Manometer – Air Testing of Tanks

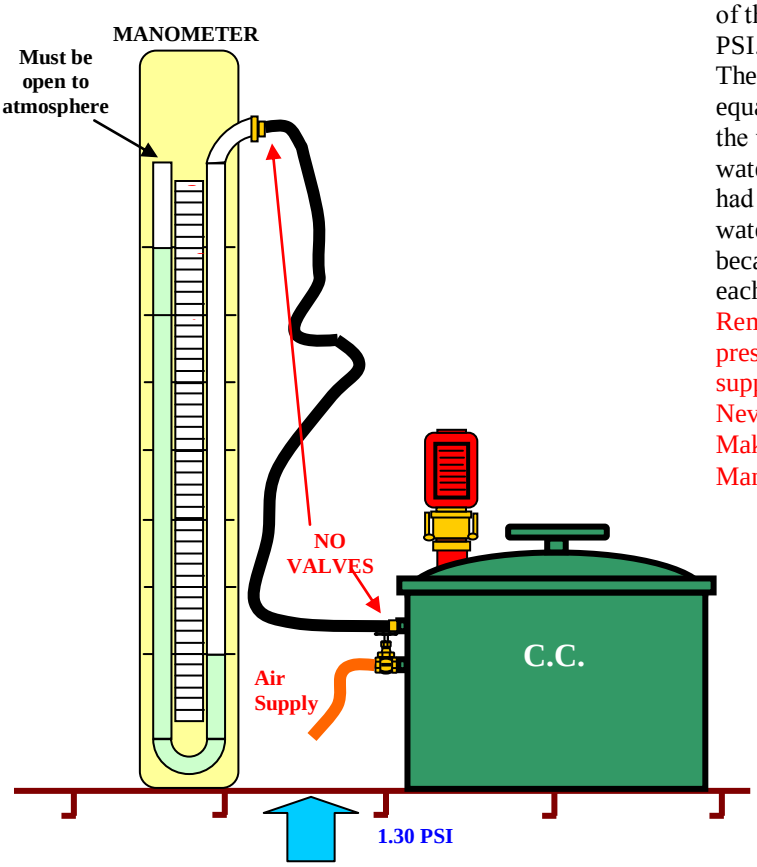
A manometer is read by adding the difference between both sides of the water column. In other words, if the water column moves down 1" on the pressure side and up 1" on the other side, that would equal 2" of water. The reading of a manometer that equals 2" of water column is .07226 PSI.
One inch of water column equals .03613 pounds per square inch (PSI). Twelve times .03613 PSI equals .43356 PSI, so one foot of water equals .43356 PSI or almost a half of a pound.
On the manometer that would read as 6" on one side and 6" on the other.
The manometer should be mounted in a vertical position and tied off or otherwise fastened to prevent false readings and the possibility of spilling the water solution. The water solution can be colored with dye or a small amount of antifreeze to make it easier to see. Only use enough to tint the water as antifreeze has a different specific gravity and could affect the readings by as much as 12%.
To give you an idea of the pressure exerted on a tank top I will use as an example a typical tank on the DBL 151. The tank top measures approximately 32' X 60' and at a test pressure of 1 ½ PSI, the upward force acting on the deck would be 207 tons.

$$\frac{32 \times 60 \times 144 \times 1.5}{2000} = 207.36$$

1 ½ PSI = 41.5 inches of water column
That would be 20 ¾ inches on each side

This might be a good time to mention a very important precaution to take when air testing cargo lines. Always make sure all cargo tanks are vented to atmosphere as the sudden release of 125 PSI in a cargo line by opening a valve into a closed tank could easily over pressurize the tank.

The decks of most oil barges are designed when new to withstand 8' of water head or 3.468 PSI. Testing of a cargo tank for the regulating authorities or us is usually done between 1.3 PSI (36" total or 18" per side) and 2 PSI (55 3/8" total or 27 ½" per side).
Over pressurizing a cargo tank will always result in damage. It could be as minor as cracked frames or as serious as doming the deck requiring complete replacement of the top of that compartment and anything attached to it.
Pressurizing a tank and watching for a pressure drop is not an acceptable test. The pressure must be kept up and a soap and water mixture applied with a spray or brush to all new welds or suspected leak areas.



A manometer that indicates 24" of water column would equal a pressure of .867 PSI.
The manometer on this page indicates a water column of three feet, 18" on each side for a pressure of 1.30 PSI.
The air pressure in a cargo tank exerts its force equally on all sides, top and bottom. If a barge is in the water and has a 2' draft, then in effect it has a 24" water column head acting on the bottom. If the barge had a leak in the bottom and was pressurized to 24" of water column it would not show any air bubbles because the two pressures would be equal and cancel each other out.
Remember; No valves on the manometer - never pressurize a tank over 2 PSI – Never leave the air supply unattended unless the air is disconnected – Never tee the air supply and manometer together – Make sure the passages of the Manometer are free and clear.