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NATIONAL STANDARD OF THE
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ICS 29.020

J 50

GB/T 24344-2009

**Electrical equipment of industrial machines - High-voltage
test specifications**

工业机械电气设备 耐压试验规范

Issued on: September 30, 2009

Implemented on: February 01, 2010

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine of PRC;**

Standardization Administration of PRC.

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Electrical equipment of industrial machines - High-voltage test specifications

1 Scope

This standard specifies the requirements for the test voltage, test method, test scope, test record for the withstand voltage test of electrical, electronic equipment and systems of industrial machinery.

This standard applies to the withstand voltage test of electrical, electronic equipment and systems of industrial machinery.

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 5226.1-2008 Electrical safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:2005, IDT)

GB/T 2900.19-1994 Electrotechnical terminology - High-voltage test technique and insulation co-ordination

GB/T 16927.1-1997 High voltage test techniques - Part 1: General test requirements (eqv IEC 60060-1:1989)

GB/T 16927.2-1997 High voltage test techniques - Part 2: Measuring systems (eqv IEC 60060-2:1994)

GB/T 24243-2009 Electrical equipment of industrial machinery - Insulation resistance test specification

3 Terms and definitions

The following terms and definitions apply to this standard.

3.1

circuit of the entire electrical equipment, as well as the connection between the circuit under test and the protective grounding circuit. Clean up the test site. Make warning signs, within the safety range of the electrical equipment to be tested.

5.2 Determine the test voltage value; the maximum test voltage is 2 times the rated power supply voltage value of the electrical equipment or 1000 V, whichever is larger.

5.3 When applying the test voltage to the electrical equipment under test, it shall start from a value, which is sufficiently low, to prevent the influence of overvoltage, during operation transients. Then, the voltage shall be raised slowly, for an accurate reading on the meter, BUT not so slowly, that it would cause it to be exposed to test voltage, which is close to the specified value of the test voltage, for too long.

5.4 When the test voltage is applied to the electrical equipment under test, the time it takes to reach 1000 V or more shall be greater than 2 s and less than 10 s. After the test voltage rises to the specified maximum value, it shall be maintained for a specified time; the holding time shall be greater than 1 s and less than 5 s. After the holding time, the voltage shall be quickly reduced, but it shall not be cut off suddenly, so as to avoid the possibility of transient process, which leads to failure or incorrect test results.

5.5 The output voltage of the withstand voltage test equipment is applied, between the conductor of the circuit under test and the protective grounding circuit.

6 The range of withstand voltage test

6.1 General requirements

Only electrical equipment, that has been subjected to the relevant requirements in GB 5226.1-2008 or the insulation resistance test of GB/T 24243-2009, is allowed to be subject to the withstand voltage test.

The scope of the withstand voltage test shall include the power input terminals and output terminals of the power switch of the entire electrical equipment, as well as all power circuit wires. If there is a dedicated power inlet terminal group, it shall also be subject to the withstand voltage test, at the same time as the power switch and all power circuit wires.

The control circuit in the electrical equipment, as well as the circuit wires and components that need to be subjected to the withstand voltage test, shall be subjected to the withstand voltage test, at the same time as the power circuit.

Circuits in electrical equipment below PELV AND circuits unsuitable to withstand the test shall be disconnected, during the test.

6.2 Test range

- a) Power circuit wires and related components, including power input terminals, output terminals and actuators of power switches (such as motors, electromagnets, electromagnetic clutches, etc.);
- b) Control circuits higher than PELV, in electrical equipment, AND circuit wires and components, that need to be subjected to withstand voltage test;
- c) Except for circuits intended to operate at a voltage, which is lower than or equal to PELV;
- d) Circuits, which are unsuitable to withstand the test, shall be disconnected during the test;
- e) Components that have been subjected to the withstand voltage test, according to the product standard, can be disconnected during the test.

During the withstand voltage test, a) and b) shall be tested simultaneously.

7 Test

7.1 Withstand voltage test

When the withstand voltage test is performed on the electrical equipment under test, it shall use the test equipment, which complies with the provisions of GB/T 16927.2-1997.

The test method of withstand voltage test shall be as specified in Chapter 5.

7.2 Test requirements

For the conductor of the withstand voltage test circuit, in the electrical equipment under test, the grounding output terminal of the testing equipment shall be connected to the PE or protective grounding wire of the electrical equipment under test; the high voltage output terminal of the testing equipment shall be reliably connected with the tested conductors of the electrical equipment test.

Flashover and dielectric puncture are not allowed in the withstand voltage test. Otherwise, the test is regarded as failed.

For large-scale equipment under test AND equipment under test requiring segmented tests, segmented tests are allowed. During the test, each segment shall not produce flashover and dielectric puncture.

After the withstand voltage test, the circuit of the electrical equipment under test shall be restored, AND the electrical equipment under test shall be able to work normally.

Appendix A

(Informative)

Examples and brief description of withstand voltage test of electrical equipment of industrial machinery

A.1 Brief description

This Appendix gives the circuit diagram of a certain electrical equipment of industrial machinery (Figure A.1 ~ Figure A.6), as the circuit diagram of the withstand voltage test of the electrical equipment of industrial machinery. Figure A.1 and Figure A.2 is the main circuit and control circuit power supply.

This Appendix only serves as an example for individual parts, which contain PELV. Figure A.3 ~ Figure A.6 is the control circuit.

A.2 Withstand voltage test procedure

- a) Cut off the power supply line of the electrical equipment under test.
- b) Close the power switch.
- c) Connect F1, F2, F6, F7, F14, F11, F12, F13.
- d) Short-circuit the terminals U11 and 1 on T1.
- e) Short-circuit the terminals U11 and 29 on T2.
- f) Short-circuit the terminals U01 and U02 on T3.
- g) Short-circuit the contacts 39 and 40, 05 and 41 on K3.
- h) Short-circuit the U and U21 on the main contact of K1.
- i) Short-circuit the U and U23 on the main contact of K2.
- j) Clean up the work site.
- k) Add a safety isolation fence or a safety cordon, at the safe distance of the electrical equipment under test.
- l) Check the safety protection measures of the operator.
- m) Apply withstand voltage test voltage, between U and the protective earth circuit.
- n) Record test data.

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