JB

MECHANICAL INDUSTRY STANDARD

OF THE PEOPLE'S REPUBLIC OF CHINA

ICS 29.180

K 41

Filing number: 51338-2015

JB/T 7065-2015

Replacing JB/T 7065-2004, JB/T 7069-2004

Pressure relief device for transformers

变压器用压力释放阀

Issued on: October 10, 2015 **Implemented on: March 01, 2016**

Issued by: Ministry of Industry and Information Technology of PRC

Table of Contents

Pressure relief device for transformers

1 Scope

This standard specifies the terms and definitions, structure type, product model, product specifications and installation dimensions, technical requirements, test items and test requirements, marking, packaging, transportation, storage and exit-factory documents of pressure relief valves.

This standard applies to pressure relief valves (hereinafter referred to as relief valves) installed on oil-immersed transformers (including transformers, reactors, tap changers, etc.).

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this standard.

GB/T 191 Packaging - Pictorial marking for handling of goods

GB/T 531.1 Rubber vulcanized or thermoplastic - Determination of indentation hardness - Part 1: Durometer method (Shore hardness)

GB/T 531.2 Rubber vulcanized or thermoplastic - Determination of indentation hardness - Part 2: IRHD pocket meter method

GB 1094.1 Power transformers - Part 1: General

GB/T 1690 Rubber, vulcanized or thermoplastic - Determination of the effect of liquids

GB/T 2423.4 Environmental testing for electric and electronic products - Part 2: Test method - Test Db: Damp heat，cyclic (12h + 12h cycle)

GB/T 2423.16 Environmental testing - Part 2: Test methods - Test J and guidance: Mold growth

GB/T 2423.17 Environmental testing for electric and electronic products - Part 2: Test method - Test Ka: Salt mist

GB/T 2900.95 Electrotechnical terminology - Transformers, voltage regulators and reactors

GB 4208 Degrees of protection provided by enclosure (IP Code)

JB/T 3837 Identification method of transformers product type

JB/T 8448.1 Technical specifications of sealing articles for transformer and similar products - Part 1: Rubber sealing articles

JB/T 8448.2 Technical specifications of sealing articles for transformer and similar products - Part 2: Cork rubber sealing articles

3 Terms and definitions

The terms and definitions as defined in GB/T 2900.95 as well as the following terms and definitions apply to this document.

3.1

Operating pressure

The inlet pressure on the diaphragm when the diaphragm of the relief valve jumps, and the transformer oil is continuously discharged.

3.2

Closing pressure

When the diaphragm re-contacts the valve seat or the opening height is zero, the inlet pressure on the diaphragm (that is, the pressure when the leakage through the sealing device stops).

3.3

Open time

The time it takes for the diaphragm to leave the valve seat and reach the maximum opening height.

3.4

Seal pressure

The maximum pressure that is higher than the closing pressure and lower than the operating pressure and can ensure the reliable sealing of the relief valve.

4 Structure type, product model, product

- Installation position: The relief valve can be installed on the fuel tank cover, on the raised seat or on the upper side wall of the fuel tank.

5.3 Action performance

5.3.1 Operating pressure

The operating pressure of the relief valve shall meet the requirements of Table 3.

For the relief valve with mechanical signal mark, when the relief valve is opened, the marker rod shall move obviously. When the relief valve is closed, the marker rod shall still stay in the opened position and reset manually. If the relief valve is equipped with a signal switch, when the relief valve is opened, the signal contact shall be reliably switched and self-locked, meanwhile reset manually.

If there are other special requirements, the user shall negotiate with the manufacturer.

5.3.2 Closing pressure

The closing pressure of the relief valve shall meet the requirements of Table 3.

5.3.3 Opening time

When the pressure acting on the diaphragm reaches the operating pressure, the relief valve shall open quickly; its open time shall not exceed 2 ms.

5.3.4 High and low temperature opening performance

When the temperature is within the range of -30 °C ~ 115 °C, the operating pressure of the relief valve shall meet the requirements of Table 3.

5.3.5 Aging opening performance

After the assembled relief valve is left for at least 24 hours, the first operating pressure shall meet the requirements of Table 3.

5.4 Sealing performance

5.4.1 Sealing performance of sealing pressure value

When the relief valve is closed, apply static pressure of the sealing pressure value as specified in Table 3 to the relief valve for 2 h; there shall be no leakage.

5.4.2 Vacuum sealing performance

5.10 Appearance requirements

After the relief valve is assembled, the outer cover and valve seat shall be straight, and the center line shall be aligned; there shall be no distortion. The outer surface coating of the relief valve shall be oil-resistant, uniform and bright; there shall not have defects such as peeling, blisters, or accumulation. The marker rod shall be colored and eye-catching.

5.11 Enclosure's protection performance

The enclosure's protection level of the relief valve shall meet the requirements of IPX5.

5.12 Requirements for moisture proof, salt spray proof and mildew proof

The relief valve shall meet the requirements of the corresponding transformer (including transformers, reactors, tap switches, etc.) products of moisture proof, salt spray proof and mildew proof.

5.13 Vibration resistance

When the relief valve has a vibration frequency of 4 Hz ~ 20 Hz (sine wave) and an acceleration of 2 g ~ 4 g, test it in the x-axis, y-axis, z-axis directions for 1 min. The switch contacts shall not act.

6 Test items and test requirements

6.1 Test items

6.1.1 Routine test

The routine test items are as follows:

a) Visual inspection (according to 6.2.2.1);

b) Operating pressure test (according to 6.2.2.2);

c) Opening time test (according to 6.2.2.3);

The special test items are as follows:

a) Moisture-proof performance test (according to 6.2.2.16, when the corresponding transformer, mutual inductor, reactor, tap changer and other products have this requirement):

b) Salt spray performance test (according to 6.2.2.17, when the corresponding transformer, mutual inductor, reactor, tap changer and other products have this requirement);

c) Mildew proof performance test (according to 6.2.2.18, when corresponding transformers, mutual inductor, reactors, tap changers and other products have this requirement).

6.2 Test requirements

6.2.1 Main equipment or devices

6.2.1.1 Air compressor for test

The outlet pressure of the air compressor shall be set between 450 kPa and 550 kPa.

There must be an air tank between the air compressor and the test tank of the relief valve. The volume of the gas storage tank shall not be less than 200 L (if the gas source is stable, the pressure and flow can fully meet the requirements, then the gas storage tank may not be provided).

6.2.1.2 Pressure gauge or pressure sensor for testing

The range of the pressure gauge shall be 0 MPa ~ 0.1 MPa; the accuracy shall not be lower than grade 1.5.

The installation position of the pressure gauge shall be such that it is not affected by the vibration of the tank.

The range of the pressure sensor is 0 MPa ~ 0.15 MPa; the accuracy is not less than grade 0.25.

6.2.1.3 Test tank for operating pressure

The test tank for operating pressure is suitable for operating pressure tests at room temperature, high temperature, low temperature, aging, 500-operation reliability.

The volume of the test tank for operating pressure shall meet the requirements of Table 5.

The displacement test system consists of a pressurized tank, a flow meter, a special test device, a pressure measuring instrument, a collection device, etc.

6.2.2 Test method

6.2.2.1 Visual inspection

The assembly and appearance quality of the relief valve shall be inspected. The inspection result shall meet the requirements of 5.10.

6.2.2.2 Operating pressure test

The operating pressure test at room temperature refers to the operating pressure test at room temperature, aging, 500 times of reliability.

According to the relief valve's diameter, select the test tank according to Table 5.

Clamp-install the relief valve on the test tank for operating pressure. Fill the tank with compressed air at room temperature. Adjust the air intake. When the increase in intake pressure is 25 kPa/s ~ 40 kPa/s, the relief valve shall be continuous and intermittent bounce, at a cycle of 1 s ~ 4 s. The signal switch shall switch and self-lock during each bounce. The mechanical signal marks shall also be obvious. It shall be able to correctly judge that the relief valve has acted; it requires manually reset after each actuation. If there is no abnormality after 10 consecutive actions, it is qualified.

The operating pressure shall meet the requirements of Table 3.

6.2.2.3 Opening time test

The test system consists of test tank, ignition device, pressure sensor, signal preamplifier and recorder (or other instruments).

Install the relief valve on the test tank and connect the electrical circuit.

After evacuating the test tank to a certain degree of vacuum, turn off the vacuum pump; quickly fill the test tank with prepared hydrogen; close the inlet valve; detonate the mixed gas to simulate a short circuit accident. Use the pressure sensor, signal preamplifier and recorder to record the entire process of pressure action in the test tank. Repeat the above test three times, to ensure that there are at least two operating time of the relief valve actions is less than 2 ms, which is qualified.

Other test methods can also be used.

6.2.2.4 Signal switch insulation performance test

6.2.2.8 High-temperature opening performance test

Start the thermostat. Adjust the control temperature to 120 °C. Place the test tank with the relief valve in the thermostat. When the temperature reaches 120 °C and keeps it for 30 minutes. Take out the test tank and install the pressure gauge. Fill the tank with compressed air. When the pressure increase is 25 kPa/s ~ 40 kPa/s and the pressure in the tank reaches the operating pressure, the relief valve shall be opened and intermittently beating. The mechanical marks and signal switches shall operate normally. If there is no abnormality after 10 operations, it is qualified. All tests shall not exceed 2 min.

6.2.2.9 Low-temperature opening performance test

The relief valve that has passed the normal-temperature, aging, high-temperature operating pressure test needs to be left for 24 hours or more before the low-temperature opening performance test can be performed.

Start the thermostat. Adjust the control temperature to -30 °C. Place the test tank with the relief valve in the thermostat. When the temperature reaches -30 °C and keeps it for 30 minutes. Take out the test tank and install the pressure gauge. Fill the tank with compressed air. When the pressure increase is 25 kPa/s ~ 40 kPa/s and the pressure in the tank reaches the operating pressure, the relief valve shall be opened and intermittently beating. The mechanical marks and signal switches shall operate normally. If there is no abnormality after 10 operations, it is qualified. All tests shall not exceed 2 min.

6.2.2.10 Sealing ring’s oil resistance and aging resistance test

After immersing the specimen into transformer oil at 120 °C and keeping it for 168 h, its performance and size meet the requirements of relevant standards.

Other test methods are carried out in accordance with the provisions of GB/T 531.1, GB/T 531.2, GB/T 1690.

6.2.2.11 Vacuum sealing performance test

The vacuum system consists of a vacuum pump, a vacuum gauge with corresponding resolution, a vacuum device.

The leakage rate of the vacuum system itself shall be as low as 0.1 Pa•L/s

Install the relief valve on the vacuum device. Start the vacuum pump. Adjust the vacuum valve. Close the vacuum valve when the vacuum is not greater than 133 Pa. Start timekeeping when the vacuum gauge’s value returns to 133 Pa; the leakage rate after 10 minutes shall not exceed 1.33 Pa•L/s. Its components shall not be damaged or deformed.

The moisture-proof performance test shall be carried out in accordance with the provisions of GB/T 2423.4.

6.2.2.17 Salt spray resistance test

The salt spray resistance test is carried out in accordance with the provisions of GB/T 2423.17.

6.2.2.18 Mold-proof test

The mold-proof test is carried out in accordance with the provisions of GB/T 2423.16.

7 Marking, packaging, transportation, storage, exit-factory documents

7.1 The relief valve shall have a clear and corrosion-resistant nameplate; the following content shall be marked on the nameplate:

a) The name of the manufacturer;

b) Product name;

c) Product model;

d) Mass [unit in kilogram (kg)]

e) Exit-factory number;

f) Date of manufacture.

7.2 Each relief valve shall be sealed in a plastic bag and then put into the packaging carton. The pictorial signs for packaging, storage and transportation shall meet the requirements of GB/T 191.

7.3 The relief valve shall be sealed before packaging, to prevent debris from entering the relief valve.

7.4 The relief valve shall not be thrown or hit during transportation and storage.

7.5 The relief valve shall be placed in a dry and clean place; prevent dust and foreign objects from entering the relief valve.

7.6 The following documents shall be accompanied to the relief valve when leaving the factory:

a) Installation & use instructions;

This is an excerpt of the PDF (Some pages are marked off intentionally)

------ The End ------