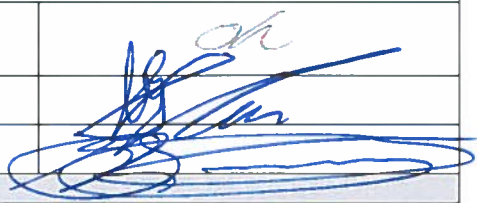




Test Report issued under the responsibility of:



TEST REPORT IEC 60947-3 Low-voltage switchgear and controlgear Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units	
Report Number..... :	2168756.72
Date of issue..... :	2015-01-26
Total number of pages	26
CB Testing Laboratory	DEKRA Certification B.V.
Address.....	Meander 1051, 6825 MJ Arnhem, The Netherlands
Applicant's name	LSIS Co., Ltd.
Address.....	127, LS-ro, Dongan-gu, Anyang-si, Gyeonggi-do, Korea
Test specification:	
Standard	IEC/EN 60947-3:2008 (Third Edition) + A1:2012 in conjunction with IEC/EN 60947-1:2007 (Fifth Edition) + A1:2010
Test Report Form No.	IEC60947_3C
Test Report Form(s) Originator	OVE
Master TRF	Dated 2013-05
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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.....	Switch-disconnector
Trade Mark.....	LS
Manufacturer	LSIS Co. Ltd.
Model/Type reference	TS1000NA, TS1250NA, TS1600NA
Ratings.....	1000, 1250, 1600 A; 690 V; AC-23B

Testing procedure and testing location:		
<input type="checkbox"/>	CB Testing Laboratory:	
Testing location/ address.....:		
<input type="checkbox"/>	Associated CB Laboratory:	
Testing location/ address.....:		
Tested by (name + signature).....:		
Approved by (name + signature)....:		
<input type="checkbox"/>	Testing procedure: TMP	
Testing location/ address.....:		
Tested by (name + signature).....:		
Approved by (name + signature)....:		
<input checked="" type="checkbox"/>	Testing procedure: WMT	
Testing location/ address.....:		LSIS Co., Ltd. CheongJu Plant, 95, Baekbong-ro, Heungdeok-gu, Cheongju-si, Chungcheongbukdo, Korea
Tested by (name + signature).....:		Mr. Oh Jun-Sik
Witnessed by (name + signature)...:		H.G.M. Kormelink
Approved by (name + signature)....:		H.L. Schendstok
		
<input type="checkbox"/>	Testing procedure: SMT	
Testing location/ address.....:		
Tested by (name + signature).....:		
Approved by (name + signature)....:		
Supervised by (name + signature):		

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

Summary of testing:

The original product has been certified under NL-20336 dated 2011-04-19.

The MCCB variant of this product has been tested according IEC 60947-2. The Switch disconnecter has been derived from the MCCB and verified by a spot check for the make break capacity by checking sequence I according the latest version of the IEC 60947-3. Only one position of the make break test has been verified according the standard.

Tests performed (name of test and test clause):

Sequence I

Testing location:

LSIS Co., Ltd. CheongJu Plant,
95, Baekbong-ro, Heungdeok-gu,
Cheongju-si, Chungcheongbukdo, Korea, 361-720
Power Testing & Technology Institute (PT&T)

Summary of compliance with National Differences

List of countries addressed: N.A.

Copy of marking plate

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

Name plate:



Marking plate on product



Test item particulars	
- method of operation	Independent manual operation
- suitability for isolation	suitable
- degree of protection	IP30
- number of poles.....	3/4 P
- kind of current.....	AC / DC
-in the case of a.c., number of phases and rated frequency.....	
- number of positions of the main contacts (if more than two).....	2
-breaking arrangement for fused devices	single break / double break
Rated and limiting values, main circuit.....	
- rated operational voltage U_e (V).....	690 Vac
- rated insulation voltage U_i (V)	1000 V
- rated impulse withstand voltage U_{imp} (kV)	8 kV
- conventional free air thermal current I_{th} (A)	1600 A
- conventional enclosed thermal current I_{the} (A)	
- rated operational current I_e (A).....	1000, 1250, 1600 A
- rated uninterrupted current I_u (A)	1000, 1250, 1600 A
- rated frequency (Hz).....	50/60 Hz
- utilization category	AC-23B
Short-circuit characteristic	
- rated short-time withstand current I_{cw} (kA).....	25 kA – 1 sec
- rated short-time making capacity I_{cm} (kA).....	52,5 kA
- rated conditional short-circuit current.....	
Control circuits	
Auxiliary circuits	
Relays and releases	
Co-ordination with short-circuit protective devices	
- kind of protective device.....	

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)

TestingDate of receipt of test item: January 5th, 2014Date (s) of performance of tests: February 3rd, 2014 ~ July 28th, 2014**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.**Manufacturer's Declaration per sub-clause 4.2.5 of IECCE 02:**

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided

☐ **Yes**☒ **Not applicable****When differences exist; they shall be identified in the General product information section.**

Name and address of factory (ies).....: LSIS Co., Ltd. Cheongju Plant
95, Baekbong-ro, Heungdeok-gu, Cheongju-si,
Chungcheongbuk-do, South Korea

General product information:

See report 2131728.57, dated 19-04-2011

IEC 60947-3			
Clause	Requirement + Test	Result - Remark	Verdict
5.2	MARKING		
	Marking on equipment itself or on nameplate or nameplates attached to the equipment and legible from the front after mounting		
	- indication of the open and closed position	Compliance	P
	- suitability for isolation	Compliance	P
	- disconnectors AC-20 and DC-20 only: marked "Do not operate under load"	-	N/A
	Following marking is visible after mounting:		
	- direction of movement of the actuator (see 7.1.5.2)	Position indicating	P
	- indication of the position of the actuator (see also 7.1.6.1 and 7.1.6.2)	Compliance	P
	- approval or certification mark, if applicable	-	N/A
	- for miniaturized equipment, symbol, colour code or letter code	-	N/A
	- terminal identification and marking (see 7.1.8.4)	-	P
	- IP code and class of protection against electric shock, when applicable (marked preferably on the equipment as far as possible)	-	N/A
	- suitability for isolation, where applicable, with the isolation function symbol according to IEC 60617-7, reference 07-01-03, combined with the appropriate function symbol for the equipment	Compliance	P
	- this symbols are clearly and unmistakably marked	Compliance	P
	- this symbols are visible when the equipment is installed as in service and the actuator is accessible	Compliance	P
	In the case of electronically controlled electromagnets, information other than that given in 5.1 may also be necessary (see also 4.5 and Annex U)	-	N/A
	The indication "s", "sol", "r" or "f" for non-universal screwless terminals shall be marked on the device or, if the space available is not sufficient, on the smallest package unit or in technical information provided with the product	-	N/A
	Marking on equipment not needed to be visible after mounting:		
	- manufacturer's name or trademark	LS	P

IEC 60947-3			
Clause	Requirement + Test	Result - Remark	Verdict
	- type designation or serial number	TS1000NA, TS1250NA, TS1600NA	P
	- rated operational currents or rated powers	1000, 1250, 1600 A	P
	- rated operational voltage	690 V	P
	- utilization category	AC-23B	P
	- rated frequency or the indication "DC"	50/60 Hz	P
	- manufacturer's claim for compliance with IEC 60947-3	Compliance	P
	- degree of protection	IP30	P
	Marking on fuse-combination units:		
	- fuse type	-	N/A
	- maximum rated current	-	N/A
	- power loss of the fuse-link	-	N/A
	Identification of terminals:		
	- line terminals, unless connection is immaterial	-	N/A
	- load terminals, unless connection is immaterial	-	N/A
	- neutral pole terminal	Compliance	P
	- protective earth terminal	-	N/A
	Data in the manufacturer's published information:		
	- rated insulation voltage	1000 V	P
	- rated impulse withstand voltage for equipment suitable for isolation or when determined	8 kV	P
	- pollution degree, if different from 3	3	
	- rated duty	Uninterrupted duty	P
	- rated short-time withstand current and duration	25 kA - 1s	P
	- rated short-circuit making capacity	52.5 kA	P
	- rated conditional short-circuit current	-	N/A
5.3	Instructions for installation, operation and maintenance	Compliance	P
6	NORMAL SERVICE, MOUNTING AND TRANSPORT CONDITIONS		
6.1	Normal service conditions	Compliance	P
6.1.1	Ambient air temperature	The ambient air temperature does not exceed +40 °C and its average over a period of 24 h does not exceed +35 °C.	P

IEC 60947-3			
Clause	Requirement + Test	Result - Remark	Verdict
6.1.2	Altitude	The altitude of the site of installation does not exceed 2 000 m.	P
6.1.3	Atmospheric conditions		
6.1.3.1	Humidity	The relative humidity of the air does not exceed 50 % at a maximum temperature of +40 °C. Higher relative humidities may be permitted at lower temperatures, e.g. 90 % at +20 °C.	P
6.1.3.2	Pollution degree	Pollution degree 3	P
6.1.4	Shock and vibration	-	N/A
6.2	Conditions during transport and storage	No special conditions	N/A
6.3	Mounting	The equipment shall be mounted in accordance with the manufacturer's instructions.	P
7	CONSTRUCTIONAL AND PERFORMANCE REQUIREMENTS		
7.1	Constructional requirements		
7.1.1	General		
7.1.2	Materials		
7.1.2.1	General material requirements		
	Parts of insulating materials which might be exposed to thermal stresses due to electrical effects within the equipment shall not be adversely affected by abnormal heat and by fire.	Compliance	P
	The manufacturer specifies which test method, 7.1.2.2 or 7.1.2.3, is to be used	6.1.2.2.	
7.1.2.2	Glow wire Testing		
	The suitability of materials used is verified by making tests on.....: or	Material tests were verified under project 210713300	P
	- providing data from the insulating material supplier fulfilling the requirements according to IEC 60695-2-12	-	N/A
	Glow-wire test according to IEC 60695-2-10 and IEC 60695-2-11		—
	Parts made of insulating material necessary to retain current-carrying parts in position: test temperature 960 °C		
	No visible flame and no sustained glowing	Compliance	P

IEC 60947-3			
Clause	Requirement + Test	Result - Remark	Verdict
	Flames and glowing extinguish within 30 s	Compliance	P
	No ignition of the tissue paper	Compliance	P
	Parts of insulating material not necessary to retain current-carrying parts in position, even though in contact with them: test temperature 650 °C		
	No visible flame and no sustained glowing	Compliance	P
	Flames and glowing extinguish within 30 s	Compliance	P
	No ignition of the tissue paper	Compliance	P
7.1.2.3	Test based on flammability category		
	For parts of insulating materials, hot wire ignition and, where applicable, arc ignition tests as specified in 8.2.1.1.2, shall be made based on flammability category	-	N/A
	Tests on materials are made in accordance with Annex M	-	N/A
	The hot wire ignition (HWI) and arc ignition (AI) test value requirements related to the material flammability category shall conform to Table M.1 or M.2	-	N/A
	Alternatively, the manufacturer may provide data from the insulating material supplier fulfilling the requirements given in Annex M	-	N/A
7.1.3	Current-carrying parts and their connections	Compliance	P
	Current-carrying parts have the necessary mechanical strength and current-carrying capacity for their intended use	Compliance	P
	For electrical connections, no contact pressure is transmitted through insulating material other than ceramic or other material with characteristics not less suitable, unless there is sufficient resiliency in the metallic parts to compensate for any possible shrinkage or yielding of the insulation material	Compliance	P
7.1.4	Clearances	see appended table 7.1.4	P
	Creepage distances	see appended table 7.1.4	P
	Pollution degree	3	—
	Comparative tracking index (V)	$175 \leq CTI < 400$	—
	Material group	IIIa	—
7.1.5	Actuator		
7.1.5.1	Insulation		—

IEC 60947-3			
Clause	Requirement + Test	Result - Remark	Verdict
	Actuator insulated from live parts for		—
	- rated insulation voltage	1000 V	P
	- rated impulse withstand voltage	8 kV	P
	Actuator made of metal		—
	- connected to a protective conductor or provided with an additional insulation	-	N/A
	Actuator made of or covered by insulating material :	-	—
	- internal metal parts, which might become accessible in the event of an insulation failure, are also insulated from live parts for the rated insulation voltage	-	N/A
7.1.5.2	Direction of movement		
	The direction of operation for actuators shall where applicable conform to IEC 60447	Compliance	P
	There is no doubt of the “I” and “O” position and the direction of operation	Compliance	P
7.1.6	Indication of contact position		
7.1.6.1	Indicating means	Position indicating	P
7.1.6.2	Indication by the actuator	Compliance	P
7.1.7	Additional safety requirements for equipment suitable for isolation		
7.1.7.1	Additional constructional requirements		
	- marking according to 5.2.1b	Compliance	P
	- indication of the position of the contacts	Compliance	P
	- construction of the actuating mechanism	Compliance	P
	- minimum clearances across open contacts (see Table 13, 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 is rated according to IEC 60947-5-1 (unless the equipment is rated AC-23)	-	N/A
	Time interval between opening of the contacts of the auxiliary contact and the contacts of the main poles: ≥20 ms	-	—
	Measured time interval (ms)	-	N/A

IEC 60947-3			
Clause	Requirement + Test	Result - Remark	Verdict
	During the closing operation the contacts of the auxiliary switch closes after or simultaneously with the contacts of the main poles	-	N/A
7.1.7.3	Supplementary requirements for equipment provided with means for padlocking the open position:		
	The locking means is so designed that it cannot be removed with the appropriate padlock(s) installed	-	N/A
	Test force F applied to the actuator in an attempt to operate to the closed position (N) :	-	—
	Rated impulse withstand voltage (kV) :	-	—
	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 are of metal having adequate mechanical strength	(see 8.2.4 below)	P
	Terminal connections are such that necessary contact pressure is maintained	(see 8.2.4 below)	P
	Terminals are so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal	(see 8.2.4 below)	P
	Terminals do 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 is not reduced below the rated value	(see 8.2.4 below)	P
	Screwless-type clamping units, unless otherwise specified by the manufacturer, shall accept rigid and flexible conductors as indicated in Table 1	-	N/A
	On screwless-type clamping unit, the connection or disconnection of conductors shall be made as follows:		
	– on universal clamping units by the use of a general purpose tool or a convenient device, integral with the clamping unit to open it for the insertion or withdrawal of the conductors	-	N/A
	– on push-wire clamping units by simple insertion. For the disconnection of the conductors an operation other than a pull only on the conductor shall be necessary. The use of a general purpose tool or of a convenient device, integral with the clamping unit is allowed in order to "open" it and to assist the insertion or the withdrawal of the conductor	-	N/A
8.2.4	Mechanical properties of terminals		

IEC 60947-3			
Clause	Requirement + Test	Result - Remark	Verdict
	Mechanical strength of terminals		
	Maximum cross-sectional area of conductor (mm ²) : 2x(50 mm x 10 mm)	1000 mm ² or	—
	Diameter of thread (mm) :	10 mm	—
	Torque (Nm) :	50 Nm	—
	5 times on 2 separate clamping units	Compliance	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 neither slips out of the terminal nor breaks near the clamping unit	-	N/A
	Pull-out test		
	Force (N), applied for 1 min. :	-	—
	During the test, the conductor neither slips out of the terminal nor breaks 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 neither slips out of the terminal nor breaks near the clamping unit	-	N/A
	Pull-out test		
	Force (N), applied for 1 min. :	-	—
	During the test, the conductor neither slips out of the terminal nor breaks near the clamping unit	-	N/A
	Conductor of the largest and smallest cross-sectional area (mm ²) :	-	—

IEC 60947-3			
Clause	Requirement + Test	Result - Remark	Verdict
	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 neither slips out of the terminal nor breaks near the clamping unit	-	N/A
	Pull-out test		
	Force (N), applied for 1 min.	-	—
	During the test, the conductor neither slips out of the terminal nor breaks near the clamping unit	-	N/A
7.1.8.2	Connection capacity		
	Type of conductors	-	—
	Minimum cross-sectional area of conductor (mm ²) :	-	—
	Maximum cross-sectional area of conductor (mm ²)	-	—
	Number of conductors simultaneously connectable to the terminal	-	—
7.1.8.3	Connection		
	Terminals for connection to external conductors are readily accessible during installation	Compliance	P
	Clamping screws and nuts do not serve to fix any other component	Compliance	P
7.1.8.4	Terminal identification and marking		
	Terminal intended exclusively for the neutral conductor	Compliance	P
	Protective earth terminal	-	N/A
	Other terminals	-	N/A
7.1.9	Additional requirements for equipment provided with a neutral pole		
	Equipment provided with a pole intended for the connection of neutral, this pole shall be clearly marked by the letter "N"	Compliance	P
	The switched neutral pole does not break before and does not make after the other poles except	Compliance	P

IEC 60947-3			
Clause	Requirement + Test	Result - Remark	Verdict
	- a pole having the appropriate short-circuit breaking and making capacity is used as neutral pole, all poles may operate together	-	N/A
	Conventional thermal current of neutral pole	1600 A	P
7.1.10	Provisions for protective earthing		
7.1.10.1	The exposed conductive parts are electrically interconnected and connected to a protective earth terminal	-	N/A
7.1.10.2	Protective earth terminal is readily accessible	-	N/A
	Protective earth terminal is suitably protected against corrosion	-	N/A
	Electrical continuity between the exposed conductive parts of the protective earth terminal and the metal sheathing of connecting conductors	-	N/A
	Protective earth terminal has no other functions	-	N/A
7.1.10.3	Protective earth terminal marking and identification	-	N/A
7.1.11	Enclosure for equipment		
7.1.11.1	Design		
	When the enclosure is opened, all parts requiring access for installation and maintenance are readily accessible	-	N/A
	Sufficient space is provided inside the enclosure	-	N/A
	The fixed parts of a metal enclosure are 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 a removable metal part of the enclosure is insulated from the part carrying the earth terminal when the removable part is in place	-	N/A
	The removable parts of the enclosure are 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 is provided to prevent loss of the fastening devices	-	N/A

IEC 60947-3			
Clause	Requirement + Test	Result - Remark	Verdict
	If the enclosure is used for mounting push-buttons, it is not 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 is securely fixed to the enclosure	-	N/A
7.1.12	Degree of protection of enclosed equipment		
	Degree of protection: IP		N/A
7.1.13	Conduit pull-out, torque and bending with metallic conduits		
	Withstand the stress occurring during its installation: IP		N/A

8.3.3	TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS		
8.3.3.1	Temperature-rise		
	ambient temperature 10-40 °C: 27,4 °C		—
	test enclosure W x H x D (mm x mm x mm): -		—
	material of enclosure: -		—
	Main circuits, test conditions:		
	- rated operational current I _e (A): 1 600 A		—
	- cable/busbar cross-section (mm ²) / length (mm) ..: 50 X 10 (mm ²) x 2 / 2 000 mm		—
	Fuse-link details (fuse-combination units only):		
	- manufacturer's name, trademark or identification mark: -		—
	- manufacturer's model or type reference: -		—
	- rated current (A): -		—
	- power loss (W): -		—
	- rated breaking capacity (kA): -		—
	Measured temperature-rise: see appended table 8.3.3.1		P
	Auxiliary circuits, test conditions:		
	- rated operation current (A): -		—
	- cable cross-section (mm ²): -		—
	Measured temperature-rise: see appended table 8.3.3.1		N/A

IEC 60947-3			
Clause	Requirement + Test	Result - Remark	Verdict
8.3.3.2	Test of dielectric properties		
	Rated impulse withstand voltage (kV)	8 kV	—
	- test Uimp main circuits (kV)	9,8 kV	P
	- test Uimp auxiliary circuits (kV)	-	
	- test Uimp on open main contacts (equipment suitable for isolation) (kV)	12,3 kV	P
	Power-frequency withstand voltage (V)	-	—
	- main circuits, test voltage for 5 sec. (V)	-	N/A
	- control and auxiliary circuits, test voltage for 5 sec. (V)	-	N/A
	Devices, which have been disconnected for the power-frequency withstand voltage test	-	N/A
	Equipment suitable for isolation, leakage current not exceed 0,5 mA	-	—
	Test voltage 1,1 Ue (V)	759 V	—
	Measured leakage current (mA)	≤ 0,01 mA	P
8.3.3.3	Making and breaking capacity		
	- utilization category	AC-23B	—
	- rated operational voltage Ue (V)	690 V	—
	- rated operational current Ie (A) or power (kW)	1 600 A	—
	Fuse-link details (fuse-combination units only):		—
	- manufacturer's name, trademark or identification mark	-	—
	- manufacturer's model or type reference	-	—
	- rated current (A)	-	—
	- power loss (W)	-	—
	- rated breaking capacity (kA)	-	—
	Conditions for make/break operations or make operation, AC-23A and AC-23B only:		
	- test voltage, U = 1,05 Ue	L1: 735,3 V L2: 735,0 V L3: 735,7 V	—
	- test current, I = 10 x Ie (A):	L1: 16,1 kA L2: 15,9 kA L3: 16,2 kA	—

IEC 60947-3			
Clause	Requirement + Test	Result - Remark	Verdict
	- power factor:	L1: 0,35 L2: 0,35 L3: 0,35	—
	Conditions for break operation, AC-23A and AC-23B only:		
	- test voltage, $U = 1,05 U_e$ (V):	L1: 735,3 V L2: 735,0 V L3: 735,7 V	—
	- test current, $I =$ $8 \times I_e$ (A):	L1: 16,1 kA L2: 15,9 kA L3: 16,2 kA	—
	- power factor:	L1: 0,35 L2: 0,35 L3: 0,35	—
	Conditions for make/break operations, other than AC-23A/B:		
	- test voltage, $U = 1,05 U_e$ (V):	L1: L2: L3:	—
	- test current, $I =$ $\times I_e$ (A):	L1: L2: L3:	—
	- power factor/ time constant:	L1: L2: L3:	—
	Number of make/break or make and break operations	3	P
	- recovery voltage duration (≥ 50 ms)	100 ms	P
	- current duration (ms)	100 ms	—
	- time interval between operations	200 s	P
	Characteristic of transient recovery voltage for AC-22 and AC-23 only		
	- oscillatory frequency (kHz)		—
	- measured oscillatory frequency (kHz)	L1: L2: L3:	N/A
	- factor γ	L1: L2: L3:	N/A
8.3.3.3.5	Behaviour of the equipment during making and breaking capacity tests		
	Test performed without:		—
	- endanger to the operator	Compliance	P

IEC 60947-3			
Clause	Requirement + Test	Result - Remark	Verdict
	- cause damage to adjacent equipment	Compliance	P
	No permanent arcing	Compliance	P
	No flash over between poles and poles and frame	Compliance	P
	No melting of the fuse in the detection circuit	Compliance	P
8.3.3.3.6	Condition of the equipment after making and breaking capacity tests		
	Immediately after the test equipment must work satisfactorily	Compliance	P
	- required opening force not greater than the test force of 8.2.5.2 and table 17 of IEC 60947-1	210 N (with aux. handle)	P
	- equipment is able to carry its rated current after normal closing operation	Compliance	P
8.3.3.4	Dielectric verification		
	test voltage: $2 \cdot U_e$ with a minimum of 1000V~	1 380 V	—
	No flashover or breakdown	No	P
8.3.3.5	Leakage current		
	test voltage (1,1 U_e) (V)	759 V	—
	Leakage current (utilization categories AC-20A, AC-20B, DC-20A and DC-20B): $\leq 0,5$ mA/pole	-	N/A
	Leakage current (other utilization categories): ≤ 2 mA/pole)	$\leq 0,01$ mA	P
8.3.3.6	Temperature-rise verification		
	Fuse-link details (fuse-combination units only):		—
	- manufacturer's name, trademark or identification mark	-	—
	- manufacturer's model or type reference	-	—
	- rated current (A)	-	—
	- power loss (W)	-	—
	- rated breaking capacity (kA)	-	—
	- conductor cross-section (mm ²)	50 x 10 (mm ²) Busbar x 2	—
	- test current I_e (A)	1 600 A	—
	Measured temperature-rise	see appended table 8.3.3.6	P
8.3.3.7	Strength of actuator mechanism		
8.2.5	Verification of the strength of actuator mechanism and position indicating device		
	- actuator type (fig.) :	Fig.1e)	—

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Clause	Requirement + Test	Result - Remark	Verdict
8.2.5.2.1	Dependent and independent manual operation		
	- actuating force for opening (N)	205,8 N (with aux. handle)	—
	- test force with blocked main contacts (N)	6 00 N (with aux. handle)	—
	- used method to keep the contact closed	By pushing the moving contact	—
	During and after the test, open position not indicated	Compliance	P
	Equipment with locking mean, no locking in the open position while test force is applied	-	N/A
8.2.5.2.2	Dependent power operation		
	- main contacts fixed together in the closed position:	-	N/A
	- used method to keep the contact closed	-	N/A
	- 110% of the rated supply voltage applied to the equipment (3 times)	-	N/A
	During and after the test, open position not indicated	-	N/A
	Equipment show no damage impairing its normal operation	-	N/A
	Equipment with locking mean, no locking in the open position while test force is applied	-	N/A
8.2.5.2.3	Independent power operation		
	- main contacts fixed together in the closed position:	-	N/A
	- used method to keep the contact closed	-	N/A
	- stored energy of the power operator released (3 times)	-	N/A
	During and after the test, open position not indicated	-	N/A
	Equipment show no damage impairing its normal operation	-	N/A
	Equipment with locking mean, no locking in the open position while test force is applied	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.4	TEST SEQUENCE II: OPERATIONAL PERFORMANCE CAPABILITY		N/A
8.3.5	TEST SEQUENCE III: SHORT-CIRCUIT PERFORMANCE CAPABILITY		N/A
8.3.6	TEST SEQUENCE IV: CONDITIONAL SHORT-CIRCUIT CURRENT		N/A
8.3.7	TEST SEQUENCE V: OVERLOAD PERFORMANCE CAPABILITY		N/A
8.4	ELECTROMAGNETIC COMPATIBILITY TESTS		N/A
Annex A (normative)			N/A
Annex C (normative)			N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.3.6	TABLE: Temperature-rise (measurements)		S1-1
Temperature rise dT of part:		dT (K) measured	dT (K) required
Terminals (Line L1)		59,1	80
Terminals (Line L2)		60,5	80
Terminals (Line L3)		55,2	80
Terminals (Load L1)		58,7	80
Terminals (Load L2)		57,2	80
Terminals (Load L3)		52,8	80
Parts which need not be touched during normal operation		16,1	60
Parts intended to be touched but not hand-held: metallic / non-metallic		10,7	50
Manual operating means: metallic / non-metallic		15,7	35
Ambient : 27,4 °C		-	-
supplementary information: Before test			

8.3.3.6	TABLE: Temperature-rise (measurements)		S1-1
Temperature rise dT of part:		dT (K) measured	dT (K) required
Terminals (Line L1)		57,1	80
Terminals (Line L2)		63,7	80
Terminals (Line L3)		58,0	80
Terminals (Load L1)		57,8	80
Terminals (Load L2)		59,8	80
Terminals (Load L3)		57,7	80
Parts which need not be touched during normal operation		29,7	60
Parts intended to be touched but not hand-held: metallic / non-metallic		10,6	50
Manual operating means: metallic / non-metallic		20,3	35
Ambient : 27,9 °C		-	-
supplementary information: After test			

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE: clearance and creepage distance measurements							
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)	
Pole to Pole		1000	8	40,3	16	49	
Live part to accessible part		1000	8	30,58	16	40,37	
Across open contacts		1000	8	35,65	16	89,6	
supplementary information:							

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Clause	Requirement + Test	Result - Remark	Verdict

List of test equipment used:

(Note: This is an example of the required attachment. Other forms with a different layout but containing similar information are also acceptable.)

Clause	Measurement / testing	Testing / measuring equipment / material used	Range used	Calibration date
8.3.3.1	Temperature-rise	Over Current Tester (85-0030)	~ 2 500 A	2014.04.24
		Over Current Tester (85-0032)	~ 1300 A	2013.08.26
		Recorder DR130 (70-0301)	-40 ~ 200 °C	2014.05.19
		CT (68-0102)	~ 5000 A	2013.06.13
		AC V-A Meter (24-0038)	~ 750 V ~ 30 A	2014.02.28
		Recorder (70-0254)	60 CH	2013.11.23
8.3.3.2	Test of dielectric properties	Dielectric Tester (31-0068)	~ 5 kV ~ 110 mA	2014.08.14
8.3.3.3	Making and breaking capacities	Digital Power Meter (25-0087)	~ 600 V ~ 20 A	2014.06.30
		CT (68-0207)	~ 5000 A	2014.07.07
		CT (68-0208)	~ 5000 A	2014.07.07
		CT (68-0209)	~ 5000 A	2014.07.07
		PT (68-0181)	660 V : 5 V	2013.05.20
		PT (68-0182)	660 V : 5 V	2013.05.20
		PT (68-0183)	660 V : 5 V	2013.05.20
		PT (68-0184)	660 V : 5 V	2013.05.20
		PT (68-0185)	660 V : 5 V	2013.05.20
		PT (68-0186)	660 V : 5 V	2013.05.20
		R-Coil (62-0133)	~ 6 000 A	2013.06.18
8.3.3.4	Dielectric verification	Dielectric Tester (31-0068)	~ 5 kV ~ 110 mA	2014.08.14
8.3.3.5	Leakage current	Dielectric Tester (31-0068)	~ 5 kV ~ 110 mA	2014.08.14
8.3.3.6	Temperature-rise verification	Refer to Clause.8.3.3.1		
8.3.3.7	Strength of actuator	Push Pull Gage (18-0381)	490 N	2013.09.17

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Clause	Requirement + Test	Result - Remark		Verdict
	mechanism			
8.3.4.1	Operational performance test	Digital Power Meter (25-0087)	~ 600 V ~ 20 A	2014.06.30
		CT (68-0207)	~ 5000 A	2014.07.07
		CT (68-0208)	~ 5000 A	2014.07.07
		CT (68-0209)	~ 5000 A	2014.07.07
8.3.4.2	Dielectric verification	Refer to Clause.8.3.3.4		
8.3.4.3	Leakage current	Refer to Clause.8.3.3.4		
8.3.4.4	Temperature-rise verification	Refer to Clause.8.3.3.1		

Photographs

TS1600NA 4P

