

## Spring 2021 – 653-2051

### Title: Allow Limited Extension of Bottom Service Interval After Non-Complying Robotic Inspection Results

Date: Rev 6– Fall, 2023

Revision: 6

Handled By: Earl Crochet  
Crochet Midstream Consulting  
281-734-2915  
earl@crochetmc.com

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**Purpose:** Make sure Owners are not put in the position of having to take tanks out of service unexpectedly after performing in-service bottom inspections.

**Source:** Earl Crochet

**Impact:** Significant

**Discussion:**

When API 653 was created, the only way to inspect and determine bottom plate thickness was when the tank was out of service. Advancements in technology now allows Owners to get bottom plate integrity data while the tank is in service, under certain conditions. In addition, based on existing technology, it may become possible to do an equivalent bottom inspection while the tank is in service in the not too distance future.

So, what happens today if you perform a bottom assessment and find that the tank is below the limits of Table 4.4 but the tank is not leaking? When API 653 is used either as a regulation or as a company procedure, there is no current way to handle this situation.

The use of robotics and other online and onstream data collection technologies continue to gain acceptance in the industry. For these technologies to continue to be used in the industry, Owner/Operators need a reasonable time frame to handle the results of the inspections.

For additional context, liquid pipelines regulated by DOT/PHMSA are inspected every 5 years by ILI or “smart pigs”. These pipelines operate at pressures from 285 psi to over 1,000 psi. PHMSA allows pipeline operators time to inspect and remediate the pipelines based on the severity of the findings. Tanks operate at much lower pressures and the risk to the public is significantly less with a tank in a facility than a pipeline outside the fence.

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## Existing

6.4.1.2 All tanks shall have a formal internal inspection conducted at the intervals defined by 6.4.2. The authorized inspector shall supervise or conduct a visual examination and assure the quality and completeness of the nondestructive examination (NDE) results. If the internal inspection is required solely for the purpose of determining the condition and integrity of the tank bottom, the internal inspection may be accomplished with the tank in-service utilizing various ultrasonic robotic thickness measurement and other on-stream inspection methods capable of assessing the thickness of the tank bottom, in combination with methods capable of assessing tank bottom integrity as described in 4.4.1. Electromagnetic methods may be used to supplement the on-stream ultrasonic inspection. If an in-service inspection is selected, the data and information collected shall be sufficient to evaluate the thickness, corrosion rate, and integrity of the tank bottom and establish the internal inspection interval, based on tank bottom thickness, corrosion rate, and integrity, utilizing the methods included in this standard.

**Table 4.4—Bottom Plate Minimum Thickness**

<b>Minimum Bottom Plate Thickness at Next Inspection (in.)</b>	<b>Tank Bottom/ Foundation Design</b>
0.10	Tank bottom/foundation design with no means for detection and containment of a bottom leak.
0.05	Tank bottom/foundation design with means to provide detection and containment of a bottom leak.
0.05	Applied tank bottom reinforced lining, > 0.05 in. thick, in accordance with API 652.

## Proposed Change

### 6.4.1.3

If after using the on-stream inspection methods allowed in 6.4.1.2, it is determined that the bottom predicted minimum thickness as determined by the Owner/Operators procedures is less than the minimum allowed as applicable by one or more of the following: Table 4.4; section 4.4.6 for annular rings (when required by API 650); or paragraph 4.4.5.4 for the critical zone, the following shall happen:

1. Inspection coverage shall be considered either Medium or High Inspection effectiveness as defined by the Owner / Operator procedures. Refer to API RP 581 for examples of medium or high inspection effectiveness.
2. Calculate the corrosion rate based on the previous internal inspection(s) for subsequent inspections or baseline for initial inspection and the deepest predicted indication found during the latest on-stream inspection. The tank shall be removed from service no later than the lesser of:
  - a) When the minimum predicted remaining thickness based on the calculated corrosion rate is half of the value in Table 4.4.
  - b) When the minimum predicted remaining thickness based on the calculated corrosion rate of the annular ring or critical zone is below the limits determined by a fitness-for-service per API 579-1.
3. c) 12 months from the date of the on-stream inspection or as defined by Section 6.4.2.2. In all cases when the minimum remaining thickness is  $<0.05$  in, the owner/operator shall perform an additional risk analysis and document the approval of risk. The risk analysis should consider:
  - a. Probability of detection for NDE methods used with floor surface conditions.
  - b. Uninspected areas.