15.7.6.1.7 Pressure Stability For steel tanks, the internal pressure from the stored product stiffens thin cylindrical shell structural elements subjected to membrane compression forces. This stiffening effect is permitted to be considered in resisting seismically induced compressive forces if permitted by the reference document or the authority having jurisdiction.

15.7.6.1.8 Shell Support Steel tanks resting on concrete ring walls or slabs shall have a uniformly supported annulus under the shell. Uniform support shall be provided by one of the following methods:

a. Shimming and grouting the annulus.
b. Using fiberboard or other suitable padding.
c. Using butt-welded bottom or annular plates resting directly on the foundation.
d. Using closely spaced shims (without structural grout) provided that the localized bearing loads are considered in the tank wall and foundation to prevent local crippling and spalling.

Anchored tanks shall be shimmed and grouted. Local buckling of the steel shell for the peak compressive force due to operating loads and seismic overturning shall be considered.

15.7.6.1.9 Repair, Alteration, or Reconstruction Repairs, modifications, or reconstruction (i.e., cut down and re-erect) of a tank or vessel shall conform to industry standard practice and this standard. For welded steel tanks storing liquids, see API 653 and the applicable reference document listed in Chapter 23. Tanks that are relocated shall be re-evaluated for the seismic loads for the new site and the requirements of new construction in accordance with the appropriate reference document and this standard.

15.7.7 Water Storage and Water Treatment Tanks and Vessels

15.7.7.1 Welded Steel

Welded steel water storage tanks and vessels shall be designed in accordance with the seismic requirements of AWWA D100.

15.7.7.2 Bolted Steel

Bolted steel water storage structures shall be designed in accordance with the seismic requirements of AWWA D103 except that the design input forces of AWWA D100 shall be modified in the same manner shown in Section 15.7.7.1 of this standard.

15.7.7.3 Reinforced and Prestressed Concrete

Reinforced and prestressed concrete tanks shall be designed in accordance with the seismic requirements of AWWA D110, AWWA D115, or ACI 350.3 except that the importance factor, I_e, shall be determined according to Section 15.4.1.1, the response modification coefficient, R, shall be taken from Table 15.4-2, and the design input forces for strength design procedures shall be determined using the procedures of ACI 350.3 except

a. S_{ac} shall be substituted for C_c in ACI 350.3 Section 9.4.2 using Eqs. 15.7-10 for $T_c \le T_L$ and 15.7-11. for $T_c > T_L$ from Section 15.7.6.1; and
b. The value of C_t from ACI 350.3 Section 9.4.3 shall be determined using the procedures of Section 15.7.2(c). The values of I, Ri, and b as defined in ACI 350.3 shall be taken as 1.0 in the determination of vertical seismic effects.

15.7.8 Petrochemical and Industrial Tanks and Vessels Storing Liquids

15.7.8.1 Welded Steel

Welded steel petrochemical and industrial tanks and vessels storing liquids under an internal pressure of less than or equal to 2.5 psig (17.2 kpa g) shall be designed in accordance with the seismic requirements of API 650. Welded steel petrochemical and industrial tanks and vessels storing liquids under an internal pressure of greater than 2.5 psig (17.2 kpa g) and less than or equal to 15 psig (104.4 kpa g) shall be designed in accordance with the seismic requirements of API 620.

15.7.8.2 Bolted Steel

Bolted steel tanks used for storage of production liquids. API 12B covers the material, design, and erection requirements for vertical, cylindrical, above-ground bolted tanks in nominal capacities of 100 to 10,000 barrels for production service. Unless required by the authority having jurisdiction, these temporary structures need not be designed for seismic loads. If design for seismic load is required, the loads are permitted to be adjusted for the temporary nature of the anticipated service life.

15.7.8.3 Reinforced and Prestressed Concrete

Reinforced concrete tanks for the storage of petrochemical and industrial liquids shall be designed in accordance with the force requirements of Section 15.7.7.3.