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Interturn insulation of random-wound winding for AC low-voltage electrical machines - Part 1: Test methods

交流低压电机散嵌绕组匝间绝缘 第1部分：试验方法

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Foreword

GB/T 22719 Interturn insulation of random-wound winding for AC low-voltage electrical machines consists of following two parts. - Part

1 Scope

GB/T 22719.1-2008 is the Chinese national standard on interturn insulation of random-wound winding for ac low-voltage electrical machines - part 1: test methods, in the field of electrical engineering. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 30 December 2008 by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China; Standardization Administration of China, and has been in force since 1 October 2009. Classification: ICS 29.160.01, CCS K20. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This Part of GB/T 22719 specifies the test method - interturn insulation test of random-wound winding for AC motor. This Part applies to random-wound winding interturn insulation test for the 3-phase or single-phase AC electrical machines of which the nominal voltage is no more than 1140V.

2 Normative References

The articles contained in the following documents have become part of this Part of

GB/T 22719 when they are quoted herein. For the dated documents so quoted, all the modifications (excluding corrections) or revisions made thereafter shall not be applicable to this Standard. For the undated documents so quoted, the latest editions shall be applicable to this Standard.

JB/T 9615.2-2000 Test limits of the interturn insulation on random wound winding for AC low-voltage machines

3 Terms and Definitions

For the purpose of this Part, the following terms and definitions apply.

3.1 Comparison Method of Impulse Waveforms A method that uses impulse voltage to test motor winding (or coil) interturn insulation. The principle is to directly apply impulse voltage wave with specified peak value and wave-front time alternately (or simultaneously) ON the same-design test winding (or coil) GB/T 22719.1--2008

3.2 Reference winding (or Coil) When using impulse waveform comparison method to test motor winding (or coil) interturn insulation, the motor winding (or coil) is used to compare with test sample winding (or coil).

3.3 Difference Quantity Between Test Waveforms When using impulse waveform comparison method to test motor winding (or coil) interturn insulation, and between the test windings (or coils) and reference windings (or coils), the percentage is used to express the difference caused by the fault of interturn insulation or other fault caused by material and process fluctuations that don't belong to fault of insulation.

4 Test Instruments

4.1 Two groups of impulse voltage wave outputted from the instrument shall be symmetrical (tolerance is ±3%). It is allowed that the instrument outputs single group of impulse voltage wave or converts single group of impulse voltage into double groups of impulse voltage waves for output.

4.3 Maximum impulse voltage peak outputted by instrument shall meet the test limits requirements on related test sample of JB/T 9615.2-2000, tolerance is ±5% or ±3%, ±3% is recommended preferably. Impulse voltage peak outputted by instrument shall be continuously adjustable, and it shall have indication or can be pre-set.

4.4 The instrument can display and distinguish waveform explicitly, waveform sweep frequency is adjustable.

4.5 The instrument can operate continuously and reliably.

4.6 The instrument shall be equipped with special test wire, reliable earth terminal and necessary safety warning, the test conversion connection shall be convenient and reliable.

5.1 Preparation

5.1.1 Inspect the instrument shell if it is reliably grounded.

5.1.2 Shock test voltage peak value and wave-front time shall be preset according to JB/T 9615.2-2000.

5.1.5 Iron core of the test sample shall be grounded properly, or it can be insulated to ground (in this case, the iron core is charged). When testing, whether the iron core is grounded or not will change test sample's impedance and impact on test waveform display. When testing, the iron core's discharging at poor grounding position will disturb the display and identification of test waveform. 5.2 3-phase motor test 5.2.1 Phi (Phase) Connection Any phase winding (e.g. phase U) can be selected as reference winding, another phase winding (e.g. phase V) is regarded as test winding (see Figure 1), the peak value specified by JB/T 9615.2-2000 and impulse voltage wave of wave-front time shall be alternately (or simultaneously) applied onto phases U and V, then compare the difference quantity between the 2 damped oscillation waveforms. Then convert into phases V and W (or phases U and W) in turn, and re-test it one more time. 5.2.3 (Angle) Connection For motor windings which has already been connected as Delta connection, any one (2 phase windings in serial then in parallel with the third winding) winding (e.g. UW) is selected as reference winding, another (2 phase windings in serial then in parallel with the third winding) winding (e.g. VW) acts as test sample (see Figure 3), the peak value specified by JB/T 9615.2-2000 and the impulse voltage of wave-front time shall be alternately (or simultaneously) applied onto UW or VW, compare the difference quantity between the 2 damped oscillation waveforms. Then the L terminal is converted into U (or V) terminal in turn, and retest one more time.

5.3 Single-phase Motor The peak value and impulse voltage of wave-front time specified by JB/T 9615.2-2000 are alternately applied on corresponding test winding and reference winding (e.g. Z1Z2) (see figure 4), then compare the difference quantity between the 2 damped oscillation waveforms. Then test is repeated on another corresponding winding of test winding and reference winding (e.g. U1U2).

5.4 Test Display and Test Time

5.4.1 Test Display Test waveform shall be shown on display screen. It is allowable to only display identification result without displaying the test waveform when conducting automatic test.

5.4.2 Test Time Test time shall be according to the provisions in

4.3 of JB/T 9615.2-2000.

6 Selection Principle of Test Connection

6.1 Phi (Phase) Connection Phi (Phase) connection is applicable to test windings with leading-out terminal at both sides of the phase, or Y windings with leading-out midpoint N, or windings with disengaged junction point. It is also applicable to pole-phase group of test winding or comparable unit test winding such as single coil.

6.2 Y (Wiring) Connection It is applicable to test Y connection motor winding. Y (wiring) connection can increase test sample's impedance and expand the capacity scope of test instrument for test sample. It is recommended to select Y (wiring) connection test for motor winding with larger capacity.

7 Test Identification

7.1 Overview This Part takes test waveform as the identification basis. The automatic test waveform identification device which can compare and calculate test waveforms' difference quantity can be regarded as supplementary methods for automatic identification.

7.4 Identification of 3-Phase Motor Fault 7.4.1 3-Phase motor shall be respectively identified for fault by different wiring methods.

7.4.2 Examples of fault identification of Phi (phase) connection are shown in Table 1 (see figure 1 for wiring), use same analogy for others.

7.5 Single-phase Motor Fault Identification If test waveform displays difference, then fault is existed in corresponding winding of the test motor.

8 Automatic Testing and Automatic Identification

8.1 For large quantities of motor windings which are continuously manufactured, it is recommended to test voltage conversion test device and automatic identification alarm device.