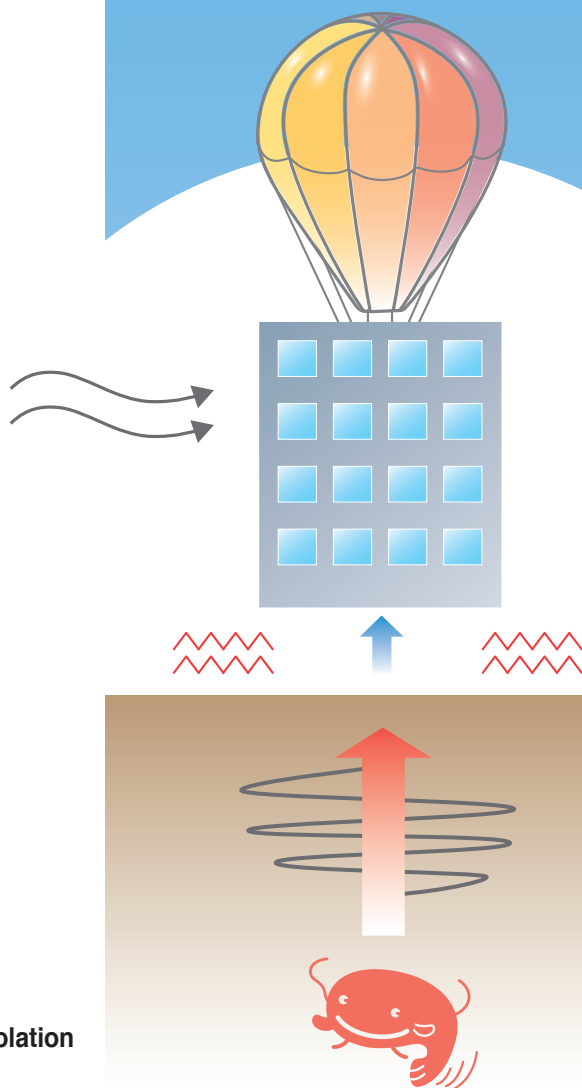




SEISMIC ISOLATION

— Get to know about seismic isolation —



What is seismic isolation?

Protecting human life
and property from earthquakes



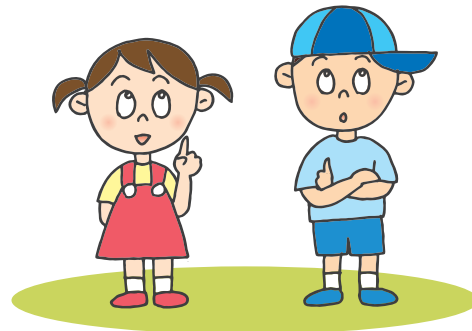
Mechanism of a seismically isolated building

“Seismic isolation” is a method of protecting a building from major earthquakes.

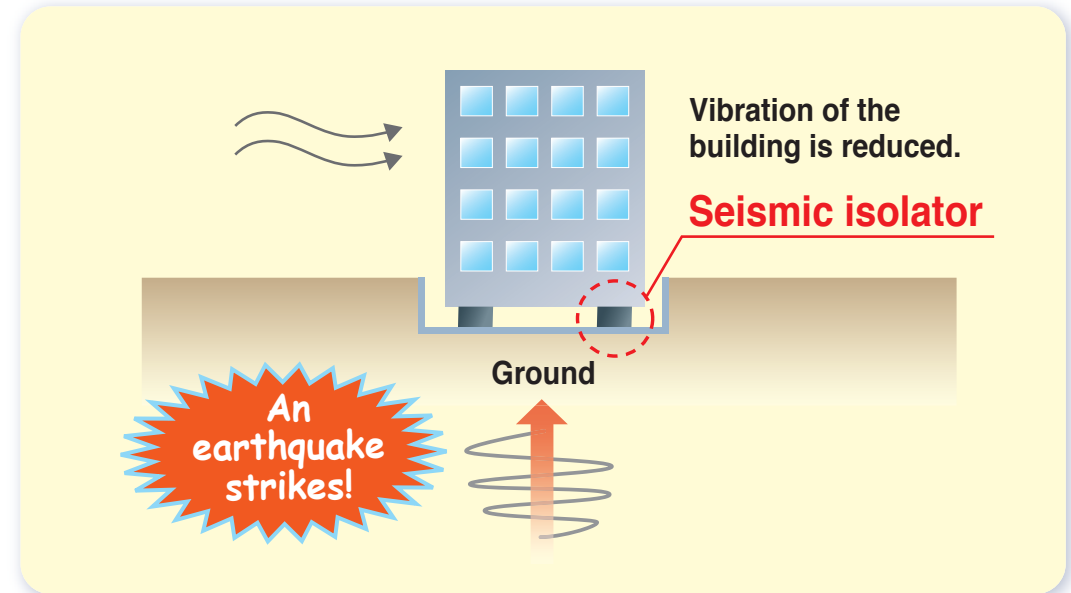
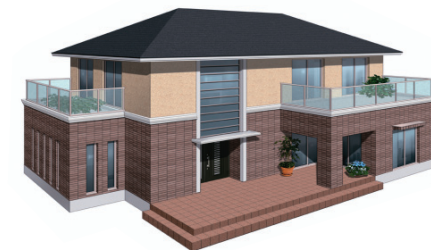
“Isolators” are installed between a building and the ground to reduce vibrations that transmit to a building.

It is as if the building were in a condition of floating in the air above the ground.

This building is called a seismically isolated building.



Seismic isolation can be applied not only to buildings but also to houses.



What is seismic isolation?

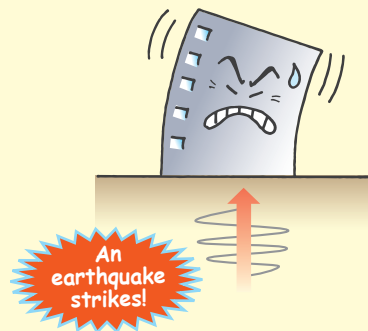
— Protecting human life
and property from earthquakes —



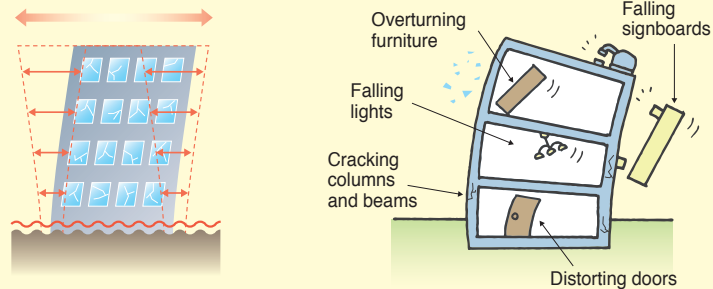
How buildings sway during an earthquake

Ordinary building

Earthquake vibrations transmit directly to a building.



The building sways violently when an earthquake strikes.



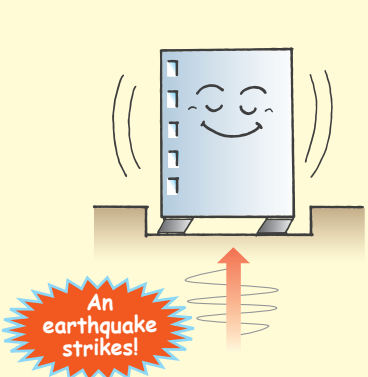
A building sways violently, so that furniture, etc., turn over, posing a danger to human life.

Inside of a room

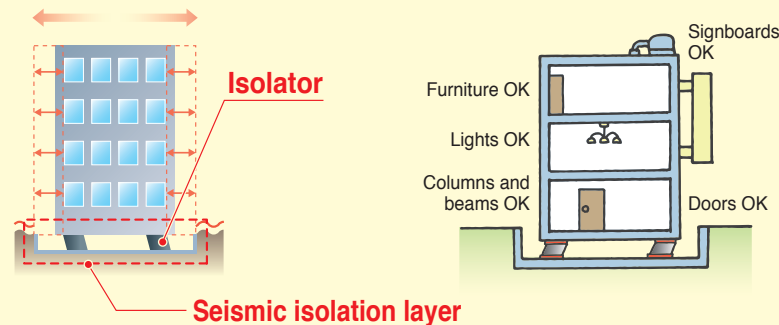


Seismically isolated building

Earthquake vibrations are reduced.



A building sways slowly when an earthquake strikes.



Isolators absorb vibrations, so that vibrations hardly transmit to a building. Furniture, fixtures, etc., are as usual.

Inside of a room



Functions of seismic isolation devices



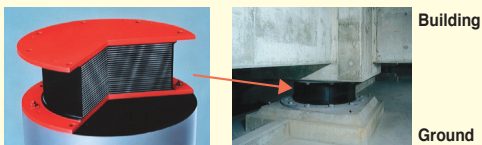
Family of seismic isolation devices

1 Function of reducing and inhibiting transmission of vibrations and supporting a building

2 Function of putting a building back into position

● Elastomeric isolator

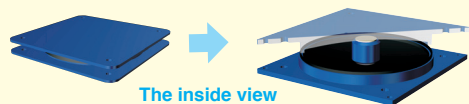
It always supports a building, and when an earthquake strikes, it functions to change slow vibrations.



Elastomeric isolator supporting a building

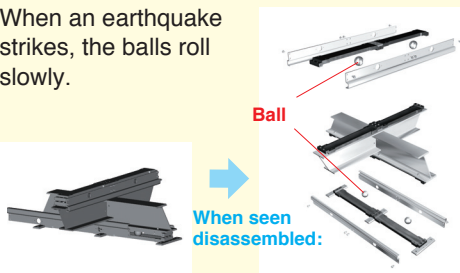
● Slider

The smoothened plate moves slowly during earthquake.



● Rotating ball bearing

When an earthquake strikes, the balls roll slowly.



While lateral earthquake vibrations sway slowly, a building is securely supported in the vertical direction (1). For example, it is like this house constructed on balls.



With this alone, the house will crash into the house next door. So, a function of putting a house back into position (2) is necessary.



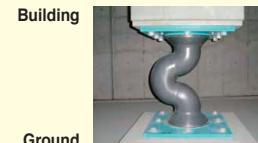
For that purpose, methods of putting a house back into position have been devised, such as inserting rubber, and making spherical dish under the balls.



3 Function of suppressing building vibrations

● Lead damper

The lead shaped as shown in the photograph deforms to absorb the energy of vibrations, and reduce vibrations.



Deformed lead damper

● Steel damper

The U-shape steel rod bends to absorb the energy of earthquake vibrations, and reduce them.



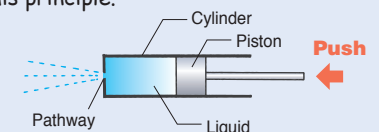
Bent Steel damper

● Oil damper

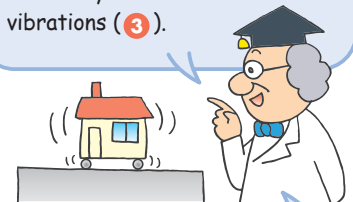
This damper suppresses earthquake vibrations by the force of liquid contained in it: hydraulic oil.



If you push a water pistol quickly, you will need a great deal of power, but if you push it slowly, you don't need that much power. The oil damper adopts this principle.



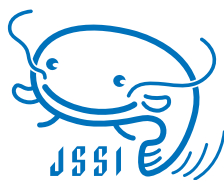
But, if nothing is done, when an earthquake strikes, a building will keep swaying. So, it is necessary to reduce vibrations (3).



The dampers function to absorb the energy of vibrations, and reduce them.



For a seismically isolated building, these are effectively used in combination.

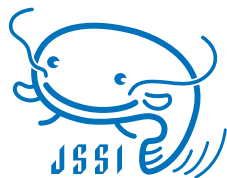


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The Japan Society of Seismic Isolation

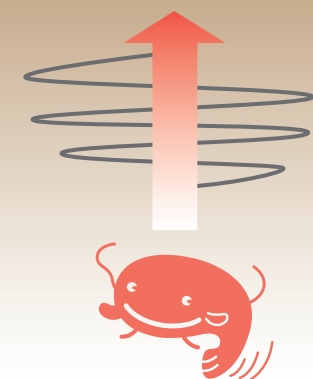
JIA Building 2F, 2-3-18 Jingumae,
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Vibration Control

to Protect Buildings from Earthquakes



The Japan Society of Seismic Isolation

What is Vibration Control?

Protecting lives and property from earthquakes



Mechanism of a Vibration-Control Building

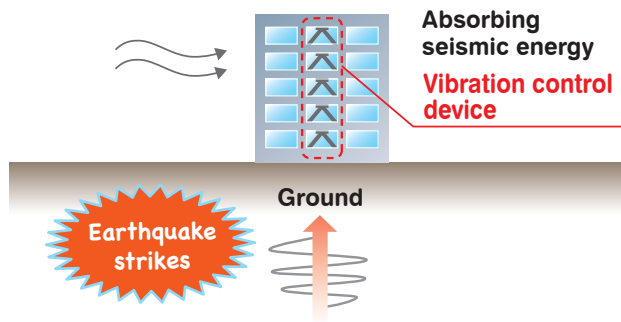
Vibration control is a method of protecting buildings from major earthquakes.

"Vibration control devices" are installed in a building to reduce the shaking of the building.

How much an earthquake shakes a building depends on the energy of the earthquake.

In an ordinary building, the energy of an earthquake is transmitted directly to the building, causing it to sway significantly. Absorbing some of the energy of an earthquake, which reduces the shaking of the building.

A building installed vibration control devices is called a "vibration control building".



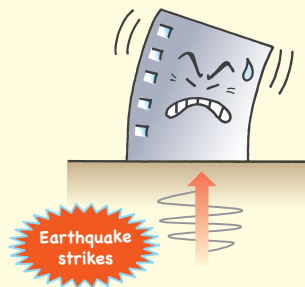
Vibration control is used in a wide range of applications from residential to high-rise buildings.

It is sometimes adopted to cope with wind vibration.

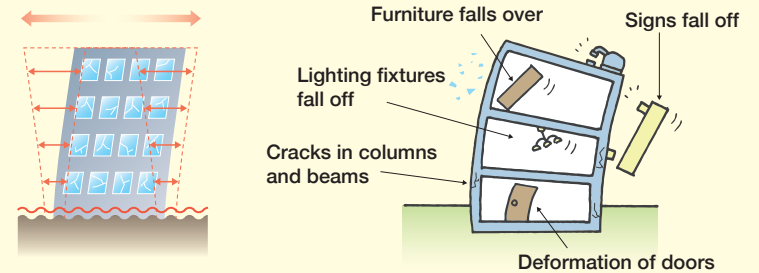
How Buildings Shake During Earthquakes

Conventional Building

The shaking of an earthquake is transmitted directly to the building.



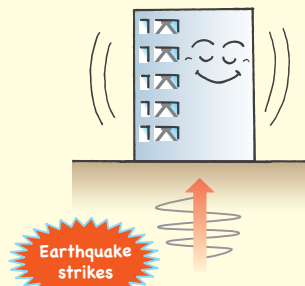
Shaking violently when an earthquake strikes



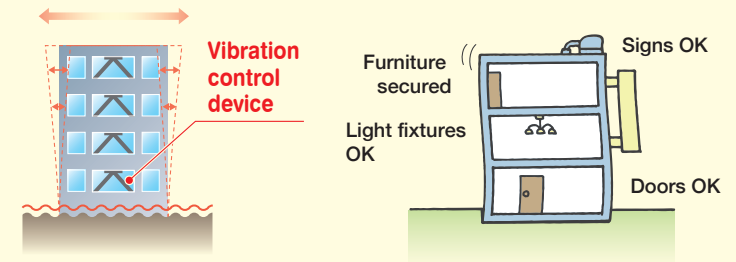
Buildings shake violently, causing furniture and other objects to fall over and possibly endangering people's lives.

Vibration Control Building

Reduces seismic swaying



Less swaying compared to conventional buildings



Vibration control devices absorb part of the energy of an earthquake, reducing the amount of shaking transmitted to the building and making it more difficult for furniture and other objects to fall over.

Functions of Vibration Control Devices



Family of Vibration Control Devices and Types of Installation

Metal-based Vibration Control Devices

As the metal deforms, it absorbs and dissipates seismic energy by converting it into heat energy, thereby reducing building sway.



Liquid-based Vibration Control Devices

Oil or other viscous materials injected into the device resist flow and absorb and dissipate seismic energy by converting it into thermal energy, thereby reducing building sway.



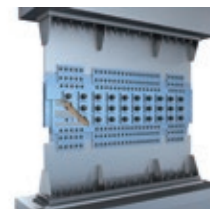
Vibration Control Devices Using Soft Materials

By installing soft materials such as rubber inside the vibration control device, the soft materials deform greatly during an earthquake, absorbing and dissipating seismic energy by converting it into heat energy, thereby reducing building shaking.



Friction-based Vibration Control Device

Friction materials such as metal and sliding materials are tightened together to reduce building sway by absorbing and dissipating seismic energy by converting it into thermal energy through the frictional force generated when the materials move.



► Brace type



► Wall type



► Stud type



Vibration control devices are sometimes added as seismic reinforcement.

