

Agenda Item: 650-1093

Title: Steel Internal Floating Roof Bearing Plate Requirements

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Purpose: To more clearly define the intent of Section H.4.6.6 and H.4.6.11 in API Standard 650

Reference: H.4.6., C.3.10

Revision: 5

Impact: Minor increase in cost and time.

Background: API 650 Standard Section C.3.10.5 requires external floating roof legs to “have matching steel landing pads with continuous full-fillet welded to the tank bottom with minimum dimensions of 10-mm (3/8-in.) thickness by 340-mm (14-in.) diameter. The centerline of the legs shall coincide with the centerline of the landing pads”. While API 650 Standard Section H.4.6.6, allows “With Purchaser’s approval, pads may be omitted if the tank bottom will support the live load plus the dead load of the floating roof”.

Proposal: Revise Section H.4.6.in API Standard 650 to be consistent with API 650 Standard Section C.3.10 regarding steel roofs. Clearly define the intent of Section H.4.6.6 and address the concern for corrosion and mechanical damage on the tank bottom when steel roof leg supports are utilized.

Rationale: Internal and external steel floating roofs supported by legs exhibit the same potential for mechanical damage and corrosion when the roof is landed.

LEGEND:

Black text is the existing API 650 language (some of which has been moved or deleted).

Blue text is rev. 4 changes to API 650.

Green text includes rev. 5 changes.

Purple text are previously balloted and passed recommended changes to API 650.

NOTE: Some content has been moved from H.4.6.5 to H.4.6.11 for better readability (specifically the sentence “Fixed roofs shall be designed...”).

H.4.6.5 Supports shall be fabricated from pipe, unless cable or another type is specified on the Data Sheet, Line 34 and approved by the Purchaser. Supports fabricated from pipe shall be notched or otherwise constructed at the bottom to provide complete liquid drainage. ~~Cable~~

~~supports shall be adjustable externally and shall not have an open penetration at the floating roof surface. Fixed roofs shall be designed or verified suitable for cable support loads, when used, per agreement between the Purchaser and tank/roof Manufacturers.~~

H.4.6.6 ~~Steel pads or other means shall be used to distribute the loads on the bottom of the tank and provide a wear surface. Steel support legs shall have matching-compatible steel landing pads continuously full-fillet welded to the tank bottom with the lesser of the bottom thickness or minimum dimensions of 10-mm (3/8-in.) thickness by 350-mm (14-in.) diameter~~ to distribute the loads on the bottom of the tank and provide a wear surface. With the Purchaser's approval, pads may be omitted if the tank bottom will support the live load plus the dead load of the floating roof. ~~If pads are used, they shall be continuously welded to the tank bottom.~~

H.4.6.7 Aluminum supports shall be isolated from carbon steel by an austenitic stainless steel spacer, an elastomeric bearing pad, or equivalent protection, unless specified otherwise by the Purchaser.

H.4.6.8 Special protective measures (corrosion allowance, material selection, linings) are to be evaluated for supports that interface with stratified product bottoms, which may include corrosive contaminant combinations not found in the normal product. The Purchaser shall specify if any protective measures are required.

H.4.6.9 For tanks with internal linings, the Purchaser shall specify on Line 23 of the Data Sheet any special requirements for minimizing corrosion where the leg contacts the tank bottom, such as a flat plate or bull nose on the leg base, a thicker base plate, or other means.

H.4.6.10 Consideration shall be given to the use of fixed supports for the operating position (low level) of internal floating roofs, which utilize cable supports suspended from a fixed roof. These supports are typically not adjustable, are sealed to prevent emissions, and are for the operating position (low level) set at a level as specified by the Purchaser. The use of fixed supports for the low level positions are intended to reduce the frequency of fixed roof loading. The operating position (low level) and length of the cables shall be such that sinking and/or collapse of the internal floating roof will not apply loads to the support cables.

H.4.6.11 If cable supports are used, the supports shall be adjustable externally from the fixed roof while the floating roof is floating ~~and~~ with the cables unloaded and shall not have open penetration at the floating roof surface. ~~Fixed roofs shall be designed or verified suitable for cable support loads, when used, per agreement between the Purchaser and tank/roof Manufacturers.~~

H.4.6.12 Cables, cable segments, or cable connections which support the floating roof are prohibited from using a fusible link or other devices which are designed to fail at a specified load limit.

H.4.6.13 Cables used to support internal floating roofs shall be 300 series stainless steel and shall be flexible to facilitate repeatable lay down patterns on the floating roof as it travels up and down within the tank. Lay down patterns shall be positioned to avoid rim seals and floating roof appurtenances that could prevent the cable from freely extending as the floating roof lowers.

Clean copy of all changes:

H.4.6.5 Supports shall be fabricated from pipe, unless cable or another type is specified on the Data Sheet, Line 34 and approved by the Purchaser. Supports fabricated from pipe shall be notched or otherwise constructed at the bottom to provide complete liquid drainage.

H.4.6.6 Steel support legs shall have compatible steel landing pads continuously full-fillet welded to the tank bottom with the lesser of the bottom thickness or 10-mm (3/8-in.) thickness by 350-mm (14-in.) diameter to distribute the loads on the bottom of the tank and provide a wear surface. With the Purchaser's approval, pads may be omitted if the tank bottom will support the live load plus the dead load of the floating roof.

H.4.6.7 Aluminum supports shall be isolated from carbon steel by an austenitic stainless steel spacer, an elastomeric bearing pad, or equivalent protection, unless specified otherwise by the Purchaser.

H.4.6.8 Special protective measures (corrosion allowance, material selection, linings) are to be evaluated for supports that interface with stratified product bottoms, which may include corrosive contaminant combinations not found in the normal product. The Purchaser shall specify if any protective measures are required.

H.4.6.9 For tanks with internal linings, the Purchaser shall specify on Line 23 of the Data Sheet any special requirements for minimizing corrosion where the leg contacts the tank bottom, such as a flat plate or bull nose on the leg base, a thicker base plate, or other means.

H.4.6.10 Consideration shall be given to the use of fixed supports for the operating position (low level) of internal floating roofs, which utilize cable supports suspended from a fixed roof. These supports are typically not adjustable, are sealed to prevent emissions, and are for the operating position (low level) set at a level as specified by the Purchaser. The use of fixed supports for the low level positions are intended to reduce the frequency of fixed roof loading. The operating position (low level) and length of the cables shall be such that sinking and/or collapse of the internal floating roof will not apply loads to the support cables.

H.4.6.11 If cable supports are used, the supports shall be adjustable externally from the fixed roof while the floating roof is floating with the cables unloaded and shall not have open penetration at the floating roof surface. Fixed roofs shall be designed or verified suitable for cable support loads, per agreement between the Purchaser and tank/roof Manufacturers.

H.4.6.12 Cables, cable segments, or cable connections which support the floating roof are prohibited from using a fusible link or other devices which are designed to fail at a specified load limit.

H.4.6.13 Cables used to support internal floating roofs shall be 300 series stainless steel and shall be flexible to facilitate repeatable lay down patterns on the floating roof as it travels up and down within the tank. Lay down patterns shall be positioned to avoid rim seals and floating roof appurtenances that could prevent the cable from freely extending as the floating roof lowers.