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**Kitchen Systems****Kettles, Steam-Jacketed**

If kettles (see Figure 3.66) are not anchored, they are likely to topple, spilling their contents and possibly rupturing their gas supply lines.

**EQUIPMENT SEISMIC CATEGORY**

- "C" support equipment.

**SEISMIC SPECIFICATION**

- SDS-2.

**SEISMIC QUALIFICATION APPROACH**

- Equivalent static coefficient analysis
  - Base anchorage for units that are provided with drilled base plates by the manufacturer.

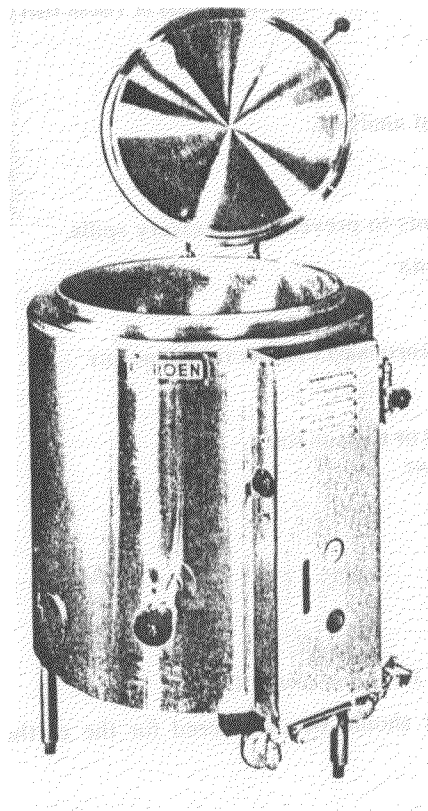


FIGURE 3.66. Gas-heated, self-contained, steam-jacketed kettle. Photograph courtesy of Groen, A Division of the Dover Corporation.

- Design team judgment.
  - Provide flexible gas and electric connections.
  - Provide base anchorage where base plates are not provided by the manufacturer.

**REFERENCE FOR INSTALLATION DETAILS**

- Appendix 3.

**RELATIVE DEGREE OF DAMAGE OF INADEQUATELY PROTECTED EQUIPMENT**

- Minor to moderate.

**MOST LIKELY TYPE OR CONSEQUENCE OF DAMAGE FOR INADEQUATELY PROTECTED EQUIPMENT**

- Toppled kettles.
- Spilled food.
- General cleanup required.

**Kitchen Systems****Portable Tray Carts, Temperature Controlled**

Temperature controlled food carts (Figure 3.67) are relatively expensive and if not protected are highly susceptible to damage. Wheel locks do not prevent toppling. These units should be restrained when not in use.

**EQUIPMENT SEISMIC CATEGORY**

- "D" support equipment.

**SEISMIC SPECIFICATION**

- SDS-2.

**SEISMIC QUALIFICATION APPROACH**

- Design team judgment.
  - Provide anchorage for equipment when it is not in use.

**REFERENCE FOR INSTALLATION DETAILS**

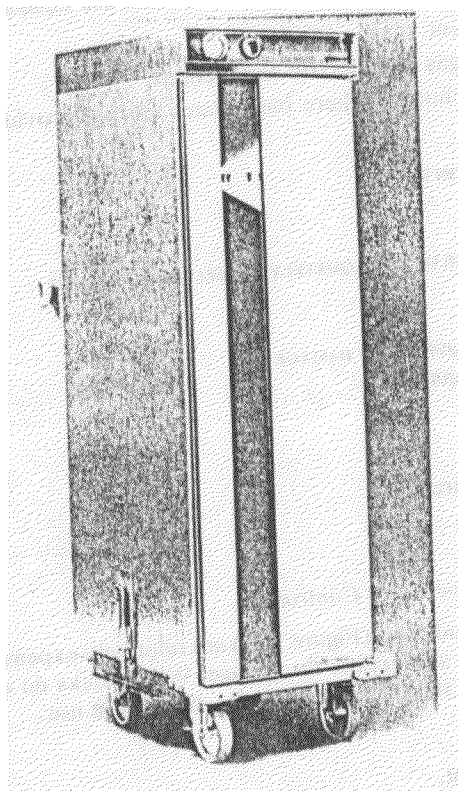
- Appendix 3.

**RELATIVE DEGREE OF DAMAGE OF INADEQUATELY PROTECTED EQUIPMENT**

- Minor.

**MOST LIKELY TYPE OR CONSEQUENCE OF DAMAGE FOR INADEQUATELY PROTECTED EQUIPMENT**

- Dislodged equipment.
- Toppled equipment.



**FIGURE 3.67.** Temperature controlled portable tray cart. Note the anchorage lever that could be used for restrained storage of the cart when it is not in use. Photograph courtesy of Precision Metal Products, Incorporated.

- Spilled food, and so on
- General cleanup required

#### *Kitchen Systems*

##### *Refrigerators, Large Units*

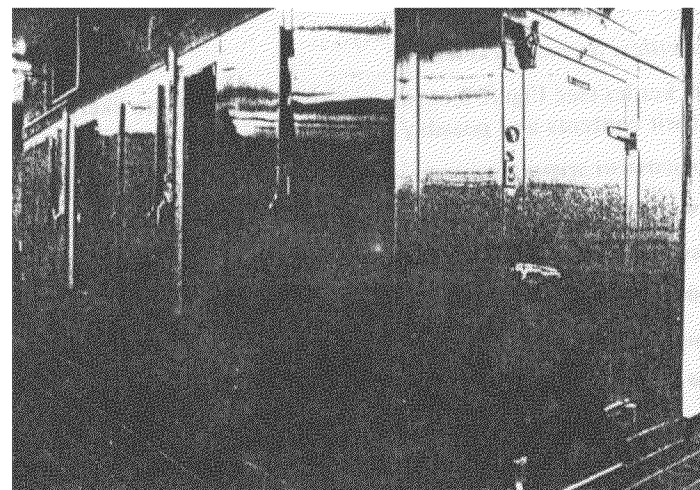
Very large objects such as refrigerators (see Figure 3.68) can also be dislodged by an earthquake if not adequately protected.

#### **EQUIPMENT SEISMIC CATEGORY**

- "C" support equipment.

#### **SEISMIC SPECIFICATION**

- SDS-2.



**FIGURE 3.68.** Large walk-in refrigerator unit. Photograph courtesy of Vulcan-Hart Corporation.

#### **SEISMIC QUALIFICATION APPROACH**

- Equivalent static coefficient analysis.
  - Anchorage of units
- Design team judgment.
  - Provide shelf-tip restraints to prevent unnecessary spills.

#### **REFERENCE FOR INSTALLATION DETAILS**

- Appendix 3

#### **RELATIVE DEGREE OF DAMAGE OF INADEQUATELY PROTECTED EQUIPMENT**

- Minor to moderate.

#### **MOST LIKELY TYPE OR CONSEQUENCE OF DAMAGE FOR INADEQUATELY PROTECTED EQUIPMENT**

- Dislodged equipment.
- Spilled items.
- General cleanup required

#### *Kitchen Systems*

##### *Refrigerators, Medium (Figure 3.69) and Small Units*

All tall and slender equipment should be considered for the earthquake environment

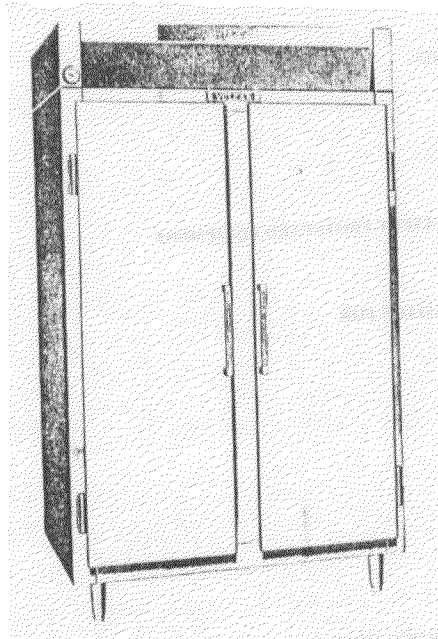


FIGURE 3.69. Medium sized kitchen refrigerator. Photograph courtesy of Vulcan-Hart Corporation.

#### EQUIPMENT SEISMIC CATEGORY

- “C” support equipment.

#### SEISMIC SPECIFICATION

- SDS-2.

#### SEISMIC QUALIFICATION APPROACH

- Equivalent static coefficient analysis
  - Base anchorage.
  - Top bracing.

#### REFERENCE FOR INSTALLATION DETAILS

- Appendix 3.

#### RELATIVE DEGREE OF DAMAGE OF INADEQUATELY PROTECTED EQUIPMENT

- Minor to moderate

#### MOST LIKELY TYPE OR CONSEQUENCE OF DAMAGE FOR INADEQUATELY PROTECTED EQUIPMENT

- Shifted refrigerators
- Toppled refrigerators.

- Inoperative refrigerators.
- Potential for personnel injury.
- General cleanup required.

#### Kitchen Systems

##### Serving Lines

High speed makeup systems (Figure 3.70) can be wheeled or stationary. The individual pieces of equipment should be tied together to reduce the toppling potential. Stationary equipment should be base anchored.

#### EQUIPMENT SEISMIC CATEGORY

- “D” or “E” miscellaneous equipment.

#### SEISMIC SPECIFICATION

- SDS-2.

#### SEISMIC QUALIFICATION APPROACH

- Equivalent static coefficient analysis.
  - Base anchorage for stationary equipment
- Design team judgment.
  - Connect wheeled modules together to reduce toppling potential.
  - Consider modular anchorage system for wheeled equipment.

#### REFERENCE FOR INSTALLATION DETAILS

- Appendix 3.

#### RELATIVE DEGREE OF DAMAGE OF INADEQUATELY PROTECTED EQUIPMENT

- Minor to moderate.

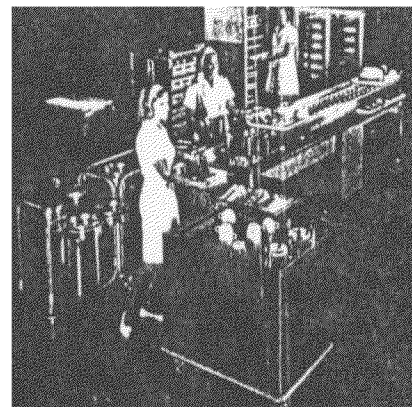


FIGURE 3.70. High-speed makeup serving line. Photograph courtesy of Precision Metal Products, Incorporated

#### MOST LIKELY TYPE OR CONSEQUENCE OF DAMAGE FOR INADEQUATELY PROTECTED EQUIPMENT

- Dislodged equipment.
- Topped equipment.
- Spilled food, boiling water, dishes, and so on.
- General cleanup required

#### *Kitchen Systems*

##### *Steam Cookers*

Anchorage of this type of equipment (Figure 3.71) increases the operability potential of kitchens found in essential facilities such as hospitals.

#### EQUIPMENT SEISMIC CATEGORY

- "C" support equipment.

#### SEISMIC SPECIFICATION

- SDS-2.

#### SEISMIC QUALIFICATION APPROACH

- Equivalent static coefficient analysis.
  - Base anchorage

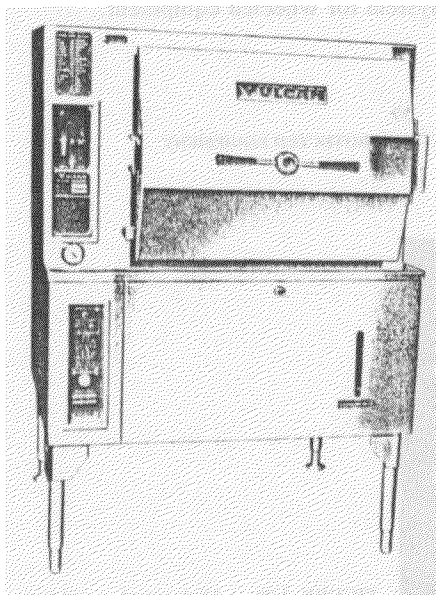


FIGURE 3.71 Upright steam cooker. Photograph courtesy of Vulcan-Hart Corporation.

- Design team judgment
  - Flexible electrical connections.
  - Flexible gas connections.

#### REFERENCE FOR INSTALLATION DETAILS

- Appendix 3.

#### RELATIVE DEGREE OF DAMAGE OF INADEQUATELY PROTECTED EQUIPMENT

- Minor to moderate.

#### MOST LIKELY TYPE OR CONSEQUENCE OF DAMAGE FOR INADEQUATELY PROTECTED EQUIPMENT

- Dislodged equipment.
- Broken electrical connections
- Broken gas lines.
- Topped equipment.

#### *Kitchen Systems*

##### *Stoves and Ovens, Large (Modular Applications)*

Individual pieces of equipment can be hooked together into modular applications (Figure 3.72) that may not be as likely to topple as the individual units, but nonetheless require earthquake protection.

#### EQUIPMENT SEISMIC CATEGORY

- "C" support equipment.

#### SEISMIC SPECIFICATION

- SDS-2.

#### SEISMIC QUALIFICATION APPROACH

- Equivalent static coefficient analysis.
  - Base anchorage.
- Design team judgment
  - Flexible gas and electrical connections between the building structure and the equipment.

#### REFERENCE FOR INSTALLATION DETAILS

- Appendix 3.

#### RELATIVE DEGREE OF DAMAGE OF INADEQUATELY PROTECTED EQUIPMENT

- Minor to moderate.

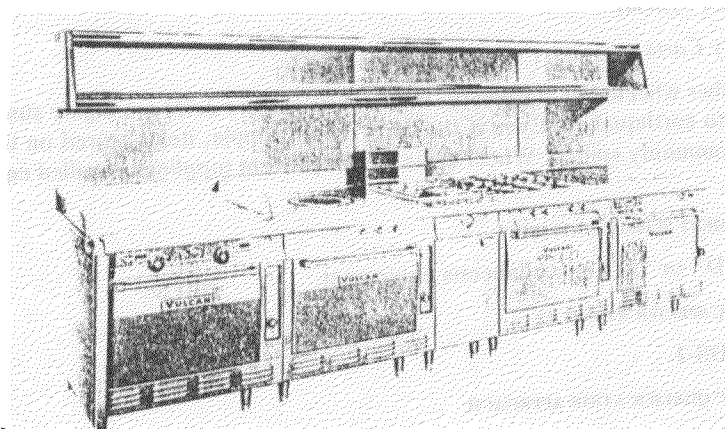


FIGURE 3.72 Modular cook-top assembly. Photograph courtesy of Vulcan-Hart Corporation.

**MOST LIKELY TYPE OR CONSEQUENCE OF DAMAGE FOR INADEQUATELY PROTECTED EQUIPMENT**

- Dislodged equipment.
- Spilled grease, and so on.
- Potential for personnel injury.
- General cleanup required.

**Kitchen Systems**

*Stoves and Ovens, Small (Figure 3.73)*

Toppled or dislodged stoves can injure personnel as well as create significant cleanup problems.

**EQUIPMENT SEISMIC CATEGORY**

- “C” support equipment.

**SEISMIC SPECIFICATION**

- SDS-2.

**SEISMIC QUALIFICATION APPROACH**

- Equivalent static coefficient analysis.
  - Base anchorage.
- Design team judgment.
  - Flexible gas and electrical connections between the building structure and the equipment.

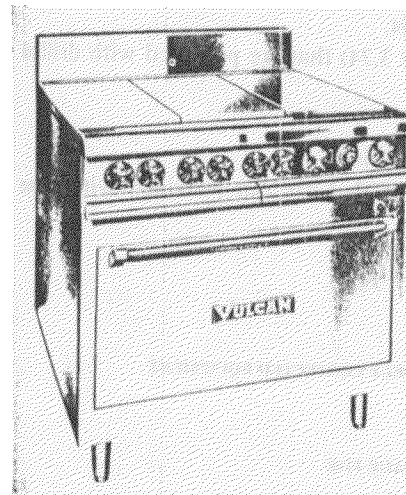


FIGURE 3.73. Small range. Photograph courtesy of Vulcan-Hart Corporation.

**REFERENCE FOR INSTALLATION DETAILS**

- Appendix 3.

**RELATIVE DEGREE OF DAMAGE OF INADEQUATELY PROTECTED EQUIPMENT**

- Minor to moderate.

**MOST LIKELY TYPE OR CONSEQUENCE OF DAMAGE FOR INADEQUATELY PROTECTED EQUIPMENT**

- Dislodged stoves and ovens.
- Toppled stoves and ovens.
- Spilled grease, and so on.
- Ruptured gas lines and electrical connections.
- General cleanup required.

**Kitchen Systems**

*Urns/Brewers*

Urns that are toppled as a result of an earthquake can spill scalding water.

**EQUIPMENT SEISMIC CATEGORY**

- “E” miscellaneous equipment.

**SEISMIC SPECIFICATION**

- SDS-2.