Fire Rated Self Bunded Tank
INSTALLATION INSTRUCTIONS

Sept 2023

1 TANK SITE EVALUATION AND PREPARATION PRIOR TO INSTALLATION

1.1 The foundation for the tank must be designed to support the weight of the tank plus 100% of the weight of the tank's contents when full. The design shall also take into account the type of support that is being used and the point load associated with that support. The foundation may be constructed using concrete, asphalt, gravel, or other stable material and must include provisions in its design to prevent tank movement. The foundation design should include any provisions necessary for seismic considerations, applicable local building codes, potential flooding considerations and considerations for exposure to winds. The foundation design must also include provision for draining surface water away from the tank.

1.2 For tank installations without cathodic corrosion protection, the tank should be grounded in accordance with applicable electrical and fire code standards.

1.3 Where the tank body is in contact with the earth or foundation, it should be protected from external corrosion. For external corrosion protection using cathodic corrosion protection, consult applicable standards (e.g., NACE/AMPP) to provide the tank with appropriate protection from lightning without interfering with the corrosion protection. Steel tanks in contact with the earth should not use copper grounding. Refer to STI R893-89, "Recommended Practice for External Corrosion Protection of Shop Fabricated Aboveground Storage Tank Floors."

1.4 Tanks located in areas subject to flooding must be protected against flotation. Aboveground tanks should not be located above underground utilities or directly beneath overhead power lines. The tank shall be protected from vandalism and accidental damage in accordance with all applicable codes.

2 TANK HANDLING

2.1 Do not handle or install tank without having knowledge and experience in procedures in- volved with proper and safe installation of an aboveground tank used for storage of stable, flammable, and combustible liquids. To avoid tank damage, use skilled, professional installers.

2.2 Equipment for handling the tank shall be of adequate size to lift and position the tank. DO NOT DROP OR DRAG THE TANK.

2.3 Tanks shall be carefully handled. Use cables or chains of adequate length (with spreader bars, if necessary) and size. Attach to the tank using the lifting lugs provided. Care should be taken that the angle between the two cables, at the lift point, shall be no greater than 60 degrees.

2.4 DO NOT HANDLE OR MOVE THE TANK UNLESS IT IS EMPTY OF LIQUID AND FREE OF VAPORS.

2.5 This is a stationary tank. Do not use this tank for transport of any product.

3 TESTING OF TANK INTEGRITY AT THE TIME OF INSTALLATION, AFTER REPAIRS, OR TO CONFIRM TANK INTEGRITY AS PART OF TANK MAINTENANCE

3.1 GENERAL REQUIREMENTS

3.1.1 An on-site integrity test of the tank may be required by local authorities after the tank is placed to ensure no damage has occurred in shipping and handling, after a tank repair or as part of tank maintenance to confirm the integrity of the tank system. A pressure test or vacuum test may be used to evaluate integrity. However, the Authority Having Jurisdiction (AHJ) or a responsible party overseeing the work should establish the appropriate method. All testing shall be performed as described in paragraph 3.2 below.

3.1.2 If the manufacturer has shipped the double wall tank with a vacuum on the space between the walls, this may serve as the onsite integrity test with AHJ approval if vacuum is held until the tank is placed. Read and record the vacuum pressure of the tank at the time of delivery and at the time of tank placement. The vacuum reading at the time of shipment should be provided by the tank manufacturer. If the vacuum gauge reading has dropped more than 2 inches Hg (40.5 6.77 kPa) from the level at which it was shipped, contact the tank manufacturer. Remember that vacuum can decrease if the tank environment is warmer than when the tank was originally put under vacuum.

3.2 AIR PRESSURE TEST PROCEDURE FOR TANKS

3.2.1 Manways must be secured with bolts and/or C-clamps of appropriate size and strength to hold the vent cover in the sealed position to maintain the tank pressures required. If the manway is to be used as the emergency vent (i.e., long bolt manway) the manway must be returned to the long bolt configuration at the completion of the test. Tanks listed per UL will not be shipped with long bolt manways as E-vents after March 2021. If tank is equipped with standard emergency vents, remove emergency vents and cap openings to hold tank pressure as required.

NOTE: Use only calibrated air pressure gauges with a 0-15 psig (0-103 kPa) dial span. The relief valve must have a flow rate at the set pressure that is greater than the flow rate of the air supply line. The regulated air supply test pressure used for this test should be as follows:

a. **HORIZONTAL CYLINDRICAL (AND DIKED TANKS, IF APPLICABLE) TANKS** - Not less than 3 psig (20.7 kPa) nor more than 5 psig (34.5 kPa). Set the pressure relief valve in the air supply line at 5 psig (34 kPa).

b. **VERTICAL TANKS** - Not to be less than 1 ½ psig (10.4 kPa) nor more than 2 ½ psig (17 kPa) or that gauge pressure above 1 ½ psig (10.4 kPa) which first causes visible deformation of the tank. Set the pressure relief valve in the air supply line at 2 ½ psig (17 kPa).

c. **RECTANGULAR TANKS** - Not more than 1 ½ psig (10.4 kPa). Tank pressurization should stop if the tank shell starts to deform. Set the pressure relief valve in the air supply line at 1 ½ psig (10.4 kPa). This 1 ½ psig (10.4 kPa) pressure is to be used for testing tanks in the field ONLY.

In-shop testing during tank manufacture will be performed at different pressures which are specified by the tank construction standard.

CAUTION: Do not leave a pressurized tank unattended while the air supply line is connected, or any tank compartment is at an elevated pressure. Do not stand in front of tank heads or fittings when pressurizing tank.

Pressurizing of large tanks may result in the slight deformation or bulging of the tops and bottom of vertical tanks, bulging of the sides of rectangular tanks, and bulging of the heads and ends of cylindrical tanks. Should visible bulging occur, or deformation appear severe, immediately relieve the pressure. Aboveground vertical tanks may have a "weak shell to roof" seam. Do not air pressure test a tank with a “weak shell to roof” seam. Rather, fill these tanks with water and check for leaks. Also remember that as temperature increases the tank pressure may increase. Regularly monitor the tank pressure during the test and release tank pressure if site conditions cause pressure to rise above the allowable limits set in section 3.2.1.

3.3 SINGLE-WALL TANK PRESSURIZING PROCEDURE

3.3.1 Install test piping as shown in Figure 3.3.2. Temporarily plug, cap, or seal off remaining tank openings to hold pressure.

3.3.2 Close valves A and B.

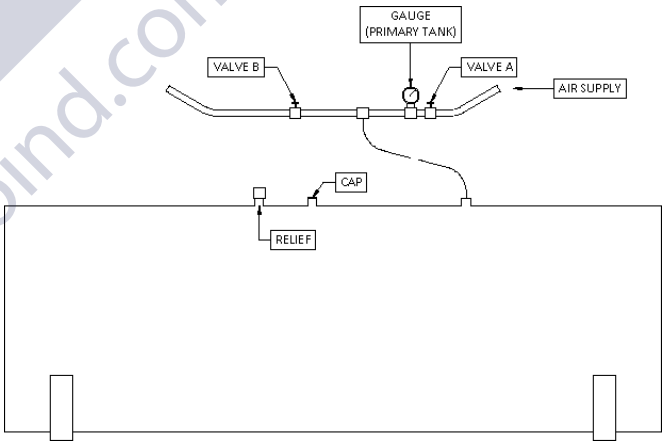


FIGURE 3.3.2
SINGLE-WALL TANK

3.3.3 Connect regulated test air supply line to test piping as shown in Figure 3.3.2.

3.3.4 **WARNING:** A relief valve should be installed in a tank opening and set at the maximum test pressure to prevent causing tank failure by over-pressurization.

3.3.5 Slowly open valve A to pressurize the tank. Pressure gauge should indicate test air pressure given in paragraph 3.2.1 above. Close valve A. Disconnect regulated test air supply line from test piping.

If the tank is a multiple compartment tank test each compartment separately if the tank compartments share a common bulkhead. If the tank does not share common bulkhead with the neighboring compartment, then the individual tank compartments can be tested simultaneously. For compartmented tanks, each compartment must be tested separately if single bulkheads are used. If compartments use double bulkhead construction, the individual compartments can be tested simultaneously. Proceed to paragraph 4 “Detection of Leaks” below.

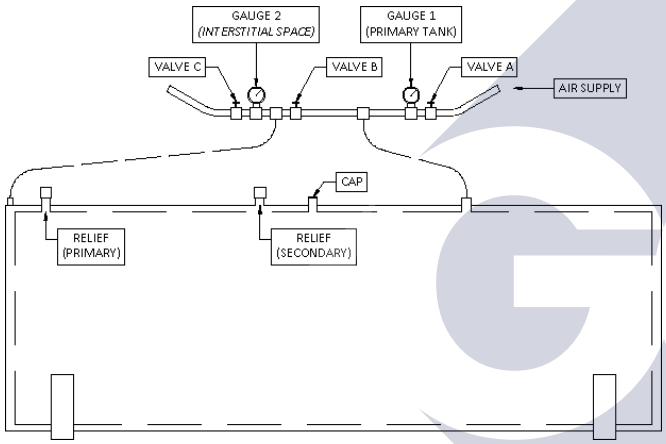


FIGURE 3.3.8
DOUBLE-WALL TANK

3.4 DOUBLE-WALL TANK PRESSURIZING

3.4.1 The following air pressure testing does not apply to double-wall tanks equipped with interstitial vacuum monitoring systems. In lieu of the air pressure test, the tank may be shipped from the factory with a vacuum in the tank interstice. If the vacuum pressure, gauge reading has deviated more than 2 inches Hg (40.5kPa) from the shipping pressure contact the tank manufacturer.

3.4.2 The following air pressure testing applies only to single compartment double wall tanks. Follow the procedure described in section 3.5 to test multi compartment double wall tanks. Read and record the vacuum pressure.

3.4.3 Install test piping as shown in Figure 3.3.8. Temporarily plug, cap, or seal off remaining tank openings to hold pressure.

3.4.4 Connect regulated test air supply line to test piping as shown in Figure 3.3.8.

3.4.5 Close valves A and B. Open valve C.

3.4.6 Slowly open valve A to pressurize the primary tank. Pressure gauge 1 should indicate test air pressure given in paragraph 3.2.1.

3.4.7 Close valve A. Disconnect regulated test air supply line from test piping.

3.4.8 Monitor test pressure in primary tank for 1 hour minimum. A steady drop in pressure reading for gauge 1 indicates there may be a leak in the primary tank. Check the fittings, and gauge, then retest. If the problem persists, contact the tank manufacturer.

3.4.9 If no leaks are found, close valve C and slowly open valve B to pressurize the interstitial space between the double walls of the tank. Pressure gauge 1 will indicate a slight drop in test pressure when valve B is opened but should hold steady at the lower pressure. If test pressure drops below minimum requirements found in 3.2.1, close valve B, reconnect air supply line and slowly open valve A to increase pressure in primary tank. When the required pressure is indicated on gauge 1 close valve A, disconnect test air supply line. Open valve B to equalize pressure in the primary tank and the interstitial space. Gauge 1 and gauge 2 should have the same pressure reading.

WARNING: Do not apply air pressure to the interstitial space between the walls of a double wall tank without air pressure in the primary tank. Several re-pressurization cycles may be needed to pressurize the interstitial space of a protected and/or insulated tank because the insulating material will absorb some of the air during pressurization. A tank that is 20,000 gallons or less may require up to four re- pressurization cycles, and a tank large than 20,000 gallons may require up to six re- pressurization cycles. Do not apply air pressure to the interstitial space that is higher than the air pressure in the primary tank. Damage to the tank may result.

3.4.10 Upon stabilization of pressure in the interstitial space close valve B and disconnect the air line. Hold test pressure in interstitial space for 1 hour minimum. A steady drop in pressure gauge 2 indicates there may be a leak in the interstitial space. The tank test pressure should not vary more than 5% during the test. Check the test fittings, the gauges, tank fittings and then retest if variance exceeds 5%. Be especially careful to check the emergency vent cap or plug for leaks. If the problem persists, contact the tank manufacturer. Do not leave the tank unattended if any part of the tank is under pressure.

3.4.11 Proceed to paragraph 4 “Detection of Leaks” to complete testing. In lieu of the air pressure test described in this section, a vacuum may be applied to the interstice of a double-wall tank or to the interstice of a double-bottom tank as described in paragraph 3.6.

3.5 DOUBLE WALL MULTI COMPARTMANT TANK PRESSURIZING

3.5.1 Multi compartment tanks can be pressure tested however when testing secondary containment type multi compartment tanks steps must be taken to prevent pressurizing the secondary tank when the primary tanks are not also under a pressure at least equal to the test pressure of the secondary tank. If the secondary tank pressure exceeds the primary tank pressure(s) the primary tank(s) may be damaged.

3.5.2 The first step is to pressure test the individual tank compartments to confirm their integrity. Multi compartment tanks which have common bulkheads must have each compartment tested individually. Multi compartment tanks that have individual tank bulkheads separated from the adjoining tank bulkhead can have the tank compartments tested simultaneously. The type of compartment construction can be established via the tank drawing or by contacting the tank manufacturer. If the tank construction cannot be established test each compartment individually as if the tank compartments share bulkheads.

3.5.3 **WARNING:** A relief valve should be installed in a tank opening and set at the maximum test pressure to prevent causing tank failure by over-pressurization.

3.5.4 Once the individual compartments have been tested and have passed, the tank should be configured as shown in Figure 3.5.8 to allow the tank compartments to be pressurized simultaneously, and then to allow the pressure from the primary tank to be transferred to the secondary tank.

3.5.5 Close valves A and B. Open valve C. Slowly open valve A to pressurize the primary tanks simultaneously. Pressure gauge 1 should indicate test air pressure given in paragraph 3.2.1.

3.5.6 Close valve A. Disconnect regulated test air supply line from test piping.

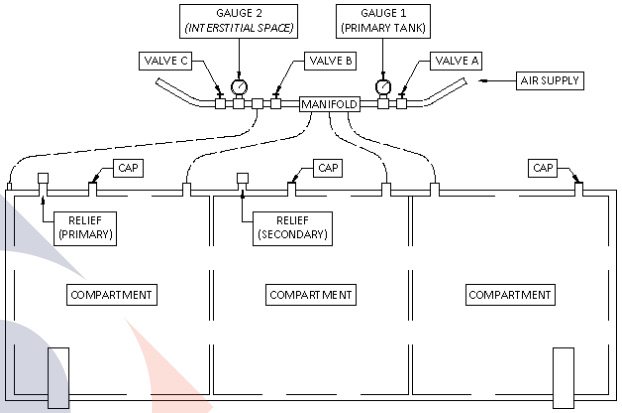


FIGURE 3.3.8
DOUBLE-WALL MULTI COMPARTMENT TANK

3.5.7 Monitor test pressure in primary tanks to confirm test assembly integrity. A steady drop in pressure reading for gauge 1 indicates there may be a leak in one of the primary tanks or test fittings. If leak is suspected, check the fittings, and gauge, then retest. If the problem persists, reconfigure the tanks to test each compartment separately. If the leak cannot be identified, contact the tank manufacturer.

3.5.8 If no leaks are found, close valve C and slowly open valve B to pressurize the interstitial space between the double walls of the tank compartments. Pressure gauge 1 will indicate a slight drop in test pressure when valve B is opened but should hold steady at the lower pressure. If test pressure drops below minimum requirements, close valve B, reconnect air supply line and slowly open valve A to increase pressure in primary tank. When the required pressure is indicated on gauge 1 close valve A, disconnect test air supply line. Open valve B to equalize pressure between the primary tanks and the interstitial space. Gauge 1 and gauge 2 should have the same pressure reading.

3.5.9 Several re-pressurization cycles may be needed to pressurize the interstitial space of a protected tank because the insulating material will absorb some of the air during pressurization. A tank that is 20,000 gallons or less may require up to four re-pressurization cycles, and a tank large than 20,000 gallons may require up to six re- pressurization cycles. Re-pressurizations are done by transferring air from the primary tanks to the secondary tank. Air pressure may need to be added to the primary tanks to maintain test pressure. Do not apply air pressure directly to the interstitial space. Damage to the tank may result. Only apply air pressure to the interstitial space of a double wall tank when the air pressure in the primary tank is equal to the test pressure.

3.5.10 Once the pressures have stabilized close valve B. Upon stabilization of pressure in the interstitial space hold test pressure in interstitial space for 1 hour minimum. A steady drop in pressure gauge 2 indicates there may be a leak in the interstitial space. The tank pressure or the pressure in the interstitial space should not vary more than 5% during the test. If leak is suspected, check the test fittings, the gauges, the tank fittings and then retest. Be especially careful to check the emergency vent cap or plug for leaks. If the pressure in the interstitial space should exceed the pressure in the primary tanks, valve C should be opened to discharge the pressure for the interstitial space and the source of the leak is found. If the problem persists, contact the tank manufacturer.

3.5.11 Proceed to paragraph 4 “Detection of Leaks” to complete testing. In lieu of the air pressure test described in this section, a vacuum may be applied to the interstice of a double-wall tank or to the interstice of a double-bottom tank as described in paragraph 3.6.

3.6 VACCUM TEST FOR DOUBLE WALL AND DOUBLE BOTTOM TANKS

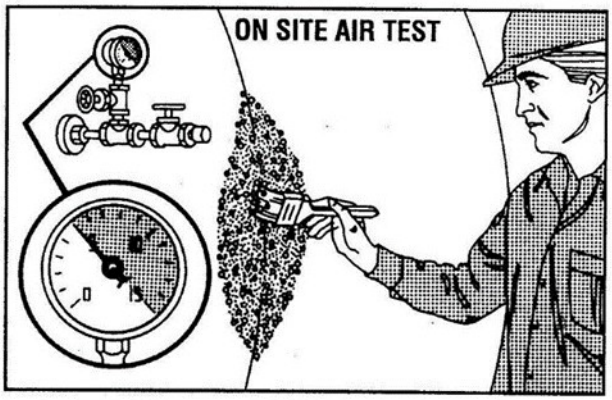
3.6.1 **NOTE:** This test procedure may be difficult to conduct for large (greater than 20,000 gallons) tanks because of the greater volume of space to be evacuated and difficulty in sealing the tank openings. **DO NOT APPLY A VACUUM TO THE PRIMARY TANK OF A DOUBLE-WALL TANK OR TO A SINGLE-WALL TANK.** A vacuum of 6 inches Hg (20.3 kPa) is to be applied to the interstice only. The vacuum shall be allowed to stabilize for 10 minutes and, if the vacuum is lost due to tank shifting or the effects of temperature, the test vacuum can be re-established. Once the test pressure is stabilized the vacuum should be held without a loss for one hour on tanks less than 20,000 gallons and for 2 hours for tanks greater than or equal to 20,000 gallons. If this vacuum cannot be held for the specified time interval, then perform the air test procedure described in paragraph 3.4 or 3.5 as appropriate, and the leak check described in paragraph 4.

3.6.2 Caution must be taken in applying a vacuum to the interstice of a tank and the testing must be stopped if any deformation appears on the tank.

3.6.3 Performing a vacuum test on an insulated tank can be difficult due to the porosity of the tank insulation. The vacuum will need to be applied in stages to allow the insulation to yield trapped air. Vacuum should be checked 15 minutes after it is applied to check for stabilization. Vacuum can be re-applied if the level has dropped from test value. This process can be repeated up to four times for a tank less than 20,000 gallons in capacity and six time for a tank greater than 20,000 gallons. After the stabilization period is complete the interstitial vacuum can be set at 6” hg, the tank should hold the vacuum for one hour if less than 20,000 gallons capacity and two hours if the tank is greater than 20,000 gallons capacity. The vacuum should not vary more than 5% during the test (0.3” hg) for the duration of the test. If this vacuum cannot be held for the specified time interval, then perform the air test procedure described in paragraph 3.4 or 3.5 as appropriate, and the leak check described in paragraph 4.

4 DETECTION OF LEAKS

4.1 Immediately apply leak test solution to tank exterior surfaces, welds, fittings, etc. Check for leaks. No leaks are permitted. If leaks are found, notify the tank manufacturer. If no leaks are found, testing of the tank is complete.



4.2 For single-wall tank, open valve B, then slowly open valve A to release test air pressure. For double-wall tank, open valve C, then slowly open valve B to release test air pressure.

4.3 **WARNING:** A relief valve should be installed in the air supply line and set below the maximum pressure listed in 3.2.1.

5 TANK PIPING AND ACCESSORIES

5.1 Install all permanent piping and fittings using compatible, non-hardening thread sealant material. All openings should be inspected and cleaned prior to attaching components to the tank.

5.2 All unused tank openings must be properly sealed with metal pipe plugs or caps and tested to be liquid and vapor tight prior to putting the tank into service.

DO NOT WELD ON THE TANK, MODIFY OR PENETRATE THE TANK STRUCTURE IN ANY WAY WITHOUT THE EXPRESS WRITTEN PERMISSION OF THE TANK MANUFACTURER.

5.3 All tank accessories shall be installed as required per local codes and manufacturer recommendations. Anti-siphon devices, overfill shut-offs and alarms, vents, gauges, emergency vents, etc. are common requirements for tank systems storing and dispensing motor fuels.

6 MAINTENANCE

6.1 The tank operator should perform periodic walk-around inspections to identify and repair areas of damage to the tank or the coating. Check for proper drainage around the tank area.

6.2 It is imperative that the tank exterior be inspected periodically to ensure that the integrity of the coating is maintained. The frequency of periodic repainting will be based upon environmental factors in the geographic area where the tank is located. Special consideration should be given to the selection of the paint, surface preparation and coating application. The coating selected should be suitable for use with the current coating, or the existing coating should be removed. The coating selected should be of industrial quality. Care must be taken to ensure that tank certification label and serial number label are preserved as these are unique to the tank.

6.3 Proper site preparation and maintenance are vital to ensure drainage of surface water. Should ground conditions change or settlement occur, take the appropriate steps to maintain proper drainage and prevent standing water near or under the tank area.

6.3.1 For diked tanks, remove any product spills immediately. Be sure to dispose of hazardous material properly.

6.3.2 For diked tanks fitted with a drain, drain off water only. Drain openings are required to be maintained liquid tight.

6.4 The primary tank should be inspected monthly for the presence of water at the lowest possible points inside the primary tank. Remove any water found. Water and sediment in fuel can cause plugging of filters. Also, bacterial growth in this media can cause filters to plug, diminish fuel quality and cause corrosion of tanks and lines. For procedures on how to check for the presence of water and removal of water, refer to STI RP111, Storage Tank Maintenance. For copies of the RP and more information, please go to www.steeltank.com.

6.5 Tank relocation requirements – Aboveground storage tanks are often relocated. The following instructions are to be followed when this occurs. All steps are to be documented and the documentation is to be kept for the life of the tank.

6.5.1 The hazards associated with the cleaning, entry, inspection, testing, maintenance, or other aspects of ASTs are significant. Safety considerations and controls should be established prior to undertaking physical activities associated with ASTs. Cleaning of tanks must be per state and local jurisdiction requirements.

6.5.2 Refer to STI Standard SP001, “Standard for the Inspection of Aboveground Storage Tanks” for requirements concerning tank inspections. This SP001 Standard details requirements for inspections based on the tank installation and age. A tank must undergo the appropriate inspection prior to relocation.

The tank must be subjected to a pressure (or vacuum) test as detailed paragraph 3.2 above except an inert gas, such as nitrogen, should be used for tanks that have previously held fuel.