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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 22670-2018

Replacing GB/T 22670-2008

**Test procedures for converter-fed three phase cage induction
motors**

变频器供电三相笼型感应电动机试验方法

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Table of Contents

1	Scope
2	Normative references
3	Terms, definitions and symbols
4	Test requirements
4.1	Test power supply
4.1.1	Sine wave test power supply According to the requirements specified in
4.3	Setting of the converter
4.4	Measurement requirements
5	Test preparation
5.1	Determination of insulation resistance
6	No-load test
7	Locked-rotor test
7.1	Rated frequency locked-rotor test
7.1.1	Determination of locked-rotor current, locked-rotor torque, locked- rotor power
7.1.2	Calculation of test results
8	Load test
8.3	Load characteristic curve
9	Determination of loss
9.2	Iron loss P _{Fe}
9.3	Wind friction loss P _{fw}
9.4	Load loss
9.5	Load stray loss P _{LL}
10	Determination of efficiency...
11	Thermal test...
12	Determination of maximum torque...
13	Determination of minimum torque...

1 Scope

GB/T 22670-2018 is the Chinese national standard on test procedures for converter-fed three phase cage induction motors, 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 17 September 2018 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 April 2019. Classification: ICS 29.160.30, CCS K22. 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 standard specifies the test requirements, pre-test preparation, no-load test, locked-rotor test, load test, determination of loss and efficiency, thermal test, maximum torque and minimum torque test for converter-fed three-phase cage induction motors. This standard applies to converter-fed three-phase cage induction motors. This standard does not apply to traction motors.

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 755-2008 Rating and performance of rotating motor

GB/T 1032-2012 Test procedures for three-phase induction motors

GB/T 10068-2008 Mechanical vibration of certain machines with shaft heights 56 mm and higher - Measurement, evaluation and limits of vibration severity

GB/T 10069.1-2006 Measurement of airborne noise emitted by rotating electrical machines and the noise limits - Part

1.Method for the measurement of airborne noise emitted by rotating electrical machines

GB/T 18039.4-2017 Electromagnetic compatibility - Environment - Compatibility levels in industrial plants for low-frequency conducted disturbances

GB/T 21211-2017 Equivalent loading and superposition techniques - Indirect testing to determine temperature rise of rotating electrical machines

3 Terms, definitions and symbols

3.1 Terms and definitions The terms and definitions as defined in GB/T 755-2008, GB/T 1032-2012, GB/T 32877-2016 as well as the following terms and definitions apply to this document.

3.2 Symbols The following symbols and units apply to this document. $\cos\phi$ - Power factor. f - Frequency, in hertz (Hz). f_N - Rated frequency of the motor, in hertz (Hz). f_r - The

maximum frequency of the measuring device, in hertz (Hz). fsw - Switching frequency, in Hertz (Hz). fMot - The fundamental frequency of the motor, in Hertz (Hz). I - Stator line current, in ampere (A). I0 - No-load line current, in ampere (A). IK - Current of the locked-rotor line, in amperes (A). IN - Rated current, in ampere (A). K1 - The reciprocal of the temperature coefficient of resistance of the conductor material at 0 °C.

4.1.1 Sine wave test power supply According to the requirements specified in

4.2 of GB/T 1032-2012.

4.1.2 Converter power supply The performance of the motor is closely related to the characteristics of the converter. The motor shall be powered by a suitable frequency converter and be tested under the same carrier frequency.

4.2 Measuring instruments For AC motors, unless otherwise specified in this standard, it shall use the arithmetic average of the three-phase line current and line voltage.

4.3 Setting of the converter

4.3.1 Overview For the test converter used in all test methods, the converter parameters shall be set according to the requirements of this standard. If a combination of a specific frequency converter and a motor is used in the test, for this specific application, the parameters of the frequency converter shall be set according to the specific application. The selected parameter settings shall be recorded in the test report.

4.4 Measurement requirements

4.4.1 Voltage measurement The signal wire of the measuring terminal voltage shall be connected to the motor terminal. If this connection is not allowed on site, the error caused by this shall be calculated and the reading shall be corrected. Take the arithmetic average of the three-phase voltage to calculate the motor performance.

4.4.4 Torque measurement The load test shall be carried out with a torque measuring instrument of appropriate specifications. In addition to the locked-rotor test, the measurement of the maximum torque and the minimum torque, the torque sensor has at least

0.2 accuracy level; the minimum torque measured shall not be less than 10% of the nominal torque of the torque sensor. The higher the accuracy level of the sensor, the corresponding expansion of the allowable torque range.

4.4.5 Measurement of speed and frequency The instrument for measuring frequency shall have an accuracy of $\pm 0.1\%$ of full scale. The accuracy of the speed measuring instrument shall be within

0.1 r/min.

4.4.6 Operating procedures In any test, when reading a series of gradually increasing or decreasing data, it shall be noted that the sequence of operations of increasing or decreasing shall not be changed, to avoid reversing the direction of the test.

4.4.7 Safety Due to the dangerous current, voltage and mechanical force involved, safety precautions shall be taken for all tests. All tests shall be performed by personnel with relevant knowledge and experience.

4.4.8 Anti-interference measures The influence of the interference radiation of the converter on the measurement shall be fully considered during the test. Anti-interference measures shall be taken in the installation of the converter, the selection of test cables, the selection of measuring instruments, the power isolation of the measuring instruments, the system grounding, etc.

5.1 Determination of insulation resistance

5.1.1 State of the motor during measurement When measuring the insulation resistance of the motor windings, it shall be carried out in the actual cold state and in the hot state (after the thermal test). During the inspection test, it is allowed to measure in the actual cold state.

5.1.3 Measurement method When measuring the winding's insulation resistance, if the beginning and end of winding at each phase are all lead out, it shall measure the insulation resistance of each winding to the casing and between the windings, respectively. At this time, other windings and embedded thermometers and other components that do not participate in the test shall be electrically connected to the iron core or casing. The casing shall be grounded. If only three terminals are lead out from inside the motor for the three-phase windings, it measures the insulation resistance of all the connected windings to the casing.

5.2 Determination of the DC terminal resistance of the winding in the initial (cold) state

5.2.1 Determination of winding temperature in the initial state Use a thermometer to measure the winding temperature. The motor shall be placed indoors for a period of time before the test. The difference between the winding temperature and the temperature of the cooling medium measured with a thermometer (or embedded thermometer) shall not exceed 2 K. For large and medium-sized motors, the thermometer shall be placed for not less than 15 minutes.

5.3 Test resistance The unit of winding resistance R is ohm, which is measured by an appropriate method. R represents the terminal resistance of the stator winding. The resistance measurement at the end of the thermal test shall be the extrapolation method as described in 8.6.2.3.3 of GB/T 755-2008, using the shortest possible time instead of the time interval as specified in Table 5 of GB/T 755-2008; then it is extrapolated to zero.