




Test Report issued under the responsibility of:



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| TEST REPORT | |
| IEC/EN 60947-3 | |
| Low-voltage switchgear and controlgear | |
| Part 3: Switches, disconnectors, switch-disconnectors and fuse combination units | |
| Report Reference No. | LA-08.121/E |
| Date of issue | 2008-07-31 |
| Total number of pages | 48 |
| CB/CCA Testing Laboratory | BBJ-SEP TESTING LABORATORY |
| Address | 04-703 Warszawa, ul. Pozaryskiego 28, POLAND |
| Applicant's name | APATOR S.A. |
| Address | 87-100 Toruń, ul. Żółkiewskiego 21/29 POLAND |
| Test specification: | |
| Standard | <input checked="" type="checkbox"/> IEC 60947-3:1999 (Second Edition) + A1:2001 + A2:2005 in conjunction with IEC 60947-1:2004 (Fourth Edition) |
| | <input checked="" type="checkbox"/> EN 60947-3:1999 + A1:2001 + A2:2005 in conjunction with EN 60947-1:2004 |
| Test procedure | CCA |
| Non-standard test method | N/A |
| Test Report Form No. | IECEN60947_3B |
| Test Report Form(s) Originator | OVE |
| Master TRF | Dated 2006-08 |
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| 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 | Fuse-switch disconnectors |
| Trade Mark | |
| Manufacturer | APATOR S.A. 87-100 Toruń ul. Żółkiewskiego 21/29 POLAND |
| Model/Type reference | ARS 2 |
| Ratings | see page 4 |



ВЕРНО С
ОРИГИНАЛА

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| Testing procedure and testing location: | |
| <input checked="" type="checkbox"/> CB/CCA Testing Laboratory: |  BBJ-SEP TESTING LABORATORY |
| Testing location/ address: 20-150 Lublin, ul. Rapackiego 13/15, POLAND | |
| <input type="checkbox"/> Associated CB Laboratory: | |
| Testing location/ address: N/A | |
| Tested by (name + signature).....: Dariusz Szczepanowski <i>D. Sz</i> | |
| Approved by (+ signature): Leszek Krzyżanowski <i>LK</i> | |
| <input type="checkbox"/> Testing procedure: TMP | |
| Tested by (name + signature).....: N/A | |
| Approved by (+ signature): N/A | |
| Testing location/ address: N/A | |
| <input type="checkbox"/> Testing procedure: WMT | |
| Tested by (name + signature).....: N/A | |
| Witnessed by (+ signature).....: N/A | |
| Approved by (+ signature): N/A | |
| Testing location/ address: N/A | |
| <input type="checkbox"/> Testing procedure: SMT | |
| Tested by (name + signature).....: N/A | |
| Approved by (+ signature): N/A | |
| Supervised by (+ signature).....: N/A | |
| Testing location/ address: N/A | |
| <input type="checkbox"/> Testing procedure: RMT | |
| Tested by (name + signature).....: N/A | |
| Approved by (+ signature): N/A | |
| Supervised by (+ signature).....: N/A | |
| Testing location/ address: N/A | |

| Summary of testing: | | | | |
|---------------------|---------|---|----------------------|-----------------|
| Test sequence | Clause | Requirements - Test | Sample No. | Verdict |
| 0 | 5 | Product information | A2/10 | P |
| | 7 | Constructional and performance requirements | A2/10, A2/11, A2/15 | P |
| I | 8.3.3.1 | Temperature rise | | P |
| | 8.3.3.2 | Dielectric properties | | P |
| | 8.3.3.3 | Making and breaking capacity | A2/1 (AC-22B, 690 V) | P |
| | 8.3.3.4 | Dielectric verification | A2/3 (AC-22B, 400 V) | P |
| | 8.3.3.5 | Leakage current | A2/4 (AC-21B, 690 V) | P |
| | 8.3.3.6 | Temperature-rise verification | A2/6 (AC-21B, 400 V) | P |
| | 8.3.3.7 | Strength of actuator mechanism | — | N/A |
| II | 8.3.4.1 | Operational performance | A2/2 (AC-22B, 690 V) | P |
| | 8.3.4.2 | Dielectric verification | A2/7 (AC-22B, 400 V) | P |
| | 8.3.4.3 | Leakage current | A2/5 (AC-21B, 690 V) | P |
| | 8.3.4.4 | Temperature-rise verification | A2/8 (AC-21B, 400 V) | P |
| III | 8.3.5 | Short-circuit performance capability | — | N/A |
| IV | 8.3.6.2 | Fuse protected short-circuit withstand | 3W | P ^{*)} |
| | 8.3.6.3 | Dielectric verification | | P |
| | 8.3.6.4 | Leakage current | | P |
| | 8.3.6.5 | Temperature-rise verification | | P |
| V | 8.3.7.1 | Overload test | A2/9 | P |
| | 8.3.7.2 | Dielectric verification | | P |
| | 8.3.7.3 | Leakage current | | P |
| | 8.3.7.4 | Temperature-rise verification | | P |

*) Short-circuit breaking capacity with alternating current test was carried out at Laboratorium Badawcze Aparatury Rozdzielczej of Instytut Elektrotechniki in Warsaw. The particular results of the test are given in test report No. 7670/NBR/08 from 2008-06-12, see Annex to this report.

Summary of compliance with National Differences: —





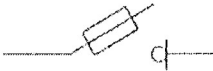




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Copy of marking plate:

| | | | |
|---|---|---|---|
|  APATOR Typ ARS 2-6-M  | |  APATOR Typ ARS 2-1-V  | |
| Nr <input type="text"/>  | | Nr <input type="text"/>  | |
| $U_n=690V \sim$ AC-21B/690V AC-22B/690V | $I_n=I_e=400A$ 2 $P_n=45W$ 40-60Hz IP 30 PN-EN 60947-3 | $U_n=690V \sim$ AC-21B/690V AC-22B/690V | $I_n=I_e=400A$ 2 $P_n=45W$ 40-60Hz IP 30 PN-EN 60947-3 |
|  APATOR Typ ARS 2-1-2V  | | | |
| Nr <input type="text"/>  | | | |
| $U_n=690V \sim$ AC-21B/690V AC-22B/690V | $I_n=I_e=400A$ 2 $P_n=45W$ 40-60Hz IP 30 PN-EN 60947-3 | | |

| Marking of samples for tests: | | |
|----------------------------------|---|-----------------|
| Type of fuse-switch disconnector | Number of samples | Date of receipt |
| ARS 2-6-M | A2/1, A2/2, A2/3, A2/4, A2/5, A2/6, A2/7, A2/8, A2/9, A2/10, | 2008-05-16 |
| | 3W (sample tested at IEL in Warsaw) | — |
| ARS 2-1-V | A2/11, A2/12, A2/13, A2/14 | 2008-05-16 |
| ARS 2-1-2V | A2/15, A2/16, A2/17, A2/18 | |

| | |
|---|---------------------------|
| Test item particulars: | |
| - method of operation.....: | Manual |
| - switching positions.....: | O I |
| - number of poles.....: | 3 |
| - kind of current.....: | AC |
| - number of phases.....: | 3 |
| - rated frequency (Hz).....: | 40...60 Hz |
| - number of positions of the main contacts.....: | 2 |
| Rated and limiting values, main circuit: | |
| - rated operational voltage U_e (V).....: | 400 V, 690 V - AC |
| - rated insulation voltage U_i (V).....: | 1000 V |
| - rated impulse withstand voltage U_{imp} (kV).....: | 12 kV |
| - conventional free air thermal current I_{th} (A).....: | 400 A |
| - conventional enclosed thermal current I_{the} (A).....: | — |
| - rated operational current I_e (A).....: | 400 A |
| - rated uninterrupted current I_u (A).....: | 400 A |
| - utilization category.....: | AC-22B, AC-21B |
| Short-circuit characteristic: | |
| - rated short-time withstand current I_{cw} (kA).....: | — |
| - rated short-time making capacity I_{cm} (kA).....: | — |
| - rated conditional short-circuit current.....: | 100 kA (fuse link 400 A) |
| Rated and limiting values, auxiliary circuits: | |
| - rated operational voltage (V).....: | — |
| - rated frequency (Hz).....: | — |
| - number of circuits.....: | — |
| - number and kind of contact elements.....: | — |
| Co-ordination of short-circuit protective devices: | |
| - kind of protective device.....: | fuse link 400 A gG |
| 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.....: | 2008-05-16 |
| Date (s) of performance of tests.....: | 2008-05-16 ... 2008-07-31 |

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General remarks:

The test results presented in this report relate only to the object tested.

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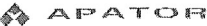
"(See Enclosure #)" refers to additional information appended to the report.

"(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.

General product information: —

| IEC / EN 60947-3 | | | |
|------------------|---|--|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 5.2 | MARKING | | P |
| | Marking on equipment itself or on nameplate or nameplates attached to the equipment and legible from the front after mounting | | P |
| | - indication of the open and closed position | Visible isolating distance between open contacts | 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: | | P |
| | - manufacturer's name or trademark |  | P |
| | - type designation or serial number | ARS 2 | P |
| | - rated operational current | See copies of marking plates | P |
| | - rated operational voltage | 690 V - AC | P |
| | - utilization category | AC-22B, AC-21B | P |
| | - rated frequency | 40 – 60 Hz | P |
| | - manufacturer's claim for compliance with IEC/EN 60947-3 | EN 60947-3 | P |
| | - degree of protection | | N/A |
| | Marking on fuse-combination units: | | P |
| | - fuse type | 2 gG | P |
| | - maximum rated current | 400 A | P |
| | - power loss of the fuse-link | 45 W | P |
| | Identification of terminals: | | P |
| | - line terminals | | P |
| | - load terminals | L1, L2, L3 | P |
| | - neutral pole terminal | | N/A |
| | - protective earth terminal | | N/A |
| | Data in the manufacturer's published information: | | P |
| | - rated insulation voltage | 1000 V | P |
| | - rated impulse withstand voltage for equipment suitable for isolation or when determined | 12 kV | P |
| | - pollution degree, if different from 3 | 3 | P |
| | - rated duty | Uninterrupted duty | P |
| | - rated short-time withstand current and duration | | N/A |

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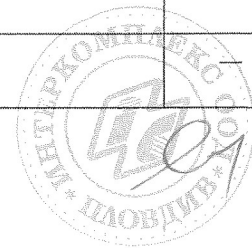
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| IEC / EN 60947-3 | | | |
|------------------|--|----------------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - rated short-circuit making capacity | | N/A |
| | - rated conditional short-circuit current | 100 kA (500V AC) | P |
| 7.1 | CONSTRUCTION | | P |
| 7.1.1 | Materials | | P |
| 7.1.1.1 | Resistance to abnormal heat and fire | | 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 | | P |
| | No visible flame and no sustained glowing | see appended table 7.1.1.1 | P |
| | Flames and glowing extinguish within 30 s | see appended table 7.1.1.1 | P |
| | No ignition of the tissue paper | see appended table 7.1.1.1 | P |
| | Parts of insulating material not necessary to retain current-carrying parts in position, even though in contact with them: test temperature 650 °C | | P |
| | No visible flame and no sustained glowing | see appended table 7.1.1.1 | P |
| | Flames and glowing extinguish within 30 s | see appended table 7.1.1.1 | P |
| | No ignition of the tissue paper | see appended table 7.1.1.1 | P |
| 7.1.2 | Current-carrying parts and their connection | | P |
| 7.1.3 | Clearances..... : see appended table 7.1.3 | | P |
| | Creepage distances : see appended table 7.1.3 | | P |
| | Pollution degree : 3 | | — |
| | Comparative tracking index (V) : 500 V | | — |
| | Material group : II | | — |
| 7.1.4 | Actuator | | P |
| 7.1.4.1 | Insulation | | — |
| | Actuator insulated from live parts for | | — |
| | - rated insulation voltage | 1000 V | P |
| | - rated impulse withstand voltage | 12 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 |

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|------------------|--|---|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 7.1.4.2 | Direction of movement | | P |
| | 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 | | P |
| 7.1.5 of Part 1 | Indication of contact position | | P |
| 7.1.5.1 | Indicating means | Visible isolating distance between open contacts in the open position | P |
| 7.1.5.2 | Indication by the actuator | | P |
| 7.1.6 | Additional safety requirements for equipment suitable for isolation | | P |
| 7.1.6.1 | Additional constructional requirements for equipment suitable for isolation ($U_e > 50$ V): | | P |
| | - marking according to 5.2.1b | | P |
| | - indication of the position of the contacts | | P |
| | - construction of the actuating mechanism | | P |
| | - minimum clearances across open contacts (see Table XIII, Part 1) (mm) | 14 mm | — |
| | - measured clearances (mm) | 35 mm | P |
| | - test U_{imp} across gap (kV) | 18,1 kV | P |
| 7.1.6.2 | Supplementary requirements for equipment with provision for electrical interlocking with contactors or circuit-breakers: | | N/A |
| | 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 |
| 7.1.6.3 | Supplementary requirements for equipment provided with means for padlocking the open position: | | N/A |
| | 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) | — | — |

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AD

| IEC / EN 60947-3 | | | |
|------------------|---|-------------------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Rated impulse withstand voltage (kV) : | — | — |
| | Test Uimp on open main contacts at the test force | | N/A |
| 7.1.7 of Part 1 | Terminals | | P |
| 7.1.7.1 | 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 | Terminals of type V | P |
| | Mechanical strength of terminals | Sample No A2/11 | P |
| | Maximum cross-sectional area of conductor (mm ²) : | 240 mm ² (rigid) | — |
| | Diameter of thread (mm) : | 11,8 mm | — |
| | Torque (Nm) : | 1,1 x 40 Nm = 44 Nm | — |
| | 5 times on 2 separate clamping units | | P |
| | Testing for damage to and accidental loosening of conductor (flexion test) | | P |
| | Conductor of the smallest cross-sectional area (mm ²) : | 50 mm ² (flexible) | — |
| | Number of conductor of the smallest cross section: | 1 | — |
| | Diameter of bushing hole (mm) : | 15,9 mm | — |
| | Height between the equipment and the platen : | 343 mm | — |
| | Mass at the conductor(s) (kg) : | 9,5 kg | — |
| | 135 continuous revolutions: the conductor neither slips out of the terminal nor breaks near the clamping unit | | P |
| | Pull-out test | | P |
| | Force (N), applied for 1 min. : | 236 N | — |
| | During the test, the conductor neither slips out of the terminal nor breaks near the clamping unit | | P |

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|------------------|---|-----------------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Conductor of the largest cross-sectional area (mm ²) | 240 mm ² (rigid) | — |
| | Number of conductor of the largest cross section : | 1 | — |
| | Diameter of bushing hole (mm) | 28,6 mm | — |
| | Height between the equipment and the platen : | 464 mm | — |
| | Mass at the conductor(s) (kg) | 20 kg | — |
| | 135 continuous revolutions: the conductor neither slips out of the terminal nor breaks near the clamping unit | | P |
| | Pull-out test | | P |
| | Force (N), applied for 1 min. : | 578 N | — |
| | 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) | — | — |
| | 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 | | N/A |
| | 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 |
| 7.1.7.2 | Connection capacity | | P |
| | Type of conductors | Rigid/flexible | — |
| | Minimum cross-sectional area of conductor (mm ²) : | 50 mm ² | — |
| | Maximum cross-sectional area of conductor (mm ²) | 240 mm ² | — |
| | Number of conductors simultaneously connectable to the terminal | 1 | — |

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|------------------|---|--|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.2.4 | Mechanical properties of terminals | Terminals of type 2V | P |
| | Mechanical strength of terminals | Sample No A2/15 | P |
| | Maximum cross-sectional area of conductor (mm ²) : | 2x240 mm ² (rigid) | — |
| | Diameter of thread (mm) | 11,8 mm | — |
| | Torque (Nm) | 1,1 x 40 Nm = 44 Nm | — |
| | 5 times on 2 separate clamping units | | P |
| | Testing for damage to and accidental loosening of conductor (flexion test) | | P |
| | Conductor of the smallest cross-sectional area (mm ²) | 50 mm ² (flexible) | — |
| | Number of conductor of the smallest cross section: | 2 | — |
| | Diameter of bushing hole (mm) | 15,9 mm | — |
| | Height between the equipment and the platen : | 343 mm | — |
| | Mass at the conductor(s) (kg) | 9,5 kg | — |
| | 135 continuous revolutions: the conductor neither slips out of the terminal nor breaks near the clamping unit | | P |
| | Pull-out test | | P |
| | Force (N), applied for 1 min. : | 236 N | — |
| | During the test, the conductor neither slips out of the terminal nor breaks near the clamping unit | | P |
| | Conductor of the largest cross-sectional area (mm ²) | 240 mm ² (rigid) | — |
| | Number of conductor of the largest cross section : | 2 | — |
| | Diameter of bushing hole (mm) | 28,6 mm | — |
| | Height between the equipment and the platen : | 464 mm | — |
| | Mass at the conductor(s) (kg) | 20 kg | — |
| | 135 continuous revolutions: the conductor neither slips out of the terminal nor breaks near the clamping unit | | P |
| | Pull-out test | | P |
| | Force (N), applied for 1 min. : | 578 N | — |
| | 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) | 240 mm ² + 50 mm ² | — |

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|------------------|---|--|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Number of conductor of the smallest cross section, number of conductor of the largest cross section : | 1 1 | — |
| | Diameter of bushing hole (mm) | 28,6 mm | — |
| | Height between the equipment and the platen | 464 mm | — |
| | Mass at the conductor(s) (kg) | 20 kg | — |
| | 135 continuous revolutions: the conductor neither slips out of the terminal nor breaks near the clamping unit | | P |
| | Pull-out test | | P |
| | Force (N), applied for 1 min. | 578 N | — |
| | 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) | 240 mm ² + 50 mm ² | — |
| | Number of conductor of the smallest cross section, number of conductor of the largest cross section : | 1 1 | — |
| | Diameter of bushing hole (mm) | 15,9 mm | — |
| | Height between the equipment and the platen | 343 mm | — |
| | Mass at the conductor(s) (kg) | 9,5 kg | — |
| | 135 continuous revolutions: the conductor neither slips out of the terminal nor breaks near the clamping unit | | P |
| | Pull-out test | | P |
| | Force (N), applied for 1 min. | 236 N | — |
| | During the test, the conductor neither slips out of the terminal nor breaks near the clamping unit | | P |
| 7.1.7.2 | Connection capacity | | |
| | Type of conductors | Rigid/flexible | — |
| | Minimum cross-sectional area of conductor (mm ²): | 50 mm ² | — |
| | Maximum cross-sectional area of conductor (mm ²) | 240 mm ² | — |
| | Number of conductors simultaneously connectable to the terminal | 2 | — |
| 7.1.7.3 | Connection | | P |
| | Terminals for connection to external conductors are readily accessible during installation | | P |

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| IEC / EN 60947-3 | | | |
|------------------|--|--------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Clamping screws and nuts do not serve to fix any other component | | P |
| 7.1.7.4 | Terminal identification and marking | | P |
| | Terminal intended exclusively for the neutral conductor | | N/A |
| | Protective earth terminal | | N/A |
| | Other terminals | L1, L2, L3 | P |
| 7.1.8 | Additional requirements for equipment provided with a neutral pole | | N/A |
| | 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 |
| 7.1.9 | Provisions for protective earthing | | N/A |
| 7.1.9.1 | The exposed conductive parts are electrically interconnected and connected to a protective earth terminal | | N/A |
| 7.1.9.2 | 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 |
| 7.1.9.3 | Protective earth terminal marking and identification | | N/A |
| 7.1.10 | Enclosure for equipment | | P |
| 7.1.10.1 | Design | | P |
| | When the enclosure is opened, all parts requiring access for installation and maintenance are readily accessible | Integral enclosure | P |
| | Sufficient space is provided inside the enclosure | | P |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| | 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 |
| | 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 |
| 7.1.10.2 | Insulation | | N/A |
| | 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 |
| 7.1.11 | Degree of protection of enclosed equipment | | N/A |
| | Degree of protection : — | | N/A |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.3 | TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS | | P |
| 8.3.3.1 | Temperature-rise | Samples Nos. A2/10, A2/11 and A2/15 | P |
| | ambient temperature 10-40 °C | See appended tables 8.3.3.1 | — |
| | test enclosure W x H x D (mm x mm x mm) | — | — |
| | material of enclosure | — | — |
| | Main circuits, test conditions: | | — |
| | - conventional thermal current I _{th} (A) | 400 A | — |
| | - conventional enclosed thermal current I _{the} (A) .. | — | — |
| | - cable/busbar cross-section (mm ²) / length (mm) : | 240 mm ² | — |
| | Fuse-link details (fuse-combination units only): | | — |
| | - manufacturer's name, trademark or identification mark | APATOR | — |
| | - manufacturer's model or type reference | WTNH gG | — |
| | - rated current (A) | 400 A | — |
| | - power loss (W) | 31 W | — |
| | - rated breaking capacity (kA) | 120 kA | — |
| | Measured temperature-rise | See appended tables 8.3.3.1 | P |
| | Auxiliary circuits, test conditions: | | N/A |
| | - rated operation current (A) | — | — |
| | - cable cross-section (mm ²) | — | — |
| | Measured temperature-rise | — | N/A |
| 8.3.3.2 | Test of dielectric properties | Samples Nos. A2/10, A2/11 and A2/15 | P |
| | Rated impulse withstand voltage (kV) | 12 kV | — |
| | - test U _{imp} main circuits (kV) | 14,5 kV | P |
| | - test U _{imp} auxiliary circuits (kV) | — | N/A |
| | - test U _{imp} on open main contacts (equipment suitable for isolation) (kV) | 18,1 kV | P |
| | Power-frequency withstand voltage (V) | 2200 V | — |
| | - main circuits, test voltage for 5 sec. (V) | 5 s | 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 |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| | Equipment suitable for isolation, leakage current not exceed 0,5 mA | | — |
| | Test voltage 1,1 Ue (V) | 759 V | — |
| | Measured leakage current (mA) | 0,009 mA | P |
| 8.3.3.3 | Making and breaking capacity | Sample No.: A2/1 | P |
| | - utilization category | AC-22B | — |
| | - rated operational voltage Ue (V) | 690 V | — |
| | - rated operational current Ie (A) or power (kW) .. | 400 A | — |
| | Conditions for make/break operations or make operation, AC-22B: | | P |
| | - test voltage, U = 1,05 Ue.....(V): | L1: 725 V L2: 725 V L3: 725 V | — |
| | - test current, I = 3x Ie (A): | L1: 1213 A L2: 1216 A L3: 1216 A | — |
| | - power factor | L1: 0,65 L2: 0,65 L3: 0,65 | — |
| | Conditions for break operation, AC-22B | | P |
| | - test voltage, U = 1,05 Ue.....(V): | L1: 725 V L2: 725 V L3: 725 V | — |
| | - test current, I = 3x Ie (A): | L1: 1213 A L2: 1216 A L3: 1216 A | — |
| | - power factor | L1: 0,65 L2: 0,65 L3: 0,65 | — |
| | Number of make/break or make and break operations | 5 make 5 break | P |
| | - recovery voltage duration (≥ 50 ms) | 725 V | P |
| | - current duration (ms) | 440 ms | — |
| | - time interval between operations | 35 s | P |
| | Characteristic of transient recovery voltage for AC-22 and AC-23 only | | P |
| | - oscillatory frequency (kHz) | 44,24 kHz | — |
| | - measured oscillatory frequency (kHz) | L1: 42,80 kHz L2: 44,05 kHz L3: 43,30 kHz | P |

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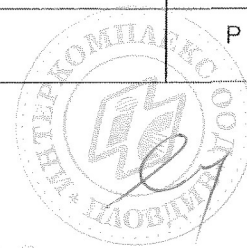
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| Clause | Requirement + Test | Result - Remark | Verdict |
| | - factor γ | L1: 1,09 L2: 1,07 L3: 1,09 | P |
| 8.3.3.3.5 | Behaviour of the equipment during making and breaking capacity tests | | P |
| | Test performed without: | | — |
| | - endanger 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 |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | 120 N (before the test 90 N) | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.3.4 | Dielectric verification | | P |
| | test voltage: $2 \cdot U_e$ with a minimum of 1000V~..... | 1380 V | — |
| | No flashover or breakdown | | P |
| 8.3.3.5 | Leakage current | | P |
| | 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 | 0,009 mA | P |
| 8.3.3.6 | Temperature-rise verification | | P |
| | - conductor cross-section (mm ²) | 240 mm ² | — |
| | - test current I_e (A) | 400 A | — |
| | Measured temperature-rise..... | see appended tables 8.3.3.6 | P |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.3.3 | Making and breaking capacity | Sample No.: A2/3 | P |
| | - utilization category | AC-22B | — |
| | - rated operational voltage U_e (V) | 400 V | — |
| | - rated operational current I_e (A) or power (kW) .. | 400 A | — |
| | Conditions for make/break operations or make operation, AC-22B: | | P |
| | - test voltage, $U = 1,05 U_e$(V): | L1: 420 V L2: 421 V L3: 421 V | — |
| | - test current, $I = 3$x I_e (A): | L1: 1215 A L2: 1214 A L3: 1218 A | — |
| | - power factor | L1: 0,66 L2: 0,65 L3: 0,66 | — |
| | Conditions for break operation, AC-22B | | P |
| | - test voltage, $U = 1,05 U_e$(V): | L1: 420 V L2: 421 V L3: 421 V | — |
| | - test current, $I = 3$x I_e (A): | L1: 1215 A L2: 1214 A L3: 1218 A | — |
| | - power factor | L1: 0,66 L2: 0,65 L3: 0,66 | — |
| | Number of make/break or make and break operations | 5 make 5 break | P |
| | - recovery voltage duration (≥ 50 ms) | 421 V | P |
| | - current duration (ms) | 430 ms | — |
| | - time interval between operations | 35 s | P |
| | Characteristic of transient recovery voltage for AC-22 and AC-23 only | | P |
| | - oscillatory frequency (kHz) | 69,43 kHz | — |
| | - measured oscillatory frequency (kHz) | L1: 69,30 Hz L2: 68,25 kHz L3: 68,85 kHz | P |
| | - factor γ | L1: 1,08 L2: 1,09 L3: 1,06 | P |
| 8.3.3.3.5 | Behaviour of the equipment during making and breaking capacity tests | | P |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| | 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 |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | 110 N (before the test 90 N) | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.3.4 | Dielectric verification | | P |
| | test voltage: $2 \cdot U_e$ with a minimum of 1000V~ : | 1380 V | — |
| | No flashover or breakdown | | P |
| 8.3.3.5 | Leakage current | | P |
| | 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) | 0,010 mA | P |
| 8.3.3.6 | Temperature-rise verification | | P |
| | - conductor cross-section (mm^2) | 240 mm^2 | — |
| | - test current I_e (A) | 400 A | — |
| | Measured temperature-rise..... : | see appended tables 8.3.3.6 | P |

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|------------------|---|-------------------------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.3.3 | Making and breaking capacity | Sample No.: A2/4 | P |
| | - utilization category | AC-21B | — |
| | - rated operational voltage U_e (V) | 690 V | — |
| | - rated operational current I_e (A) or power (kW) ... | 400 A | — |
| | Conditions for make/break operations or make operation, AC-21B: | | P |
| | - test voltage, $U = 1,05 U_e$(V): | L1: 725 V L2: 725 V L3: 725 V | — |
| | - test current, $I = 1,5$x I_e (A): | L1: 616 A L2: 625 A L3: 612 A | — |
| | - power factor | L1: 0,96 L2: 0,95 L3: 0,96 | — |
| | Conditions for break operation, AC-21B | | P |
| | - test voltage, $U = 1,05 U_e$(V): | L1: 725 V L2: 725 V L3: 725 V | — |
| | - test current, $I = 1,5$x I_e (A): | L1: 616 A L2: 625 A L3: 612 A | — |
| | - power factor | L1: 0,96 L2: 0,95 L3: 0,96 | — |
| | Number of make/break or make and break operations | 5 make 5 break | P |
| | - recovery voltage duration (≥ 50 ms) | 725 V | P |
| | - current duration (ms) | 390 ms | — |
| | - time interval between operations | 35 s | P |
| | Characteristic of transient recovery voltage for AC-22 and AC-23 only | | N/A |
| | - 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 | | P |

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ΕΡΓΑΣΤΗΡΙΟ ΗΛΕΚΤΡΟΜΗΧΑΝΙΚΗΣ

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| Clause | Requirement + Test | Result - Remark | Verdict |
| | 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 |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | 100 N (before the test 90 N) | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.3.4 | Dielectric verification | | P |
| | test voltage: $2 \cdot U_e$ with a minimum of 1000V~..... : | 1380 V | — |
| | No flashover or breakdown | | P |
| 8.3.3.5 | Leakage current | | P |
| | 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) | 0,010 mA | P |
| 8.3.3.6 | Temperature-rise verification | | P |
| | - conductor cross-section (mm ²) | 240 mm ² | — |
| | - test current I_e (A) | 400 A | — |
| | Measured temperature-rise..... : | see appended tables 8.3.3.6 | P |

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|------------------|---|-------------------------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.3.3 | Making and breaking capacity | Sample No.: A2/6 | P |
| | - utilization category | AC-21B | — |
| | - rated operational voltage U_e (V) | 400 V | — |
| | - rated operational current I_e (A) or power (kW) .. | 400 A | — |
| | Conditions for make/break operations or make operation, AC-21B: | | P |
| | - test voltage, $U = 1,05 U_e$(V): | L1: 420 V L2: 421 V L3: 421 V | — |
| | - test current, $I = 1,5$x I_e (A): | L1: 610 A L2: 612 A L3: 610 A | — |
| | - power factor | L1: 0,94 L2: 0,95 L3: 0,95 | — |
| | Conditions for break operation, AC-21B | | P |
| | - test voltage, $U = 1,05 U_e$(V): | L1: 420 V L2: 421 V L3: 421 V | — |
| | - test current, $I = 1,5$x I_e (A): | L1: 610 A L2: 612 A L3: 610 A | — |
| | - power factor | L1: 0,94 L2: 0,95 L3: 0,95 | — |
| | Number of make/break or make and break operations | 5 make 5 break | P |
| | - recovery voltage duration (≥ 50 ms) | 421 V | P |
| | - current duration (ms) | 430 ms | — |
| | - time interval between operations | 35 s | P |
| | Characteristic of transient recovery voltage for AC-22 and AC-23 only | | N/A |
| | - 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 | | P |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| | 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 |
| 8.3.3.3.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | 120 N (before the test 90 N) | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.3.4 | Dielectric verification | | P |
| | test voltage: $2 \cdot U_e$ with a minimum of 1000V~ : | 1380 V | — |
| | No flashover or breakdown | | P |
| 8.3.3.5 | Leakage current | | P |
| | 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) | 0,010 mA | P |
| 8.3.3.6 | Temperature-rise verification | | P |
| | - conductor cross-section (mm ²) | 240 mm ² | — |
| | - test current I_e (A) | 400 A | — |
| | Measured temperature-rise..... : | see appended tables 8.3.3.6 | P |
| 8.3.3.7 | Strength of actuator mechanism | | N/A |
| 8.2.5 | Verification of the strength of actuator mechanism and position indicating device | | N/A |
| | - actuator type (fig.) | 1e | — |
| 8.2.5.2.1 | Dependent and independent manual operation | — | N/A |
| | - actuating force for opening (N) | 90 N | — |
| | - test force with blocked main contacts (N) | — | — |
| | - used method to keep the contact closed | — | — |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| | During and after the test, open position not indicated..... : | The main contacts position is visible in the open position – test not applicable | N/A |
| | 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 | — | N/A |
| | - 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 | — | N/A |
| | - 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 | | P |
| 8.3.4.1 | Operational performance test | Sample No A2/2 | P |
| | - utilization category | AC-22B | — |
| | - rated operational voltage (V) | 690 V | — |
| | - rated operational current (A) | 400 A | — |
| | Test conditions for electrical operation cycles: | | |
| | - test voltage (V) | L1: 692 V L2: 693 V L3: 692 V | — |
| | - test current (A) | L1: 408 A L2: 410 A L3: 405 A | — |
| | - power factor/time constant | L1: 0,80 L2: 0,81 L3: 0,81 | — |
| | Number of cycles with current | 200 | P |
| | Number of cycles without current | 800 | P |
| | First test sequence (with/without current) | without current | — |
| | Second test sequence (with/without current) | with current | — |
| | - time interval between first and second test sequence | 7500 s | — |
| 8.3.4.1.5 | Behaviour of the equipment during the operational performance test | | P |
| | 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 | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | 80 N (before the test 90 N) | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.4.2 | Dielectric verification | | P |
| | test voltage: $2 \cdot U_e$ with a minimum of 1000V~ : | 1380 V | — |
| | No breakdown or flashover | | P |
| 8.3.4.3 | Leakage current | | P |
| | 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 | 0,011 mA | P |
| 8.3.4.4 | Temperature-rise verification | | P |
| | - conductor cross-section (mm ²) | 240 mm ² | — |
| | - test current I_e (A) | 400 A | — |
| | Measured temperature-rise | see appended tables 8.3.4.4 | P |
| 8.3.4.1 | Operational performance test | Sample No A2/7 | P |
| | - utilization category | AC-22B | — |
| | - rated operational voltage (V) | 400 V | — |
| | - rated operational current (A) | 400 A | — |
| | Test conditions for electrical operation cycles: | | |
| | - test voltage (V) | L1: 400 V L2: 400 V L3: 401 V | — |
| | - test current (A) | L1: 406 A L2: 402 A L3: 405 A | — |
| | - power factor/time constant | L1: 0,79 L2: 0,79 L3: 0,79 | — |
| | Number of cycles with current | 200 | P |
| | Number of cycles without current | 800 | P |
| | First test sequence (with/without current) | without current | — |
| | Second test sequence (with/without current) | with current | — |
| | - time interval between first and second test sequence | 3000 s | — |
| 8.3.4.1.5 | Behaviour of the equipment during the operational performance test | | P |
| | Test performed without: | | — |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| | - 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 | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | 120 N (before the test 90 N) | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.4.2 | Dielectric verification | | P |
| | test voltage: $2 \cdot U_e$ with a minimum of 1000V~ : | 1380 V | — |
| | No breakdown or flashover | | P |
| 8.3.4.3 | Leakage current | | P |
| | 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 | 0,010 mA | P |
| 8.3.4.4 | Temperature-rise verification | | P |
| | - conductor cross-section (mm ²) | 240 mm ² | — |
| | - test current I_e (A) | 400 A | — |
| | Measured temperature-rise..... | see appended tables 8.3.4.4 | P |
| 8.3.4.1 | Operational performance test | Sample No A2/5 | P |
| | - utilization category | AC-21B | — |
| | - rated operational voltage (V) | 690 V | — |
| | - rated operational current (A) | 400 A | — |
| | Test conditions for electrical operation cycles: | | |
| | - test voltage (V) | L1: 691 V L2: 692 V L3: 692 V | — |

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|------------------|---|-------------------------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - test current (A) | L1: 408 A L2: 412 A L3: 405 A | — |
| | - power factor/time constant | L1: 0,94 L2: 0,94 L3: 0,94 | — |
| | Number of cycles with current | 200 | P |
| | Number of cycles without current | 800 | P |
| | First test sequence (with/without current) | without current | — |
| | Second test sequence (with/without current) | with current | — |
| | - time interval between first and second test sequence | 2000 s | — |
| 8.3.4.1.5 | Behaviour of the equipment during the operational performance test | | P |
| | 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 | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | 100 N (before the test 90 N) | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.4.2 | Dielectric verification | | P |
| | test voltage: $2 \cdot U_e$ with a minimum of 1000V~ | 1380 V | — |
| | No breakdown or flashover | | P |
| 8.3.4.3 | Leakage current | | P |
| | 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 | 0,011 mA | P |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.4.4 | Temperature-rise verification | | P |
| | - conductor cross-section (mm ²) | 240 mm ² | — |
| | - test current I _e (A) | 400 A | — |
| | Measured temperature-rise | see appended tables 8.3.4.4 | P |
| 8.3.4.1 | Operational performance test | Sample No A2/8 | P |
| | - utilization category | AC-21B | — |
| | - rated operational voltage (V) | 400 V | — |
| | - rated operational current (A) | 400 A | — |
| | Test conditions for electrical operation cycles: | | |
| | - test voltage (V) | L1: 400 V L2: 400 V L3: 401 V | — |
| | - test current (A) | L1: 402 A L2: 404 A L3: 404 A | — |
| | - power factor/time constant | L1: 0,95 L2: 0,96 L3: 0,95 | — |
| | Number of cycles with current | 200 | P |
| | Number of cycles without current | 800 | P |
| | First test sequence (with/without current) | without current | — |
| | Second test sequence (with/without current) | with current | — |
| | - time interval between first and second test sequence | 3500 s | — |
| 8.3.4.1.5 | Behaviour of the equipment during the operational performance test | | P |
| | 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 | | P |
| | Immediately after the test equipment must work satisfactorily | | P |

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|------------------|--|------------------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | 120 N (before the test 90 N) | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.4.2 | Dielectric verification | | P |
| | test voltage: $2 \cdot U_e$ with a minimum of 1000V- : | 1380 V | — |
| | No breakdown or flashover | | P |
| 8.3.4.3 | Leakage current | | P |
| | 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 | 0,010 mA | P |
| 8.3.4.4 | Temperature-rise verification | | P |
| | - conductor cross-section (mm ²) | 240 mm ² | — |
| | - test current I_e (A) | 400 A | — |
| | Measured temperature-rise | see appended tables 8.3.4.4 | P |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.5 | TEST SEQUENCE III: SHORT-CIRCUIT PERFORMANCE CAPABILITY | | N/A |
| | Requirements of this clause not applicable to the tested products | | — |

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|------------------|---|---|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.6 | TEST SEQUENCE IV: CONDITIONAL SHORT-CIRCUIT CURRENT | | P |
| | Short-circuit breaking capacity test was carried out at Laboratorium Badawcze Aparatury Rozdzielczej of Instytut Elektrotechniki in Warsaw. The particular results of the test are given in test report No. 7670/NBR/08 | | — |
| | Protective device details: | Sample No. 3W | P |
| | - manufacturer's name, trademark or identification mark | APATOR | — |
| | - manufacturer's model or type reference | WTNH 2 gG | — |
| | - rated voltage (V) | 500 V | — |
| | - rated current (A) | 400 A | — |
| | - rated breaking capacity (kA) | 120 kA | — |
| 8.3.6.2 | Fuse protected short-circuit withstand | | P |
| | test voltage (1,05 Ue) (V) | 420 V | — |
| | test current (kA) | 100 kA | — |
| | rated frequency (Hz) | 50 Hz | — |
| | power factor | 0,2 | — |
| | Time constant (ms) | — | — |
| | Fuse protected short-circuit withstand (equipment in closed position) | | |
| | - max. let-through current (kA) | L1: 35,54 kA L2: 26,164 kA L3: 40,95 kA | — |
| | - Joule integral I ² dt (A ² s) | L1: 1610 kA ² s L2: 780 kA ² s L3: 1530 kA ² s | — |
| | Fuse protected short-circuit making | | P |
| | - mean velocity of 15 manually under no-load conditions operations (m/s) | 1 m/s | — |
| | - point at which the measurement is made | Actuator | — |
| | - test speed during the fuse protected short-circuit making (m/s) | 1 m/s | — |
| | - max. let-through current (kA) | L1: 39,89 kA L2: 28,07 kA L3: 11,24 kA | — |
| | - Joule integral I ² dt (A ² s) | L1: 1340 kA ² s L2: 648 kA ² s L3: 146 kA ² s | — |
| 8.3.6.2.5 | Behaviour of the equipment during the test | | P |

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|------------------|--|------------------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | 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 |
| 8.3.6.2.6 | Condition of the equipment after making and breaking capacity tests | | P |
| | Immediately after the test equipment must work satisfactorily | | P |
| | - required opening force not greater than the test force of 8.2.5.2 and table 8 | 120 N (before the test 90 N) | P |
| | - equipment is able to carry its rated current after normal closing operation | | P |
| 8.3.6.3 | Dielectric verification | | P |
| | test voltage: $2 \cdot U_e$ with a minimum of 1000V~ : | 1380 V | — |
| | No flashover or breakdown | | P |
| 8.3.6.4 | Leakage current | | P |
| | 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) $\leq 2,0$ mA/pole | 0,012 mA | P |
| 8.3.6.5 | Temperature-rise verification | | P |
| | - conductor cross-section (mm ²) | 240 mm ² | — |
| | - test current I_e (A) | 400 A | — |
| | Measured temperature-rise..... : | see appended table 8.3.6.5 | P |

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|------------------|---|----------------------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.7 | TEST SEQUENCE V: OVERLOAD PERFORMANCE CAPABILITY | | P |
| 8.3.7.1 | Overload test | | P |
| | ambient temperature 10-40 | 24 °C | — |
| | test enclosure W x H x D (mm x mm x mm) | — | — |
| | material of enclosure | — | — |
| | test current $1,6 \times I_{th}$ or $1,6 \times I_{th}$ (A) | 640 A | — |
| | cable/busbar cross-section (mm ²) / length (mm) | 240 mm ² | — |
| | Fuse-link details: | | P |
| | - manufacturer's name, trademark or identification mark | APATOR WTNH 2 | — |
| | - rated current (A) | 400 A | — |
| | - power loss (W) | 29 W | — |
| | - rated breaking capacity (kA) | 120 kA | — |
| | - time duration of the overload test (s) | 1826 s | — |
| | Within 3 to 5 min after the fuse(s) has(have) operated (or 1 h), the equipment has been operated once, i.e. opened and closed | 5 min open and close | P |
| | Required opening force not greater than the test force of 8.2.5.2 and table 8 | 95 N | P |
| | The equipment has not undergone any impairment hindering such operation | | P |
| 8.3.7.2 | Dielectric verification | | P |
| | test voltage: $2 \times U_e$ with a minimum of 1000V~ | 1380 N | — |
| | No flashover or breakdown | | P |
| 8.3.7.3 | Leakage current | | P |
| | 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 | 0,010 mA | P |
| 8.3.7.4 | Temperature-rise verification | | P |
| | Fuse links aged during the overload test are replaced by new fuse-links | — | P |
| | - conductor cross-section (mm ²) | 400 A | — |
| | - test current I_e (A) | 240 mm ² | — |
| | Measured temperature-rise | see appended table 8.3.7.4 | P |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.4 | ELECTROMAGNETIC COMPATIBILITY TESTS | | P |
| 8.4.1 | Immunity | | P |
| 8.4.1.1 | Equipment not incorporating electronic circuits: no tests necessary | | P |
| 8.4.1.2 | Equipment incorporating electronic circuits: | | N/A |
| | Equipment utilizing circuits in which all components are passive are not required to be tested | | N/A |
| | All other equipment, requirements according to 7.3.3.2 and limits according table 6 apply | | N/A |
| | Performed tests | — | N/A |
| | No unintentional separation or closing of contacts has occurred during these tests | — | N/A |
| 8.4.2 | Emission | | P |
| 8.4.2.1 | Equipment not incorporating electronic circuits: no tests necessary | | P |
| 8.4.2.2 | Equipment incorporating electronic circuits: | | N/A |
| | Equipment utilizing circuits in which all components are passive are not required to be tested | | N/A |
| | All other equipment, requirements according to 7.3.3.2 and limits according table 7 apply | | N/A |
| | Performed tests | — | N/A |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| Annex A (normative) | | | N/A |
| A | Equipment for direct switching of a single motor | | N/A |
| | Requirements of this clause not applicable to the tested products | | |

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|----------------------------------|---|--------|--------------|-----------------------------|-----------------|-------------------|----------|
| Clause | Requirement + Test | | | | Result - Remark | | Verdict |
| 7.1.3 | TABLE: Clearance and creepage distance measurements | | | | | | P |
| Type of fuse-switch disconnecter | clearance cl and creepage distance dcr at/of: | Up (V) | U r.m.s. (V) | required cl (mm) case A / B | cl (mm) | required dcr (mm) | dcr (mm) |
| ARS 2-6-M | L-L | 12 kV | 1000 | 14 / 4,5 | 27,4 | 14 | 55,6 |
| | L-A | | | | 9,1 | | 15,0 |
| ARS 2-1-V | L-L | | | | 16,6 | | 55,6 |
| | L-A | | | | 9,1 | | 15,0 |
| ARS 2-1-2V | L-L | | | | 10,0 | | 55,6 |
| | L-A | | | | 9,1 | | 15,0 |
| supplementary information: — | | | | | | | |

| 7.1.1.1 | TABLE: resistance to heat and fire. Glow-wire flammability test. | | | | | | P |
|--|--|------------------|---|---|-----------------|--------------------------|---------|
| | Conditioning time | 24 h | | | | | — |
| | Ambient temperature | 20 °C | | | | | — |
| | Relative humidity | 50 % | | | | | — |
| | Time of glow-wire tip application (t _a) | (30 ± 1) s | | | | | — |
| Tested part / material / market name / color | Thickness of material | Wire temperature | Duration from tip application to ignition | Duration from tip application to flames extinguishing | Height of flame | Specified layer ignition | Verdict |
| | mm | °C | (t) s | (t _e) s | mm | no / yes | |
| Viewer I, Viewer II, terminals housing / polycarbonate / Lexan 9945A / transparent | 2 | 650 | 0 | 0 | 0 | no | P |
| Enclosure, actuator, cover, conductor / poliamid / Starflam RX06082 / grey or black | 3 | 650 | 0 | 0 | 0 | no | P |
| Base, arc chamber, terminals cover, blocking plate / poliamid / Starflam RF0057E/ grey | 2 | 960 | 5 | 31 | 3 | no | P |
| supplementary information: | | | | | | | |
| Test carried out on parts from equipment. Criteria of acceptance: t _e ≤ t _a + 30 s. | | | | | | | |

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|--|--|--------------------|--------------------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.3.1 | TABLE: Temperature-rise (measurements) | Sample No A2/10 | P |
| Temperature rise dT of part: | | dT (K) measured | dT (K) required |
| Terminals | L1 | 67 | 70 |
| | L2 | 68 | |
| | L3 | 60 | |
| | U | 52 | |
| | V | 54 | |
| | W | 52 | |
| Manual operating means: metallic / non-metallic | | —/7 | 15/25 |
| Parts intended to be touched but not hand-held: metallic / non-metallic | | —/16 | 30/40 |
| Parts which need not be touched during normal operation: metallic / non-metallic | | —/25 | 40/50 |
| supplementary information: ambient temperature: 23 °C | | | |

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|--|--|--------------------|--------------------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.3.1 | TABLE: Temperature-rise (measurements) | Sample No A2/11 | P |
| Temperature rise dT of part: | | dT (K) measured | dT (K) required |
| Terminals | L1 | 55 | 70 |
| | L2 | 68 | |
| | L3 | 58 | |
| | U | 41 | |
| | V | 47 | |
| | W | 42 | |
| Manual operating means: metallic / non-metallic | | —/11 | 15/25 |
| Parts intended to be touched but not hand-held: metallic / non-metallic | | —/36 | 30/40 |
| Parts which need not be touched during normal operation: metallic / non-metallic | | —/41 | 40/50 |
| supplementary information: ambient temperature: 25 °C | | | |

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| Clause | Requirement + Test | Result - Remark | Verdict |

| 8.3.3.1 | TABLE: Temperature-rise (measurements) | Sample No A2/15 | P |
|--|--|-----------------|-----------------|
| Temperature rise dT of part: | | dT (K) measured | dT (K) required |
| Terminals | L1 | 47 | 70 |
| | L2 | 65 | |
| | L3 | 61 | |
| | U | 35 | |
| | V | 39 | |
| | W | 40 | |
| Manual operating means: metallic / non-metallic | | —/10 | 15/25 |
| Parts intended to be touched but not hand-held: metallic / non-metallic | | —/33 | 30/40 |
| Parts which need not be touched during normal operation: metallic / non-metallic | | —/35 | 40/50 |
| supplementary information: ambient temperature: 25 °C | | | |

| 8.3.3.6 | TABLE: Temperature-rise (measurements) | Sample No A2/1 | P |
|--|--|-----------------|-----------------|
| Temperature rise dT of part: | | dT (K) measured | dT (K) required |
| Terminals | L1 | 60 | 80 |
| | L2 | 74 | |
| | L3 | 66 | |
| | U | 51 | |
| | V | 53 | |
| | W | 57 | |
| Manual operating means: metallic / non-metallic | | —/7 | 25/35 |
| Parts intended to be touched but not hand-held: metallic / non-metallic | | —/27 | 40/50 |
| Parts which need not be touched during normal operation: metallic / non-metallic | | —/45 | 50/60 |
| supplementary information: ambient temperature: 24 °C | | | |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.3.6 | TABLE: Temperature-rise (measurements) | Sample No A2/3 | P |
| Temperature rise dT of part: | | dT (K) measured | dT (K) required |
| Terminals | L1 | 65 | 80 |
| | L2 | 48 | |
| | L3 | 50 | |
| | U | 43 | |
| | V | 45 | |
| | W | 43 | |
| Manual operating means: metallic / non-metallic | | —/10 | 25/35 |
| Parts intended to be touched but not hand-held: metallic / non-metallic | | —/23 | 40/50 |
| Parts which need not be touched during normal operation: metallic / non-metallic | | —/44 | 50/60 |
| supplementary information: ambient temperature: 23 °C | | | |

| | | | |
|--|--|-----------------|-----------------|
| 8.3.3.6 | TABLE: Temperature-rise (measurements) | Sample No A2/4 | P |
| Temperature rise dT of part: | | dT (K) measured | dT (K) required |
| Terminals | L1 | 61 | 80 |
| | L2 | 41 | |
| | L3 | 43 | |
| | U | 38 | |
| | V | 39 | |
| | W | 40 | |
| Manual operating means: metallic / non-metallic | | —/10 | 25/35 |
| Parts intended to be touched but not hand-held: metallic / non-metallic | | —/16 | 40/50 |
| Parts which need not be touched during normal operation: metallic / non-metallic | | —/32 | 50/60 |
| supplementary information: ambient temperature: 24 °C | | | |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.3.3.6 | TABLE: Temperature-rise (measurements) | Sample No A2/6 | P |
| Temperature rise dT of part: | | dT (K) measured | dT (K) required |
| Terminals | L1 | 75 | 80 |
| | L2 | 45 | |
| | L3 | 43 | |
| | U | 39 | |
| | V | 38 | |
| | W | 40 | |
| Manual operating means: metallic / non-metallic | | —/10 | 25/35 |
| Parts intended to be touched but not hand-held: metallic / non-metallic | | —/29 | 40/50 |
| Parts which need not be touched during normal operation: metallic / non-metallic | | —/36 | 50/60 |
| supplementary information: ambient temperature: 25 °C | | | |

| | | | |
|--|--|-----------------|-----------------|
| 8.3.4.4 | TABLE: Temperature-rise (measurements) | Sample No A2/2 | P |
| Temperature rise dT of part: | | dT (K) measured | dT (K) required |
| Terminals | L1 | 62 | 80 |
| | L2 | 71 | |
| | L3 | 72 | |
| | U | 55 | |
| | V | 56 | |
| | W | 52 | |
| Manual operating means: metallic / non-metallic | | —/6 | 25/35 |
| Parts intended to be touched but not hand-held: metallic / non-metallic | | —/26 | 40/50 |
| Parts which need not be touched during normal operation: metallic / non-metallic | | —/33 | 50/60 |
| supplementary information: ambient temperature: 24 °C | | | |

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|------------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 8.3.4.4 | TABLE: Temperature-rise (measurements) | Sample No A2/5 | P |
|--|--|--------------------|--------------------|
| Temperature rise dT of part: | | dT (K) measured | dT (K) required |
| Terminals | L1 | 65 | 80 |
| | L2 | 45 | |
| | L3 | 46 | |
| | U | 42 | |
| | V | 38 | |
| | W | 40 | |
| Manual operating means: metallic / non-metallic | | —/9 | 25/35 |
| Parts intended to be touched but not hand-held: metallic / non-metallic | | —/28 | 40/50 |
| Parts which need not be touched during normal operation: metallic / non-metallic | | —/39 | 50/60 |
| supplementary information: ambient temperature: 24 °C | | | |

| 8.3.4.4 | TABLE: Temperature-rise (measurements) | Sample No A2/7 | P |
|--|--|--------------------|--------------------|
| Temperature rise dT of part: | | dT (K) measured | dT (K) required |
| Terminals | L1 | 52 | 80 |
| | L2 | 53 | |
| | L3 | 56 | |
| | U | 43 | |
| | V | 45 | |
| | W | 44 | |
| Manual operating means: metallic / non-metallic | | —/10 | 25/35 |
| Parts intended to be touched but not hand-held: metallic / non-metallic | | —/23 | 40/50 |
| Parts which need not be touched during normal operation: metallic / non-metallic | | —/30 | 50/60 |
| supplementary information: ambient temperature: 24 °C | | | |

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| Clause | Requirement + Test | Result - Remark | Verdict |

| 8.3.4.4 | TABLE: Temperature-rise (measurements) | Sample No A2/8 | P |
|--|--|-----------------|-----------------|
| Temperature rise dT of part: | | dT (K) measured | dT (K) required |
| Terminals | L1 | 63 | 80 |
| | L2 | 62 | |
| | L3 | 60 | |
| | U | 42 | |
| | V | 41 | |
| | W | 44 | |
| Manual operating means: metallic / non-metallic | | —/9 | 25/35 |
| Parts intended to be touched but not hand-held: metallic / non-metallic | | —/28 | 40/50 |
| Parts which need not be touched during normal operation: metallic / non-metallic | | —/37 | 50/60 |
| supplementary information: ambient temperature: 25 °C | | | |

| 8.3.6.5 | TABLE: Temperature-rise (measurements) | Sample No. 3W | P |
|--|--|-----------------|-----------------|
| Temperature rise dT of part: | | dT (K) measured | dT (K) required |
| Terminals | L1 | 43 | 80 |
| | L2 | 41 | |
| | L3 | 38 | |
| | U | 46 | |
| | V | 47 | |
| | W | 51 | |
| Manual operating means: metallic / non-metallic | | —/6 | 25/35 |
| Parts intended to be touched but not hand-held: metallic / non-metallic | | —/16 | 40/50 |
| Parts which need not be touched during normal operation: metallic / non-metallic | | —/29 | 50/60 |
| supplementary information: ambient temperature: 25 °C | | | |

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

| 8.3.7.4 | TABLE: Temperature-rise (measurements) | Sample No. A2/9 | P |
|--|--|--------------------|--------------------|
| Temperature rise dT of part: | | dT (K) measured | dT (K) required |
| Terminals | L1 | 41 | 80 |
| | L2 | 44 | |
| | L3 | 40 | |
| | U | 41 | |
| | V | 45 | |
| | W | 43 | |
| Manual operating means: metallic / non-metallic | | —/9 | 25/35 |
| Parts intended to be touched but not hand-held: metallic / non-metallic | | —/22 | 40/50 |
| Parts which need not be touched during normal operation: metallic / non-metallic | | —/28 | 50/60 |
| supplementary information: ambient temperature: 25 °C | | | |

TRF No. IECEN60947_3B



ВЪРНО С
ОРЪЖИНАЛА

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Photos of ARS 2



Photos of ARS 2

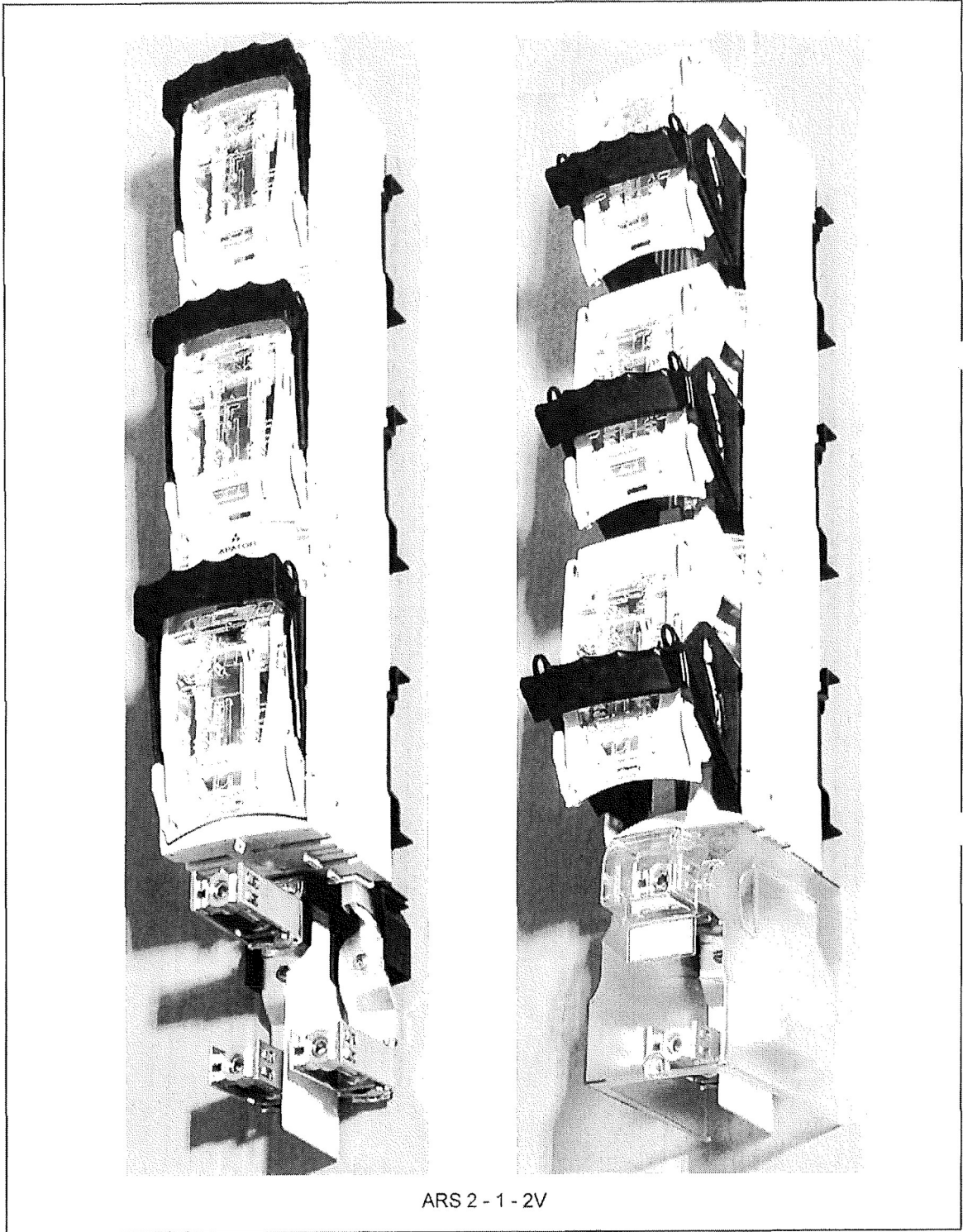


ARS 2 - 1 - V



ВЕРНО С
ОРИГИНАЛА

Photos of ARS 2



ARS 2 - 1 - 2V