



Safety Instruction

Reducing Workplace Earthquake Hazards

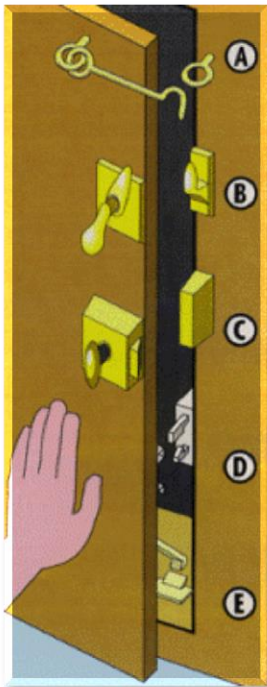
Securing equipment such as furniture, shelved items, and other building contents, improves safety by:

- Reducing injuries and damage caused by falling and moving items;
- Maintaining clear exit paths from the building and access into the building for responders; and
- Reducing the potential for hazardous material spills, fires, and utility leaks.

Identify Hazards

Identify unsecured objects that might fall, overturn, slide, spill, or rupture during shaking. Examples include:

- Tall furniture and equipment;
- Equipment and furniture on wheels;
- Objects, equipment, containers, and materials in cabinets and on open shelves;
- Wall- or ceiling-mounted displays, art, pictures, and mirrors;
- Fixtures and utility conduits;
- Compressed gas cylinders; or
- Other building contents.



Cabinets

Store heavy items on lower shelves to prevent cabinets from being top-heavy. Less damage will be done if they do fall.

Use positive latching devices on cabinet doors. Many types are available at hardware suppliers. Examples include slide bolts, safety hasps, and "child-proof" baby latches.

See illustrated types of cabinet latches on left.

(A) The standard hook and eye is an inexpensive and secure latch, but you may not close it every time you enter the cabinet because it takes extra effort to do so.

(B, C) Some standard types of secure latches mount on the surface of the door.

(D) Latches are available that mount inside the door, hold the door firmly shut, and open by being pushed gently inward. These are marketed under names such as push latch, touch latch, or pressure catch. If you cannot find these latches, ask your hardware dealer to order them for you.

(E) A child-proof catch prevents a door from opening more than an inch or two. These catches close automatically, but they require an extra action every time you open the door.

Open Shelves

Shelving in facilities containing chemicals, glassware, or hazardous equipment or materials must be provided with seismic restraints to resist shelf content movement, breakage, and reaction of chemicals.

- Store heavy and breakable items on lower shelves. Less damage will be done if they fall.
- Use shelf lips to prevent light-weight containers and objects from vibrating off shelves. Shelf lip height requirements:
 - For shelving containing chemicals, glassware, or hazardous materials, shelf lips must be at least 2 inches high from the shelf surface.

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- For low hazard areas such as offices, especially over employee work stations, shelf lips must be at least 1.5 inches high from the shelf surface.
- Use eyehooks and loop material (fishing line, cord, thin wire, etc.) to restrain larger, heavier objects on shelves.
 - Note: Bungie cords are not as effective as other materials. Small items may slip under them.
- Use adhesive products to secure light-weight objects on open shelves. Various commercial "putty-like" products are available. Adhesive-backed velcro is another option.

Computer Equipment

- Secure desktop computers, monitors, and printers.
 - Choose from many commercially available products including velcro fasteners and non-slip pads.
 - Attach raised shelf edges to prevent low-profile equipment from vibrating off the edge.
- Prepare server rooms.
 - Anchor stacking racks to protect personnel from falling equipment.
 - Consider restraint systems that allow *some* server movement to protect the unit from absorbing all the shock.
 - Examples of restraints for servers include the use of caster pads, caster wheel locks, sliding pads, elastomer bumpers, and tethers.
 - Consult the service provider for your equipment to determine the best method for securing your server environment.

Compressed Gas Cylinders

Secure cylinders in an upright position to a substantial, fixed surface with upper **and** lower restraints made of non-combustible material. Preferably use a chain and keep the area unobstructed.

Note: Single restraints are not as successful as upper and lower restraints. C-clamps are not reliable.

See [Compressed Gas Safety](#) Instructional sheet for additional tips.

Hanging Items

Use closed hooks to hang mirrors, pictures, and other suspended objects so they can't jump off the hook during shaking.

- Install strong brackets on the top, bottom, and sides of heavy mirrors and pictures — the preferred solution for heavy items.
 - Make sure the clips are anchored into wall studs.
- Place only soft art or displays adjacent to areas where people sit or stand. Unframed posters, rugs, and tapestries are good choices.

Laboratories

- Plan for seismic restraints when designing your laboratory layout. Some equipment arrives ready for bracing.
- Store chemicals, hazardous materials and reactivities properly – see [Chemical Storage Guidelines](#) SI for proper storage procedures.
- Protect temperature-sensitive materials with a backup generator in case power is interrupted.

Tall Furniture and Equipment

Free-standing items or equipment over 42 inches in height and having a height which is 3 or more times greater than the smallest dimension of the base must be adequately secured.

- Bolt securely to the wall studs or move tall cabinets, bookcases, shelving, stacked items, or equipment so they will not overturn on people or block corridors or doorways if they fall or move.
- Select a restraint material and method suitable for your purpose. Many commercially available tethers, cables, and angle brackets are available to secure heavy equipment and furniture to walls.



- Consider:
 - Strength and flexibility of the restraint
 - How to anchor the restraint to a secure surface
 - Quick-release mechanisms if equipment must be moved for use

- Different types of equipment restraints:



Biological safety cabinet anchored to the floor with a metal bracket

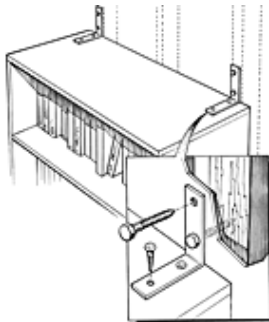


Equipment on casters

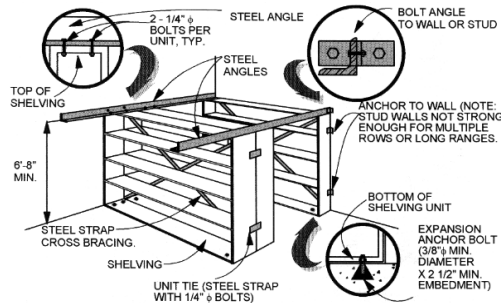


Freezer tethered to wall-anchoring system

- Methods for securing furniture and equipment:



Brackets at top or side



Free-standing shelving



File cabinets

- Choose wide-based storage (deeper shelves) when possible. It's more stable. The taller and narrower furniture or equipment is, the more likely it is to tumble over.

Water Heaters

Strap water heaters to a secure wall.

Basic instructions (see image at right):

(A) Wrap a 1-1/2-inch-wide, 16-gauge-thick metal strap around the top of the water heater and bolt the ends together. Do the same about 1/3 of the way up the side of the water heater.

(B) Take 4 lengths of EMT electrical conduit, each no longer than 30 inches. Flatten the ends. Bolt one end to the metal strap as shown. Screw the other end to a 2-inch by 4-inch stud in the wall using a 5/16-inch by 3-inch lag screw.

(C) Be sure a flexible pipe is used to connect the gas supply to the heater.

