

JJG

INDUSTRY STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

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Verification Regulation of Vibration Displacement Transducer (English Translation)

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1 Scope

This Regulation applies to the type approval, prototype testing, initial verification, subsequent verification, and in-use inspection of inductive, capacitive and resistive displacement transducers (hereinafter referred to as the transducers) used for mechanical vibration measurement within the frequency range of (0 ~ 5,000) Hz.

2 References

GB/T 2298-1991 Mechanical Vibration and Shock - Terminology

GB/T 13866-1992 Shock and Vibration Measurements - Characteristics to be Specified for Seismic Pick-ups

GB/T 13823.1-1993 Methods for the Calibration of Vibration and Shock Pick-ups - Basic Concepts

GB/T 13823.3-1992 Methods for the Calibration of Vibration and Shock Pick-ups -

Comparison (secondary vibration) Calibration by Sinusoidal Excitation

GB/T 13823.16-1995 Methods for Calibration of Vibration and Shock Pick-ups - Testing of Temperature Response by Comparison

JJG 2054-1990 Measuring Instruments for Vibration

JJF 1015-2002 General Norm for Pattern Evaluation and Pattern Approval of Measuring Instruments

JJF 1016-2002 The Rules for Drafting Program of Pattern Evaluation of Measuring Instruments

JB/T 9256-1999 Inductive Displacement Transducers

JB/T 9257-1999 Alternating-current Linear Variable Differential Transformer (AC-AC LVDT) Displacement Transducers

JB/T 9258-999 Direct-current Linear Variable Differential Transformer (DC-DC LVDT) Displacement Transducers

JB/T 9329-1999 Basic Environmental Conditions and Testing Methods for Instruments Transportation and Storage in the Transportation

When using this Regulation, attention shall be paid to using the current valid versions of the above-cited references.

3 Overview

Vibration displacement transducers are a key component of displacement measuring instruments, primarily used for measuring mechanical vibration. They utilize changes in inductance, capacitance or resistance to convert the displacement of mechanical vibration into changes in voltage or current, thus measuring the vibration displacement.

4 Metrological Performance Requirements

The metrological performance requirements for vibration displacement transducers are shown in Table 1.

5.1 Appearance and Accessories

5.1.1

The transducer casings shall have a nameplate indicating the product name, specifications, manufacturer, exit-factory date, and serial number, and shall also be marked with the mark and its serial number.

dimensions and installation mode.

5.3 Environmental Adaptability of Transducers

5.3.1

Normal operating environment of transducers.

Temperature. within the temperature range specified by the manufacturer.

Humidity. $\leq 85\%RH$.

No strong magnetic fields, corrosive gases or liquids, or strong vibration sources in the vicinity.

5.3.2 Test requirements for environmental adaptability

The environmental tests shall comply with the requirements for humidity test and drop test in

Article 3 of JB/T 9329-1999 Basic Environmental Conditions and Testing Methods for Instruments Transportation and Storage in the Transportation.

Humidity test. $95\%RH$ ($25\text{ }^{\circ}C$);

Drop test. free fall from a height of 100 mm.

6 Control of Measuring Instruments

Control of measuring instruments includes type approval or prototype testing, initial verification, subsequent verification, and in-use inspection.

6.1 Type Approval or Prototype Testing

6.1.1

Type approval or prototype testing shall be conducted in accordance with the relevant requirements of JJF 1015-2002 General Norm for Pattern Evaluation and Pattern Approval of

Measuring Instruments and JJF 1016-2002 The Rules for Drafting Program of Pattern Evaluation of Measuring Instruments.

6.1.2

The items for type approval and prototype testing are shown in Table 2.

6.1.3

The methods for type approval and prototype testing are shown in Appendix A.

6.2.1.1 Environmental conditions

- 1) Temperature. $(20 \pm 5) ^\circ\text{C}$.
- 2) Humidity. $\leq 85\% \text{RH}$.
- 3) Power supply voltage fluctuation shall not exceed $\pm 10\%$ of the rated value.
- 4) The verification site shall be free from the interferences of strong vibration sources and strong magnetic fields, as well as corrosive gases and liquids.

6.2.1.2 Verification instruments and equipment

The following verification instruments and equipment can be selected in accordance with the type and model of the transducer under verification.

- 1) Instruments and equipment for static calibration.

Displacement (length) measuring instruments.

Third-class standard gauge blocks. measurement uncertainty $(0.1 + 1L) \mu\text{m}$ ($k = 3$);

Fourth-class standard gauge blocks. measurement uncertainty $(0.2 + 2L) \mu\text{m}$ ($k = 3$);

Dial indicator. $(0 \sim 5) \text{ mm}$, indication error. $\pm 5 \mu\text{m}$;

Dial gauge. $(0 \sim 10) \text{ mm}$, indication error. $\pm 20 \mu\text{m}$;

$(0 \sim 25) \text{ mm}$, indication error. $\pm 30 \mu\text{m}$;

Displacement static calibrator. $(0 \sim 10) \text{ mm}$ or $(0 \sim 30) \text{ mm}$;

DC digital voltmeter. measurement uncertainty 0.1% ($k = 2$);

Oscilloscope. indication error $\pm 5\%$;

DC regulated power supply. voltage stability $\pm 0.1\%$, ripple voltage $< 1 \text{ mV}$.

- 2) Instruments and equipment for dynamic calibration.

Standard vibration table. acceleration waveform distortion $\leq 5\%$; lateral vibration ratio $\leq 10\%$;

Acceleration amplitude stability $\leq 0.5\%$; signal-to-noise ratio $\geq 60 \text{ dB}$;

Table surface magnetic leakage $\leq 3 \text{ mT}$.

Standard accelerometer set.

Reference sensitivity calibration uncertainty.

At 160 Hz or 80 Hz , 0.5% ($k = 3$);

Within the $(20 \sim 1,000) \text{ Hz}$ frequency range, 1.0% ($k = 3$);