Vessel Supports

The vessel support is intended to support the vessel on the support base. The vessel support structure should be able to withstand the dead weight of the vessel and internals and the contained fluid without experiencing permanent deformation. The support also has to be designed to withstand seismic and other stresses on the vessel. The supports for pressure vessels can be of various types including lug support, skirt support, and saddle support.

Lug support

This is a common means of support for vertical vessels that are mounted on I-beams. Brackets or lugs offer many advantages over other types of supports. They are inexpensive, can absorb diametrical expansions, are easily attached to the vessel by minimum amounts of welding, and are easily leveled in the field. As a result of eccentricity of this type of support, compressive, tensile and shear stresses are introduced in the wall of the vessel. Lug supports are ideal for thick-walled vessels since the thick wall has a considerable moment of inertia and is therefore capable of absorbing flexural stresses due to the eccentricity of the loads. In thin-walled vessels, however, this type of support is not convenient unless the proper reinforcements are used or many lugs are welded to the vessel.

Skirt Support

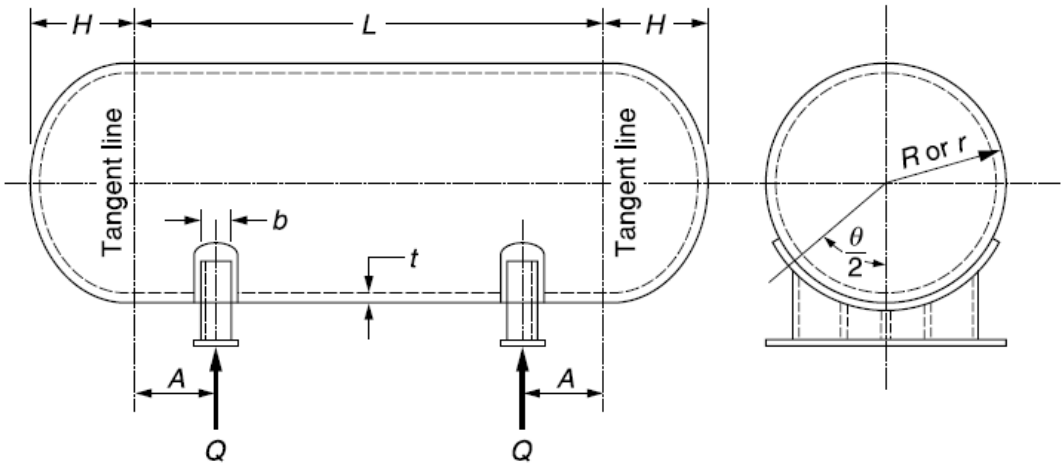
One of the most common methods of supporting vertical vessels is by means of a rolled cylindrical or conical shell called a skirt. The skirt may be welded directly to the bottom dished head, flush with the shell, or to the outside of the shell. This method of support is attractive from the designer's standpoint because it minimizes the local stresses at the point of attachment, and the direct load is uniformly distributed over the entire circumference. The use of conical skirts is more expensive from a fabrication standpoint, and unnecessary for most design situations.

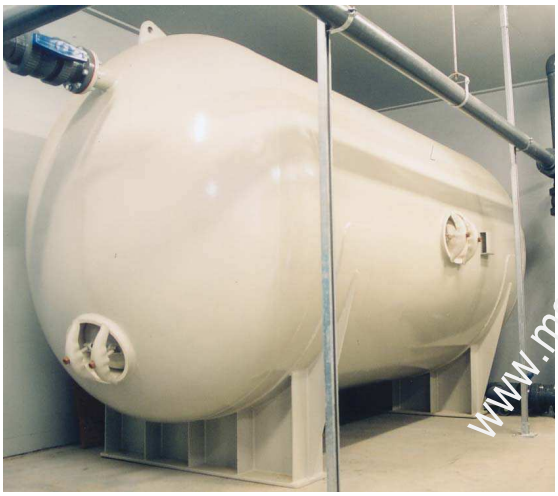
The critical line in the skirt support is the weld attaching the vessel to the skirt. This weld, in addition to transmitting the overall weight and overturning moments, must also resist the thermal and bending stresses due to the temperature drop in the skirt.

The bottom of the skirt of the vessel must be securely anchored to the concrete foundation by means of anchor bolts embedded in the concrete to prevent overturning from the bending moments induced by wind or seismic loads.

Saddle Support

Horizontal pressure vessels are usually supported on two symmetrically spaced saddle supports or cradles, as shown in figure. If two equally spaced supports are used, the load resulting from the weight of the vessel and its contents will be equally divided even though one support may settle more than the other. Since the loads will not be equally divided after the supports settle if more than two supports are used, the two-support system has an advantage over a system employing a large number of supports.





In selecting the location of the saddle supports it is preferable to make dimension *A* less than *R* in order to take advantage of the head. Dimension *A* is often selected so that *A* = 0.4*R*. Dimension *A* should never exceed 20% of dimension *L*; otherwise the stresses resulting from cantilever action will be excessive. Horizontal pressure vessels are generally fixed at one saddle and the other is allowed to move to accommodate thermal expansion.