

## Agenda Item: 653-228

- Title:** Requirement for the Evaluation of the Fixed Roof for Cable-Supported Internal Floating Roofs
- Date:** May 31, 2009
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- Purpose:** The existing language within the current version of API Standard 653 does not address the issue of retrofitting a cable-suspended internal floating roof onto the fixed roof of an existing tank. The common practice within the industry is to refer to the API Standard 650 for these cases; however the 11<sup>th</sup> Edition of API-650 introduces the potential for conflict in this situation. This issue could effect the continued application of cable suspended internal floating roofs. The intent of this agenda item is to clarify that a structural evaluation of the fixed roof should be performed when retro-fitting a cable-supported internal floating roof in an existing tank, and to provide general guidelines for both the Purchaser and Manufacturer in meeting this requirement.
- Source:** Requested during the Subgroup Design session of the Spring 2008 meeting.
- Revision:** 2
- Impact:** This agenda item will serve to prevent delays with cable-suspended internal floating roof installation schedules (as well as subsequent profit losses) due strictly to disagreement between the involved parties regarding the need for verifying the suitability of the existing fixed roof (to safely support the additional loading).
- Background:** The requirements of API Standard 653 regarding this issue should be in-line with the current wording of API Standard 650, Appendix 'H'.
- Proposal:** See below
- Rationale:** Currently it is not clear that these fixed roof verification analyses are being performed on a regular basis within the industry by either party (purchasers or manufacturers). If a manufacturer requires this verification prior to installing their product (thereby creating delays and additional cost), then they may stand to lose a competitive advantage to another manufacturer who does not. The current language in API-653 is ambiguous regarding the requirement for the analysis, and in fact it is not addressed at all. Appendix H of API-650, which is the default reference for internal floating roof retrofit projects, was updated in 2007 to include a statement addressing this issue (reference Section H.4.6.5). A similar clarification within API-653 will serve to inform floating roof manufacturers and purchasers that a verification analysis is required for any internal floating roof retrofit or modification to a cable-supported system
- Notes:** The original version of this ballot item attempted to address who should be responsible for the analysis. However through comments received during the voting process, it was

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pointed-out that this was not in keeping with the other sections of the Standard. It now appears that the consensus of the committee is that the party who shall perform the fixed roof verification analysis should be determined during the contractual phase of a project. It was also pointed-out that an inspection of the fixed roof should be included as part of the process, and language has been added to this effect.

## Existing Text

### 9.12 REPAIR OF FLOATING ROOFS

#### 9.12.1 External Floating Roofs

Any method of repair is acceptable that will restore the roof to a condition enabling it to perform as required.

#### 9.12.2 Internal Floating Roofs

Repairs to internal floating roofs shall be made in accordance with the original construction drawings, if available. If the original construction drawings are not available, the roof repairs shall be in compliance with the requirements of API Std 650, Appendix H.

#### 9.12.3 Repair of Leaks in pontoons

All leaks in pontoons or compartments of double deck floating roofs shall be repaired by re-welding the leaking joints and/or use of patch plates.

## Proposed Changes

### 9.12 REPAIR, REPLACEMENT OR ADDITION OF FLOATING ROOFS

#### 9.12.1 Addition or Replacement

When a floating roof is added or replaced, the requirements of API-650 Appendix C shall be met for external floating roofs and Appendix H shall be met for internal floating roofs.

#### 9.12.2 External Floating Roofs

Any method of repair is acceptable that will restore the roof to a condition enabling it to perform as required.

#### 9.12.3 Internal Floating Roofs

9.12.3.1 Repairs to internal floating roofs shall be made in accordance with the original construction drawings, if available. If the original construction drawings are not available, the roof repairs shall be in compliance with the requirements of API Std 650, Appendix H.

9.12.3.2 When ~~a cable-supported~~ an internal floating roof is to be cable-supported, ~~the Owner/Operator shall be responsible for evaluating the capability~~ the suitability of the fixed roof to safely support the imposed loading shall be verified in accordance with Section H.4.6.5 of API-650. The ~~load combinations~~ loading requirements specified by API-650 Section R.1.g shall be ~~used for this evaluation~~ utilized for this verification; however, if specified by the Purchaser, the live load plus dead load combination for the internal floating roof ( $\{L_{f1}$  or  $L_{f2}$  or  $P_{fe}\} + D_f$ ) can be used in lieu of the requirements of Section R.1.g provided that this load combination is less than or equal to 50% of the fixed roof dead load value ( $D_f$ ). At a minimum, the requirements of Section R.1.e must be met. An inspection of the fixed roof should be performed prior to the verification analysis.

#### 9.12.4 Repair of Leaks in Pontoons

All leaks in pontoons or compartments of double deck floating roofs shall be repaired by re-welding the leaking joints and/or use of patch plates.