



Protecting Your Business From Earthquakes

FEDERAL EMERGENCY MANAGEMENT AGENCY

ARE YOU AT RISK?

If you aren't sure whether your business is at risk from earthquakes, check with your local building official, city engineer, or planning and zoning administrator. They can tell you whether you are in an earthquake hazard area. Also, they can usually tell you how to protect your business from earthquakes.

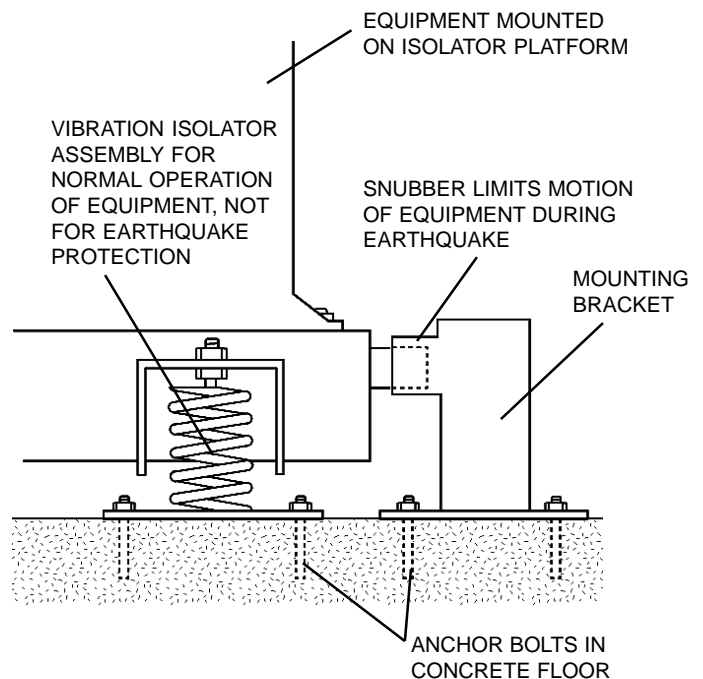
WHAT YOU CAN DO

Protecting your business from earthquakes can involve a variety of actions, from inspecting and maintaining your buildings to installing protective devices. Most of these actions, especially those that affect the structure of your buildings or their utility systems, should be carried out by qualified maintenance staff or professional contractors licensed to work in your state, county, or city. One example of earthquake protection is properly anchoring heavy equipment.

ANCHOR LARGE EQUIPMENT PROPERLY

To control the vibrations created by heavy equipment, many businesses install such equipment on spring-loaded platforms or mounts, known as vibration isolators. Isolators are designed to absorb the vibrations created by the normal operation of the equipment but not the excessive movement that can occur during an earthquake. Earthquake forces, coupled with the weight of the equipment, can stretch the isolator springs beyond their ability to rebound. As a result, the isolators can fail, equipment can be overturned, utility line connections can be broken, and workers may be injured.

In earthquake hazard areas, anchoring equipment directly to the floor or another suitable part of the building is preferable to mounting equipment on vibration isolators. If isolators are used, they should be securely anchored and they should be equipped with snubbers as shown in the figure at the left. Snubbers allow small motions resulting from normal operation of the equipment but prevent the equipment from moving beyond the limits of the springs during earthquakes.



VIBRATION ISOLATOR MOUNT EQUIPPED WITH SNUBBER FOR USE IN EARTHQUAKE HAZARD AREA

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Anchor Large Equipment Properly

TIPS

Keep these points in mind when you anchor heavy equipment:

- ✓ The multipurpose isolator system shown on the front of this sheet is designed to absorb equipment vibrations resulting from normal operations and to prevent excessive motion during an earthquake. Systems of this type can be used for newly installed equipment and as replacements for existing isolator systems that do not include snubbers or other restraints.
- ✓ Equipment mounted on vibration isolators must be able to move freely. Be sure to use flexible connections wherever utility lines, piping, and ductwork are attached to the equipment.
- ✓ Before anchoring equipment to floors or walls, make sure they are strong enough to resist earthquake forces.
- ✓ Tall pieces of equipment with narrow bases are more likely to overturn during earthquakes and will therefore need additional anchoring.
- ✓ Equipment suspended from the ceiling must also be braced to resist earthquake forces.
- ✓ The equipment manufacturer or dealer may be able to provide or recommend mounting methods and hardware for use in earthquake hazard areas.

ESTIMATED COST

The cost of anchoring a piece of heavy equipment will depend on its size, weight, location, and operation; the type and number of utility lines connected to it; and the anchoring method used – rigid connectors or vibration isolators.

OTHER SOURCES OF INFORMATION

Seismic Retrofit Training for Building Contractors and Building Inspectors: Participant Handbook, FEMA, 1995

Reducing the Risks of Nonstructural Earthquake Damage: A Practical Guide, FEMA-74, 1994

Protecting Your Home and Business from Nonstructural Earthquake Damage, FEMA, 1994

National Earthquake Hazard Reduction Program Handbook for the Seismic Evaluation of Existing Buildings, FEMA 178, 1992

National Earthquake Hazard Reduction Program Handbook for the Seismic Rehabilitation of Existing Buildings, FEMA 172, 1992

To obtain copies of FEMA documents, call FEMA Publications at 1-800-480-2520. Information is also available on the World Wide Web at <http://www.fema.gov>.