

TankTalk®

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Storage Tank Engineering Updates for Owners and Operators of Industrial Tanks

API 653 to Reference Fitness-for-Service Concepts of API RP 579

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Tank Industry Consultants

API 653 is currently being revised to explicitly recognize the fitness-for-service concepts of API RP 579. The impact of this revision on the petroleum and other related industries is beneficial in that it will permit the use of risk-based inspection and fitness-for-service principles to evaluate existing storage tanks and allow more cost-effective repairs when repairs are necessary.

Since first published in 1991, API Standard 653 has provided standards for the inspection, repair, alteration, and reconstruction of aboveground storage tanks. API 653 also included, from its inception, rules to periodically inspect and evaluate existing tanks for their suitability for future service—whether that service is the same as in the past or a new service.

These rules were necessary because many tanks experienced deterioration of, or damage to, the pressure boundary and structural components and no widely accepted standards existed for assessing the consequences of this damage and deterioration. It was also recognized that there needed to be some rational and industry-accepted technical basis for evaluating the serviceability of deteriorated or damaged tanks.

At the same time API 653 was gaining widespread usage, the development of risk-based assessment procedures was progressing rapidly, driven primarily by those industries using pressure vessels. In 2000, this development cul-

minated in the publication of the First Edition of API Recommended Practice (RP) 579, "Fitness for Service." API RP 579 provides risk-based assessment procedures that can be used to evaluate a wide range of damage and deterioration conditions for essentially any pressure containing structure, including above-ground storage tanks, as well as piping and some commonly used structural elements.

API RP 579 provides procedures for varying levels of damage assessment. There are three levels for each type of damage addressed that range in complexity from a relatively simple Level 1 assessment to a complex, analytical Level 3 assessment. Unlike API 653, API RP 579 is not intended for—nor easily used by—engineers not familiar with API-type storage tanks.

Although API RP 579 is generally more complex than API 653, with the possible exception of a Level 1 assessment of some types of damage, its use can result in more cost-effective remediation or repairs to tanks that have deteriorated or sustained damage. For this reason, it was decided that the risk-based procedures of API RP 579, when properly applied, could be used to supplement the prescriptive rules of API 653.

In recognition of the value of API RP 579, an agenda item was assigned to the API Subcommittee on Pressure Vessels and Tanks in early 2000 to in-

corporate, by reference, the assessment procedures of API RP 579.

API RP 579 provides the Owner/Operator with the means to determine not only if, but also when a given damage or deterioration scenario may become serious or significant, if left untreated.

The ability to eliminate some repairs and prioritize others allows the tank Owner/Operator to make the most cost-effective use of the maintenance budget.

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See you at ILTA
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ASME Standard for the Design and Construction of Structures for Bulk Solids

The American Society for Mechanical Engineers (ASME) is developing a standard for structures which contain bulk solids.

John M. Lieb, P.E., Chief Industrial Engineer for Tank Industry Consultants, was named chair of this committee. John is a member of the ANSI/ASME Standard Committee on Granular Storage Tanks. He is also active on the API Subcommittee on Pressure Vessels and Tanks, Chairs the Task Group on External Pressure, and is Secretary of the Design Subgroup.

It is anticipated that this Standard will have a substantial impact on the bulk storage industry.



John M. Lieb, P.E.
Newly Named Chair of
ASME Bulk Solids Group

WRC Bulletin 453 Published *Minimum Weld Spacing Requirements for API Above- Ground Storage Tanks*

Authored by John Lieb (TIC), K. Mokhtarian, L.R. Shockley, and E. Uptis, this Welding Research Council Bulletin focuses on minimum required weld spacing for the shell-to-bottom and nozzle welds, as well as pad welds for existing storage tanks. These new guidelines could lead to a reduction in storage tank maintenance costs while maintaining the structural integrity of the tank.

Owner's Options for Out-of-Tolerance Tanks

Tank construction standards are intended to ensure that the final product will have an acceptable appearance as well as be structurally and geometrically adequate to perform as intended. Careful planning and workmanship on the part of the Contractor is generally required to ensure that construction tolerances are met. However, compliance with these construction tolerances is not always easy to verify, and sometimes the Owner can be left with a new tank that doesn't meet the specifications or construction standards with respect to tolerances. Some of the more common occurrences are that the tank has flat spots, dents, or buckles that may be permanent, transient, or a combination of the two. What are the Owner's options when this situation occurs?

◆ **Operate the tank as constructed**
When the deformations are relatively minor and will not affect the structural integrity of the tank or its operation (e.g. cause a floating roof to bind or hang up), the Owner may elect to accept the tank as-is. However, if it can be shown that the tank does not satisfy the specified or referenced tolerances, the Owner should consider pursuing compensation from the Contractor since the final product did not meet the specifications. Technically, a tank cannot be certified to be in accordance with API Standard 650 (and should not bear an API nameplate) if API 650 construction tolerances are not met.

◆ **Insist that the tank be repaired to meet the standards or specification requirements**

If the deformations are structurally significant or are not aesthetically acceptable, the Owner should consider repairing the tank. The Owner should recognize that it is generally more difficult to remove deformations from a tank than it is to construct it properly in the first place. The Owner should be satisfied that the repair plan will achieve the intended results.

◆ **Demolish and replace the tank**
If the deformations are extreme, it may not be practical or cost-effective to repair the tank as compared to cutting it down and starting over. This is a rare

occurrence but has been known to occur with inexperienced Contractors.

When the above situation occurs, the Owner should obtain an independent third-party opinion as to which option is the most appropriate for the circumstances. The Contractor may have a bias. A completely objective evaluation by an experienced and unbiased Engineer will usually result in the most professional and cost-effective resolution of the situation.

Seismic Design of Storage Tanks

San Jose, CA—July 23rd
San Diego, CA—July 26th
Irvine, CA—July 30th

Call for more information on these seminars, or visit our web site at www.tankindustry.com

Industrial & Water Tank Talks

Welcome to the inaugural issue of the Industrial Edition of *Tank Talk*. For more than 20 years, *Tank Talk* has been an informational resource for storage tank owners, operators, and engineers. As the storage tank industry has grown, more and more complex issues, standards, and regulations have been implemented. To make sure that all our readers have up-to-date information that is of value to them, we are publishing newsletters for both the water and industrial segments of the industry.

If you have received the wrong edition of this newsletter or you would like to receive both, please contact us:

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Thanks for reading, and if you have any topics, questions, or concerns that you would like to have addressed in future editions of *Tank Talk*, please let us know.