
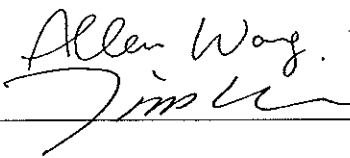
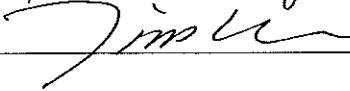




Test Report issued under the responsibility of:



| | |
|--|---|
| TEST REPORT IEC/EN 60947-3 Low-voltage switchgear and controlgear Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units | |
| Report Reference No. | SH12040006-011 |
| Date of issue | April 27, 2012 |
| Total number of pages | 30 |
| CB Testing Laboratory | Intertek Testing Services Shanghai |
| Address | Building No.86, 1198 Qinzhou Road (North), Shanghai 200233, China |
| Applicant's name | LSIS Co., Ltd. |
| Address | Beakbong-ro 95, Heung deok-gu, Cheongju-si, Chungcheongbuk-do, Korea |
| Test specification: | |
| Standard | <input checked="" type="checkbox"/> IEC 60947-3: 3 rd Edition (2008) in conjunction with IEC 60947-1: 5 th Edition (2007) |
| Test procedure | Type test |
| Non-standard test method | N/A |
| Test Report Form No. | IEC60947_3B |
| Test Report Form(s) Originator | OVE |
| Master TRF | Dated 2009-08 |
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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-disconnectors |
| Trade Mark |  |
| Manufacturer | Shanghai Yongji Electrical Co., Ltd / No.2239 Jianshi South RD., Jinshan District, Shanghai |
| Model/Type reference | BKD |
| Ratings | 230/400V~, 63A, 80A, 100A, 125A AC-22A |

| | |
|---|--|
| Testing procedure and testing location: | |
| <input checked="" type="checkbox"/> CB Testing Laboratory: | Intertek Testing Services Shanghai |
| Testing location/ address.....: | Building No.86, 1198 Qinzhou Road (North), Shanghai 200233, China |
| <input checked="" type="checkbox"/> Associated CB Test Laboratory: | Inspection Center of Products' Quality of Low Voltage Electric Apparatus in Zhejiang Province |
| Testing location/ address.....: | West Zhonghuan Road, Jiaxing City, Zhejiang Province, P.R.China |
| Tested by (name + signature).....: | Allen Wang  |
| Approved by (+ signature) | Jim Hua  |
| <input type="checkbox"/> Testing procedure: TMP | |
| Testing location/ address.....: | |
| Tested by (name + signature).....: | |
| Approved by (+ signature) | |
| <input type="checkbox"/> Testing procedure: WMT | |
| Testing location/ address.....: | |
| Tested by (name + signature).....: | |
| Witnessed by (+ signature).....: | |
| Approved by (+ signature) | |
| <input type="checkbox"/> Testing procedure: SMT | |
| Testing location/ address.....: | |
| Tested by (name + signature).....: | |
| Approved by (+ signature) | |
| Supervised by (+ signature).....: | |
| <input type="checkbox"/> Testing procedure: RMT | |
| Testing location/ address.....: | |
| Tested by (name + signature).....: | |
| Approved by (+ signature) | |
| Supervised by (+ signature).....: | |

| Summary of testing: | | |
|---|--|-------------------------|
| Clause | Tests performed (name of test and test clause): | Testing location |
| 5.2 | Marking | CBTL |
| 7.1 | Construction | CBTL |
| 8.3.3.1 | Temperature-rise | ACTL |
| 8.3.3.2 | Dielectric properties | ACTL |
| 8.3.3.3 | Making and breaking capacity | ACTL |
| 8.3.3.4 | Dielectric verification | ACTL |
| 8.3.3.5 | Leakage current | ACTL |
| 8.3.3.6 | Temperature-rise verification | ACTL |
| 8.3.3.7 | Strength of actuator mechanism | ACTL |
| 8.3.4.1 | Operational performance test | ACTL |
| 8.3.4.2 | Dielectric verification | ACTL |
| 8.3.4.3 | Leakage current | ACTL |
| 8.3.4.4 | Temperature-rise verification | ACTL |
| 8.3.5.1 | Short-time withstand current | ACTL |
| 8.3.5.2 | Short-circuit making capacity | ACTL |
| 8.3.5.3 | Dielectric verification | ACTL |
| 8.3.5.4 | Leakage current | ACTL |
| 8.3.5.5 | Temperature-rise verification | ACTL |
| 8.3.6.1 | Fuse protected short-circuit withstand | N/A |
| 8.3.6.3 | Dielectric verification | N/A |
| 8.3.6.4 | Leakage current | N/A |
| 8.3.6.5 | Temperature-rise verification | N/A |
| 8.3.7.1 | Overload test | N/A |
| 8.3.7.2 | Dielectric verification | N/A |
| 8.3.7.3 | Leakage current | N/A |
| 8.3.7.4 | Temperature-rise verification | N/A |
| Summary of compliance with National Differences: | | |

Copy of marking plate**Summary of testing:**

Number of tests for test procedure, according to clause 8.3.2.1.3, table 11, 13, 14, 15 and 16

| Test report ref. No. | No. of poles | I_e (A) | Test sequence and number of samples | | | | |
|------------------------------|-----------------|-----------|-------------------------------------|----|-------------------|------------------|-----------------|
| | | | I | II | III ^{b)} | IV ^{c)} | V ^{d)} |
| SH12040006-010 | 1P | 125 | 1 | 1 | 1 | - | - |
| | 1P | 63 | - | - | 1 | - | - |
| SH12040006-011 | 2P | 125 | 1 | 1 | 1 | - | - |
| | 2P | 63 | - | - | 1 | - | - |
| SH12040006-012 ^{a)} | 3P | - | - | - | - | - | - |
| SH12040006-013 | 4P | 125 | 1 | 1 | 1 | - | - |
| | 4P | 63 | - | - | 1 | - | - |

Notes:

- a) The tests of three-pole switch are omitted when four-pole switch has been tested according to clause 8.3.2.1.3 of IEC 60 947-3
- b) Test sequence III is not mandatory if test sequence IV is carried out.
- c) Test sequence IV is not mandatory if test sequence III is carried out.
- d) Not required for switches, disconnectors and switch-disconnectors.

| | |
|---|---------------------------------------|
| Test item particulars | |
| - method of operation | independent manual operation |
| - suitability for isolation | suitable / not suitable |
| - degree of protection | IP20 |
| - number of poles | 2 |
| - kind of current..... | a.c. |
| - number of positions of the main contacts..... | 2 |
| Rated and limiting values, main circuit | |
| - rated operational voltage U_e (V)..... | 230/400 |
| - rated insulation voltage U_i (V)..... | 600 |
| - rated impulse withstand voltage U_{imp} (kV)..... | 6 |
| - conventional free air thermal current I_{th} (A)..... | 63A, 80A, 100A, 125 |
| - conventional enclosed thermal current I_{the} (A) | N/A |
| - rated operational current I_e (A)..... | 63A, 80A, 100A, 125 |
| - rated uninterrupted current I_u (A) | 63A, 80A, 100A, 125 |
| - rated frequency (Hz) | 50/60 |
| - utilization category | AC-22A |
| Short-circuit characteristic..... | |
| - rated short-time withstand current I_{cw} (kA)..... | $12I_e$, 1s |
| - rated short-time making capacity I_{cm} (A)..... | $28,4I_e$ |
| - rated conditional short-circuit current | N/A |
| Control circuits..... | N/A |
| Auxiliary circuits..... | N/A |
| Relays and releases..... | N/A |
| Co-ordination of short-circuit protective devices | N/A |
| - kind of protective device | N/A |
| 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 | April 08, 2012 |
| Date (s) of performance of tests | From April 08, 2012 to April 20, 2012 |

General remarks:

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.

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

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


This test report is valid only being read together with the test reports of SH12040006-010, -012, -013.

General product information:

$U_e = 230/400V\sim(1P, 2P, 3P, 4P)$


$I_e = 63A, 80A, 100A, 125A$

$I_{cw} = 12I_e / 1s, I_{cm} = 28,4I_e, U_i = 600V, U_{imp} = 6kV, Cat.: AC-22A$

| IEC / EN 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 | "I" and "O" | P |
| | - suitability for isolation | | P |
| | - disconnectors AC-20 and DC-20 only: marked "Do not operate under load" | | N/A |
| | Marking on equipment not needed to be visible after mounting: | | |
| | - manufacturer's name or trademark |  | P |
| | - type designation or serial number | BKD | P |
| | - rated operational currents | 63A, 80A, 100A, 125A | P |
| | - rated operational voltage | 230/400V~ | P |
| | - utilization category | AC-22A | P |
| | - rated frequency | 50/60Hz | P |
| | - manufacturer's claim for compliance with IEC 60947-3 | IEC 60947-3 | P |
| | - degree of protection | | N/A |
| | 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 | "1,3" | P |
| | - load terminals, unless connection is immaterial | "2,4" | P |
| | - neutral pole terminal | | N/A |
| | - protective earth terminal | | N/A |
| | Data in the manufacturer's published information: | | |
| | - rated insulation voltage | 600V~ | P |
| | - rated impulse withstand voltage for equipment suitable for isolation or when determined | 6kV | P |
| | - pollution degree, if different from 3 | | N/A |
| | - rated duty | Uninterrupted duty | P |
| | - rated short-time withstand current and duration | 12I _e , 1s | P |
| | - rated short-circuit making capacity | 28,4I _e | P |
| | - rated conditional short-circuit current | | N/A |

| IEC / EN 60947-3 | | | |
|------------------|--|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 5.3 | Instructions for installation, operation and maintenance | | N/A |
| 6 | Normal service, mounting and transport conditions | | N/A |

| | | | |
|-----------------|--|---|-----|
| 7.1 | CONSTRUCTIONAL AND PERFORMANCE REQUIREMENTS | | |
| 7.1.2 | Materials | | |
| 7.1.2.2 | Resistance to abnormal heat and fire | | |
| | Test performed on : | - the equipment - sections taken from the equipment - samples of identical material | P |
| | 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 | | N/A |
| | Flames and glowing extinguish within 30 s | 1,8s | P |
| | No ignition of the tissue paper | | 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 | No visible flame | P |
| | Flames and glowing extinguish within 30 s | | N/A |
| | No ignition of the tissue paper | | P |
| 7.1.3 of Part 1 | Current-carrying parts and their connection | Copper alloy | 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(the shaft holding movable contactors) | |
| | Material group : | IIIa | |
| 7.1.5 of Part 1 | Actuator | | |
| 7.1.5.1 | Insulation | | |
| | Actuator insulated from live parts for | | |
| | - rated insulation voltage | 600V~ | P |
| | - rated impulse withstand voltage | 6kV | P |
| | Actuator made of metal | | |

| IEC / EN 60947-3 | | | |
|------------------|--|--|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - 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 | | P |
| 7.1.5.2 | Direction of movement | | |
| | The direction of operation for actuators shall where applicable conform to IEC 60447 | | P |
| | There is no doubt of the "I" and "O" position and the direction of operation | O and I | P |
| 7.1.6 of Part 1 | Indication of contact position | | |
| 7.1.6.1 | Indicating means | | P |
| 7.1.6.2 | Indication by the actuator | | 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 |  | P |
| | - indication of the position of the contacts | "I" & "O" | P |
| | - construction of the actuating mechanism | | P |
| | - minimum clearances across open contacts (see Table 13, Part 1) (mm) | 2,0 | |
| | - measured clearances (mm) | 5,1 | P |
| | - test Uimp across gap (kV) | 9,8(sea level) | 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 |
| | 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 |

| IEC / EN 60947-3 | | | |
|------------------|---|-------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | 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 of Part 1 | 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 |
| 8.2.4 | Mechanical properties of terminals | | |
| | Mechanical strength of terminals | | |
| | Maximum cross-sectional area of conductor (mm ²) | 70 | |
| | Diameter of thread (mm) | 5,8 | |
| | Torque (Nm) | 2,5 | |
| | 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 (mm ²) | 4,0 | |
| | Number of conductor of the smallest cross section : | 2 | |
| | Diameter of bushing hole (mm) | 9,5 | |
| | Height between the equipment and the platen | 280 | |
| | Mass at the conductor(s) (kg) | 0,9 | |
| | 135 continuous revolutions: the conductor neither slips out of the terminal nor breaks near the clamping unit | | P |
| | Pull-out test | | |
| | Force (N), applied for 1 min. | 60 | |
| | During the test, the conductor neither slips out of the terminal nor breaks near the clamping unit | | P |

| IEC / EN 60947-3 | | | |
|------------------|---|---|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Conductor of the largest cross-sectional area (mm ²) | 70 | |
| | Number of conductor of the largest cross section .. | 1 | |
| | Diameter of bushing hole (mm) | 19,1 | |
| | Height between the equipment and the platen | 368 | |
| | Mass at the conductor(s) (kg) | 10,4 | |
| | 135 continuous revolutions: the conductor neither slips out of the terminal nor breaks near the clamping unit | | P |
| | Pull-out test | | |
| | Force (N), applied for 1 min. | 285 | |
| | During the test, the conductor neither slips out of the terminal nor breaks near the clamping unit | | P |
| | Conductor of the largest and smallest cross-sectional area (mm ²) | 70 / 4,0 | |
| | Number of conductor of the smallest cross section, number of conductor of the largest cross section .. | 1 / 2 | |
| | Diameter of bushing hole (mm) | 19,1 / 9,5 | |
| | Height between the equipment and the platen | 368 / 280 | |
| | Mass at the conductor(s) (kg) | 10,4 / 0,9 | |
| | 135 continuous revolutions: the conductor neither slips out of the terminal nor breaks near the clamping unit | | P |
| | Pull-out test | | |
| | Force (N), applied for 1 min..... | 285 / 60 | |
| | During the test, the conductor neither slips out of the terminal nor breaks near the clamping unit | | P |
| 7.1.8.2 | Connection capacity | | |
| | Type of conductors | Solid or rigid (stranded) | |
| | Minimum cross-sectional area of conductor (mm ²) : | 4,0 | |
| | Maximum cross-sectional area of conductor (mm ²) | 70 | |
| | Number of conductors simultaneously connectable to the terminal | 1(70mm ²), 2(4,0mm ²) | |
| 7.1.8.3 | Connection | | |
| | Terminals for connection to external conductors are readily accessible during installation | | P |
| | Clamping screws and nuts do not serve to fix any other component | | P |

| IEC / EN 60947-3 | | | |
|------------------|--|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 7.1.8.4 | Terminal identification and marking | | |
| | Terminal intended exclusively for the neutral conductor | | N/A |
| | Protective earth terminal | | N/A |
| | Other terminals | | P |
| 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" | | N/A |
| | The switched neutral pole does not break before and does not make after the other poles except | | N/A |
| | - 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 | | N/A |
| 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 | No enclosure | 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 |

| IEC / EN 60947-3 | | | |
|------------------|--|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | 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 |
| | 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: IP20 | | P |
| 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 -1 sample: 2 poles, 125A | | |
| 8.3.3.1 | Temperature-rise | | |
| | ambient temperature 10-40 °C: 27 | | |
| | test enclosure W x H x D (mm x mm x mm): No enclosure | | |
| | material of enclosure: | | |
| | Main circuits, test conditions: | | |
| | - rated operational current I _e (A): 125 | | |
| | - cable/busbar cross-section (mm ²) / length (mm)..: 50 / 2 | | |
| | 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 on page 26 | | P |

| IEC / EN 60947-3 | | | |
|------------------|---|---------------------------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Auxiliary circuits, test conditions: | | |
| | - rated operation current (A) | - | |
| | - cable cross-section (mm ²) | - | |
| | Measured temperature-rise | see appended table 8.3.3.1 on page __ | N/A |
| 8.3.3.2 | Test of dielectric properties | | |
| | Rated impulse withstand voltage (kV) | 6 | |
| | - test Uimp main circuits (kV) | 7,4 | P |
| | - test Uimp auxiliary circuits (kV) | | N/A |
| | - test Uimp on open main contacts (equipment suitable for isolation) (kV) | 9,8 | P |
| | Power-frequency withstand voltage (V) | | |
| | - main circuits, test voltage for 5 sec. (V) | 2500 | P |
| | - 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)..... | 457 | |
| | Measured leakage current (mA)..... | 1,4x10 ⁻³ mA(Maximum) | P |
| 8.3.3.3 | Making and breaking capacity | | |
| | - utilization category | AC-22A | |
| | - rated operational voltage Ue (V) | 230/400 | |
| | - rated operational current Ie (A) or power (kW) | 125 | |
| | 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.....(V): | L1: L2: L3: | N/A |

| IEC / EN 60947-3 | | | |
|------------------|---|-------------------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - test current, $I = 10 \dots\dots\dots \times I_e$ (A): | L1: L2: L3: | N/A |
| | - power factor $\dots\dots\dots$: | L1: L2: L3: | N/A |
| | Conditions for break operation, AC-23A and AC-23B only: | | |
| | - test voltage, $U = 1,05 U_e \dots\dots\dots$ (V): | L1: L2: L3: | N/A |
| | - test current, $I = 8 \dots\dots\dots \times I_e$ (A): | L1: L2: L3: | N/A |
| | - power factor $\dots\dots\dots$: | L1: L2: L3: | N/A |
| | Conditions for make/break operations, other than AC-23A/B: | | |
| | - test voltage, $U = 1,05 U_e \dots\dots\dots$ (V): | L1: 426 L2: 426 L3: - | P |
| | - test current, $I = 3 \dots\dots\dots \times I_e$ (A): | L1: 376 L2: 376 L3: - | P |
| | - power factor/ time constant $\dots\dots\dots$: | L1: 0,66 L2: 0,66 L3: - | P |
| | Number of make/break or make and break operations $\dots\dots\dots$: | 5 | P |
| | - recovery voltage duration (≥ 50 ms) | 120ms | P |
| | - current duration (ms) $\dots\dots\dots$: | 0,8s | P |
| | - time interval between operations $\dots\dots\dots$: | 30 | P |
| | Characteristic of transient recovery voltage for AC-22 and AC-23 only | | |
| | - oscillatory frequency (kHz) $\dots\dots\dots$: | 54,2 | |
| | - measured oscillatory frequency (kHz) $\dots\dots\dots$: | L1: 54,4 L2: 54,4 L3: - | P |
| | - factor $\gamma \dots\dots\dots$: | L1: 1,12 L2: 1,12 L3: - | P |
| 8.3.3.3.5 | Behaviour of the equipment during making and breaking capacity tests | | |
| | Test performed without: | | |
| | - endanger to the operator | | P |

| IEC / EN 60947-3 | | | |
|------------------|--|---------------------------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | |
| | Immediately after the test equipment must work satisfactorily | | |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.3.4 | Dielectric verification | | |
| | test voltage: $2 \cdot U_e$ with a minimum of 1000V~ | 1000V~ | |
| | No flashover or breakdown | | P |
| 8.3.3.5 | Leakage current | | |
| | test voltage (1,1 U_e) (V) | 457 | |
| | 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) | $1,4 \times 10^{-3}$ mA(Maximum) | 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 | |
| | - test current I_e (A) | 125 | |
| | Measured temperature-rise | see appended table 8.3.3.6 on page 26 | 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.) | Figure 1d | |
| 8.2.5.2.1 | Dependent and independent manual operation | | |
| | - actuating force for opening (N) | 24 | |

| IEC / EN 60947-3 | | | |
|------------------|--|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - test force with blocked main contacts (N) | 72 | |
| | - used method to keep the contact closed | | |
| | During and after the test, open position not indicated | | P |
| | Equipment with locking mean, no locking in the open position while test force is applied | | P |
| 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 |
| 8.3.4 | TEST SEQUENCE II: OPERATIONAL PERFORMANCE CAPABILITY | | |
| | - 1 sample: 2 poles, 125A | | |
| 8.3.4.1 | Operational performance test | | |
| | - utilization category | AC-22A | |
| | - rated operational voltage (V) | 230/400 | |
| | - rated operational current (A) | 125 | |
| | Test conditions for electrical operation cycles: | | |

| IEC / EN 60947-3 | | | |
|------------------|---|----------------------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - test voltage (V) | L1: 426 L2: 426 L3: - | P |
| | - test current (A) | L1: 126 L2: 126 L3: - | P |
| | - power factor/time constant | L1: 0,78 L2: 0,78 L3: - | P |
| | Number of cycles with current | 1000 | P |
| | Number of cycles without current | 7000 | P |
| | First test sequence (with /without current) | With current | P |
| | Second test sequence (with/ without current) | Without current | P |
| | - time interval between first and second test sequence | 60s | P |
| 8.3.4.1.5 | Behaviour of the equipment during the operational performance test | | |
| | Test performed without: | | |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.4.1.6 | Condition of the equipment after making and breaking capacity tests | | |
| | Immediately after the test equipment must work satisfactorily | | |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.4.2 | Dielectric verification | | |
| | test voltage: $2 \cdot U_e$ with a minimum of 1000V~ | 1000V~ | |
| | No breakdown or flashover | | P |
| 8.3.4.3 | Leakage current | | |
| | test voltage (1,1 U_e) (V) | 457 | |
| | 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 | $1,4 \times 10^{-3}$ mA(Maximum) | P |

| IEC / EN 60947-3 | | | |
|------------------|--|---|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.4.4 | 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 | |
| | - test current I _e (A) | 125 | |
| | Measured temperature-rise | see appended table 8.3.4.4 on page 26 | P |
| 8.3.5 | TEST SEQUENCE III: SHORT-CIRCUIT PERFORMANCE CAPABILITY - 1 sample: 2 poles, 125A | | |
| 8.3.5.1 | Short-time withstand current test | | |
| | Rated short-time withstand current I _{cw} (A) (>12.I _e max) | 12I _e | |
| | test voltage (V) | L1: 426 L2: 426 L3: - | P |
| | r.m.s. test current (A) | L1: 1,52x10 ³ L2: 1,52x10 ³ L3: - | P |
| | peak test current (A) | L1: 2,34x10 ³ L2: 2,34x10 ³ L3: - | P |
| | power factor/time constant | L1: 0,92 L2: 0,92 L3: - | P |
| | test duration (s) | 1,0 | P |
| 8.3.5.1.5 | Behaviour of the equipment during the test | | |
| | Test performed without: | | |
| | - endanger to the operator | | P |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |

| IEC / EN 60947-3 | | | |
|------------------|---|--|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.5.1.6 | Condition of the equipment after making and breaking capacity tests | | |
| | Immediately after the test equipment must work satisfactorily | | |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.5.2 | Short-circuit making capacity | | |
| | Rated short-circuit making capacity I _{cm} (A) : | 28,4I _e | |
| | test voltage (U _e) (V): | L1: 426 L2: 426 L3: - | P |
| | r.m.s. test current (A) : | L1: 1,52x10 ³ L2: - L3: - | P |
| | maximum peak test current (factor n) | 2,14x10 ³ A(1,42) | P |
| | power factor/time constant : | L1: 0,92 L2: 0,92 L3: - | P |
| | current duration (s) : | 0,27s | P |
| | Time interval between the cycles | 3min | P |
| 8.3.5.2.5 | Behaviour of the equipment during the test | | |
| | Test performed without: | | |
| | - endanger to the operator | | P |
| | -cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.5.2.6 | Condition of the equipment after making and breaking capacity tests | | |
| | Immediately after the test equipment must work satisfactorily | | |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.5.3 | Dielectric verification | | |
| | test voltage: 2*U _e with a minimum of 1000V~ : | 1000V~ | |
| | No flashover or breakdown | | P |

| IEC / EN 60947-3 | | | |
|------------------|---|---|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.5.4 | Leakage current | | |
| | test voltage (1,1 Ue) (V) | 457 | |
| | 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) $\leq 2,0$ mA/pole | $1,4 \times 10^{-3}$ mA(Maximum) | P |
| 8.3.5.5 | 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 | |
| | - test current Ie (A) | 125 | |
| | Measured temperature-rise | see appended table 8.3.5.5 on page 26 | P |
| 8.3.5 | TEST SEQUENCE III: SHORT-CIRCUIT PERFORMANCE CAPABILITY - 1 sample: 2poles, 63A | | |
| 8.3.5.1 | Short-time withstand current test | | |
| | Rated short-time withstand current I _{cw} (A) ($>12 \cdot I_e$ max) | 12I _e | |
| | test voltage (V) | L1: 426 L2: 426 L3: - | P |
| | r.m.s. test current (A) | L1: 762 L2: 762 L3: - | P |
| | peak test current (A) | L1: $1,14 \times 10^3$ L2: $1,14 \times 10^3$ L3: - | P |
| | power factor/time-constant | L1: 0,92 L2: 0,92 L3: - | P |
| | test duration (s) | 1,01 | P |
| 8.3.5.1.5 | Behaviour of the equipment during the test | | |
| | Test performed without: | | |
| | - endanger to the operator | | P |

| IEC / EN 60947-3 | | | |
|------------------|---|-------------------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.5.1.6 | Condition of the equipment after making and breaking capacity tests | | |
| | Immediately after the test equipment must work satisfactorily | | |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.5.2 | Short-circuit making capacity | | |
| | Rated short-circuit making capacity I _{cm} (A): | 28,4le | |
| | test voltage (U _e) (V): | L1: 426 L2: 426 L3: - | P |
| | r.m.s. test current (A): | L1: 760 L2: 760 L3: - | P |
| | maximum peak test current (factor n) | 1,12 x10 ³ A(1,41) | P |
| | power factor/time-constant: | L1: 0,92 L2: 0,92 L3: - | P |
| | current duration (s): | 0,26s | P |
| | Time interval between the cycles | 3min | P |
| 8.3.5.2.5 | Behaviour of the equipment during the test | | |
| | Test performed without: | | |
| | - endanger to the operator | | P |
| | -cause damage to adjacent equipment | | P |
| | No permanent arcing | | P |
| | No flash over between poles and poles and frame | | P |
| | No melting of the fuse in the detection circuit | | P |
| 8.3.5.2.6 | Condition of the equipment after making and breaking capacity tests | | |
| | Immediately after the test equipment must work satisfactorily | | |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | | P |

| IEC / EN 60947-3 | | | |
|------------------|---|------------------------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.5.3 | Dielectric verification | | |
| | test voltage: $2 \cdot U_e$ with a minimum of 1000V~ | 1000V~ | |
| | No flashover or breakdown | | P |
| 8.3.5.4 | Leakage current | | |
| | test voltage (1,1 U_e) (V) | 457 | |
| | 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) $\leq 2,0$ mA/pole | $1,4 \times 10^{-3}$ mA(Maximum) | P |
| 8.3.5.5 | 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) | - | |
| | - test current I_e (A) | - | |
| | Measured temperature-rise | see appended table 8.3.5.5 page __ | N/A |

| IEC / EN 60947-3 | | | |
|-------------------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|-------|---|--|-----|
| 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) | | | |
|----------------------------|--|--|-----|
| A | Equipment for direct switching of a single motor | | N/A |

| Annex C (normative) | | | |
|----------------------------|--|--|-----|
| C | Single pole operated three pole switches | | N/A |

| IEC / EN 60947-3 | | | |
|------------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | | | | |
|---|--|--------|------------------|---------|-------------------|----------|
| 7.1.4 | TABLE: Clearance and creepage distance measurements | | | | | P |
| clearance cl and creepage distance dcr at/of: | Uimp (V) | Ui (V) | required cl (mm) | cl (mm) | required dcr (mm) | dcr (mm) |
| Across open contacts | 6000 | 600 | 2,0 | 5,1 | >cl | 7,6 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| supplementary information: | | | | | | |

| IEC / EN 60947-3 | | | |
|------------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

Appended table:

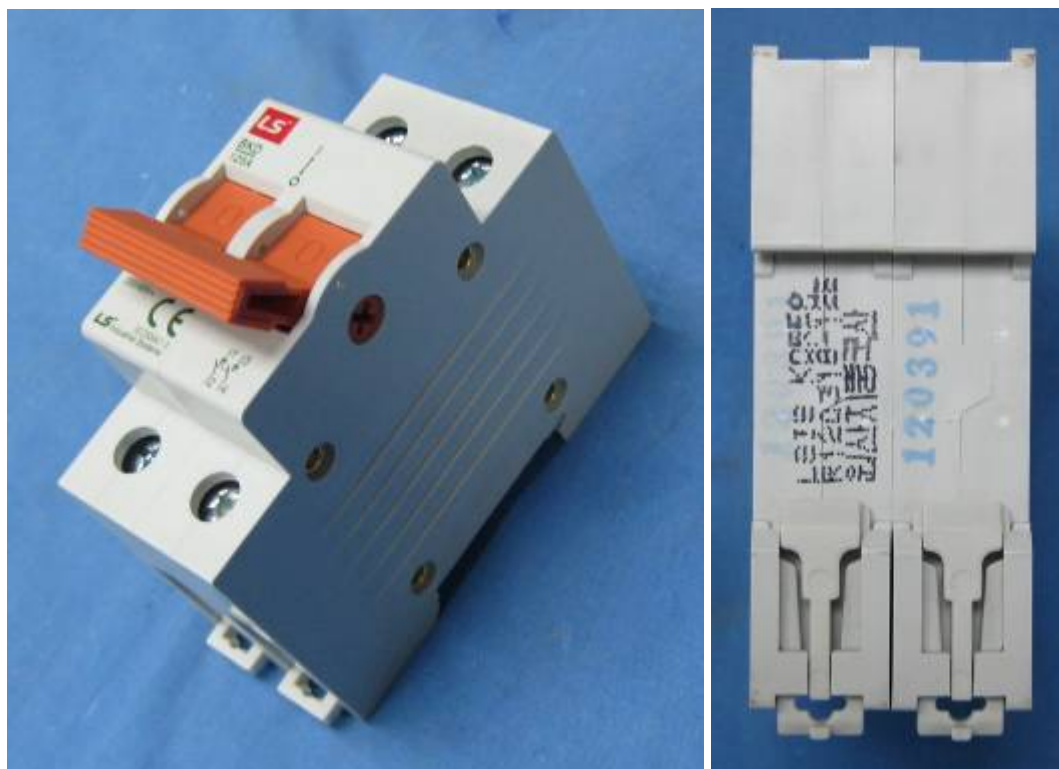
| | | | |
|---|---|--------------------|--------------------|
| 8.3.3.1 | TABLE: Temperature-rise (measurements) | | |
| Temperature rise dT of part: 2 poles, 125A | | dT (K) measured | dT (K) required |
| Terminals | | 36 | 70 |
| Manual operating means: metallic / non-metallic | | 9 | 25 |
| Parts intended to be touched but not hand-held: metallic / non-metallic | | 20 | 40 |
| Parts which need not be touched during normal operation | | 22 | 50 |
| supplementary information: | | | |
| 8.3.3.6 | TABLE: Temperature-rise (measurements) | | |
| Temperature rise dT of part: 2 poles, 125A | | dT (K) measured | dT (K) required |
| Terminals | | 46 | 80 |
| Manual operating means: metallic / non-metallic | | 10 | 35 |
| Parts intended to be touched but not hand-held: metallic / non-metallic | | 23 | 50 |
| Parts which need not be touched during normal operation | | 24 | 60 |
| supplementary information: | | | |
| 8.3.4.4 | TABLE: Temperature-rise (measurements) | | |
| Temperature rise dT of part: 2 poles, 125A | | dT (K) measured | dT (K) required |
| Terminals | | 44 | 80 |
| Manual operating means: metallic / non-metallic | | 10 | 35 |
| Parts intended to be touched but not hand-held: metallic / non-metallic | | 22 | 50 |
| Parts which need not be touched during normal operation | | 25 | 60 |
| supplementary information: | | | |
| 8.3.5.5 | TABLE: Temperature-rise (measurements) | | |
| Temperature rise dT of part: 2 poles, 125A | | dT (K) measured | dT (K) required |
| Terminals | | 42 | 80 |
| Manual operating means: metallic / non-metallic | | 10 | 35 |
| Parts intended to be touched but not hand-held: metallic / non-metallic | | 24 | 50 |
| Parts which need not be touched during normal operation | | 25 | 60 |
| supplementary information: | | | |

| TABLE: Resistance to heat (Ball pressure test) | | | | | | |
|--|-----------------------------|-------------|----------|------------------|-----------------|---------|
| no. | Specimen | | | | | Verdict |
| | Description | Colour | Temp. °C | Impress diam. mm | Result diam. mm | |
| 1 | Enclosure | French gery | 125 | 2,0 | 1,0 | P |
| 2 | Insulation mechanical parts | White | 125 | 2,0 | 1,2 | P |
| 3 | Handle | Saffron | 125 | 2,0 | 1,0 | P |

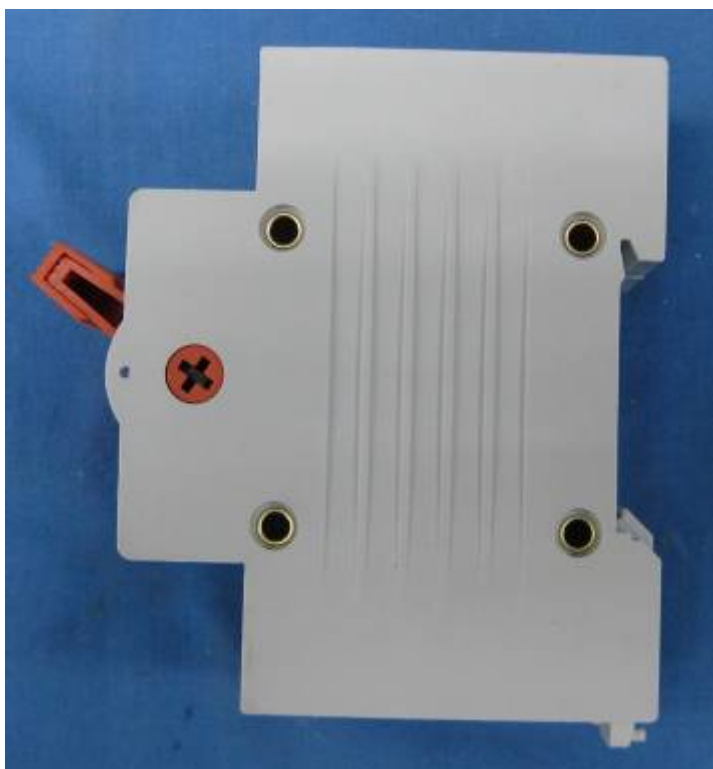
| TABLE 7.1.1.1: Resistance to fire (Glow wire test) | | | | | | | | |
|--|-----------------------------|-------------|------------|----------|---------------------|-------|-----------------|---------|
| no. | Specimen | | | | | | | Verdict |
| | Description | Colour | Thick (mm) | Temp. °C | burning after t (s) | drops | support burning | |
| 1 | Enclosure | French gery | 2,5 | 960 | 1,6 | No | No | P |
| 2 | Insulation mechanical parts | White | 2,5 | 960 | 1,8 | No | No | P |
| 3 | Handle | Saffron | 2,5 | 650 | - | No | No | P |

| TABLE: Resistance to tracking (tracking test) | | | | | | | | |
|---|-----------------------------|-------------|-------------|-------------|---------|-------------|---------------|---------|
| no. | Specimen | | | | | | | Verdict |
| | Description | Colour | Drops (no.) | Voltage (V) | Burning | Current (A) | Result | |
| 1 | Enclosure | French gery | >50 | 175 | - | - | No flashovers | P |
| 2 | Insulation mechanical parts | White | >50 | 175 | - | - | No flashovers | P |
| 3 | Handle | Saffron | >50 | 175 | - | - | No flashovers | P |

Photos of sample:



Photos of sample:



Photos of sample:

