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**NATIONAL STANDARD OF THE
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**Test method for electric power fittings -- Part 3: Heat cycle tests
for electric power fittings
(English Translation)**

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1 Scope

This Part of GB/T 2317 specifies the heat cycle test method for electric power fittings.

This Part applies to the electrical performance test, for the electrical resistance, temperature rise, heat cycle of electrical connection fittings.

2 Normative references

The provisions in following documents become the provisions of this Part, through reference in this Part of GB/T 2317. For the dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Part; however, parties who reach an agreement based on this Part are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 2314 General technical requirements for electric power fittings GB/T 2317.4 Test method for electric power fittings - Part 4: Acceptance inspection for electric power fittings

3 Overview

Electrical connection fittings can be divided into two categories, according to the stress conditions: those with tensile force (category A) and those without tensile force (category B) (see Appendix A).

4.1 Number of test pieces

It is carried out, in accordance with the provisions of GB/T 2317.4.

4.2 Electrical connection fittings for connecting two or more conductors

For electrical connection fittings, which connect two or more conductors, select the conductors, which have the largest specification and the smallest specification, for testing.

4.3 Preparation

The electrical connection fittings and the contact surfaces on the conductors shall be treated, according to the manufacturer's instructions; then installed on the new conductors, without loosening.

5.1 Test conditions

The test shall be carried out, under relatively unventilated conditions, which have an ambient temperature of 15 °C ~ 30 °C. The test arrangement shall keep a certain distance, between the fittings or other connecting parts, which are introduced for the convenience of the test, to make it sufficient to ensure that the influence of thermal disturbance is ignored. The test piece shall be supported in such a way, that air can circulate freely around the test piece and cool naturally. If accelerated cooling is used, it shall be uniformly cooled, throughout the test arrangement area.

A new conductor shall be used for the test. A tension of not more than 20% of the calculated breaking force of the conductor, can be applied to the electrical connection fittings under tension.

5.2 Reference conductor

To measure resistance and temperature, the test circuit shall include a conductor, which has a certain length, as a reference body for measuring the resistance and temperature of fittings. If two sizes of conductors are to be connected to one connection fitting, in an arrangement, THEN, the smaller conductor shall be used as the reference conductor.

The length of the reference conductor shall not be less than 100 times the diameter of the conductor; the longest shall not exceed 4 m.

5.3 Potential measuring point

When measuring resistance, the position of the measuring point shall be located on the conductor, at 25 mm away from the end of each electrical connection fitting. For the potential measuring points of the reference conductor, the schematic diagrams in Appendix B and Appendix C may be used.

Note: Potential test points do not have to be soldered. The practical operation of the potential measuring points, in Appendix D, can be used to obtain satisfactory performance.

5.4 Installation of test circuit

average value of the two measured resistances, as the actual resistance value of the test piece.

- Before measuring the resistance, there shall be a constant temperature or cooling for a period of time. The length of the constant temperature or cooling time will affect the measured value. Therefore, it needs a long enough time, after the power is cut off. In order to shorten the test time, it is allowed for the forced cooling of the test piece.

5.5.2 Temperature measurement method

Electrical connection fittings, reference conductors, ambient temperature shall be measured by thermocouples or other suitable instruments. The measurement accuracy is 2 °C or higher.

The recorded temperature of electrical connection fitting shall be the temperature of the hottest part of its surface. The temperature measuring probe is close to the surface of the test piece; OR a small hole is punched in the test piece, in which the temperature measuring probe is inserted. For the reference conductor, the temperature measuring probe shall be placed in the center of the length of the conductor AND securely fixed.

For stranded conductors, the temperature measuring probe shall be placed in the strand.

A small hole can be drilled for the whole conductor; the temperature measuring probe is placed in the small hole (see Appendix B and Appendix C).

The ambient temperature shall be measured, throughout the test. The temperature measuring probe shall be set in a place, which is not affected by the heating of the electrical circuit.

6.1 Test procedure

Determine the potential measuring point, according to 5.3. Measure the DC resistance of the reference conductor and the test piece, according to the measurement method, which is specified in 5.5.1. Calculate the average value, as the actual resistance value.

6.2 Judgment criteria

For compressive type fittings, if its resistance value is not greater than the resistance value of the reference conductor, which has the same length as the fittings, the test is passed. For non-compressive fittings, if the resistance value is not greater than 1.1 times the resistance value of the reference conductor, which has the same length as the fittings, the test is passed.

reference conductor, according to the length of the test piece;

b) Let the current pass through the test circuit. The magnitude of the test current and the length of the energization time shall make the temperature of the reference conductor rise above the ambient temperature $T_f + 5\text{ }^{\circ}\text{C}$; keep the constant temperature for 30 min. In order to shorten the test time, the initial current can be increased, to accelerate the heating, BUT it shall not exceed 1.5 times of the test current;

c) After the heating process is over, cut off the current. Let the conductor cool to within $5\text{ }^{\circ}\text{C}$ higher than the ambient temperature. In order to shorten the cooling time, it is allowed for forced cooling;

d) Repeat the operation, for $0.1N \pm 0.02N$ cycles;

e) In the $0.1N \pm 0.02N$ heat cycles, it shall measure the temperature of the conductor and the test piece, in one of the last 5 cycles, within the last 15 min of the constant temperature of 30 min;

f) Then cool the test piece to the ambient temperature. Measure the resistance of the conductor and the test piece;

g) Continue heat cycle. Measure temperature and resistance, at the end of each 0.1N heat cycle, until finishing 0.5N cycles;

h) In the next 0.5N cycles, it shall measure the resistance, for each 0.05N ($\pm 0.01N$) cycle. It shall measure the temperature, for each 0.1N ($\pm 0.02N$) cycle.

The test piece shall not be tightened or adjusted, during the test. The above test procedure is shown in Appendix E, in graphical form.

8.3 Judgment criteria

The test is passed, if the following requirements are met:

a) The difference, between the initial resistance value of each test piece, in the test circuit, and the average value of the initial resistance of the 4 test pieces, shall not exceed 30% of the average value;

b) For every 0.1N heat cycle, the surface temperature of the test piece shall not exceed the temperature of the reference conductor;