

		Agenda Item 650-2077
Subject:	Alternate to VBT examination for "Welded-on Patch" in Bottom plate	
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Purpose:		
Source:	RFI-10142 API 650 14 th Ed	
Revision:	0 Rev 0 was completely re-written. Rev1 started from scratch 1 Rev1 in red 2 Rev2 in green – split agenda item 653-2077 from agenda item 650-2077. Added “no indication” to 7.3.3c 3 Rev3 in blue – Updated to the latest published version. API 650 14th Ed; addressed comments from Spring 2026 ballot 4 Rev4 in orange – Address 2026 balloted items and comments in the spring meeting. 2 negatives. Justin & Frank – concerned PT will be used on all bottom welds. Addressed negatives	
Date:	Rev0 - 5/07/2025 Rev1 – 11/10/2025 Rev2 – 3/7/2026 Rev3 – 5/4/2026 Rev4 – 5/5/2026	
Impact:		
Background:	RFI-10142 posed the following scenario and question. Welded on Lap patches provided on bottom plates (due to soil side corrosion) will be subjected to examination and testing as mentioned in Clause 12.1.7 of API-653 API 653 is specified to refer API-650 Section 7.3.3 for the examination and testing requirements of Tank bottom. But practically, Welded-on patch in bottom plate is welded from all sides and while carrying out VBT, it will not show any leak indications since all sides are closed by welding/ tightly fixed on bottom plate. Moreover, all sides are closed by welding, VBT on lap patches will not show any leak indication (bubbles) due to the lack of air (from underside of the patch/bottom plate) In view of the above mentioned constraints found while carrying out VBT on Welded-on patch, API shall consider DPI/MPI examination for inspecting the welds of Welded-on patch in Bottom plates. After review of vacuum box testing requirements, it is recommended to add language to the vacuum box test requirements in 650 to resolve the vacuum box concern mentioned in the RFI. The wording in 653 can be updated at this time to remove references to 650 section numbers and add “bottom leak test” for clarification. 650 can also be updated to add PT as a “leak test” so it clear that it can be used in lieu of vacuum boxing if necessary.	
Current wording:	API 650 7.3.3 Examination and Testing of the Tank Bottom 7.3.3.1 Each completed bottom and annular weld shall be visually examined in accordance with 8.5 followed by one of the leak test methods below.	

	a) A vacuum-box test in accordance with 8.6. b) A tracer gas test in accordance with 8.6.11. c) After at least the lowest shell course has been attached to the bottom, water (to be supplied by the Purchaser) shall be pumped underneath the bottom. A head of 150 mm (6 in.) of liquid shall be maintained using a temporary dam to hold that depth around the edge of the bottom. The line containing water for testing may be installed temporarily by running it through a manhole to one or more temporary flange connections in the bottom of the tank, or the line may be installed permanently in the subgrade beneath the tank. The method of installation should be governed by the nature of the subgrade. Reasonable care shall be taken to preserve the prepared subgrade under the tank. 8.6.2 Vacuum testing shall be performed in accordance with a written procedure prepared by the Manufacturer of the tank. The procedure shall require: a) performing a visual examination of the bottom and welds prior to performing the vacuum-box test; b) verifying the condition of the vacuum box and its gasket seals; c) verifying that there is no quick bubble or spitting response to large leaks; and d) applying the film solution to a dry area, such that the area is thoroughly wetted and a minimum generation of application bubbles occurs.
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Revised Proposal:	API 650 7.3 Examination, Inspection, and Repairs ... 7.3.3 Examination and Testing of the Tank Bottom 7.3.3.1 Each completed bottom and annular weld (excluding shell-to-bottom weld) shall be visually examined in accordance with 8.5 followed by one of the bottom leak test methods below. a) A vacuum-box test in accordance with 8.6. b) A tracer gas test in accordance with 8.6.11. c) For small pads, patches or configurations in which vacuum-box testing is impractical, a no-indication liquid penetrant test in accordance with 8.4 d) After at least the lowest shell course has been attached to the bottom, water (to be supplied by the Purchaser) shall be pumped underneath the bottom. A head of 150 mm (6 in.) of liquid shall be maintained using a temporary dam to hold that depth around the edge of the bottom. The line containing water for testing may be installed temporarily by running it through a manhole to one or more temporary flange connections in the bottom of the tank, or the line may be installed permanently in the subgrade beneath the tank. The method of installation should be governed by the nature of the subgrade. Reasonable care shall be taken to preserve the prepared subgrade under the tank. 8.6 Vacuum Testing ... 8.6.2 Vacuum testing shall be performed in accordance with a written procedure prepared by the Manufacturer of the tank. The procedure shall require: a) performing a visual examination of the bottom and welds prior to performing the vacuum-box test; b) verifying the condition of the vacuum box and its gasket seals;
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- c) verifying that there is no quick bubble or spitting response to large leaks; ~~and~~
- d) verifying air can freely flow ~~unrestricted and~~ without creating a vacuum on the backside of the weld to be tested; ~~and~~
- e) applying the film solution to a dry area, such that the area is thoroughly wetted and a minimum generation of application bubbles occurs.

Annex T

(informative)

NDE Requirements Summary

PT (no-indication)	Bottom welds if not tested to 7.3.3a, 7.3.3b or 7.3.3d	7.3.3c
Tracer Gas	Entire length of bottom weld joints if not tested to 7.3.3a, or 7.3.3c or 7.3.3d	7.3.3b
VB	Bottom welds if not tested to 7.3.3b, or 7.3.3c or 7.3.3d	7.3.3a
Water	Bottom welds if not tested to 7.3.3a, 7.3.3b or 7.3.3c vacuum box or tracer gas tested	7.3.3d e

Rationale: Added an option to allow no-indication liquid penetrant to test small pads, patches or impractical to vacuum box bottom welds in lieu of the three (3) current options: vacuum box, tracer gas and water. This option combined with updating the requirements of vacuum box testing to ensure free flowing air on the backside of the weld, addresses RFI-10142 that concerns vacuum box testing repair patches where indications may not be revealed due to lack of air flowing through the indication.