

Revision letter: A

Rev. Date: 9/10/2019

QCP-1162
Leak Test Procedure (Pressurized Water Method)
Welded Fluid Tank

CONTROLLED
ORIGINAL IN RED

Date

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Approvals

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REVISION HISTORY

Rev.	Date	Changes
A	9/10/2019	Initial Release

Objective:

Setup and procedure for leak testing a welded fluid tank using pressurized water method.

Equipment:

1. Bulk water tank with fluid volume greater than tank to be tested.
2. Transfer pump
3. Plumbing, e.g. hoses, fitting and selector valves to connect test equipment to test tank.
4. Pressure control valve, e.g. ball valve.
5. Pressure gauge

Test Setup:

Figures 1 and 2 provides a diagram for two options for the basic test setup. One option has the test pressure gauge installed the plumbing circuit and the second has the pressure gauge installed directly in the Tank Under Test.

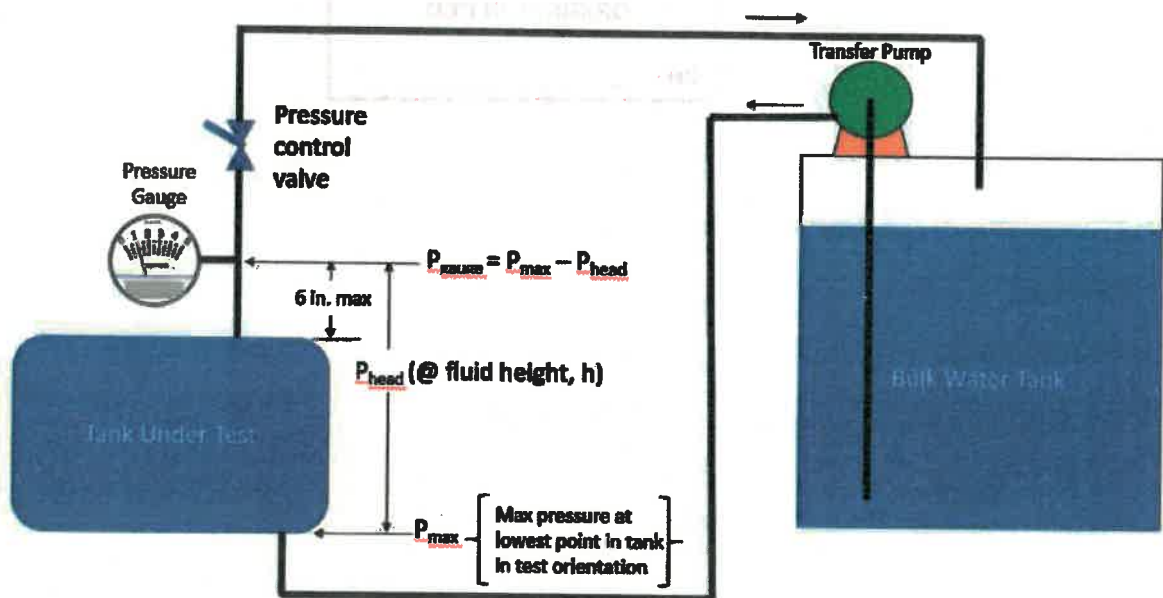


Figure 1: Basic Test Setup (Pressure Gauge Installed in Return Flow Line)

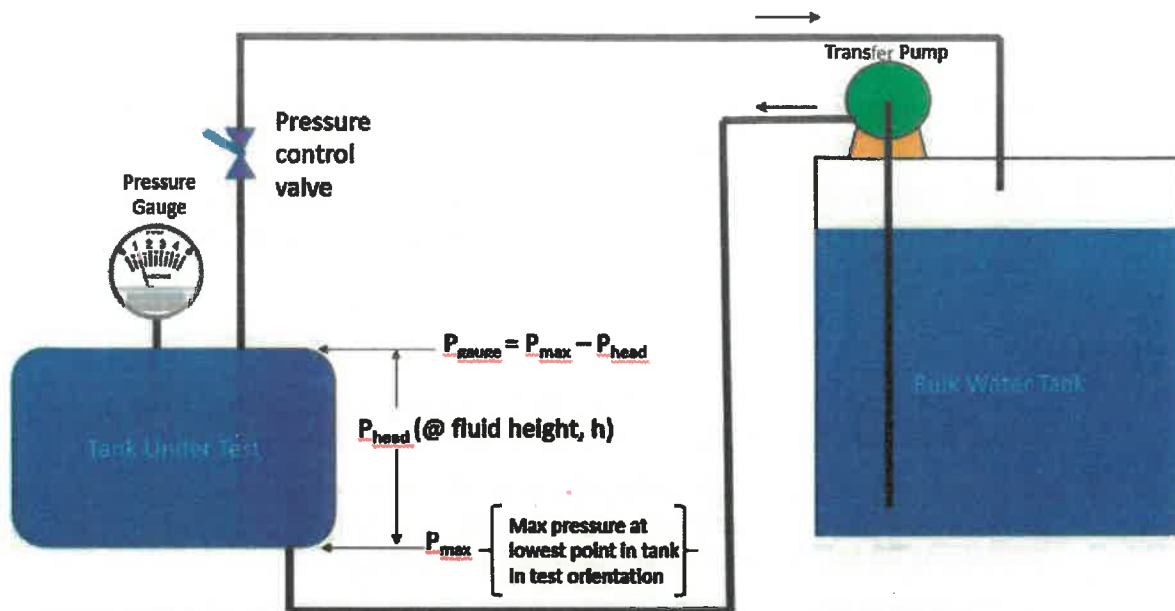


Figure 2: Basic Test Setup (Pressure Gauge Installed in the Tank Under Test)

Determine Pressure Gauge Setting, P_{gauge} :

1. Define the maximum allowable test pressure at the bottom of the Test Tank, P_{max} . The maximum test pressure, P_{max} , shall be noted on the tank weldment/fabrication drawing.

CAUTION: THE MAXIMUM PRESSURE IN THE TANK UNDER TEST, P_{max} , MUST NOT EXCEED THE STRENGTH CAPABILITY OF THE TANK DESIGN, E.G. YIELD STRENGTH OF TANK MATERIALS AND WELDS AND NO PERMANENT DEFORMATION.

2. Calculate the Pressure Gauge set point, P_{gauge}

$$P_{gauge} \text{ (psi)} = P_{max} - P_{head}$$

P_{max} (psi), maximum test pressure: (provide on tank fabrication drawing)

P_{head} (psi), fluid head pressure, = ρgh (psi),

ρ , density of water= 1.94 slugs/ft.³

h , fluid height to gauge (see Fig 1)= (measure test setup) ft.

g , gravity = 32.2 ft./sec²

Example:

If, $P_{max} = 4$ psi

$h = 3$ ft

then,

$$P_{gauge} = P_{max} - P_{head} \text{ (or } \rho gh \text{)}$$

$$= 4 \text{ psi} - [1.94 \text{ slugs/ft.}^3 \times 32.2 \text{ ft./sec}^2 \times 3 \text{ ft}] \times [1 \text{ ft.}^2/144 \text{ in.}^2]$$

$$= 4 \text{ psi} - 1.3 \text{ psi}$$

$$P_{gauge} = 2.7 \text{ psi}$$

Tank Setup:

1. The Tank Under Test must be setup and oriented so it is completely filled with water during the test, i.e. no air pockets in test tank.
2. The bulk water must be the same temperature or warmer than the test tank to prevent condensation on the exterior of the Tank Under Test which could obscure a true leak point and make visual inspection difficult.

Procedure:

1. Start the transfer pump with the Pressure Control Valve fully open until the tank is filled which should be indicated by water flowing back into the Bulk Water Tank.
2. After the Tank Under Test is completely filled, gradually close the Pressure Control Valve until the pressure reading on the Pressure Gauge reaches the P_{gauge} set point. Adjust the Pressure Control Valve during the test as needed to maintain the pressure setting.
3. After the water pressure has been applied for 5 minutes minimum, inspect all welds, designated to seal fluid, for leaks which will be indicated by water leaking out the weld. The leaks may be small seepage, pressurized sprays or large continuous flows. Visual identification is the primary method for identifying leaks. If leaks are found, they should be wiped dry to verify it is an active leak that reappears again after wiping off.
4. Mark all leaks found, turn off the transfer pump and drain the tank.
 - a. The tank can be drained back into the Bulk Water Tank by switching the suction and supply hoses connections to the Transfer Pump and run the pump. Switching hose connections may be achieved with additional plumbing and selector valves in the initial test setup.

Note: the return line/hose to the Bulk Water Tank needs to be above the fluid level to drain with this method. See Figure 3 for basic layout for draining tank.

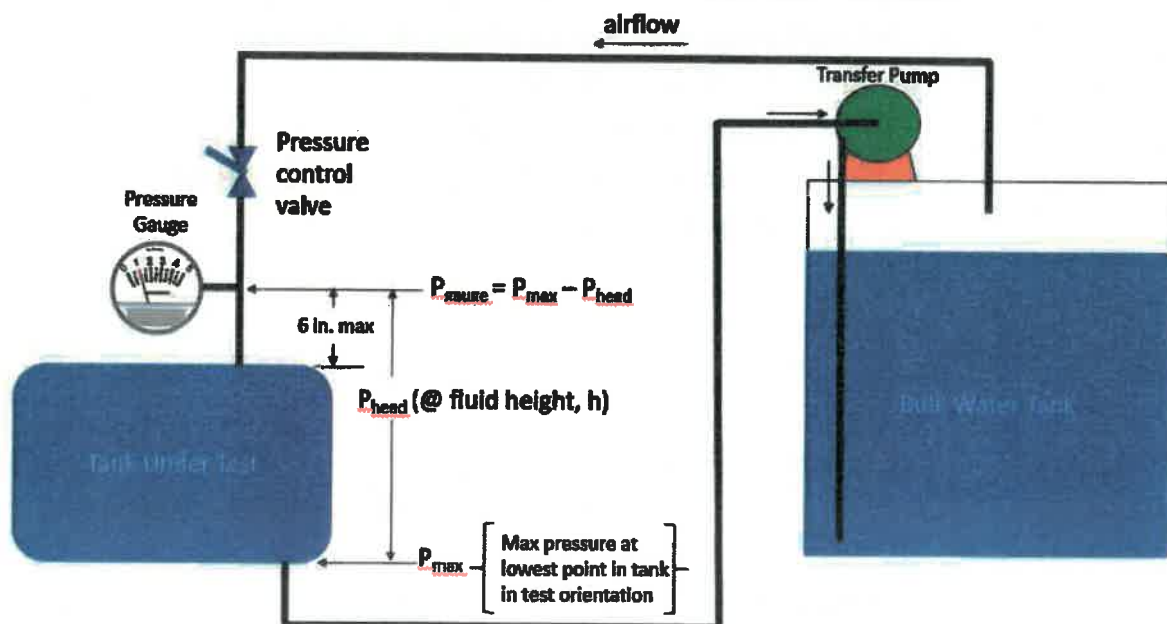


Figure 3: Basic Test Setup for Tank Draining

5. Repair all leaks and retest the tank.
6. If no leaks are found, the tank has passed the leak test requirement.

