

15.7.12.5 Post and Rod Supported

For post supported spheres that are cross-braced:

- The requirements of Section 15.7.10.4 shall also be applicable to this section.
- The stiffening effect (reduction in lateral drift) from pretensioning of the bracing shall be considered in determining the natural period.
- The slenderness and local buckling of the posts shall be considered.
- Local buckling of the sphere shell at the post attachment shall be considered.
- For spheres storing liquids, bracing connections shall be designed and constructed to develop the minimum published yield strength of the brace. For spheres storing gas vapors only, bracing connection shall be designed for Ω_0 times the maximum design load in the brace. Lateral bracing connections directly attached to the pressure or liquid boundary are prohibited.

15.7.12.6 Skirt Supported

For skirt-supported spheres, the following requirements shall apply:

- The requirements of Section 15.7.10.5 shall also apply.
- The local buckling of the skirt under compressive membrane forces due to axial load and bending moments shall be considered.
- Penetration of the skirt support (manholes, piping, etc.) shall be designed and constructed to maintain the strength of the skirt without penetrations.

15.7.13 Refrigerated Gas Liquid Storage Tanks and Vessels**15.7.13.1 General**

Tanks and facilities for the storage of liquefied hydrocarbons and refrigerated liquids shall meet the requirements of this standard. Low-pressure welded steel storage tanks for liquefied hydrocarbon gas (e.g.,

LPG, butane, etc.) and refrigerated liquids (e.g., ammonia) shall be designed in accordance with the requirements of Section 15.7.8 and API 620.

15.7.14 Horizontal, Saddle Supported Vessels for Liquid or Vapor Storage**15.7.14.1 General**

Horizontal vessels supported on saddles (sometimes referred to as “blimps”) shall be designed to meet the force and displacement requirements of Section 15.3 or 15.4.

15.7.14.2 Effective Mass

Changes to or variations in material density shall be considered. The design of the supports, saddles, anchorage, and foundation for seismic overturning shall assume the material stored is a rigid mass acting at the volumetric center of gravity.

15.7.14.3 Vessel Design

Unless a more rigorous analysis is performed

- Horizontal vessels with a length-to-diameter ratio of 6 or more are permitted to be assumed to be a simply supported beam spanning between the saddles for determining the natural period of vibration and global bending moment.
- For horizontal vessels with a length-to-diameter ratio of less than 6, the effects of “deep beam shear” shall be considered where determining the fundamental period and stress distribution.
- Local bending and buckling of the vessel shell at the saddle supports due to seismic load shall be considered. The stabilizing effects of internal pressure shall not be considered to increase the buckling resistance of the vessel shell.
- If the vessel is a combination of liquid and gas storage, the vessel and supports shall be designed both with and without gas pressure acting (assume piping has ruptured and pressure does not exist).