



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

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Standard for vibration control design of industrial buildings

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Table of Contents

- 1 General
- 2 Terms and symbols
 - 2.1 Terminology
 - 2.2 Symbols
- 3 Basic Regulations
 - 3.1 General provisions
 - 3.2 Site selection and equipment layout of industrial buildings
 - 3.3 Structural selection and layout
- 4 Multi-storey industrial buildings should adopt concrete floors or composite floors.
 - 4.1 General provisions
 - 4.2 Numerical calculation method for structural vibration analysis
- 5 Vibration control of single-story industrial buildings
 - 5.1 General provisions
 - 5.2 Calculation of structural vibration
 - 5.3 Calculation of internal force of components
 - 5.4 Vibration control construction measures
- 6 Vibration control of multi-storey industrial buildings
 - 6.1 General provisions
 - 6.2 Calculation of structural vibration

1 General

1.0.1 In order to implement relevant national laws and regulations and technical and economic policies in the vibration control of industrial building structures, ensure that industrial buildings meet structural safety, normal production and environmental requirements under the action of vibration loads, and achieve advanced technology and economical rationality, this standard is formulated.

1.0.2 This standard applies to structural vibration control design of industrial buildings under the action of mechanical vibration loads, not applicable to structural vibration control under earthquake, wind and other excitations.

1.0.3 The vibration control design of industrial buildings shall not only comply with this standard, but also comply with the current relevant national standards.

2.1.1 building vibration

Vibration of building structures caused by vibratory loads.

2.1.2 allowable vibration value allowable vibration value

The limit value of the vibration index of the vibration object.

2.1.3 horizontal vibration horizontal vibration

For vibration parallel to the ground, the two orthogonal directions are represented by the chi axis and the U axis.

2.1.4 vertical vibration vertical vibration

The vibration perpendicular to the ground is represented by the Z axis.

2.1.5 first frequency compact zone first frequency dense zone

Under the action of vibration load, the frequency-intensive area first appears on the amplitude-frequency characteristic curve of the multi-span continuous structure.

2.1.6 vibration control vibration control

Take measures to reduce the vibration response of the structure to the vibration load source, the vibration transmission path or the building structure itself.

2.1.7 vibration isolation vibration isolation

Measures to reduce the transmission of vibrations using elastic elements, damping elements or barriers.

2.2.1 Action and action effect.

u-vibration displacement;

v - vibration velocity;

a-vibration acceleration;

Fv - vibration load;

Fv0-vibration load amplitude;

R--the resistance design value of the structural member;

S - effect design value;

C--Effect limit value of normal use of equipment and instruments;

delta-deformation of the member under the action of unit force.

2.2.2 Calculation indicators.

K-system or component stiffness;

m-the uniform mass of the member;

E - modulus of elasticity of the material;

f--structure natural frequency;

f₀--equipment vibration load frequency;

f_{e,min}--minimum value of the frequency in the frequency sweep area;

f_{e,max}--maximum value of the frequency in the frequency sweep area;

epsilon--sweep calculation parameters;

w--circular frequency of vibration;

zeta--Damping ratio.

2.2.3 Geometric parameters.

A₀--equipment base area;

B - gable spacing;

H - the height of the column top of a single-storey industrial building;

I - moment of inertia of member section;

L--Structural transverse span, component span;

r₀--Equipment foundation conversion radius.

3.1 General provisions

3.1.1 The vibration control of industrial buildings shall meet the requirements for the normal use of equipment and instruments as well as the requirements for the bearing capacity of structures and components.

3.1.2 The vibration control design of industrial buildings shall have the following information.

- 1 General plan of the project and process layout;
- 2 Equipment and instrument floor plan, equipment name, model, shape and base size;
- 3 Vibration load of power equipment;

- 4 Allowable vibration standards for controlled equipment and instruments;
- 5 Structural plan and section;
- 6 Construction site geotechnical investigation report;
- 7 Power equipment and environmental vibration data around the building, buildings with high requirements for vibration control and crowd distribution data.

3.1.3 The vibration control design of industrial buildings shall meet the following requirements.

- 1 The vibration load shall be determined according to the relevant provisions of the current national standard "Building Vibration Load Standard" GB/T 51228;
- 2 The permissible vibration standard should be determined according to the relevant provisions of the current national standard "Construction Engineering Permissible Vibration Standard" GB 50868;
- 3 When adopting vibration isolation measures, they should comply with the relevant provisions of the current national standard "Engineering Vibration Isolation Design Standards" GB 50463.

3.1.4 The natural vibration frequency of industrial building structures should avoid the vibration load frequency.

3.1.5 When the industrial building structure is under the action of vibration of large power equipment, when the vibration control cannot meet the requirements of normal use, measures should be taken to reduce the vibration output of the power equipment or to isolate and reduce vibration.

3.2 Site selection and equipment layout of industrial buildings

3.2.1 When the equipment and instruments in the industrial building have high requirements on the vibration environment, the site selection of the building should be far away from the vibration source with relatively large vibration.

3.2.2 When the vibration load of industrial building power equipment is relatively large, the site selection should avoid soft soil, filled soil, liquefied soil and other unfavorable geology; if it cannot be avoided, foundation treatment should be carried out.

3.2.3 During the process design of industrial buildings, equipment with large vibrations should be arranged separately from precision instruments and processing equipment, and ordinary processing equipment should be arranged separately from precision processing equipment.