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Code for design of vibration isolation

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1 General

1.0.1 In order to make the vibration isolation design of the project based on the characteristics of the vibration source and the vibration isolation object, rationally select the vibration isolation method, dynamic parameters, support structure form and vibration isolator, etc., to achieve advanced technology, economical and reasonable, and ensure normal use. To meet the requirements of production and environment, formulate this standard.

1.0.2 This standard applies to vibration isolation design in the following situations.

1 Active vibration isolation and intelligent vibration isolation to reduce the adverse effects of vibration generated by power machines, vehicles, etc. on production, work, life and the surrounding environment;

2. Passive vibration isolation and intelligent vibration isolation to reduce the adverse effects of external vibration on instruments, machines and equipment.

1.0.3 This standard is not suitable for isolating vibrations caused by natural actions such as earthquakes, winds, and waves.

1.0.4 In addition to implementing this standard, the vibration isolation design of the project should also comply with the current relevant national standards.

2.1.1 active vibration isolation active vibration isolation

Vibration isolation measures taken for vibration sources.

2.1.2 Passive vibration isolation passive vibration isolation

Vibration isolation measures for instruments, meters, machines and other equipment affected by vibration.

2.1.3 intelligent vibration isolation

There is an external control energy input, and the control parameters can be intelligently adjusted according to the control target.

2.1.4 barrier vibration isolation barrier vibration isolation

Barriers are installed in the vibration transmission path to reduce the impact of ground vibration transmission.

2.1.5 vibration isolation system vibration isolation system

A system consisting of a pedestal structure, vibration isolators and necessary dampers.

2.1.6 vibration isolated object vibration isolated object

Instruments, instruments, machines, etc. that require vibration isolation measures.

2.1.7 vibration isolation system vibration isolation institution

A system consisting of vibration isolation objects and vibration isolation systems.

2.1.8 allowable vibration value allowable vibration value

The maximum vibration limit value of the vibrated object.

2.1.9 Transmissibility

When the vibration system is forced to vibrate, the ratio of the displacement response amplitude to the external excitation displacement amplitude; for active vibration isolation, it is the ratio of the output displacement of the vibration isolation system to the static displacement of the system under the action of the disturbance amplitude; for passive vibration isolation, It is the ratio of the output displacement of the vibration isolation system to the input disturbance displacement.

2.1.10 vibration isolator vibration isolator

A device that isolates vibration or shock transmission, often in combination with a damper.

2.1.11 damper damper

A device that reduces shock or vibration by means of energy dissipation.

2.2.1 Action and action effect.

F_x --disturbance force value acting on the center of mass of the vibration isolation system along the x -axis;

F_y --disturbance force acting on the center of mass of the vibration isolation system along the y -axis;

F_z --the disturbance force value acting on the center of mass of the vibration isolation system along the z -axis;

M_x --the disturbance moment value around the x -axis acting on the mass center of the vibration isolation system;

M_y --the disturbance moment value around the y -axis at the mass center of the vibration isolation system;

M_z --the disturbance moment value around the z -axis at the center of mass of the vibration isolation system;

u --vibration displacement;

$\dot{u}$ --vibration velocity;

a --vibration acceleration;

u_x --vibration displacement along the x -axis at the mass center of the vibration isolation system;

u_y --vibration displacement along the y -axis at the mass center of the vibration isolation system;

u_z --vibration displacement along the z -axis at the mass center of the vibration isolation system;

θ_x --vibration angular displacement of the center of mass of the vibration isolation system rotating around the x -axis;

θ_y --vibration angular displacement of the center of mass of the vibration isolation system rotating around the y -axis;

θ_z --the vibration angular displacement of the center of mass of the vibration isolation system rotating around the z -axis;

u_{ox} --vibration displacement along the x -axis generated at the supporting structure or foundation;

uoy-vibration displacement along the y-axis generated at the supporting structure or foundation;

uoz-vibration displacement along the z-axis generated at the supporting structure or foundation;

uodia. x-the vibration angular displacement generated at the supporting structure or foundation around the chi axis;

uodia. y--vibration angular displacement generated at the supporting structure or foundation around the y-axis;

uodia. z--the vibration angular displacement generated by the supporting structure or the foundation around the z-axis.

2.2.2 Calculation indicators.

Kx--total stiffness of the vibration isolator along the chi axis;

Ky-the total stiffness of the vibration isolator along the y-axis;

Kz--total stiffness of the vibration isolator along the z-axis;

Kdia. x-total torsional rigidity of the vibration isolator around the chi axis;

Kdia. y-total torsional rigidity of the vibration isolator around the y-axis;

Kdia. z-total torsional rigidity of the vibration isolator around the z-axis;

omega--interference circle frequency;

omeganx--the undamped natural circular frequency of the vibration isolation system along the chi axis;

omegany-the undamped natural circular frequency of the vibration isolation system along the y-axis;

omeganz-the undamped natural circular frequency of the vibration isolation system along the z-axis;

omegandia. x--the undamped natural circular frequency of the vibration isolation system rotating around the chi axis;

omegandia. y--the undamped natural circular frequency of the vibration isolation system rotating around the y-axis;

omegandia. z-the undamped natural circular frequency of the vibration isolation system rotating around the z-axis;

xi--damping ratio;

xix--the damping ratio of the vibration isolator along the chi axis;