CCS P 15

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 51408-2021

Building isolation design standard

Issued on: April 27, 2021 **Implemented on: September 1, 2021**

Issued by: Ministry of Housing and Urban-Rural Development of the People's Republic of China;
State Administration for Market Regulation

Table of Contents

1 General

1.0.1 In order to implement the national laws and regulations on earthquake prevention and disaster reduction in construction projects, implement the policy of focusing on prevention, so that after the building adopts seismic isolation technology, the earthquake safety is further improved, and the function of the building after the fortification earthquake is not short, To avoid casualties and secondary disasters, reduce social impact and economic losses, this standard is formulated.

1.0.2 This standard applies to the seismic isolation design of buildings in areas with a seismic fortification intensity of 6 degrees and above and the seismic isolation and reinforcement design of existing buildings.

1.0.3 Except for special regulations, the basic fortification objectives of earthquake-isolated buildings are. when subjected to a fortified earthquake equivalent to the basic intensity of the region, the main structure can continue to be used without damage or repair; When the structure may be damaged, it can continue to be used after being repaired; when the special fortification building is subjected to an extremely rare earthquake, it will not collapse or cause life-threatening serious damage.

1.0.4 When there are special requirements for the use functions of the structural components, non-structural components and auxiliary equipment of the

earthquake-isolated building, in addition to meeting the basic fortification objectives, they shall also meet the provisions of the seismic performance standards for structural components, non-structural components and auxiliary equipment.

1.0.5 When the height, regularity, structure type, and setting of seismic isolation floors of seismic-isolated buildings exceed the relevant standards or there are special requirements such as seismic fortification standards, it is advisable to use the structural seismic performance design method for supplementary analysis in accordance with Appendix A of this standard and argument.

1.0.6 The design of seismically isolated buildings and the seismically isolated and reinforced design of existing buildings shall not only comply with this standard, but also comply with the provisions of the current relevant national standards.

2.1.1 Seismically isolated building

In order to reduce the seismic response, a building with a seismic isolation layer is set in the structure to realize the seismic isolation function, including the upper structure, the seismic isolation layer, the lower structure and the foundation.

2.1.2 Seismic isolation

A general term for all components of an earthquake-isolated building set between the foundation, the bottom or the substructure and the superstructure, including earthquake-isolation bearings, damping devices, wind-resistant devices, limit devices, tensile devices, auxiliary devices and related supporting or connection components, etc.

2.1.3 superstructure superstructure

Seismic isolation buildings are located in the structural part above the seismic isolation layer.

2.1.4 Substructure

Seismic isolation building is the structural part located below the seismic isolation layer, excluding the foundation.

2.1.5 Base isolation base isolation

The seismic isolation system is set at the bottom of the building.

2.1.6 inter-storey isolation

The seismic isolation system is set at a position above the bottom of the building.

2.1.7 roof isolation

The seismic isolation layer is set between the building column top or wall top and the top roof of the seismic isolation system.

2.1.8 Seismic isolator

The seismic isolation layer is used to carry the upper structure and has a bearing with seismic isolation and deformation capacity.

2.1.9 damping device damping device

A device that attenuates the seismic response of an isolation layer by absorbing and dissipating seismic input energy.

2.1.10 anti-wind device anti-wind device

The seismic isolation layer is a device used to resist the wind load of the superstructure, which can be an integral part of the seismic isolation bearing or can be set separately.

2.1.11 Anti-tension device

The device used in the seismic isolation layer to resist the vertical tension caused by the overturning action of the superstructure.

2.1.12 limit device stopper

A device that limits the displacement of an isolation layer beyond a reasonable design range.

2.1.13 Base shear ratio

The ratio of the shear force at the bottom of the upper structure of the building structure after seismic isolation to that before isolation.

2.1.14 Equivalent stiffness equivalent stiffness

The secant stiffness of an isolator or isolator for a specific horizontal displacement.

2.1.15 Equivalent damping ratio equivalent damping ratio

The damping ratio of an isolating layer or isolating mount for a particular pair of horizontal displacements.

2.1.16 very rare earthquake

Earthquake motion with annual exceedance probability of during the design reference

period.

3.1 General provisions

3.1.1 The seismic fortification category of seismically isolated buildings shall be determined in accordance with the relevant provisions of the current national standard "Classification Standards for Seismic Fortification of Construction Engineering" GB 50223.

3.1.2 For seismically isolated buildings, a reasonable seismic isolation scheme should be determined according to the building's seismic fortification category, design ground motion parameters, site conditions, building structure type, and use requirements.

3.1.3 Under fortified earthquakes, the bearing capacity and deformation of the structure and the isolation layer should be checked; under rare earthquakes, the deformation of the structure and the isolation layer should be checked, and the bearing capacity of the isolation layer should be checked. Check calculation; under the action of extremely rare earthquakes, the deformation check calculation of the structure and the isolation layer should be carried out for special fortification buildings.

3.1.4 The design service life of the seismic isolation bearing in the seismic isolation layer should not be lower than the design service life of the building structure. When the design service life of other devices in the seismic isolation layer is lower than the design service life of the building structure, replaceable measures shall be indicated and preset in the design.

3.2 Site, foundations and foundations

3.2.1 The site of the earthquake-isolated building should choose the favorable location for earthquake resistance, and avoid the unfavorable location; when it cannot be avoided, effective measures should be taken.

3.2.2 The foundation of the earthquake-isolated building should be stable and reliable, and the site where it is located should be Category I, II, and III; when the site is Category IV, effective measures should be taken.

3.2.3 The design and seismic calculation of the foundation of the earthquake-isolated building shall meet the requirements of seismic fortification intensity in the region.

3.2.4 The anti-seismic structural measures of the foundation foundation of earthquake-isolated buildings shall comply with the provisions of the current national standard "Code for Seismic Design of Buildings" GB 50011.For the anti-liquefaction measures of the foundation of key fortified buildings, it shall be determined by increasing the liquefaction level; for special The foundation anti-liquefaction measures of fortified buildings should be specially studied, and should not be lower than the corresponding requirements of key fortified buildings until liquefaction subsidence is completely eliminated.