

## 6.4 MECHANICAL, ELECTRICAL, AND PLUMBING COMPONENTS

### 6.4.3 PRESSURE PIPING

#### 6.4.3.2 IN-LINE VALVES AND PUMPS

This category covers equipment that is in-line with pressure piping. These items may be valves or pumps and may be suspended, floor-mounted, roof-mounted, or wall-mounted. They may be mounted with or without vibration isolation.

#### TYPICAL CAUSES OF DAMAGE

- Poorly restrained in-line valves or equipment may fall. Pumps may be damaged if not properly restrained; these items may slide or fall. Movement of the in-line equipment may result in damage to the attached piping at the connection or at adjacent pipe joints. Equipment or piping damage may result in leaks.

#### SEISMIC MITIGATION CONSIDERATIONS

- Details shown are for overhead restraints for items in-line with suspended piping. Generally, seismic restraint in the form of typical pipe bracing is provided on each side of the connected item.
- Details for other conditions such as equipment in-line with floor- or wall-mounted piping can be found in FEMA 414 *Installing Seismic Restraints for Duct and Pipe* (2004). Section 6.4.1.5 also includes general details for suspended equipment.
- Many vendors supply specialized hardware for seismic anchorage of piping including load rated anchorage assemblies, spring loaded hangers, and pipe dampers.

## Mitigation Examples



Figure 6.4.3.2-1      Inline pump mounted on independent concrete inertia pad with vibration isolation and seismic snubbers (Photo courtesy of Mason Industries).

## Mitigation Details

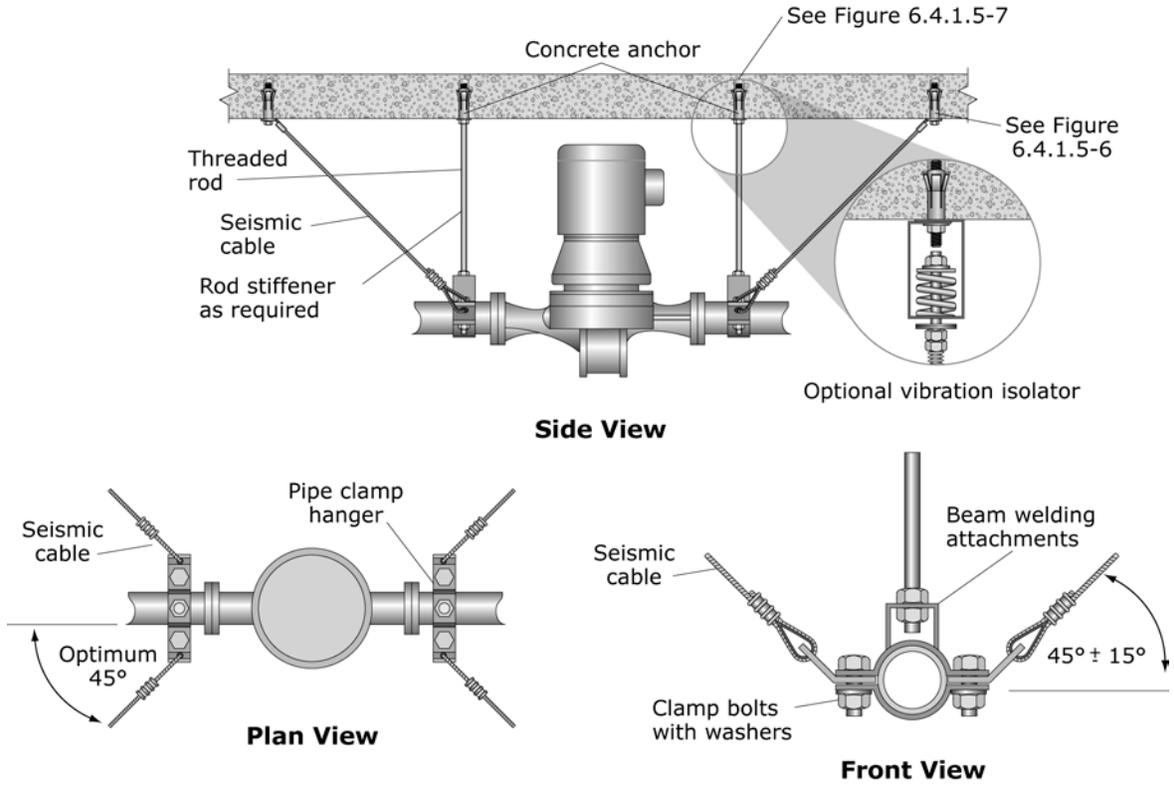


Figure 6.4.3.2-2 In-line valves and pumps (ER).

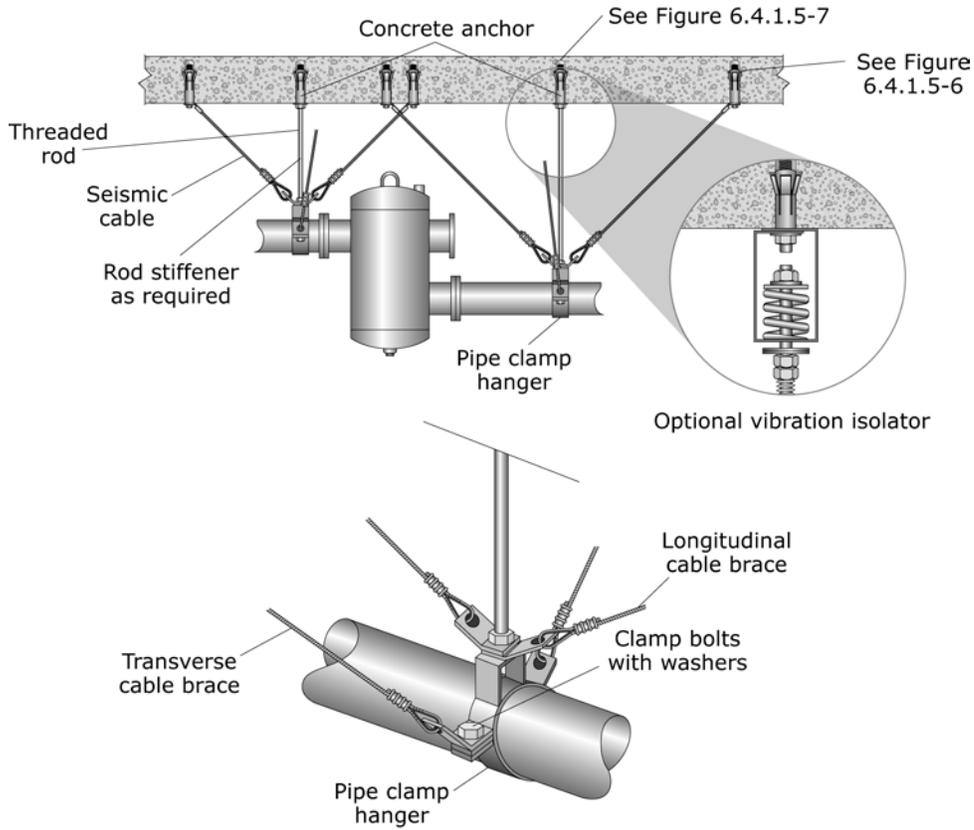


Figure 6.4.3.2-3 In-line valves and pumps (ER).

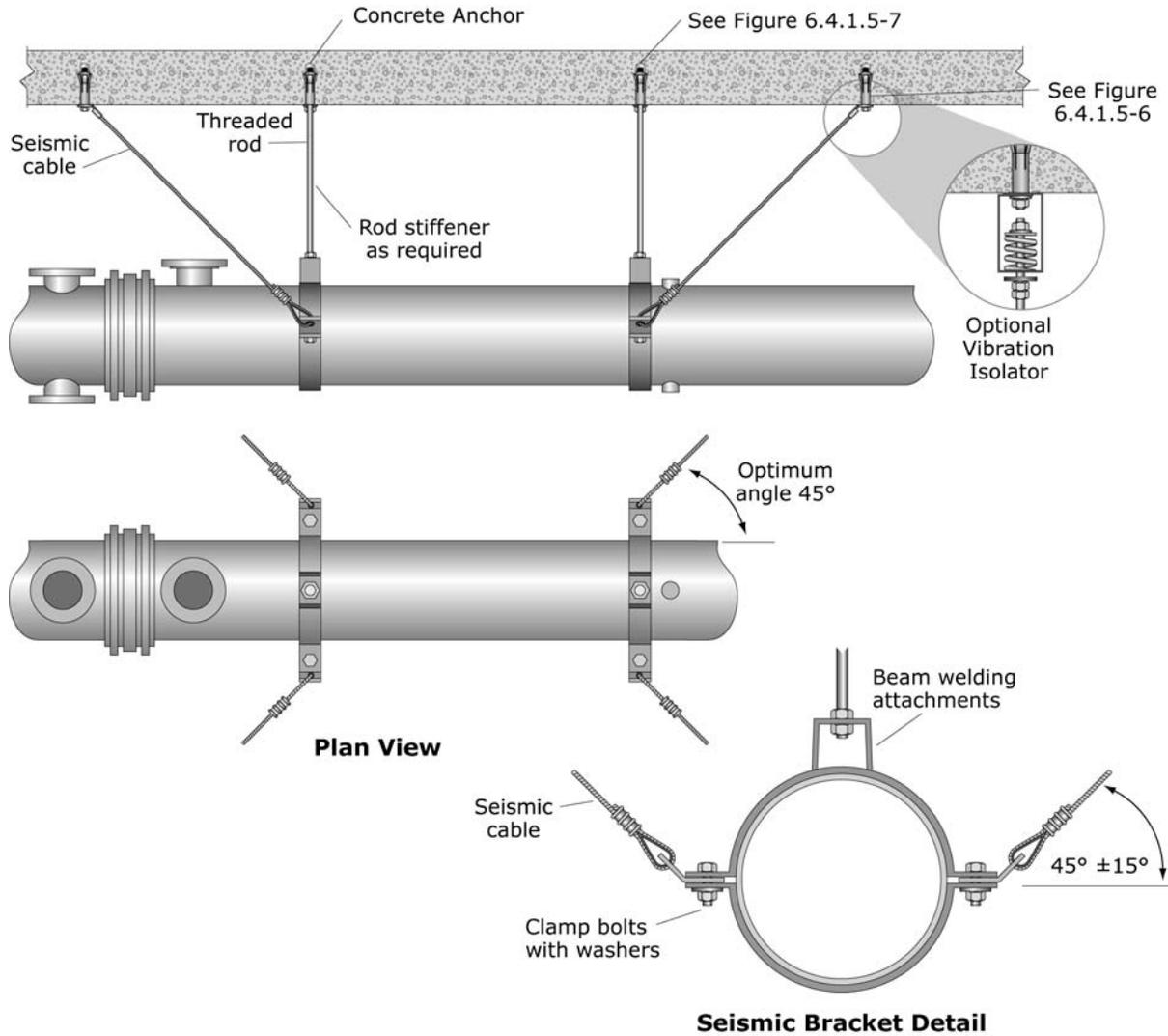


Figure 6.4.3.2-4 In-line valves and pumps (ER).