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**Test methods for floor vibration performance of timber
structures**

(English Translation)

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Foreword

This document starts from the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part 1: Structure and Drafting Rules of Standardization Documents" grass.

1 Scope

This document specifies the terms and definitions of the vibration performance of wooden floor slabs, the environmental conditions of the test site, test equipment, test procedures, test report.

This document is applicable to laboratory or on-site testing of vibration performance of joist floor slabs and flat floor slabs. It is not applicable to the vibration comfort of wooden floor slab Evaluation.

2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version applies to this article Pieces. For undated reference documents, the latest version (including all amendments) is applicable to this document.

GB/T 2298-2010 Mechanical vibration, shock and condition monitoring vocabulary (ISO 2041:2009, IDT) GB/T 11349.2 Vibration and shock mechanical admittance test determination Part 2: Single-point translational excitation measurement with a vibrator (GB/T 11349.2-2006, ISO 7626-2.:1990, IDT) JB/T 6822 piezoelectric acceleration sensor JJF 1305 Linear Displacement Sensor Calibration Specification JJG 834 dynamic signal analyzer

3 Terms and definitions

The following terms and definitions defined in GB/T 2298-2010 apply to this document.

Coherence function

A dimensionless measure of the relationship between the response signal and the excitation signal in the frequency domain. It describes the linear relationship of each frequency component. It is an important part of the quality of the test.

One of the important indicators.

Window function

The truncation function that intercepts the signal in order to reduce the leakage of spectrum energy. Commonly used window functions include rectangular window, Hanning window, and exponential window.

Damping

Dissipation of energy over time or distance.

Natural frequency

The free vibration response characteristics of the floor structure when subjected to external transient excitation.

Frequency response function Frequency response function the ratio of the Fourier transform of the vibration response of the floor structure system to the Fourier transform of the excitation signal in the frequency domain.

Modal damping ratio

The ratio of the actual damping to the critical damping coefficient, that is, a dimensionless parameter, expresses the attenuation form of the structure's vibration after being excited.

Modal analysis

Through frequency response function modal parameter identification, determine the natural frequency, damping ratio, modal shape, etc. of the floor structure within the frequency range of the collection and analysis Process of vibration modal parameters.

Mode shape

The displacement and deformation of each mode of the floor structure are relative to the vibration mode.

Nodal point

Modal node

The fixed point where the displacement value is zero in the mode shape of the floor structure.

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Static deflection

Deformation caused by applying concentrated load on the floor slab. If the floor is a joist structure, the static load deflection of the center of the floor is the span of the center joist of the floor.

Deflection of the middle part.

4 Conditions of the test site

4.1

The environmental conditions of the test site of the floor laboratory should be maintained at $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and $65\% \pm 5\% \text{ RH}$, and the floor to be tested should be stored in the test site Until the equilibrium condition is reached. The actual temperature and humidity should be recorded during the field test of the floor slab.

4.2

The test floor should ensure that there is no movable additional mass on the upper part to avoid errors in the vibration measurement. If it cannot be removed, it should not be changed Attach the quality status and record it in the test report.

5.1.1 Vibration exciter

Vibration exciters include electric vibration exciters, electro-hydraulic vibration exciters, piezoelectric vibration exciters, etc., which are used to excite the vibration of the structure and should meet the following requirements Claim.

- a) The excited modal test signal has a sufficient signal-to-noise ratio and does not produce a nonlinear response;
- b) Applicable excitation mode and frequency components cover the frequency to be measured.

5.1.2 Pulse excitation device

The pulse excitation device can be an instrumented force hammer equipped with a built-in force sensor, or an impact device equipped with an independent force sensor. Pulse excitation equipment it is suitable to set the impact head with a weight of more than 10 kg and a rubber material.

5.1.3 Force sensor

The force sensor is calibrated according to the factory instructions before use, and the calibration process is described in GB/T 11349.2. The frequency response range of the force sensor is 0.5Hz~1kHz.

5.2 Acceleration sensor

The acceleration sensor is calibrated according to the factory instructions before use, and the calibration process is shown in JB/T 6822. Acceleration sensor frequency response range the range is 0.5Hz~1kHz, and the amplitude accuracy is $\pm 1\text{dB}$.

5.3 Data acquisition device

It is used to collect and store vibration signal data, analyze and record the time signal and extract the required information. The data acquisition device should be equipped to at least 2 analog input channels are needed to collect excitation force signal and wooden floor response signal at the same time. The sampling frequency should be more than 2 times the highest frequency to be tested Above, in order to capture the natural frequency characteristics of the floor to be tested, the output result of the signal analyzer should at least include the frequency response function and the coherence function.

The front end of the hardware analog signal acquisition of the data acquisition device shall have an analog anti-aliasing filter, and the cut-off frequency of the filter shall be greater than that of the wooden floor structure the highest analysis frequency, and the filter attenuation steepness outside the band is greater than 80dB/Oct; the acquisition instrument has an independent analog-to-digital converter (A/D) of more than 24 bits, the highest frequency is greater than 51.2 kHz, which meets the standard accuracy of JJG 834 dynamic analyzer class A.

5.4 Deflection test device

The accuracy of the deflection test device should be 0.3% of the expected deflection. Refer to JJF 1305 for the calibration process.