# Technical Construction File

## EN 60898-1:2019 Circuit-breakers for over current protection for household and similar installations

| | |
|---|---|
| Report reference No. : | TLZJ21020129167 |
| Compiled by (+ signature) : | Stephen Zhang / Test Engineer |
| Approved by (+ signature) : | Kosco Vent / Project Manager |
| Date of issue : | February 02,2021 |
| Reviewing laboratory : | Shanghai Global Testing Services Co., Ltd. |
| Reviewing location : | Floor 2nd, Building D-1, No. 128, Shenfu Road, Minhang District, Shanghai, China. |
| Applicant : | Changcheng Electrical Group Zhejiang Technology Co., Ltd. |
| Address : | DianHou Village, Liushi Town,Yueqing City, Zhejiang P.R. China |
| Manufacturer : | Changcheng Electrical Group Zhejiang Technology Co., Ltd. |
| Address : | DianHou Village, Liushi Town,Yueqing City, Zhejiang P.R. China |
| Factory: | The same as applicant |
| Address : | The same as applicant |
| Standard : | ☒ EN 60898-1:2019 |
| Review Report Form No. : | 60898 |
| TRF originator. : | GTS |
| Master TRF : | Reference No. EN 60898-1:2019 |
| Review procedure : | GTS |
| Type of Review object: | Miniature Circuit Breaker |
| Trademark : | / |
| Model/type reference : | YCB6H-63 |
| Rating : | Ue=230/400V~(1P, 2P), 400V~(2P, 3P, 4P);<br>1, 2, 3, 4, 5, 6, 10, 16, 20, 25, 32, 40, 50, 63A;<br>Icu=3000, 4500, 6000A; B, C, D type |

| |
|---|
| Possible review case verdicts:<br>- review case does not apply to the test object.... N(.A.)<br>- review object does meet the requirement..... P(ass)<br>- review object does not meet the requirement.... F(ail) |
| General remarks: |
| ”(see remark #)” refers to a remark appended to the report.<br>”(see appended table)” refers to a table appended to the report.<br>Throughout this report a comma is used as the decimal separator.<br>The review results presented in this report relate only to the object reviewed.<br>This report shall not be reproduced except in full without the written approval of the third party. |

| | |
|---|---|
| **Testing:** | |
| Date of receipt of review item: | January 26,2021 |
| Date(s) of performance of review: | January 26,2021 to February 02,2021 |

| |
|---|
| **General product information:**<br>Miniature Circuit Breaker |
| **Summary of reviewing:**<br><br>This review report includes:<br><br>Annex I: **3** page(s) of photo documentation. |
| Copy of marking plate |

| | |
|---|---|
| Miniature Circuit Breaker,<br>Model YCB6H-63<br><br>Changcheng Electrical Group Zhejiang Technology Co., Ltd. | CE |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | **TESTS „A“ 1 sample** | A1 | - |
| **6** **)* | **MARKING AND OTHER INFORMATION** | | |
| **see Appendix 1* | Circuit-breaker marked with: | | - |
| | a) Manufacturer’s name or trade mark..... : | Changcheng Electrical Group Zhejiang Technology Co., Ltd. | P |
| | b)Type designation, catalogue number or other identification number.....: | | P |
| | c) Rated voltage (V).....: | | P |
| | d) Rated current (A)..... : | | P |
| | e) Rated frequency (Hz).....: | | P |
| | f) Rated short circuit capacity (A)..... : | | P |
| | g) Wiring diagram | - | N |
| | h) Ambient air temperature, if different from 30°C | | P |
| | i) Degree of protection, if different from | | P |
| | j) For D-type circuit-breakers: the maximum instantaneous tripping current, if higher than 20 In(see table 2) | | N |
| | k) Rated impulse withstand voltage $U_{imp}$ if it is 2,5 kV | | P |
| | Symbol for instantaneous tripping current | | P |
| | Symbol for nature of supply | | P |
| | Marking for rated current and for instantaneous tripping shall be readily visible when CB is installed | | P |
| | Other marking shall be easily discernible | | P |
| | The suitability for isolation, which is provided by all circuit-breakers of this standard, may be indicated by the symbol on the device | | P |
| | Energy limiting class | | P |
| | $I^2t$ characteristic (documentation) | | P |
| | Symbols on supply and load terminal | | P |
| | Terminal for neutral conductor N | | P |
| | Earthing terminal if any (IEC 60417-5019) | | P |
| | On - off position shall be clearly indicated - 0 I - | | P |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | For push-button CB the off push-button shall either be red or be marked with the symbol ´0´ | | P |
| | Red not used for other push-button | | P |
| | This symbol shall be easily discernible | | P |
| | For CB with multiple current ratings, the maximum value is marked, the adjusted value indicated without ambiguity | | P |
| | Marking shall be indelible and easily legible (not on removable parts), 15 s with water, 15 s with hexane (see cl. 8.3) | | P |

| | | | |
|---|---|---|---|
| **8.** | **REQUIREMENTS FOR CONSTRUCTION AND OPERATION** | | |
| **8.1.1** | **General** | | - |
| **8.1.2** | **Mechanism** | | - |
| | The moving contact shall be mechanically coupled so that all poles make and break together, whether operated manually or automatically, even if an overload occurs on one pole only | | N |
| | The switched neutral shall close before and open after the protected pole (s) | | N |
| | Neutral pole having adequate making and breaking capacity and CB with independent manual operation: all poles operate together including neutral pole | | N |
| | CB shall have a trip free mechanism | | P |
| | It shall be possible to switch the CB on and off by hand | | P |
| | No intermediate position of the contacts | | P |
| | Position of contacts shall be indicated | | P |
| | Indication visible from the outside | | P |
| | If the indication is on the actuating means, it shall, when released, automatically take up or stay in the position corresponding to that of the moving contacts;<br>operating means shall have two different rest positions, except that, for automatic operation, a third distinct rest position may be provided | | N/A |
| | If a separate mechanical indicator is used to indicate the position of the main contacts, colour red shall be used for the on position and green for the off position. | | P |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | The action of the mechanism shall not be influenced by the position of enclosures | | P |
| | If the cover is used as a guiding means for push-button, it shall not be possible to remove this button from the outside | | N |
| | Operating means securely fixed, not possible to remove them without a tool | | P |
| | For the up-down operating means the contacts shall be closed by the up movement. | | P |
| **8.1.3** | **Clearances and creepage distances** | | - |
| **8.1.3** | **Clearances [mm] see table 4** | | - |
| | 1.between live parts (of the main circuits) which are separated when the CB is in off position.....: | | P |
| | 2.between live parts of different polarity.....: | | N |
| | 3.between circuits supplied from different sources, one of which being PELV or SELV..... : | | N |
| | 4. between live parts and | | - |
| | - accessible surfaces of operating means..... : | | P |
| | - screws or other means for fixing covers.....: | | N |
| | - surface on which the base is mounted.....: | | N |
| | - screws or other means for fixing the circuit breaker.....: | | N |
| | - metal covers or boxes.....: | | N |
| | - other accessible metal parts.....: | | P |
| | - metal frames supporting the base (flush-type).. : | | P |
| | 5.between metal parts of mechanism and: | | |
| | - accessible metal parts..... : | | P |
| | - screws or other means for fixing the circuit breaker..... : | | N |
| | - metal frames supporting the base (flush type).. : | | P |
| **8.1.3** | **Creepage distances [mm] (see table 4)** | | - |
| | Material group | | P |
| | 1.between live parts (of the main circuits) which are separated when the CB is in off position.....: | | P |
| | 2.between live parts of different polarity.....: | | N |
| | 3.between circuits supplied from different sources, one of which being PELV or SELV..... : | | N |
| | 4. between live parts and | | N |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | - accessible surfaces of operating means..... : | | N |
| | - screws or other means for fixing covers..... : | | N |
| | - surface on which the base is mounted.....: | | N |
| | - screws or other means for fixing the circuit breaker.....: | | N |
| | - metal covers or boxes.....: | | N |
| | - other accessible metal parts.....: | | P |
| | - metal frames supporting the base (flush-type).. : | | P |
| | 5.between metal parts of mechanism and: | | - |
| | - accessible metal parts.....: | | P |
| | - screws or other means for fixing the circuit breaker..... : | | N |
| | - metal frames supporting the base (flush type).. : | | P |
| **8.1.4** | **Screws, current-carrying parts and connections** | | - |
| 8.1.4.1 | Connections, withstand mechanical stresses occurring in normal use | | N |
| | Screws for mounting of the CB not of the thread-cutting type | | N |
| | Test according to cl. 9.4: | | N |
| | - 10 times (screw Ø / torque Nm) | | N |
| | - 5 times (screw Ø / torque Nm) | | N |
| | Plug in connections tested by plugging in and pulling out five times | | N |
| | After test connections have not become loose nor electrical function impaired | | P |
| 8.1.4.2 | Screws with a thread of insulating material ensured correct introduction | | N |
| 8.1.4.3 | Electrical connection:<br>contact pressure not transmitted through insulating material, unless there is sufficient resilience in the metallic parts | | - |
| | - copper | | N |
| | - alloy 58% copper for worked cold parts | | P |
| | - alloy 50% copper for other parts | | N |
| | - other metal | | N |
| **8.1.5** | **Terminals for external conductors** | | - |
| 8.1.5.1 | Terminals ensure correct connection of conductors (Test acc. to cl. 9.5 or annex J or K) | | P |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| 9.5 | Torque<br>Ø___mm___Nm<br>Ø___mm___Nm<br>Ø___mm___Nm<br>max. sect._____ mm² | | P |
| 9.5.1 | Pull test:<br>min sect._____ mm²<br>max sect._____mm²<br>Pull_____N for 1 min<br><br>During the test conductor does not move noticeably | | P |
| 9.5.2 | min sect._____ ____ mm²<br>Torque (2/3)=_____ Nm<br>max sect._____ mm²<br><br>The conductor shows no damage | | P |
| 9.5.3 | Nominal cross-section from<br>1,0__ to 25___ mm²<br><br>No of wires 7____<br>Ø of wires 0,67_ mm<br><br>Torque (2/3) =_____1,33 Nm<br><br>After the test no wire escaped outside | | P |
| 8.1.5.2 | Terminals allow the connection of conductors of the following cross-sectional areas: (table 5) | | P |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | Rated current (A) / Range of nominal cross sections to be clamped (mm²)<br>≤ 13: 1 to 2,5<br>> 13 ≤ 16: 1 to 4<br>> 16 ≤ 25: 1,5 to 6<br>> 25 ≤ 32: 2,5 to 10<br>> 32 ≤ 50: 4 to 16<br>> 50 ≤ 80: 10 to 25<br>> 80 ≤ 100: 16 to 35<br>> 100 ≤ 125: 25 to 50 | | P |
| | It is required that, for current ratings up to and including 50 A terminals are designed to clamp solid conductors as well as rigid stranded conductors; the use of flexible conductors is permitted | | P |
| | Nevertheless, it is permitted that terminals for conductors having cross-sections from 1 mm² up to 6 mm² are designed to clamp solid conductors only. | | N |
| 8.1.5.3 | Means for clamping the conductors in the terminals not serve to fix any other component (See test sub-clause 9.5) | | P |
| 8.1.5.4 | Terminals for $I_N \leq 32$ A allow the connection of conductors without special preparation | | P |
| 8.1.5.5 | Terminals shall have adequate mechanical strength; ISO thread or equivalent (See tests of sub-clause 9.4 and 9.5.1) | | P |
| 8.1.5.6 | Clamping of conductor without damage to the conductor (See test of sub-clause 9.5.2) | | P |
| 8.1.5.7 | Clamping of conductor between metal surfaces (See tests of sub-clause 9.4 and 9.5.1) | | P |
| 8.1.5.8 | Conductor shall not slip-out when the clamping screw or nuts are tightened (See test of sub-clause 9.5.3) | | P |
| 8.1.5.9 | Terminals shall be properly fixed. No work loose when the clamping screws or nuts are tightened or loosened (See test of sub-clause 9.4) | | P |
| 8.1.5.10 | Clamping screws or nuts of terminals for protective conductors adequately secured against accidental loosening | | N |
| 8.1.5.12 | Screws and nuts of terminals for external conductors shall be in engagement with a metal thread, and the screws shall not be of tapping screw type | | N |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| **8.1.6** | **Non interchangeability** | | - |
| | For circuit-breakers intended to be mounted on bases forming a unit therewith (plug-in or screw-in type) it shall not be possible, without the aid of a tool, to replace a circuit-breaker when mounted as for normal use by another of the same make having a higher rated current, compliance is checked by inspection | | N |
| 8.1.7 | Plug-in type circuit-breakers, the holding in position of which does not depend solely on their plug-in connection(s), shall be reliable and have adequate stability | | N |
| 8.1.7.1 | Plug-in type circuit-breakers, the holding in position of which does not depend solely on their plug-in connection(s)<br>Compliance of the mechanical mounting is checked by the relevant test 9.13 | | N |
| 8.1.7.2 | Plug-in type circuit-breakers, the holding in position of which does depend solely on their plug-in connection(s)<br>Compliance of the mechanical mounting is checked by the relevant test 9.13 | | N |
| **8.2** | **Protection against electric shock** | | P |
| | Live parts not accessible in normal use | | P |
| | For CB, other than plug-in type, external parts, other than screws and other means for fixing covers, which are accessible shall be of insulating material | | N |
| | Unless the live parts are within an internal enclosure of insulating material:<br>Lining<br>- reliable fixed,<br>- adequate thickness and<br>- mechanical strength | | N |
| | Inlet openings for cables shall be in insulating material or be provided with bushings or similar devices in insulating material<br>Such device<br>- shall be reliable fixed<br>- shall have adequate mechanical strength | | N |
| | For plug-in CB, external parts, other than screws and other means for fixing covers, which are accessible shall be in insulating material | | N |
| | Metallic operating means insulated from live parts | | N |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | Metal parts of the mechanism not accessible and insulated from accessible metal parts, metal frames (for flush-type), screws or other means for fixing the base | | P |
| | Replacement of plug-in CB possible without touching live parts | | P |
| | Lacquer or enamel not considered | | N |
| **9.6** | **Test of protection against electric shock** | | - |
| | Use of test finger so designed that each jointed can be turned through an angle of 90° with respect to the finger | | P |
| | Circuit-breaker with enclosures of thermoplastic material are additional tested at 35 °C for 1 min with a force of 75 N | | N |
| **7.10** | **Resistance to heat** | | - |
| | CB sufficiently resistant to heat | | - |
| **9.14** | **Test of resistance to heat** | | - |
| 9.14.1 | Test: | | - |
| | - without removable covers.....1 h (100 ± 2) °C | | P |
| | - removable covers.....1 h (70 ± 2) °C | | N |
| | After the test no access to live parts, marking still legible | | P |
| 9.14.2 | Ball pressure test for external parts of insulating material (parts retaining current-carrying parts and parts of the protective circuit in position)<br>T = 125°C<br>Ø of impression ≤ 2 mm | | P |
| 9.14.3 | Ball pressure test for external parts of insulating material (parts not retaining current-carrying parts and parts of the protective circuit in position<br>T = (70 ± 2)°C or<br>T = ___ °C = (40 ± 2)°C + max. temperature rise of sub-clause 8.8<br>Ø of impression ≤ 2 mm | | P |
| 8.11 | Resistance to abnormal heat and to fire | | - |
| | External parts of insulating material shall not ignite or spread fire under fault or overload conditions | | P |
| **9.15** | **Resistance to abnormal heat and to fire** | | - |
| | Glow wire test:<br>No visible flame, no sustained glowing or flames and glowing extinguish within 30 s | | P |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | external parts retaining current-carrying parts and parts of the protective circuit<br>in position..... (960 ± 15)°C | | P |
| | all other external parts ..... (650 ± 10)°C | | - |
| 8.12 | Resistance to rusting | | - |
| | Ferrous parts adequately protected against rusting | | P |
| 9.16 | Test of resistance to rusting: | | - |
| | - 10 min immersed in a cold chemical degreaser such as methyl-chloroform or refined petrol | | P |
| | - 10 min immersed in a 10% solution of ammoniur chloride in water at 20°C | | P |
| | - 10 min at 95% humidity at 20°C | | P |
| | - 10 min at 100°C | | P |
| | No sign of rust | | - |

| | | | |
|---|---|---|---|
| | **TESTS „B“ 3 samples** | | P |
| **8.3** | **Dielectric properties and isolating capability** | | - |
| | CB shall have adequate dielectric properties and shall ensure isolation: | | P |
| 8.3.1 | Dielectric strength at power frequency | | P |
| | Compliance is checked by the tests 9.7.1, 9.7.2 and 9.7.3 on circuit-breaker in new condition | | P |
| 8.3.2 | Isolating capability | | - |
| | Circuit-breakers shall be suitable for isolation.<br>Compliance is checked by the verification of compliance with the minimum clearances and creepage distances of item 1 of table 4 and by tests of 9.7.6.1 and 9.7.6.3. | | P |
| 8.3.3 | Dielectric strength at rated impulse withstand voltage (Uimp) | | P |
| | Circuit-breakers shall adequately withstand impulse voltages.<br>Compliance is checked by the tests of 9.7.6.2. | | P |
| **9.7** | **Test of dielectric properties and isolating capability** | | - |
| 9.7.1 | Resistance to humidity | | P |
| 9.7.1.1 | Preparation of the circuit-breaker for test | | P |
| | Inlet openings, if any, are left open; if knock-outs are provided, one of them is opened. | | P |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| 9.7.1.2 | Test conditions | | - |
| | The humidity treatment is carried out in humidity cabinet 91% to 95% and the temperature of the air between 20 °C and 30 °C | | P |
| 9.7.1.3 | Test procedure: | | - |
| | The sample is kept in the cabinet for 48 h. | | P |
| 9.7.1.4 | Condition of the circuit-breaker after the test | | - |
| | After this treat, the sample show no damage within the meaning of this standard and shall withstand the tests of 9.7.2 and 9.7.3 | | P |
| 9.7.2 | Insulation resistance of the main circuit | | - |
| 9.7.2 | After an interval between 30 min and 60 min flowing this treatment, the insulation resistance is measured 5 s after application of a d.c. voltage of approximately 500 V, consecutively as follows: | | P |
| | a) In off-position, between the terminals which are electrically connected together when the circuit-breaker is in the closed position ≥ 2 MΩ | | P |
| | b) in off-position, between each pole in turn and the others connected together ≥ 2 MΩ | | P |
| | c) in on-position, between all poles connected together and the frame ≥ 5 MΩ | | P |
| | d) between metal parts of mechanism and the frame ≥ 5 MΩ | | P |
| | e) between the frame and metal foil in contact with the inner surface of the internal enclosure or lining of insulating material ≥ 5 MΩ | | P |
| 9.7.3 | Dielectric strength of the main circuit | | - |
| | After the circuit-breakers have passed the tests of 9.7.2 the test voltage specified in 9.7.5 is applied for 1 min between the parts indicated in 9.7.2 | | P |
| | a) 2000 V | | P |
| | b) 2000 V | | N |
| | c) 2000 V | | P |
| | d) 2000 V | | P |
| | e) 2500 V | | N |
| 9.7.4 | Dielectric strength of the auxiliary and control circuits | | - |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | For these tests, the main circuit shall be connected to the frame. The test voltage specified in 9.7.5 shall be applied for 1 min as follows: | | N |
| | 1) Between all the auxiliary or control circuits and the frame U = ____ V | | N |
| | 2) Between each part of the auxiliary or control circuits which may be isolated from the other parts of the auxiliary or control circuits and these other parts connected together<br>U = [1000 V if Ui ≤ 60 V or<br>2Ui + 1000 V if Ui > 60 V] | | N |
| 9.7.6 | Verification of the impulse withstand voltage (across clearances and across solid insulation) and leakage current across open contacts | | - |
| 9.7.6.1 | Verification of the impulse withstand voltage across open contacts (suitability for isolation) | | - |
| | The 1,2/50µs impulse voltage shall be applied three times for each polarity at intervals of 1s minimum | | - |
| | - rated impulse withstand voltage (kV) : | | - |
| | - sea level of the laboratory: | | - |
| | - test Uimp on open main contacts (equipment suitable for isolating) (see table 13..... : | | - |
| | - no unintentional disruptive discharge during the test's | | P |
| 9.7.6.2 | Verification of impulse withstand voltage for the parts not test in 9.7.6.1 | | |
| | The 1,2/50µs impulse voltage shall be applied three times for each polarity at intervals of 1s minimum | | - |
| | - rated impulse withstand voltage (kV) : | | - |
| | - sea level of the laboratory: | | - |
| | - test Uimp main circuits (see table 14) : | | - |
| | Application of test voltage | | - |
| | i) Between all the phase pole(s) connected together and to the neutral pole (or path) of the circuit-breaker | | N |
| | ii) Between all the phase pole(s) and the neutral pole (or path) connected together and the metal support connected to the terminals intended for the protective conductor(s) | | P |
| | - no unintentional disruptive discharge during the test's | | P |

| EN 60898-1:2019 | | | | | | |
|---|---|---|---|---|---|---|
| Cl. | Requirement – Test | Result | | | | Verdict |
| 9.7.6.3 | Verification of leakage currents across open contacts (suitability for isolation) | | | | | - |
| | For circuit-breakers suitable for isolation, the leakage current shall be measured. Each pole having been submitted to the test of 9.12.11.2, or 9.12.11.3, or 9.12.11.4.2 or 9.12.11.4.3 is supplied at a test voltage of 1,1 times its rated operational voltage, the circuit-breaker being in the open position | | | | | - |
| | The leakage current flowing across the open contacts is measured and shall not exceed 2 mA | | | | | P |
| **8.4** | **Temperature rise** | | | | | - |
| | Temperature rise does not exceed the limiting values stated in table V: | | | | | P |
| 9.8.2 | Test current: $I_N$= (reach the steady-state value)<br>Four-pole CB's:<br>1) three poles loaded<br>2) one pole and neutral pole loaded | | | | | - |
| | Ambient air temperature..... : | | | | | - |
| | Parts..... Temperature rise [K] | | | | | |
| | L1 | - | - | - | | - |
| | L2 | - | - | - | | |
| | L3 | - | - | - | | |
| | L4(N) | - | - | - | | |
| | L3 | - | - | - | | |
| | N | - | - | - | | |
| | Terminals for external connections.....60 | | | | | P |
| | External parts liable to be touched during manual operation of the circuit-breaker, including operating means of insulating material and metallic means for coupling of insulating operating means of several poles.....40 | | | | | P |
| | External metallic parts of operating means.....25 | - | - | - | | N/A |
| | Other external parts, including that face of the circuit-breaker is in direct contact with the mounting surface.....60 | | | | | P |
| **9.8.5** | **Measurement of power losses** | | | | | - |
| | Power loss do not exceed the values stated in table 15 | | | | | P |

| EN 60898-1:2019 | | | | | |
|---|---|---|---|---|---|
| Cl. | Requirement – Test | Result | | | Verdict |
| | | | | | P |
| | Test current: $I_N$ = _____ A (reach the steady state value) | | | | |
| | Loaded one pole after the other | | | | |
| | Max. power loss : _____ W | | | | |
| | L1 | 6,9 | 6,3 | 9,2 | P |
| | L2 | - | - | - | |
| | L3 | - | - | - | |
| | L4(N) | - | - | - | |
| | L3 | - | - | - | |
| | N | - | - | - | |
| 8.5 | Uninterrupted duty | | | | - |
| | Circuit-breakers operate reliable even after long service | | | | P |
| **9.9** | **28 day test** | | | | - |
| | 28 cycles - 21 h with current<br>- 3 h without current<br>cross sectional area. ____ mm² | | | | - |
| | During the test no tripping during the last period, temperature rise shall be measured | | | | P |
| | Ambient air temperature..... : | | | | - |
| | Parts..... Temperature rise [K] | | | | - |
| | Terminals for external connections.....75 | | | | P |
| | The temperature rise does not exceed the value measured during the temperature rise test (subclause 8.8) by more than 15 K | | | | P |
| | Test current 1,45 $I_N$ =___91,4_____A | | | | P |
| | - Tripping within | | | | - |
| | - 1h (≤ 63 A) | | | | P |
| | - 2h (> 63 A) | | | | N |

| | | | | | |
|---|---|---|---|---|---|
| | **TESTS „C“ 3 samples** | **C1** | **C2** | **C3** | - |
| 8.7 | Mechanical and electrical endurance | | | | - |

| EN 60898-1:2019 | | | | | |
|---|---|---|---|---|---|
| Cl. | Requirement – Test | Result | | | Verdict |
| | Circuit-breaker shall be capable to perform an adequate number of cycles with rated current | | | | - |
| 9.11.1 | General test conditions | | | | - |
| | Test:<br>Test Voltage __240____V (rated voltage)<br>Test Current ___63___A (rated current)<br>Power factor _____(0,85-0,9)<br>Par. resistor _____ Ohm<br>Cross sect. area ____mm² | | | | P |
| **9.11.2** | **Test procedure** | | | | - |
| | The circuit-breaker is submitted to 4000 operating cycles with rated current. | | | | - |
| | - $I_N \leq 32$ A: 2 s on - 13 s off | | | | N |
| | - $I_N > 32$ A: 2 s on - 28 s off | | | | N |
| | During the test the circuit-breaker shall be operated as in normal use. | | | | |
| **9.11.3** | **Condition of the circuit-breaker after the test** | | | | |
| | Following the test 9.11.2 the sample shall not show: | | | | P |
| | - undue wear | | | | P |
| | - discrepancy between the position of the moving contacts and corresponding position of the Indicating device | | | | P |
| | - damage to the enclosure permitting access to live parts by test finger (see 9.6 | | | | P |
| | - loosening of electrical or mechanical connections | | | | P |
| | - seepage of sealing compound | | | | N |
| | Moreover test current.....2,55 $I_N$__161___A | | | | - |
| | Opening time not less 1 s or more than | | | | - |
| | - 60 s ( $\leq 32$ A) | - | - | - | - |
| | - 120 s ( $> 32$ A) | | | | P |
| | Dielectric strength reduced to 1500 V *)see Appendix 1 | | | | - |
| **9.12.11.2** | **Test at reduced short-circuit currents** | | | | - |
| 9.12.11.2.1 | Test on all circuit-breakers | | | | - |
| 9.12.11.2.1 | Test at reduced short-circuit currents: Fig. 3 | | | | - |
| | Test current: | | | | - |
| | - 500 A or 10 In | | | | P |

| EN 60898-1:2019 | | | | | |
|---|---|---|---|---|---|
| Cl. | Requirement – Test | Result | | | Verdict |
| | Test voltage 1,05 Un | | | | P |
| | Power factor 0,93-0,98 | _____ | | | -- |
| 9.12.9.1 | Test in free air<br>copper wire F': ☐ 0,12 mm / ☐ 0,16 mm<br>resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm | | | | P |
| 9.12.9.2 | Test in enclosures<br>copper wire F': ☐ 0,12 mm / ☐ 0,16 mm<br>resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm | | | | N |
| | $I_{Peak}$ (A) max. value | | | | -- |
| | Sequence: 6 x "0" and 3 x "CO" | [$kA^2s$] | [$kA^2s$] | [$kA^2s$] | -- |
| | Max. $I^2t \leq$ _____$kA^2s$ | | | | - |
| | - No permanent arcing | | | | - |
| | - No flash-over between poles or between poles and frame | | | | - |
| | - No blowing of the fuses F and F′ | | | | - |
| | - Polyethylene foil shows no holes | | | | |
| | After the test: | | | | -- |
| **9.12.12** | **Verification of the circuit-breaker after short-circuit tests** | | | | P |
| 9.12.12.1 | The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests. | | | | P |
| | a) leakage current across open contacts, according to 9.7.6.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position | C1-1 (mA) | C1-2 (mA) | C1-3 (mA) | - |
| | The leakage current shall not exceed 2 mA L1 | | | | - |
| | L2 | | | | - |
| | L3 | | | | - |
| | L4(N) | | | | - |
| | Electric strength test: | | | | P |
| | Test voltage 1500 V (see 8.7.2) | | | | P |
| | a) | | | | P |
| | b) | | | | - |
| | c) | | | | - |
| | d) | | | | - |
| | e) 2000 V | | | | - |

| EN 60898-1:2019 | | | | | |
|---|---|---|---|---|---|
| Cl. | Requirement – Test | Result | | | Verdict |
| **9.12.11.2.2** | **Short-circuit test on circuit-breakers rated 230 V, or 240 V or 230/400 V for verifying for use in IT systems** | | | | |
| | Test current: | Obtained | | | P |
| | - 500 A or 1,2 times the upper limit of the standard range of instantaneous tripping (see table 2 ) whichever is the higher, but < 2500 A. When tripping exceed 20 In the current adjusted at 1,2 times the upper limit even when higher 2500 A | | | | P |
| | Test voltage 1,05 Un | | | | P |
| | Power factor 0,93-0,98 | | | | -- |
| 9.12.9.1 | Test in free air<br>copper wire F': ☐ 0,12 mm / ☐ 0,16 mm<br>resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm | | | | P |
| 9.12.9.2 | Test in enclosures<br>copper wire F': ☐ 0,12 mm / ☐ 0,16 mm<br>resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm | | | | P |
| | $I_{Peak}$ (A) max. value | | | | -- |
| | Sequence: "0" + "CO" on each protected pole | [$kA^2s$] | [$kA^2s$] | [$kA^2s$] | -- |
| | Shifted point 30 ° on the other protected pole | C2-1 | C2-2 | C2-3 | -- |
| | Max. $I^2t \leq$ _____$kA^2s$ L1<br>L2<br>L3<br>L4 | ___<br>___<br>___<br>___ | ___<br>____<br>___<br>___ | ___<br>___<br>___<br>___ | P |
| | - No permanent arcing | | | | P |
| | - No flash-over between poles or between poles and frame | | | | P |
| | - No blowing of the fuses F and F′ | | | | P |
| | - Polyethylene foil shows no holes | | | | P |
| | After the test: | | | | -- |
| **9.12.12.1** | **The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.** | | | | - |
| | a) leakage current across open contacts, according to 9.7.6.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position | C2-1 (mA) | C2-2 (mA) | C2-3 (mA) | - |
| | The leakage current shall not exceed 2 mA L1 | | | | P |
| | L2 | | | | P |

| EN 60898-1:2019 | | | | | |
|---|---|---|---|---|---|
| Cl. | Requirement – Test | Result | | | Verdict |
| | L3 | | | | P |
| | L4(N) | | | | P |
| | Electric strength test: | | | | |
| | Test voltage 1500 V (see 8.7.2) | | | | P |
| | a) | | | | P |
| | b) | | | | P |
| | c) | | | | P |
| | d) | | | | P |
| | e) 2000 V | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | **TESTS „D“ 3 samples** | | | | - |
| **8.6** | **Automatic operation** | | | | P |
| 8.6.1 | Standard time-current zone | | | | P |
| | Tripping characteristic of CB ensures adequate protection of the circuit, without premature operation. | | | | P |
| **9.10** | **Tests: DO** | **DO 1** | **DO 2** | **DO 3** | P |
| | $I_N$ (A) | | | | - |
| | Sect. (mm²) | | | | - |
| | Instantaneous tripping current | | | | -- |
| 9.10.1 | Test of time-current characteristic | | | | P |
| 9.10.1.1 | Test current 1,13 $I_N$ (A) starting from cold for: | | | | -- |
| | - 1 h ($I_N \leq 63$ A) | | | | P |
| | - 2 h ($I_N > 63$ A) | | | | P |
| | No tripping | | | | P |
| | Then steadily increased within 5 s to 1,45 $I_N$ (A) | | | | -- |
| | - Tripping within | | | | P |
| | - 1h ($\leq 63$ A) | | | | P |
| | - 2h (> 63 A) | | | | P |
| 9.10.1.2 | Test current 2,55 $I_N$ (A) starting from cold for: | | | | -- |
| | opening time not less than 1 s or more than | | | | P |
| | - 60 s | | | | P |
| | - 120 s | | | | P |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| 9.10.2 | Test of instantaneous tripping and of correct opening of the contacts | | P |
| 9.10.2.1 | General test conditions | | P |
| | For the lower values of the test current the test is made once, at any convenient voltage. | | P |
| | For the upper values of the test current the test is made at rated voltage Un( phase to neutral) with a power factor between 0,95 and 1. | | P |
| | The sequence of operation is : O-CO-CO-CO<br>Interval time: > 3 min | | P |
| | The tripping time of the O operation is measured | | P |
| | After each operation the indicating means shall show the open position of the contacts | | P |
| 9.10.2.2 *) | ☐ For circuit-breakers of the B - Type | | P |
| *see Appendix 1 | Test current $3I_N$ (A), starting from cold | | -- |
| | Opening time: | | -- |
| | - 0,1s ≤ t *[≤ 45s (≤ 32A) *)acc. EN60898]* | | |
| | - 0,1s ≤ t *[≤ 90s (> 32A) *)acc. EN60898]* | | P |
| | Test current 5 $I_N$ (A), starting from cold | | P |
| | Tripping less than 0,1 s | | P |
| 9.10.2.3 *) | ☐ For circuit-breakers of the C - Type | | P |
| *see Appendix 1 | Test current $5I_N$ (A), starting from cold | | -- |
| | Opening time: | | -- |
| | - 0,1s ≤ t *[≤ 15s (≤ 32A) *)acc. EN60898]* | | P |
| | - 0,1s ≤ t *[≤ 30s (> 32A) *)acc. EN60898]* | | P |
| | Test current 10 $I_N$ (A), starting from cold | | P |
| | Tripping less than 0,1 s | | P |
| 9.10.2.4 *) | ☐ For circuit-breakers of the D - Type | | P |
| *see Appendix 1 | Test current $10I_N$ (A), starting from cold | | -- |
| | Opening time: | | -- |
| | - 0,1s ≤ t *[≤ 4s (≤ 32A) *)acc. EN60898]* | | P |
| | - 0,1s ≤ t *[≤ 8s (> 32A) *)acc. EN60898]* | | P |
| | Test current 20 $I_N$ (A) or to the maximum instantaneous tripping current(see cl. 6, item j), starting from cold | | P |
| | Tripping less than 0,1 s | | P |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| 9.10.3 | Test of effect of single pole loading on the tripping characteristic of multipole circuit-breakers: | | P |
| | Test current 1,1 It (A), (two pole) starting from cold | | -- |
| | Tripping within | | -- |
| | - 1h | | P |
| | - 2h | | P |
| | Test current 1,2 It (A), (three pole or four pole) starting from cold | | -- |
| | Tripping within | | -- |
| | - 1h | | P |
| | - 2h | | P |
| 9.10.4 | Test of effect of ambient temperature on the tripping characteristics | | P |
| | a) Ambient temperature of (35 ± 2)°C below the ambient air reference temperature | | P |
| | Test current 1,13 $I_N$ (A) | | -- |
| | - Passed for 1h | | P |
| | - Passed for 2h | | P |
| | Current is then steadily increased to 1,9 $I_N$ (A) within 5s | | -- |
| | Tripping within | | -- |
| | - 1h | | P |
| | - 2h | | P |
| | b) Ambient temperature of (40 ± 2)°C | | P |
| | Test current $I_N$ (A) | | -- |
| | No tripping within | | -- |
| | - 1h | | P |
| | - 2h | | P |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | **Tests: D1** | **$D1_1$ $D1_2$ $D1_3$** | P |
| **8.9** | **Resistance to mechanical shock and impact** | | P |
| | CB shall have adequate mechanical behaviour so as to withstand the stresses imposed during installation and use | | P |
| **9.13.1** | **Mechanical shock** | | P |
| | - 50 falls on two sides of vertical board C | | P |
| | - Vertical board turned 90° | | P |
| | - 50 falls on two sides of vertical board C | | P |
| | During the test the circuit-breakers shall not open | | P |
| 9.13.2 | Mechanical impact | | P |
| 9.13.2.1 | All types: | | P |
| | - Impact test: 10 blows-height 10 cm, no damage | | P |
| 9.13.2.2 | Screw-in types: | | P |
| | - Torque 2,5 Nm for 1 min, no damage | | P |
| 9.13.2.3 | CB intended to be mounted on a rail | | P |
| | - downward vertical 50 N for 1 min | | P |
| | - upward vertical 50 N for 1 min, no damage | | P |
| 9.13.2.4 | Plug-in types | | P |
| | The circuit-breaker are mounted in there normal position, complete with plug-in base but without cables and any cover plate | | P |
| | A force of 20 N applied for 1min to the circuit-breaker (see fig 17). | | P |
| | During this test the circuit-breaker part shall not become loose from the base and shall not show damage impairing further use. | | P |
| **9.12.11.3** | **Test at 1500 A:** | | P |
| | Prospective current of 1500 A - power factor 0,93 to 0,98 | | P |
| | Prospective current obtained (A) | | -- |
| | Power factor | | -- |
| | Test voltage 1,05 Un | | P |
| | Test circuit: figure | | -- |
| | T (min) | | -- |

| EN 60898-1:2019 | | | | | |
|---|---|---|---|---|---|
| Cl. | Requirement – Test | Result | | | Verdict |
| 9.12.9.1 | Test in free air<br>copper wire F': ☐ 0,12 mm / ☐ 0,16 mm<br>resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm | | | | P |
| 9.12.9.2 | Test in enclosures<br>copper wire F': ☐ 0,12 mm / ☐ 0,16 mm<br>resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm | | | | P |
| | Sequence | | | | -- |
| | $I_{Peak}$ (A) max. value | | | | -- |
| | $I^2t \leq$ _____ $kA^2s$ | [$kA^2s$] | [$kA^2s$] | [$kA^2s$] | -- |
| | Max. $I^2t \leq$ _____$kA^2s$ L1<br>L2<br>L3<br>N | ___<br>___<br>___<br>___ | ___<br>____<br>___<br>___ | ___<br>___<br>___<br>___ | P |
| | - No permanent arcing | | | | P |
| | - No flash-over between poles or between poles and frame | | | | P |
| | - No blowing of the fuses F and F′ | | | | P |
| | - Polyethylene foil shows no holes | | | | P |
| | After the test: | | | | -- |
| 9.12.12.1 | The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests. | | | | P |
| | a) leakage current across open contacts, according to 9.7.6.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position | D-1 (mA) | D-2 (mA) | D-3 (mA) | P |
| | The leakage current shall not exceed 2 mA L1 | | | | P |
| | L2 | | | | P |
| | L3 | | | | P |
| | L4(N) | | | | P |
| | Electric strength test: | | | | P |
| | Test voltage 1500 V (see 8.7.2) | | | | P |
| | a) | | | | P |
| | b) | | | | P |
| | c) | | | | P |
| | d) | | | | P |
| | e) 2000 V | | | | P |

| EN 60898-1:2019 | | | | | |
|---|---|---|---|---|---|
| Cl. | Requirement – Test | Result | | | Verdict |
| | Test current 0.85x non tripping current (1,13 $I_N$ ) | | | | -- |
| | - Passed for 1h | | | | P |
| | - Passed for 2h | | | | P |
| | Current is then steadily increased to 1,1 x tripping current (1,45 $I_N$ ) within 5s | | | | -- |
| | | D1<br>min | D2<br>min | D3<br>min | P |
| | Tripping within ☐ 1 hour / ☐ 2 hour | _____ | _____ | _____ | P |

| | | | | | |
|---|---|---|---|---|---|
| | **TESTS „E“ 3 + 3 samples** **) see Appendix 1* | | | | P |
| **8.12.11.4.2** | **Test: E1(Test at service short-circuit capacity)** | **$E_{1-1}$** | **$E_{1-2}$** | **$E_{1-3}$** | **P** |
| | Service short-circuit capacity..... : | | | | -- |
| | Test circuit: figure..... : | | | | -- |
| | Prospective current..... : | | | | -- |
| | Prospective current obtained..... : | | | | -- |
| | Power factor..... : | | | | -- |
| | Power factor obtained..... : | | | | -- |
| | Sequence..... : | | | | -- |
| | T (min)..... : | | | | -- |
| 9.12.9.1 | Test in free air<br>copper wire F': ☐ 0,12 mm / ☐ 0,16 mm<br>resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm | | | | P |
| 9.12.9.2 | Test in enclosures<br>copper wire F': ☐ 0,12 mm / ☐ 0,16 mm<br>resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm | | | | P |
| | $I_{Peak}$ (A) max. value..... : | | | | -- |
| | $I^2t \leq$ _____ $kA^2s$ | [$kA^2s$] | [$kA^2s$] | [$kA^2s$] | -- |
| | Max. $I^2t \leq$ _____$kA^2s$ L1<br>L2<br>L3<br>N | ___<br>___<br>___<br>___ | ___<br>____<br>___<br>___ | ___<br>___<br>___<br>___ | P |
| | - No permanent arcing | | | | P |
| | - No flash-over between poles or between poles and frame | | | | P |
| | - No blowing of the fuses F and F′ | | | | P |

| EN 60898-1:2019 | | | | | |
|---|---|---|---|---|---|
| Cl. | Requirement – Test | Result | | | Verdict |
| | - Polyethylene foil shows no holes | | | | P |
| | After the test: | | | | -- |
| **9.12.12.1** | **The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests.** | | | | P |
| | a) leakage current across open contacts, according to 9.7.6.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position | E1-1 (mA) | E1-2 (mA) | E1-3 (mA) | P |
| | The leakage current shall not exceed 2 mA L1 | | | | P |
| | L2 | | | | P |
| | L3 | | | | P |
| | L4(N) | | | | P |
| | Electric strength test: | | | | P |
| | Test voltage 1500 V (see 8.7.2) | | | | P |
| | a) | | | | P |
| | b) | | | | P |
| | c) | | | | P |
| | d) | | | | P |
| | e) 2000 V | | | | P |
| | Test current 0.85x non tripping current (1,13 $I_N$ ) | | | | -- |
| | - Passed for 1h | | | | P |
| | - Passed for 2h | | | | P |
| | Current is then steadily increased to 1,1 x tripping current (1,45 $I_N$ ) within 5s | | | | -- |
| | | E1-1 min | E1-2 min | E1-3 min | - |
| | Tripping within ☐ 1 hour / ☐ 2 hour | _____ | _____ | _____ | - |

| EN 60898-1:2019 | | | | | |
|---|---|---|---|---|---|
| Cl. | Requirement – Test | Result | | | Verdict |
| | **TESTS „E2“ 3 or 4 samples** | | | | P |
| **9.12.11.4.3** | **Test: E2 (Test at rated short-circuit capacity)** | **$E_{2-1}$** | **$E_{2-2}$** | **$E_{2-3}$** | **P** |
| | Service short-circuit capacity..... : | | | | -- |
| | Test circuit: figure..... : | | | | -- |
| | Prospective current..... : | | | | -- |
| | Prospective current obtained..... : | | | | -- |
| | Power factor..... : | | | | -- |
| | Power factor obtained..... : | | | | -- |
| | Sequence..... : | | | | -- |
| | T (min)..... : | | | | -- |
| 9.12.9.1 | Test in free air<br>copper wire F': ☐ 0,12 mm / ☐ 0,16 mm<br>resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm | | | | P |
| 9.12.9.2 | Test in enclosures<br>copper wire F': ☐ 0,12 mm / ☐ 0,16 mm<br>resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm | | | | P |
| | $I_{Peak}$ (A) max. value..... : | | | | -- |
| | $I^2t \leq$ _____ $kA^2s$ | [$kA^2s$] | [$kA^2s$] | [$kA^2s$] | -- |
| | Max. $I^2t \leq$ _____$kA^2s$ L1<br>L2<br>L3<br>N | ___<br>___<br>___<br>___ | ___<br>___<br>___<br>___ | ___<br>___<br>___<br>___ | P |
| | - No permanent arcing | | | | P |
| | - No flash-over between poles or between poles and frame | | | | P |
| | - No blowing of the fuses F and F′ | | | | P |
| | - Polyethylene foil shows no holes | | | | P |
| | After the test: | | | | -- |
| 9.12.12.1 | The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests. | | | | P |
| | a) leakage current across open contacts, according to 9.7.6.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit – breaker is in the open position | $E_{2-1}$ (mA) | $E_{2-2}$ (mA) | $E_{1-3}$ (mA) | P |
| | The leakage current shall not exceed 2 mA L1 | | | | P |

| EN 60898-1:2019 | | | | | |
|---|---|---|---|---|---|
| Cl. | Requirement – Test | Result | | | Verdict |
| | L2 | | | | P |
| | L3 | | | | P |
| | L4(N) | | | | P |
| | Electric strength test: | | | | P |
| | Test voltage 900 V (see 9.7.3) | | | | P |
| | a) | | | | - |
| | b) | | | | - |
| | c) | | | | - |
| | d) | | | | - |
| | e) 2000 V | | | | - |
| | Test current 2,8 $I_N$ | | | | - |
| | Tripping within > 0,1 s up to | (s) | (s) | (s) | - |
| | - 60 s | | | | - |
| | - 120 s | | | | - |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | Annex J | | - |
| | Particular requirements for circuit-breakers with screw less type terminals for external copper conductors (In not exceeding 20 A, cross-sectional area up to 4 $mm^2$ | | - |
| **J.6** | **Marking** | | **P** |
| | Universal terminals | | -- |
| | - no marking | | P |
| | Non-universal | | -- |
| | - declared for rigid-solid conductors ..... | | P |
| | - declared for rigid(solid and stranded)..... | | P |
| | - declared for flexible conductors..... | | P |
| | The markings should appear on the circuit-breaker or, if available space is not sufficient, on smallest package unit or in technical information ..... | | P |
| | Indication of length of insulation to be removed on the circuit-breaker..... | | P |
| **J.7** | **Standard conditions for operation in service** | | P |
| | Clause 7 applies | | P |
| **J.8** | **Constructional requirements** | | P |
| | Clause 8 applies with the follow modifications: | | P |
| | In clause 8.1.5 only –5.1, -5.2. –5.3, - 5.6 and - .5.7 apply | | P |
| | Compliance is checked by inspection and by the tests of J.9.1 and J.9.2 | | P |
| **J.8.1** | **Connection or disconnection of conductors** | | P |
| | The connection or disconnection shall be made by: | | P |
| | A general purpose tool or by a convenient device integral with the terminal or | | P |
| | , for rigid conductors by simple insertion | | P |
| | For disconnection an operation other than a pull shall be necessary (push-wire terminals) | | P |
| | Universal terminals shall accept rigid (solid or stranded and flexible unprepared conductors | | P |
| | Non-universal terminals shall accept conductors declared by the manufacturer | | P |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | Compliance is checked by inspection and by the tests of J.9.1 and J.9.2 | | P |
| **J.8.8.2** | **Dimensions of connectable conductors** | | P |
| | The dimensions of connectable conductors are given in table J.1 | | P |
| | The ability to connect these conductors shall be checked by inspection and by the tests of J.9.1 and J.9.2 | | P |
| **J.8.3** | **Connectable cross-sectional areas** | | P |
| | The nominal cross-sections to be clamped are given in table j.2 | | P |
| | Compliance is checked by inspection and by the tests of J.9.1 and J.9.2 | | P |
| **J.8.4** | **Insertion and connection of conductors** | | P |
| | The insertion and disconnection of the conductors shall be made in accordance with the manufacturer's instructions | | P |
| **J.8.5** | **Design and construction of terminals** | | P |
| | Terminals shall be designed and constructed that: | | P |
| | - each conductor is clamped individually | | P |
| | - connection or disconnection connectors connected or disconnected separate or same | | P |
| | - inadequate insertion of the conductor is avoided | | P |
| | Compliance is checked by inspection and by the tests of J.9.1 and J.9.2 | | P |
| **J.8.6** | **The terminals shall be resistant to ageing** | | P |
| | Compliance is checked by the tests of J.9.3 | | P |
| **J.9** | **Tests** | | P |
| | Clause 9 applies, by replacing 9.4 and 9.5 by the follow | | P |
| **J.9.1** | **Test of reliability of screw less terminals** | | P |
| **J.9.1.1** | **Reliability of screw less system** | | - |
| | 5 times connection and disconnection | | P |
| | 3 rigid conductors min. cross-section<br>max. cross-section | | P |
| | 3 flexible conductors min. cross-section<br>max. cross-section | | P |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | After tests, the terminal shall not be damage in such a way as to impair its further use | | P |
| **J.9.1.2** | **Test of reliability of connection** | | - |
| | 3 terminals of poles of new sample are fitted with new copper conductors according table J.2 | | P |
| | rigid conductors min. cross-section<br>max. cross-section | | P |
| | flexible conductors min. cross-section<br>max. cross-section | | P |
| | Each conductor is either pushed as far as possible into the terminal or shall be inserted so that adequate connection is obvious | | P |
| | After tests, no wire of the conductor shall have escaped outside the terminals | | P |
| **J.9.2.** | **Tests of reliability of terminals for external conductors: Mechanical strength** | | P |
| | Three terminals of new samples are fitted with new conductors of the type and of the minimum and maximum cross sectional area according table J.2. | | P |
| | Each conductor is subjected to a pull force of value shown in table J.3. for 1 min | | P |
| | Terminal screw torque : $^2/_3$ of table 10 | | P |
| | rigid conductors min. cross-section<br>max. cross-section | | P |
| | flexible conductors min. cross-section<br>max. cross-section | | P |
| | During the test the conductor shall not slip out of the terminal | | P |
| **J.9.3.** | **Cycling test** | | - |
| | The test is carried out with new copper conductors having a cross sectional area according table 9 | | P |
| | The test is carried out on new samples( a sample is one pole, the number of which is defined below, according the type of terminal | | P |
| | - universal terminals for rigid (solid and stranded) and flexible conductors | | P |
| | - non-universal terminals for solid conductors only | | P |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | -- non- universal terminals for rigid (solid and stranded) conductors | | P |
| | - non-universal terminals for flexible conductors only | | P |
| | The conductors is connected in series as in normal use to each of the three samples as defined on fig. J.1. | | P |
| | The sample is provided with a hole or equivalent in order to measured the voltage drop on the terminal | | P |
| | The test arrangement is placed in a heating cabinet which is initially on 20°C | | P |
| | Except the cooling period the test current (rated current) is applied to the circuit | | P |
| | The samples shall be subjected to 192 temperature cycles, each cycle having a duration of +/- 1 hour | | P |
| | Description of the temperature cycle:<br>In 20 min raised to 40°C, maintained for 10 min, then cool down in 20 min to 30 °C, maintained for 10 min. For measurement of the voltage drop it is allowed to cool down to 20 °C | | P |
| | The maximum voltage drop, measured on each terminal, at the end of the 192nd cycle, with Inom. shall not exceed the smaller of the two following values<br>- either 22,5 mV<br>- or 1,5 times the value measured after the 24 cycle | | P |
| | Sample<br>after 24 cycles: rigid conductors (mV)<br>flexible conductors (mV) | | P |
| | Sample<br>after 192 cycles: rigid conductors (mV)<br>flexible conductors (mV) | | P |
| | After this test the samples shall shown no changes evidently impairing further use, such as cracks, deformations or like | | P |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | Annex K | | - |
| | Particular requirements for circuit-breakers with flat quick-connect terminations | | - |
| **K.6.** | **Marking** | | - |
| | The whole of clause 6 applies | | P |
| | Addition after the lettered item k | | -- |
| | The following information regarding the female connector according to IEC 61210 and the type of conductor to be used shall be given in the manufacturers instructions | | P |
| | l) manufacturers name or trade mark | | -- |
| | m) type reference | | P |
| | n) information on cross-sections of conductors and colour code of insulating female connectors (see table K.1) | | P |
| | o) the use of only silver or tin-plated copper alloys | | P |
| **K.7** | **Standard conditions for operation in service** | | - |
| | Clause 7 applies | | P |
| **K.8** | **Constructional requirements** | | - |
| | Clause 8 applies with the follow modifications: | | P |
| | *replacement of 8.1.3 by:* | | P |
| **K.8.1** | **Clearances and creepage distances (see annex B)** | | - |
| | Subclause 8.1.3 applies, the female connectors being fitted to the male tabs of the circuit-breaker | | P |
| | *Replacement of 8.1.5 by:* | | P |
| **K.8.2** | **Terminals for external conductors** | | - |
| K.8.2.1 | Male tabs and female connectors shall be of a metal having mechanical strength, electrical conductivity and resistance to corrosion adequate for their intended use | | P |
| K.8.2.2 | The nominal width of male tab is 6,3 mm and the thickness 0,8 mm, applicable to rated currents up to and including 16 A<br>NOTE 1 The use for rated currents up to and including 20 A is accepted in BE, FR, IT, pT, ES and US | | P |
| | The dimensions of the male tab shall comply with those specified in table K.3 and in figures K.2, K3, K4, K5, where the dimensions A, B, C, D, E, F, J, M, N and Q are mandatory | | P |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | The dimensions of the female connector which may be fitted-on are given in figure K.6 and in table K.4 | | P |
| | Compliance is checked by inspection and by measurement | | P |
| **K.8.2.3** | **Male tabs shall be securely retained** | | P |
| | Compliance is checked by the mechanical overload test of K.9.1 | | P |
| | | | |
| **K.9** | **Tests** | | P |
| | Clause 9 applies, with follow modifications: | | P |
| | *Replacement of 9.5* | | P |
| **K.9.1** | **Mechanical overload-force** | | P |
| | 10 terminals of circuit-breakers, mounted as normal use are subjected to a axial push force and successively the axial pull force specified in table K2 applied to male tab once | | P |
| | No damage which could impair further use shall occur to the tab or to the circuit-breaker in which the tab is integrated | | P |
| | *Addition to 9.8.3:* | | P |
| | Fine –wire thermocouples shall be placed in such a way as not to influence the contact or the connection area. An example of placement is shown in fig K.1 | | P |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | Annex L | | - |
| | Specific requirements for circuit-breakers with screw-type terminals for external untreated aluminium conductors and with aluminium screw-type terminals for use with copper or with aluminium conductors | | - |
| **L.6** | **Marking** | | - |
| | In addition to clause 6 the following apply: | | P |
| | Terminal marking according table L.1, on the circuit breaker, near the terminals | | - |
| | Conductor types accepted: | | P |
| | Copper only | | P |
| | Aluminium only | | P |
| | Aluminium and copper | | P |
| | Other information concerning the number of conductors, screw torque (if different from table 10) and cross-section shall be indicated on the circuit-breaker | | P |
| **L.7** | **Standard conditions for operation in service** | | P |
| | Clause 7 applies | | P |
| **L.8** | **Constructional requirements** | | P |
| | Clause 8 applies with the following exeptions: | | P |
| 8.1.5.2 | *is completed by:* | | P |
| | For connection of aluminium conductors, circuit-breakers shall be provided with screw-type terminals allowing the connection of conductors having nominal cross-sections as shown in table L.2 | | P |
| | Terminals for the connection of aluminium conductors and terminals of aluminium for the connection of copper or aluminium conductors shall have mechanical strength adequate to withstand the tests of 9.4, with the test conductors tightened with the torque indicated in table 10, or with the torque specified by the manufacturer, which shall never be lower than that specified in table 10. | | P |
| | Comliance is checked by inspection, by measurement and by fitting in turn one conductor of the smallest and one of the largest cross-section areas as specified | | P |
| 8.1.5.4 | Terminals shall allow the conductors to be connected without special preparation | | P |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | Compliance is checked by inspection and by the tsets of L.9 | | P |
| | | | P |
| **L.9** | **Tests** | | P |
| | Clause 9 applies with the following modifications/additions: | | P |
| | For the tests which are influenced by the material of the terminal and the type of conductor that can be connected, the test conditions of table L.3 are applied | | P |
| | Additionally the test of L.9.2 is carried out on terminals seperated from the circut-breaker | | P |
| **L.9.2** | **Current cycling test** | | P |
| | This test is carried out on seperate terminals | | P |
| | The general arrangement of the samples shall be as shown in figure L.1 | | P |
| | 90 % of torque stated by the manufacturer or selected in table 10 used for the specimens | | P |
| | The test is carried out with conductors according to table L.5. The length of the test conductor from the point of entry to the screw-type terminal specimens to the equalizer shall be as in table L.6 | | P |
| | Cross section of equalizer not greater than that given in table L.7 | | P |
| L.9.2.4 | Test method and acceptance criteria | | P |
| | Test loop subjected to 500 cycles of 1h current-on and 1h current-off, starting at an a.c. current value of 1,12 times the test current value determined in table L.8 | | P |
| | Near the end of each current-on period of the first 24 cycles, the current shall subsequently be adjusted to raise the temperature of the reference conductor to 75°C | | P |
| | At the end of the 25$^{th}$ cycle the test current shall be adjusted the last time and the stable temperature shall be recorded as the first measurement. No further adjustment of test current for the remainder of the test | | P |
| | Temperatures recorded for at least one cycle of each workin day, and after approximately 25, 50, 75, 100, 125, 175, 225, 350, 425 and 500 cycles | | P |

| EN 60898-1:2019 | | | | |
|---|---|---|---|---|
| Cl. | Requirement – Test | Result | | Verdict |
| | For each screw-type terminal | | | P |
| | - the temperature rise shall not exceed 110 K | | | P |
| | - the stability factor Sf shall not exceed ± 10 °C | | | - |
| | ambient air temperature: _____°C | max. temperature rise [K] | max. stability factor Sf [°C] | - |
| | Terminal 1 | | | P |
| | Terminal 2 | | | P |
| | Terminal 3 | | | P |
| | Terminal 4 | | | P |
| | Terminal 5 | | | P |
| | Terminal 6 | | | P |
| | Terminal 7 | | | P |
| | Terminal 8 | | | P |
| | | | | |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | **Appendix 1** | | |
| | **IEC 60898-1:2015+AMD1:2019/EN 60898-1:2019 COMMON MODIFICATIONS** | | |

| | | | |
|---|---|---|---|
| | **GENERAL** | | P |
| **9.12** | **Short-circuit tests** | | P |
| 9.12.2 | Value of the power frequency recovery voltage shall be equal to 110 % of the rated voltage. | | P |
| 9.12.3 | Tolerances on test quantities | | P |
| | voltage (including recovery voltage) : 0, -5% | | P |

| | | | |
|---|---|---|---|
| | **TESTS „A“ 1 sample** | | P |
| **6** | **MARKING AND OTHER INFORMATION** | | - |
| **6.1** | **Standard marking:** | | P |
| | f) Rated short circuit capacity (A):within a rectangle, without symbol “A”.....: | | P |
| | h)Calibration temperature, if different from 30°C | | P |
| | j) Energy limiting class in a square in accordance with annex ZA, if applied | | P |
| | k) Making and breaking capacity on an individual protected pole of multipole circuit-breakers (Icn1), if different from Icn | | P |
| **6.2** | **Additional marking** | | - |
| | Additional marking to other standards (EN or IEC or other) is allowed under the follow conditions: | | - |
| | - the circuit-breaker shall comply with all the requirements of the additional standard; | | - |
| | - the relevant standard to which the additional marking refers shall be indicated adjacent to this marking and shall be clearly differentiated or separated from the standard marking according to cl. 6.1 | | - |
| | Compliance is checked by inspection and by carrying out all the test sequences reqired by the relevant standard. Eqivalent or less severe test sequences need not be repeated. | | P |
| **6.3** | **Guidance table for marking** | | - |

| EN 60898-1:2019 | | | |
|---|---|---|---|
| Cl. | Requirement – Test | Result | Verdict |
| | Each MCB shall be marked in a durable manner with all or, for small apparatus, according table for marking | | P |

| | **TESTS „C“ 3 samples** | **C1** | **C2** | **C3** | - |
|---|---|---|---|---|---|
| 9.11.3 | Dielectric strength reduced to 900 V | | | | - |

| | **TESTS „D“ 3 samples** | | | | - |
|---|---|---|---|---|---|
| **9.10** | **Tests: DO** | **DO 1** | **DO 2** | **DO 3** | - |
| 9.10.2.2 | ☐ For circuit-breakers of the B – Type | | | | - |
| | Moreover the C.B. shall perform following test: | | | | - |
| 9.10.1.2 | Test current 2,55 $I_N$ (A) starting from cold for: | | | | - |
| | opening time not less than 1 s or more than | | | | - |
| | - 60 s | | | | - |
| | - 120 s | | | | - |
| 9.10.2.2 | ☐ For circuit-breakers of the C – Type | | | | P |
| | Moreover the C.B. shall perform following test: | | | | P |
| 9.10.1.2 | Test current 2,55 $I_N$ (A) starting from cold for: | | | | P |
| | opening time not less than 1 s or more than | | | | P |
| | - 60 s | | | | P |
| | - 120 s | | | | P |
| 9.10.2.2 | ☐ For circuit-breakers of the D – Type | | | | N |
| | Moreover the C.B. shall perform following test: | | | | N |
| 9.10.1.2 | Test current 2,55 $I_N$ (A) starting from cold for: | | | | N |
| | opening time not less than 1 s or more than | | | | N |
| | - 60 s | | | | N |
| | - 120 s | | | | N |

| | **TESTS „E3“** | | | | - |
|---|---|---|---|---|---|
| **9.12.11.4.4** | **Test: E3 (Test at making and breaking capacity on a individual pole (Icn1)** | **$E_{3-1}$** | **$E_{3-2}$** | **$E_{3-3}$** | **P** |
| | Service short-circuit capacity..... : | | | | -- |
| | Test circuit: figure.....: | | | | -- |
| | Prospective current.....: | | | | -- |
| | Prospective current obtained..... : | | | | -- |

| EN 60898-1:2019 | | | | | |
|---|---|---|---|---|---|
| Cl. | Requirement – Test | Result | | | Verdict |
| | Power factor.....: | | | | -- |
| | Power factor obtained..... : | | | | -- |
| | Sequence..... : | | | | -- |
| | T (min)..... : | | | | -- |
| 9.12.9.1 | Test in free air<br>copper wire F': ☐ 0,12 mm / ☐ 0,16 mm<br>resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm | | | | P |
| 9.12.9.2 | Test in enclosures<br>copper wire F': ☐ 0,12 mm / ☐ 0,16 mm<br>resistor R' : ☐ 0,75 Ohm / ☐ 1,5 Ohm | | | | P |
| | $I_{Peak}$ (A) max. value.....: | | | | -- |
| | $I^2t \leq$ _____ $kA^2s$ | [$kA^2s$] | [$kA^2s$] | [$kA^2s$] | -- |
| | Max. $I^2t \leq$ _____$kA^2s$ L1<br>L2<br>L3 | ___<br>----<br>---- | -----<br>___<br>----- | ----<br>----<br>___ | P |
| | - No permanent arcing | | | | P |
| | - No flash-over between poles or between poles and frame | | | | P |
| | - No blowing of the fuses F and F′ | | | | P |
| | - Polyethylene foil shows no holes | | | | P |
| | After the test: | | | | -- |
| 9.12.12.1 | The circuit-breakers shall show no damage impairing their further use and shall maintenance, withstand the following tests. | | | | P |
| | a) leakage current across open contacts, according to 9.7.6.3, each pole is supplied at a voltage 1,1 times Un.= _____ V. The circuit –breaker is in the open position | $E_{2-1}$ (mA) | $E_{2-2}$ (mA) | $E_{1-3}$ (mA) | - |
| | The leakage current shall not exceed 2 mm L1 | | | | - |
| | L2 | | | | - |
| | L3 | | | | - |
| | L4(N) | | | | - |
| | Electric strength test: | | | | - |
| | Test voltage 900 V (see 9.7.3) | | | | - |
| | a) | | | | - |
| | b) | | | | - |

| EN 60898-1:2019 | | | | | |
|---|---|---|---|---|---|
| Cl. | Requirement – Test | Result | | | Verdict |
| | c) | | | | - |
| | d) | | | | - |
| | e) 2000 V | | | | - |
| | Test current 2,8 $I_N$ | | | | - |
| | Tripping within > 0,1 s up to | (s) | (s) | (s) | - |
| | - 60 s | | | | - |
| | - 120 s | | | | - |

- End of test report -

Type of equipment, model: Miniature Circuit Breaker, YCB6H-63

Details of:

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom


Details of:

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Details of:

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Details of:

View:

[X] general

[ ] front

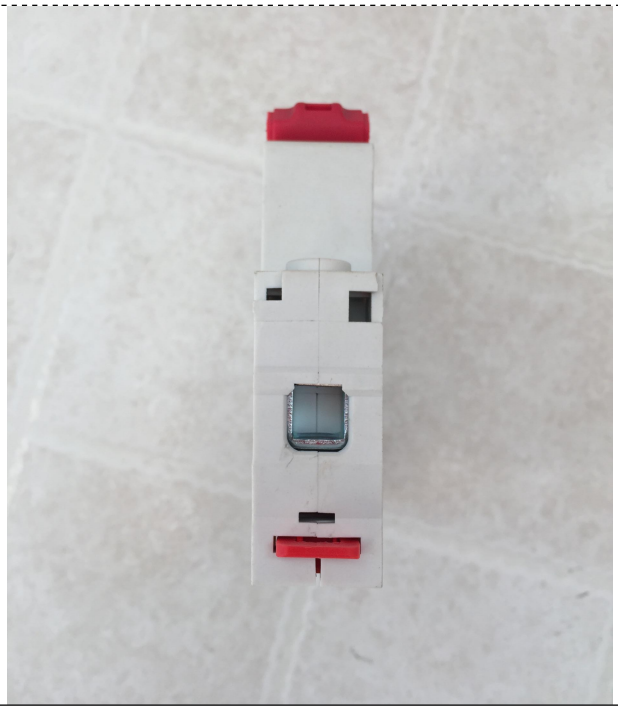
[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom



Details of:

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom


Details of:

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom


- End of Annex I -