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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 22712-2021

Replacing GB/T 22712-2008

Technical specification for G series cooling fans for variable frequency motors

变频电机用G系列冷却风机技术规范

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1 Scope

China's national technical specification for the G series cooling fans fitted to variable frequency motors. It specifies the types, the basic parameters and dimensions, the technical requirements, the test methods, the inspection rules, the marking and packaging and the warranty period for G series cooling fans used with variable frequency three-phase asynchronous motors of the YVF2 series and IP54 enclosure. This is a small standard that exists because of a specific problem. An ordinary induction motor is cooled by a fan mounted on its own shaft, which is adequate because the motor runs at one speed. A motor fed from a variable frequency drive does not: it may be required to deliver full torque at ten per cent of rated speed, and at that speed a shaft-mounted fan delivers almost no air - the flow falls with speed while the losses in the winding do not, so the machine overheats at exactly the operating point the drive was installed to provide. The remedy is a separately driven fan, running at constant speed from the mains regardless of what the motor is doing, and that fan is a component in its own right: it is mounted on the motor, it has to fit the frame size, it has to deliver a defined airflow against the resistance of that motor's cooling path, and it has to last as long as the motor. Standardising it as a series means a motor of a given frame has a defined fan, that a replacement fits, and that the cooling on which the motor's rating depends is a known quantity rather than whatever the builder attached. The standard fixes the types and mounting dimensions by frame size, the airflow and pressure, the electrical requirements, the noise, the insulation and protection, and the tests. Issued on 11 October 2021 and in force since 1 May 2022, it replaces GB/T 22712-2008.

This document stipulates the type, basic parameters and dimensions, technical requirements, test methods, inspection rules, marking, packaging and warranty period for G series cooling fans for YVF2 series (IP54) three-phase asynchronous motors powered by frequency converters. This document applies to G series cooling fans (axial flow) for YVF2

series (IP54) three-phase asynchronous motors powered by frequency converters (hereinafter referred to as "fan"); for other series of three-phase asynchronous motors powered by frequency converters, this document applies as a reference for the selection of fans. It can also be implemented as a reference for all kinds of fans derived from this fan.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the version corresponding to that date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

GB/T 191-2008, Packaging - Pictorial marking for handling of goods

GB/T 755-2019, Rotating electrical machines - Rating and performance

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

GB/T 1236-2017, Industrial fan - Performance testing using standardized airways

GB/T 1971-2021, Rotating electrical machines - Terminal markings and direction of rotation

GB/T 1993-1993, Cooling methods for rotating electrical machines

GB/T 2888-2008, Methods of noise measurement for fans blowers compressors and roots blowers

GB/T 4772.1-1999, Dimensions and output series for rotating electrical machines - Part 1: Frame numbers 56 to 400 and flange numbers 55 to 1 080

GB/T 4942-2021, Degrees of protection provided by the integral design of rotating electrical machines (IP code) - Classification

GB/T 5171.1-2014, Small power motors - Part 1: General technical requirements

GB/T 5171.21-2016, Small power motors - Part 21: General test methods

GB/T 10068-2020, Mechanical vibration of certain machines with shaft heights 56 mm and higher - Measurement, evaluation and limits of vibration severity

GB/T 12350, Safety requirements of small power motors

3 Terms and definitions

No terms and definitions need to be defined in this document.

4 Types, basic parameters and dimensions

4.1 The type of fans consists of three parts: series code, specification code and design

code. Example:

4.2 The fan is directly connected to the motor, and the motor is of an outer rotor structure, or an inner rotor structure, which is also allowed.

4.3 The cooling method of the motor applied to the fan (hereinafter referred to as the fan motor) is IC01 (according to the regulations of GB/T 1993-1993).

5.2 The deviation of the power supply voltage and frequency from the rated value during the operation of the fan motor shall comply with the provisions of GB/T 755- 2019.

5.3 The fan motor adopts 155 (F) class insulation, and the temperature rise (resistance method) of the stator winding is assessed by 80 K.

5.4 When the fan motor is in a hot state and the torque is gradually increased, it shall be able to withstand an over-torque exceeding 60% of the rated torque for 15 s without sudden change in speed or stalling, and the voltage and frequency shall be maintained at the rated value at this time.

5.5 Under no-load conditions, the fan motor shall be able to withstand an increase in speed to 120% of its rated value for 2 minutes without harmful deformation.

5.6 The insulation resistance of the stator winding of the fan motor shall not be lower than 2 MOmega in the hot state, and not lower than 20 MOmega in the normal state.

5.7 The stator winding of the fan motor shall be able to withstand the 1 min voltage withstand testing without breakdown. The frequency of the test voltage is

50 Hz, which shall be as sinusoidal as possible; the effective value of the voltage is 1 760 V. The same fan shall not be subjected to this test repeatedly.

5.8 The stator winding of the fan motor shall be able to withstand the inter-turn impulse withstand voltage test without breakdown, and the peak value of the test impulse voltage of the coil shall comply with the provisions of GB/T 22719.2-2008.

5.9 After the stator winding of the fan motor is tested for 6 cycles according to the 40 °C damp heat cyclic test method specified in GB/T 12665-2017, the insulation resistance shall not be lower than 2 MOmega, and it shall be able to withstand the withstand voltage test specified in

5.7 without breakdown, but the effective value of the test voltage shall be 1 500 V, and the test time shall be 1 min.

5.10 Measure the current (hereinafter referred to as "no-load current of the fan") under the condition of rated voltage, rated frequency, and fan motor with impeller. The value shall be within a certain range and shall be lower than the rated current of the fan motor.

6 Test methods

6.1 The heat test shall be carried out in accordance with the provisions of GB/T 5171.21-2016.

6.2 The aerodynamic performance test shall be carried out in accordance with the provisions of GB/T 1236-2017.

6.3 The 40 °C damp heat cyclic test shall comply with the provisions of GB/T 12665- 2017.

6.4 The noise test method shall be carried out according to the provisions of GB/T 2888-2008.

6.5 The test method of vibration shall be carried out in accordance with the provisions of GB/T 10068-2020.

6.6 The test method of leakage current shall be carried out according to the provisions of GB/T 12350.

6.7 The measurement of the insulation resistance between the fan motor stator winding and the casing and the withstand voltage test of the fan motor winding shall be carried out in accordance with the provisions of GB/T 5171.21-2016.

6.8 The measurement of the DC resistance of the fan motor stator winding in the actual cold state, the measurement of the no-load current of the fan motor, and the short-term over-torque test shall be carried out in accordance with the provisions of GB/T 1032- 2012.

6.9 The inter-turn impulse withstand voltage test of fan motor windings shall be carried out in accordance with the provisions of GB/T 22719.1-2008.

6.10 The overspeed test of the fan impeller shall be carried out in accordance with the provisions of JB/T 6445-2017.

6.11 The test method for the protection grade of the enclosure shall be carried out in accordance with the provisions of GB/T 4942-2021.