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**Flame-retardant, fire-proof, fire resistance specifications
of testing method of busbar trunking system (busways)**

母线干线系统（母线槽）阻燃、防火、耐火性能的试验方法

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Flame-retardant, fire-proof, fire resistance specifications of testing method of busbar trunking system (busways)

1 Scope

This standard specifies the test device, test conditions, test piece requirements, test procedures, determination conditions, and test reports for the flame-retardant, fire-proof, and fire-resistant properties of the busbar trunking system (busways).

This standard applies to busbar trunking system (busways) which has a nominal AC voltage of not more than 1000 V and a frequency of 50 Hz or 60 Hz.

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For the dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard; however, parties who reach an agreement based on this Standard 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 9978-1999 Fire-resistance tests - Elements of building construction (neq ISO/FDIS 834-1:1997 E)

GB 13539.5-1999 Low-voltage fuses Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses for mainly for household and similar application) examples of standardized fuses (idt IEC 60296-3-1:1999)

GB/T 18380.3-2001 Tests on electric cables under fire conditions - Part 3: Tests on bunched wires or cables (idt IEC 60332-3:1992)

GB/T 19216.11-2003 Tests for electric cables under fire conditions - Circuit integrity - Part 11: Apparatus - Fire alone at a flame temperature of at least 750 °C (idt IEC 60331-11:1992)

3 Terms and definitions

The following terms and definitions apply to this standard.

2.7 in GB/T 18380.3-2001, the time for the fire is 40 min.

4.1.5 Judgment conditions

If the test pieces do not burn or the maximum height of the inner and the three outer surfaces of the carbonized part does not exceed 2.5 m, the flame retardant performance is considered to be acceptable.

4.2 Fire-proof performance test method

4.2.1 Test device

It shall comply with the provisions of chapter 4 of GB/T 9978-1999.

4.2.2 Test conditions

4.2.2.1 Temperature rise conditions

It shall comply with the provisions of 5.1 of GB/T 9978-1999.

4.2.2.2 Pressure conditions

It shall comply with the provisions of 5.2 of GB/T 9978-1999.

4.2.2.3 Fire conditions

The test piece is surrounded by fire, unless otherwise there is actual engineering requirement.

4.2.3 Test piece requirements

The fireproof straight length busbar trunking unit has a length of 1800 mm.

4.2.4 Installation

The support structure of the test piece during the test may use a precast concrete floor or a brick wall. In accordance with the actual installation in the building, the test piece is installed in the reserved hole on the support structure. The test piece shall be in the positive pressure zone of the test device, the distance to the two sides and the upper side of the test device shall not be less than 200 mm; when multiple test pieces are tested at the same time, the distance between each test piece shall not be less than 200 mm. The fire-proof performance of the support structure shall meet the fire-proof performance requirements of the test piece.

The gap between the reserved hole on the support structure and the test piece is sealed with a non-flammable heat insulation material, the firing end of the test piece is sealed and wrapped with a non-flammable heat insulation material, the packing length and the test piece support structure are same in thickness.

- 3 - Wires connected to L_3 (or L_2 or L_1);
- 4 - Test piece;
- 5 - Busbar;
- 6 - Load and indicator devices (e.g. bulb).

Figure 4 -- Electrical connection diagram of test piece

4.3.2.5 Test procedure

4.3.2.5.1 Start and end of test

After the power is turned on, the transformer is adjusted to gradually increase the rated voltage of the test piece, and the current passing through the circuit is made at 0.25 A through the load configuration. Then it is fired, when the temperature of the thermocouple near the center of the test piece in the fireproof test furnace reaches 50 °C, all measuring instruments start timing and the test is started. During the test, it shall be observed in accordance with 4.3.2.5.2. The time for the fire shall not be less than 30 minutes. After the fire is stopped, electricity is continued for 15 minutes. That is, the total test time is the time for the fire plus a cooling time of 15 minutes.

4.3.2.5.2 Measurement and observation

a) Measurement of temperature in the test furnace

Test furnace temperature is measured in accordance with the provisions of 7.3.1 of GB/T 9978-1999.

b) Measurement of pressure in the test furnace

Test furnace pressure is measured in accordance with the provisions of 7.3.2 of GB/T 9978-1999.

c) Observation of test phenomenon

During the fire-resistance test, observe the display of fuses and bulbs at any time.

4.3.2.5.3 Judgement conditions

In the process of fire resistance test, if the following conditions are met, it means that the circuit integrity has not been lost, and the test piece has passed the fire test.

- The voltage is maintained, i.e., no fuse or circuit breaker is open;
- Continuous conductors, i.e. no bulb goes out.

Appendix A

(Normative)

Spray test method

The test shall be conducted in a suitable cabinet or test chamber. The cabinet (or test chamber) shall have facilities for the treatment of any harmful gases produced by the combustion and shall be sufficiently ventilated to maintain the flame during the test.

Note: Examples of suitable cabinets are as specified in GB/T 17651.1.

The ambient temperature of the cabinet (or) outside the test chamber shall be guaranteed between 5°C and 40°C.

Note 1: Barriers, such as the baffles specified in GB/T 17651.1, may be placed in a suitable place to protect the torch so that ventilation does not affect the geometry of the flame.

Note 2: The tests specified in this part may involve voltages and temperatures that are harmful to humans. Appropriate measures should be taken to prevent possible impact, combustion, fire, explosion and other hazards, and to prevent any harmful gases that may be generated.

A.1 Test device

A.1.1 Heating device

The heating device specified in this standard conforms to the provisions of GB/T 19216.11-2003/IEC 60331-11:1999. If a heating device cannot meet the requirements of the four-side firing requirements of the test piece, two sets of heating devices can be used on both sides of the test piece for simultaneous heating.

A.1.2 Spraying device

As shown in Figure A, the standard nozzle inner diameter: 6.3 mm, water spray rate: (12.5 ± 0.625) L/min, nozzle pressure: about 30 kPa (equivalent to a vertical upward free jet height of 2.5 m).

A.1.3 Circuit connection device

a) Transformer

Transformer requirements are same as 4.3.2.1.b).

b) Fuse

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