

markings, and suppliers may be contacted to obtain information that can not be verified in the field.

2.2.2 Field Walk-Down

In addition to the system design parameters, the Designer should initiate the seismic retrofit of an existing system with a system walk-down to record the following information (with field notes and photographs):

The isometric layout (three dimensional sketch of pipe routing and dimensions).

Support types and locations.

Anchorage details.

Pipe material and size.

Components and equipment, with name tag information.

Type, thickness and linear weight of insulation.

Material condition of piping, equipment, components and supports.

Potential spatial interactions.

Estimated weights and center of gravity of heavy components.

Any notes and concerns of significance.

2.2.3 Material Condition

A review of material condition should include the following attributes:

Pipe fittings should be standard (ANSI/ASME B16), and have the right pressure rating (for example, a 150 lb flange should not be used on a 500 psi system).

The fabrication, welding, joining, erection of pipe, pipe supports and attachments to building structure should be sound and of good quality.

The review of maintenance records is important to determine the history of leakage, repairs, and operability. While minimal or mediocre maintenance may have been sufficient for normal operation of a system, the following conditions may pose a problem in case of earthquake:

Distortion of pipe supports.

Visibly poor welds (rough, incomplete, uneven) or brazed joints (no visible brazing).

Unusual temporary repairs.

Significant bearing, scratch marks of pipe surface.

Pipe dislodged from supports.

Deformed thin vessel shell.

Shifted base plate, loose anchor bolts, cracked foundation.

Missing nuts and bolts on pipe or support components.

Signs of leakage (discoloration, dripping, wet surface).

Deterioration of protective coating.

Restricted operation of pipe rollers or slide plates.

Insecure attachment between pipe and support, or between support and building.

The walk-down should also assess the internal corrosion condition of the pipe. This can be done by the following methods:

- (1) Direct external and internal visual examination if the system can be opened at flanges.
- (2) Volumetric examination of the pipe wall at points where corrosion would be expected (by ultrasonic, radiographic or magnetic techniques).
- (3) Assessment of corrosion history in similar systems together with a review of the maintenance history of the system.