

## Agenda Item 620-1033

### Title: Testing Clarifications for Secondary Liquid Containers

Date: November 13, 2023

Revision: 0

Handled By: Eric Gnade  
CB&I  
14105 S. Route 59  
Plainfield, IL 60544-8984  
Telephone: 815-439-6476  
Email: [Eric.Gnade@mcdermott.com](mailto:Eric.Gnade@mcdermott.com)

---

**Purpose:** 1) Clarify the hydrotest allowable for secondary liquid containers, when required by purchaser  
2) Clarify testing requirements that are applicable to secondary liquid containers and other non-purge gas containers.

**Source:** CB&I observation that the allowable stress for hydrotest of a secondary liquid containers, when required by purchaser, are not clearly defined in Q.6 and R.6.

**Impact:** Reduced ambiguity

**Rationale:** While the API 620 and API 625 standards do not require the secondary liquid container to be hydrotested, API 625 10.3.2 does include guidance on what should be done when a purchaser specifies hydrotesting of the secondary liquid container. To be consistent throughout the standards, it seems appropriate for API 620 to provide clear guidance on what allowable stress for hydrotest of a secondary liquid container should be considered.

The changes specify that the secondary liquid container utilizes the same allowables and procedure for determining hydrotest level as for a primary liquid container.

Changes also more clearly define what types of containers are covered by the pneumatic testing requirements lists in Q.6.6 and R.6.5.

Revise heading for Q.6 and R.6 to properly cover the types of containers discussed. The heading currently states the sections are limited to Primary Liquid, Primary Vapor and Membrane Tank Outer Containers. This isn't correct since pneumatic testing of secondary liquid containers is currently covered within these sections.

Update the numbering system in R.6.5.4 to be consistent with Q.6.6.4.

## **Proposed Changes:**

### **Q.6 Testing ~~the Primary~~ Liquid, Primary Vapor, and Membrane Tank Outer Containers**

#### **Q.6.1 General**

The provisions stated in Q.6.2 through Q.6.5 are testing requirements for the primary liquid container and membrane tank outer container. Provisions stated in Q.6.6 cover the pneumatic testing of the warm product vapor container, secondary liquid container, refrigerated temperature roofs and portions of a primary liquid container or membrane tank outer container not tested by the hydrostatic test. ~~(or when inner tank is not open top, the refrigerated temperature roof).~~ Hydrostatic testing of a secondary liquid container is not mandatory to meet the requirements of this standard. If such a test is specified by the purchaser, then the provisions stated in Q.6.2 through Q.6.5 shall be followed in addition to those in API 625.

#### **Q.6.6 Pneumatic Pressure**

...

**Q.6.6.4** Solution film and vacuum box examination of welds shall be conducted as follows:

**Q.6.6.4.1** For a double-wall tank without an inner fixed roof, all welded joints in the steel outer shell (product vapor container or secondary liquid container) and roof (warm vapor container) shall be checked with a solution film examination or by vacuum box except where a non-mandatory hydrostatic test of this container has been performed. Exceptions of Q.6.6.4.5 apply.

### **R.6 Testing ~~the Primary~~ Liquid, Primary Vapor, and Membrane Tank Outer Containers**

#### **R.6.1 General**

The provisions stated in R.6.2 through R.6.4 are testing requirements for the primary liquid container and membrane tank outer container. Provisions stated in R.6.5 cover the pneumatic testing of the warm product vapor container, secondary liquid container, refrigerated temperature roofs and portions of a primary liquid container or membrane tank outer container not tested by the hydrostatic test. ~~(or when inner tank is not open top, the refrigerated temperature roof) and also the membrane tank outer container.~~ Hydrostatic testing of a secondary liquid container is not mandatory to meet the requirements of this standard. If such a test is specified by the purchaser, then the provisions stated in R.6.2 through R.6.4 shall be followed in addition to those in API 625.

#### **R.6.5 Pneumatic Pressure**

...

**R.6.5.4** Solution film and vacuum box examination of welds shall be conducted as follows:

**R.6.5.4.1** ~~a~~ For a double-wall tank without an inner fixed roof, all welded joints in the steel outer shell (product vapor container or secondary liquid container) and roof (warm vapor container) shall be checked with a solution film examination or by vacuum box except where a non-mandatory hydrostatic test of this container has been performed. Exceptions of R.6.5.4.5 ~~e~~ apply.

**R.6.5.4.2** ~~b~~ For the inner tank of a double wall, double roof tank and for a single-wall tank, welds above the water level shall be checked with a solution film examination or by vacuum box. Exceptions of R.6.5.4.5 ~~e~~ apply.

**R.6.5.4.3** ~~c~~ For a membrane tank outer container hydrostatically tested prior to application of insulation (see R.6.1), all welded joints in the steel shell and roof above the test water level shall be checked with a solution film examination or by vacuum box. Exceptions of R.6.5.4.5 ~~e~~ apply.

**R.6.5.4.4** ~~d~~ For a membrane tank outer container hydrostatically tested after the installation of the insulation and membrane, all accessible welded joints in the steel shell and roof above the test water level shall be checked with a solution film examination or by vacuum box. The welded joints in the steel shell and roof that are not accessible during hydrostatic test shall be examined by solution film examination or by vacuum box prior to installation of the insulation and membrane. "Accessible" means that pneumatic pressure or vacuum reaches the weld in question and that weld repair access (from two sides where relevant) is possible. Exceptions of R.6.5.4.5 ~~e~~ apply for both conditions.

**R.6.5.4.5** ~~e~~ Solution film examinations are mandatory at the following locations:

- a 1) Solution-film examination is required (no vacuum box substitution) on all welds around openings and all piping joints, except vacuum box substitution is permitted for full penetration roof butt-welded connections.
- b 2) Solution-film examination is required (no vacuum box substitution) on compression ring to the roof and shell, except vacuum box substitution is permitted where the following details are used:
- 1) Continuous double lap roof to compression ring welds.
  - 2) Shell to compression ring welds, continuous inside and outside, and constructed of a thickened upper shell ring detail similar to Figure 5-6, details f or f-1. The thickened upper shell ring shall be greater than half of the conical compression ring thickness and greater than two times the adjacent shell ring thickness.