

6.4 MECHANICAL, ELECTRICAL, AND PLUMBING COMPONENTS

6.4.1 MECHANICAL EQUIPMENT

6.4.1.6 SUSPENDED EQUIPMENT

This category covers any type of suspended equipment items other than HVAC equipment suspended in-line with ductwork, such as unit gas heaters. Current codes require anchorage for items weighing over 20 pounds that are mounted more than 4 feet above the floor.

TYPICAL CAUSES OF DAMAGE

- Poorly supported suspended items may lose support and fall.
- Suspended items can swing and impact building elements or other equipment.
- Internal components may be damaged by shaking or impact.
- Connections of fuel lines or other connected piping may be damaged.
- Equipment may cease to function due to misalignment or internal damage.

Damage Examples

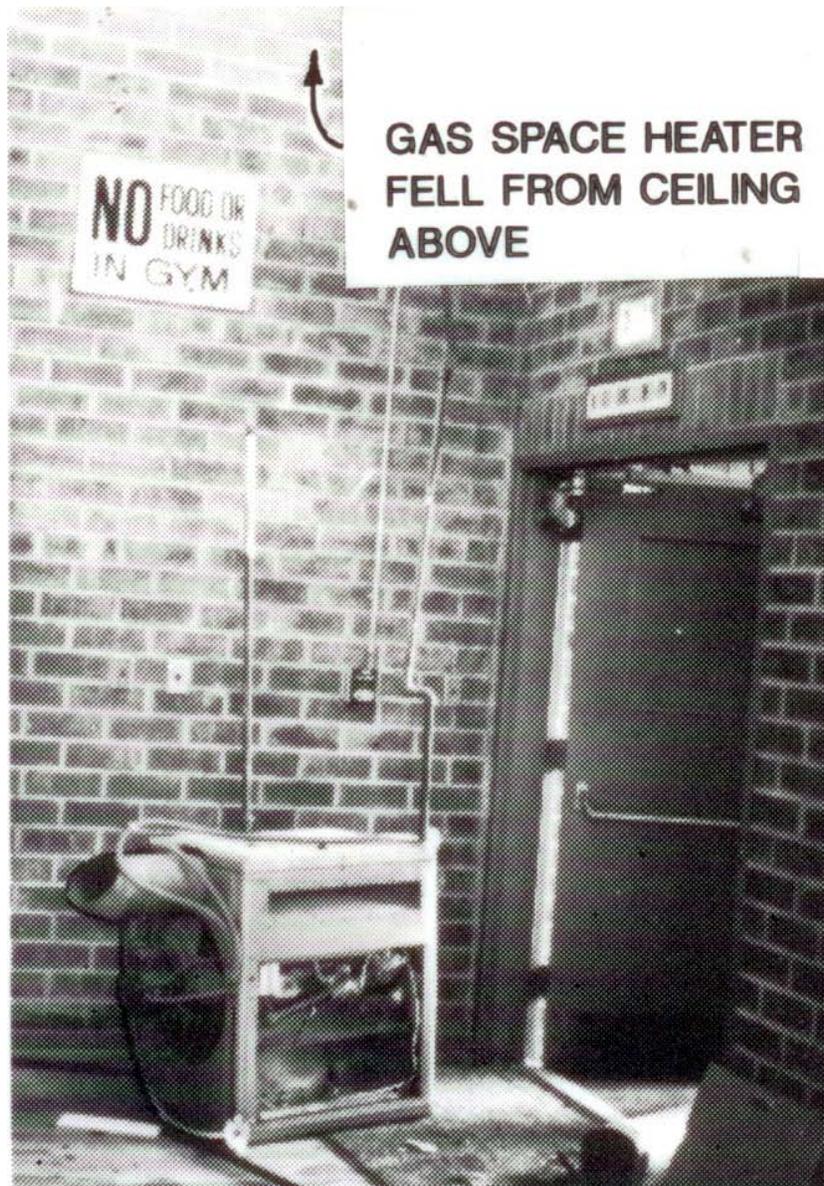


Figure 6.4.1.6-1 Gas space heater fell from ceiling above in the 1971 magnitude-6.6 San Fernando Earthquake (Photo courtesy of C. Wilton, Scientific Service, Inc.).

SEISMIC MITIGATION CONSIDERATIONS

- Detail shown provides rigid attachment for small suspended equipment weighing less than 150 pounds. Two or more double angle assemblies could be used for larger items. If the equipment is suspended with rigid, unbraced hangers, the details shown may be adapted to provide diagonal bracing.
- Provide flexible connections for fuel lines.
- Refer to Section 6.4.1.5 for details for suspended HVAC items; these details can be adapted for multiple suspended items. See also FEMA 412 *Installing Seismic Restraints for Mechanical Equipment* (2002) and FEMA 414 *Installing Seismic Restraints for Duct and Pipe* (2004) for additional information and details.
- Several engineered seismic bracing systems are available for suspended equipment and can be customized for most applications, more options may be found on the internet.

Mitigation Details

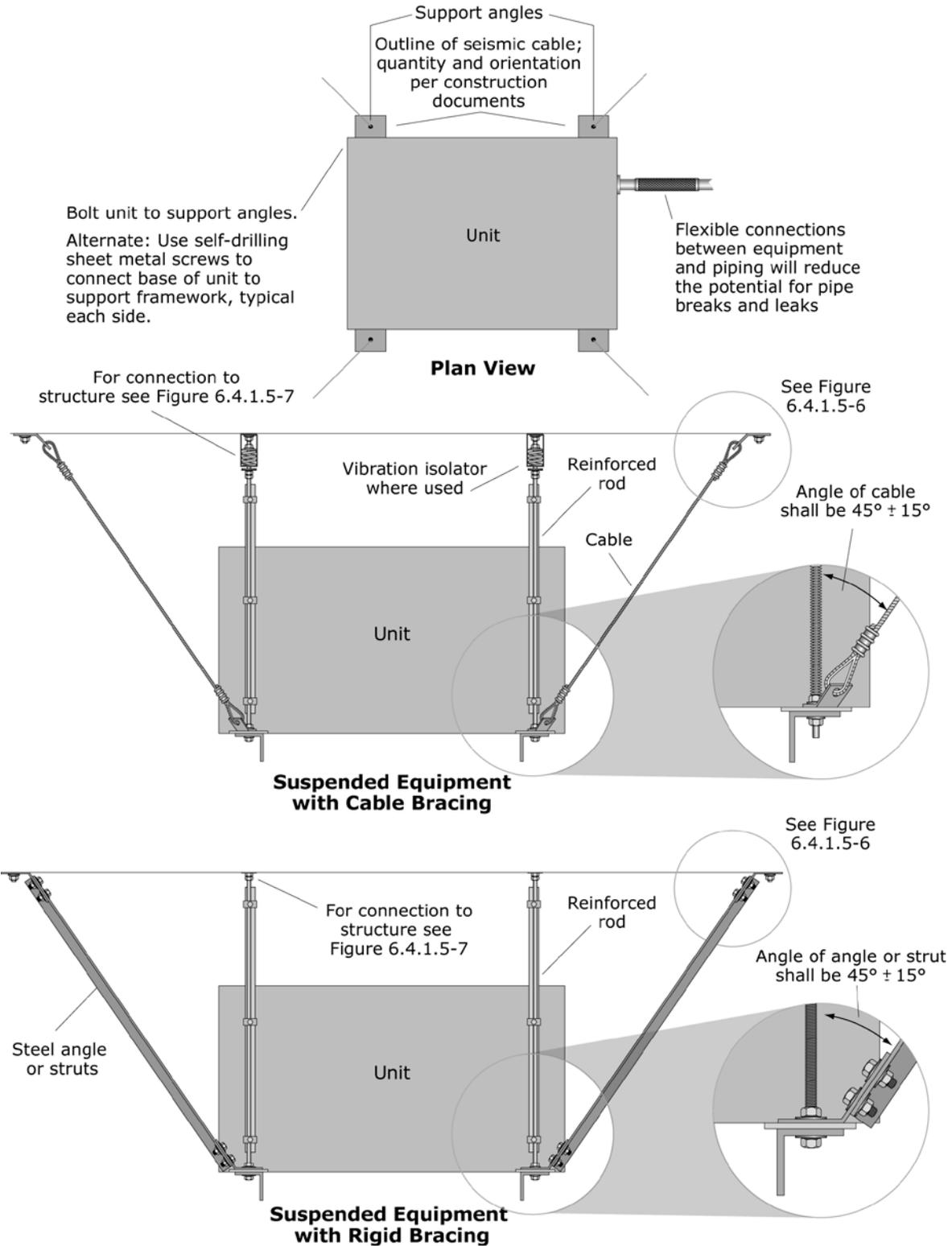


Figure 6.4.1.6-2 Suspended equipment (ER).