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**JB**

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Replacing JB/T 8689-1998

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**Fan vibration detection and its limited value**

通风机振动检测及其限值

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## Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard replaces JB/T 8689-1998 "Fan vibration detection and its limited value". As compared with JB/T 8689-1998, the main technical changes are as follows:

- In the foreword, ADD the release of each version of this standard;
- In the scope, MODIFY the descriptions;
- REVISE the Appendix A (Suggestive) in 3.3.1 to Appendix A (Informative).
- REVISE the Appendix A (Suggestive) to Appendix A (Informative).

This standard was proposed by the China Machinery Industry Federation.

This standard shall be under the jurisdiction of the National Fan Standardization Technical Committee (SAC/TC 187).

Drafting organizations of this standard: Shenyang Blower Research Institute (Co., Ltd.), Chongqing General Industrial (Group) Co., Ltd., Shangyu Fan Co., Ltd., Zhejiang Yilida Fan Co., Ltd., Shanghai General Fan Co., Ltd.

The main drafters of this standard: Chen Zhongcai, Chen Fengyi, Zheng Hua, Liao Yulong, Yu Haishui, Zhang Qizhong, Gong Xinglong.

This standard replaces the standard previously issued as follows:

- JB/TQ 334-1984, JB/TQ 334-1987, JB/T 8689-1998.

# Fan vibration detection and its limited value

## 1 Scope

This standard specifies the vibration limit of the operation of the fan, the measurement part of the vibration of the fan, the requirements of measuring instrument, the installation of the tested product, the operating conditions during the measurement.

This standard is applicable to the exit-factory inspection and type test of the centrifugal, axial and mixed flow fans as well as the acceptance of on-site vibration indicators.

## 2 Terms and definitions

The following terms and definitions apply to this document.

### 2.1

#### Root-mean-square value of vibration velocity

The rms value of the vibration velocity, which is also called the effective value of the vibration velocity.

For periodic vibration, it refers to the square root of the average value of the instantaneous value of the vibration velocity in a vibration period. Its mathematical expression is as follows:

$$v_{\text{rms}} = \sqrt{\frac{1}{T} \int_0^T [v(t)]^2 dt}$$

Where:

$v_{\text{rms}}$  - The rms value of vibration velocity (effective value), in millimeters per second (mm/s);

T - The vibration period, in seconds (s);

$v(t)$  - The function of the vibration velocity as a function of time t, in millimeters per second (mm/s);

t - The independent variable of time, in seconds (s).

For sinusoidal vibration at a single frequency,  $v(t) = v \cos \omega t$ , the rms value of the vibration velocity as obtained by the above formula is:

$$v_{\text{rms}} = \frac{v}{\sqrt{2}}$$

Where:

$v$  - Single peak of vibration velocity, in millimeters per second (mm/s).

$$v = X \omega$$

Where:

$X$  - The single peak value of vibration displacement, in millimeters (mm);

$\omega$  - The angular frequency, in radians per second (rad/s).

## 2.2

### Periodic vibration

The vibration whose vibration waveform repeats once per a time period  $P$ .

## 2.3

### Rigid support

After the fan is installed, when the basic natural frequency of the “fan-support system” is higher than the main working frequency of the fan, it is called rigid support.

Note: Generally, fan is directly fixed and connected to the rigid foundation.

## 2.4

### Flexible support

After the fan is installed, when the basic natural frequency of the “fan-support system” is lower than the main working frequency of the fan, it is called flexible support.

Note: Under special conditions, the fan is connected to the foundation through the vibration isolator.

### **3.5 Operating conditions of the tested fan**

**3.5.1** The fan shall be operated at a stable rated speed and rated conditions. If the fan has multiple rated speeds and rated conditions, it shall respectively measure the vibrations under various rated conditions. Take the maximum measured value to represent the vibration value of this fan. Meanwhile indicate the operating conditions at the time of measurement.

**3.5.2** Due to the objective conditions, if the rated speed and the rated condition of the fan cannot be achieved at the same time during the test, it shall be as close as possible to the rated conditions at the rated speed, measure the vibration value and record the operating conditions during the measurement.

**3.5.3** If the fan adopts the variable speed regulator to regulate the range of use, it shall, within the speed regulating range as specified for the fan, respectively measure the vibration value at 3 speeds: high, medium, low. At each speed, it shall be as close as possible to the working conditions. Take the maximum measured value to represent the vibration value of the fan. Meanwhile indicate the operating conditions at the time of measurement.

**3.5.4** If the fan cannot meet the actual hot-state running conditions during test, it may, under the cold-state, use the conditions as close to the rated working conditions as possible as allowed for the motor. Meanwhile indicate the operating conditions at the time of measurement.

**3.5.5** The difference between the vibration value of the fan when it is running and when it is not running shall be more than 3 times the vibration value of the fan when it is not running. Otherwise, it is considered that the tested fan has an external vibration environment, in this case it shall take measures to avoid external influences.

**3.5.6** The temperature, humidity, magnetic field, corrosion characteristics, etc. around the fan shall meet the requirements for the use of the instrument.