,0 MA^2s L3 : 0,5 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 18,3 kApeak L2 : 40,5 kA peak L3 : 31,3 kApeak	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,5 MA^2s L2 : 2,2 MA^2s L3 : 1,1 MA^2s	P
	Melting of the fusible element	No	P
	Holes in the PE-sheet for test sequence "O"	No	P
	Cracks observed	No	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	630 A	
	Maximum rated operational voltage: Ue (V)	500 V	
	Conductor cross-sectional area (mm^2) :	185 mm^2X2 (250 kcmil X2)	
	Number of operating cycles per hour	60 cycles per hour	P
	Number (5% of the number given in columm 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	50 cycles	P
	Applied voltage: closing mechanism (V)	500 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.	-	N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	L1 : 518,1 V L2 : 504,2 V L3 : 517,2 V	P
	- test current I/Ie = 1,0 (A)..... L1: ..... L2: L3:	L1 : 625 A L2 : 628 A L3 : 640 A	P
	- power factor/time constant:	0,72	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1000 ms	P
	- off-time (s):	59 s	P
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	700 uA / 550 V	P

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Clause	Requirement – Test	Result – Remark	Verdict
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	See Remarks	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	55,0 K	P
	conductor cross-sectional area (mm²) :	185 mm²X2 (250 kcmil X2)	P
	test current Ie (A) :	630 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	950 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	1718 s	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	80~720 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 261 s L2 : 220 s L3 : 224 s	P

8.3.5	TEST SEQUENCE III (Icu)		
	Rated ultimate short-circuit breaking		
	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.		
	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.		
	For integrally fused circuit-breakers, test sequence V applies in place or this sequence.		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current: In (A)	-	
	Rated operational voltage: Ue (V)	-	
	Rated ultimate short-circuit breaking capacity: (kA)	-	

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Clause	Requirement – Test	Result – Remark	Verdict
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	-	N/A
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A
8.3.5.2	Test of rated ultimate short-circuit breaking capacity		
	The test sequence of operations is O – t – CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	N/A
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	-	N/A
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm²) :	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening, torques: (Nm)	-	N/A
	Test sequence of operation: O – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: L3:	-	N/A
	power factor/time constant :	-	N/A
	- Factor "n"	-	N/A
	- peak test current (Amax) :	-	N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Pause, t: (min)	-	N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Melting of the fusible element	-	N/A
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	-	N/A
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	-	N/A
	- no breakdown or flashover	-	N/A
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	-	N/A
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A

8.3.6	TEST SEQUENCE IV		
	Rated short-time withstand current		
	Except where the combined test sequence applies, this test sequence applies to circuit-breakers of utilization category B and to those circuit-breaker of category A covered by note 3 of table 4, and comprises the following tests:		
	Where integrally fused circuit-breaker are of utilization category B, they shall meet the requirements of this sequence.		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current: In (A)	-	
	Rated operational voltage: Ue (V)	-	
	Rated short-time withstand current: (kA/s)	-	
	Rated frequency: (Hz)	-	
8.3.6.1	Verification of overload releases		
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	-	N/A
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A
8.3.6.2	Test of rated short-time withstand current.		
	For this test, any over-current release, including the instantaneous override, if any, likely to operate during the test, shall be rendered inoperative.		
	- test frequency: (Hz)	-	N/A
	- duration of the test: (s)	-	N/A
	- test frequency: (Hz)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- power factor / time constant (ms):	-	N/A
	- factor "n"	-	N/A
	- test voltage: (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current: (kA) ..... L1: ..... L2: L3:	-	N/A
	- highest peak current: (kA)	-	N/A
8.3.6.3	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm²) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.6.4	Test of short-circuit breaking capacity at the max. short-time withstand current.		
	Rated short-time withstand current: (kA/s)		
	Test sequence: O – t - CO		
	max. available time setting of the short–time delay short-circuit release. (s)	-	N/A
	- test frequency: (Hz)	-	N/A
	- power factor / time constant (ms):	-	N/A
	- factor "n"	-	N/A
	Test sequence "O"		
	- test voltage: (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current: (kA) ..... L1: ..... L2: L3:	-	N/A
	- highest peak current: (kA)	-	N/A
	- the circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short–time delay short-circuit release and -	-	N/A
	- the instantaneous override, if any, shall not operate.	-	N/A
	-pause: t (s)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence "CO"		
	- test voltage: (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current: (kA) ..... L1: ..... L2: L3:	-	N/A
	- highest peak current: (kA)	-	N/A
	- the circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short–time delay short-circuit release and -	-	N/A
	- the instantaneous override, if any, shall not operate.	-	N/A
	- if the circuit-breaker has a making current release, this requirement does not apply to the CO operation, if the prospective current exceeds the pre-determined value, since it will then operate.	-	N/A
8.3.6.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	-	
	- no breakdown or flashover	-	N/A
8.3.6.6	Verification of overload releases	-	N/A
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A

8.3.7	TEST SEQUENCE V		
	Performance of integrally fused circuit-breakers		
	STAGE 1		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current: In (A)	-	
	Rated operational voltage: Ue (V)	-	

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Clause	Requirement – Test	Result – Remark	Verdict
	Value of prospective current equal to the selectivity limit current, as declared by the manufacturer. (kA)	-	
	Type of integrated fuses (all details)	-	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	
8.3.7.1	Short-circuit at the selectivity limit current		
	Test sequences "O"		
	Fuses shall be fitted	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	-	N/A
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm²) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	-	N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	-	N/A
	power factor/time constant :	-	N/A
	- factor "n"	-	N/A
	- peak test current (Amax) :	-	N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	- fuses shall still intact ..... L1: ..... L2: L3:	-	N/A
8.3.7.2	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm^2) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.7.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	-	N/A
	- no breakdown or flashover	-	N/A

	STAGE 2		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current: In (A)	-	
	Rated operational voltage: Ue (V)	-	
	1.1 time the value of prospective current equal to the selectivity limit current, as declared by the manufacturer. (kA)	-	
	Type of integrated fuses (all details)	-	

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Clause	Requirement – Test	Result – Remark	Verdict
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	
8.3.7.4	Verification of overload releases	-	N/A
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A
8.3.7.5	Short-circuit at 1,1 times the take-over current		
8.3.7.1	Short-circuit at the selectivity limit current		
	Test sequences "O"		
	Fuses shall be fitted	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0.8 mm, 50 mm long	-	N/A
	Circuit is earthed at: (load-star- or supply-star point)		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Conductor cross-sectional area (mm²) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	-	N/A
	1.1 time the value of prospective current equal to the selectivity limit current, as declared by the manufacturer. (kA)		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	-	N/A
	power factor/time constant :	-	N/A
	- factor "n"	-	N/A
	- peak test current (Amax) :	-	N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	- at least two of the fuses shall have blown ..... L1: ..... L2: L3:	-	N/A
8.3.7.6	Short-circuit at ultimate short-circuit breaking capacity		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current: In (A)	-	
	Rated operational voltage: Ue (V)	-	
	Rated ultimate short-circuit breaking capacity. (kA)	-	
	Type of integrated fuses (all details)	-	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	
	Test sequences: O – t – CO		
	Fuses shall be fitted	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	-	N/A
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm²) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	-	N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	-	N/A
	power factor/time constant :	-	N/A
	- factor "n"	-	N/A
	- peak test current (A) :	-	N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Pause: t (s)	-	N/A
	new fitted fuses	-	N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
8.3.7.7	Verification of dielectric withstand		
	- equal twice time rated operational voltage with a minimum of 1000 V (new fuses fitted)	-	N/A
	- no breakdown or flashover	-	N/A
8.3.7.8	Verification of overload releases		
	The operation of overload releases shall be verified at 2.5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A

8.3.8	Combined test sequence		
	At the discretion of, or in agreement with the manufacturer, this sequence may be applied to circuit-breaker of utilization cat. B:		
	Type designation or serial number	-	N/A
	Sample no:	-	N/A
	Rated current: In (A)	-	N/A
	Rated operational voltage: Ue (V)	-	N/A
	Rated short-time withstand current: (kA/s)	-	N/A
	Rated frequency: (Hz)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
8.3.8.1	Verification of overload releases		
	The operation of overload releases shall be verified twice times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A
8.3.8.2	Test of rated short-time withstand current.		
	For this test, any over-current release, including the instantaneous override, if any, likely to operate during the test, shall be rendered inoperative.		
	- test frequency: (Hz)	-	N/A
	- duration of the test: (s)	-	N/A
	- test frequency: (Hz)	-	N/A
	- power factor / time constant (ms):	-	N/A
	- factor "n"	-	N/A
	- test voltage: (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current: (kA) ..... L1: ..... L2: L3:	-	N/A
	- highest peak current: (kA)	-	N/A
8.3.8.3	Test of rated service short-circuit breaking capacity		
	At the highest voltage applicable to the rated short-time current.		
	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)	-	

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Clause	Requirement – Test	Result – Remark	Verdict
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	-	N/A
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm²) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	-	N/A
	Test sequence of operation: O – t – CO – t – CO		
	The highest voltage applicable to the rated short-time current.	-	N/A
	- test voltage U/Ue = 1,05 (V) .....L1: .....L2: L3:	-	N/A
	- r.m.s. test current AC/DC: (A) .....L1: .....L2: L3:	-	N/A
	power factor/time constant :	-	N/A
	- Factor "n"	-	N/A
	- peak test current (A) :	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence "O"		
	- max. let-through current: (kApeak ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Pause, t: (min)	-	N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Pause, t: (min)	-	N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	The circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short-time delay short-circuit release.	-	N/A
	During this test the instantaneous override shall not operate	-	N/A
	- and the making current release shall operate	-	
8.3.8.4	Operational performance capability with current.		
	Rated current: In (A)	-	N/A
	Maximum rated operational voltage: Ue (V)	-	N/A
	Conductor cross-sectional area (mm^2) :	-	N/A
	Number of operating cycles per hour	-	N/A
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Conditions, make/break operations:	-	N/A
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	-	N/A
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	-	N/A
	- power factor/time constant:	-	N/A
	- frequency: (Hz)	-	N/A
	- on-time (ms):	-	N/A
	- off-time (s):	-	N/A
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.8.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	-	
	- no breakdown or flashover	-	N/A
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	-	N/A
8.3.8.7	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm²) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.8.7	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
Annex C	Individual pole short-circuit test sequence		
	Circuit-breaker for use on phase-earthed systems		
C.2	Test of individual pole short-circuit breaking capacity		
	A short-circuit test is made with a value of prospective current (Isu) equal to 25% of the ultimate rated short-circuit breaking capacity (Icu)		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current: In (A)	-	
	Rated operational voltage: Ue (V)	-	
	Rated ultimate short-circuit breaking capacity: (kA)	-	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	
	The test sequence of operations is O – t – CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	N/A
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm²) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	-	N/A
	Test sequence of operation: O – t – CO		
	Test circuit according figure: 9	-	N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A
	short-circuit test current (Isu): equal to 25% of the ultimate rated short-circuit breaking capacity (Icu)	-	N/A
	- r.m.s. test current AC/DC: (A):	-	N/A
	power factor/time constant :	-	N/A
	- Factor "n"	-	N/A
	- peak test current (Amax) :	-	N/A
	Test sequence "O" L1		
	- max. let-through current: (kApeak) L1:	-	N/A
	- Joule integral I²dt (A²s) L1:	-	N/A
	Pause, t: (min)	-	N/A
	Test sequence "CO" L1		
	- max. let-through current: (kApeak) L1:	-	N/A
	- Joule integral I²dt (A²s) L1:	-	N/A
	Test sequence "O" L2		
	- max. let-through current: (kApeak) L2:	-	N/A
	- Joule integral I²dt (A²s) L2:	-	N/A
	Pause, t: (min)	-	N/A
	Test sequence "CO" L2		
	- max. let-through current: (kApeak) L2:	-	N/A
	- Joule integral I²dt (A²s) L2:	-	N/A
	Test sequence "O" L3		
	- max. let-through current: (kApeak) L3:	-	N/A
	- Joule integral I²dt (A²s) L3:	-	N/A
	Pause, t: (min)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence "CO" L3		
	- max. let-through current: (kApeak) L3:	-	N/A
	- Joule integral I^2dt (A^2s) L3:	-	N/A
	Melting of the fusible element	-	N/A
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	-	N/A
C.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	-	N/A
	- no breakdown or flashover	-	N/A
C.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2.5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A

Annex H	Individual pole short-circuit test sequence		
	Circuit-breaker for use in IT systems		
H.2	Test of individual pole short-circuit breaking capacity		
	A short-circuit test is made on the individual poles of a multipole circuit-breaker at a value of prospective current (I_{IT}) equal to 1,2 times the max. setting of the short-time delay release tripping current or, in the absence of such a release, 1,2 time the max. setting of the tripping current of the instantaneous release, or, where relevant 1,2 times the max. setting of the definite time delay release tripping current, but not exceeding 50kA.		
	Type designation or serial number	TS630L	
	Sample no:	H-1	
	Rated current: In (A)	630 A	
	Rated operational voltage: Ue (V)	500 V	
	Rated ultimate short-circuit breaking capacity: (kA)	9,1 kA	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	

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Clause	Requirement – Test	Result – Remark	Verdict
	The test sequence of operations is O – t - CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	180(W) × 380(L) × 110(H)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,55	P
	- size of hole: <30mm^2	28 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm^2) :	185 mm^{2}X2 (250 kcmil X2)	P
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	10,0 Nm	P
	Test sequence of operation: O – t – CO	Compliance	P
	Test circuit according figure: 9	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	550,4 V	P
	Short-circuit test current (I_{IT}): equal to 1,2 times the max. setting of the short-time delay release tripping current,	-	N/A
	or, in the absence of such a release, 1,2 time the max. setting of the tripping current of the instantaneous release,	9,1 kA	P

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Clause	Requirement – Test	Result – Remark	Verdict
	or, where relevant 1,2 times the max. setting of the definite time delay release tripping current, but not exceeding 50kA.	-	N/A
	- r.m.s. test current AC/DC: (A)	9,2 kA	P
	power factor/time constant :	0,48	P
	- Factor "n"	1,71	P
	- peak test current (Amax) :	15,7 kA	P
	Test sequence "O" L1		
	- max. let-through current: (kApeak) L1:	14,6 kApeak	P
	- Joule integral I^2dt (A^2s) L1:	956,0 kA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L1		
	- max. let-through current: (kApeak) L1:	14,8 kApeak	P
	- Joule integral I^2dt (A^2s) L1:	971,9 kA^2s	P
	Test sequence "O" L2		
	- max. let-through current: (kApeak) L2:	14,9 kApeak	P
	- Joule integral I^2dt (A^2s) L2:	991,2 kA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L2		
	- max. let-through current: (kApeak) L2:	14,3 kApeak	P
	- Joule integral I^2dt (A^2s) L2:	913,8 kA^2s	P
	Test sequence "O" L3		
	- max. let-through current: (kApeak) L3:	14,7 kApeak	P
	- Joule integral I^2dt (A^2s) L3:	964,4 kA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L3		
	- max. let-through current: (kApeak) L3:	14,4 kApeak	P
	- Joule integral I^2dt (A^2s) L3:	1,6 MA^2s	P
	Melting of the fusible element	No	P
	Holes in the PE-sheet for test sequence "O"	No	P
	Cracks observed	No	P
H.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	10 uA / 550 V	P
H.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2.5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	80 ~ 720 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 199 s L2 : 190 s L3 : 186 s	P
H.5	Marking		
	Circuit-breaker for which all values of rated voltage have not been tested according to this annex or are not covered by such testing, shall be identified by the symbol which shall be market on the circuit-breaker immediately following these values of rated voltage	Compliance	P

IEC 60 947-2				
	TABLE: temperature rise measurements			
temperature rise dT of part:		phase	dT (K)	required dT (K)
1	Terminals of line side	L1	50,5	80
2	Terminals of line side	L2	63,5	80
3	Terminals of line side	L3	58,8	80
4	Terminals of load side	L4	46,3	80
5	Terminals of load side	L5	55,3	80
6	Terminals of load side	L6	53,7	80
7	Parts, which need not to be touched (non-metallic)		48,9	60
8	Parts intended to be touched (non-metallic)		37,6	50
9	Manual operating means (non-metallic)		19,6	35
10	Ambient temperature			24,2 ℃

Sequence Ⅰ : S1-1 [500 V, 630 A]

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	TABLE: temperature rise measurements			
temperature rise dT of part:		phase	dT (K)	required dT (K)
1	Terminals of line side	L1	49,2	80
2	Terminals of line side	L2	57,3	80
3	Terminals of line side	L3	48,5	80
4	Terminals of load side	L4	46,1	80
5	Terminals of load side	L5	53,5	80
6	Terminals of load side	L6	46,1	80
7	Ambient temperature			25,0 ℃
8				
9				
10				

Sequence Ⅱ : S2-1N [240 V, 630 A]

IEC 60 947-2				
TABLE: temperature rise measurements				
temperature rise dT of part:		phase	dT (K)	required dT (K)
1	Terminals of line side	L1	51,9	80
2	Terminals of line side	L2	56,4	80
3	Terminals of line side	L3	52,3	80
4	Terminals of load side	L4	50,1	80
5	Terminals of load side	L5	56,7	80
6	Terminals of load side	L6	48,6	80
7	Ambient temperature			25,0 ℃
8				
9				
10				

Sequence Ⅱ : S2-3 [415 V, 630 A]

IEC 60 947-2				
TABLE: temperature rise measurements				
temperature rise dT of part:		phase	dT (K)	required dT (K)
1	Terminals of line side	L1	48,6	80
2	Terminals of line side	L2	55,0	80
3	Terminals of line side	L3	50,9	80
4	Terminals of load side	L4	46,3	80
5	Terminals of load side	L5	52,4	80
6	Terminals of load side	L6	48,3	80
7	Ambient temperature			24,9 ℃
8				
9				
10				

Sequence Ⅱ : S2-4-1 [500 V, 630 A]

TABLE: Resistance to head (Ball pressure test)						
no.	Specimen					Verdict
	Description	Colour	Temp. °C	Impress diam. mm	Result	
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

TABLE: Resistance to fire (Glow wire test)								
no.	Specimen							Verdict
	Description	Colour	Thick (mm)	Temp. °C	burning after t (s)	drops	support burning	
1	PA66 2413GW	Grey	3.0	960	< 1 s	No	No	P
2	PC GN 2101F	Grey	3.0	960	8.0 s	No	No	P
3	BMC PREMIX	White	4.0	960	< 1 s	No	No	P
4	PPS RYTON R-7	Grey	3.5	960	6.3 s	No	No	P
5								
6								
7								
8								
9								
10								

TABLE: Resistance to tracking (tracking test)								
no.	Specimen							Verdict
	Description	Colour	Drops (no.)	Impress (mm)	Burning	Current (A)	Result	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

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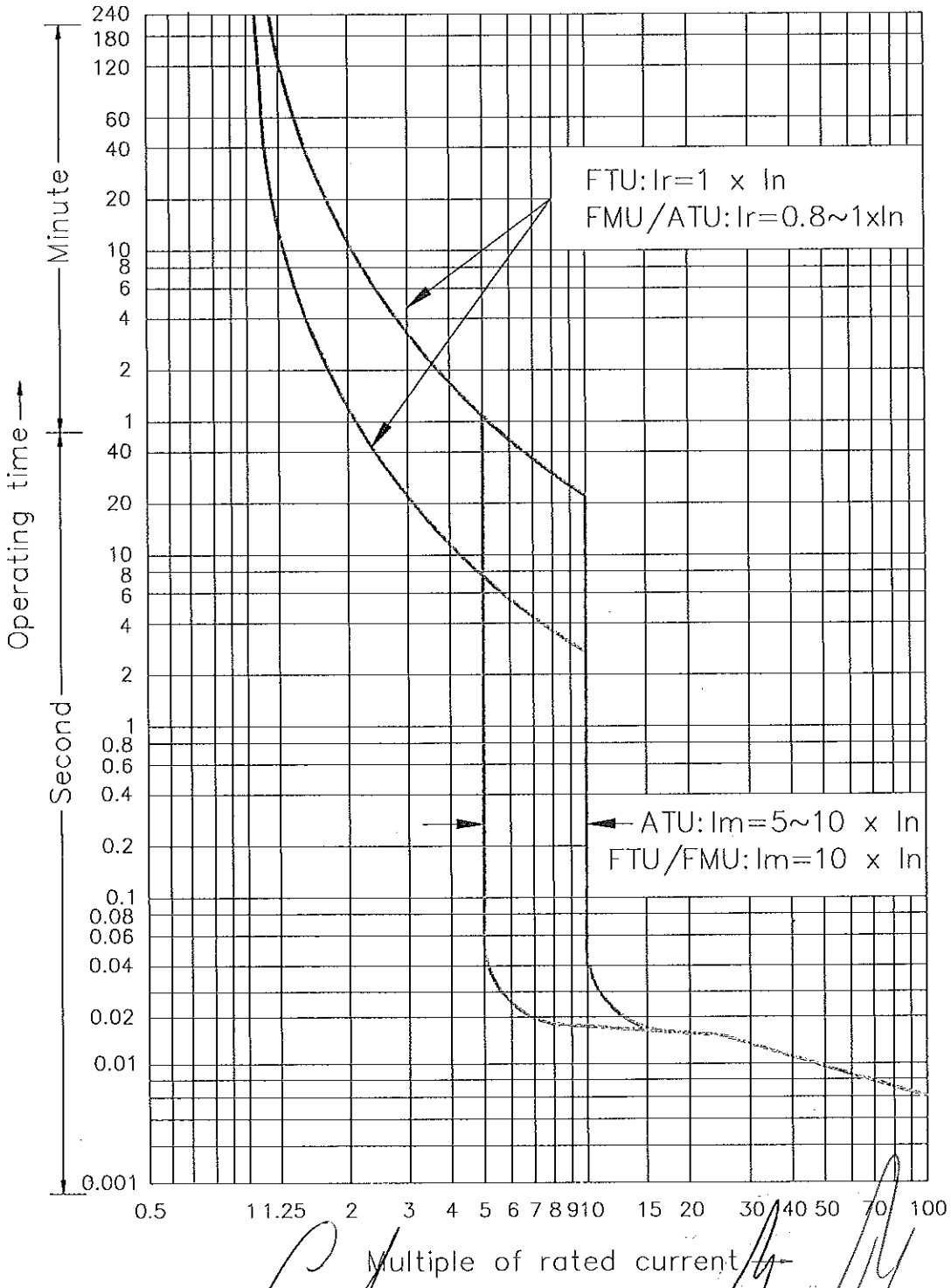
IEC 60 947-2

Remarks

TS630 FTU,FMU,ATU(300~630A)



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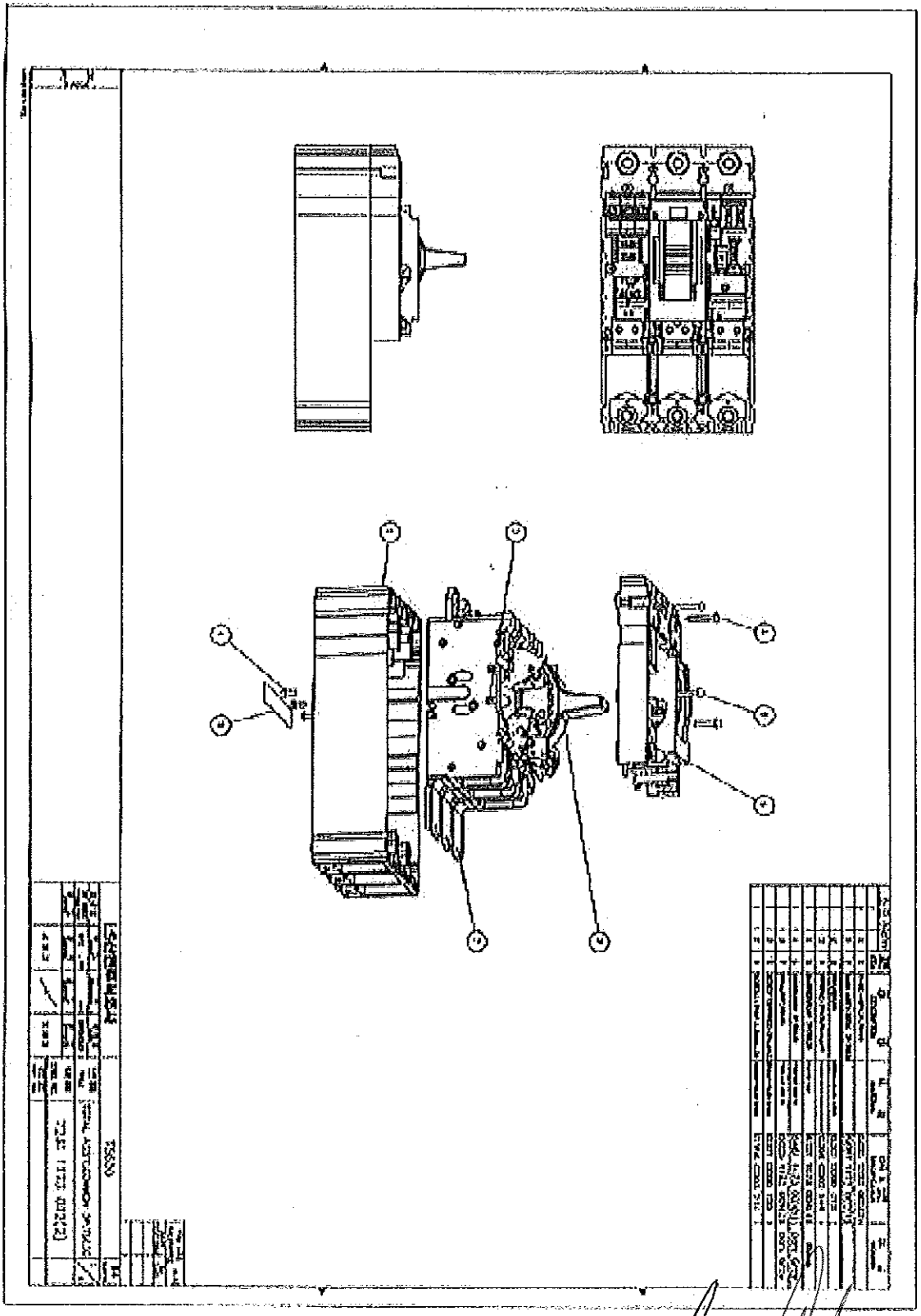
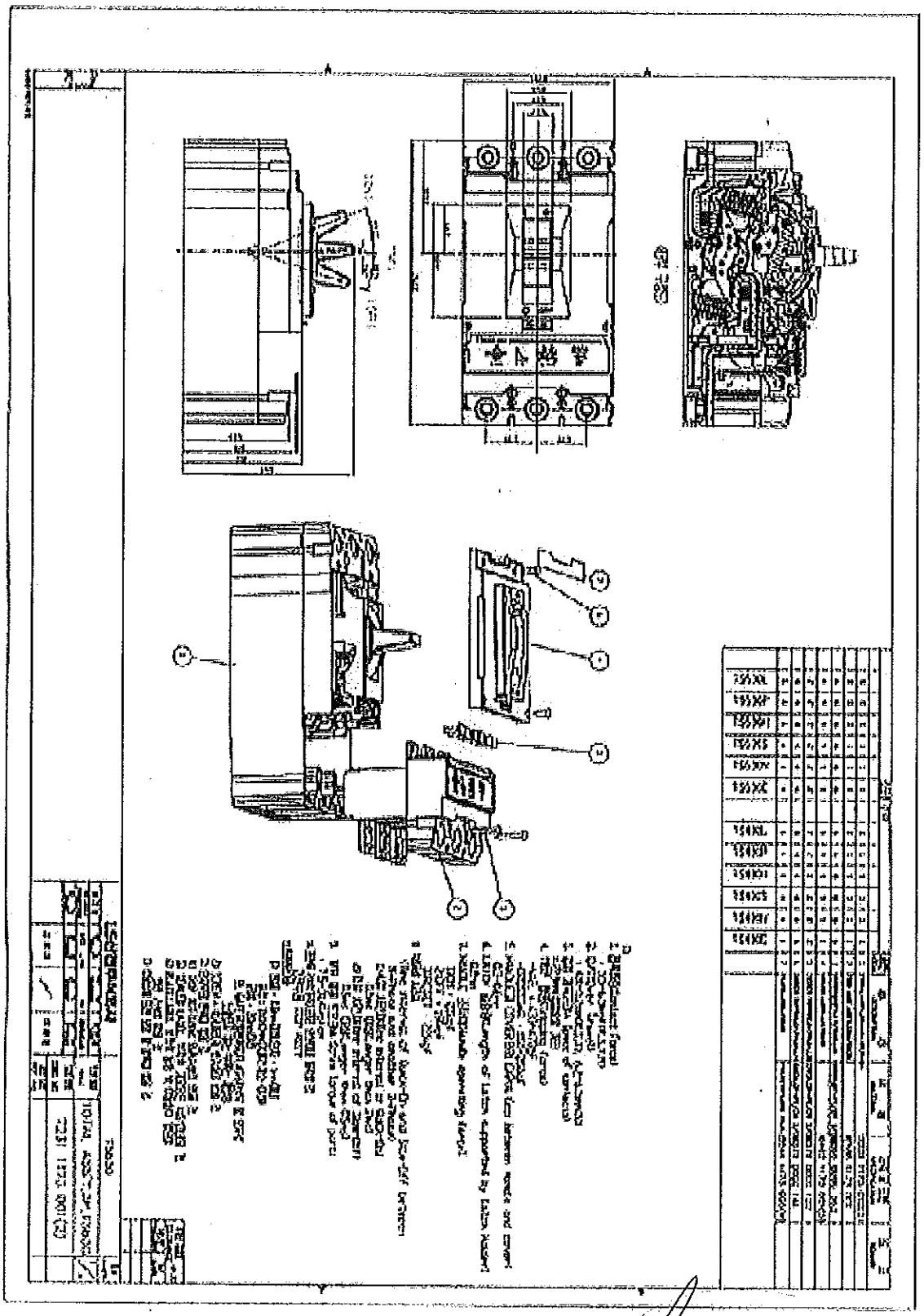
Compensation ratio for ambient temperature

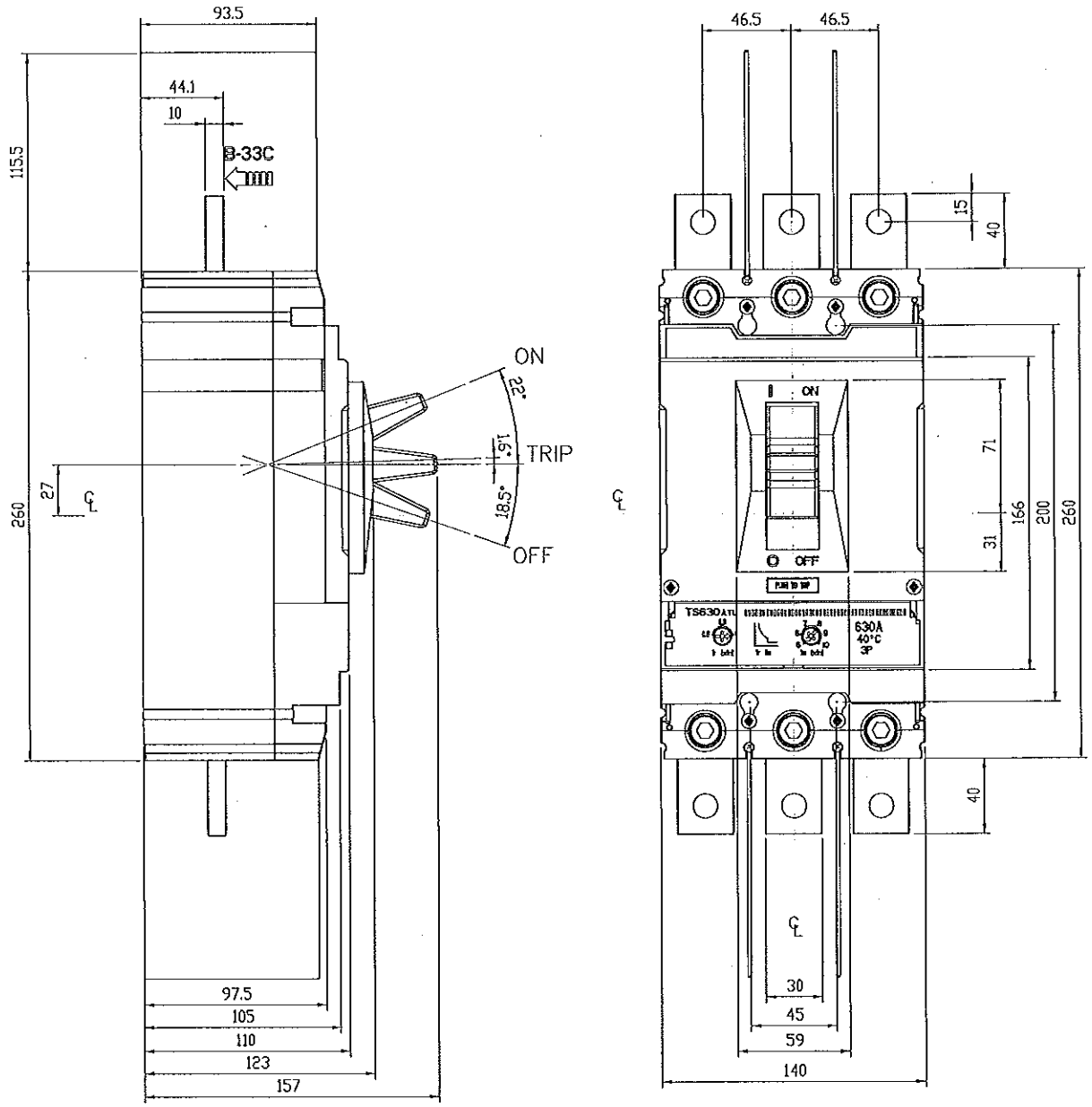
Temperature (℃)	Compensation ratio	Note
10	1.070	
11	1.068	
12	1.066	
13	1.064	
14	1.062	
15	1.060	
16	1.058	
17	1.056	
18	1.054	
19	1.052	
20	1.050	
21	1.048	
22	1.046	
23	1.044	
24	1.042	
25	1.040	
26	1.038	
27	1.036	
28	1.034	
29	1.032	
30	1.030	
31	1.027	
32	1.024	
33	1.021	
34	1.018	
35	1.015	
36	1.012	
37	1.009	
38	1.006	
39	1.003	
40	1.000	

Drawings





Dimensions



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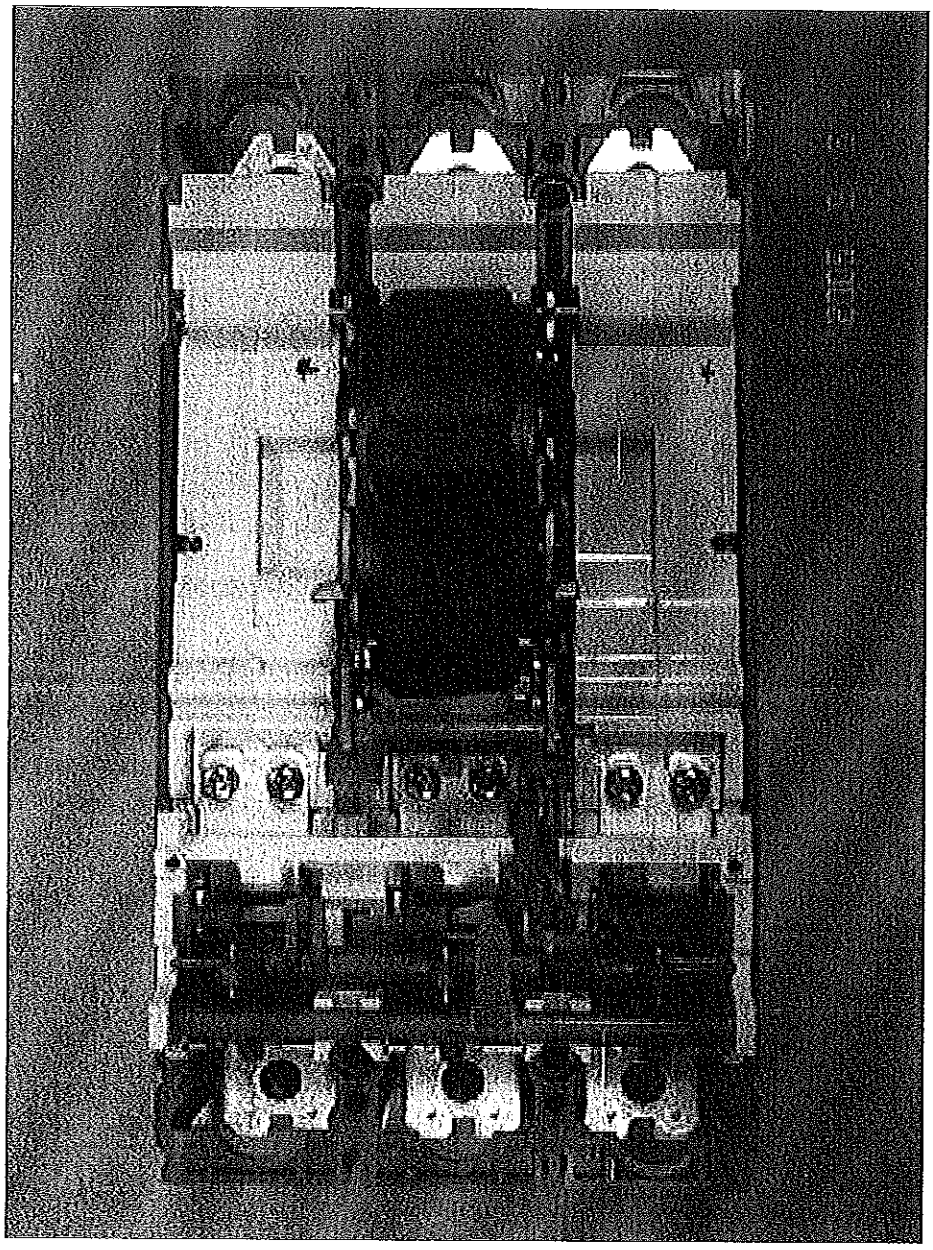
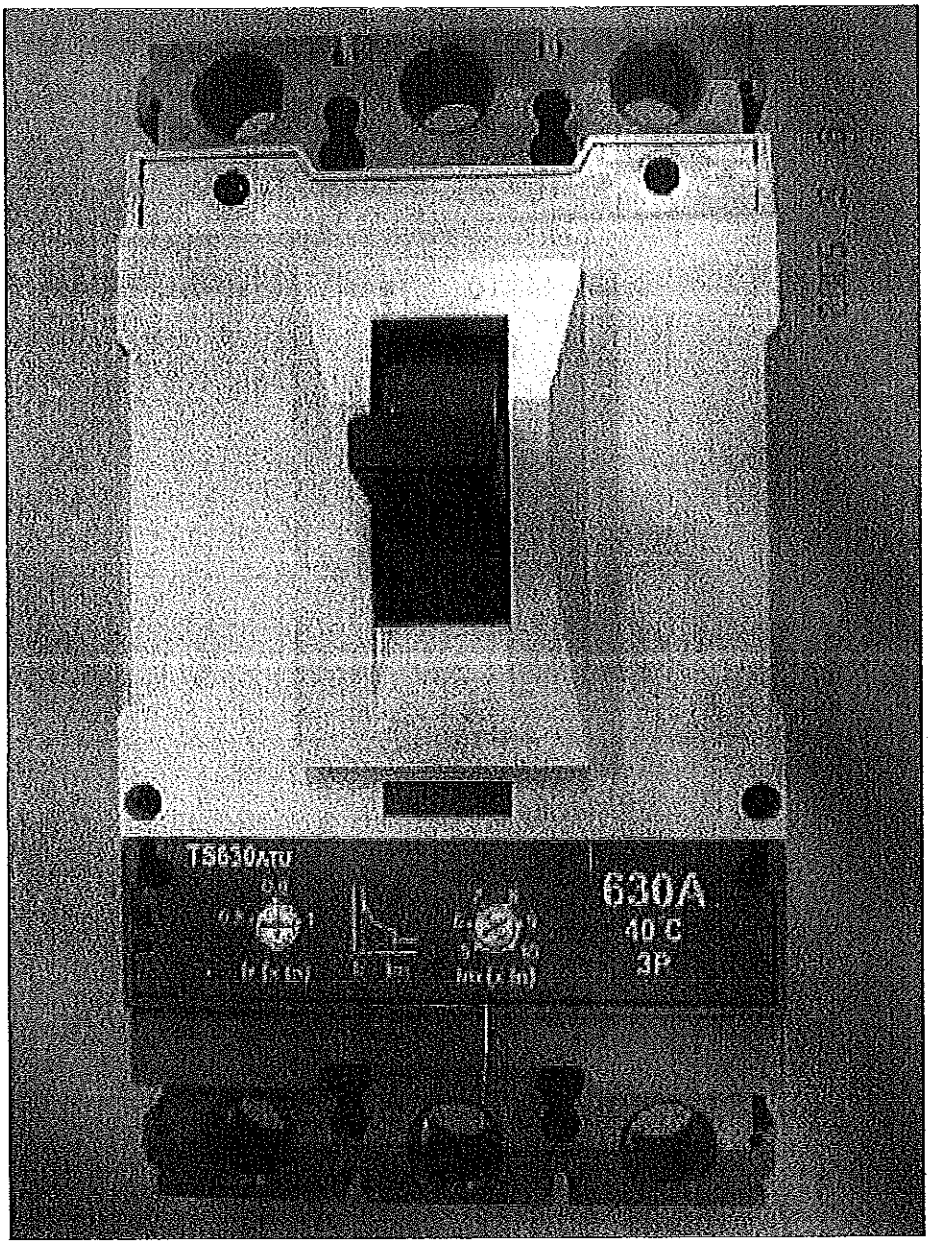
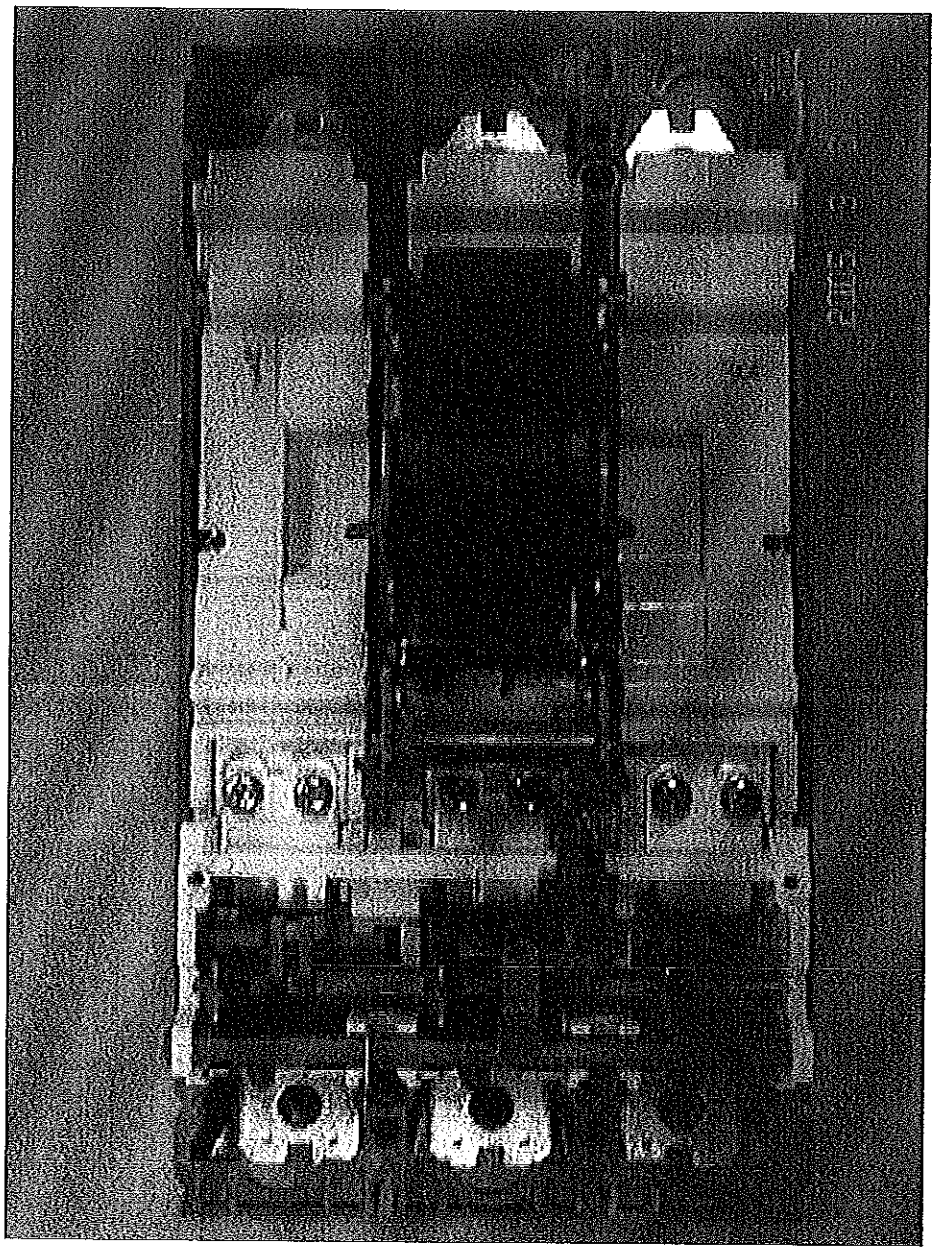
TS630 maximum current inside



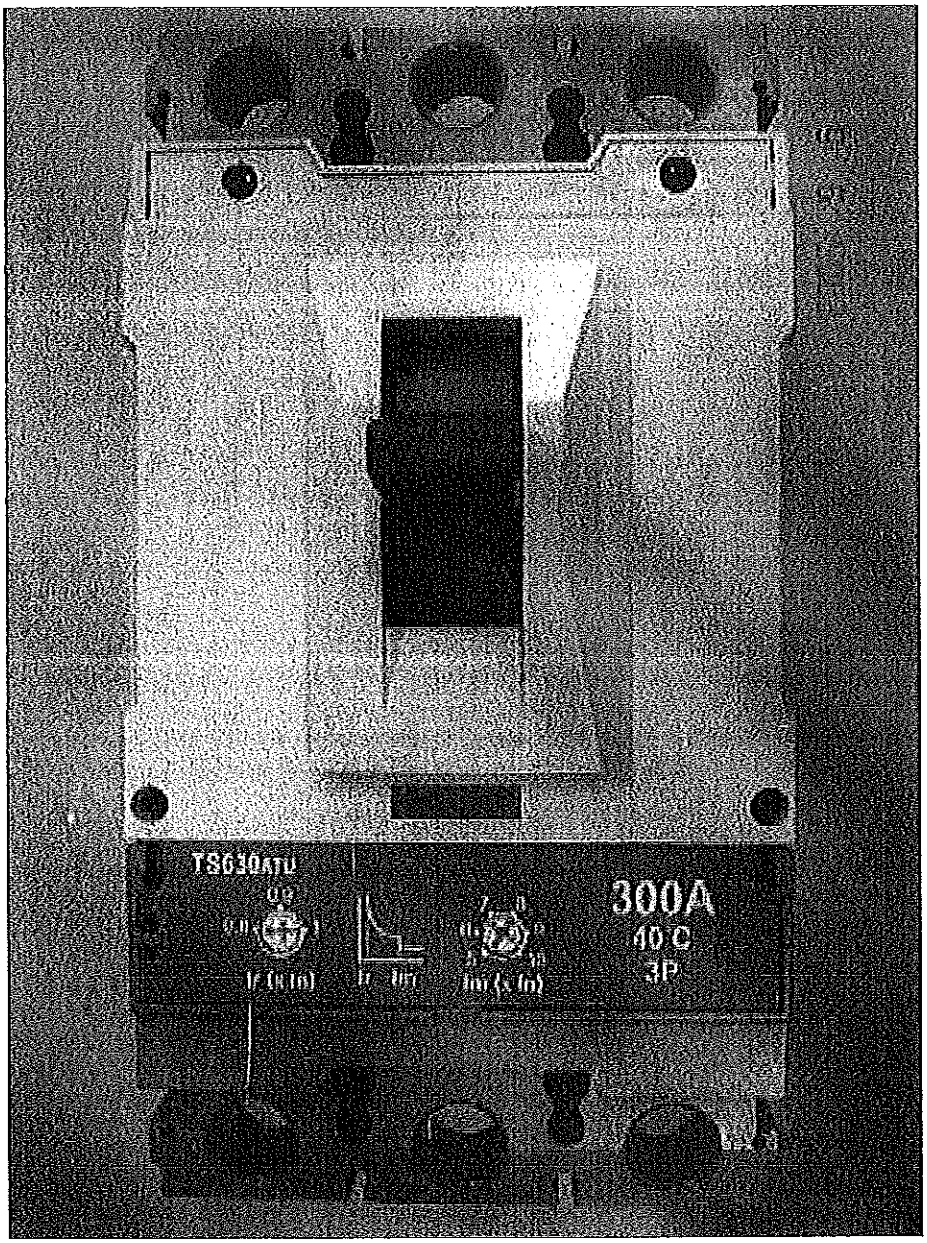
TS630 maximum current outside



TS630 minimum current inside



TS630 minimum current outside



СЕРТИФИКАТ / АКРЕДИТАЦИЯ

на независимата изпитвателна лаборатория, провела типовите изтитвания по т. 4

Приложено е заверено копие на акредитацията на изпитвателната лаборатория, в която са проведени типовите изпитвания за предлаганите автоматични прекъсвачи с лят корпус, както следва:

Марка: LS Industrial Systems Co.,Ltd.
Продукт: Автоматични прекъсвачи с лят корпус
Серия: Susol (TE100, TD160, TS250, TS400)

София, 10.08.2015 г.

.....
Владимир Лазаров, Управител
ВИВ-Изоматик ООД

International Electrotechnical Commission

Worldwide System for Conformity Testing and Certification of Electrotechnical Equipment and Components (IECEE)

CERTIFICATE OF ACCEPTANCE

TO PARTICIPATE IN THE IECEE CB-SCHEME

DEKRA Testing Services (Zhejiang) Co., Ltd.
No. 5. Changjiang Road, Great Bridge Industrial Park, North Baixiang, Wenzhou, Zhejiang, 325603, P.R.China

has been assessed and determined to fully comply with the requirements of ISO/IEC 17025: 2005-05, The Basic Rules, IECEE 01: 2012-06 and Rules of Procedure IECEE 02: 2012-06, and the relevant IECEE CB-Scheme Operational Documents.

DEKRA Testing Services (Zhejiang) Co., Ltd.

is therefore entitled to operate as a Chinese CB Testing Laboratory under the responsibility of **DEKRA Certification B.V.** as National Certification Body and to carry out testing within the IECEE CB Scheme for the Scope (Product Category(ies) and Standard(s)) as listed in the relevant part of the IECEE Web Site at www.iecee.org, and is subject to all other terms as set forth in the IECEE Basic Rules and Rules of Procedure

This certificate remains valid until April 3rd 2016 at which time it will be reissued by the IECEE Executive Secretary upon successful completion of the normally scheduled 3-year Reassessment Programme administered by the IECEE CB Scheme.

Signed by:

.....

Pierre de Ruvo
IECEE EXECUTIVE SECRETARY

Date of Issue: 2013-09-13
TL241

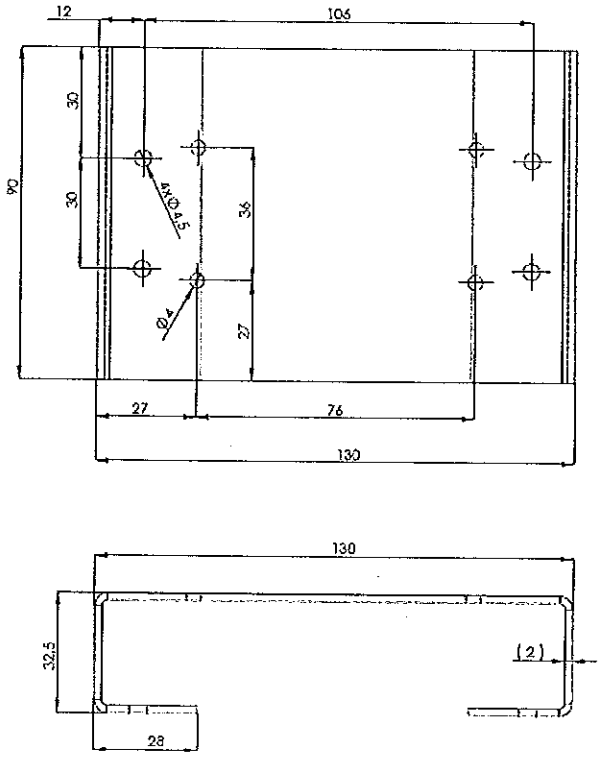
Приложение № 2.1.6
към Техническо предложение по ОП реф. № PPD 15 – 033, ОП 1

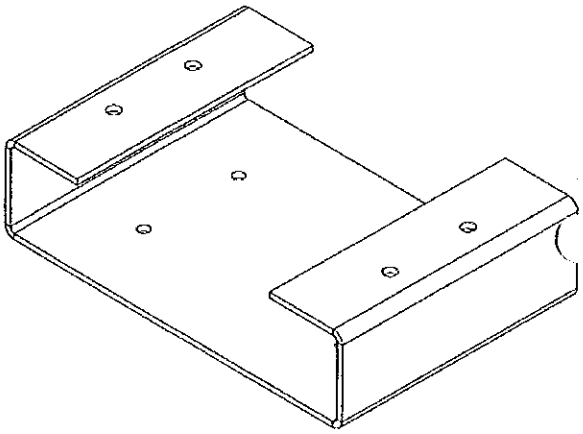
ТЕХНИЧЕСКО ОПИСАНИЕ НА МОНТАЖНИ ПЛАНКИ

за триполюсни автоматични прекъсвачи с лят корпус серия Susol

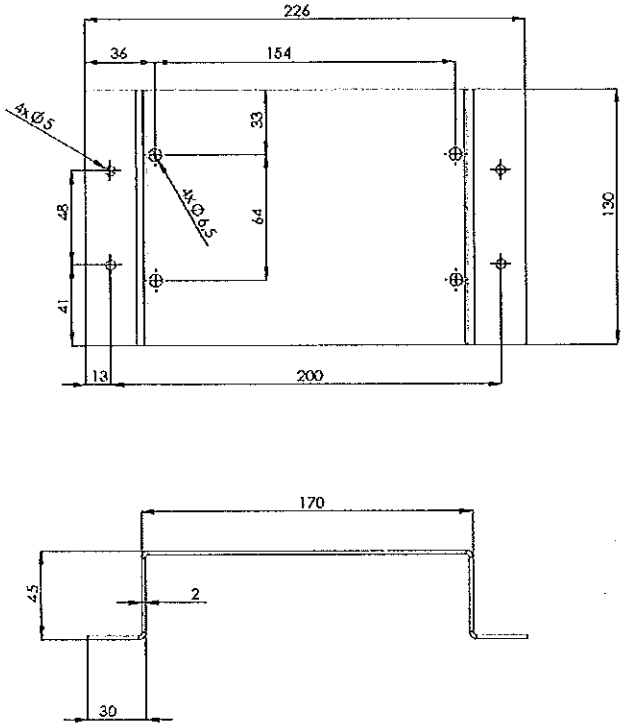
Монтажните планки са изработени от листова стомана с дебелина 2 мм. Планките са прахово боядисани за защита от корозия. Габаритните размери и присъединителните отвори са съобразно изискванията на техническата документация към търг PPD 15-033.

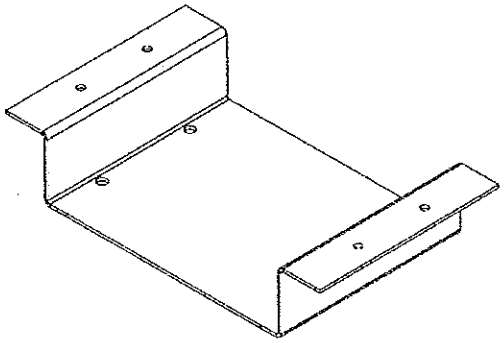
Планка за 100/160A





Планка за 250/400/630A





Планка за 1000/1250A

Предлаганите триполюсни автоматични прекъсвачи с лят корпус серия Susol за 1000A и 1250A са с съответните габаритни размери, така че при присъединяването им не е приложимо използването на монтажни планки.

ИНСТРУКЦИИ ЗА
транспортиране, складиране, монтиране, обслужване и поддържане на автоматични прекъсвачи с лят корпус

1. Транспорт

Автоматичните прекъсвачи трябва да се транспортират опаковани в оригиналната опаковка.

Няма специфични изисквания към начина на транспорт.

2. Съхранение

Автоматичните прекъсвачи трябва да се съхраняват в сухи, закрити помещения опаковани в оригиналната опаковка.

Температура на съхранение: от -30 до +55 °C.

Няма специфични изисквания към начина на съхранение.

3. Монтиране

Автоматичните прекъсвачи могат да бъдат монтирани директно върху монтажната плоча на електрическото табло. Въртящият момент при затягане на клемите не трябва да превишава:
- За Susol TE100 и TE160 – 7.65 N.m
- За Susol TD100 и TD160 – 7.65 N.m
- За Susol TS250 – 14.41 N.m
- За Susol TS400 и TS630 – 48.02 N.m
- За Susol TS1000 и TS1250 – 55.27 N.m

При монтажа трябва да се спазват отстоянията приложени по-долу:
(Забележка: За серия TE да се гледат редовете отнасящи се за TD100N/TD160N)

Табл.1 – минимално разстояние до разположена отгоре изолационна преграда

	A(mm)	
	415V	240V
TD100N, TD160N	35	30
TD100H, TD160H	35	30
TD100L, TD160L	35	30
TS100N, TS160N, TS250N	35	30
TS100H, TS160H, TS250H	35	30
TS100L, TS160L, TS250L	35	30
TS400N, TS630N	60	50
TS400H, TS630H	60	50
TS400L, TS630L	60	50
TS800N	100	80
TS800H	100	80
TS800L	100	80

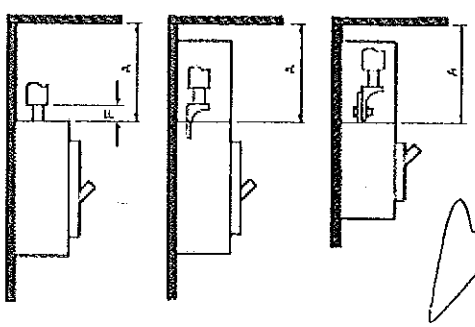
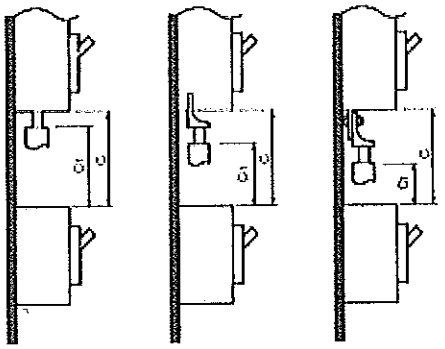


Табл.2 – минимални разстояния между прекъсвачи разположени един под друг

	C1(mm)		C(mm)
	415V	240V	
TD100N, TD160N	35	30	The dimension of exposed conduct
TD100H, TD160H	35	30	
TD100L, TD160L	35	30	
TS 100N, TS160N, TS250N	35	30	
TS100H, TS160H, TS250H	35	30	
TS100L, TS160L, TS250L	35	30	
TS400N, TS630N	60	50	
TS400H, TS630H	60	50	
TS400L, TS630L	60	50	
TS800N	100	80	
TS800H	100	80	
TS800L	100	80	



Direct connection of cable

Connection by using a cable terminal or ring terminal

Connection by using a cable terminal with extended terminal

Табл.3 – минимални изолационни отстояния при клемите на прекъсвача

	D1 (mm)	D2 (mm)	D3 (mm)	D4 (mm)
TD100N, TD160N	The dimension of exposed conduct + 20	50	The dimension of exposed conduct + 20	50
TD100H, TD160H		50		50
TD100L, TD160L		50		50
TS100N, TS160N, TS250N		100		100
TS100H, TS160H, TS250H		100		100
TS100L, TS160L, TS250L		100		100
TS400N, TS630N		100		100
TS400H, TS630H		200		200
TS400L, TS630L		200		200
TS800N		100		100
TS800H		200		200
TS800L		200		200

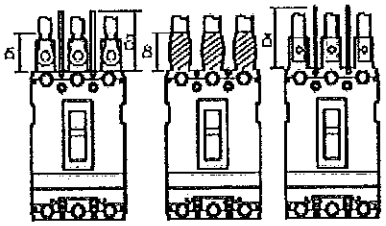


Табл.4 – минимални изолационни разстояния до странично разположена изолационна преграда

	E(mm)	
	415V	240V
TD100N, TD160N	25	15
TD100H, TD160H	25	15
TD100L, TD160L	25	15
TS100N, TS160N, TS250N	25	15
TS100H, TS160H, TS250H	25	15
TS100L, TS160L, TS250L	25	15
TS400N, TS630N	20	15
TS400H, TS630H	20	15
TS400L, TS630L	20	15
TS800N	45	20
TS800H	45	20
TS800L	45	20

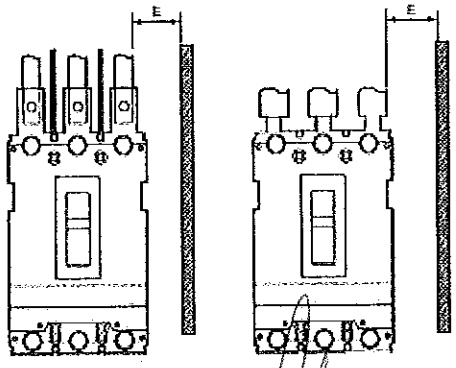
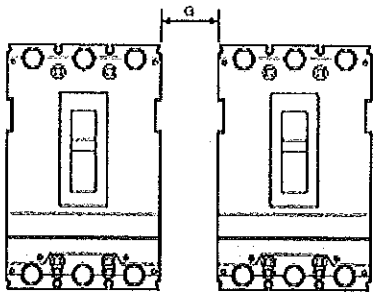


Табл.5 – минимално отстояния на два съседни прекъсвача

	G (mm)
TD100N, TD160N	0
TD100H, TD160H	0
TD100L, TD160L	0
TS100N, TS160N, TS250N	0
TS100H, TS160H, TS250H	0
TS100L, TS160L, TS250L	0
TS400N, TS630N	0
TS400H, TS630H	0
TS400L, TS630L	0
TS800N	0
TS800H	0
TS800L	0

Note) In case of using long or short terminal covers.



София, 10.08. 2015 г.

.....

Владимир Лазаров, Управител
ВИВ-Изоматик ООД

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Приложение № 2.2.1
към Техническо предложение по ОП реф. № PPD 15 – 033, ОП 1

ДЕКЛАРАЦИЯ ЗА ПРОИЗХОД

Долуподписаният Владимир Лазаров,

Управител на фирма "ВИВ-Изоматик" ООД, София 1680, ул. „Пирин" 40А,

В качеството си на търговски представители на LS Industrial Systems Co.,Ltd.,

Декларираме, че продуктът:

Марка:	LS Industrial Systems Co.,Ltd.
Продукт:	Автоматични прекъсвачи с лят корпус
Серия:	Susol (TS630, TS1000, TS1250)

За който се отнася тази декларация, е произведен в завода на LS Industrial Systems Co.,Ltd. в Чеонг Жу, Южна Корея.

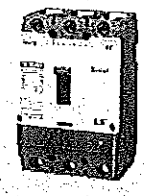
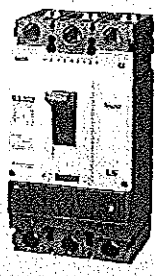
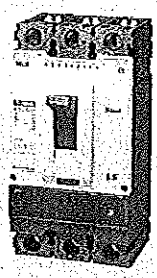
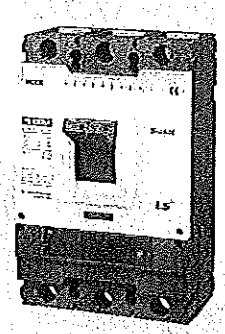
Приложен към настоящата декларация е каталог на производителя.

София, 10.08.2015 г.

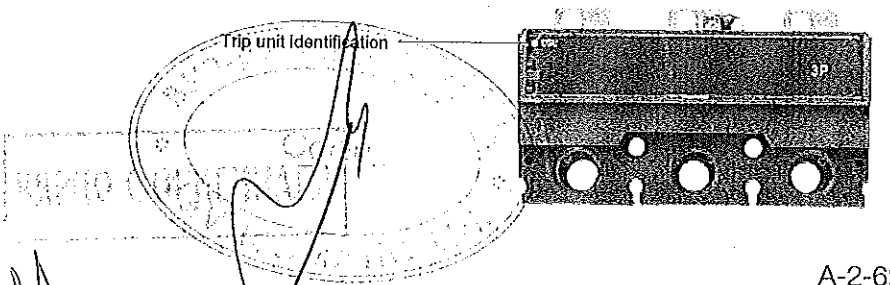
.....
Владимир Лазаров, Управител
ВИВ-Изоматик ООД

314

TS series

TS250NA	TS400NA	TS630NA	TS800NA
250	400	630	800
250	400	630	800
2, 3, 4	2, 3, 4	2, 3, 4	2, 3, 4
690	690	690	690
500	500	500	500
250	400	630	800
8	8	8	8
750	750	750	750
4.9	7.1	8.5	12
3500	5000	6300	8000
3500	5000	6300	8000
1350	1930	2320	2560
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
25000	20000	20000	10000
10000	6000	6000	3000
105 160 86	140×260×110	140 260 110	210 320 135
140 160 86	186.5 260 110	186.5 260×110	280 320 135
2	5.4	5.4	15.1
2.6	7.2	7.2	19.6
IEC60947-3	IEC60947-3	IEC60947-3	IEC60947-3



	TS100			TS160			TS250			TS400			TS630			TS800	
	100			160			250			400			630			800	
	40, 50, 63, 80, 100			(100)※, 125, 160			125, 160, 200, 250			300, 400			500, 630			700**, 800	
	2*, 3, 4			2*, 3, 4			2*, 3, 4			2*, 3, 4			2*, 3, 4			2*, 3, 4	
	690			690			690			690			690			690	
	500			500			500			500			500			500	
	8			8			8			8			8			8	
	750			750			750			750			750			750	
N	H	L	N	H	L	N	H	L	N	H	L	N	H	L	N	H	L
100	120	200	100	120	200	100	120	200	100	120	200	100	120	200	100	120	200
50	85	150	50	85	150	50	85	150	65	85	150	65	85	150	65	100	150
50	70	130	50	70	130	50	70	130	65	85	130	65	85	130	65	100	130
42	65	85	42	65	85	42	65	85	42	65	85	42	65	85	42	85	100
10	15	20	10	15	20	10	15	20	10	20	35	10	20	35	10	20	35
50	85	100	50	85	100	50	85	100	50	85	100	50	85	100	50	85	100
50	85	100	50	85	100	50	85	100	50	85	100	50	85	100	50	85	100
100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
220	264	440	220	264	440	220	264	440	220	264	440	220	264	440	220	264	440
105	187	330	105	187	330	105	187	330	143	187	330	143	187	330	143	220	330
105	154	286	105	154	286	105	154	286	143	187	286	143	187	286	143	220	286
88	143	187	88	143	187	88	143	187	88	143	187	88	143	187	88	187	220
17	30	40	17	30	40	17	30	40	17	40	74	17	40	74	17	40	74
	A			A			A			A			A			A	
	●			●			●			●			●			●	
	●			●			●			●			●			●	
	●			●			●			●			●			●	
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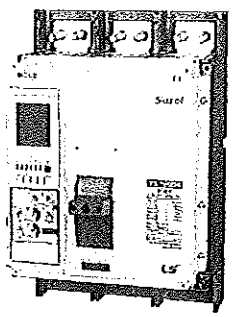
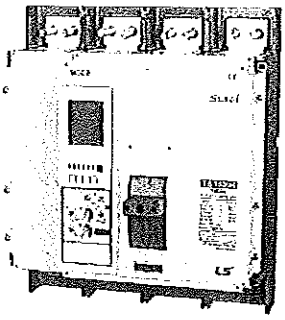
	●			●			●			●			●			●	
	25000			25000			25000			20000			20000			10000	
	10000			10000			10000			6000			6000			3000	
	-			-			-			-			-			-	
	105	160	86	105	160	86	105×160×86			140	260	110	140	260×110		210×320×135	
	140	160	86	140	160×86		140×160×86			186.5	260	110	186.5	260	110	280×320	135
	-			-			-			-			-			-	
	2			2			2			5.4			5.4			15.1	
	2.6			2.6			2.6			7.2			7.2			19.6	
	IEC60947-2			IEC60947-2			IEC60947-2			IEC60947-2			IEC60947-2			IEC60947-2	

1. The breakers with electronic trip units are available only at 3-pole version. (Only for AC supply)
※ The trip unit ATU is available from 125A

Electrical characteristics





				TS1000		TS1250			TS1600	
Type				TS1000		TS1250			TS1600	
Ampere frame				1000		1250			1600	
Pole				3, 4		3, 4			3, 4	
Rated current,(A)		In	-5~40°C	800, 1000		1250			1600	
			50°C	800, 1000		1250			1560	
			65°C	800, 1000		1240			1420	
Rated insulation voltage, (V)		Ui		1000		1000			1000	
Rated impulse withstand voltage, (kV)		Uimp		8		8			8	
Rated operational voltage, (V)		Ue	AC50/60Hz	690		690			690	
			DC	-		-			-	
Rated short-circuit breaking capacity				N	H	L	N	H	N	H
IEC60947-2 AC50/60Hz (sym)	Rated ultimate short-circuit breaking capacity, (kA) (Icu)		220/240V	55	75	200	55	75	55	75
			380/415V	50	70	150	50	70	50	70
			440/460V	50	65	130	50	65	50	65
			480/500V	40	50	100	40	50	40	50
			660/690V	35	45	50	35	45	35	45
		DC	250V 2P	-	-	-	-	-	-	-
			500V 2P	-	-	-	-	-	-	-
			750V 3P	-	-	-	-	-	-	-
	Rated service breaking capacity (Ics)	%Icu		100%	75%	100%	100%	75%	100%	75%
	Rated short-circuit making capacity (kA) (Icw)	AC50/60Hz	1s	25		12	25		25	
			3s	-			-		-	
Overriding instantaneous protection			kA peak	50		30	50		50	
Isolation				O			O		O	
Category				B		A	B		B	
(Life cycle)	Mechanical life (operations)			10000		4000	10000		10000	
	Electrical life (operations)	440V	In/2	6000		4000	5000		5000	
			In	5000		3000	4000		2000	
		690V	In/2	4000		3000	3000		2000	
			In	2000		2000	2000		1000	
Pollution degree				3			3		3	
Dimension (mm) (H W D)			3-pole	327×210×152.5						
			4-pole	327×280×152.5						
Weight (kg)			3-pole	13						
			4-pole	16.8						

Приложение № 2.2.2
към Техническо предложение по ОП реф. № PPD 15 – 033, ОП 1

ТЕХНИЧЕСКО ОПИСАНИЕ

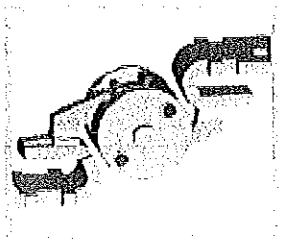
I. Триполюсни автоматични прекъсвачи с лят корпус серия Susol за ток от 630 до 1250А,

Автоматични прекъсвачи серия Susol TE/TD/TS са произведени от фирма LS Industrial Systems и представляват механични комутационни апарати, способни да провеждат и да включват/изключват ръчно електрически токове от 630 до 1250 А във вериги при нормални условия и да провеждат за определено време и да изключват автоматично токове във вериги при условията на претоварване и късо съединение.
Тялото на автоматични прекъсвачи е изработено чрез формоване на устойчив на нагряване, на огън и на механични удари изолационен материал. В монтирано състояние съгласно инструкциите на производителя и след опроводяване активните части на автоматичните прекъсвачи не са достъпни.

При вертикално монтиране на автоматични прекъсвачи лостът се движи в направление „нагоре - надолу", при което контактите се затварят при движение „нагоре". Автоматични прекъсвачи са снабдени с ясно видимо от челната страна средство за указване на затвореното и отвореното положение на контактната система- Означение „ON/OFF" върху лоста за управление. При задействане на защитата (или натискане на специален бутон на лицевата страна) лоста застава в „Trip" положение, което е оказано със символ на челната страна. За да се включи прекъсвача от „Trip" положение, лостът първо трябва да се придвижи надолу към положение „OFF", а след това нагоре до положение „ON". Устройствата отговарят на следните стандарти: EN/IEC 60947-1, EN/IEC 60947-2, EN/IEC 60947-3, EN/IEC 60947-4.

Прекъсвачите са маркирани с CE маркировка за съответствие и на лицевия панел на устройството са отпечатани следните основни параметри:
- Разривен ток при различни напрежения
- Допустимо импулсно напрежение на изолацията
- Номинален ток
- Номинално напрежение
- Краткотрайно издържан ток
- Работна изключвателна възможност

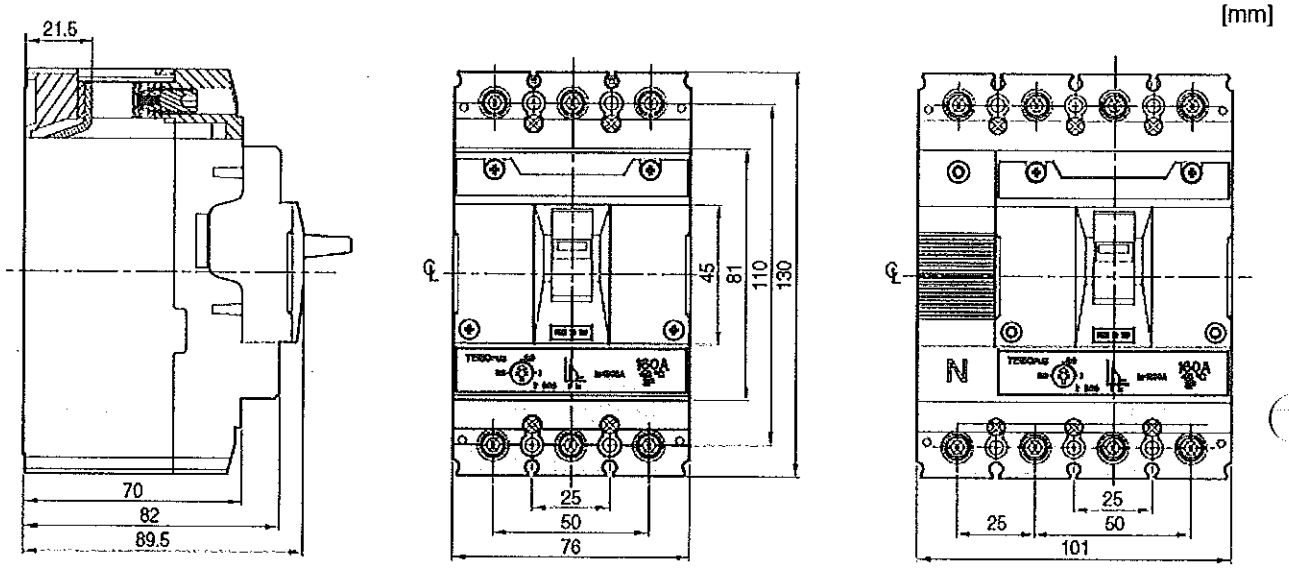
Автоматични прекъсвачи серия Susol са снабдени с ротационна контактна система и имат повишена изключвателна възможност поради двойното разкъсване всеки полюс.



Ротационната контактна система има следните преимущества:
- Двойно разкъсване на всеки полюс
- Мигновенно отвеждане на дъгата към дъгогасителните камери
- Повишава дълготрайността на контактите като ги предпазва от износване
- Отлични токоограничаващи свойства
- Висока изключвателна възможност при компактни размери

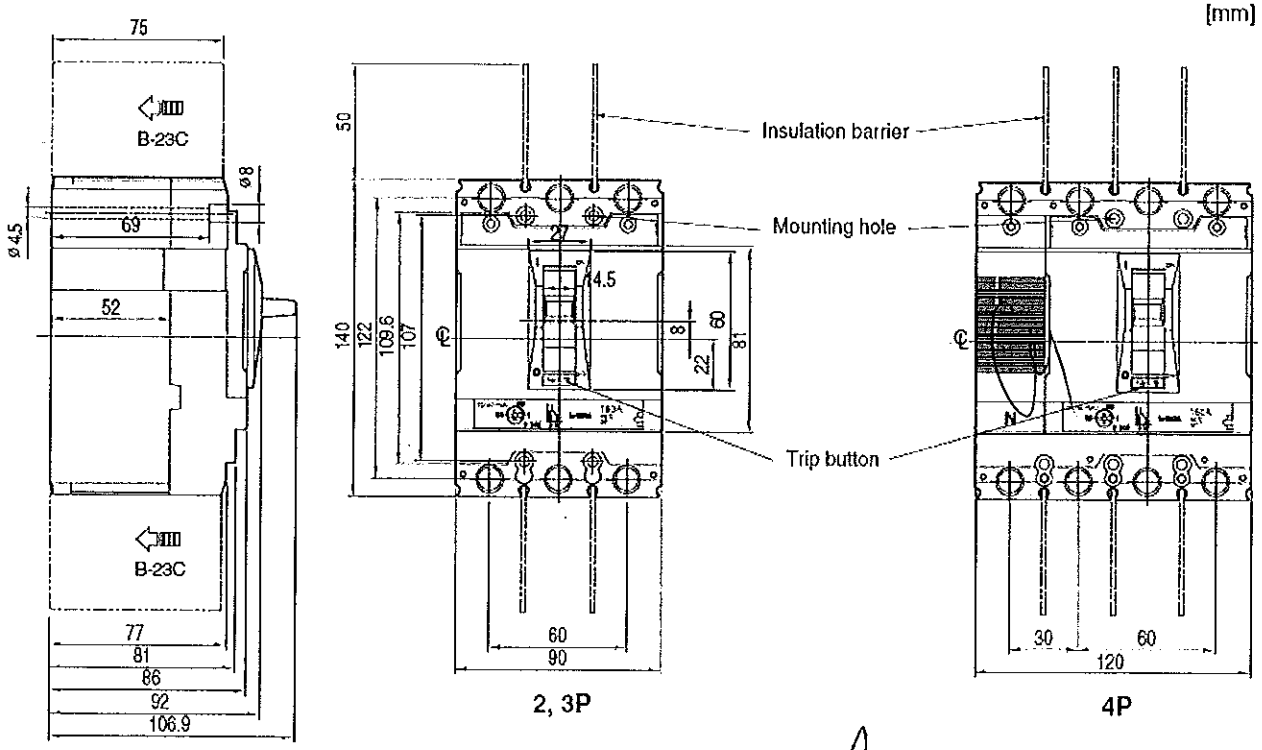
TE100/160

[mm]

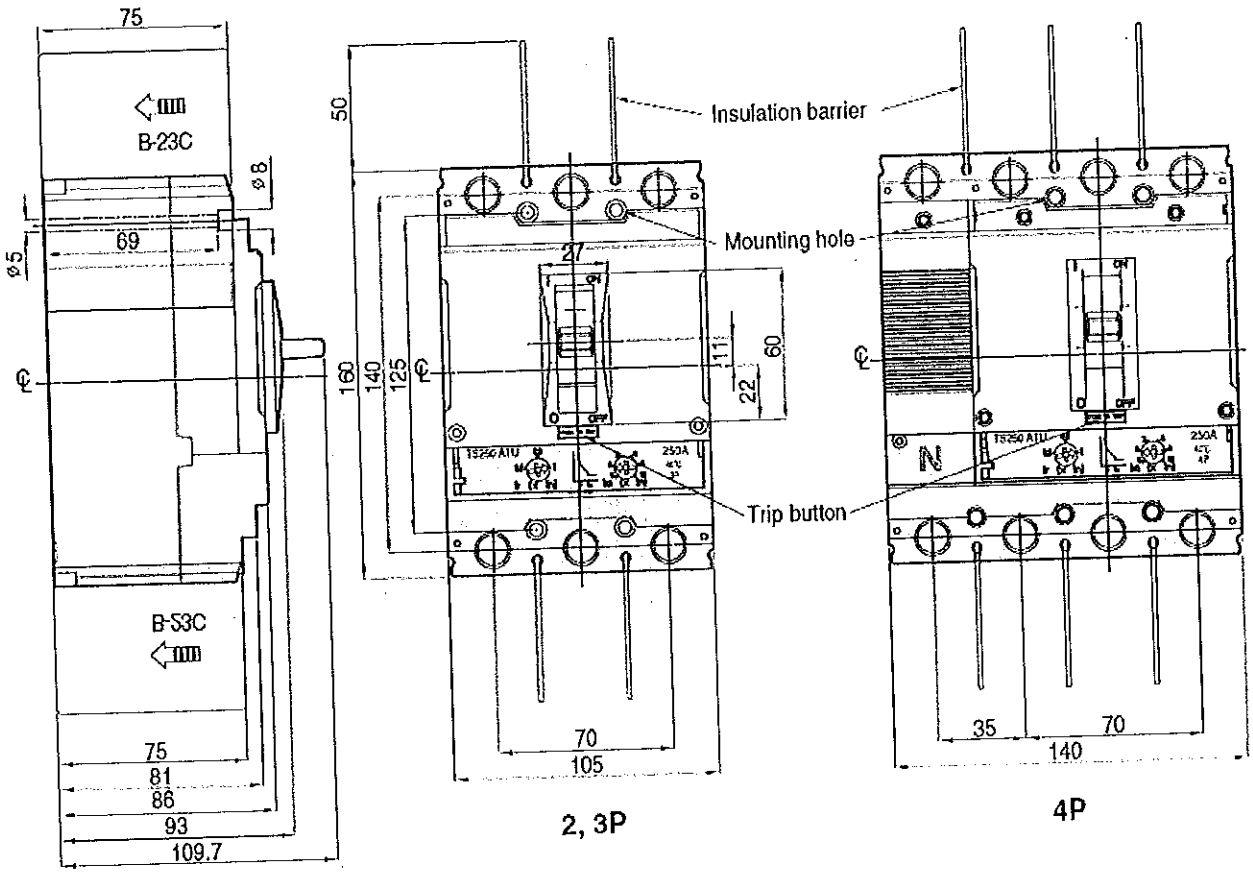


TD100/160

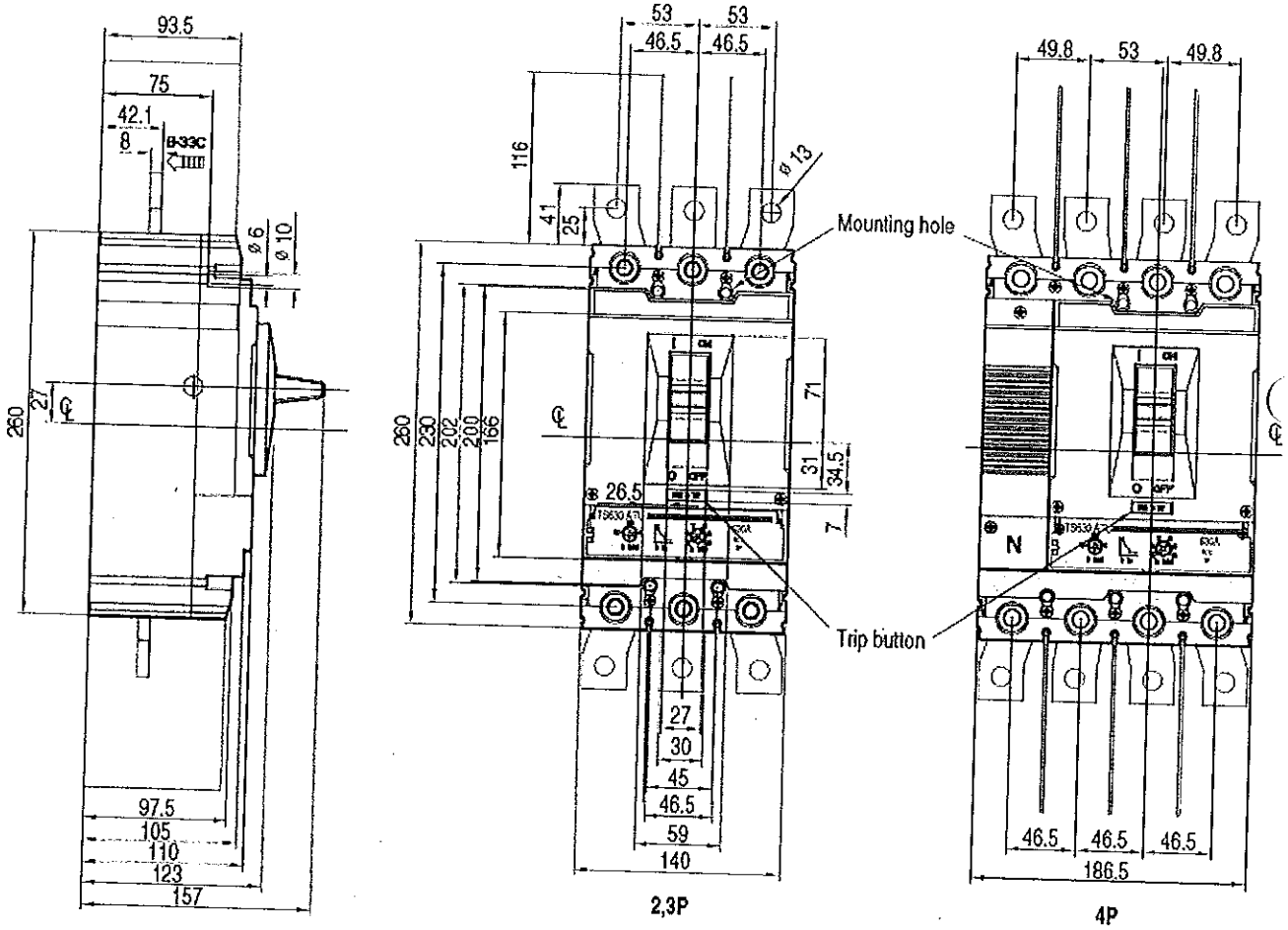
[mm]



TS100/160/250



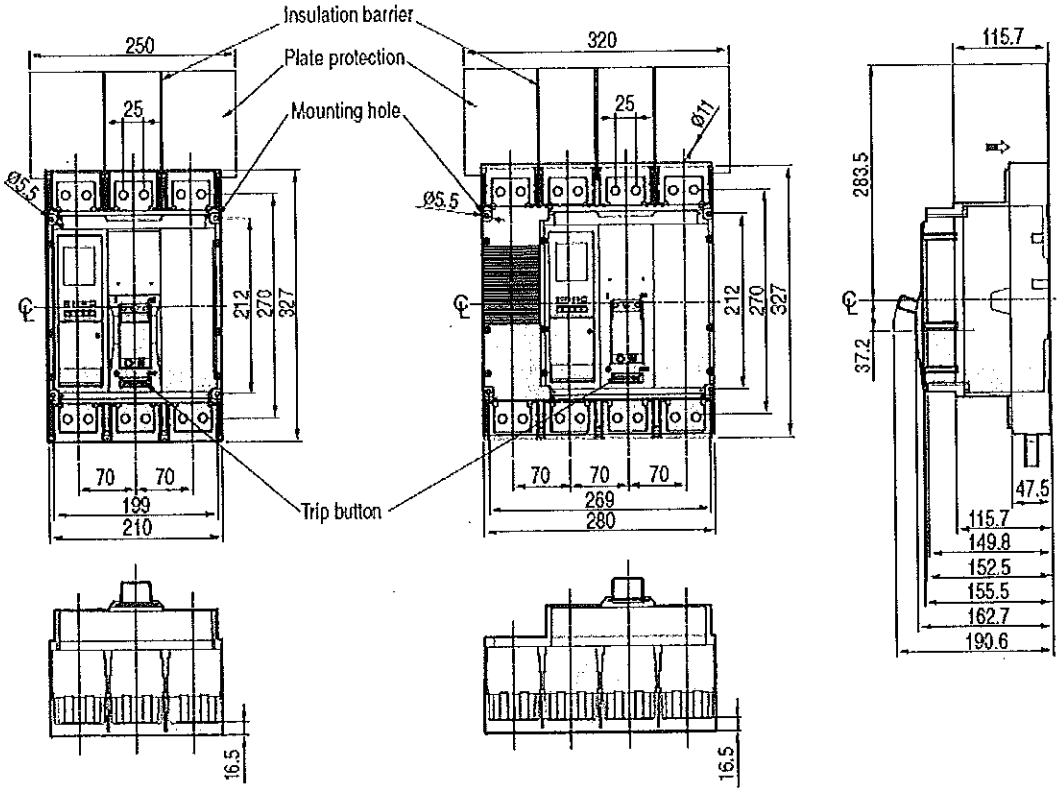
TS400/630


93.5
75
42.1
8
B-33C
ø 6
ø 10
27
260
97.5
105
110
123
157
53
53
46.5
46.5
116
41
25
ø 13
Mounting hole
71
31
34.5
7
26.5
Trip button
260
230
202
200
166
27
30
45
46.5
59
140
2,3P
49.8
53
49.8
N
46.5
46.5
46.5
186.5
4P

TS 1000, 1250, 1600A

Front Type

[mm]



Приложение № 2.2.3
към Техническо предложение по ОП реф. № PPD 15- 033, ОП 1

ДЕКЛАРАЦИЯ ЗА СЪОТВЕТСТВИЕ

Долуподписаният Владимир Лазаров,

Управител на фирма "ВИВ-Изоматик" ООД, София 1680, ул. „Пирин" 40А,

В качеството си на търговски представители на LS Industrial Systems Co.,Ltd.,

Декларираме, че продуктът:

Марка:	LS Industrial Systems Co.,Ltd.
Продукт:	Автоматични прекъсвачи с лят корпус
Серия:	Susol (TS630, TS1000, TS1250)

За който се отнася тази декларация, при условие, че е инсталиран, обслужван и използван за приложения, за които е предназначен, е в съответствие със следните стандарти, технически одобрения или други нормативни актове:

БДС EN 60947-1
БДС EN 60947-2

София, 10.08.2015 г.

Владимир Лазаров, Управител
ВИВ-Изоматик ООД

Приложение № 2.2.4
към Техническо предложение по ОП реф. № PPD 15 – 033; ОП 1

СПИСЪК

на типовите изпитвания, проведени от независима изпитвателна лаборатория,
за предлаганите автоматични прекъсвачи с лят корпус, както следва:

Марка: LS Industrial Systems Co.,Ltd.
Продукт: Автоматични прекъсвачи с лят корпус
Серия: Susol (TS630, TS1000, TS1250)

5.2 Маркировка
7.1 Конструкция
8. ИЗПИТВАНИЯ
8.2.4. Механични свойства на клеми
8.3.3 Последователност I: Експлоатационна възможност
8.3.3.1. Граници и времетокови характеристики на задействане
8.3.3.2 Диелектрични свойства, издържано импулсено напрежение
8.3.3.3. Механично задвижване и експлоатационна възможност
8.3.3.4. Работа при претоварване
8.3.3.5 Проверка на диелектричните свойства на прекъсвача
8.3.3.6 Проверка на прекъсвача при повишаване на температурата
8.3.3.7 Проверка на изключвателната бобина при претоварване
8.3.3.8 Проверка на минималнонапреженовата бобина и панелния изключвател
8.3.3.9 Проверка на експлоатационна възможност на задвижващия механизъм
8.3.4. Последователност II
8.3.4.1. Изпитване на работната изключвателна възможност при късо съединение
8.3.4.2. Експлоатационна възможност по ток
8.3.4.3 Проверка на диелектричните свойства на прекъсвача
8.3.4.4 Проверка на прекъсвача при повишаване на температурата
8.3.4.5 Проверка на изключвателната бобина при претоварване
8.3.5 Последователност III
8.3.5.1 Издържан импулсен ток
8.3.5.2. Изпитване на граничната изключвателна възможност при късо съединение
8.3.5.3 Проверка на диелектричните свойства на прекъсвача
8.3.5.4 Проверка на изключвателната бобина при претоварване
8.3.6. Последователност IV: Издържан ток на късо съединение със стопяем предпазител
8.3.7 Последователност V: Ток на утечка
8.3.8 Комбинирана изпитвателна последователност

Приложение: Протоколи от типови изпитвания, проведени от независима изпитвателна лаборатория

София, 10.08.2015 г.

.....
Владимир Лазаров, Управител
ВИВ-Изоматик ООД

324

Type Approval Certificate

This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.

Certificate No.	44 992 - 07 HH
Company	LSIS Co., Ltd. 1, Song Jung-dong, Hung Duk-gu Cheong Ju, Choongbuk 361-720, KOREA, REPUBLIC OF
Product Description	Molded Case Circuit Breaker SUSOL
Type	TS400, TS630 E\ N\ S\ H\ P\ L, ETS, ETM
Environmental Category	C
Technical Data / Range of Application	Number of poles : 3 Rated operational current Ie : 160 - 630 A Rated operational voltage Ue : 500 V AC Rated insulation voltage Ui : 750 V AC Rated impulse voltage Uimp : 8 kV Rated frequency fe : 50/60 Hz Utilization category : A

Rated short circuit capacity Performance at :

		E	N	S	H	P	L
500V	Icm	187	220	264	264	330	440 kA
240V	Ics = Icu	85	100	120	120	150	200 kA
415V	Ics = Icu	50	65	70	85	130	150 kA
460V	Ics = Icu	50	65	70	85	100	130 kA
500V	Ics = Icu	35	42	50	65	70	85 kA

Release system : Thermal, Magnetic, Electronic, INST, STD

Test Standard	Guidelines for the Performance of Type Approvals Part 2, Edition 2003 IEC 60947-2 (2003) incl. Annex F, H
Documents	Test report : KEMA 208602900.52 dated 2006-03-23 KEMA 208602900.55 dated 2006-03-23 KEMA 2087087-QUA/EMC 05-4964 dated 2005-10-27 PT&T R36-0772 (2006-08-14), R36-0776 (2006-07-24)
Remarks	None
Valid until	2017-01-17

Page 1 of 1

File No. I.K.01

Type Approval Symbol GL

Hamburg, 2012-01-18

Germanischer Lloyd

Thomas Hartmann

Harald Amberger

This certificate is issued on the basis of "Guidelines for the Performance of Type Approvals Part 1, Procedure".

325

KEMA

TEST REPORT

IEC 60 947-2

Low-voltage switchgear and controlgear

Part 2: Circuit - breakers

Report reference No. ..... :	2086029.52
Compiled by (+ signature)..... :	H.H.M. Versteegen
Approved by (+ signature)..... :	H.L. Schendstok
Date of issue ..... :	12 December 2005
	19 December, 2006 revised due to editorial change in address
CB Testing Laboratory ..... :	KEMA Quality B.V.
Address..... :	Utrechtseweg 310, 6812 AR Arnhem, The Netherlands
Testing location/procedure ..... :	CBTL ☐ SMT ☐ WMT ☒
Address..... :	LS Industrial Systems Co., Ltd. CheongJu Plant
	1, Songjeong-dong, Heungdeok-gu Cheongju-si, Chungcheongbuk-do, Korea
Applicant's Name ..... :	LS Industrial Systems Co., Ltd.
Address ..... :	84-11, Namdaemunno5(o)-ga, Jung-gu, Seoul, Korea
Test specification	
Standard ..... :	IEC 60 947-2:2003 see also IEC 60 947-1:2004
Test procedure ..... :	CB
Non-standard test method ..... :	N/A
Test Report Form	IEC60947_2B
TRF originator..... :	SEV
Master TRF ..... :	Dated 2002-11

Test item description ..... :	Moulded-case circuit-breaker
Trade Mark ..... :	LS
Model Type reference ..... :	TS400 E, TS400 N, TS400 S, TS400 H, TS400 P, TS400 L, TS630 E, TS630 N, TS630 S, TS630 H, TS630 P, TS630 L
Ratings ..... :	TS400 E/N/S/H/P/L : 300 and 400 A TS630 E/N/S/H/P/L : 300, 400, 500 and 630 A

Particulars: test item vs. test requirements	
3. Classification	
3.1. Utilization category: (A or B) :	A
3.2. Interruption medium: (air, vacuum, gas Break) :	Air
3.3. Design: (open construction, moulded case) :	Moulded case
3.4. Method of controlling the operation mechanism: (dependent manual operation, independent manual operation, dependent power operation, independent power operation) :	Independent manual operation
3.5. Suitability for insulation: (suitable, not -suitable) :	Suitable
3.6. Provision for maintenance: (maintainable, non maintainable) :	Maintainable
3.7. Method of installation: (fixed, plug in, withdrawable:	Fixed
3.8. Degree of protection: (IP code) :	IP20
4.8. Integral fuses (integrally fused circuit-breakers) Type and characteristics of SCPD :	N/A
4.9. Switching overvoltages: (when Uimp. is declared) :	8 kV
7.3 Electromagnetic compatibility (EMC) Environment A or B :	B
Circuit-breaker for use on phase-earthed systems :	N/A
Circuit-breaker for use in IT systems :	P
Rated and limiting values, main circuit :	
- rated operational voltage: Ue (V) :	AC 220, 240, 380, 415, 440, 460, 480 and 500 V
- rated insulation voltage: Ui (V) :	AC 750 V
- rated impulse withstand voltage: Uimp (kV) :	8 kV
- rated operational current: Ie (A) :	300, 400, 500 and 630 A
- kind of current :	A.C.
- conventional free air thermal current: Ith (A) :	300, 400, 500 and 630 A
- conventional enclosed thermal current: Ithe (A) :	N/A
- current rating for four-pole circuit-breakers: (A) :	N/A
- number of poles :	3
- rated frequency: (Hz) :	50/60 Hz
- integral fuses (rated values) :	N/A
- suitability for environment (A or B) :	A
Rated duty :	
- eight-hour duty :	N/A
- uninterrupted duty: Iu (A) :	250 A
Short-circuit characteristic :	
rated short-time making capacity: Icm (kA) :	440 kA
rated ultimate short-circuit breaking capacity: Icu (kA) :	200 kA–220&240V, 150 kA–380&415 V, 130 kA–440&460V, 85 kA–480&500 V
rated service short-circuit breaking capacity: Ics (kA) :	100% Icu
rated short-time withstand current: Icw (kA/s) :	N/A

Control circuits :	
Electrical control circuits :	
- kind of current: (AC, DC) ..... :	N/A
- rated frequency: (Hz) ..... :	N/A
- rated control circuit voltage: Uc (nature, frequency, V) ... :	N/A
- rated control supply voltage: Us (nature, frequency V):	N/A
Air supply control circuits: (pneumatic or electro-pneumatic) :	
- rated pressure and its limit ..... :	N/A
- volumes of air, at atmospheric pressure, required for each closing and each opening operation ..... :	N/A
Auxiliary circuits :	
Rated and limiting values, auxiliary circuits ..... :	N/A
- rated operational voltage Ue (V) ..... :	N/A
- rated insulation voltage: Ui (V) ..... :	N/A
- rated operational current: Ie (A) ..... :	N/A
- kind of current ..... :	N/A
- rated frequency: (Hz) ..... :	N/A
- number of circuits ..... :	N/A
- number and kind of contact elements ..... :	N/A
- rated uninterrupted current: Iu (A) ..... :	N/A
- utilization category: (AC, DC, current and voltage) ..... :	N/A
Short-circuit characteristic :	
Rated conditional short-circuit current: Icn (kA) ..... :	N/A
Co-ordination of short-circuit protective devices :	
- kind of protective device ..... :	N/A
Releases :	
1) shunt release ..... :	N/A
2) Over current release ..... :	See Remarks
a) instantaneous ..... :	P
b) definite time delay ..... :	N/A
c) inverse time delay ..... :	P
- independent of previous load ..... :	N/A
- dependent on previous load; (for example thermal type release) ..... :	P
3) Undervoltage release (for opening) ..... :	N/A
4) Other releases ..... :	N/A
Characteristics :	
1) Shunt release and undervoltage release (for opening) ... :	
- rated control circuit voltage: Uc (nature, frequency, V) ... :	N/A
- kind of current ..... :	N/A
-rated frequency: (if AC) ..... :	N/A

2) Overcurrent release ..... :	
- rated current ..... :	300, 400, 500 and 630 A
- kind of current..... :	A.C.
- rated frequency: (if AC) ..... :	50/60 Hz
- current setting (or range of settings)..... :	0,8 ~ 1,0 In
- time settings (or range of settings) ..... :	N/A

Test case verdicts	
Test case does not apply to the test object :	N/A
Test item does meet the requirement :	P(ass)
Test item does not meet the requirement :	F(ail)
Testing	
Date of receipt of test item :	August 18, 2005
Date(s) of performance of test :	August 22, 2005 ~ October

General remarks

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

The test results presented in this report relate only to the object tested.
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"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a comma (point) is used as the decimal separator.

General product information:

Subject	Moulded-case circuit-breaker
Manufacturer	LS Industrial Systems Co., Ltd.
Type designation	TS400 E/N/S/H/P/L, TS630 E/N/S/H/P/L
Frame size	630 AF
Number of poles	3
Rated frequency	50/60 Hz
Rated operational voltage	AC 220, 240, 380, 415, 440, 460, 480 and 500 V
Rated insulation voltage	AC 750 V
Rated impulse withstand voltage	8 kV
Suitability for isolation	Yes
Rated current	300, 400, 500 and 630 A

Rated ultimate short-circuit breaking capacity	200kA-220/240V, 150 kA-380/415 V, 130kA-440/460V, 85 kA-480/500 V	
Rated service short-circuit breaking capacity	Ics=100% Icu	
Utilization category	A	
Type of tripping device	Thermal Magnetic	
Instantaneous releases:	Magnetic	
Current setting (or range of settings)	5~10 In	
Time setting (or range of setting)	N/A	
Inverse time-delay release:	Thermal magnetic(Bi-metal)	
Current setting (or range of settings)	0.8~1.0 In	
Time setting (or range of setting)	N/A	
Release dependent on ambient air temperature	Yes	
Reference temperature	40℃	
Dimension of specimen	140(W) x 260(H) x 110(D)	
Dimension of metal screen	180(W) x 380(H) x 110(D)	

Breaking Capacities

Rated short circuit Breaking Capacity Icu

Type		TS400E TS630E	TS400N TS630N	TS400S TS630S	TS400H TS630H	TS400P TS630P	TS400L TS630L
Rated Voltage	AC 220/240V	85kA	100kA	120kA	120kA	150kA	200kA
Rated Voltage	AC 380/415V	50kA	65kA	70kA	85kA	130kA	150kA
Rated Voltage	AC 440/460V	50kA	65kA	70kA	85kA	100kA	130kA
Rated Voltage	AC 480/500V	35kA	42kA	50kA	65kA	70kA	85kA

Rated service short circuit Breaking Capacity(Ics) : 100% Icu

Additional ratings assigned by manufacturer

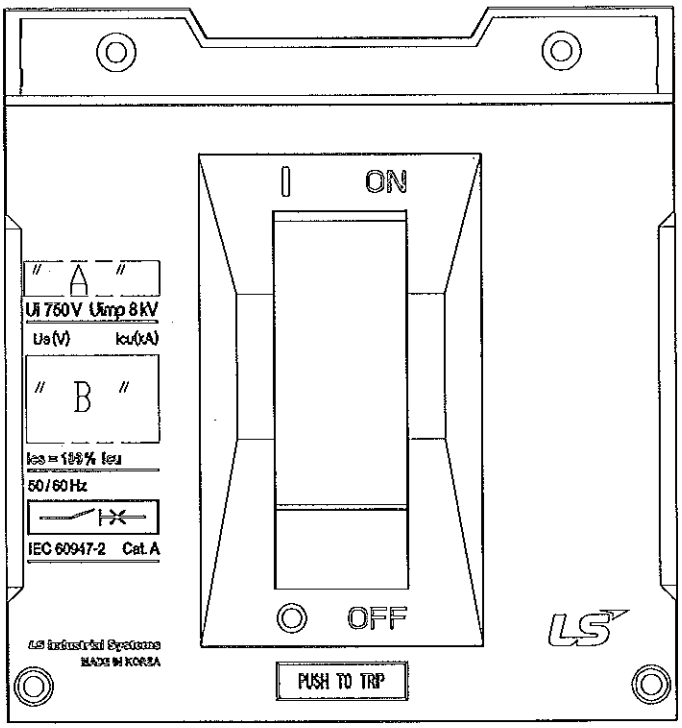
Construction break	N/A	
Contact material	AgNiC(Fixed),AgWC(Moving)	
Earthing system	Phase-earthed system / IT system	
Normal ambient temperature	-5 ~ 40 ℃	
Relative humidity	45~85%RH	
IP code	IP20	
Pollution degree	3	
Suitable for environment	A	

Field conditions	Inhomogeneous(Case A)	
Accessory	N/A	
Tripping current for a single pole	13×In	
Operating time for 200% of In	80~720 s	
Overload test option	12(Manual)+3(Auto at any convenient voltage)	

Terminals/Connection :

Rated current	300, 400, 500 and 630 A
Type of terminals	Screw
Materials of terminals	Copper
Plating of terminals	Line terminal : Ag, Load terminal : Sn
Connectable conductors ISO(㎟) or AWG number metric equivalent(㎟)	IEC-185 ㎟(300A)~IEC-185 ㎟ X 2 (630A)
Number of conductors per terminal	1(300A) and 2(630A)
Type of terminal screw	Hex. Socket bolt (M10)
Tightening Torque	Hex.Socket bolt (M10) : 10 N.m
Type of conductors	Flexible / stranded / Bus bar
Specification of cable Lug	IEC: KRT185

Copy of marking plate and summary of test results (information/comments):



Drawing Number	'A' Printing Contents	'B' Printing Contents
6462 1173 001	TS400E	220/240~ 85kA 380/415~ 50kA 440/460~ 50kA 480/500~ 35kA 250 - 42kA
6462 1173 011	TS630E	
6462 1173 002	TS400N	220/240~ 100kA 380/415~ 65kA 440/460~ 65kA 480/500~ 42kA 250 - 50kA
6462 1173 012	TS630N	
6462 1173 003	TS400S	220/240~ 120kA 380/415~ 70kA 440/460~ 70kA 480/500~ 50kA 250 - 65kA
6462 1173 013	TS630S	
6462 1173 004	TS400H	220/240~ 120kA 380/415~ 85kA 440/460~ 85kA 480/500~ 65kA 250 - 85kA
6462 1173 014	TS630H	
6462 1173 005	TS400P	220/240~ 150kA 380/415~ 130kA 440/460~ 100kA 480/500~ 70kA 250 - 85kA
6462 1173 015	TS630P	
6462 1173 006	TS400L	220/240~ 200kA 380/415~ 150kA 440/460~ 130kA 480/500~ 85kA 250 - 100kA
6462 1173 016	TS630L	

Summary of testing:

Sequence I

S1-1 : 500 V 630 A : Passed

Sequence II & III

S2-1N : 240 V 630 A 200 kA : Passed

S2-2 : 240 V 300 A 200 kA : Passed

S2-3 : 415 V 630 A 150 kA : Passed

S2-4-1 : 500 V 630 A 85 kA, connections reversed : Passed

AnnexH

H-1 : 500 V 630 A 9,1 kA : Passed

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
5.2	MARKING		
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.		
	- rated current:	300, 400, 500 and 630 A	P
	- suitability for isolation, if applicable, with the symbol	Compliance	P
	- indication of the open and closed position: with O and I respectively, if symbols are used	Compliance	P
b)	Marking on equipment not needed to be visible after mounting:		
	- manufacturer's name or trademark	LS	P
	- type designation or serial number	TS400 E, TS400 N, TS400 S, TS400 H, TS400 P, TS400 L, TS630 E, TS630 N, TS630 S, TS630 H, TS630 P, TS630 L	P
	- IEC 60947-2 if the manufacturer compliance with this standard.	IEC 60947-2	P
	- utilization category	A	P
	- rated operational voltage(s) Ue	500 V	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 market on the circuit-breaker immediately following these values of rated voltage	Compliance	P
	- value (or range) of the rated frequency and/or the indication DC (or symbol)	50/60 Hz	P
	- rated service short-circuit breaking capacity. Ics	200 kA	P
	- rated ultimate short-circuit breaking capacity. Icu	200 kA	P
	- rated short-time withstand current, (Icw) and associated short-time delay, for utilization category B	-	N/A
	- line and load terminals, unless their connection is immaterial	-	N/A
	- neutral pole terminals, if applicable, by the letter N	-	N/A
	- protective earth terminal, where applicable, by the symbol acc. 7.1.9.3 of part 1	-	N/A
	- ref. temperature for non-compensated thermal releases, if different from 30°C	40 °C	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
c)	Marked on the circuit-breaker as specified in item b), or shall be made available in the manufacturer's published information:		
	- rated short-circuit making capacity (Icm) (if higher than specified in 4.3.5.1	440 kA	P
	- rated insulation voltage. (Ui) if higher than the maximum rated operational voltage)	750 V	P
	- rated impulse withstand voltage (Uimp), when declared.	8 kV	P
	- pollution degree if other than 3	-	N/A
	- conventional enclosed thermal current (Ithe) if different from the rated current:	-	N/A
	- IP Code, where applicable:	IP20	P
	- minimum enclosure size and ventilation data (if any) to which marked ratings apply:	-	N/A
	- details of minimum distance between circuit-breaker and earthed metal parts for circuit-breaker intended for use without enclosure:	Compliance	P
	- r.m.s sensing if applicable, according to F.4.1.1	-	N/A
	- suitability for environment A or B	A	P
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:		
	- rated control circuit voltage of the closing device, and rated frequency for AC:	-	N/A
	- rated control circuit voltage of the shunt release and/or of the under-voltage release, and rated frequency:	-	N/A
	- rated current of indirect over-current releases:	-	N/A
	- 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.	-	N/A
e)	Terminal shall be clearly and permanently identified in acc. with IEC 60445 and annex L :		
	- line terminal	-	N/A
	- load terminal	-	N/A
	- neutral pole terminal "N"	-	N/A
	- protective earth terminal ⏚	-	N/A
	- terminal of coils (A/B)	-	N/A
	- terminal of shunt release (B)	-	N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	- terminals of under-voltage release (D)	-	N/A
	- terminals of interlocking electromagnets (E)	-	N/A
	- terminals of indicated light devices (X)	-	N/A
	- terminals of contact elements for switching devices (no)	-	N/A

7.1	CONSTRUCTION		
7.1.1	Withdrawable circuit-breaker	-	N/A
	In the disconnected position (main- and auxiliary circuits)		
	Isolating distances for circuit-breaker suitable for isolating warranted:	-	N/A
	Mechanism fitted with a reliable indicating device with indicates the position of the isolating contacts.	-	N/A
	Mechanism fitted with interlocks witch only permit the isolating contacts to be separate or re-closed when main contacts are open	-	N/A
	Mechanism fitted with interlock witch only permit the main contacts to be closed when the isolating contacts are fully closed.	-	N/A
	Mechanism fitted with interlock witch only permit the main contacts to be closed when in disconnected position.	-	N/A
	The isolating distances between the isolating contacts cannot be inadvertently reduced.	-	N/A
7.1.1.1	Resistance to abnormal heat and fire	650 ℃ 960 ℃	P
7.1.2	Current-carrying parts and their connection	Compliance	P
7.1.3	Clearences and creepage distances:		
	For circuit-breakers for which the manufacturer has declared a value of rated impulse withstand voltage. (Uimp.)		
	Clearances distances:		
	- Uimp is given as:	8 kV	
	- max. value of rated operational voltage to earth	289 V	
	- nominal voltage of supply system:	500 V	
	- overvoltage category:	IV	
	- pollution degree:	3	
	- field-in or homogeneous:	Inhomogeneous	
	- minimum clearances (mm):	8 mm	

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	- measured clearances (mm):	14,5 mm	P
	Creepage distances:		
	- rated insulation voltage Ui (V)	750 V	
	- pollution degree	3	
	- comparative tracking index (V)	≥ 600 V	
	- material group	IIIa	
	Minimum creepage distances (mm)	12,5 mm	
	Measured creepage distances (mm)	14,5 mm	P
7.1.4 part 1	Actuator		
7.1.4.1 part 1	Insulation		
	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	Compliance	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/A
	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	Compliance	P
7.1.4.2	Direction of movement		
	The direction of operation for actuators of devices shall normally conform to IEC 60447.	Compliance	P
	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	Compliance	P
7.1.5 part 1	Indication of contact position		
7.1.5.1 part 1	Indicating means		
	When an equipment is provided with means for indicating the closed and open positions, these positions shall be unambiguous and clearly indicated	Compliance	P
	This is done by means of a position indicating device (see 2.3.18)	Compliance	P

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IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	If symbols are used, they shall indicate the closed and open position respectively, in accordance with IEC 60417-2:		
	- 60417-2-IEC-5007 I On (power)	Compliance	P
	- 60417-2-IEC-5007 O Off (power)	Compliance	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"	-	N/A
	Red colour shall not be used for any other push-button	-	N/A
	The colours of other push-buttons, illuminated push-buttons and indicator lights shall be in accordance with IEC 60073	-	N/A
7.1.5.2 part 1	Indication by the actuator		
	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	On position Off position Trip position	P
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 V):		
	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:		
	- the position of the actuator	Compliance	P
	- a separate mechanical indicator	-	N/A
	- visibility of the moving contacts	-	N/A
	When means are provided or to lock the equipment in the open position, locking only be possible when contacts are in the open position	-	N/A
	Actuator front-plate fitted to the equipment in a manner witch ensures correct contact position indication and locking	-	N/A
	The indicated open position is the only position in witch the specified isolation distances between the contacts is ensured.	Compliance	P
	- minimum clearances across open contacts (see Table XIII, Part 1) (mm) :	8 mm	

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	- measured clearances (mm) :	14,5 mm	P
	- test Uimp across gap (kV) :	12,1 kV	P
7.1.6.2	Supplementary requirements for equipment with provision for electrical interlocking with contactors or circuit-breakers:		
	auxiliary switch shall be rated according to IEC 60 947-5-1	-	N/A
	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/A
	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/A
	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/A
	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/A
	During the closing operation the contacts of the auxiliary switch shall close after or simultaneously with the contacts of the main poles	-	N/A
	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	-	N/A
7.1.6.3	Supplementary requirements for equipment provided with means for padlocking the open position:		
	the locking means shall be designed in such a way that it cannot be removed with the appropriate padlock(s) installed	-	N/A
	Alternatively, the design may provide padlockable means to prevent access to the actuator	-	N/A
	test force F applied to the actuator in an attempt to operate to the closed position (N) :	-	N/A
	rated impulse withstand voltage (kV) :	-	N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	test Uimp on open main contacts at the test force	-	N/A
7.1.7	Terminals		
7.1.7.1	All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength	Compliance	P
	Terminal connections shall be such that necessary contact pressure is maintained	Compliance	P
	Terminals shall be so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal	Compliance	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	Compliance	P
7.1.7.2	Connection capacity		
	type of conductors :	Flexible and stranded type	P
	minimum cross-sectional area of conductor (mm²) :	185mm^2 or 350 kcmil [300 A]	P
	maximum cross-sectional area of conductor (mm²) :	185mm^2 or 350 kcmil [630 A]	P
	number of conductors simultaneously connectable to the terminal :	1 [300 A] 2 [630 A]	P
7.1.7.3	Connection		
	terminals for connection to external conductors shall be readily accessible during installation	Compliance	P
	clamping screws and nuts shall not serve to fix any other component	Compliance	P
7.1.7.4	Terminal identification and marking		
	terminal intended exclusively for the neutral conductor	-	N/A
	protective earth terminal	-	N/A
	other terminals	-	N/A
7.1.8 part 1	Additional requirements for equipment provided with a neutral pole		
	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.).	-	N/A
	A switched neutral pole shall break not before and shall make not after the other poles	-	N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	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	-	N/A
	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	-	N/A
	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.	-	N/A
7.1.9	Provisions for protective earthing		
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/A
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	-	N/A
	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 50 mm x 50 mm) or are so located as to exclude any contact with live parts	-	N/A
7.1.9.2 part 1	Protective earth terminal		
	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/A
	The protective earth terminal shall be suitably protected against corrosion	-	N/A
	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/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	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/A
7.1.9.3	Protective earth terminal marking and identification		
	The protective earth terminal shall be clearly and permanently identified by its marking	-	N/A
	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/A
	Graphical symbol to be used: 60417-2-IEC-5019 Protective earth (ground) in accordance with IEC 60417-2	-	N/A
7.1.10	Enclosure for equipment		
7.1.10.1	Design		
	The enclosure, when it is opened: all parts requiring access for installation and maintenance are readily accessible	-	N/A
	Sufficient space shall be provided inside the enclosure	-	N/A
	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	-	N/A
	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	-	N/A
	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/A
	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	-	N/A
	If the enclosure is used for mounting push-buttons, it shall not be possible to remove the buttons from the outside of the enclosure	-	N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
7.1.10.2	Insulation		
	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	-	N/A
7.1.11	Degree of protection of enclosed equipment		
	Degree of protection.	IP20	
	Test for first characteristic.	IPXX	
	Test for first numeral .....:	1 2 3 4 5 6	N/A
	Test for second characteristic	IPXX	
	Test for second numeral .....:	1 2 3 4 5 6 7 8	N/A
7.1.12 part 1	Conduit pull-out, torque and bending with metallic conduits		
	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/A
7.2	Performance requirements		
7.2.1	Operating condition		
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	Compliance	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
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	-	N/A
	Such a circuit-breaker should not be used in circuits having a prospective peak making current exceeding 10 kA	-	N/A
	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	-	N/A
7.2.1.1.2	Independent manual closing		
	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	Compliance	P
7.2.1.1.3	Dependent power closing		
	At 110% of the rated control supply voltage, the closing operation performed on no-load shall not cause any damage to the circuit-breaker.	-	N/A
	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.	-	N/A
7.2.1.1.4	Independent power closing		
	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	-	N/A
	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/A
7.2.1.1.5	Stored energy closing		
	Capable ensuring closing of the circuit-breaker in any condition between no-load and its rated making capacity	-	N/A

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IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	- when the stored energy is retained within the circuit-breaker, a device is provided witch indicates when the storing mechanism is fully charged.	-	N/A
	- 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/A
	- 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/A
	- by manually operated circuit-breaker is the direction of operation indicated. (not for circuit-breaker with an independent manual closing operation.)	-	N/A
	- 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/A
7.2.1.2	Opening		
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		
7.2.1.2.2	Opening by undervoltage releases		
7.2.1.3. a part 1	Operating voltage		
	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	-	N/A
	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	-	N/A
	Unless otherwise stated in the relevant product standard, the upper limit of the supply voltage shall be 110% of its rated value	-	N/A
7.2.1.3. b part 1	Operating time		
	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	-	N/A
7.2.1.2.3	Opening by shunt releases	-	N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
7.2.1.4 part 1	Limits of operation of shunt releases		
	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/A
7.2.1.5 part 1	Limits of operation of current operated relays and released		
	Limits of operation of current operated relays and releases shall be stated in the relevant product standard	-	N/A
7.2.1.2.4	Opening by over-current releases		
a)	Opening under short-circuit conditions		
	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	Compliance	P
	Where necessary for over-current co-ordination the manufacturer shall provide information (usually curves) showing	-	N/A
	- maximum cut-off (let-through) peak current as a function of prospective current (r.m.s. symmetrical)	Compliance	P
	- I^2t characteristics for circuit-breakers of utilization category A and, if applicable, B for circuit-breakers with instantaneous override (see not to 8.3.5)	Compliance	P
b)	Opening under overload conditions		
1)	Instantaneous or definite time-delay operation	-	N/A
	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/A
2)	Inverse timer-delay operation		
	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	Compliance	P
	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	Compliance	P

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Clause	Requirement – Test	Result – Remark	Verdict
	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	Compliance	P
	The width of the temperature band shall be at least 10 K on either side of the reference temperature	Compliance	P
7.2.4.2	Operational performance capability		
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	Compliance	P
	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	Compliance	P

8	TESTS		
8.2.4	Mechanical properties of terminals		
	Mechanical strength of terminals		
	maximum cross-sectional area of conductor (mm^2) :	-	
	diameter of thread (mm) :	12	
	torque (Nm) :	14	
	5 times on 2 separate clamping units Nm	15,4	P
	Testing for damage to and accidental loosening of conductor (flexion test)		
	conductor of the smallest cross-sectional area (mm^2) :	-	
	number of conductor 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	-	N/A
	Pull-out test		
	force (N) :	-	

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Clause	Requirement – Test	Result – Remark	Verdict
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A
	conductor of the largest cross-sectional area (mm^2) :	-	
	number of conductor 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	-	N/A
	Pull-out test		
	force (N) :	-	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A
	conductor of the largest and smallest cross-sectional area (mm^2) :	-	
	number of conductor of the smallest cross section, number of conductor 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	-	N/A
	Pull-out test		
	force (N) :	-	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A

8.3.3	TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS		
8.3.3.1	Tripping limits and characteristic		
8.3.3.1.2	Opening under short-circuit conditions		
	Manufacturer's name or trademark	LS	
	Type designation or serial number	TS630L	
	Sample no:	S1-1	
	Rated operational voltage: Ue (V)	500 V	

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Clause	Requirement – Test	Result – Remark	Verdict
	Rated current: In (A)	630 A	
	Ambient temperature 10-40 °C :	24 °C	P
	Value of the tripping current declared by the manufacturer for a single pole, at witch value they shall operate.	4095 A (Im=5×Ir) 8190 A (Im=10×Ir)	P
	Range of adjustable setting current. (A)	3150 ~ 6300 A (Im=5~10×Ir)	P
	Time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 80% of the rated, or minimum adjustable setting current: (A)	2520 A (Im=5×Ir)	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	L1-L2: >0,2 s L1-L3: >0,2 s L2-L3: >0,2 s	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/A
	Test current: 80% of the maximum adjustable setting current: (A)	5040 A (Im=10×Ir)	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	L1-L2: >0,2 s L1-L3: >0,2 s L2-L3: >0,2 s	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/A
	Test current: 120% of the rated, or minimum adjustable setting current: (A)	3780 A (Im=5×Ir)	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	L1-L2: 0,0254 s L1-L3: 0,0271 s L2-L3: 0,0278 s	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/A
	Test current: 120% of the maximum adjustable setting current: (A)	7560 A (Im=10×Ir)	P

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Clause	Requirement – Test	Result – Remark	Verdict
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	L1-L2: 0,0296 s L1-L3: 0,0239 s L2-L3: 0,0286 s	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/A
	Test current: tripping current declared for single pole operation (A)	4095 A (Im=5×Ir) 8190 A (Im=10×Ir)	P
	Operating time: < 20 ms in case of instantaneous release: L1: L2: L3:	Min / Max adjustable setting L1: 0,0280 s / 0,0261 s L2: 0,0277 s / 0,0229 s L3: 0,0288 s / 0,0240 s	P
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3:	-	N/A
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/A
	Value of the tripping current declared by the manufacturer for a single pole, at witch value they shall operate.	-	N/A
	Range of adjustable setting current. (A)	-	N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 90% of the rated, or minimum adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases:	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Test current: 90% of the maximum adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases:	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
b)	Inverse time delay releases		
	Manufacturer's name or trademark	LS	
	Type designation or serial number	TS630L	
	Sample no:	S1-1	
	Rated operational voltage: Ue (V)	500 V	
	Rated current: In (A)	630 A	
	For releases dependent of ambient air temperature: Reference temperature	40 °C	P
	Test ambient temperature (°C)	24 °C	P
	If test made at a difference ambient temperature: Acc. manufacturer's correction temperature/current data:	See Remarks	P
	Range of adjustable setting current: (A)	0,8 / 0,9 / 1,0 x In	P
	For releases independent of ambient temperature: Test made at 30°C and/or at 20/40°C	-	N/A
	Test ambient air temperature:	-	N/A
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40 °C	P

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Clause	Requirement – Test	Result – Remark	Verdict
	Releases, independent of ambient air temperature: at 30°C	-	N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	551 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	2h	P
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	683 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	886 s	P
	Test current: 105% of the maximum adjustable setting current: (A)	689 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	2 h	P
	Test current: 130% of the maximum adjustable setting current: (A)	853 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	670 s	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:	-	N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	-	N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	-	N/A
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A
	Test current: 105% of the maximum adjustable setting current: (A)	-	N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	-	N/A
	Test current: 130% of the maximum adjustable setting current: (A)	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A
	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		
	Releases, dependent of ambient air temperature: Reference temperature (°C)	25 °C	P

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Clause	Requirement – Test	Result – Remark	Verdict
	Releases, independent of ambient air temperature: at 30°C	-	N/A
	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)	1576 A (0,8 In) 1969 A (1,0 In)	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolorances)	184 s (0,8 In) 135 s (1,0 In)	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:	-	N/A
	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/A
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolorances)	-	N/A
8.3.3.1.4	Additional test for definite time-delay releases		
a)	Time delay		
	Test is made at a current equal to 1,5 times the current setting		
	overload releases: (all phase poles loaded)	-	N/A
	short-circuit releases: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.	-	N/A
	Test current: 1,5 times of the rated, or minimum adjustable setting current: (A)	-	N/A
	Operating time, overload releases: (s)	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Operating time, short-circuit releases: (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Test current: 1,5 times of the maximum adjustable setting current: (A)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Operating time, overload releases: (s)	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Operating time, short-circuit releases: (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
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.		
	overload releases: (all phase poles loaded)	-	N/A
	short-circuit releases: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.	-	N/A
	Test current: 1,5 times of the rated, or minimum adjustable setting current: (A)	-	N/A
	Time interval: non-tripping duration stated by the manufacturer: (s)	-	N/A
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:	-	N/A
	Test current: 1,5 times of maximum adjustable setting current: (A)	-	N/A
	Time interval: non-tripping duration stated by the manufacturer: (s)	-	N/A
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:	-	N/A
	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.		
	Test current: of the rated, or minimum adjustable setting current: (A)	-	N/A
	Time interval: twice the delay-time stated by the manufacturer: (s)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:	-	N/A
	Test current: maximum adjustable setting current: (A)	-	N/A
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:	-	N/A
8.3.3.2	Test of dielectric properties, impulse withstand voltage (Uimp indicated):		
8.3.3.4 part1	The 1,2/50µs impulse voltage shall be applied five times for each polarity at intervals of 1s minimum		
	- rated impulse withstand voltage (kV) :	8 kV	P
	- sea level of the laboratory:	200 m	P
	- test Uimp main circuits (kV) :	9,6 kV	P
	- test Uimp auxiliary circuits (kV) :	-	N/A
	- test Uimp control circuits (kV) :	-	N/A
	- test Uimp on open main contacts (equipment suitable for isolating) (kV) :	12,1 kV	P
a)	Application of test voltage		
	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.	Compliance	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.	compliance	P
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit	Compliance	P
	- other circuits	-	N/A
	- exposed conductive parts	-	N/A
	- enclosure of mounting plate	-	N/A
	iv) equipment suitable for isolation	Compliance	P
	equipment not suitable for isolation	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- no unintentional disruptive discharge during the test's	Compliance	P
	Test of dielectric properties, dielectric withstand voltage (Uimp not indicated):		
	- rated insulation voltage (V) :	-	N/A
	- main circuits, test voltage for 1 min (V)	-	N/A
	- auxiliary circuits, test voltage for 1 min (V)	-	N/A
	- control circuits, test voltage for 1 min (V)	-	N/A
8.3.3.2.2	Application of test voltage		
1)	with circuit-breaker in the closed position		
	- between all live parts of all poles connected together and the frame of the circuit-breaker .	-	N/A
	- between each pole and all the other poles connected to the frame of the circuit-breaker	-	N/A
2)	with the circuit-breaker in the open position and, additionally, in the tripped position, if any.	-	N/A
	- between all live parts of all poles connected together and the frame of the circuit-breaker.	-	N/A
	- between the terminals of one side connected together and the terminals of the other side connected together.	-	N/A
b)	Control and auxiliary circuits		
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/A
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/A
	No unintentional disruptive discharge during the test's	-	N/A
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/A
8.3.3.3	Mechanical operation and operational performance capability		
8.3.3.3.2	Construction and mechanical operation		
a)	Construction		
	A withdrawable circuit-breaker shall be checked for the requirements stated in 7.1.1	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	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	-	N/A
b)	Mechanical operation		
	A circuit-breaker with dependent power operation shall comply with the requirements stated in 7.2.1.1.3	-	N/A
	A circuit-breaker with dependent power operation shall operate with the operating mechanism charged to the minimum and maximum limits stated by the manufacturer	-	N/A
	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.	-	N/A
	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	-	N/A
	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/A
	If the closing and opening times of a circuit-breaker are stated by the manufacturer, such times shall comply with the stated values	-	N/A
c)	Undervoltage releases		
	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/A
i)	Drop out voltage		
	It shall be verified that the release operates to open the circuit-breaker between the voltage limits specified	-	N/A
	The voltage shall be reduced from rated voltage at a rate to reach 0 V in approximately 30 s	-	N/A
	The test for the lower limit is made without current in the main circuit and without previous heating of the release coil	-	N/A
	In the case of a release with a range of rated voltages, this test applies to the maximum voltage of the range	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	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/A
	This test may be combined with the temperature-rise test of 8.3.3.6	-	N/A
	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	-	N/A
ii)	Test for limits of operation		
	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/A
	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/A
iii)	Performance under overvoltage conditions		
	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/A
d)	Shunt releases		
	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	-	N/A
	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	-	N/A
	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	-	N/A
8.3.3.3.3	Operational performance capability without current.		
	Type designation or serial number	TS630L	
	Sample no:	S1-1	
	Rated current In (A)	630 A	
	Rated operational voltage: Ue (V)	500 V	

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Clause	Requirement – Test	Result – Remark	Verdict
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt releases: Uc (V)	-	
	Rated control supply voltage undervoltage releases: Uc (V)	-	
	Ambient temperature 10-40 °C :	25 °C	P
	Number of operating cycles per hour	120 cycles per hour	P
	Number of cycles without current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Number of cycles without current (without releases)	4000 cycles	P
	Applied voltage: closing mechanism (V)	-	N/A
	10% of total cycles for circuit-breaker with fitted shunt release: (50% at the beginning- and 50% at the end of the test.) Energized at the rated Uc	-	N/A
	Applied voltage: shunt releases (V)	-	N/A
	10% of total cycles for circuit-breaker with undervoltage releases: (50% at the beginning- and 50% at the end of the test.) Energized at the minimum rated Uc	-	N/A
	10 cycles without applied voltage at the undervoltage releases. (Shall not possible to close the circuit-breaker.)	-	N/A
	Applied voltage: undervoltage releases (V)	-	N/A
	Electrical components do not exceed the value indicated in tab. 7.	Compliance	P
8.3.3.3.4	Operational performance capability with current.		
	Rated current: In (A)	630 A	
	Maximum rated operational voltage: Ue (V)	500 V	
	Conductor cross-sectional area (mm²) :	185 mm^2 X2 (350 kcmil X2)	P
	Number of operating cycles per hour	60 cycles per hour	P
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	1000 cycles	P
	Applied voltage: closing mechanism (V)	500 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.	-	N/A
	Conditions, make/break operations:		

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Clause	Requirement – Test	Result – Remark	Verdict
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	L1 : 511,9 V L1 : 510,0 V L2 : 511,5 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	L1 : 628 A L1 : 621 A L2 : 649 A	P
	- power factor/time constant:	0,73	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1000 ms	P
	- off-time (s):	59 s	P
	Electrical components do not exceed the value indicated in tab. 7.	Compliance	P
8.3.3.3.5	Additional test of operational performance capability without current for withdrawable circuit-breaker.		
	Number of operations cycles : 100	-	N/A
	After test, the isolating contacts, withdrawable mechanism and interlocks shall be suitable for further service.	-	N/A
8.3.3.4	Overload performance		
	this test applies to circuit-breaker of rated current up to and including 630 A		
	Type designation or serial number	TS630L	
	Sample no:	S1-1	
	Rated current In (A)	630 A	
	Rated operational voltage: Ue (V)	500 V	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt releases: Uc (V)	-	
	Rated control supply voltage undervoltage releases: Uc (V)	-	
	Ambient temperature 10-40 °C :	25 °C	P
	Number of operating cycles per hour	60 cycles per hour	P
	Maximum rated operational voltage: Ue (V)	500 V	P
	Number of operating cycles per hour	-	N/A
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Applied voltage: closing mechanism (V)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload/short-circuit settings at maximum.	-	N/A
	Conditions, overload operations:		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1 : 546,1 V L1 : 545,5 V L2 : 549,2 V	P
	- test current AC/DC: I/Ie = 6,0/2.5 (A) ..... L1: ..... L2: L3:	L1 : 3810 A L1 : 3880 A L2 : 3840 A	P
	- power factor/time constant:	0,47	P
	- Number of cycles manually opened: 9	12	P
	- Number of cycles automatically opened by an overload release: 3	3 (at the lower voltage)	P
	- frequency: (Hz)	60 Hz	P
	- on-time max 2s:	1 s	P
8.3.3.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1.1 Ue)	< 5uA / 550 V	P
8.3.3.6	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	See table	P
	Temperature rise of main circuit terminals ≤ 80 K (K) :	63,5 K	P
	conductor cross-sectional area (mm²) :	185 mm² X2 (350 kcmil X2)	P
	test current Ie (A) :	630 A	P
8.3.3.7	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	952 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	299 s	P
8.3.3.8	Verification of undervoltage and shunt releases		
	Circuit-breaker fitted with undervoltage releases. The release shall not operate at 70% of the minimum control supply voltage -	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	and shall operate at 35% of the maximum control supply voltage.	-	N/A
	Circuit-breaker fitted with shunt releases. The release shall operate at 70% of the minimum rated control supply voltage. Test made at room temperature.	-	N/A
8.3.3.9	Verification of the main contact position for circuit-breakers for isolation		
	actuating force for opening (N) .....:	117,6 N	—
	test force with blocked main contacts for 10 s (N) .:	352,8 N	—
	Dependent power operation		
	Supply voltage of 110% of rated voltage (V).....:	-	N/A
	Three attempts of 5 s to operate the equipment at intervals of 5 min.	-	N/A
	Independent power operation		
	Three attempts to operate the equipment by the stored energy.	-	N/A
	Lockability of driving mechanism in OFF-position at test force and blocked main contacts .....:	-	N/A
	Position indicator does not show OFF-position after capture of test force at blocked main contacts	Compliance	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/A
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	-	N/A
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm²) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	-	N/A
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	-	N/A
	power factor/time constant :	-	N/A
	- Factor "n"	-	N/A
	- peak test current (A) :	-	N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:	-	N/A
	Pause, t: (min)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Pause, t: (min)	-	N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Melting of the fusible element	-	N/A
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	-	N/A
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	-	
	Maximum rated operational voltage: Ue (V)	-	
	Conductor cross-sectional area (mm^2) :	-	
	Number of operating cycles per hour	-	N/A
	Number (5% of the number given in columm 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	-	N/A
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	-	N/A
	- power factor/time constant:	-	N/A
	- frequency: (Hz)	-	N/A
	- on-time (ms):	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- off-time (s):	-	N/A
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	-	N/A
	- no breakdown or flashover	-	N/A
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1.1 Ue)	-	N/A
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm²) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.4.5	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A

8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
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	TS630L	
	Sample no:	S2-1N	
	Rated current: In (A)	630 A	
	Rated operational voltage: Ue (V)	240 V	
	Rated service short-circuit breaking capacity: (kA)	200 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.	Compliance	P

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Clause	Requirement – Test	Result – Remark	Verdict
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	180(W) x 380(H) x 110(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,55	P
	- size of hole: <30mm^2	28 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm^2) :	185 mm^{2}X2 (250 kcmil X2)	P
	If terminals unmarked: line connected at: (underside/upside)	upside	P
	Tightening torques: (Nm)	10,0 Nm	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.		
	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.		
	Time specified by the manufacturer:	80~720 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 499 s L2 : 406 s L3 : 374 s	P
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1 : 258,4 V L2 : 258,4 V L3 : 258,4 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	L1 : 205200 A L2 : 203800 A L3 : 207600 A	P
	power factor/time constant :	0,18	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- Factor "n"	2,2	P
	- peak test current (A) :	457800 A	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 21,3 kApeak L2 : 45,1 kA peak L3 : 27,2 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,3 MA^2s L2 : 1,6 MA^2s L3 : 0,5 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 8,6 kApeak L2 : 31,9 kA peak L3 : 38,7 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,0 MA^2s L2 : 0,9 MA^2s L3 : 1,2 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 31,9 kApeak L2 : 40,0 kA peak L3 : 10,5 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,9 MA^2s L2 : 1,3 MA^2s L3 : 0,1 MA^2s	P
	Melting of the fusible element	No	P
	Holes in the PE-sheet for test sequence "O"	No	P
	Cracks observed	No	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	630 A	
	Maximum rated operational voltage: Ue (V)	240 V	
	Conductor cross-sectional area (mm^2) :	185 mm^2X2 (250 kcmil X2)	
	Number of operating cycles per hour	60 cycles per hour	P
	Number (5% of the number given in columm 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	50 cycles	P
	Applied voltage: closing mechanism (V)	240 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.	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	L1 : 248,2 V L2 : 244,9 V L3 : 242,1 V	P
	- test current I/Ie = 1,0 (A)..... L1: ..... L2: L3:	L1 : 626 A L2 : 615 A L3 : 648 A	P
	- power factor/time constant:	0,73	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1000 ms	P
	- off-time (s):	59 s	P
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	10 uA / 264 V	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	See Remarks	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	57,3 K	P
	conductor cross-sectional area (mm²) :	185 mm^2X2 (250 kcmil X2)	P
	test current Ie (A) :	630 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	950 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	594 s	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	80~720 s	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 250 s L2 : 195 s L3 : 211 s	P
8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
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	TS630L	
	Sample no:	S2-2	
	Rated current: In (A)	300 A	
	Rated operational voltage: Ue (V)	240 V	
	Rated service short-circuit breaking capacity: (kA)	200 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.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	180(W) x 380(H) x 110(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,55	P
	- size of hole: <30mm^2	28 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm²) :	185 mm^2 (250 kcmil)	P

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Clause	Requirement – Test	Result – Remark	Verdict
	If terminals unmarked: line connected at: (underside/upside)	Upside	P
	Tightening torques: (Nm)	10,0 Nm	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.		
	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.		
	Time specified by the manufacturer:	80~720 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 487 s L2 : 555 s L3 : 362 s	P
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1 : 258,4 V L2 : 258,4 V L3 : 258,4 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	 L1 : 205200 A L2 : 203800 A L3 : 207600 A	P
	power factor/time constant :	0,18	P
	- Factor "n"	2,2	P
	- peak test current (A) :	457800 A	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 20,2 kApeak L2 : 40,4 kA peak L3 : 24,2 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,3 MA^2s L2 : 1,4 MA^2s L3 : 0,4 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 36,2 kApeak L2 : 28,0 kA peak L3 : 16,3 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 1,2 MA^2s L2 : 0,6 MA^2s L3 : 0,2 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 35,4 kApeak L2 : 6,1 kA peak L3 : 32,1 kApeak	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 1,1 MA^2s L2 : 0,0 MA^2s L3 : 1,0 MA^2s	P
	Melting of the fusible element	No	P
	Holes in the PE-sheet for test sequence "O"	No	P
	Cracks observed	No	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	-	
	Maximum rated operational voltage: Ue (V)	-	
	Conductor cross-sectional area (mm^2) :	-	
	Number of operating cycles per hour	-	N/A
	Number (5% of the number given in columm 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	-	N/A
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	-	N/A
	- power factor/time constant:	-	N/A
	- frequency: (Hz)	-	N/A
	- on-time (ms):	-	N/A
	- off-time (s):	-	N/A
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	10 uA / 264 V	P

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Clause	Requirement – Test	Result – Remark	Verdict
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm²) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	452 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	2308 s	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	80~720 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 174 s L2 : 171 s L3 : 154 s	P
8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
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	TS630L	
	Sample no:	S2-3	
	Rated current: In (A)	630 A	
	Rated operational voltage: Ue (V)	415 V	
	Rated service short-circuit breaking capacity: (kA)	150 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.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	180(W) x 380(H) x 110(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,55	P
	- size of hole: <30mm^2	28 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm^2) :	185 mm^{2}X2 (250 kcmilX2)	P
	If terminals unmarked: line connected at: (underside/upside)	upside	P
	Tightening torques: (Nm)	10,0 Nm	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.		
	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.		
	Time specified by the manufacturer:	80~720 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 345 s L2 : 330 s L3 : 395 s	P
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1 : not recorded L2 : not recorded L3 : not recorded	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	 L1 : 151800 A L2 : 151800 A L3 : 148400 A	P
	power factor/time constant :	0,19	P
	- Factor "n"	2,0	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- peak test current (A) :	333400 A	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 26,6 kApeak L2 : 52,9 kA peak L3 : 29,2 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,6 MA^2s L2 : 2,4 MA^2s L3 : 0,7 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 24,2 kApeak L2 : 50,2 kA peak L3 : 28,7 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,5 MA^2s L2 : 2,1 MA^2s L3 : 0,7 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 16,7 kApeak L2 : 35,4 kA peak L3 : 49,4 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,3 MA^2s L2 : 1,2 MA^2s L3 : 2,2 MA^2s	P
	Melting of the fusible element	No	P
	Holes in the PE-sheet for test sequence "O"	No	P
	Cracks observed	No	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	630 A	
	Maximum rated operational voltage: Ue (V)	415 V	
	Conductor cross-sectional area (mm^2) :	185 mm^2X2 (250 kcmil X2)	
	Number of operating cycles per hour	60 cycles per hour	P
	Number (5% of the number given in columm 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	50 cycles	P
	Applied voltage: closing mechanism (V)	415 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.	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	L1 : 426,3 V L2 : 418,3 V L3 : 422,8 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	L1 : 624 A L2 : 625 A L3 : 640 A	P
	- power factor/time constant:	0,71	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1000 ms	P
	- off-time (s):	59 s	P
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	550 uA / 457 V	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	See Remarks	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	56,7 K	P
	conductor cross-sectional area (mm²) :	185 mm²X2 (250 kcmil X2)	P
	test current Ie (A) :	630 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	950 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	421 s	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	80~720 s	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 248 s L2 : 199 s L3 : 220 s	P
8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
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	TS630L	
	Sample no:	S2-4-1	
	Rated current: In (A)	630 A	
	Rated operational voltage: Ue (V)	500 V	
	Rated service short-circuit breaking capacity: (kA)	85 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.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	180(W) x 380(H) x 110(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,55	P
	- size of hole: <30mm^2	28 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm²) :	185 mm^{2}X2 (250 kcmil X2)	P

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Clause	Requirement – Test	Result – Remark	Verdict
	If terminals unmarked: line connected at: (underside/upside)	Underside	P
	Tightening torques: (Nm)	10,0 Nm	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.		
	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.		
	Time specified by the manufacturer:	80~720 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 455 s L2 : 360 s L3 : 401 s	P
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1 : not recorded L2 : not recorded L3 : not recorded	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	 L1 : 86400 A L2 : 85400 A L3 : 86400 A	P
	power factor/time constant :	0,18	P
	- Factor "n"	2,2	P
	- peak test current (A) :	189600 A	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 26,5 kApeak L2 : 43,8 kA peak L3 : 20,9 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,9 MA^2s L2 : 2,2 MA^2s L3 : 0,5 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 25,1 kApeak L2 : 40,7 kA peak L3 : 20,8 kApeak	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,8 MA^2s L2 : 2,0 MA^2s L3 : 0,5 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1 : 18,3 kApeak L2 : 40,5 kA peak L3 : 31,3 kApeak	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1 : 0,5 MA^2s L2 : 2,2 MA^2s L3 : 1,1 MA^2s	P
	Melting of the fusible element	No	P
	Holes in the PE-sheet for test sequence "O"	No	P
	Cracks observed	No	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	630 A	
	Maximum rated operational voltage: Ue (V)	500 V	
	Conductor cross-sectional area (mm^2) :	185 mm^2X2 (250 kcmil X2)	
	Number of operating cycles per hour	60 cycles per hour	P
	Number (5% of the number given in columm 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	50 cycles	P
	Applied voltage: closing mechanism (V)	500 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.	-	N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	L1 : 518,1 V L2 : 504,2 V L3 : 517,2 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	L1 : 625 A L2 : 628 A L3 : 640 A	P
	- power factor/time constant:	0,72	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1000 ms	P
	- off-time (s):	59 s	P
	Electrical components do not exceed the value indicated in tab. 7.		N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	700 uA / 550 V	P

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Clause	Requirement – Test	Result – Remark	Verdict
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	See Remarks	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	55,0 K	P
	conductor cross-sectional area (mm²) :	185 mm^2X2 (250 kcmil X2)	P
	test current Ie (A) :	630 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	950 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	1718 s	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	80~720 s	P
	- Operation time: (s) ..... L1: ..... L2: L3:	L1 : 261 s L2 : 220 s L3 : 224 s	P

8.3.5	TEST SEQUENCE III (Icu)		
	Rated ultimate short-circuit breaking		
	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.		
	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.		
	For integrally fused circuit-breakers, test sequence V applies in place or this sequence.		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current: In (A)	-	
	Rated operational voltage: Ue (V)	-	
	Rated ultimate short-circuit breaking capacity: (kA)	-	

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Clause	Requirement – Test	Result – Remark	Verdict
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	-	N/A
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A
8.3.5.2	Test of rated ultimate short-circuit breaking capacity		
	The test sequence of operations is O – t – CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	N/A
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	-	N/A
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm^2) :	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening, torques: (Nm)	-	N/A
	Test sequence of operation: O – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: L3:	-	N/A
	power factor/time constant :	-	N/A
	- Factor "n"	-	N/A
	- peak test current (Amax) :	-	N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Pause, t: (min)	-	N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Melting of the fusible element	-	N/A
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	-	N/A
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	-	N/A
	- no breakdown or flashover	-	N/A
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	-	N/A
	- Operation time: (s) .....L1: .....L2: L3:	-	N/A

8.3.6	TEST SEQUENCE IV		
	Rated short-time withstand current		
	Except where the combined test sequence applies, this test sequence applies to circuit-breakers of utilization category B and to those circuit-breaker of category A covered by note 3 of table 4, and comprises the following tests:		
	Where integrally fused circuit-breaker are of utilization category B, they shall meet the requirements of this sequence.		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current: In (A)	-	
	Rated operational voltage: Ue (V)	-	
	Rated short-time withstand current: (kA/s)	-	
	Rated frequency: (Hz)	-	
8.3.6.1	Verification of overload releases		
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	-	N/A
	- Operation time: (s) .....L1: .....L2: L3:	-	N/A
8.3.6.2	Test of rated short-time withstand current.		
	For this test, any over-current release, including the instantaneous override, if any, likely to operate during the test, shall be rendered inoperative.		
	- test frequency: (Hz)	-	N/A
	- duration of the test: (s)	-	N/A
	- test frequency: (Hz)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- power factor / time constant (ms):	-	N/A
	- factor "n"	-	N/A
	- test voltage: (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current: (kA) ..... L1: ..... L2: L3:	-	N/A
	- highest peak current: (kA)	-	N/A
8.3.6.3	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm²) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.6.4	Test of short-circuit breaking capacity at the max. short-time withstand current.		
	Rated short-time withstand current: (kA/s)		
	Test sequence: O – t - CO		
	max. available time setting of the short–time delay short-circuit release. (s)	-	N/A
	- test frequency: (Hz)	-	N/A
	- power factor / time constant (ms):	-	N/A
	- factor "n"	-	N/A
	Test sequence "O"		
	- test voltage: (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current: (kA) ..... L1: ..... L2: L3:	-	N/A
	- highest peak current: (kA)	-	N/A
	- the circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short–time delay short-circuit release and -	-	N/A
	- the instantaneous override, if any, shall not operate.	-	N/A
	-pause: t (s)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence "CO"		
	- test voltage: (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current: (kA) ..... L1: ..... L2: L3:	-	N/A
	- highest peak current: (kA)	-	N/A
	- the circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short–time delay short-circuit release and -	-	N/A
	- the instantaneous override, if any, shall not operate.	-	N/A
	- if the circuit-breaker has a making current release, this requirement does not apply to the CO operation, if the prospective current exceeds the pre-determined value, since it will then operate.	-	N/A
8.3.6.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	-	
	- no breakdown or flashover	-	N/A
8.3.6.6	Verification of overload releases	-	N/A
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A

8.3.7	TEST SEQUENCE V		
	Performance of integrally fused circuit-breakers		
	STAGE 1		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current: In (A)	-	
	Rated operational voltage: Ue (V)	-	

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Clause	Requirement – Test	Result – Remark	Verdict
	Value of prospective current equal to the selectivity limit current, as declared by the manufacturer. (kA)	-	
	Type of integrated fuses (all details)	-	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	
8.3.7.1	Short-circuit at the selectivity limit current		
	Test sequences "O"		
	Fuses shall be fitted	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	-	N/A
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm²) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	-	N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- r.m.s. test current AC/DC: (A) .....L1: .....L2: L3:	-	N/A
	power factor/time constant :	-	N/A
	- factor "n"	-	N/A
	- peak test current (Amax) :	-	N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) .....L1: .....L2: L3:	-	N/A
	- fuses shall still intact .....L1: .....L2: L3:	-	N/A
8.3.7.2	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm^2) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.7.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	-	N/A
	- no breakdown or flashover	-	N/A

	STAGE 2		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current: In (A)	-	
	Rated operational voltage: Ue (V)	-	
	1.1 time the value of prospective current equal to the selectivity limit current, as declared by the manufacturer. (kA)	-	
	Type of integrated fuses (all details)	-	

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Clause	Requirement – Test	Result – Remark	Verdict
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	
8.3.7.4	Verification of overload releases	-	N/A
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A
8.3.7.5	Short-circuit at 1,1 times the take-over current		
8.3.7.1	Short-circuit at the selectivity limit current		
	Test sequences "O"		
	Fuses shall be fitted	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0.8 mm, 50 mm long	-	N/A
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Conductor cross-sectional area (mm²) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	-	N/A
	1.1 time the value of prospective current equal to the selectivity limit current, as declared by the manufacturer. (kA)		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	-	N/A
	power factor/time constant :	-	N/A
	- factor "n"	-	N/A
	- peak test current (Amax) :	-	N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	- at least two of the fuses shall have blown ..... L1: ..... L2: L3:	-	N/A
8.3.7.6	Short-circuit at ultimate short-circuit breaking capacity		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current: In (A)	-	
	Rated operational voltage: Ue (V)	-	
	Rated ultimate short-circuit breaking capacity. (kA)	-	
	Type of integrated fuses (all details)	-	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	
	Test sequences: O – t – CO		
	Fuses shall be fitted	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	-	N/A
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm²) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	-	N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	-	N/A
	power factor/time constant :	-	N/A
	- factor "n"	-	N/A
	- peak test current (A) :	-	N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Pause: t (s)	-	N/A
	new fitted fuses	-	N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
8.3.7.7	Verification of dielectric withstand		
	- equal twice time rated operational voltage with a minimum of 1000 V (new fuses fitted)	-	N/A
	- no breakdown or flashover	-	N/A
8.3.7.8	Verification of overload releases		
	The operation of overload releases shall be verified at 2.5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A

8.3.8	Combined test sequence		
	At the discretion of, or in agreement with the manufacturer, this sequence may be applied to circuit-breaker of utilization cat. B:		
	Type designation or serial number	-	N/A
	Sample no:	-	N/A
	Rated current: In (A)	-	N/A
	Rated operational voltage: Ue (V)	-	N/A
	Rated short-time withstand current: (kA/s)	-	N/A
	Rated frequency: (Hz)	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
8.3.8.1	Verification of overload releases		
	The operation of overload releases shall be verified twice times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A
8.3.8.2	Test of rated short-time withstand current.		
	For this test, any over-current release, including the instantaneous override, if any, likely to operate during the test, shall be rendered inoperative.		
	- test frequency: (Hz)	-	N/A
	- duration of the test: (s)	-	N/A
	- test frequency: (Hz)	-	N/A
	- power factor / time constant (ms):	-	N/A
	- factor "n"	-	N/A
	- test voltage: (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current: (kA) ..... L1: ..... L2: L3:	-	N/A
	- highest peak current: (kA)	-	N/A
8.3.8.3	Test of rated service short-circuit breaking capacity		
	At the highest voltage applicable to the rated short-time current.		
	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)	-	

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Clause	Requirement – Test	Result – Remark	Verdict
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	-	N/A
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm²) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	-	N/A
	Test sequence of operation: O – t – CO – t – CO		
	The highest voltage applicable to the rated short-time current.	-	N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	-	N/A
	power factor/time constant :	-	N/A
	- Factor "n"	-	N/A
	- peak test current (A) :	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence "O"		
	- max. let-through current: (kApeak ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Pause, t: (min)	-	N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	Pause, t: (min)	-	N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	-	N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	-	N/A
	The circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short-time delay short-circuit release.	-	N/A
	During this test the instantaneous override shall not operate	-	N/A
	- and the making current release shall operate	-	
8.3.8.4	Operational performance capability with current.		
	Rated current: In (A)	-	N/A
	Maximum rated operational voltage: Ue (V)	-	N/A
	Conductor cross-sectional area (mm^2) :	-	N/A
	Number of operating cycles per hour	-	N/A
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Conditions, make/break operations:	-	N/A
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	-	N/A
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	-	N/A
	- power factor/time constant:	-	N/A
	- frequency: (Hz)	-	N/A
	- on-time (ms):	-	N/A
	- off-time (s):	-	N/A
	Electrical components do not exceed the value indicated in tab. 7.	-	N/A
8.3.8.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	-	
	- no breakdown or flashover	-	N/A
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	-	N/A
8.3.8.7	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm²) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.8.7	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
Annex C	Individual pole short-circuit test sequence		
	Circuit-breaker for use on phase-earthed systems		
C.2	Test of individual pole short-circuit breaking capacity		
	A short-circuit test is made with a value of prospective current (Isu) equal to 25% of the ultimate rated short-circuit breaking capacity (Icu)		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current: In (A)	-	
	Rated operational voltage: Ue (V)	-	
	Rated ultimate short-circuit breaking capacity: (kA)	-	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	
	The test sequence of operations is O – t – CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	-	N/A
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	-	N/A
	Test made in free air:	-	N/A
	Distances of the metallic screen's: (all sides)	-	N/A
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	-	N/A
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	-	N/A
	- size of hole: <30mm^2	-	N/A
	- finish: bare or conductive plating	-	N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	-	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Circuit is earthed at: (load-star- or supply-star point)	-	N/A
	Conductor cross-sectional area (mm²) :	-	N/A
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	-	N/A
	Test sequence of operation: O – t – CO		
	Test circuit according figure: 9	-	N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A
	short-circuit test current (Isu): equal to 25% of the ultimate rated short-circuit breaking capacity (Icu)	-	N/A
	- r.m.s. test current AC/DC: (A):	-	N/A
	power factor/time constant :	-	N/A
	- Factor "n"	-	N/A
	- peak test current (Amax) :	-	N/A
	Test sequence "O" L1		
	- max. let-through current: (kApeak) L1:	-	N/A
	- Joule integral I²dt (A²s) L1:	-	N/A
	Pause, t: (min)	-	N/A
	Test sequence "CO" L1		
	- max. let-through current: (kApeak) L1:	-	N/A
	- Joule integral I²dt (A²s) L1:	-	N/A
	Test sequence "O" L2		
	- max. let-through current: (kApeak) L2:	-	N/A
	- Joule integral I²dt (A²s) L2:	-	N/A
	Pause, t: (min)	-	N/A
	Test sequence "CO" L2		
	- max. let-through current: (kApeak) L2:	-	N/A
	- Joule integral I²dt (A²s) L2:	-	N/A
	Test sequence "O" L3		
	- max. let-through current: (kApeak) L3:	-	N/A
	- Joule integral I²dt (A²s) L3:	-	N/A
	Pause, t: (min)	-	N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence "CO" L3		
	- max. let-through current: (kApeak) L3:	-	N/A
	- Joule integral I^2dt (A^2s) L3:	-	N/A
	Melting of the fusible element	-	N/A
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	-	N/A
C.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	-	N/A
	- no breakdown or flashover	-	N/A
C.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2.5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:	-	N/A

Annex H	Individual pole short-circuit test sequence		
	Circuit-breaker for use in IT systems		
H.2	Test of individual pole short-circuit breaking capacity		
	A short-circuit test is made on the individual poles of a multipole circuit-breaker at a value of prospective current (I_{IT}) equal to 1,2 times the max. setting of the short-time delay release tripping current or, in the absence of such a release, 1,2 time the max. setting of the tripping current of the instantaneous release, or, where relevant 1,2 times the max. setting of the definite time delay release tripping current, but not exceeding 50kA.		
	Type designation or serial number	TS630L	
	Sample no:	H-1	
	Rated current: In (A)	630 A	
	Rated operational voltage: Ue (V)	500 V	
	Rated ultimate short-circuit breaking capacity: (kA)	9,1 kA	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	

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Clause	Requirement – Test	Result – Remark	Verdict
	The test sequence of operations is O – t - CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	180(W) × 380(L) × 110(H)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,55	P
	- size of hole: <30mm^2	28 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm²) :	185 mm^{2}X2 (250 kcmil X2)	P
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	10,0 Nm	P
	Test sequence of operation: O – t – CO	Compliance	P
	Test circuit according figure 9	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	550,4 V	P
	Short-circuit test current (I_{TT}): equal to 1,2 times the max. setting of the short-time delay release tripping current,	-	N/A
	or, in the absence of such a release, 1,2 time the max. setting of the tripping current of the instantaneous release,	9,1 kA	P

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Clause	Requirement – Test	Result – Remark	Verdict
	or, where relevant 1,2 times the max. setting of the definite time delay release tripping current, but not exceeding 50kA.	-	N/A
	- r.m.s. test current AC/DC: (A)	9,2 kA	P
	power factor/time constant :	0,48	P
	- Factor "n"	1,71	P
	- peak test current (Amax) :	15,7 kA	P
	Test sequence "O" L1		
	- max. let-through current: (kApeak) L1:	14,6 kApeak	P
	- Joule integral I^2dt (A^2s) L1:	956,0 kA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L1		
	- max. let-through current: (kApeak) L1:	14,8 kApeak	P
	- Joule integral I^2dt (A^2s) L1:	971,9 kA^2s	P
	Test sequence "O" L2		
	- max. let-through current: (kApeak) L2:	14,9 kApeak	P
	- Joule integral I^2dt (A^2s) L2:	991,2 kA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L2		
	- max. let-through current: (kApeak) L2:	14,3 kApeak	P
	- Joule integral I^2dt (A^2s) L2:	913,8 kA^2s	P
	Test sequence "O" L3		
	- max. let-through current: (kApeak) L3:	14,7 kApeak	P
	- Joule integral I^2dt (A^2s) L3:	964,4 kA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L3		
	- max. let-through current: (kApeak) L3:	14,4 kApeak	P
	- Joule integral I^2dt (A^2s) L3:	1,6 MA^2s	P
	Melting of the fusible element	No	P
	Holes in the PE-sheet for test sequence "O"	No	P
	Cracks observed	No	P
H.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	10 uA / 550 V	P
H.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2.5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	80 ~ 720 s	P
	- Operation time: (s) .....L1: .....L2: L3:	L1 : 199 s L2 : 190 s L3 : 186 s	P
H.5	Marking		
	Circuit-breaker for which all values of rated voltage have not been tested according to this annex or are not covered by such testing, shall be identified by the symbol ⑭ which shall be market on the circuit-breaker immediately following these values of rated voltage	Compliance	P

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TABLE: temperature rise measurements				
temperature rise dT of part:		phase	dT (K)	required dT (K)
1	Terminals of line side	L1	50,5	80
2	Terminals of line side	L2	63,5	80
3	Terminals of line side	L3	58,8	80
4	Terminals of load side	L4	46,3	80
5	Terminals of load side	L5	55,3	80
6	Terminals of load side	L6	53,7	80
7	Parts, which need not to be touched (non-metallic)		48,9	60
8	Parts intended to be touched (non-metallic)		37,6	50
9	Manual operating means (non-metallic)		19,6	35
10	Ambient temperature			24,2 ℃

Sequence Ⅰ : S1-1 [500 V, 630 A]

IEC 60 947-2				
TABLE: temperature rise measurements				
temperature rise dT of part:		phase	dT (K)	required dT (K)
1	Terminals of line side	L1	49,2	80
2	Terminals of line side	L2	57,3	80
3	Terminals of line side	L3	48,5	80
4	Terminals of load side	L4	46,1	80
5	Terminals of load side	L5	53,5	80
6	Terminals of load side	L6	46,1	80
7	Ambient temperature			25,0 ℃
8				
9				
10				

Sequence Ⅱ : S2-1N [240 V, 630 A]

IEC 60 947-2				
TABLE: temperature rise measurements				
temperature rise dT of part:		phase	dT (K)	required dT (K)
1	Terminals of line side	L1	51,9	80
2	Terminals of line side	L2	56,4	80
3	Terminals of line side	L3	52,3	80
4	Terminals of load side	L4	50,1	80
5	Terminals of load side	L5	56,7	80
6	Terminals of load side	L6	48,6	80
7	Ambient temperature			25,0 ℃
8				
9				
10				

Sequence Ⅱ : S2-3 [415 V, 630 A]

IEC 60 947-2				
TABLE: temperature rise measurements				
temperature rise dT of part:		phase	dT (K)	required dT (K)
1	Terminals of line side	L1	48,6	80
2	Terminals of line side	L2	55,0	80
3	Terminals of line side	L3	50,9	80
4	Terminals of load side	L4	46,3	80
5	Terminals of load side	L5	52,4	80
6	Terminals of load side	L6	48,3	80
7	Ambient temperature			24,9 ℃
8				
9				
10				

Sequence Ⅱ : S2-4-1 [500 V, 630 A]

TABLE: Resistance to head (Ball pressure test)						
no.	Specimen					Verdict
	Description	Colour	Temp. °C	Impress diam. mm	Result	
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

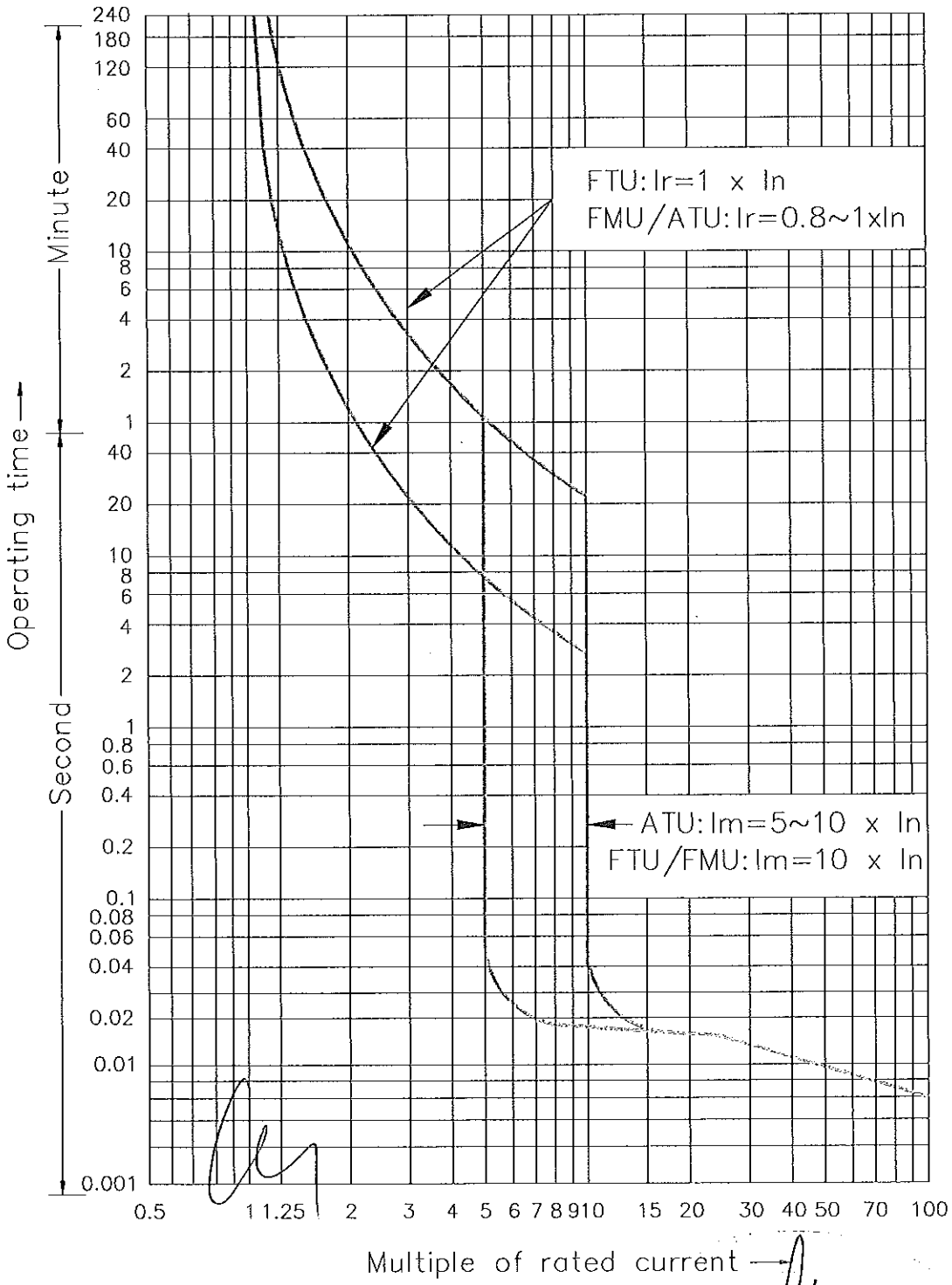
TABLE: Resistance to fire (Glow wire test)								
no.	Specimen							Verdict
	Description	Colour	Thick (mm)	Temp. °C	burning after t (s)	drops	support burning	
1	PA66 2413GW	Grey	3.0	960	< 1 s	No	No	P
2	PC GN 2101F	Grey	3.0	960	8.0 s	No	No	P
3	BMC PREMIX	White	4.0	960	< 1 s	No	No	P
4	PPS RYTON R-7	Grey	3.5	960	6.3 s	No	No	P
5								
6								
7								
8								
9								
10								

TABLE: Resistance to tracking (tracking test)								
no.	Specimen							Verdict
	Description	Colour	Drops (no.)	Impress (mm)	Burning	Current (A)	Result	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

IEC 60 947-2

Remarks

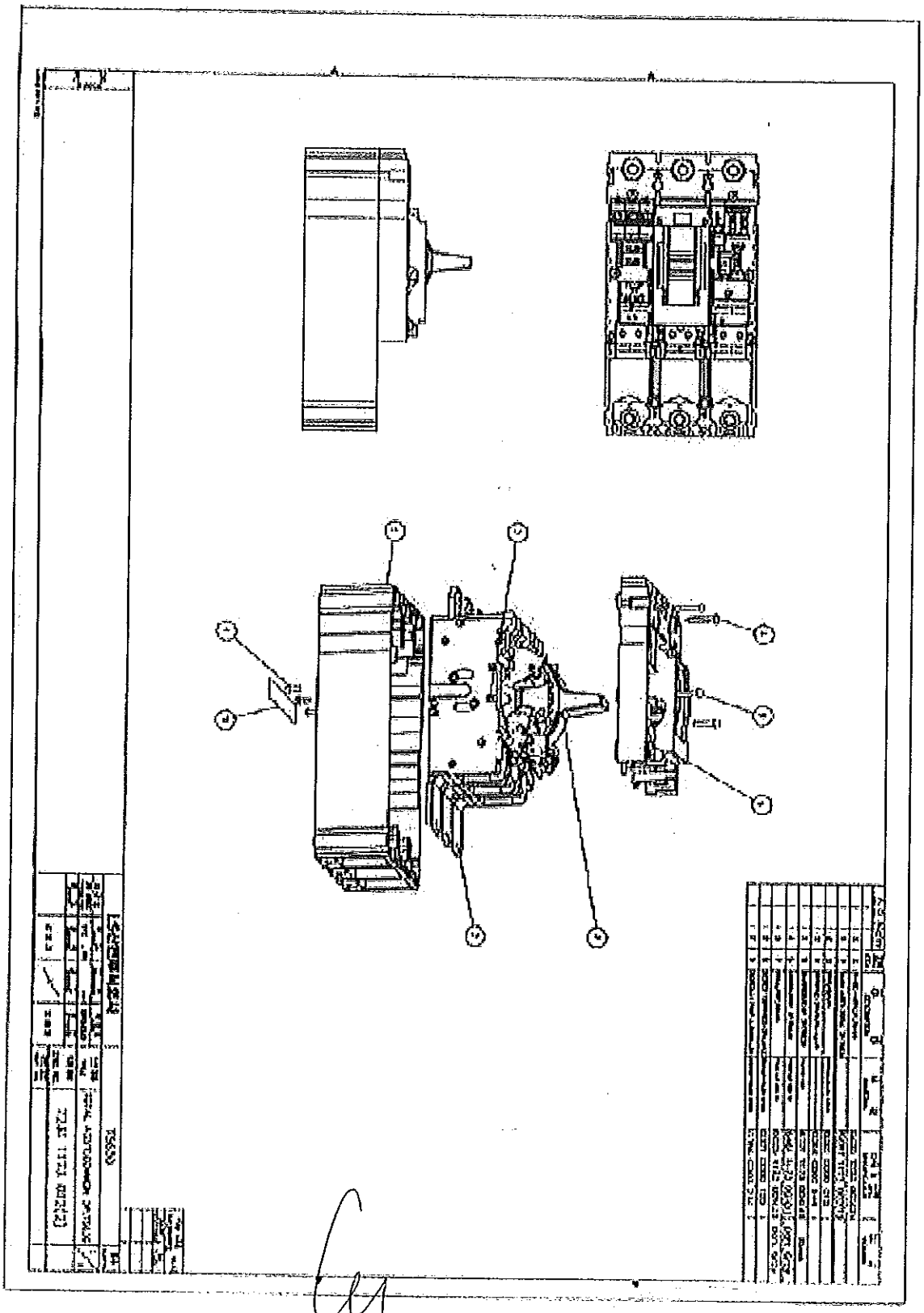
TS630 FTU,FMU,ATU(300~630A)

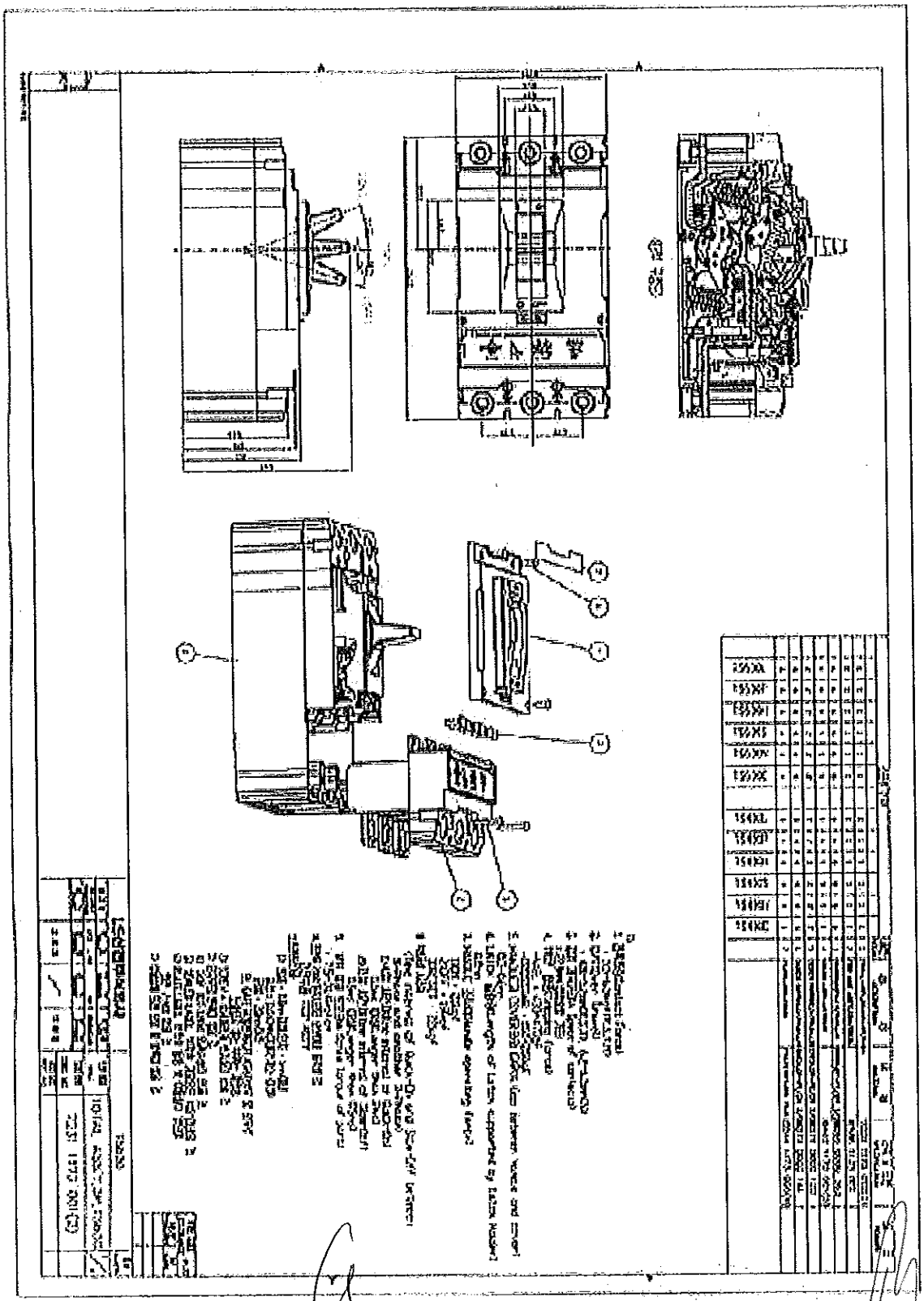


Compensation ratio for ambient temperature

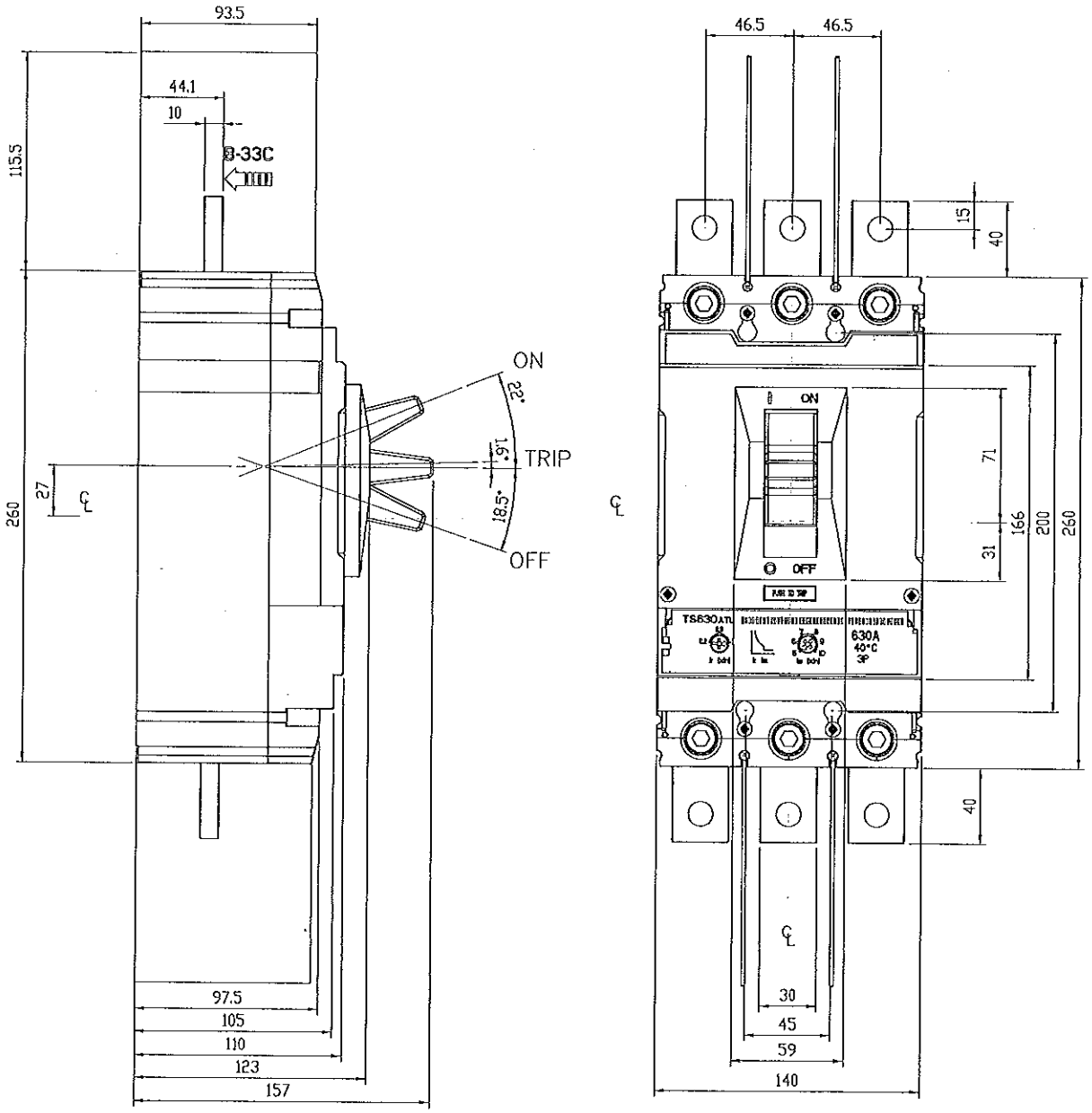
Temperature (℃)	Compensation ratio	Note
10	1.070	
11	1.068	
12	1.066	
13	1.064	
14	1.062	
15	1.060	
16	1.058	
17	1.056	
18	1.054	
19	1.052	
20	1.050	
21	1.048	
22	1.046	
23	1.044	
24	1.042	
25	1.040	
26	1.038	
27	1.036	
28	1.034	
29	1.032	
30	1.030	
31	1.027	
32	1.024	
33	1.021	
34	1.018	
35	1.015	
36	1.012	
37	1.009	
38	1.006	
39	1.003	
40	1.000	

Drawings

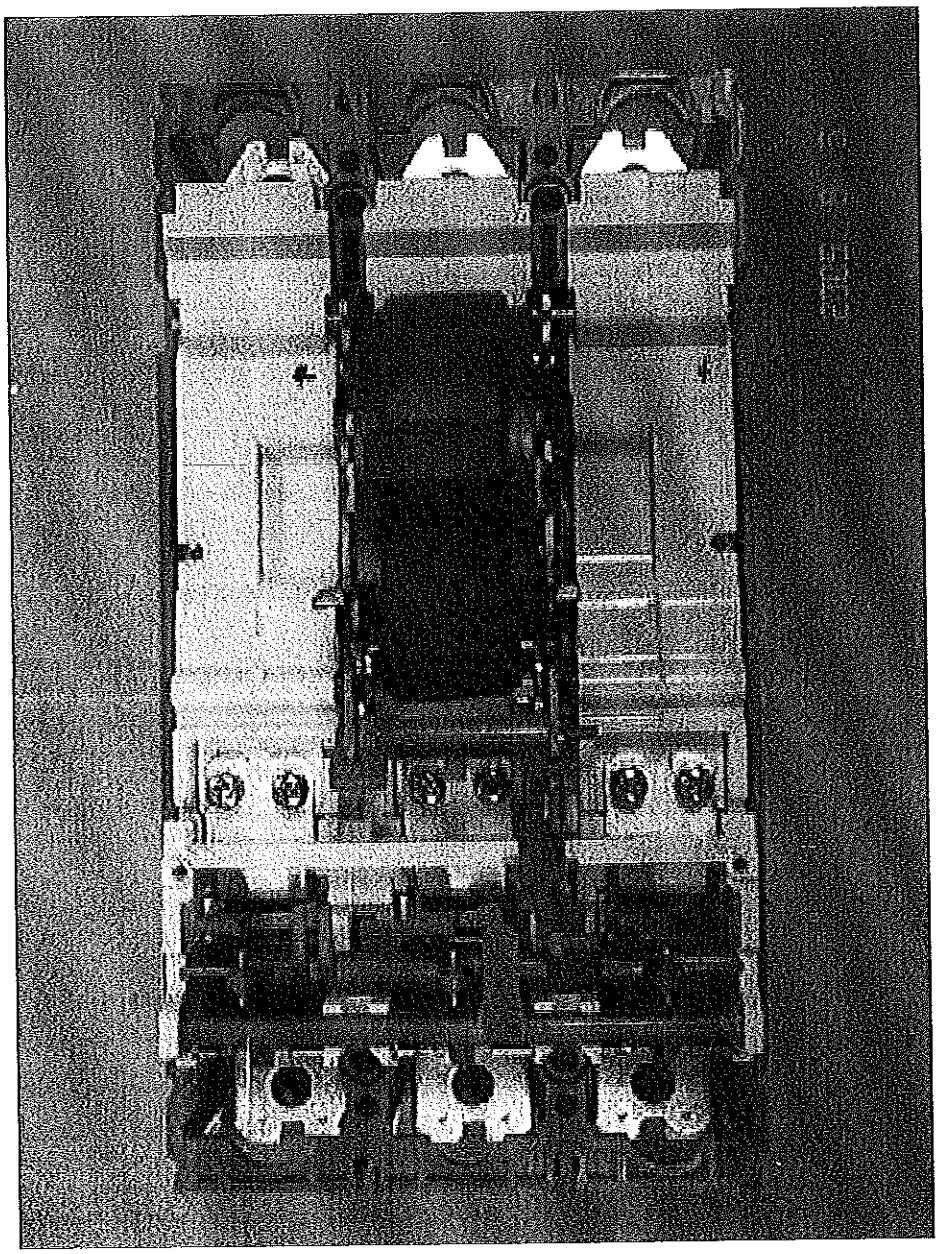




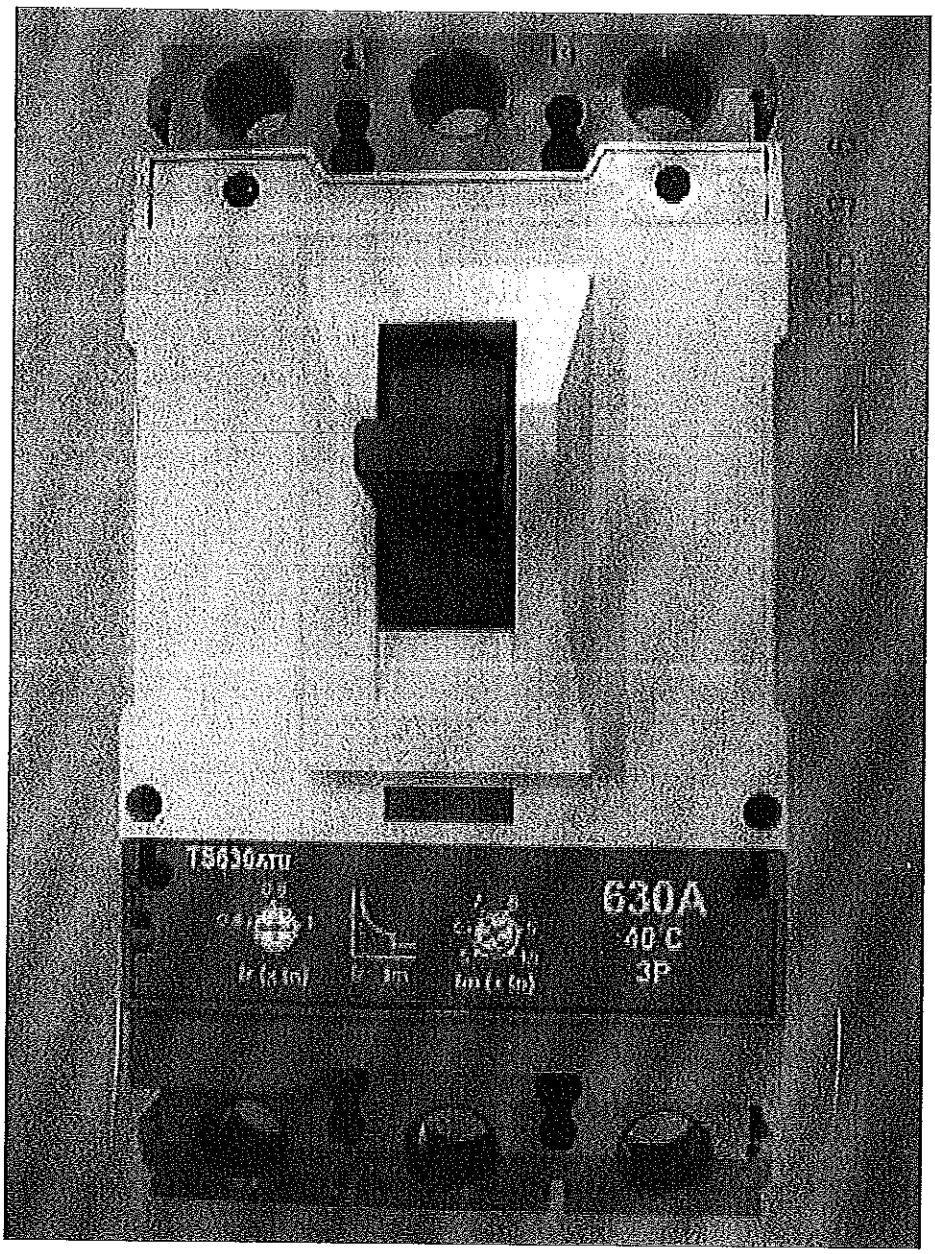
Dimensions


93.5
44.1
10
8-33C
115.5
260
27
ON
22°
16°
TRIP
18.5°
OFF
97.5
105
110
123
157
46.5
46.5
15
40
ON
OFF
71
166
31
200
260
TS630AT
630A
40°C
3P
40
30
45
59
140

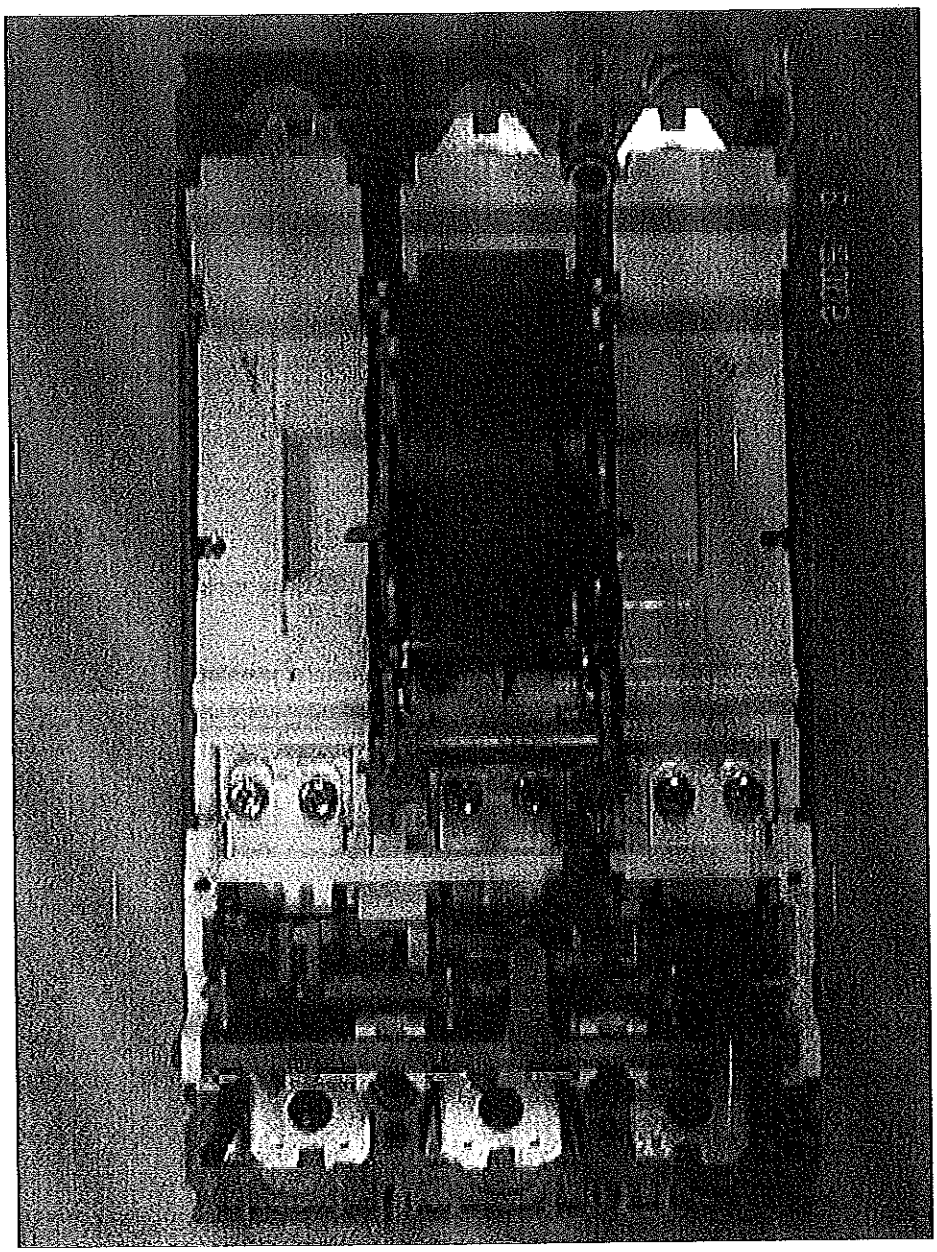
TS630 maximum current inside



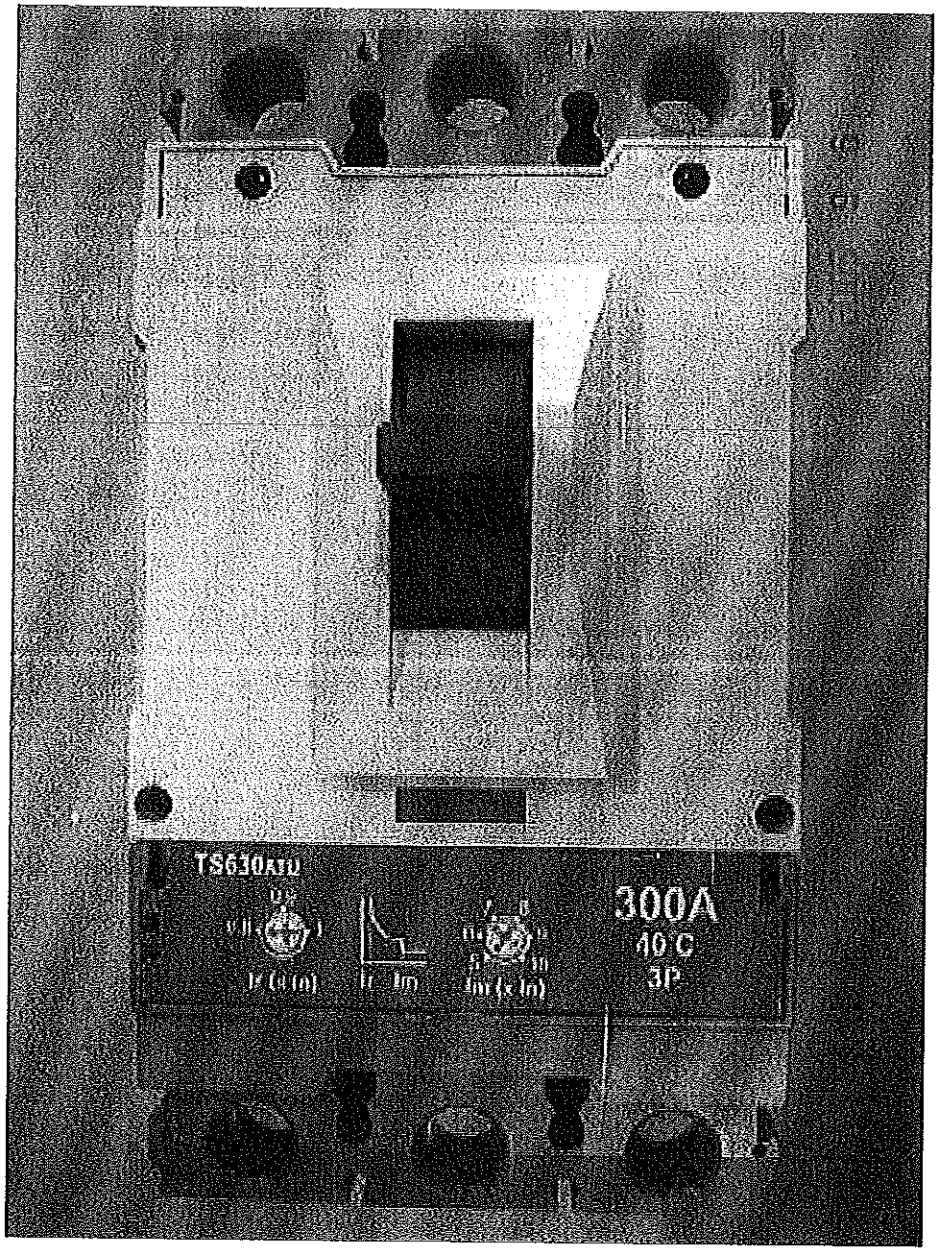
TS630 maximum current outside



TS630 minimum current inside



TS630 minimum current outside



CB TEST CERTIFICATE

Ref. Certificate No.

NL-20335

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

Issued by:	DEKRA Certification B.V.		
Product:	Moulded-case circuit-breaker		
Applicant:	LS Industrial Systems Co., Ltd.	1026-6, Hogye-dong, Dong-an-gu Anyang-si, Gyeonggi-do	Korea, Republic of
Manufacturer:	LS Industrial Systems Co., Ltd.	1026-6, Hogye-dong, Dong-an-gu Anyang-si, Gyeonggi-do	Korea, Republic of
Factory:	LS Industrial Systems Co., Ltd.	1026-6, Hogye-dong, Dong-an-gu Anyang-si, Gyeonggi-do	Korea, Republic of

Rating and principal characteristics:	3P/3P+N MCCB (electronic); Ue = 220/240, 380/415, 440/460, 480/500, 660/690 V; Ie = 630, 800, 1000, 1250, 1600 A; Uimp = 8 kV; Ui = 1000 V; TS1000H, TS1250H, TS1600H: Icu = 75 kA at 220/240 V, 70 kA at 380/415 V, 65 kA at 440/460 V, 50 kA at 480/500 V, 45 kA at 660/690 V; Ics = 75% of Icu; Icw = 25 kA – 1 s; TS1000N, TS1250N, TS1600N: Icu = 55 kA at 220/240 V, 50 kA at 380/415 V, 50 kA at 440/460 V, 40 kA at 480/500 V, 35 kA at 660/690 V; Ics = 100% of Icu; Icw = 25 kA – 1 s; IP30; 50/60 Hz; Utilization category B;
Trade mark (if any):	LS
Type of Manufacturer's Testing Laboratories used:	WMT
Model/Type reference:	TS1000N, TS1250N, TS1600N, TS1000H, TS1250H, TS1600H
Additional information:	-
Sample of product tested to be in conformity with IEC:	60947-2(ed.4);am1
Test Report Ref. No:	2131728.51

This CB Test Certificate is issued by the National Certification Body:

DEKRA Certification B.V.
Utrechtseweg 310
P.O. Box 5185
6802 ED Arnhem
The Netherlands

Signed by: H.R.M. Barends

Date of issue: 2011-04-19

DEKRA

DEKRA Certification is former KEMA Quality

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Test Report issued under the responsibility of:

DEKRA

TEST REPORT
IEC 60947-2
Low-voltage switchgear and controlgear - Part 2: Circuit-breakers

Report Reference No. ..... :	2131728.51
Date of issue ..... :	2011-04-19
Total number of pages	133
CB Testing Laboratory ..... :	DEKRA Certification B.V.
Address ..... :	Utrechtseweg 310, 6812 ARNHEM, The Netherlands
Applicant's name ..... :	LS Industrial Systems Co., Ltd.
Address ..... :	1026-6, Hogye-dong, Dong-an-gu Anyang-si, Gyeonggi-do,Korea
Test specification:	
Standard ..... :	IEC 60947-2:2006 (4th Edition) + amendment 1: 2009
Test procedure ..... :	CB
Non-standard test method ..... :	N/A
Test Report Form No ..... :	IEC60947_2F
Test Report Form(s) Originator ..... :	KEMA Quality BV
Master TRF ..... :	Dated 2010-01

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

Test item description ..... :	Moulded-case circuit-breaker
Trade Mark ..... :	LS
Manufacturer ..... :	LS Industrial Systems Co., Ltd.
Model/Type reference ..... :	TS1000N, TS1250N, TS1600N, TS1000H, TS1250H, TS1600H
Ratings ..... :	630, 800, 1000, 1250, 1600 A

Testing procedure and testing location:	
☐ **CB Testing Laboratory:**	
Testing location/ address.....:	
☐ **Associated CB Laboratory:**	
Testing location/ address.....:	
Tested by (name + signature).....:	
Approved by (+ signature) .....:	
☐ Testing procedure: TMP	
Tested by (name + signature).....:	
Approved by (+ signature) .....:	
Testing location/ address.....:	
☒ Testing procedure: WMT	
Tested by (name + signature).....:	Oh Junsick
Witnessed by (+ signature).....:	F.S.Strikwerda
Approved by (+ signature) .....:	H.G.M. Kormelink
Testing location/ address.....:	LS Industrial Systems Co., Ltd. CheongJu Plant 1, Songjeong-dong, Heungdeok-gu Cheongju-si, Chungcheongbuk-do, Korea
☐ Testing procedure: SMT	
Tested by (name + signature).....:	
Approved by (+ signature) .....:	
Supervised by (+ signature).....:	
Testing location/ address.....:	
☐ Testing procedure: RMT	
Tested by (name + signature).....:	
Approved by (+ signature) .....:	
Supervised by (+ signature).....:	
Testing location/ address.....:	

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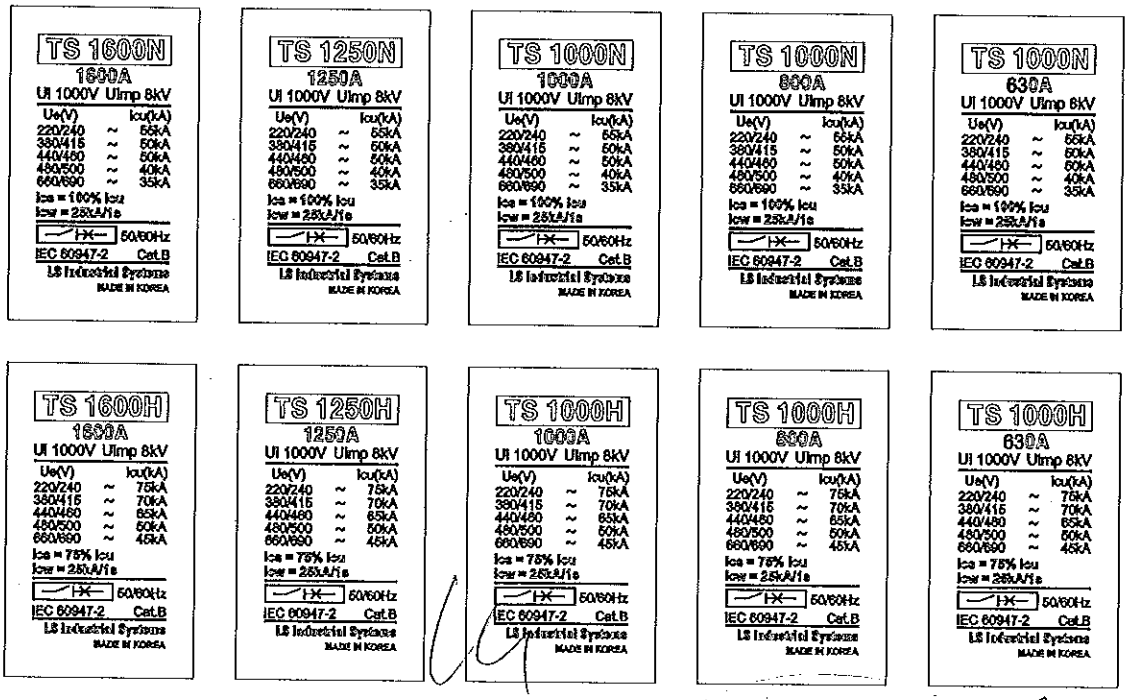
Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
8.3.3 Test sequence I: General performance characteristics 8.3.4 Test sequence II: Rated service short-circuit breaking capacity 8.3.5 Test sequence III: Rated ultimate short-circuit breaking capacity 8.3.6 Test sequence IV: Rated short-time withstand current Annex F : Additional tests for circuit-breakers with electronic over-current protection 4pole is covered by tests of Annex F on the TS1600H 3pole because the construction is identical. Annex H: Test sequence for circuit-breakers for IT systems. 4pole is covered by tests of Annex H on the TS1600H 3pole because the construction is identical. Ground fault release was not tested because the min. fault current is > 30A H-type covers the N-type because the construction is identical, only difference in marking	LS Industrial Systems Co., Ltd. CheongJu Plant 1, Songjeong-dong, Heungdeok-gu Cheongju-si, Chungcheongbuk-do, Korea, Republic Of

Summary of compliance with National Differences: N/A

Copy of marking plate



TRF No. IEC60947_2F

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Test item particulars: test item vs. test requirements	
3. Classification	
3.1. Utilization category: (A or B) :	B
3.2. Interruption medium: (air, vacuum, gas Break) :	Air
3.3. Design: (open construction, moulded case) :	Moulded case
3.4. Method of controlling the operation mechanism: (dependent manual, independent manual, dependent power, independent power) :	Independent manual
3.5. Suitability for insulation: (suitable, not -suitable) :	Suitable
3.6. Provision for maintenance: (maintainable, non maintainable) :	Maintainable
3.7. Method of installation: (fixed, plug in, withdrawable:	Fixed
3.8. Degree of protection: (IP code) :	IP30
4.7. Type of release (thermo-magnetic / electronic) :	Electronic
4.8. Integral fuses (integrally fused circuit-breakers) Type and characteristics of SCPD :	N/A
7.3 Electromagnetic compatibility (EMC) Environment A or B :	A
Circuit-breaker for use on phase-earthed systems :	N/A
Circuit-breaker for use in IT systems :	P
Rated and limiting values, main circuit :	
- rated operational voltage: Ue (V) :	220/240, 380/415, 440/460, 480/500, 660/690 V
- rated insulation voltage: Ui (V) :	1000 V
- rated impulse withstand voltage: Uimp (kV) :	8 kV
- rated operational current: Ie (A) :	630, 800, 1000, 1250, 1600 A
- kind of current :	AC
- conventional free air thermal current: Ith (A) :	1600 A
- conventional enclosed thermal current: Ithe (A) :	N/A
- current rating for four-pole circuit-breakers: (A) :	N/A
- number of poles :	3/4P
- rated frequency: (Hz) :	50/60 Hz
- integral fuses (rated values) :	N/A
Rated duty :	
- eight-hour duty :	N/A
- uninterrupted duty: Iu (A) :	1600 A

Short-circuit characteristic :	
rated short-time making capacity: Icm (kA) ..... :	165 kA
rated ultimate short-circuit breaking capacity: Icu (kA).. ..... :	TS1000H, TS1250H, TS1600H 75 kA / 220&240 V, 70 kA / 380&415 V, 65 kA / 440&460 V, 50 kA / 480&500 V , 45 kA / 660&690 V TS1000N, TS1250N, TS1600N 55 kA/220&240 V, 50 kA/380&415 V 50 kA/440&460 V, 40 kA/480&500 V 35 kA/660&690 V
rated service short-circuit breaking capacity: Ics (kA) ..... :	Ics = 75% Icu (H-type), Ics = 100% Icu (N-type)
rated short-time withstand current: Icw (kA/s) ..... :	25 kA 1s
Control circuits :	
Electrical control circuits :	
- kind of current: (AC, DC)..... :	N/A
- rated frequency: (Hz)..... :	N/A
- rated control circuit voltage: Uc (nature, frequency, V) ... :	N/A
- rated control supply voltage: Us (nature, frequency V) ... :	N/A
Air supply control circuits: (pneumatic or electro-pneumatic) :	N/A
- rated pressure and its limit..... :	N/A
- volumes of air, at atmospheric pressure, required for each closing and each opening operation ..... :	N/A
Auxiliary circuits :	
Rated and limiting values, auxiliary circuits..... :	N/A
- rated operational voltage Ue (V) ..... :	N/A
- rated insulation voltage: Ui (V)..... :	N/A
- rated operational current: Ie (A)..... :	N/A
- kind of current..... :	N/A
- rated frequency: (Hz)..... :	N/A
- number of circuits..... :	N/A
- number and kind of contact elements ..... :	N/A
- rated uninterrupted current: Iu (A)..... :	N/A
- utilization category: (AC, DC, current and voltage)..... :	N/A
Short-circuit characteristic :	
- Rated conditional short-circuit current (kA) ..... :	N/A
- kind of protective device..... :	N/A

Releases :	
1) shunt release	: N/A
2) Over-current release	:
a) instantaneous	: P
b) definite time delay	: P
c) inverse time delay	: P
- independent of previous load	: P
- dependent on previous load; (for example thermal type release)	: N/A
3) Undervoltage release (for opening)	: N/A
4) Other releases	: N/A
Characteristics :	
1) Shunt release and undervoltage release (for opening)	:
- rated control circuit voltage: Uc (nature, frequency, V)	: N/A
- kind of current	: N/A
- rated frequency: (if AC)	: N/A
2) Over-current release	:
- rated current	: 630, 800, 1000, 1250,1600 A
- kind of current	: AC
- rated frequency: (if AC)	: 50/60 Hz
- current setting (or range of settings)	: 0,4~1,0 In
- time settings (or range of settings)	: 50, 100, 200, 300, 400 ms @ 1,5 ~ 10 Ir

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Classification of installation and use ..... :	Moulded case circuit breaker
Supply Connection..... :	3 phase + N
..... :	
..... :	
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 ..... :	July 10, 2010
Date (s) of performance of tests ..... :	July 12, 2010~ August 30,2010

General remarks:

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 testing laboratory.
"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a comma (point) is used as the decimal separator.

General product information:

Subject	Molded-case circuit-breaker	
Manufacturer	LS Industrial Systems Co., Ltd.	
Type designation	TS1000N, TS1250N, TS1600N TS1000H, TS1250H, TS1600H	
Frame size	1000, 1250, 1600 AF	
Number of poles	3/4P	
Rated frequency	50/60 Hz	
Rated operational voltage	AC 220/240, 380/415, 440/460, 480/500, 660/690 V	
/ated insulation voltage	AC 1000 V	
Rated impulse withstand voltage	8 kV	
Suitability for isolation	Yes	
Rated current	630, 800, 1000, 1250, 1600A	
Rated ultimate short-circuit breaking capacity	H	N
	75 kA/220&240 V	55 kA/220&240 V
	70 kA/380&415 V	50 kA/380&415 V
	65 kA/440&460 V	50 kA/440&460 V
	50 kA/480&500 V	40 kA/480&500 V
	45 kA/660&690 V	35 kA/660&690 V
Rated service short-circuit breaking capacity	Ics = 75% Icu	Ics = 100% Icu
Rated short-time withstand current	25 kA 1sec	
Utilization category	B	
Type of tripping device	Electronics Trip Device	
Short time releases:		
Current setting (or range of settings)	1.5-2-3-4-5-6-8-10 Ir (adjustable-8 settings)	
Time setting (or range of setting)	I^2t off : 0.05-0.1-0.2-0.3-0.4 (adjustable-5 settings) I^2t on : 0.1-0.2-0.3-0.4 (adjustable-4 settings)	
Instantaneous releases:	Electronics Trip Device	
Current setting (or range of settings)	2-3-4-6-8-10-12-15 In (adjustable-8 settings)	
Time setting (or range of setting)	Fixed (<50ms)	
Long time release:		
Current setting (or range of settings)	0.4~1.0 In (adjustable-54 settings)	
Time setting (or range of setting)	0.5-1-2-4-8-12-16-20 (adjustable-8 settings)	
Type of neutral	Over-current release	
Release dependent on ambient air temperature	No	
Reference temperature	40 °C	
Dimension of specimen	327(H)X210(W)X152.5(D)[3P] / 327(H)X280(W)X152.5(D)[4P]	
Dimension □f metal screen	644(H)X357(W)X152.5(D)[3P] / 644(H)X427(W)X152.5(D)[4P]	

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IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
5.2	MARKING		
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.		
	- rated current:	630, 800, 1000, 1250, 1600 A	P
	- suitability for isolation, if applicable, with the symbol —/—|—X—	Compliance	P
	- indication of the open and closed position: with O and I respectively, if symbols are used	Compliance	P
b)	Marking on equipment not needed to be visible after mounting:		
	- manufacturer's name or trademark	LS	P
	- type designation or serial number	TS1000N, TS1250N, TS1600NTS1 000H, TS1250H, TS1600H	P
	- IEC 60947-2 if the manufacturer claims compliance with this standard.	IEC 60947-2	P
	- utilization category	B	P
	- rated operational voltage(s) Ue	220/240, 380/415, 440/460, 480/500, 660/690 V	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 (IT) which shall be marked on the circuit-breaker immediately following these values of rated voltage	Compliance	P
	- value (or range) of the rated frequency and/or the indication DC (or symbol)	50/60 Hz	P
	- rated ultimate short-circuit breaking capacity. Icu	TS1000H, TS1250H, TS1600H 75kA/220&240V, 70kA /380& 415V, 65kA/440&460V, 50kA/480&500V, 45kA / 660&690V TS1000N, TS1250N, TS1600N 55kA/220&240V, 50 kA/380& 415V, 50kA/440&460V, 40 kA/480&500V, 35kA/660&690V	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- rated service short-circuit breaking capacity. Ics	Ics = 75% Icu (H-type), Ics = 100% Icu (N-type)	P
	- rated short-time withstand current, (Icw) and associated short-time delay, for utilization category B	25 kA 1 s	P
	- line and load terminals, unless their connection is immaterial	Immaterial	P
	- neutral pole terminals, if applicable, by the letter N	-	N/A
	- protective earth terminal, where applicable, by the symbol acc. 7.1.9.3 of part 1	-	N/A
	- ref. temperature for non-compensated thermal releases, if different from 30°C	-	N/A
c)	Marked on the circuit-breaker as specified in item b), or shall be made available in the manufacturer's published information:		
	- rated short-circuit making capacity (Icm) (if higher than specified in 4.3.5.1)	165 kA	P
	- rated insulation voltage. (Ui) if higher than the maximum rated operational voltage)	1000 V	P
	- rated impulse withstand voltage (Uimp), when declared.	8 kV	P
	- pollution degree if other than 3	3	P
	- conventional enclosed thermal current (Ithe) if different from the rated current:	-	N/A
	- IP Code, where applicable:	IP30	P
	- minimum enclosure size and ventilation data (if any) to which marked ratings apply:	-	N/A
	- details of minimum distance between circuit-breaker and earthed metal parts for circuit-breaker intended for use without enclosure:	Compliance	P
	- r.m.s sensing if applicable, according to F.4.1.1	-	N/A
	- suitability for environment A or B	A	P
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:		
	- rated control circuit voltage of the closing device, and rated frequency for AC:	-	N/A

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IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- rated control circuit voltage of the shunt release and/or of the under-voltage release, and rated frequency:	-	N/A
	- rated current of indirect over-current releases:	-	N/A
	- 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.	-	N/A
e)	Terminal shall be clearly and permanently identified in acc. with IEC 60445 and annex L :		
	- line terminal	-	N/A
	- load terminal	-	N/A
	- neutral pole terminal "N"	N	P
	- protective earth terminal ⏚	-	N/A
	- terminal of coils (A/B)	-	N/A
	- terminal of shunt release (B)	-	N/A
	- terminals of under-voltage release (D)	-	N/A
	- terminals of interlocking electromagnets (E)	-	N/A
	- terminals of indicated light devices (X)	-	N/A
	- terminals of contact elements for switching devices (no)	-	N/A
7.1	CONSTRUCTION		
7.1.1	Withdrawable circuit-breaker	-	N/A
	In the disconnected position (main- and auxiliary circuits)		
	Isolating distances for circuit-breaker suitable for isolating warranted:	-	N/A
	Mechanism fitted with a reliable indicating device with indicates the position of the isolating contacts.	-	N/A
	Mechanism fitted with interlocks which only permit the isolating contacts to be separate or re-closed when main contacts are open	-	N/A
	Mechanism fitted with interlock, which only permit the main contacts to be closed when the isolating contacts are fully closed.	-	N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Mechanism fitted with interlock, which only permit the main contacts to be closed when in disconnected position.	-	N/A
	The isolating distances between the isolating contacts cannot be inadvertently reduced.	-	N/A
7.1.2.1 part 1	Resistance to abnormal heat and fire	-	N/A
7.1.3 part 1	Current-carrying parts and their connection	Compliance	P
7.1.4	Clearances and creepage distances:		
	For circuit-breakers for which the manufacturer has declared a value of rated impulse withstand voltage. (Uimp.)		
	Clearances distances:		
	- Uimp is given as:	8 kV	
	- max. value of rated operational voltage to earth.....	399 V	
	- nominal voltage of supply system:	690 V	
	- overvoltage category:	IV	
	- pollution degree:	3	
	- field-in or homogeneous:	Inhomogeneous	
	- minimum clearances (mm):	8 mm	
	- measured clearances (mm):	31,3 mm	P
	Creepage distances:		
	- rated insulation voltage Ui (V)	1000V	
	- pollution degree	3	
	- comparative tracking index (V)	175≤ CTI < 400	
	- material group	IIIa	
	- minimum creepage distances (mm)	16 mm	
	- measured creepage distances (mm)	32,9 mm	P
7.1.5 part 1	Actuator		
7.1.5.1 part 1	Insulation		
	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	Compliance	P

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IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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/A
	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	Compliance	P
7.1.5.2	Direction of movement		
	The direction of operation for actuators of devices shall normally conform to IEC 60447.	Compliance	P
	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	Compliance	P
7.1.6 part 1	Indication of contact position		
7.1.6.1 part 1	Indicating means		
	When an equipment is provided with means for indicating the closed and open positions, these positions shall be unambiguous and clearly indicated	Compliance	P
	This is done by means of a position indicating device (see 2.3.18)	Compliance	P
	If symbols are used, they shall indicate the closed and open position respectively, in accordance with IEC 60417-2:		
	- 60417-2-IEC-5007 I On (power)	Compliance	P
	- 60417-2-IEC-5007 O Off (power)	Compliance	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"	-	N/A
	Red colour shall not be used for any other push-button	-	N/A
	The colours of other push-buttons, illuminated push-buttons and indicator lights shall be in accordance with IEC 60073	-	N/A
7.1.6.2 part 1	Indication by the actuator		

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Clause	Requirement + Test	Result - Remark	Verdict
	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	On position Off position Trip position	P
7.1.7	Additional safety requirements for equipment suitable for isolation		
7.1.7.1	Additional constructional requirements for equipment suitable for isolation (Ue > 50 V):		
	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:		
	- the position of the actuator	Compliance	P
	- a separate mechanical indicator	-	N/A
	- visibility of the moving contacts	-	N/A
	When means are provided or to lock the equipment in the open position, locking only be possible when contacts are in the open position	-	N/A
	Actuator front-plate fitted to the equipment in a manner which ensures correct contact position indication and locking	-	N/A
	The indicated open position is the only position in which the specified isolation distances between the contacts is ensured.	Compliance	P
	- minimum clearances across open contacts (see Table XIII, Part 1) (mm) :	8 mm	
	- measured clearances (mm) :	31,3 mm	P
	- test Uimp across gap (kV) :	12,3 kV	P
7.1.7.2	Supplementary requirements for equipment with provision for electrical interlocking with contactors or circuit-breakers:		
	auxiliary switch shall be rated according to IEC 60 947-5-1	-	N/A
	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/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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/A
	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/A
	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/A
	During the closing operation the contacts of the auxiliary switch shall close after or simultaneously with the contacts of the main poles	-	N/A
	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	-	N/A
7.1.7.3	Supplementary requirements for equipment provided with means for padlocking the open position:		
	the locking means shall be designed in such a way that it cannot be removed with the appropriate padlock(s) installed	-	N/A
	Alternatively, the design may provide padlockable means to prevent access to the actuator	-	N/A
	test force F applied to the actuator in an attempt to operate to the closed position (N) :	-	N/A
	rated impulse withstand voltage (kV) :	-	N/A
	test Uimp on open main contacts at the test force	-	N/A
7.1.8	Terminals		
7.1.8.1	All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Terminal connections shall be such that necessary contact pressure is maintained	Compliance	P
	Terminals shall be so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal	Compliance	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	Compliance	P
7.1.8.2	Connection capacity		
	type of conductors :	Flexible and stranded type/ Copper bars	P
	minimum cross-sectional area of conductor (mm^2) :	400 mm^2 or 2x(40 mm x 5 mm)	P
	maximum cross-sectional area of conductor (mm^2) :	1000 mm^2 or 2x(50 mmx10 mm)	P
	number of conductors simultaneously connectable to the terminal :	2	P
7.1.8.3	Connection		
	terminals for connection to external conductors shall be readily accessible during installation	Compliance	P
	clamping screws and nuts shall not serve to fix any other component	Compliance	P
7.1.8.4	Terminal identification and marking		
	terminal intended exclusively for the neutral conductor	N	P
	protective earth terminal	-	N/A
	other terminals	-	N/A
7.1.9 part 1	Additional requirements for equipment provided with a neutral pole		
	When 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.).	-	N/A
	A switched neutral pole shall break not before and shall make not after the other poles	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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	-	N/A
	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	-	N/A
	if a pole with an appropriate making and breaking capacity is used as a neutral pole, then all poles, incl. the neutral pole, shall operate substantially together.	-	N/A
7.1.10	Provisions for protective earthing		
7.1.10.1	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/A
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	-	N/A
	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 50 mm x 50 mm) or are so located as to exclude any contact with live parts	-	N/A
7.1.10.2 part 1	Protective earth terminal		
	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/A
	The protective earth terminal shall be suitably protected against corrosion	-	N/A
	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/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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/A
7.1.10.3	Protective earth terminal marking and identification	-	
	The protective earth terminal shall be clearly and permanently identified by its marking	-	N/A
	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/A
	Graphical symbol to be used: 60417-2-IEC-5019 ⏚ Protective earth (ground) in accordance with IEC 60417-2	-	N/A
7.1.11	Enclosure for equipment		
7.1.11.1	Design		
	The enclosure, when it is opened: all parts requiring access for installation and maintenance are readily accessible	-	N/A
	Sufficient space shall be provided inside the enclosure	-	N/A
	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	-	N/A
	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	-	N/A
	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/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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	-	N/A
	If the enclosure is used for mounting push-buttons, it shall not be possible to remove the buttons from the outside of the enclosure	-	N/A
7.1.11.2	Insulation		
	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	-	N/A
7.1.12	Degree of protection of enclosed equipment		
	Degree of protection.	IP30	
	Test for first characteristic.	IP3X	
	Test for first numeral	1 2 3:Compliance 4 5 6	P
	Test for second characteristic	IPX0	
	Test for second numeral	1 2 3 4 5 6 7 8	P
7.1.13 part 1	Conduit pull-out, torque and bending with metallic conduits		
	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/A

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Clause	Requirement + Test	Result - Remark	Verdict
7.2	Performance requirements		
7.2.1	Operating condition		
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	Compliance	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	-	N/A
	Such a circuit-breaker should not be used in circuits having a prospective peak making current exceeding 10 kA	-	N/A
	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	-	N/A
7.2.1.1.2	Independent manual closing		
	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	Compliance	P
7.2.1.1.3	Dependent power closing		
	At 110% of the rated control supply voltage, the closing operation performed on no-load shall not cause any damage to the circuit-breaker.	-	N/A
	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	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
7.2.1.1.4	Independent power closing		
	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	-	N/A
	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/A
7.2.1.1.5	Stored energy closing		
	Capable ensuring closing of the circuit-breaker in any condition between no-load and its rated making capacity	-	N/A
	- when the stored energy is retained within the circuit-breaker, a device is provided which indicates when the storing mechanism is fully charged.	-	N/A
	- 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/A
	- 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/A
	- by manually operated circuit-breaker is the direction of operation indicated. (not for circuit-breaker with an independent manual closing operation.)	-	N/A
	- 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/A

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Clause	Requirement + Test	Result - Remark	Verdict
7.2.1.2	Opening		
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		
7.2.1.2.2	Opening by undervoltage releases		
7.2.1.3. a part 1	Operating voltage		
	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	-	N/A
	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	-	N/A
	Unless otherwise stated in the relevant product standard, the upper limit of the supply voltage shall be 110% of its rated value	-	N/A
7.2.1.3. b part 1	Operating time		
	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	-	N/A
7.2.1.2.3	Opening by shunt releases	-	N/A
7.2.1.4 part 1	Limits of operation of shunt releases		
	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/A
7.2.1.5 part 1	Limits of operation of current operated relays and released		
	Limits of operation of current operated relays and releases shall be stated in the relevant product standard	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
7.2.1.2.4	Opening by over-current releases		
a)	Opening under short-circuit conditions		
	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	Compliance	P
	Where necessary for over-current co-ordination the manufacturer shall provide information (usually curves) showing	Compliance	P
	- maximum cut-off (let-through) peak current as a function of prospective current (r.m.s. symmetrical)	Compliance	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)	Compliance	P
b)	Opening under overload conditions		
1)	Instantaneous or definite time-delay operation	-	N/A
	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/A
2)	Inverse time-delay operation		
	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	Compliance	P
	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	Compliance	P
	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	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	The width of the temperature band shall be at least 10 K on either side of the reference temperature	Compliance	P
7.2.4.2	Operational performance capability		
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	Compliance	P
	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	Compliance	P
8	TESTS		
8.2.4	Mechanical properties of terminals		
	Mechanical strength of terminals		
	maximum cross-sectional area of conductor (mm^2) :	-	
	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 (mm^2) :	-	
	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	-	N/A
	Pull-out test		
	force (N) :	-	

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Clause	Requirement + Test	Result - Remark	Verdict
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A
	conductor of the largest cross-sectional area (mm²) :	-	
	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	-	N/A
	Pull-out test		
	force (N) :	-	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A
	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 :	-	
	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	-	N/A
	Pull-out test		
	force (N) :	-	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

8.3.3	TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS		
8.3.3.1	Tripping limits and characteristic		
8.3.3.1.2	Opening under short-circuit conditions		
	Manufacturer's name or trademark	LS	
	Type designation or serial number	TS1600H 3P	
	Sample no:	S1-1	
	Rated operational voltage: Ue (V)	690 V	
	Rated current: In (A)	1600 A	
	Ambient temperature 10-40 °C :	25 °C	P
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	3840 A(Ii=2XIn) 28800 A(Ii=15XIn)	P
	Range of adjustable setting current. (A)	Compliance	P
	Time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Electromagnetic overcurrent releases	-	
	Test current: 80% of the rated, or **minimum** adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3: N-Lx:	-	N/A
	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/A
	Test current: 120% of the rated, or **minimum** adjustable setting current: (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3: N-Lx:	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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/A
	Test current: 80% of the **maximum** adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3: N-Lx:	-	N/A
	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/A
	Test current: 120% of the **maximum** adjustable setting current: (A)	Compliance	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3: N-Lx:	-	N/A
	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/A
	Test current: tripping current declared for single pole operation (A)	-	N/A
	Operating time: < 0,2 s in case of instantaneous release: L1: L2: L3: N:	-	N/A
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3: N:	-	N/A
	Electronic overcurrent releases		

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Clause	Requirement + Test	Result - Remark	Verdict
	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.	Compliance	P
	Test current: 80% of the rated, or **minimum** adjustable setting current: (A)	2560 A	P
	Operating time: >0,2s in case of instantaneous releases: L1: L2: L3: N:	 L1: >0,2 s L2: >0,2 s L3: >0,2 s	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	-	N/A
	Test current: 120% of the rated, or **minimum** adjustable setting current: (A)	3840 A	P
	Operating time: <0,2s in case of instantaneous releases: L1: L2: L3: N:	 L1: 0,048 s L2: 0,049 s L3: 0,048 s	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	-	N/A
	Test current: 80% of the **maximum** adjustable setting current: (A)	19200 A	P
	Operating time: >0,2s in case of instantaneous releases: L1: L2: L3: N:	 L1: >0,2 s L2: >0,2 s L3: >0,2 s	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	-	N/A
	Test current: 120% of the **maximum** adjustable setting current: (A)	28800 A	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time: <0,2s in case of instantaneous releases: L1: L2: L3: N:	L1: 0,051 s L2: 0,052 s L3: L2: 0,051 s	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	-	N/A
	Electronic overcurrent releases		
	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.	Compliance	P
	Test current: 80% of the rated, or **minimum** adjustable setting current: (A)	768 A(Isd=1,5X0,4XIn)	P
	Operating time: >0,2s in case of instantaneous releases: L1: L2: L3: N:	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	L1: >0,1 s L2: >0,1 s L3: >0,1 s	P
	Test current: 120% of the rated, or **minimum** adjustable setting current: (A)	1152 A(Isd=1,5X0,4XIn)	P
	Operating time: <0,2s in case of instantaneous releases: L1: L2: L3: N:	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	L1: 0,068 s L2: 0,068 s L3: 0,063 s	P
	Test current: 80% of the **maximum** adjustable setting current: (A)	12800 A(Isd=10X1,0XIn)	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time: >0,2s in case of instantaneous releases: L1: L2: L3: N:	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	L1: >0,8 s L2: >0,8 s L3: >0,8 s	N/A
	Test current: 120% of the **maximum** adjustable setting current: (A)	19200 A(Isd=10X1,0XIn)	P
	Operating time: <0,2s in case of instantaneous releases: L1: L2: L3: N:	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	L1: 0,417 s L2: 0,417 s L3: 0,417 s	P
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/A
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	-	N/A
	Range of adjustable setting current. (A)	-	N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 90% of the rated, or minimum adjustable setting current: (A)	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time: >0,2s in case of instantaneous releases:	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 90% of the maximum adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases:	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
b)	Inverse time delay releases		
	Manufacturer's name or trademark	LS	
	Type designation or serial number	TS1600H 3P	
	Sample no:	S1-1	
	Rated operational voltage: Ue (V)	690 V	
	Rated current: In (A)	1600 A	
	For releases dependent of ambient air temperature: Reference temperature	-	N/A
	Test ambient temperature (°C)	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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/A
	For thermal-magnetic releases independent of ambient temperature: Tests shall be made at 30°C and 20°C or 40°C, the release being energized on all phase poles	-	N/A
	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.	Compliance	P
	Test ambient air temperature:	25 °C	P
	Range of adjustable setting current: (A)	0,4~1,0 x In	P
	Releases, dependent of ambient air temperature: Reference temperature (°C)	-	N/A
	Thermal Magnetic releases, independent of ambient air temperature: at 30°C	-	N/A
	Test current: 105% of the rated, or **minimum** adjustable setting current: (A)	672 A (Ir=0,4XIn)	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	2 h	P
	Test current: 130% of the rated, or **minimum** adjustable setting current: (A)	832 A (Ir=0,4XIn)	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.	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	4 s	P
	Test current: 105% of the **maximum** adjustable setting current: (A)	1680 A (Ir=1,0XIn)	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	2 h	P
	Test current: 130% of the **maximum** adjustable setting current: (A)	2080 A (Ir=1,0XIn)	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.	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	247 s	P
	Thermal Magnetic releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:	-	N/A
	Test current: 105% of the rated, or **minimum** adjustable setting current: (A)	-	N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	-	N/A
	Test current: 130% of the rated, or **minimum** adjustable setting current: (A)	-	N/A
	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.	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A
	Test current: 105% of the **maximum** adjustable setting current: (A)	-	N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	-	N/A
	Test current: 130% of the **maximum** adjustable setting current: (A)	-	N/A
	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.	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A
	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		
	Releases, dependent of ambient air temperature: Reference temperature (°C)	-	N/A
	Releases, independent of ambient air temperature: at 30°C	Compliance	P
	Test ambient air temperature:	25 °C	N/A
	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)	1920 A (0,4 In X 300 %) 4800 A (1,0 In X 300 %)	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	2 s (0,4 In) 88 s (1,0 In)	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:	-	N/A
	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/A
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	-	N/A
8.3.3.1.4	Additional test for definite time-delay releases		
a)	Time delay		
	Test is made at a current equal to 1,5 times the current setting. If the test current overlaps with another tripping characteristic (e.g. an instantaneous tripping characteristic), the trip setting and the test current shall be reduced as necessary to prevent premature tripping.		
	overload releases: (all phase poles loaded)	-	N/A
	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/A
	short-circuit releases	Compliance	P
	Electromagnetic release: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.	-	N/A
	Electronic releases: on one pole chosen at random.	Compliance	P
	Test current: 1,5 times of the rated, or **minimum** adjustable setting current: (A)	1440 A (Isd=1,5X0,4XIn)	P
	Operating time, overload releases: (s)	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Operating time, short-circuit releases (electromagnetic): (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time, short-circuit releases (electronic): (s) L1: L2: L3:	 L1:0,069 s L2:0,060 s L3:0,063 s	P
	Time-delay: between the limits stated by the manufacturer:	0,025 s ~ 0,08 s	P
	Test current: 1,5 times of the **maximum** adjustable setting current: (A)	24000 A (Isd=10X1,0XIn)	P
	Operating time, overload releases: (s)	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Operating time, short-circuit releases (electromagnetic): (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Operating time, short-circuit releases (electronic): (s) L1: L2: L3:	 L1:0,417 s L2:0,418 s L3:0,418 s	P
	Time-delay: between the limits stated by the manufacturer:	0,36 ~ 0,44 s	P
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.		
	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.		
	overload releases: (all phase poles loaded)	-	N/A
	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/A
	short-circuit releases	Compliance	P
	Electromagnetic release: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.	-	N/A
	Electronic releases: on one pole chosen at random.	Compliance	P
	Test current: 1,5 times of the **minimum** adjustable setting current: (A)	1440 A (Isd=1,5X0,4XIn)	P

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Clause	Requirement + Test	Result - Remark	Verdict
	non-tripping duration stated by the manufacturer for overload release: (s)	-	N/A
	non-tripping duration stated by the manufacturer for short-circuit release thermal magnetic: (s)	-	N/A
	non-tripping duration stated by the manufacturer for short-circuit release electronic: (s)	0,025 s	P
	Time duration of current when reduced to the rated current: shall be twice the delay-time stated by the manufacturer: (s)	0,1 s	P
	Rated current	640 A (Ir=0,4XIn)	P
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases (electromagnetic), shall not trip: (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Operating time, short-circuit releases (electronic), shall not trip: (s) L1: L2: L3:	L1: >0,1 s L2: >0,1 s L3: >0,1 s	P
	Test current: 1,5 times of **maximum** adjustable setting current: (A)	24000 A (Isd=10X1,0XIn)	P
	non-tripping duration stated by the manufacturer for overload release: (s)	-	N/A
	non-tripping duration stated by the manufacturer for short-circuit release thermal magnetic: (s)	-	N/A
	non-tripping duration stated by the manufacturer for short-circuit release electronic: (s)	0,2 s	P
	Time duration of current when reduced to the rated current: shall be twice the delay-time stated by the manufacturer: (s)	0,8 s	P
	Rated current	1600 A (Ir=1,0XIn)	P
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases (electromagnetic), shall not trip: (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Operating time, short-circuit releases (electronic), shall not trip: (s) L1: L2: L3:	L1: >0,8 s L2: >0,8 s L3: >0,8 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.3.2	Test of dielectric properties, impulse withstand voltage (Uimp indicated):		
8.3.3.4 part1	The 1,2/50µs impulse voltage shall be applied five times for each polarity at intervals of 1s minimum		
	- rated impulse withstand voltage (kV) :	8 kV	P
	- sea level of the laboratory:	60 m	P
	- test Uimp main circuits (kV) :	9,8 kV	P
	- test Uimp auxiliary circuits (kV) :	-	N/A
	- test Uimp control circuits (kV) :	-	N/A
	- test Uimp on open main contacts (equipment suitable for isolating) (kV) :	12,3 kV	P
a)	Application of test voltage		
	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.	Compliance	P
	ii) Between each pole 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.	Compliance	P
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit	Compliance	P
	- other circuits	-	N/A
	- exposed conductive parts	-	N/A
	- enclosure of mounting plate	-	N/A
	iv) equipment suitable for isolation	Compliance	P
	equipment not suitable for isolation	-	N/A
	- no unintentional disruptive discharge during the test's	Compliance	P
	Test of dielectric properties, dielectric withstand voltage (Uimp not indicated):		
	- rated insulation voltage (V) :	1000 V	P
	- main circuits, test voltage for 1 min (V)	2200 V	P
	- auxiliary circuits, test voltage for 1 min (V)	-	N/A
	- control circuits, test voltage for 1 min (V)	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.3.2.2	Application of test voltage		
1)	with circuit-breaker in the closed position		
	- between all live parts of all poles connected together and the frame of the circuit-breaker .	Compliance	P
	- between each pole and all the other poles connected to the frame of the circuit-breaker	Compliance	P
2)	with the circuit-breaker in the open position and, additionally, in the tripped position, if any.		
	- between all live parts of all poles connected together and the frame of the circuit-breaker.	Compliance	P
	- between the terminals of one side connected together and the terminals of the other side connected together.	Compliance	P
b)	Control and auxiliary circuits		
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/A
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/A
	No unintentional disruptive discharge during the tests	Compliance	P
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.	≤ 0,01 mA./ 759 V	P
8.3.3.3	Mechanical operation and operational performance capability		
8.3.3.3.2	Construction and mechanical operation		
a)	Construction		
	A withdrawable circuit-breaker shall be checked for the requirements stated in 7.1.1	-	N/A
	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	-	N/A
b)	Mechanical operation		
	A circuit-breaker with dependent power operation shall comply with the requirements stated in 7.2.1.1.3	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	A circuit-breaker with dependent power operation shall operate with the operating mechanism charged to the minimum and maximum limits stated by the manufacturer	-	N/A
	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.	-	N/A
	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	-	N/A
	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/A
	If the closing and opening times of a circuit-breaker are stated by the manufacturer, such times shall comply with the stated values	-	N/A
c)	Undervoltage releases		
	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/A
i)	Drop out voltage		
	It shall be verified that the release operates to open the circuit-breaker between the voltage limits specified	-	N/A
	The voltage shall be reduced from rated voltage at a rate to reach 0 V in approximately 30 s	-	N/A
	The test for the lower limit is made without current in the main circuit and without previous heating of the release coil	-	N/A
	In the case of a release with a range of rated voltages, this test applies to the maximum voltage of the range	-	N/A
	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/A
	This test may be combined with the temperature-rise test of 8.3.3.6	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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	-	N/A
ii)	Test for limits of operation		
	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/A
	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/A
iii)	Performance under overvoltage conditions		
	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/A
d)	Shunt releases		
	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	-	N/A
	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	-	N/A
	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	-	N/A
8.3.3.3.3	Operational performance capability without current.		
	Type designation or serial number	TS1600H 3P	
	Sample no:	S1-1	
	Rated current In (A)	1600 A	
	Rated operational voltage: Ue (V)	690 V	
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt releases: Uc (V)		

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Clause	Requirement + Test	Result - Remark	Verdict
	Rated control supply voltage undervoltage releases: Uc (V)		
	Ambient temperature 10-40 °C :	25 °C	P
	Number of operating cycles per hour	20 Cycles per hour	P
	Number of cycles without current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Number of cycles without current (without releases)	2500 Cycles	P
	Applied voltage: closing mechanism (V)	-	N/A
	10% of total cycles for circuit-breaker with fitted shunt release: (50% at the beginning- and 50% at the end of the test.) Energized at the rated Uc	-	N/A
	Applied voltage: shunt releases (V)	-	N/A
	10% of total cycles for circuit-breaker with undervoltage releases: (50% at the beginning- and 50% at the end of the test.) Energized at the minimum rated Uc	-	N/A
	10 cycles without applied voltage at the undervoltage releases. (Shall not possible to close the circuit-breaker.)	-	N/A
	Applied voltage: undervoltage releases (V)	-	N/A
	Electrical components do not exceed the value indicated in tab. 7.	Compliance	P
8.3.3.3.4	Operational performance capability with current.		
	Rated current: In (A)	1600 A	
	Maximum rated operational voltage: Ue (V)	690 V	
	Conductor cross-sectional area (mm²) :	500 mm² X 2	P
	Number of operating cycles per hour	20 Cycles per hour	P
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	500 Cycles	P
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	Compliance	P
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	L1: 691,8 V L2: 700,8 V L3: 708,3 V	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	L1: 1618 A L2: 1625 A L3: 1602 A	P
	- power factor/time constant:	0,73	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1000 ms	P
	- off-time (s):	179 s	P
	Electrical components do not exceed the value indicated in tab. 7.	Compliance	P
8.3.3.3.5	Additional test of operational performance capability without current for withdrawable circuit-breaker.		
	Number of operations cycles : 100	-	N/A
	After test, the isolating contacts, withdrawable mechanism and interlocks shall be suitable for further service.	-	N/A
8.3.3.4	Overload performance		
	this test applies to circuit-breaker of rated current up to and including 630 A		
	Type designation or serial number		
	Sample no:		
	Rated current In (A)		
	Rated operational voltage: Ue (V)		
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt releases: Uc (V)		
	Rated control supply voltage undervoltage releases: Uc (V)		
	Ambient temperature 10-40 °C :	-	N/A
	Number of operating cycles per hour	-	N/A
	Maximum rated operational voltage: Ue (V)	-	N/A
	Number of operating cycles per hour	-	N/A
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Applied voltage: closing mechanism (V)	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload/short-circuit settings at maximum.	-	N/A
	Conditions, overload operations:		
	- test voltage U/Ue = 1,05 (V) .....L1: .....L2: L3:	-	N/A
	- test current AC/DC: I/Ie = 6,0/2.5 (A) .....L1: .....L2: L3:	-	N/A
	- power factor/time constant:	-	N/A
	- Number of cycles manually opened: 9	-	N/A
	- Number of cycles automatically opened by an overload release: 3	-	N/A
	- frequency: (Hz)	-	N/A
	- on-time max 2s:	-	N/A
8.3.3.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1380 V	P
	- no breakdown or flashover	No	P
	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 2 mA.	≤ 0,02 mA / 759 V	P
8.3.3.6	Verification of temperature-rise		
****	- the values of temperature-rise do not exceed those specified in tab. 7.	See table S1-1 (3P)	P
	Temperature rise of main circuit terminals ≤ 80 K (K) :	≤ 73,3 K	P
	conductor cross-sectional area (mm²) :	500 mm² x 2	P
	test current Ie (A) :	1600 A	P
8.3.3.7	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	2320 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	542 s	P

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Clause	Requirement + Test	Result - Remark	Verdict

8.3.3.8	Verification of undervoltage and shunt releases		
	Circuit-breaker fitted with undervoltage releases. The release shall not operate at 70% of the minimum control supply voltage -	-	N/A
	and shall operate at 35% of the maximum control supply voltage.	-	N/A
	Circuit-breaker fitted with shunt releases. The release shall operate at 70% of the minimum rated control supply voltage. Test made at room temperature.	-	N/A
8.3.3.9	Verification of the main contact position for circuit-breakers for isolation		
	actuating force for opening (N) .....:	206 N	—
	test force with blocked main contacts for 10 s (N) .:	618 N	—
	Dependent power operation	-	N/A
	Supply voltage of 110% of rated voltage (V).....:	-	N/A
	Three attempts of 5 s to operate the equipment at intervals of 5 min.	-	N/A
	Independent power operation	-	N/A
	Three attempts to operate the equipment by the stored energy.	-	N/A
	Lock ability of driving mechanism in OFF-position at test force and blocked main contacts .....:	-	N/A
	Position indicator does not show OFF-position after capture of test force at blocked main contacts	Compliance	P

8.3.3	TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS		
8.3.3.1	Tripping limits and characteristic		
8.3.3.1.2	Opening under short-circuit conditions		
	Manufacturer's name or trademark	LS	
	Type designation or serial number	TS1600H 4P	
	Sample no:	S1-1	
	Rated operational voltage: Ue (V)	690 V	
	Rated current: In (A)	1600 A	
	Ambient temperature 10-40 °C :	25 °C	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	3840 A(Ii=2XIn) 28800 A(Ii=15XIn)	P
	Range of adjustable setting current. (A)	Compliance	P
	Time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Electromagnetic overcurrent releases		
	Test current: 80% of the rated, or **minimum** adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3: N-Lx:	-	N/A
	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/A
	Test current: 120% of the rated, or **minimum** adjustable setting current: (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3: N-Lx:	-	N/A
	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/A
	Test current: 80% of the **maximum** adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3: N-Lx:	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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/A
	Test current: 120% of the **maximum** adjustable setting current: (A)	Compliance	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3: N-Lx:	-	N/A
	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/A
	Test current: tripping current declared for single pole operation (A)	-	N/A
	Operating time: < 0,2 s in case of instantaneous release: L1: L2: L3: N:	-	N/A
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3: N:	-	N/A
	Electronic overcurrent releases		
	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.	Compliance	P
	Test current: 80% of the rated or **minimum** adjustable setting current: (A)	2560 A(Ii=2XIn)	P
	Operating time: >0,2s in case of instantaneous releases: L1: L2: L3: N:	L1: >0,2 s L2: >0,2 s L3: >0,2 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	-	N/A
	Test current: 120% of the rated, or **minimum** adjustable setting current: (A)	3840 A(Ii=2XIn)	P
	Operating time: <0,2s in case of instantaneous releases: L1: L2: L3: N:	L1: 0,050 s L2: 0,049 s L3: 0,049 s	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	-	N/A
	Test current: 80% of the **maximum** adjustable setting current: (A)	19200 A(Ii=15XIn)	P
	Operating time: >0,2s in case of instantaneous releases: L1: L2: L3: N:	L1: >0,2 s L2: >0,2 s L3: >0,2 s	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	-	N/A
	Test current: 120% of the **maximum** adjustable setting current: (A)	28800 A(Ii=15XIn)	P
	Operating time: <0,2s in case of instantaneous releases: L1: L2: L3: N:	L1: 0,050 s L2: 0,050 s L2: 0,049 s	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	-	N/A
	Electronic overcurrent releases		

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Clause	Requirement + Test	Result - Remark	Verdict
	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.	Compliance	P
	Test current: 80% of the rated, or **minimum** adjustable setting current: (A)	768 A(Isd=1,5X0,4XIn)	P
	Operating time: >0,2s in case of instantaneous releases: L1: L2: L3: N:	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	 L1: >0,1 s L2: >0,1 s L3: >0,1 s	P
	Test current: 120% of the rated, or **minimum** adjustable setting current: (A)	1152 A(Isd=1,5X0,4XIn)	P
	Operating time: <0,2s in case of instantaneous releases: L1: L2: L3: N:	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	 L1: 0,068 s L2: 0,072 s L3: 0,065 s	P
	Test current: 80% of the **maximum** adjustable setting current: (A)	12800 A(Isd=10X1,0XIn)	P
	Operating time: >0,2s in case of instantaneous releases: L1: L2: L3: N:	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	 L1: >0,8 s L2: >0,8 s L3: >0,8 s	N/A
	Test current: 120% of the **maximum** adjustable setting current: (A)	19200 A(Isd=10X1,0XIn)	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time: <0,2s in case of instantaneous releases: L1: L2: L3: N:	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	L1: 0,418 s L2: 0,418 s L3: 0,418 s	P
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/A
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	-	N/A
	Range of adjustable setting current. (A)	-	N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 90% of the rated, or minimum adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases:	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 90% of the maximum adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases:	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
b)	Inverse time delay releases		
	Manufacturer's name or trademark	LS	
	Type designation or serial number	TS1600H 4P	
	Sample no:	S1-1	
	Rated operational voltage: Ue (V)	690 V	
	Rated current: In (A)	1600 A	
	For releases dependent of ambient air temperature: Reference temperature	-	N/A
	Test ambient temperature (°C)	-	N/A
	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/A
	For thermal-magnetic releases independent of ambient temperature: Tests shall be made at 30°C and 20°C or 40°C, the release being energized on all phase poles	-	N/A
	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.	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test ambient air temperature:	25 °C	P
	Range of adjustable setting current: (A)	0,4~1,0 x In	P
	Releases, dependent of ambient air temperature: Reference temperature (°C)	-	N/A
	Thermal Magnetic releases, independent of ambient air temperature: at 30°C	-	N/A
	Test current: 105% of the rated, or **minimum** adjustable setting current: (A)	672 A (Ir=0,4XIn)	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	2 h	P
	Test current: 130% of the rated, or **minimum** adjustable setting current: (A)	832 A (Ir=0,4XIn)	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.	998 A (Ir=0,4XIn)	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	5 s / 5 s	P
	Test current: 105% of the **maximum** adjustable setting current: (A)	1680 A (Ir=1,0XIn)	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	2 h	P
	Test current: 130% of the **maximum** adjustable setting current: (A)	2080 A (Ir=1,0XIn)	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.	2496 A (Ir=1,0XIn)	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	318 s / 145 s	P
	Thermal Magnetic releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:	-	N/A
	Test current: 105% of the rated, or **minimum** adjustable setting current: (A)	-	N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	-	N/A
	Test current: 130% of the rated, or **minimum** adjustable setting current: (A)	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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.	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A
	Test current: 105% of the **maximum** adjustable setting current: (A)	-	N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	-	N/A
	Test current: 130% of the **maximum** adjustable setting current: (A)	-	N/A
	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.	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A
	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		
	Releases, dependent of ambient air temperature: Reference temperature (°C)	Compliance	P
	Releases, independent of ambient air temperature: at 30°C	Compliance	P
	Test ambient air temperature:	25 °C	N/A
	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)	1920 A (0,4 In X 300 %) 4800 A (1,0 In X 300 %)	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	2 s (0,4 In) 89 s (1,0 In)	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:	-	N/A
	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/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	-	N/A
8.3.3.1.4	Additional test for definite time-delay releases		
a)	Time delay		
	Test is made at a current equal to 1,5 times the current setting. If the test current overlaps with another tripping characteristic (e.g. an instantaneous tripping characteristic), the trip setting and the test current shall be reduced as necessary to prevent premature tripping.		
	overload releases: (all phase poles loaded)	-	N/A
	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/A
	short-circuit releases	Compliance	P
	Electromagnetic release: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.	-	N/A
	Electronic releases: on one pole chosen at random.	Compliance	P
	Test current: 1,5 times of the rated, or **minimum** adjustable setting current: (A)	1440 A (Isd=1,5X0,4XIn)	P
	Operating time, overload releases: (s)	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Operating time, short-circuit releases (electromagnetic): (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Operating time, short-circuit releases (electronic): (s) L1: L2: L3:	 L1:0,067 s L2:0,067 s L3:0,068 s	P
	Time-delay: between the limits stated by the manufacturer:	0,025 s ~ 0,08 s	P
	Test current: 1,5 times of the **maximum** adjustable setting current: (A)	24000 A (Isd=10X1,0XIn)	P
	Operating time, overload releases: (s)	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Operating time, short-circuit releases (electromagnetic): (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Operating time, short-circuit releases (electronic): (s) L1: L2: L3:	L1:0,418 s L2:0,419 s L3:0,419 s	P
	Time-delay: between the limits stated by the manufacturer:	0,36 ~ 0,44 s	P
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.		
	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.		
	overload releases: (all phase poles loaded)	-	N/A
	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/A
	short-circuit releases	Compliance	P
	Electromagnetic release: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.	-	N/A
	Electronic releases: on one pole chosen at random.	Compliance	P
	Test current: 1,5 times of the **minimum** adjustable setting current: (A)	1440 A (Isd=1,5X0,4XIn)	P
	non-tripping duration stated by the manufacturer for overload release: (s)	-	N/A
	non-tripping duration stated by the manufacturer for short-circuit release thermal magnetic: (s)	-	N/A
	non-tripping duration stated by the manufacturer for short-circuit release electronic: (s)	0,025 s	P
	Time duration of current when reduced to the rated current: shall be twice the delay-time stated by the manufacturer: (s)	0,1 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Rated current	640 A (Ir=0,4XIn)	P
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases (electromagnetic), shall not trip: (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Operating time, short-circuit releases (electronic), shall not trip: (s) L1: L2: L3:	L1: >0,1 s L2: >0,1 s L3: >0,1 s	P
	Test current: 1,5 times of **maximum** adjustable setting current: (A)	24000 A (Isd=10X1,0XIn)	P
	non-tripping duration stated by the manufacturer for overload release: (s)	-	N/A
	non-tripping duration stated by the manufacturer for short-circuit release thermal magnetic: (s)	-	N/A
	non-tripping duration stated by the manufacturer for short-circuit release electronic: (s)	0,2 s	P
	Time duration of current when reduced to the rated current: shall be twice the delay-time stated by the manufacturer: (s)	0,8 s	P
	Rated current	1600 A (Ir=1,0XIn)	P
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases (electromagnetic), shall not trip: (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Operating time, short-circuit releases (electronic), shall not trip: (s) L1: L2: L3:	L1: >0,8 s L2: >0,8 s L3: >0,8 s	P
8.3.3.2	Test of dielectric properties, impulse withstand voltage (Uimp indicated):		
8.3.3.4 part1	The 1,2/50µs impulse voltage shall be applied five times for each polarity at intervals of 1s minimum		
	- rated impulse withstand voltage (kV) :	8 kV	P
	- sea level of the laboratory:	60 m	P
	- test Uimp main circuits (kV) :	9,8 kV	P
	- test Uimp auxiliary circuits (kV) :	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- test Uimp control circuits (kV) :	-	N/A
	- test Uimp on open main contacts (equipment suitable for isolating) (kV) :	12,3 kV	P
a)	Application of test voltage		
	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.	Compliance	P
	ii) Between each pole 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.	Compliance	P
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit	Compliance	P
	- other circuits	-	N/A
	- exposed conductive parts	-	N/A
	- enclosure of mounting plate	-	N/A
	iv) equipment suitable for isolation	Compliance	P
	equipment not suitable for isolation		N/A
	- no unintentional disruptive discharge during the test's	Compliance	P
	Test of dielectric properties, dielectric withstand voltage (Uimp not indicated):		
	- rated insulation voltage (V) :	1000 V	P
	- main circuits, test voltage for 1 min (V)	2200 V	P
	- auxiliary circuits, test voltage for 1 min (V)	-	N/A
	- control circuits, test voltage for 1 min (V)	-	N/A
8.3.3.2.2	Application of test voltage		
1)	with circuit-breaker in the closed position		
	- between all live parts of all poles connected together and the frame of the circuit-breaker .	Compliance	P
	- between each pole and all the other poles connected to the frame of the circuit-breaker	Compliance	P
2)	with the circuit-breaker in the open position and, additionally, in the tripped position, if any.		
	- between all live parts of all poles connected together and the frame of the circuit-breaker.	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- between the terminals of one side connected together and the terminals of the other side connected together.	Compliance	P
b)	Control and auxiliary circuits		
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/A
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/A
	No unintentional disruptive discharge during the tests	Compliance	P
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.	≤ 0,01 mA./ 759 V	P
8.3.3.3	Mechanical operation and operational performance capability		
8.3.3.3.2	Construction and mechanical operation		
a)	Construction		
	A withdrawable circuit-breaker shall be checked for the requirements stated in 7.1.1	-	N/A
	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	-	N/A
b)	Mechanical operation		
	A circuit-breaker with dependent power operation shall comply with the requirements stated in 7.2.1.1.3	-	N/A
	A circuit-breaker with dependent power operation shall operate with the operating mechanism charged to the minimum and maximum limits stated by the manufacturer	-	N/A
	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.	-	N/A
	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	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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/A
	If the closing and opening times of a circuit-breaker are stated by the manufacturer, such times shall comply with the stated values	-	N/A
c)	Undervoltage releases		
	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/A
i)	Drop out voltage		
	It shall be verified that the release operates to open the circuit-breaker between the voltage limits specified	-	N/A
	The voltage shall be reduced from rated voltage at a rate to reach 0 V in approximately 30 s	-	N/A
	The test for the lower limit is made without current in the main circuit and without previous heating of the release coil	-	N/A
	In the case of a release with a range of rated voltages, this test applies to the maximum voltage of the range	-	N/A
	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/A
	This test may be combined with the temperature-rise test of 8.3.3.6	-	N/A
	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	-	N/A
ii)	Test for limits of operation		
	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/A
	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/A

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Clause	Requirement + Test	Result - Remark	Verdict
iii)	Performance under overvoltage conditions		
	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/A
d)	Shunt releases		
	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	-	N/A
	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	-	N/A
	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	-	N/A
8.3.3.3.3	Operational performance capability without current.		
	Type designation or serial number	TS1600H 4P	
	Sample no:	S1-1	
	Rated current In (A)	1600 A	
	Rated operational voltage: Ue (V)	690 V	
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt releases: Uc (V)		
	Rated control supply voltage undervoltage releases: Uc (V)		
	Ambient temperature 10-40 °C :	25 °C	P
	Number of operating cycles per hour	20 Cycles per hour	P
	Number of cycles without current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Number of cycles without current (without releases)	2500 Cycles	P
	Applied voltage: closing mechanism (V)	-	N/A
	10% of total cycles for circuit-breaker with fitted shunt release: (50% at the beginning- and 50% at the end of the test.) Energized at the rated Uc	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Applied voltage: shunt releases (V)	-	N/A
	10% of total cycles for circuit-breaker with undervoltage releases: (50% at the beginning- and 50% at the end of the test.) Energized at the minimum rated Uc	-	N/A
	10 cycles without applied voltage at the undervoltage releases. (Shall not possible to close the circuit-breaker.)	-	N/A
	Applied voltage: undervoltage releases (V)	-	N/A
	Electrical components do not exceed the value indicated in tab. 7.	Compliance	P
8.3.3.3.4	Operational performance capability with current.		
	Rated current: In (A)	1600 A	
	Maximum rated operational voltage: Ue (V)	690 V	
	Conductor cross-sectional area (mm²) :	500 mm² X 2	P
	Number of operating cycles per hour	20 Cycles per hour	P
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	500 Cycles	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.	Compliance	P
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	L1: 691,8 V L2: 700,8 V L3: 708,3 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	L1: 1618 A L2: 1625 A L3: 1602 A	P
	- power factor/time constant:	0,73	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1000 ms	P
	- off-time (s):	179 s	P
	Electrical components do not exceed the value indicated in tab. 7.	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.3.3.5	Additional test of operational performance capability without current for withdrawable circuit-breaker.		
	Number of operations cycles : 100	-	N/A
	After test, the isolating contacts, withdrawable mechanism and interlocks shall be suitable for further service.	-	N/A
8.3.3.4	Overload performance		
	this test applies to circuit-breaker of rated current up to and including 630 A		
	Type designation or serial number		
	Sample no:		
	Rated current In (A)		
	Rated operational voltage: Ue (V)		
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt releases: Uc (V)		
	Rated control supply voltage undervoltage releases: Uc (V)		
	Ambient temperature 10-40 °C :	-	N/A
	Number of operating cycles per hour	-	N/A
	Maximum rated operational voltage: Ue (V)	-	N/A
	Number of operating cycles per hour	-	N/A
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload/short-circuit settings at maximum.	-	N/A
	Conditions, overload operations:		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	-	N/A
	- test current AC/DC: I/Ie = 6,0/2.5 (A) ..... L1: ..... L2: L3:	-	N/A
	- power factor/time constant:	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- Number of cycles manually opened: 9	-	N/A
	- Number of cycles automatically opened by an overload release: 3	-	N/A
	- frequency: (Hz)	-	N/A
	- on-time max 2s:	-	N/A
8.3.3.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1380 V	P
	- no breakdown or flashover	No	P
	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 2 mA.	≤ 0,02 mA / 759 V	P
8.3.3.6	Verification of temperature-rise		
****	- the values of temperature-rise do not exceed those specified in tab. 7.	See table S1-1 (4P)	P
	Temperature rise of main circuit terminals ≤ 80 K (K) :	≤ 69,1 K	P
	conductor cross-sectional area (mm²) :	500 mm² x 2	P
	test current Ie (A) :	1600 A	P
8.3.3.7	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	2320 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	540 s	P
8.3.3.8	Verification of undervoltage and shunt releases		
	Circuit-breaker fitted with undervoltage releases. The release shall not operate at 70% of the minimum control supply voltage -	-	N/A
	and shall operate at 35% of the maximum control supply voltage.	-	N/A
	Circuit-breaker fitted with shunt releases. The release shall operate at 70% of the minimum rated control supply voltage. Test made at room temperature.	-	N/A
8.3.3.9	Verification of the main contact position for circuit-breakers for isolation		
	actuating force for opening (N) .....:	216 N	—
	test force with blocked main contacts for 10 s (N) .:	648 N	—

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Clause	Requirement + Test	Result - Remark	Verdict
	Dependent power operation	-	N/A
	Supply voltage of 110% of rated voltage (V).....:	-	N/A
	Three attempts of 5 s to operate the equipment at intervals of 5 min.	-	N/A
	Independent power operation	-	N/A
	Three attempts to operate the equipment by the stored energy.	-	N/A
	Lock ability of driving mechanism in OFF-position at test force and blocked main contacts .....:	-	N/A
	Position indicator does not show OFF-position after capture of test force at blocked main contacts	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict

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	TS1600H 3P	
	Sample no:	S2-1 Rev	
	Rated current: In (A)	1600 A	
	Rated operational voltage: Ue (V)	240 V	
	Rated service short-circuit breaking capacity: (kA)	57 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.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	Side : 73.5 mm, Front : 0 mm Top bottom : no screen	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	<30mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm²) :	2CX50X10 mm²	P
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	50 Nm	P
	Test sequence of operation: O – t – CO – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) .....L1: .....L2: L3:	L1: 253,6 V L2: 253,0 V L3: 254,1 V	P
	- r.m.s. test current AC/DC: (A).....L1: .....L2: L3:	L1: 57,7 kA L2: 57,6 kA L3: 57,5 kA	P
	power factor/time constant :	0,2	P
	- Factor "n"	2,27	P
	- peak test current (A) :	131,1 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:	L1: 121,5 kA L2: 93,1 kA L3: 87,0 kA	P
	- Joule integral I^2dt (A^2s) .....L1: .....L2: L3:	L1: 70,1 MA^2s L2: 43,0 MA^2s L3: 31,8 MA^2s	P
	Pause, t: (min)	3	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:	L1: 67,5 kA L2: 105,0 kA L3: 116,7 kA	P
	- Joule integral I^2dt (A^2s) .....L1: .....L2: L3:	L1: 28,6 MA^2s L2: 49,3 MA^2s L3: 57,0 MA^2s	P
	Pause, t: (min)	3	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:	L1: 100,8 kA L2: 80,6 kA L3: 115,1 kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 51,9 MA^2s L2: 30,9 MA^2s L3: 64,1 MA^2s	P
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	Compliance	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	1600 A	
	Maximum rated operational voltage: Ue (V)	240 V	
	Conductor cross-sectional area (mm^2) :	500 mm^2 X 2	
	Number of operating cycles per hour	20 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)	25 Cycles	P
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	Compliance	P
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	L1: 243,5 V L2: 250,5 V L3: 251,5 V	P
	- test current I/Ie = 1,0 (A)..... L1: ..... L2: L3:	L1: 1604 A L2: 1618 A L3: 1606 A	P
	- power factor/time constant:	0,71	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1000 ms	P
	- off-time (s):	179 s	P
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1.1 Ue)	≤ 1,14 mA / 264 V	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed those specified in tab. 7.	See table S2-1R (3P)	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	≤ 75,3 K	P
	conductor cross-sectional area (mm²) :	500 mm² x 2	P
	test current Ie (A) :	1600 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	2320 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	535 s	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	TS1600H 3P	
	Sample no:	S2-2	
	Rated current: In (A)	630 A	
	Rated operational voltage: Ue (V)	240 V	
	Rated service short-circuit breaking capacity: (kA)	57 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.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	Side.: 73.5 mm, Front : 0 mm Top bottom : no screen	P

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Clause	Requirement + Test	Result - Remark	Verdict
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	< 30mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm²) :	2CX40X5 mm²	P
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	50 Nm	P
	Test sequence of operation: O – t – CO – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1: 253,7 V L2: 252,8 V L3: 254,0 V	P
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: L3:	L1: 57,7 kA L2: 57,6 kA L3: 57,5 kA	P
	power factor/time constant :	0,20	P
	- Factor "n"	2,27	P
	- peak test current (A) :	131,1 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 123,2 kA L2: 93,1 kA L3: 91,3 kA	P
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:	L1: 73,9 MA^{2}s L2: 44,6 MA^{2}s L3: 36,2 MA^{2}s	P
	Pause, t: (min)	4	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 75,1 kA L2: 110,2 kA L3: 111,4 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 32,8 MA^2s L2: 59,6 MA^2s L3: 65,0 MA^2s	P
	Pause, t: (min)	3	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 112,4 kA L2: 78,2 kA L3: 97,5 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 66,4 MA^2s L2: 38,0 MA^2s L3: 43,7 MA^2s	P
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	Compliance	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)		
	Maximum rated operational voltage: Ue (V)		
	Conductor cross-sectional area (mm^2) :		
	Number of operating cycles per hour	-	N/A
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	-	N/A
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- power factor/time constant:	-	N/A
	- frequency: (Hz)	-	N/A
	- on-time (ms):	-	N/A
	- off-time (s):	-	N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1.1 Ue)	≤ 0,77 mA / 264 V	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm²) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.4.5	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	913,5 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	517 s	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	TS1600H 3P	
	Sample no:	S2-3	
	Rated current: In (A)	1600 A	
	Rated operational voltage: Ue (V)	460 V	
	Rated service short-circuit breaking capacity: (kA)	50 kA	
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt release: Uc (V)		

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Clause	Requirement + Test	Result - Remark	Verdict
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	Side : 73.5 mm, Front : 0 mm Top bottom : no screen	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	< 30mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm²) :	2CX50X10 mm²	P
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	50 Nm	P
	Test sequence of operation: O – t – CO – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1: 486,2 V L2: 488,7 V L3: 484,7 V	P
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: L3:	L1: 50,9 kA L2: 50,3 kA L3: 50,5 kA	P
	power factor/time constant :	0,23	P
	- Factor "n"	2,17	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- peak test current (A) :	110,9 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 108,9 kA L2: 82,4 kA L3: 86,2 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 62,0 MA^2s L2: 38,3 MA^2s L3: 35,3 MA^2s	P
	Pause, t: (min)	5	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 86,5 kA L2: 83,1 kA L3: 106,8 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 45,8 MA^2s L2: 37,9 MA^2s L3: 64,3 MA^2s	P
	Pause, t: (min)	3	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 73,8 kA L2: 102,3 kA L3: 98,6 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 31,5 MA^2s L2: 54,7 MA^2s L3: 54,1 MA^2s	P
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	Compliance	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	1600 A	
	Maximum rated operational voltage: Ue (V)	460 V	
	Conductor cross-sectional area (mm^2) :	500 mm^2 X 2	
	Number of operating cycles per hour	20 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)	25 Cycles	P
	Applied voltage: closing mechanism (V)	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	L1: 472,0 V L2: 474,8 V L3: 476,8 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	L1: 1600 A L2: 1622 A L3: 1610 A	P
	- power factor/time constant:	0,70	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1000 ms	P
	- off-time (s):	179 s	P
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1.1 Ue)	≤ 0,58 mA / 506 V	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed those specified in tab. 7.	See table S2-3 (3P)	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	≤ 78,4 K	P
	conductor cross-sectional area () :	500 mm² x 2	P
	test current Ie (A) :	1600 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	2320 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	532 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
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	TS1600H 3P	
	Sample no:	S2-4 Rev	
	Rated current: In (A)	1600 A	
	Rated operational voltage: Ue (V)	690 V	
	Rated service short-circuit breaking capacity: (kA)	35 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.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	Side : 73.5 mm, Front : 0 mm Top bottom : no screen	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	< 30mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Conductor cross-sectional area (mm²) :	2CX50X10 mm²	P
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	50 Nm	P
	Test sequence of operation: O – t – CO – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1: 734,9 V L2: 735,7 V L3: 733,0 V	P
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: L3:	L1: 35,1 kA L2: 35,0 kA L3: 35,1 kA	P
	power factor/time constant :	0,24	P
	- Factor "n"	2,17	P
	- peak test current (A) :	76,3 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 74,5 kA L2: 58,3 kA L3: 63,2 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 31,5 MA^2s L2: 21,6 MA^2s L3: 20,4 MA^2s	P
	Pause, t: (min)	5	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 56,9 kA L2: 74,7 kA L3: 65,9 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 17,9 MA^2s L2: 30,9 MA^2s L3: 24,7 MA^2s	P
	Pause, t: (min)	3	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 62,8 kA L2: 59,0 kA L3: 74,5 kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 25,2 MA^2s L2: 20,3 MA^2s L3: 32,0 MA^2s	P
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	Compliance	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	1600 A	
	Maximum rated operational voltage: Ue (V)	690 V	
	Conductor cross-sectional area (mm^2) :	500 mm^2 X 2	
	Number of operating cycles per hour	20 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)	25 Cycles	P
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	-	N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	L1: 716,5 V L2: 719,8 V L3: 716,0 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	L1: 1622 A L2: 1622 A L3: 1624 A	P
	- power factor/time constant:	0,73	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1000 ms	P
	- off-time (s):	179 s	P
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1380 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1.1 Ue)	≤0,07 mA / 759 V	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed those specified in tab. 7.	See table S2-4R (3P)	
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	≤ 78,9 K	P
	conductor cross-sectional area (mm²) :	500 mm² x 2	P
	test current Ie (A) :	1600 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	2320 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	537 s	P

8.3.4	TEST SEQUENCE II/III (Ics=Icu):	N/A

8.3.5	TEST SEQUENCE III (Icu)		
	Rated ultimate short-circuit breaking		
	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.		
	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.		
	For integrally fused circuit-breakers, test sequence V applies in place of this sequence.		
	Type designation or serial number	TS1600H 3P	
	Sample no:	S3-1	
	Rated current: In (A)	1600 A	
	Rated operational voltage: Ue (V)	240 V	
	Rated ultimate short-circuit breaking capacity: (kA)	75 kA	
	Rated control supply voltage of closing mechanism: Uc (V)		

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Clause	Requirement + Test	Result - Remark	Verdict
	Rated control supply voltage of shunt release: Uc (V)		
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	152~317 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	216 s 204 s 220 s	P
8.3.5.2	Test of rated ultimate short-circuit breaking capacity		
	The test sequence of operations is O – t – CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	Side : 73.5 mm, Front : 0 mm Top bottom : no screen	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	< 30mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Conductor cross-sectional area (mm²) :	2CX50X10 mm²	P
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening, torques: (Nm)	50 Nm	P
	Test sequence of operation: O – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1: 253,6 V L2: 253,6 V L3: 253,7 V	P
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: L3:	L1: 75,9 kA L2: 76,3 kA L3: 74,8 kA	P
	power factor/time constant :	0,20	P
	- Factor "n"	2,27	P
	- peak test current (Amax) :	172,9 kA	
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 126,1 kA L2: 122,8 kA L3: 109,8 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 92,5 MA^2s L2: 71,7 MA^2s L3: 50,5 MA^2s	P
	Pause, t: (min)	4	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 126,1 kA L2: 110,1 kA L3: 111,4 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 92,0 MA^2s L2: 64,0 MA^2s L3: 53,9 MA^2s	P
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	Compliance	P
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1000 V	P
	- no breakdown or flashover	No	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	≤ 0,1 mA / 264 V	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	92~182 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	123 s 122 s 129 s	P

8.3.5	TEST SEQUENCE III (Icu)		
	Rated ultimate short-circuit breaking		
	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.		
	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.		
	For integrally fused circuit-breakers, test sequence V applies in place of this sequence.		
	Type designation or serial number	TS1600H 3P	
	Sample no:	S3-2	
	Rated current: In (A)	630 A	
	Rated operational voltage: Ue (V)	240 V	
	Rated ultimate short-circuit breaking capacity: (kA)	75 kA	
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt release: Uc (V)		

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Clause	Requirement + Test	Result - Remark	Verdict
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	152~317 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	218 s 212 s 214 s	P
8.3.5.2	Test of rated ultimate short-circuit breaking capacity		
	The test sequence of operations is O – t – CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	Side : 73.5 mm, Front : 0 mm Top bottom : no screen	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	< 30mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm²) :	2CX40X5 mm²	P

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Clause	Requirement + Test	Result - Remark	Verdict
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening, torques: (Nm)	50 Nm	P
	Test sequence of operation: O – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1: 253,8 V L2: 253,2 V L3: 254,1 V	P
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: L3:	L1: 75,9 kA L2: 76,3 kA L3: 74,8 kA	P
	power factor/time constant :	0,20	P
	- Factor "n"	2,28	
	- peak test current (Amax) :	172,9 kA	
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 142,5 kA L2: 120,7 kA L3: 108,0 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 98,0 MA^2s L2: 68,4 MA^2s L3: 48,9 MA^2s	P
	Pause, t: (min)	6	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 133,3 kA L2: 89,6 kA L3: 127,9 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 85,3 MA^2s L2: 46,1 MA^2s L3: 75,1 MA^2s	P
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	Compliance	P
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1000 V	P
	- no breakdown or flashover	No	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	≤ 1,31 mA / 264 V	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	92~182 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	128 s 125 s 126 s	P

8.3.5	TEST SEQUENCE III (Icu)		
	Rated ultimate short-circuit breaking		
	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.		
	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.		
	For integrally fused circuit-breakers, test sequence V applies in place of this sequence.		
	Type designation or serial number	TS1600H 3P	
	Sample no:	S3-3	
	Rated current: In (A)	1600 A	
	Rated operational voltage: Ue (V)	460 V	
	Rated ultimate short-circuit breaking capacity: (kA)	65 kA	
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt release: Uc (V)		

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Clause	Requirement + Test	Result - Remark	Verdict
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	152~317 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	211 s 215 s 209 s	P
8.3.5.2	Test of rated ultimate short-circuit breaking capacity		
	The test sequence of operations is O – t – CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	Side : 73.5 mm, Front : 0 mm Top bottom : no screen	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	< 30mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm²) :	2CX50X10 mm²	P

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Clause	Requirement + Test	Result - Remark	Verdict
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening, torques: (Nm)	50 Nm	P
	Test sequence of operation: O – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) .....L1: .....L2: L3:	L1: 484,6 V L2: 485,5 V L3: 484,4 V	P
	- r.m.s. test current AC/DC: (A).....L1: .....L2: L3:	L1: 67,0 kA L2: 65,7 kA L3: 65,8 kA	P
	power factor/time constant :	0,20	P
	- Factor "n"	2,25	P
	- peak test current (Amax) :	149,3 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:	L1: 140,3 kA L2: 111,6 kA L3: 105,7 kA	P
	- Joule integral I^2dt (A^2s) .....L1: .....L2: L3:	L1: 98,9 MA^2s L2: 65,2 MA^2s L3: 50,2 MA^2s	P
	Pause, t: (min)	5	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:	L1: 98,7 kA L2: 130,0 kA L3: 125,9 kA	P
	- Joule integral I^2dt (A^2s) .....L1: .....L2: L3:	L1: 58,9 MA^2s L2: 93,2 MA^2s L3: 93,3 MA^2s	P
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	Compliance	P
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1000 V	P
	- no breakdown or flashover	No	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	≤ 3,0 mA / 506 V	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	92~182 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	127 s 128 s 127 s	P

8.3.5	TEST SEQUENCE III (Icu)		
	Rated ultimate short-circuit breaking		
	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.		
	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.		
	For integrally fused circuit-breakers, test sequence V applies in place of this sequence.		
	Type designation or serial number	TS1600H 3P	
	Sample no:	S3-4Rev	
	Rated current: In (A)	1600 A	
	Rated operational voltage: Ue (V)	690 V	
	Rated ultimate short-circuit breaking capacity: (kA)	45 kA	
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt release: Uc (V)		

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Clause	Requirement + Test	Result - Remark	Verdict
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	152~317 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	214 s 203 s 211 s	P
8.3.5.2	Test of rated ultimate short-circuit breaking capacity		
	The test sequence of operations is O – t – CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	Side : 73.5 mm, Front : 0 mm Top bottom : no screen	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	< 30mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm^2) :	2CX50X10 mm^2	P

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Clause	Requirement + Test	Result - Remark	Verdict
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening, torques: (Nm)	50 Nm	P
	Test sequence of operation: O – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1: 734,8 V L2: 734,8 V L3: 733,0 V	P
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: L3:	L1: 45,3 kA L2: 45,0 kA L3: 45,3 kA	P
	power factor/time constant :	0,24	P
	- Factor "n"	2,13	P
	- peak test current (Amax) :	96,6 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 95,8 kA L2: 74,1 kA L3: 79,1 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 52,1 MA^2s L2: 33,8 MA^2s L3: 32,0 MA^2s	P
	Pause, t: (min)	10	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 94,3 kA L2: 86,4 kA L3: 69,1 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 48,9 MA^2s L2: 43,5 MA^2s L3: 28,0 MA^2s	P
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	Compliance	P
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1 380 V	P
	- no breakdown or flashover	No	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	≤ 0,78 mA / 759 V	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	92~182 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	127 s 126 s 126 s	P
8.3.5	TEST SEQUENCE III (Icu)		
	Rated ultimate short-circuit breaking		
	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.		
	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.		
	For integrally fused circuit-breakers, test sequence V applies in place of this sequence.		
	Type designation or serial number	TS1600H 4P	
	Sample no:	S3-1	
	Rated current: In (A)	1600 A	
	Rated operational voltage: Ue (V)	240 V	
	Rated ultimate short-circuit breaking capacity: (kA)	75 kA	
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt release: Uc (V)		

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Clause	Requirement + Test	Result - Remark	Verdict
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	152~317 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	226 s 215 s 214 s	P
8.3.5.2	Test of rated ultimate short-circuit breaking capacity		
	The test sequence of operations is O – t – CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	Side : 73.5 mm, Front : 0 mm Top bottom : no screen	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	< 30mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm²) :	2CX50X10 mm²	P

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Clause	Requirement + Test	Result - Remark	Verdict
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening, torques: (Nm)	50 Nm	P
	Test sequence of operation: O – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1: 253,4 V L2: 253,3 V L3: 253,5 V	P
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: L3:	L1: 75,9 kA L2: 76,3 kA L3: 74,8 kA	P
	power factor/time constant :	0,20	P
	- Factor "n"	2,28	P
	- peak test current (Amax) :	172,9 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 142,2 kA L2: 126,1 kA L3: 65,5 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 102,1 MA^2s L2: 80,0 MA^2s L3: 19,5 MA^2s	P
	Pause, t: (min)	4	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 111,1 kA L2: 77,6 kA L3: 80,5 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 64,0 MA^2s L2: 41,1 MA^2s L3: 33,6 MA^2s	P
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	Compliance	P
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1000 V	P
	- no breakdown or flashover	No	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	≤ 0,1 mA / 264 V	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	92~182 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	123 s 128 s 121 s	P

8.3.5	TEST SEQUENCE III (Icu)		
	Rated ultimate short-circuit breaking		
	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.		
	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.		
	For integrally fused circuit-breakers, test sequence V applies in place of this sequence.		
	Type designation or serial number	TS1600H 4P	
	Sample no:	S3-2	
	Rated current: In (A)	630 A	
	Rated operational voltage: Ue (V)	240 V	
	Rated ultimate short-circuit breaking capacity: (kA)	75 kA	
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt release: Uc (V)		

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Clause	Requirement + Test	Result - Remark	Verdict
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	152~317 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	222 s 224 s 220 s	P
8.3.5.2	Test of rated ultimate short-circuit breaking capacity		
	The test sequence of operations is O – t – CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	Side : 73.5 mm, Front : 0 mm Top bottom : no screen	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	<30mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm^2) :	2CX40X5 mm^2	P

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Clause	Requirement + Test	Result - Remark	Verdict
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening, torques: (Nm)	50 Nm	P
	Test sequence of operation: O – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1: 253,4 V L2: 253,3 V L3: 253,5 V	P
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: L3:	L1: 75,9 kA L2: 76,3 kA L3: 74,8 kA	P
	power factor/time constant :	0,20	P
	- Factor "n"	2,28	P
	- peak test current (Amax) :	172,9 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 99,3 kA L2: 100,6 kA L3: 65,4 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 71,2 MA^2s L2: 66,2 MA^2s L3: 19,7 MA^2s	P
	Pause, t: (min)	6	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 121,8 kA L2: 148,7 kA L3: 58,4 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 69,5 MA^2s L2: 106,2 MA^2s L3: 18,4 MA^2s	P
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	Compliance	P
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1000 V	P
	- no breakdown or flashover	No	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	≤ 0,45 mA / 264 V	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	92~182 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	130 s 127 s 125 s	P

8.3.5	TEST SEQUENCE III (Icu)		
	Rated ultimate short-circuit breaking		
	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.		
	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.		
	For integrally fused circuit-breakers, test sequence V applies in place of this sequence.		
	Type designation or serial number	TS1600H 4P	
	Sample no:	S3-3	
	Rated current: In (A)	1600 A	
	Rated operational voltage: Ue (V)	460 V	
	Rated ultimate short-circuit breaking capacity: (kA)	65 kA	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	

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Clause	Requirement + Test	Result - Remark	Verdict
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	152~317 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	217 s 226 s 221 s	P
8.3.5.2	Test of rated ultimate short-circuit breaking capacity		
	The test sequence of operations is O – t – CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	Side : 73.5 mm, Front : 0 mm Top bottom : no screen	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	< 30mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm²) :	2CX50X10 mm²	P

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Clause	Requirement + Test	Result - Remark	Verdict
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening, torques: (Nm)	50 Nm	P
	Test sequence of operation: O – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1: 484,8 V L2: 485,4 V L3: 484,8 V	P
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: L3:	L1: 67,0 kA L2: 65,7 kA L3: 65,8 kA	P
	power factor/time constant :	0,2	
	- Factor "n"	2.23	
	- peak test current (Amax) :	149,3 kA	
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 99,3 kA L2: 100,7 kA L3: 100,4 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 68,1 MA^2s L2: 59,8 MA^2s L3: 48,1 MA^2s	P
	Pause, t: (min)	2	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 127,7 kA L2: 134,2 kA L3: 80,0 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 77,3 MA^2s L2: 91,8 MA^2s L3: 40,0 MA^2s	P
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	Compliance	P
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1000 V	P
	- no breakdown or flashover	No	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	≤ 0,78 mA / 506 V	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	92~182 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	124 s 120 s 121 s	P

8.3.5	TEST SEQUENCE III (Icu)		
	Rated ultimate short-circuit breaking		
	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.		
	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.		
	For integrally fused circuit-breakers, test sequence V applies in place of this sequence.		
	Type designation or serial number	TS1600H 4P	
	Sample no:	S3-4Rev	
	Rated current: In (A)	1600 A	
	Rated operational voltage: Ue (V)	690 V	
	Rated ultimate short-circuit breaking capacity: (kA)	45 kA	
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt release: Uc (V)		

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Clause	Requirement + Test	Result - Remark	Verdict
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	152~317 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	218 s 218 s 224 s	P
8.3.5.2	Test of rated ultimate short-circuit breaking capacity		
	The test sequence of operations is O – t – CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	Side : 73.5 mm, Front : 0 mm Top bottom : no screen	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	< 30mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm²) :	2CX50X10 mm²	P

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Clause	Requirement + Test	Result - Remark	Verdict
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening, torques: (Nm)	50 Nm	P
	Test sequence of operation: O – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1: 735,6 V L2: 732,7 V L3: 732,8 V	P
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: L3:	L1: 45,3 kA L2: 45,0 kA L3: 45,3 kA	P
	power factor/time constant :	0,24	P
	- Factor "n"	2,14	P
	- peak test current (Amax) :	96,8 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 95,5 kA L2: 73,9 kA L3: 79,3 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 52,1 MA^2s L2: 38,1 MA^2s L3: 36,8 MA^2s	P
	Pause, t: (min)	3	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 79,1 kA L2: 75,3 kA L3: 95,3 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 43,3 MA^2s L2: 37,9 MA^2s L3: 57,8 MA^2s	P
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	Compliance	P
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1380 V	P
	- no breakdown or flashover	No	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	≤ 1,0 mA / 759 V	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	92~182 s	P
	- Operation time: (s) .....L1: .....L2: .....L3: ..... N :	127 s 127 s 127 s	P

8.3.5	TEST SEQUENCE III (Icu)		
	Rated ultimate short-circuit breaking		
	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.		
	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.		
	For integrally fused circuit-breakers, test sequence V applies in place of this sequence.		
	Type designation or serial number	TS1600H 4P	
	Sample no:	S3-5	
	Rated current: In (A)	1600 A	
	Rated operational voltage: Ue (V)	240 V/√ 3	
	Rated ultimate short-circuit breaking capacity: (kA)	75 kA	
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt release: Uc (V)		

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Clause	Requirement + Test	Result - Remark	Verdict
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	152~317 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	230 s - - 230 s	P
8.3.5.2	Test of rated ultimate short-circuit breaking capacity		
	The test sequence of operations is O – t – CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	Side : 73.5 mm, Front : 0 mm Top bottom : no screen	P
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	< 30mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm^2) :	2CX50X10 mm^2	P

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Clause	Requirement + Test	Result - Remark	Verdict
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening, torques: (Nm)	50 Nm	P
	Test sequence of operation: O – t – CO	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1: 145,8 V	P
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: L3:	L1: 77,7 kA	P
	power factor/time constant :	0,20	P
	- Factor "n"	2,15	P
	- peak test current (Amax) :	167,5 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 122,9 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 67,9 MA^2s	P
	Pause, t: (min)	4	
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 110,2 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 56,4 MA^2s	P
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	Compliance	P
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1000 V	P
	- no breakdown or flashover	No	P
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	≤ 0,77 mA / 264 V	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	92~182 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	122 s - - 129 s	P
8.3.6	TEST SEQUENCE IV		
	Rated short-time withstand current		
	Except where the combined test sequence applies, this test sequence applies to circuit-breakers of utilization category B and to those circuit-breaker of category A covered by note 3 of table 4, and comprises the following tests:		
	Where integrally fused circuit-breaker are of utilization category B, they shall meet the requirements of this sequence.		
	Type designation or serial number	TS1600H 3P	
	Sample no:	S4-1	
	Rated current: In (A)	1600 A	
	Rated operational voltage: Ue (V)	690 V	
	Rated short-time withstand current: (kA/s)	25 kA 1s	
	Rated frequency: (Hz)	60 Hz	
8.3.6.1	Verification of overload releases		
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	152~317 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	223 s 229 s 211 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.6.2	Test of rated short-time withstand current.		
	For this test, any over-current release, including the instantaneous override, if any, likely to operate during the test, shall be rendered inoperative.		
	- test frequency: (Hz)	60 Hz	P
	- duration of the test: (s)	1 s	P
	- test frequency: (Hz)	60 Hz	P
	- power factor / time constant (ms):	0,25	P
	- factor "n"	2,09	P
	- test voltage: (V) ..... L1: ..... L2: L3:	L1: 724,9 V L2: 724,6 V L3: 724,9 V	P
	- r.m.s. test current: (kA) ..... L1: ..... L2: L3:	L1: 25,5 kA L2: 25,6 kA L3: 25,4 kA	P
	- highest peak current: (kA)	53,5 kA	P
8.3.6.3	Verification of temperature-rise		
	- the values of temperature-rise do not exceed those specified in tab. 7.	See table S4-1 (3P)	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	≤ 67,0 K	P
	conductor cross-sectional area (mm²) :	500 mm² X 2	P
	test current Ie (A) :	1600 A	P
8.3.6.4	Test of short-circuit breaking capacity at the max. short-time withstand current.		
	Rated short-time withstand current: (kA/s)		
	Test sequence: O – t – CO		
	max. available time setting of the short–time delay short-circuit release. (s)	0,4 s	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1: 724,9 V L2: 724,6 V L3: 724,9 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	L1: 25,5 kA L2: 25,6 kA L3: 25,4 kA	P
	- test frequency: (Hz)	60 Hz	P
	- power factor / time constant (ms):	0,25	P
	- factor "n"	2,09	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 51,1 kA L2: 40,7 kA L3: 44,8 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 266,6 MA^2s L2: 260,4 MA^2s L3: 257,8 MA^2s	P
	Pause, t: (min)	5	P
	- the circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short–time delay short-circuit release and -		P
	- the instantaneous override, if any, shall not operate.		P
	-pause: t (s)		
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 49,8 kA L2: 38,4 kA L3: 46,3 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 7,8 MA^2s L2: 8,3 MA^2s L3: 1,2 MA^2s	P
	Pause, t: (min)		
	- the circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short–time delay short-circuit release and -		P
	- the instantaneous override, if any, shall not operate.		P
	- if the circuit-breaker has a making current release, this requirement does not apply to the CO operation, if the prospective current exceeds the pre-determined value, since it will then operate.		P
8.3.6.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1380 V	P
	- no breakdown or flashover	No	P
	- 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 2 mA.	≤ 0,03 mA / 759 V	P
8.3.6.6	Verification of overload releases	---	

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Clause	Requirement + Test	Result - Remark	Verdict
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the maximum value stated by the manufacturer for twice the value of the current setting, at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	92~182 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	132 s 130 s 129 s	P
8.3.6	TEST SEQUENCE IV		
	Rated short-time withstand current		
	Except where the combined test sequence applies, this test sequence applies to circuit-breakers of utilization category B and to those circuit-breaker of category A covered by note 3 of table 4, and comprises the following tests:		
	Where integrally fused circuit-breaker are of utilization category B, they shall meet the requirements of this sequence.		
	Type designation or serial number	TS1600H 4P	
	Sample no:	S4-1	
	Rated current: In (A)	1600 A	
	Rated operational voltage: Ue (V)	690 V/√ 3	
	Rated short-time withstand current: (kA/s)	25 kA 1s	
	Rated frequency: (Hz)	60 Hz	
8.3.6.1	Verification of overload releases		
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	152~317 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	222 s 221 s 230 s 227 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.6.2	Test of rated short-time withstand current.		
	For this test, any over-current release, including the instantaneous override, if any, likely to operate during the test, shall be rendered inoperative.		
	- test frequency: (Hz)	60 Hz	P
	- duration of the test: (s)	1 s	P
	- test frequency: (Hz)	60 Hz	P
	- power factor / time constant (ms):	0,25	P
	- factor "n"	2,09	P
	- test voltage: (V) ..... L1: ..... L2: L3:	L1: 420,8 V	P
	- r.m.s. test current: (kA) ..... L1: ..... L2: L3:	L1: 25,5 kA	P
	- highest peak current: (kA)	53,3 kA	P
8.3.6.3	Verification of temperature-rise		
	- the values of temperature-rise do not exceed those specified in tab. 7.	-	N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	-	N/A
	conductor cross-sectional area (mm²) :	-	N/A
	test current Ie (A) :	-	N/A
8.3.6.4	Test of short-circuit breaking capacity at the max. short-time withstand current.		
	Rated short-time withstand current: (kA/s)		
	Test sequence: O – t – CO		
	max. available time setting of the short-time delay short-circuit release. (s)	0,4 s	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1: 420,8 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	L1: 25,0 kA	P
	- test frequency: (Hz)	60 Hz	P
	- power factor / time constant (ms):	0,25	P
	- factor "n"	2,12	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 52,2 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 255,9 MA^2s	P
	Pause, t: (min)	3	P
	- the circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short–time delay short-circuit release and -		P
	- the instantaneous override, if any, shall not operate.		P
	-pause: t (s)		P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 38,7 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	L1: 249,8 MA^2s	P
	Pause, t: (min)		
	- the circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short–time delay short-circuit release and -		P
	- the instantaneous override, if any, shall not operate.		P
	- if the circuit-breaker has a making current release, this requirement does not apply to the CO operation, if the prospective current exceeds the pre-determined value, since it will then operate.		P
8.3.6.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1380 V	P
	- no breakdown or flashover	No	P
	- 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 2 mA.	≤ 0,03 mA / 759 V	P
8.3.6.6	Verification of overload releases		

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Clause	Requirement + Test	Result - Remark	Verdict
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the maximum value stated by the manufacturer for twice the value of the current setting, at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	92~182 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	123 s 127 s 122 s 124 s	P
8.3.7	TEST SEQUENCE V		N/A
8.3.8	TEST SEQUENCE VI: Combined test sequence		N/A
Annex B	Circuit-breakers incorporating residual current protection		N/A
Annex C	Individual pole short-circuit test sequence		N/A
Annex F	Additional tests for circuit-breakers with electronic over-current protection		P
F4 and F5	Verification of electromagnetic compatibility (EMC)		P
	See report:	**R410-1375 (A-Type)**	P
F6	Suitability for multiple frequencies		N/A
	The tests shall be performed at each rated frequency or, when a range of rated frequencies is declared, at the lowest and the highest rated frequencies.		N/A
F.6.2	Tests shall be performed on any pair of phase-poles chosen at random at any convenient voltage. Under-voltage releases, if any, shall either be energized or disabled. All other auxiliaries shall be disconnected during the test.		N/A
	The short-time and instantaneous trip current settings shall each, if relevant, be adjusted to 2,5 times the current setting. If this setting is not available, the next closest higher setting shall be used.	-	N/A
	A current of 0,95 times the conventional non-tripping current (see Table 6) is applied for a time equal to 10 times the tripping time which corresponds to 2,0 times the current setting.	-	N/A
	Immediately following the test of a), a current of 1,05 times the conventional tripping current (see Table 6) is applied.	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	A further test starting from the cold state is made at 2,0 times the current setting.	-	N/A
	For each test frequency, the overload tripping characteristics shall comply with the following requirements: – for test a) no tripping shall occur; – for test b) tripping shall occur within the conventional time (see Table 6); – for test c) tripping shall occur within 1,1 times the maximum and 0,9 times the minimum values of the manufacturer's stated time-current characteristic.	-	N/A
F.7.	Dry heat test		P
F.7.1	The test shall be performed on the circuit-breaker in accordance with 7.2.2 at the maximum rated current for a given frame size, on all phase poles, at an ambient temperature of 40 °C	In= _____ A	N/A
	The duration of the test, once temperature equilibrium is reached, shall be 168 h		N/A
	Tightening torques applied to the terminals shall be in accordance with the manufacturers' instructions. In absence of such instructions, table 4 of IEC 60947-1 shall apply	Torque= _____ Nm	N/A
	As an alternative, the test may be performed as follows:	compliance	P
	- measure and record the highest temperature rise of the air surrounding the electronic components, during the temperature rise verification of test sequence 1	Ambient temperature during temperature rise test: 36.1 °C	P
	- install the electronic controls in the chamber	compliance	P
	- supply the electronic controls which there input energizing value	compliance	P
	- adjust the temperature of the test chamber to a value of 40 K above the temperature rise recorded for the surrounding the electronic components and maintain this temperature for 168 h	Chamber temperature: 76.1 °C	P
	Test carried out.....:	☐ normal ☒ alternative	P
F.7.2	Test results		P
	The circuit-breaker and the electronic controls shall meet the following requirements:	compliance	P
	- no tripping of the circuit-breaker shall occur	compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- no operating of the electronic controls which would cause the circuit-breaker to trip shall occur	compliance	P
F.7.3	Verification of the overload releases		P
	Following the test F.7.1, the operation of the overload releases of the circuit-breaker shall be verified in accordance with 7.2.1.2.4, item b).	I test: 1680 A(1, 0 In x 1,05) I test: 2080 A(1, 0 In x 1,30) Ambient temperature: 20 °C	P
7.2.1.2.4	Opening by over-current releases	compliance	P
b)	Opening under overload conditions		N/A
1)	Instantaneous or definite time-delay operation	-	N/A
	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/A
2)	Inverse timer-delay operation		P
	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	No tripping	P
	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	792 s	P
	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/A
	The width of the temperature band shall be at least 10 K on either side of the reference temperature	compliance	P
F.8.	Damp heat test		P
F.8.1	Test procedure	compliance	P
	The test shall be performed according to IEC 60068-2-30 (12 +12 hours cycle)	compliance	P
	Test Db temperature cycle between 25°C and upper temperature	compliance	P
	The upper temperature shall be 55°C ± 2 °C (variant 1) and number of cycles shall be six.	compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	The relative humidity is maintained at a high level at the upper temperature	compliance	P
	The test may be performed with only the electronic controls in the test chamber	compliance	P
	Test result.....:	compliance	P
F.8.2	Verification of the overload releases		P
	Following the test F.8.1, the operation of the overload releases of the circuit-breaker shall be verified in accordance with 7.2.1.2.4, item b).	I test: 1680 A(1, 0 In x 1,05) I test: 2080 A(1, 0 In x 1,30) Ambient temperature: 20 °C	P
7.2.1.2.4	Opening by over-current releases	compliance	P
b)	Opening under overload conditions		N/A
1)	Instantaneous or definite time-delay operation	-	N/A
	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/A
2)	Inverse timer-delay operation		P
	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	No tripping	P
	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	786 s	P
	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/A
	The width of the temperature band shall be at least 10 K on either side of the reference temperature	compliance	P
F.9.	Temperature variation cycles at a specified rate of change		P
F.9.1	Test conditions		P
	Each design of electronic controls shall be submitted to temperature variation cycles in according with figure F.15	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	The rise and fall of temperature during the rate of variation shall be 1 K/min ± 0,2 K/min.	Compliance	P
	Their temperature, once reached, shall be maintained for at least 2 h.	Compliance	P
	The number of cycles shall be 28.	compliance	P
F.9.2	Test procedure		P
	The test shall be carried out according IEC 60068-2-14.	compliance	P
	For the these test, the electronic controls may be mounted inside the circuit-breaker or separately.	compliance	P
	The electronic controls shall be energized to simulate service conditions.	Compliance	P
	Where the electronics controls are mounted inside the circuit-breaker, the main circuit shall not be energized.	compliance	P
F.9.3	Test results		P
	The electronic controls shall meet the following requirement.	compliance	P
	No operation of the electronic controls which would cause the circuit-breaker to trip during the 28 cycles shall occur.	Compliance	P
F.9.4	Verification of overload releases	compliance	P
	Following the test F.9.1, the operation of the overload releases of the circuit-breaker shall be verified in accordance with 7.2.1.2.4, item b).	I test: 1680 A(1, 0 In x 1,05) I test: 2080 A(1, 0 In x 1,30) Ambient temperature: 20 °C	P
7.2.1.2.4	Opening by over-current releases	Compliance	P
b)	Opening under overload conditions	Compliance	P
1)	Instantaneous or definite time-delay operation	-	N/A
	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/A
2)	Inverse timer-delay operation	Compliance	P
	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	No tripping	P

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Clause	Requirement + Test	Result - Remark	Verdict
	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	754 s	P
	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/A
	The width of the temperature band shall be at least 10 K on either side of the reference temperature	compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict

Annex F	Additional tests for circuit-breakers with electronic over-current protection		P
F4 and F5	Verification of electromagnetic compatibility (EMC)		P
	See report:	**R410-1376 (S-Type)**	P
F6	Suitability for multiple frequencies		N/A
	The tests shall be performed at each rated frequency or, when a range of rated frequencies is declared, at the lowest and the highest rated frequencies.		N/A
F.6.2	Tests shall be performed on any pair of phase-poles chosen at random at any convenient voltage. Under-voltage releases, if any, shall either be energized or disabled. All other auxiliaries shall be disconnected during the test.		N/A
	The short-time and instantaneous trip current settings shall each, if relevant, be adjusted to 2,5 times the current setting. If this setting is not available, the next closest higher setting shall be used.	-	N/A
	A current of 0,95 times the conventional non-tripping current (see Table 6) is applied for a time equal to 10 times the tripping time which corresponds to 2,0 times the current setting.	-	N/A
	Immediately following the test of a), a current of 1,05 times the conventional tripping current (see Table 6) is applied.	-	N/A
	A further test starting from the cold state is made at 2,0 times the current setting.	-	N/A
	For each test frequency, the overload tripping characteristics shall comply with the following requirements: – for test a) no tripping shall occur; – for test b) tripping shall occur within the conventional time (see Table 6); – for test c) tripping shall occur within 1,1 times the maximum and 0,9 times the minimum values of the manufacturer's stated time-current characteristic.	-	N/A
F.7.	Dry heat test		P
F.7.1	The test shall be performed on the circuit-breaker in accordance with 7.2.2 at the maximum rated current for a given frame size, on all phase poles, at an ambient temperature of 40 °C	In= _____ A	N/A
	The duration of the test, once temperature equilibrium is reached, shall be 168 h		N/A
	Tightening torques applied to the terminals shall be in accordance with the manufacturers' instructions. In absence of such instructions, table 4 of IEC 60947-1 shall apply	Torque= _____ Nm	N/A
	As an alternative, the test may be performed as	compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	follows:		
	- measure and record the highest temperature rise of the air surrounding the electronic components, during the temperature rise verification of test sequence 1	Ambient temperature during temperature rise test: 36.1 °C	P
	- install the electronic controls in the chamber	compliance	P
	- supply the electronic controls which there input energizing value	compliance	P
	- adjust the temperature of the test chamber to a value of 40 K above the temperature rise recorded for the surrounding the electronic components and maintain this temperature for 168 h	Chamber temperature: 76.1 °C	P
	Test carried out.....:	☐ normal ☒ alternative	P
F.7.2	Test results		P
	The circuit-breaker and the electronic controls shall meet the following requirements:	compliance	P
	- no tripping of the circuit-breaker shall occur	compliance	P
	- no operating of the electronic controls which would cause the circuit-breaker to trip shall occur	compliance	P
F.7.3	Verification of the overload releases		P
	Following the test F.7.1, the operation of the overload releases of the circuit-breaker shall be verified in accordance with 7.2.1.2.4, item b).	I test: 1680 A(1, 0 In x 1,05) I test: 2080 A(1, 0 In x 1,30) Ambient temperature: 20 °C	P
7.2.1.2.4	Opening by over-current releases	compliance	P
b)	Opening under overload conditions		N/A
1)	Instantaneous or definite time-delay operation	-	N/A
	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/A
2)	Inverse timer-delay operation		P
	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	No tripping	P

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Clause	Requirement + Test	Result - Remark	Verdict
	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	768 s	P
	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/A
	The width of the temperature band shall be at least 10 K on either side of the reference temperature	compliance	P
F.8.	Damp heat test		P
F.8.1	Test procedure	compliance	P
	The test shall be performed according to IEC 60068-2-30 (12 +12 hours cycle)	compliance	P
	Test Db temperature cycle between 25°C and upper temperature	compliance	P
	The upper temperature shall be 55°C ± 2 °C (variant 1) and number of cycles shall be six.	compliance	P
	The relative humidity is maintained at a high level at the upper temperature	compliance	P
	The test may be performed with only the electronic controls in the test chamber	compliance	P
	Test result.....:	compliance	P
F.8.2	Verification of the overload releases		P
	Following the test F.8.1, the operation of the overload releases of the circuit-breaker shall be verified in accordance with 7.2.1.2.4, item b).	I test: 1680 A(1, 0 In x 1,05) I test: 2080 A(1, 0 In x 1,30) Ambient temperature: 20 °C	P
7.2.1.2.4	Opening by over-current releases	compliance	P
b)	Opening under overload conditions		N/A
1)	Instantaneous or definite time-delay operation	-	N/A
	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/A
2)	Inverse timer-delay operation		P

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Clause	Requirement + Test	Result - Remark	Verdict
	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	No tripping	P
	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	779 s	P
	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/A
	The width of the temperature band shall be at least 10 K on either side of the reference temperature	compliance	P
F.9.	Temperature variation cycles at a specified rate of change		P
F.9.1	Test conditions		P
	Each design of electronic controls shall be submitted to temperature variation cycles in according with figure F.15	Compliance	P
	The rise and fall of temperature during the rate of variation shall be 1 K/min ± 0,2 K/min.	Compliance	P
	Their temperature, once reached, shall be maintained for at least 2 h.	Compliance	P
	The number of cycles shall be 28.	compliance	P
F.9.2	Test procedure		P
	The test shall be carried out according IEC 60068-2-14.	compliance	P
	For the these test, the electronic controls may be mounted inside the circuit-breaker or separately.	compliance	P
	The electronic controls shall be energized to simulate service conditions.	Compliance	P
	Where the electronics controls are mounted inside the circuit-breaker, the main circuit shall not be energized.	compliance	P
F.9.3	Test results		P
	The electronic controls shall meet the following requirement.	compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	No operation of the electronic controls which would cause the circuit-breaker to trip during the 28 cycles shall occur.	Compliance	P
F.9.4	Verification of overload releases	compliance	P
	Following the test F.9.1, the operation of the overload releases of the circuit-breaker shall be verified in accordance with 7.2.1.2.4, item b).	I test: 1680 A(1, 0 In x 1,05) I test: 2080 A(1, 0 In x 1,30) Ambient temperature: 20 °C	P
7.2.1.2.4	Opening by over-current releases	Compliance	P
b)	Opening under overload conditions	Compliance	P
1)	Instantaneous or definite time-delay operation	-	N/A
	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/A
2)	Inverse timer-delay operation	Compliance	P
	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	No tripping	P
	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	782 s	P
	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/A
	The width of the temperature band shall be at least 10 K on either side of the reference temperature	compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict

Annex H	Individual pole short-circuit test sequence		
	Circuit-breaker for use in IT systems		
H.2	Test of individual pole short-circuit breaking capacity		
	A short-circuit test is made on the individual poles of a multipole circuit-breaker at a value of prospective current (I_{IT}) equal to 1,2 times the maximum setting of the short-time delay release tripping current or, in the absence of such a release, 1,2 time the max. setting of the tripping current of the instantaneous release, or, where relevant 1,2 times the maximum setting of the definite time delay release tripping current, but not less than 500 A nor exceeding 50kA.		
	Type designation or serial number	TS1600H 3P	
	Sample no:	H-1	
	Rated current: In (A)	1600 A	
	Rated operational voltage: Ue (V)	690 V	
	Rated ultimate short-circuit breaking capacity: (kA)	45 kA	
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt release: Uc (V)		
	The test sequence of operations is O – t - CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Compliance	P
	closing mechanism energized with 85% at the rated Uc: (V)	-	N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	Side : 73.5 mm, Front : 0 mm Top bottom : no screen	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	<30mm^2	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm^2):	2CX50X10 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)	-	N/A
	Tightening torques: (Nm)	50 Nm	P
	Test sequence of operation: O – t – CO	Compliance	P
	Test circuit according figure: 9	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1: 735,3 V	P
	Short-circuit test current (I_{IT}): equal to 1,2 times the max. setting of the short-time delay release tripping current,	19,2 kA	P
	or, in the absence of such a release, 1,2 time the max. setting of the tripping current of the instantaneous release,	Compliance	P
	or, where relevant 1,2 times the max. setting of the definite time delay release tripping current, but not exceeding 50kA.	-	N.A.
	- r.m.s. test current AC/DC: (A)	19,2 kA	P
	power factor/time constant:	0,30	P
	- Factor "n"	2,01	P
	- peak test current (Amax) :	38,6 kA	P
	Test sequence "O" L1		
	- max. let-through current: (kApeak) L1:	37,7 kA	P
	- Joule integral I^2dt (A^2s) L1:	154,7 MA^2s	P
	Pause, t: (min)	3	P
	Test sequence "CO" L1		
	- max. let-through current: (kApeak) L1:	32,7 kA	P
	- Joule integral I^2dt (A^2s) L1:	150,9 MA^2s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test sequence "O" L2		
	- max. let-through current: (kApeak) L2:	37,4 kA	P
	- Joule integral I^2dt (A^2s) L2:	154,3 MA^2s	P
	Pause, t: (min)	4	P
	Test sequence "CO" L2		
	- max. let-through current: (kApeak) L2:	31,1 kA	P
	- Joule integral I^2dt (A^2s) L2:	150,6 MA^2s	P
	Test sequence "O" L3		
	- max. let-through current: (kApeak) L3:	37,6 kA	P
	- Joule integral I^2dt (A^2s) L3:	154,2 MA^2s	P
	Pause, t: (min)	5	P
	Test sequence "CO" L3		
	- max. let-through current: (kApeak) L3:	33,9 kA	P
	- Joule integral I^2dt (A^2s) L3:	150,8 MA^2s	P
	For 4-pole circuit-breakers with a protected neutral pole, the test voltage for that pole shall be phase-to-phase voltage divided by √3. This test is applicable only where the construction of the protected neutral pole differs from that of the phase poles.	-	N.A.
	Test sequence "O" N		
	- max. let-through current: (kApeak) ..... N:	-	N.A.
	- Joule integral I^2dt (A^2s) ..... N:	-	N.A.
	Pause, t: (min)	-	N.A.
	Test sequence "CO" N		
	- max. let-through current: (kApeak) ..... N:	-	N.A.
	- Joule integral I^2dt (A^2s) ..... N:	-	N.A.
	Melting of the fusible element	Compliance	P
	Holes in the PE-sheet for test sequence "O"	-	N/A
	Cracks observed	Compliance	P
H.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1380 V	P
	- no breakdown or flashover	No	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
H.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2.5 times the value of their current setting on each pole separately.		
	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.		
	Time specified by the manufacturer:	92~182 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	133 s 129 s 129 s	P
H.5	Marking		
	Circuit-breaker for which all values of rated voltage have not been tested according to this annex or are not covered by such testing, shall be identified by the symbol ⊠ which shall be market on the circuit-breaker immediately following these values of rated voltage	Compliance	P

Annex J	Electromagnetic compatibility (EMC) – Requirements and test methods for circuit-breakers: see report no. EMC-PW-6538	P
Annex N	Electromagnetic compatibility (EMC) – Additional requirements and test methods for devices not covered by Annexes B, F and M	N/A
Annex O	Instantaneous trip circuit-breakers (ICB)	N/A

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	TABLE: Heating Test		S1-1 (3P)
	Test voltage (V):		—
	Ambient (°C):	24,1 °C	—

Thermocouple Locations	max. temperature measured, (°C)	max. temperature limit, (°C)
LINE L1	63,2	80
LINE L2	67,2	80
LINE L3	69,8	80
LOAD L1	63,5	80
LOAD L2	68,1	80
LOAD L3	73,3	80
Manual operating means: non-metallic	19,7	35
Parts intended to be touched but not hand-held: non-metallic	19,3	50
Parts which need not be touched during no rmal operation	40,9	60
OCR (Over current relay)	32,9	N/A

8.3.4.4	TABLE: Heating Test		S2-1R (3P)
	Test voltage (V):		
	Ambient (°C):	27,2 °C	

Thermocouple Locations	max. temperature measured, (°C)	max. temperature limit, (°C)
LINE L1	63,9	80
LINE L2	74,8	80
LINE L3	63,9	80
LOAD L1	67,6	80
LOAD L2	75,3	80
LOAD L3	66,1	80

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8.3.4.4	**TABLE: Heating Test**		S2-3 (3P)
	Test voltage (V):		
	Ambient (°C):	27,9 °C	

Thermocouple Locations	max. temperature measured, (°C)	max. temperature limit, (°C)
LINE L1	67,0	80
LINE L2	72,5	80
LINE L3	66,9	80
LOAD L1	69,7	80
LOAD L2	78,4	80
LOAD L3	74,9	80

8.3.4.4	**TABLE: Heating Test**		S2-4R (3P)
	Test voltage (V):		
	Ambient (°C):	25,9 °C	

Thermocouple Locations	max. temperature measured, (°C)	max. temperature limit, (°C)
LINE L1	63,7	80
LINE L2	70,7	80
LINE L3	62,9	80
LOAD L1	67,0	80
LOAD L2	78,9	80
LOAD L3	69,0	80

	TABLE: Heating Test		S4-1 (3P)
	Test voltage (V):		—
	Ambient (°C):	23,2 °C	—

Thermocouple Locations	max. temperature measured, (°C)	max. temperature limit, (°C)
LINE L1	60,0	80
LINE L2	66,8	80
LINE L3	61,4	80
LOAD L1	58,1	80
LOAD L2	67,0	80
LOAD L3	63,3	80

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	TABLE: clearance and creepage distance measurements					3P
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
P-P		690	8	40,3	16	49
L-A		690	8	32,9	16	32,9
C-O		690	8	31,3	16	65,79

supplementary information:

P-P : Pole to Pole, L-A : Live part to accessible part, C-O : across open contacts.

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	TABLE: Heating Test		S1-1 (4P)
	Test voltage (V):		—
	Ambient (°C):	25,5 °C	—

Thermocouple Locations	max. temperature measured, (°C)	max. temperature limit, (°C)
LINE L1	67,9	80
LINE L2	66,2	80
LINE L3	64,6	80
LOAD L1	68,0	80
LOAD L2	69,1	80
LOAD L3	65,4	80
Manual operating means: non-metallic	18,0	35
Parts intended to be touched but not hand-held: non-metallic	17,1	50
Parts which need not be touched during no rmal operation	36,7	60
OCR (Over current relay)	36,1	N/A

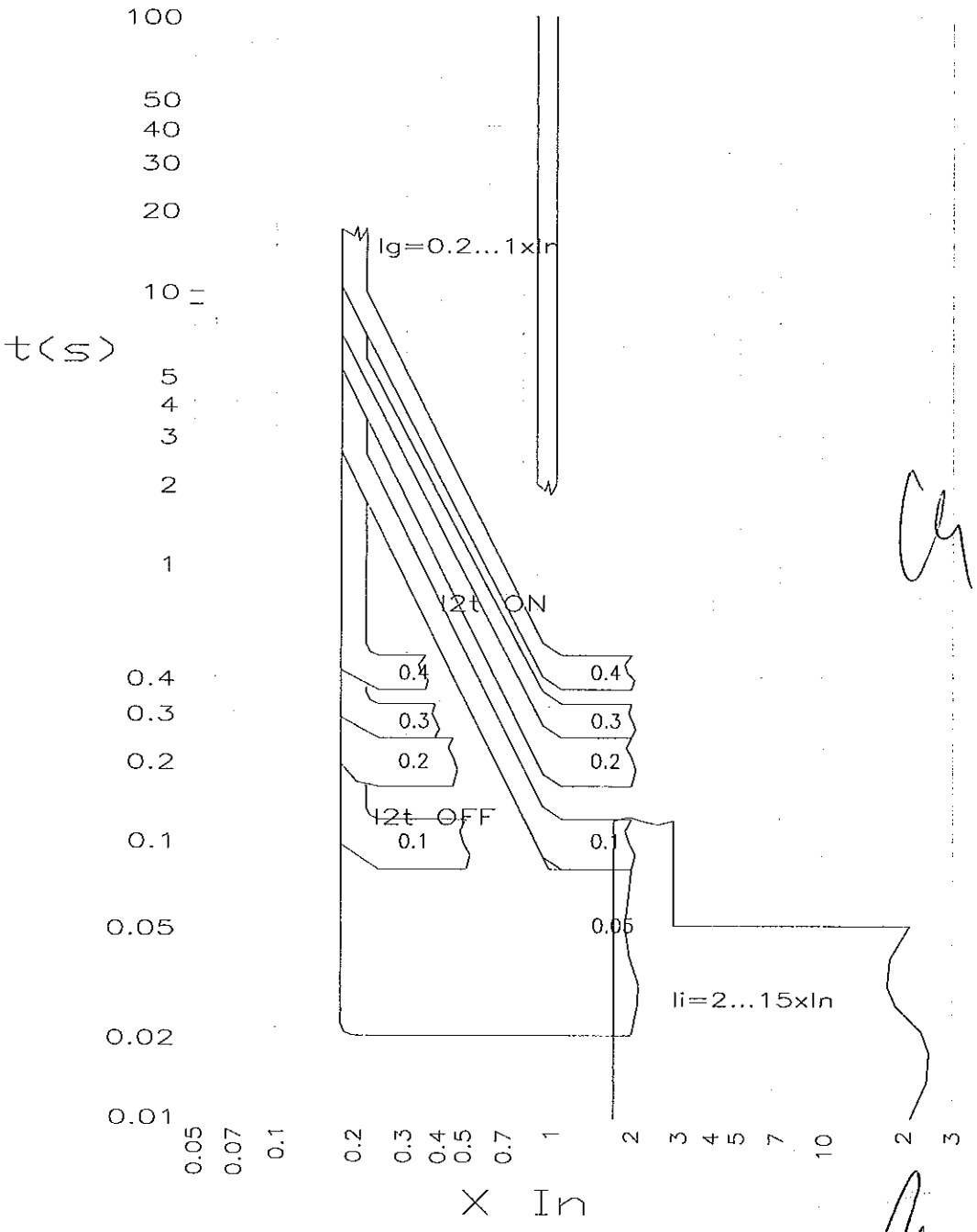
	TABLE: clearance and creepage distance measurements					4P
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
P-P		690	8	40,3	16	49
L-A		690	8	32,9	16	32,9
C-O		690	8	31,3	16	65,79

supplementary information:

P-P : Pole to Pole, L-A : Live part to accessible part, C-O : across open contacts.

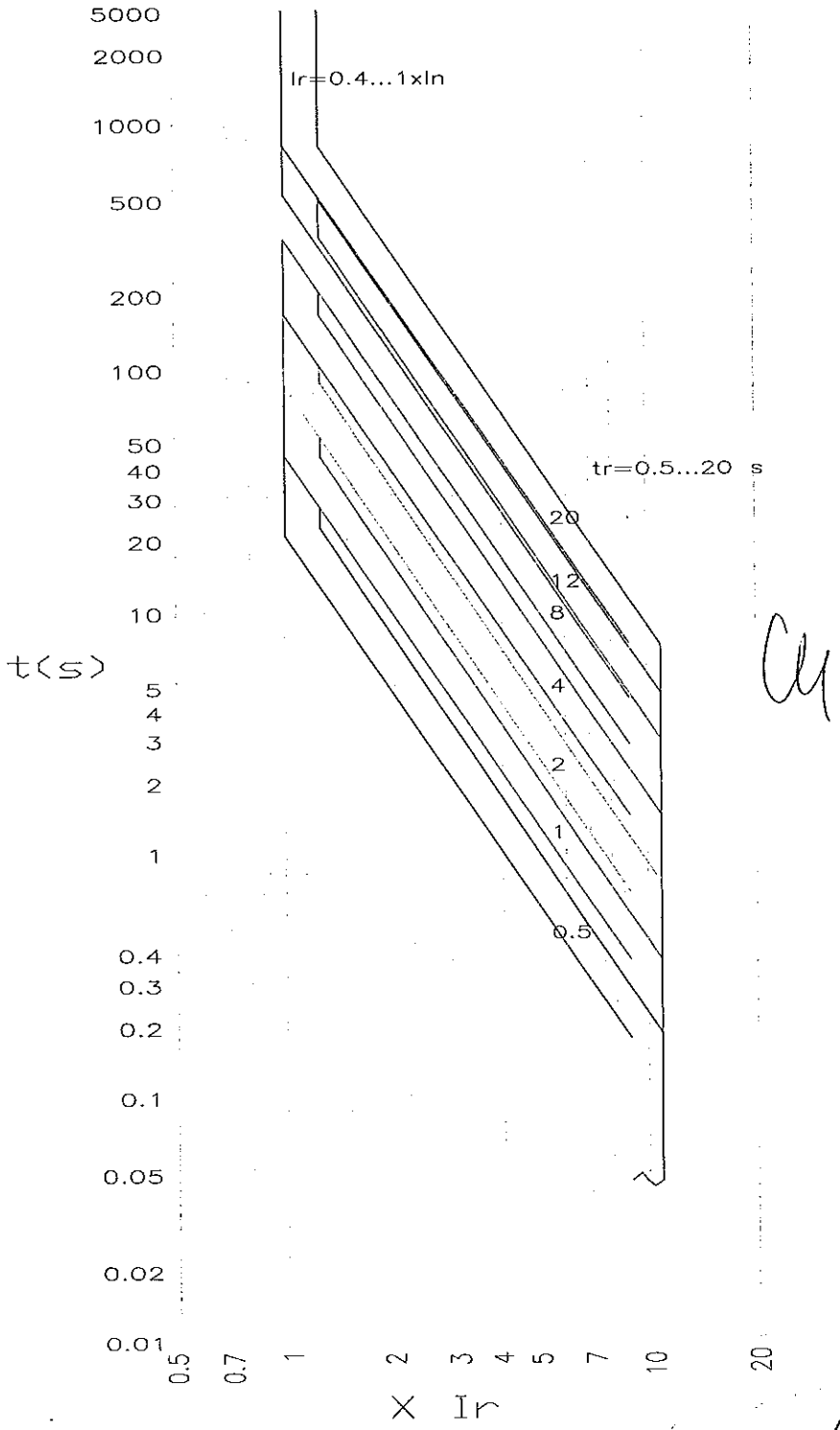
Time current characteristics

1. Instantaneous/Ground fault



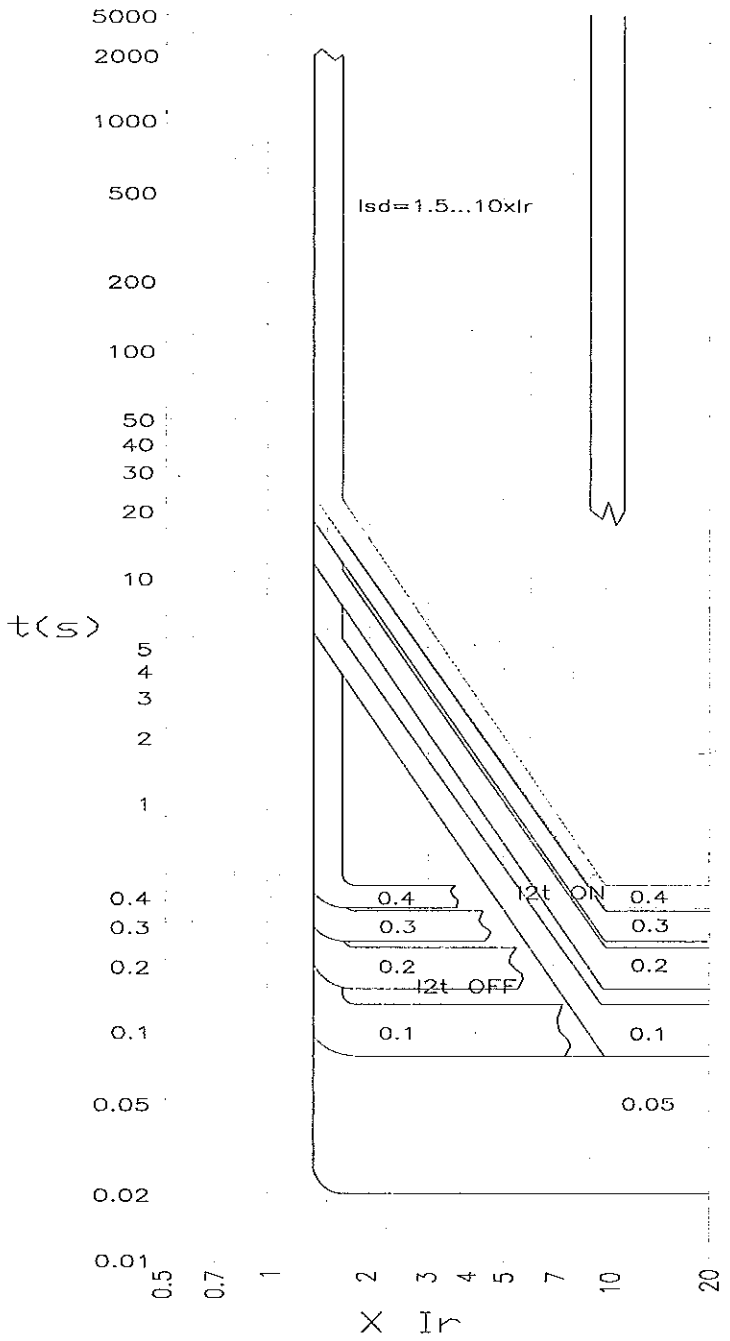
IEC 60947-2

2. Long time delay



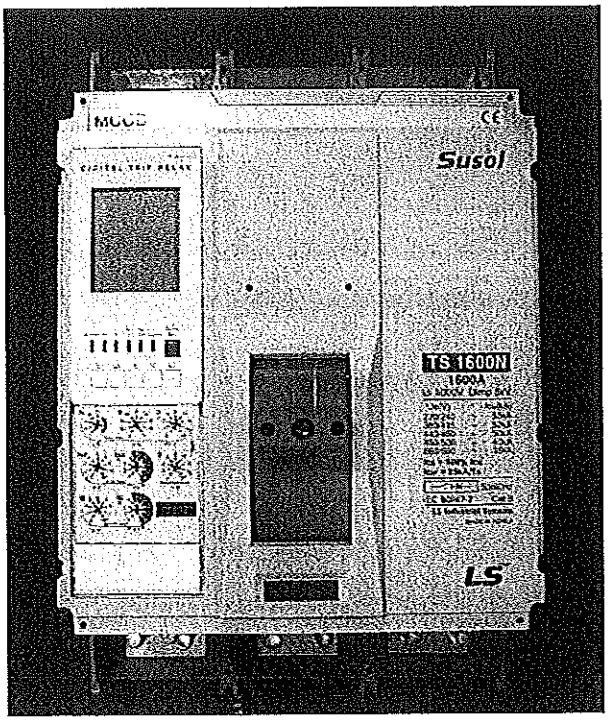
IEC 60947-2

3. Short time delay

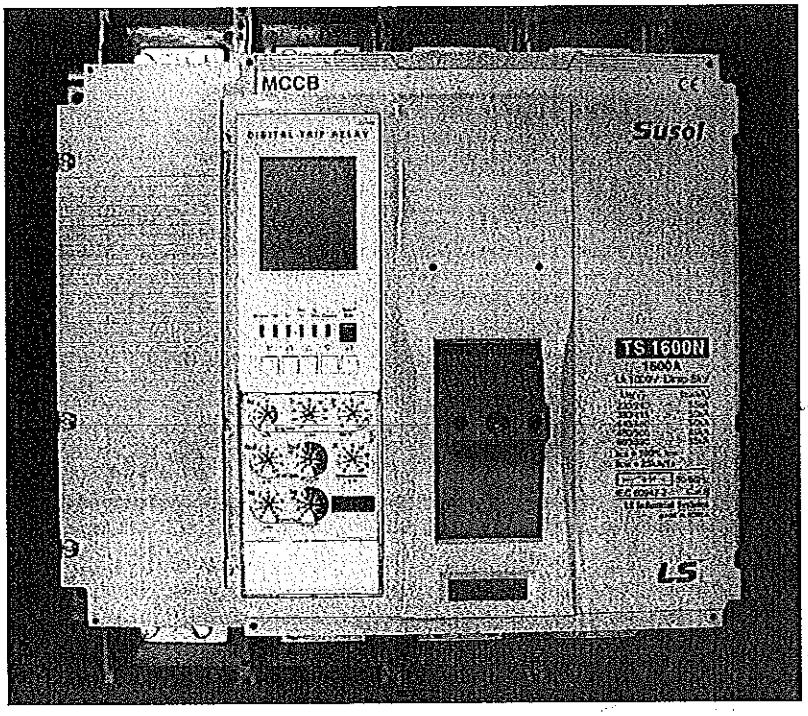


Photographs

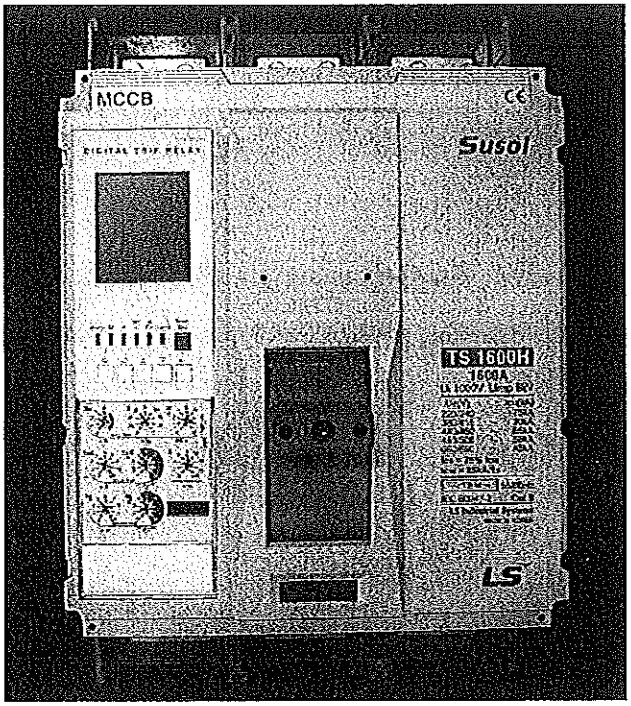
TS1600N 3P



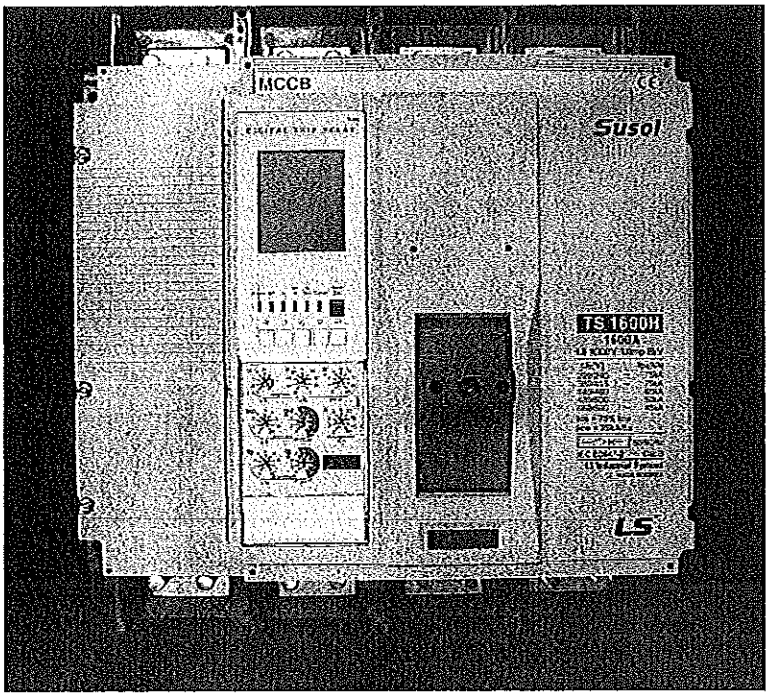
TS1600N 4P



TS1600H 3P



TS1600H 4P



Приложение № 2.2.5
към Техническо предложение по ОП реф. № PPD 15 – 033, ОП 1

СЕРТИФИКАТ / АКРЕДИТАЦИЯ

на независимата изпитвателна лаборатория, провела типовите изтитвания по т. 4

Приложено е заверено копие на акредитацията на изпитвателната лаборатория, в която са проведени типовите изпитвания за предлаганите автоматични прекъсвачи с лят корпус, както следва:

Марка: LS Industrial Systems Co.,Ltd.
Продукт: Автоматични прекъсвачи с лят корпус
Серия: Susol (TS630, TS1000, TS1250)

София, 10.08.2015 г.

.....
Владимир Лазаров, Управител
ВИВ-Изоматик ООД

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International Electrotechnical Commission

Worldwide System for Conformity Testing and Certification of Electrotechnical Equipment and Components (IECEE)

CERTIFICATE OF ACCEPTANCE

TO PARTICIPATE IN THE IECEE CB-SCHEME

DEKRA Testing Services (Zhejiang) Co., Ltd.
No. 5. Changjiang Road, Great Bridge Industrial Park, North Baixiang, Wenzhou, Zhejiang, 325603, P.R.China

has been assessed and determined to fully comply with the requirements of ISO/IEC 17025: 2005-05, The Basic Rules, IECEE 01: 2012-06 and Rules of Procedure IECEE 02: 2012-06, and the relevant IECEE CB-Scheme Operational Documents.

DEKRA Testing Services (Zhejiang) Co., Ltd.

is therefore entitled to operate as a Chinese CB Testing Laboratory under the responsibility of **DEKRA Certification B.V.** as National Certification Body and to carry out testing within the IECEE CB Scheme for the Scope (Product Category(ies) and Standard(s)) as listed in the relevant part of the IECEE Web Site at www.iecee.org, and is subject to all other terms as set forth in the IECEE Basic Rules and Rules of Procedure

This certificate remains valid until April 3rd 2016 at which time it will be reissued by the IECEE Executive Secretary upon successful completion of the normally scheduled 3-year Reassessment Programme administered by the IECEE CB Scheme.

Signed by:

.....

Pierre de Ruvo
IECEE EXECUTIVE SECRETARY

Date of Issue: 2013-09-13
TL241

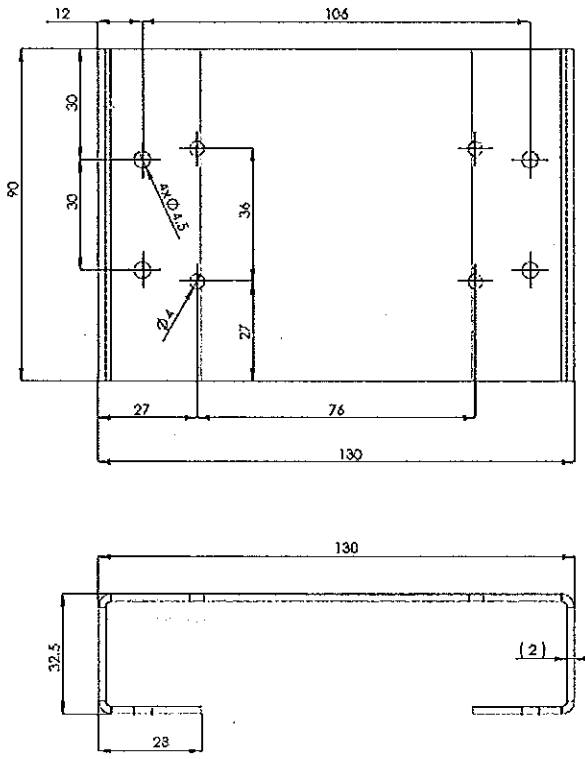
Приложение № 2.2.6
към Техническо предложение по ОП реф. № PPD 15 – 033, ОП 1

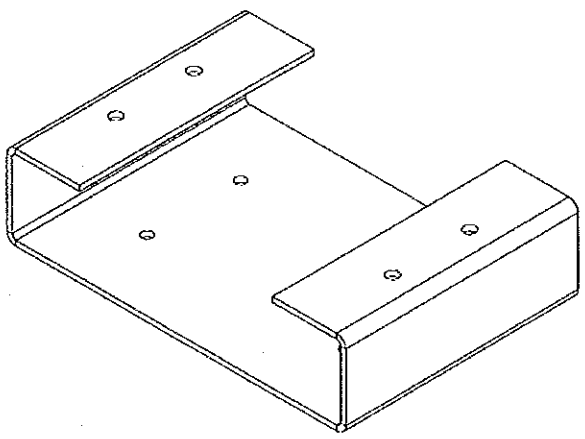
ТЕХНИЧЕСКО ОПИСАНИЕ НА МОНТАЖНИ ПЛАНКИ

за триполюсни автоматични прекъсвачи с лят корпус серия Susol

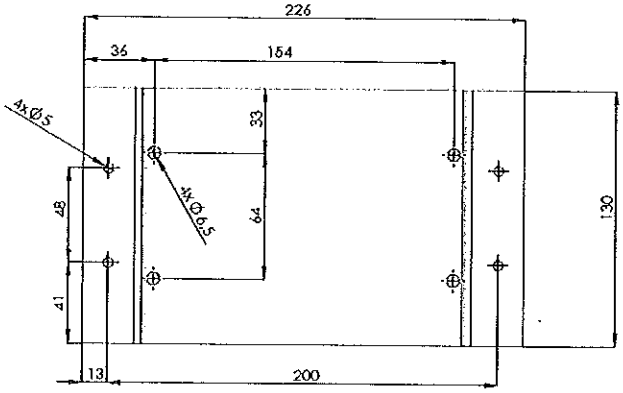
Монтажните планки са изработени от листова стомана с дебелина 2 мм. Планките са прахово боядисани за защита от корозия. Габаритните размери и присъединителните отвори са съобразно изискванията на техническата документация към търг PPD 15-033.

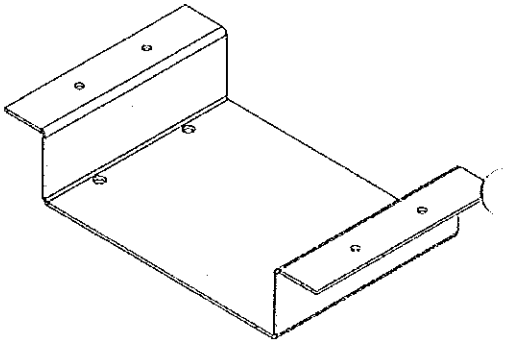
Планка за 100/160A

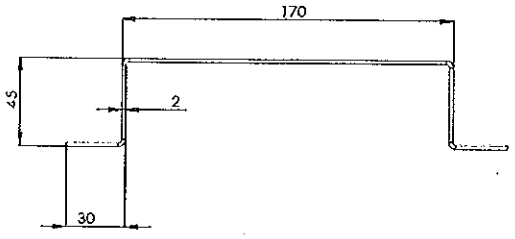




Планка за 250/400/630А







Планка за 1000/1250А

Предлаганите триполюсни автоматични прекъсвачи с лят корпус серия Susol за 1000А и 1250А са с съответните габаритни размери, така че при присъединяването им не е приложимо използването на монтажни планки.

Приложение № 2.2.7
към Техническо предложение по ОП реф. № PPD 15- 033, ОП 1

ИНСТРУКЦИИ ЗА
транспортиране, складиране, монтиране, обслужване и поддържане на автоматични прекъсвачи с лят корпус

1. Транспорт

Автоматичните прекъсвачи трябва да се транспортират опаковани в оригиналната опаковка.

Няма специфични изисквания към начина на транспорт.

2. Съхранение

Автоматичните прекъсвачи трябва да се съхраняват в сухи, закрити помещения опаковани в оригиналната опаковка.

Температура на съхранение: от -30 до +55 °C.

Няма специфични изисквания към начина на съхранение.

3. Монтиране

Автоматичните прекъсвачи могат да бъдат монтирани директно върху монтажната плоча на електрическото табло. Въртящият момент при затягане на клемите не трябва да превишава:
- За Susol TE100 и TE160 – 7.65 N.m
- За Susol TD100 и TD160 – 7.65 N.m
- За Susol TS250 – 14.41 N.m
- За Susol TS400 и TS630 – 48.02 N.m
- За Susol TS1000 и TS1250 – 55.27 N.m

При монтажа трябва да се спазват отстоянията приложени по-долу:
(Забележка: За серия TE да се гледат редовете отнасяци се за TD100N/TD160N)

Табл.1 – минимално разстояние до разположена отгоре изолационна преграда

	A(mm)	
	415V	240V
TD100N, TD160N	35	30
TD100H, TD160H	35	30
TD100L, TD160L	35	30
TS100N, TS160N, TS250N	35	30
TS100H, TS160H, TS250H	35	30
TS100L, TS160L, TS250L	35	30
TS400N, TS630N	60	50
TS400H, TS630H	60	50
TS400L, TS630L	60	50
TS800N	100	80
TS800H	100	80
TS800L	100	80

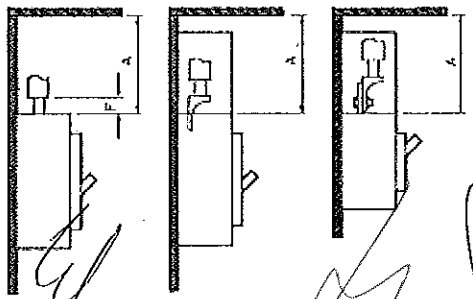


Табл.2 – минимални разстояния между прекъсвачи разположени един под друг

	C1(mm)		C(mm)
	415V	240V	
TD100N, TD160N	35	30	The dimension of exposed conduct
TD100H, TD160H	35	30	
TD100L, TD160L	35	30	
TS 100N, TS160N, TS250N	35	30	
TS100H, TS160H, TS250H	35	30	
TS100L, TS160L, TS250L	35	30	
TS400N, TS630N	60	50	
TS400H, TS630H	60	50	
TS400L, TS630L	60	50	
TS800N	100	80	
TS800H	100	80	
TS800L	100	80	

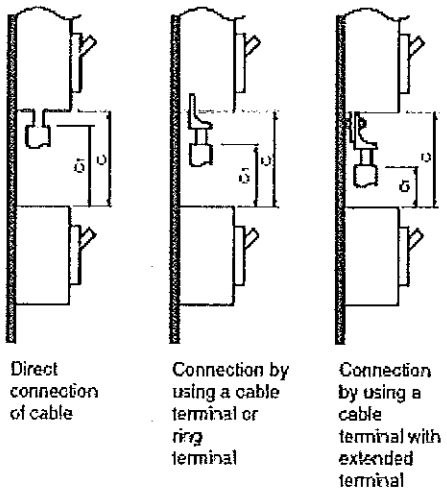


Табл.3 – минимални изолационни отстояния при клемите на прекъсвача

	D1 (mm)	D2 (mm)	D3 (mm)	D4 (mm)
TD100N, TD160N	The dimension of exposed conduct + 20	50	The dimension of exposed conduct + 20	50
TD100H, TD160H		50		50
TD100L, TD160L		50		50
TS100N, TS160N, TS250N		100		100
TS100H, TS160H, TS250H		100		100
TS100L, TS160L, TS250L		100		100
TS400N, TS630N		100		100
TS400H, TS630H		200		200
TS400L, TS630L		200		200
TS800N		100		100
TS800H		200		200
TS800L		200		200

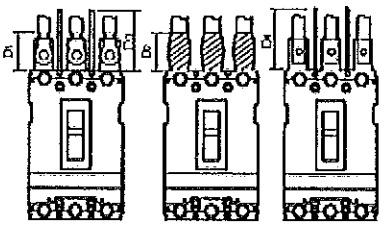


Табл.4 – минимални изолационни разстояния до странично разположена изолационна преграда

	E(mm)	
	415V	240V
TD100N, TD160N	25	15
TD100H, TD160H	25	15
TD100L, TD160L	25	15
TS100N, TS160N, TS250N	25	15
TS100H, TS160H, TS250H	25	15
TS100L, TS160L, TS250L	25	15
TS400N, TS630N	20	15
TS400H, TS630H	20	15
TS400L, TS630L	20	15
TS800N	45	20
TS800H	45	20
TS800L	45	20

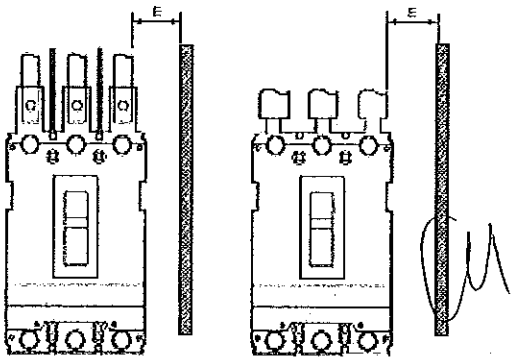
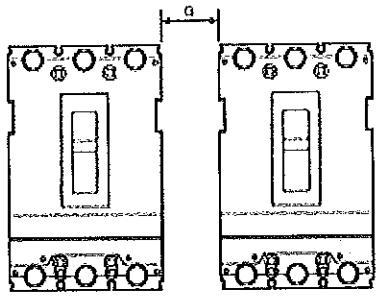


Табл.5 – минимално отстояния на два съседни прекъсвача

	G (mm)
TD100N, TD160N	0
TD100H, TD160H	0
TD100L, TD160L	0
TS100N, TS160N, TS250N	0
TS100H, TS160H, TS250H	0
TS100L, TS160L, TS250L	0
TS400N, TS630N	0
TS400H, TS630H	0
TS400L, TS630L	0
TS800N	0
TS800H	0
TS800L	0

Note) In case of using long or short terminal covers.



София, 10.08. 2015 г.

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Владимир Лазаров, Управител
ВИВ-Изоматик ООД