



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

GB/T 10068-2020

**Mechanical vibration of certain machines with shaft heights 56
mm and higher - Measurement, evaluation and limits of
vibration severity**

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Foreword

This Standard was drafted as per the rules specified in GB/T 1.1-2009.

This Standard replaced GB/T 10068-2008 Mechanical Vibration of Certain Machines with Shaft Heights 56 mm and Higher-Measurement Evaluation and Limits of Vibration Severity. Compared with GB/T 10068-2008, this Standard has the major technical changes as follows besides the editorial modifications:

- Delete the measurement of vibration acceleration; the vibration intensity of the motor only needs to measure the vibration displacement and vibration speed (see 4.2 of 2008 Edition);
- Modify the definition of "free suspension" (see 6.2 of this Edition; 6.2 of 2008 Edition);
- Change the maximum vibration speed measured on the foot of the rigid installation not exceeding 25% of the measured vibration speed of the adjacent bearing into 30% (see 6.3.1.2 of this Edition; 6.3.1 of 2008 Edition);
- Add the second rigid installation method (see 6.3.1.3 of this Edition);
- Modify the measurement limits of vibration displacement and vibration speed

(see Table 1 of this Edition; Table 1 of 2008 Edition);

--- Motors with a shaft center height of 132 and below do not consider rigid

installation (see Table 1 of this Edition; Table 1 of 2008 Edition);

--- Add the vibration limit diagram (see Figure 7 of this Edition).

This Standard adopts the translation method to equivalently use IEC 60034-14:2018 Rotating Electrical Machines - Part 14: Mechanical Vibration of Certain Machines with Shaft Heights 56mm and Higher - Measurement, Evaluation and Limits of Vibration Severity.

The Chinese documents that have consistent correspondence with the international documents quoted in the Normative References of this Standard are as follows:

--- GB/T 755-2019 Rotating Electrical Machines - Rating and Performance (IEC 60034-1:2017, IDT);

--- GB/T 997-2008 Rotating Electrical Machines-Classification of Types of Construction, Mounting Arrangements and Terminal Box Position (IM Code) (IEC 60034-7:2001, IDT);

--- GB/T 9239.32-2017 Mechanical Vibration - Rotor Balancing - Part 32: Shaft and Mechanical Vibration of Certain Machines with Shaft Heights 56mm and Higher - Measurement, Evaluation and Limits of Vibration Severity

1 Scope

This Standard specifies the factory acceptance vibration test procedures and vibration limits for certain electrical machines under specified conditions, when uncoupled from any load or prime mover.

This Standard is applicable to DC and three-phase AC machines, with shaft heights 56 mm and higher and a rated output up to 50 MW, at operational speeds from 120 r/min~15000 r/min.

This Standard is not applicable to machines mounted in situ (on site), three-phase commutator motors, single-phase machines, three-phase machines operated on

single-phase systems, vertical waterpower generators, turbine generators greater than

20 MW and machines with magnetic bearings or series-wound machines.

NOTE: For machines measured in situ, refer to current editions of ISO 20816, ISO 10816 and

ISO 7919.

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) is applicable to this document.

IEC 60034-1 Rotating Electrical Machines - Part 1: Rating and Performance

IEC 60034-7 Rotating Electrical Machines - Part 7: Classification of Types of Constructions and Mounting Arrangements (IM Code)

ISO 2954 Mechanical Vibration of Rotating and Reciprocating Machinery - Requirements for Instruments for Measuring Vibration Severity

ISO 10817-1 Rotating Shaft Vibration Measuring Systems - Part 1: Relative and

NOTE: Large AC induction machines running at very low slip values at no load may require several minutes to more than 10min for such measurements to be completed at each vibration

measuring position.

4.3 Relative shaft vibration

The criterion adopted for the relative shaft vibration shall be the vibratory displacement S_{p-p} in the direction of measurement from ISO 20816-1.

5 Measurement Equipment

The measurement equipment shall be capable of measuring the effective value of vibration with flat response over a frequency range of 10Hz ~ 1000Hz, in accordance

with the requirements of ISO 2954. However, for machines with speeds approaching or below 600r/min, the lower limit of the flat response frequency range shall be no greater than 2Hz.

Measurement equipment for relative shaft vibration shall meet the requirements in ISO 10817-1.

Multi-directional vibration sensors shall not be used.

NOTE: Multi-directional sensors do not provide proper vibration measurement in all directions

when mounted in only one location.

6.1 General

The vibration of an electrical machine is closely linked with the mounting of the machine. To permit evaluation as far as balance and vibration of rotating electrical machines are concerned, it is necessary to measure the vibration on the machine alone, under properly determined test conditions, to enable reproducible tests to be carried out and to provide comparable measurements.

6.2 Free suspension

This condition is achieved by suspending the machine on a spring or by mounting on an elastic support (springs, rubber pads, etc.).

The highest natural oscillation frequency (f_{no}) of the free suspension system and machine, shall be less than $1/3$ of the frequency (f_1) corresponding to the speed of the machine under test, as defined in 7.3. Based on the mass of the machine being tested, the relationship between elastic displacement and rated speed of the suspension maximum velocity, which is measured at the adjacent bearing housing in the same measurement direction. The ratio of foot to bearing vibration velocities is valid for the electrical line frequency component or twice electrical line frequency component (if the latter is required to be measured).

NOTE 1: The rigidity of a foundation is a relative quantity. It is compared with the rigidity of the