

CHAPTER 7: HOT TAPPING

According to API 653 3.14, Hot tapping identifies a procedure for installing a nozzle in the shell of a tank that is in service. This means that a tank can continue to be in operation whilst maintenance or modifications are being done to it. This is in complete compliance with the API 653 standard, but following some rules. First, for all of you students, let's review what the BOK of the API 653 has to say.

- a) The Inspector should be familiar with the Hot Tapping requirements. (API-653, Paragraph 9.14)
- b) The inspector should be able to calculate the minimum spacing between an existing nozzle and a new hot tap nozzle. (API-653 Paragraph 9.14.3)

Hot tapping is more common in pipelines, although the principles are the same that for tanks. In a normal pipe hot tapping operation, you wish 2 or 3 things.

1. You want flow in the pipe so you can cool the welded zone, given that the liquid works as a heat sink.
2. You want no gases or vapors in the pipe
3. You want to weld nozzles and reinforcements to the pipe without penetrating too much in the base metal, because of pressure.

With tanks, it is the same, with the difference that flow conditions in tanks are close to stagnant.

REQUIREMENTS FOR HOT TAPPING

The following diagram summarizes the requirements for hot tapping found in API 653 9.14

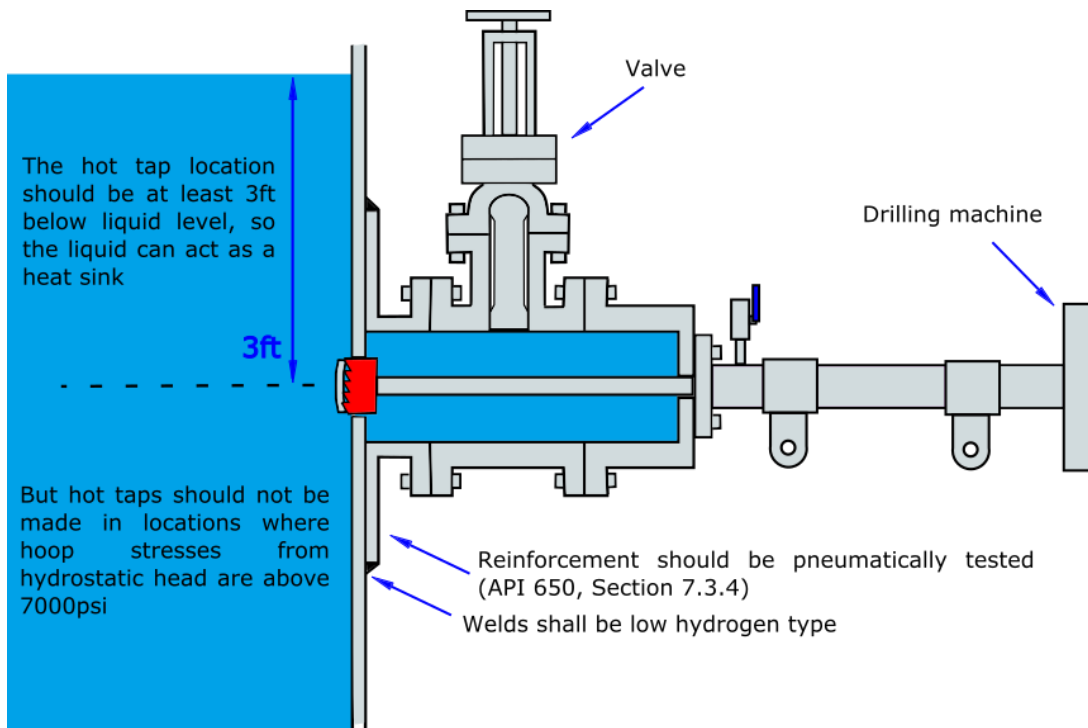


FIGURE 16 HOT TAP ARRANGEMENT

Requirements for hot-taps in tanks

1. Hot taps are not permitted on shell material requiring thermal stress relief
2. Welding shall be done with low hydrogen electrodes.
3. Hot taps are not permitted on the roof of a tank or within the gas/vapor space of the tank.
4. Hot taps shall not be installed on laminated or severely pitted shell plate. As an inspector, you have to make sure that thickness measures are taken in the proposed area for a hot tap.
5. Hot taps are not permitted on tanks where the heat of welding may cause environmental cracking (such as caustic cracking or stress corrosion cracking).
6. Minimum spacing in any direction (toe-to-toe of welds) between the hot tap and adjacent nozzles shall be equivalent to the square root of RT where R is the tank shell radius, in inches, and T is the shell plate thickness, in inches.

7. Minimum distance between the toe of the hot tap weld and a vertical seam should be 12in.

According to API RP 2201 (Remember this number very well as could be a question of the exam), the hazards for a hot tapping operation in tanks are the following:

- a. Tank venting, with vapors reaching the exterior area where welding is taking place.
- b. Product within the tank rising and overflowing.
- c. Inadvertently allowing the liquid level within the tank to fall below the point of welding, exposing the vapor space within the tank to an ignition source.

Welding on the exterior of tanks in service shall not be conducted unless controls are established and in place to prevent flammable vapors from reaching the area of welding. Work must be stopped immediately should flammable vapors be detected in the welding area.

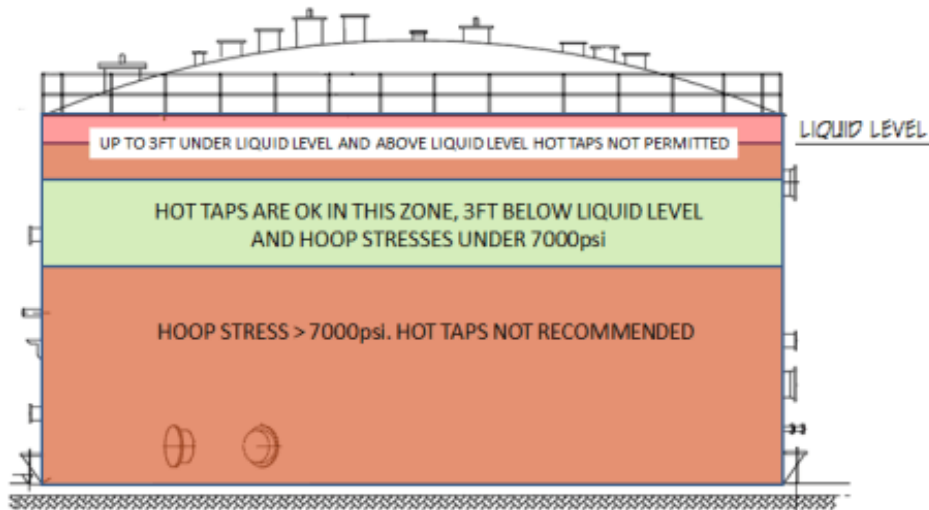


FIGURE 17 WHERE TO MAKE A HOT TAP

WHERE TO MAKE A HOT-TAP

When hot tapping or welding on a tank in service maintain liquid in the tank at a level at least 3 feet (1 meter) above the area where the work is being performed. No attempt should be made to hot tap or weld above this liquid level in

atmospheric pressure petroleum storage tanks because of the potential danger of an explosive atmosphere inside the tank vapor space. *Measurements of the tank level should be made by a hand tape gauge to verify the accuracy of automatic or remote reading gauges.*

WELDING ON FLOATING ROOFS

Welding should never be allowed on the decks of floating roof tanks, as they are subject to flammability hazards in several locations:

- a. Inside the pontoons.
- b. Between the deck and liquid surface near the tank roof gauge float compartment
- c. Near the roof seal vent.
- d. Near the floating roof lift leg vent.
- e. Between the primary and secondary seal.
- f. Near the roof drain.

Hot tapping operations must be conducted by experienced personnel.
Recommendations in this book don't constitute a procedure for hot tapping operations

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