

API INDUSTRY STANDARDS

API Standards Development and Tank Standards Update

API Storage Tank Conference

October 8 – 9, 2008

Fort Worth, Texas

Steve Crimaudo, API Standards

API History

1919: API founded as non-profit national trade association, New York City

1980s: API relocates to Washington, DC

1995: API Dallas Standards Office relocates to Washington, DC

API

- Is the only national trade association representing all segments of the oil and natural gas industry
- Represents members on legislative, regulatory, and other policy issues impacting the industry
- Speaks on behalf of the industry in a variety of forums and public events, including the media
- Provides services to members at both the national and state level, with 280 staff located in Washington, D.C. and in 33 state capitals

API Mission

To influence public policy in support of a strong and viable U.S. oil and natural gas industry essential to meet the energy needs of consumers in an efficient and environmentally responsible manner

API Roles

Work with Government - Advocacy

Develop Industry Standards

Conduct Research

Gather Statistics

Inform Government and Public

Publish Technical Industry Information

Provide Education

Oversee Quality Programs

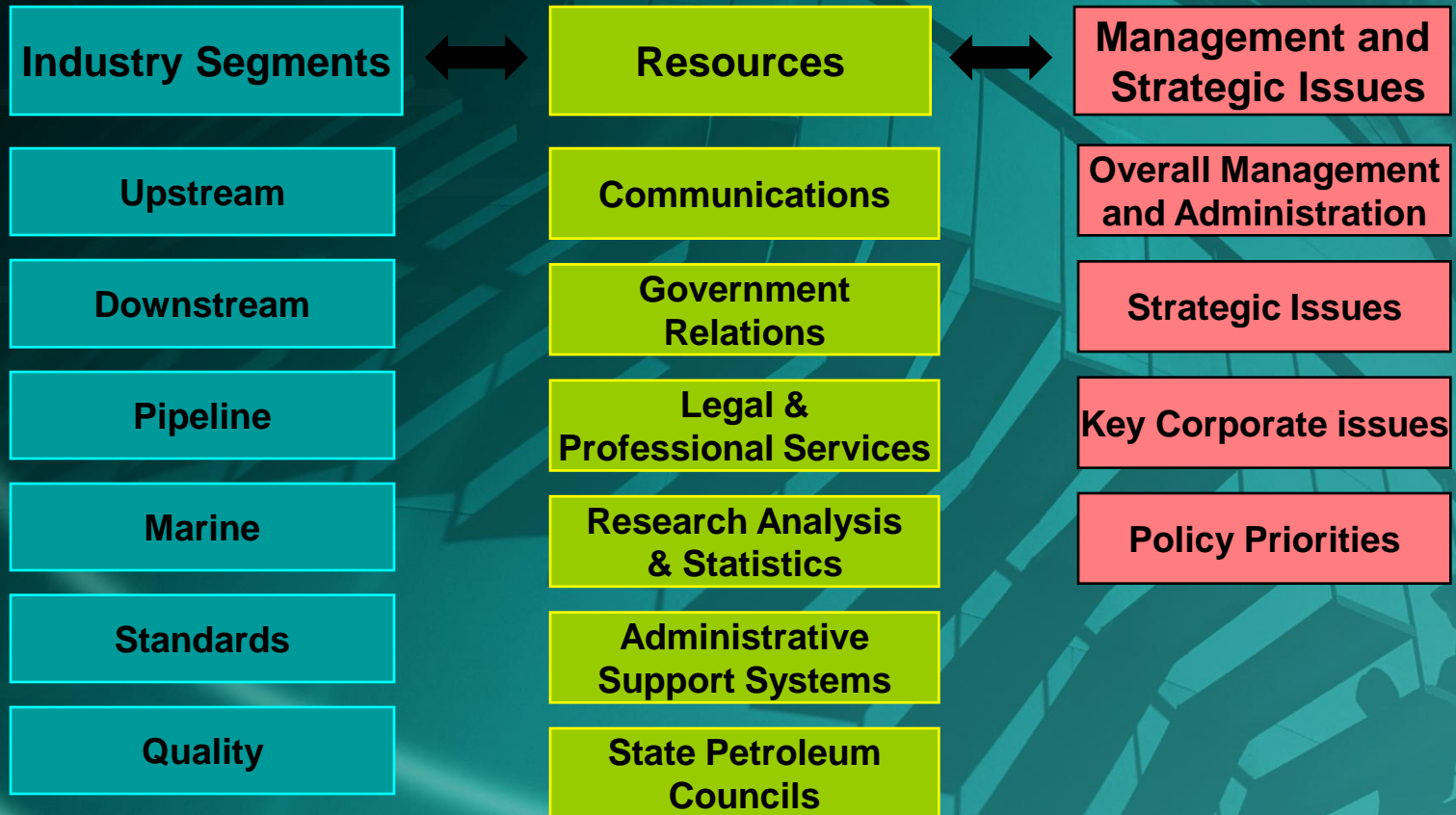
API Structure

Over 400 member companies involved in all aspects of the oil and natural gas industry

Over 700 committees and task forces covering various advocacy and technical issues

Staff of 300 led by board of directors made up of member company CEO's

API Organizational Structure



API Standards Committee Structure

**Committee on
Standardization of
Oilfield Equipment
& Materials**

**Committee on
Petroleum
Measurement**

**Committee on
Refinery Equipment**

- **Marketing**
- **Safety & Fire Protection**
- **Regulatory & Scientific Affairs**

API Standards Development Process

- API is accredited by the American National Standards Institute (ANSI)
- Regular program audits
- Open and transparent process
- All comments and objections must be considered

API Standards

500 industry standards and technical reports covering:

- Exploration & Production
- Refining
- Marketing
- Pipeline
- Measurement
- Safety and Fire Protection
- Petroleum E-commerce

Developed under an ANSI accredited process by industry members with technical expertise

One third of all API standards are referenced in the U.S. Code of Federal Regulations

Standards Development Process

- Developed by consensus (does not mean unanimity)
- Balance between tank operators and manufacturers
- API corporate membership is not a requirement for participation on API standardization committees

Requirements for Standards Committee Membership

- Be technically proficient in tank design, construction, operation, or inspection
- Attend two committee meetings per year
- Agree to work on committee business such as standards revisions and technical inquiries
- Have the support of company management to participate

Value to Industry

API standards add value:

- Standards reduce procurement costs
- Standards improve equipment interchangeability
- Standards reduce compliance costs
- Standards improve safe operations
- Foundation for company standards

Basis for many ISO standards

Value to Industry

- Basis for API's quality programs (Monogram, Individual Certification, Engine Oil, etc.)
- A means to comply with federal and state regulations (SPCC, PSM)
- Periodic revisions issued to reflect state-of-the-art
Construction and Inspection Codes - annually
Recommended Practices - every five years

Use of API Standards

- “De facto” international standards
- Increased adoption by federal agencies - MMS and DOT
- API does not promote adoption - prefer voluntary use
- Written for flexibility
- Not a “cookbook” approach!

AST Standards

API publishes over 70 standards, recommended practices, and bulletins covering various aspects of tank operations

- Design & Construction
- Inspection
- Measurement
- Emissions
- Safety & Fire Protection - Safe Entry, Overfill Protection
- Environmental - Leak detection, Release Prevention, Emissions
- Research

Design & Construction

API 620, Design and Construction of Large, Welded, Low-Pressure Storage Tanks

- Construction code for larger low-pressure AST's
- Covers material, design, fabrication, erection, and testing requirements

Current Edition of API 620

API 620, Design and Construction of Large, Welded, Low-Pressure Storage Tanks
11th Edition, published on Feb. 14, 2008.

Addendum 1 to the 11th Ed. Currently in API editing - goal is to publish by January 2009.

Approved Changes to API 620

620-287: Appendix L - Seismic Design Of API 620 Storage Tanks.

620-290: Inclusion of automatic welding into API Standard 620

Design & Construction

API 650, *Welded Steel Tanks for Oil Storage*

- Primary construction code for refinery and storage terminal AST's
- Covers material, design, fabrication, erection and testing requirements
- For tanks whose entire bottom is uniformly supported

Current Edition of API 650

API 650, *Welded Steel Tanks for Oil Storage*
11th Edition published June 2007.

Addendum 1 to the 11th Edition currently in API
editing - goal is to publish Winter 2008.

Approved Changes to API 650

650-602: To add rules for the marking of nameplates when PWHT is applied to shell openings.

650-608: To allow reduced live loads for tank roofs where allowed by load standards and to include unbalanced snow loads on tank roofs.

650-610: To permit larger than NPS 2" openings in clean out cover plates.

650-623: To clarify reinforcing of roof manholes and openings.

Approved Changes to API 650

650-624: To clarify “t” in 5.9.7.6.2 is the as built thickness of the shell. To make as built thickness the consistent basis for all wind analysis.

650-639: To revise table 5-2 , material strengths and allowable stresses for thicker plate.

650-645: To improve the roof-to-shell requirements for steel self-supporting cones (5.10.5) and self-supporting domes (5.10.6).

650-646: Clarification of design pressure to be used when determining anchor bolt loads. Plus modification of formula for uplift load due to wind.

Inspection

API 653, Tank Inspection, Repair, Alteration, and Reconstruction

- Referenced or adopted in seven US states
- Minimum requirements for maintaining the integrity of tanks after they are placed in service
- Applicable to welded, riveted, nonrefrigerated, and atmospheric pressure AST's

Current Edition of API 653

API 653, Tank Inspection, Repair, Alteration, and Reconstruction

3rd Edition, Addendum 3, published February 2008.
Errata published April 2008

4th Edition in API editing - goal is to publish January 2009.

Changes to API 653

653-150: Revise current API 653 Appendix B methodology for evaluating the FFS of a storage tank for out-of-plane settlement .

Currently under consideration:

653-185: Revise the API-653 requirements for floating roof leg pads on new bottoms to be consistent with API-650.

653-209: Improve and extend the guidance in Appendix G based on feedback from field inspections and examinations.

653-211: To add duplex stainless steels to the allowable materials for storage tank construction per A 653

653-226: Make appropriate changes to existing text of Section 12 and Appendix G to correlate with proposed additions to Appendix G under 653-209.

API Standard 625 - Tank Systems for Refrigerated, Liquefied Gas Storage

Scope - *Low pressure, aboveground, vertical, cylindrical, tank systems storing liquefied gases requiring refrigeration....*

ACI 376 Reference:

....requirements applicable to the metallic and concrete containers respectively are contained in the standards named in 1.4 (API 620) and 1.5. (ACI 376). It is a mandatory requirement of this standard that the applicable portions of these named standards are satisfied...

API Standard 625 - Tank Systems for Refrigerated, Liquified Gas Storage

Ongoing Balloting:

API 620: Appendices Q & R currently being revised to cross reference new API 625

API 625: currently being balloted to SCAST
- Comments to be resolved at Fall 2008 CRE meeting.

Inspection

API 570, Piping Inspection Code

- First published in 1993
- Minimum requirements for inspection, repair, alteration, and rerating of in-service process piping systems
- Complements API Standards 510 and 653

Inspection

- RP 574* - Inspection of Piping, Tubing, Valves, and Fittings
- RP 575* - Inspection of Aboveground Storage Tanks
- RP 576* - Inspection of Pressure-Relieving Devices
- RP 578* - Material Verification Program for New and Existing Alloy Piping Systems
- RP 579* - Fitness-for-Service

Release Prevention & Leak Detection

Pub. 306 - An Engineering Assessment of Volumetric Methods of Leak Detection in Aboveground Storage Tanks

Pub. 307 - An Engineering Assessment of Acoustic Methods of Leak Detection in Aboveground Storage Tanks

Pub. 315 - Assessment of Tankfield Dike Lining Materials and Methods

Pub. 322/323 - An Engineering Assessment of Volumetric/Acoustic Methods of Leak Detection in Aboveground Storage Tanks

Release Prevention & Leak Detection

Pub. 334 A - Guide to Leak Detection for Aboveground Storage Tanks

Pub. 340 - Liquid Release Prevention and Detection Measures for Aboveground Storage Facilities

Pub. 341 - A Survey of Diked-Area Liner Use at Aboveground Storage Tank Facilities

RP 652 - Lining of Aboveground Petroleum Storage Tank Bottoms

Pub. 4716 - Buried Pressurized Piping Systems Leak Detection Guide

Marketing Operations

RP 1004 - Bottom Loading and Vapor Recovery for MC-306 & DOT-406 Tank Motor Vehicles

RP 1007 - Loading and Unloading of MC-306/DOT-406 Cargo Tank Motor Vehicles

RP 1525 - Bulk Oil Testing, Handling, and Storage Guidelines

RP 1621 - Bulk Liquid Stock Control at Retail Outlets

RP 1637 - Using the API Color-Symbol System to Mark Equipment and Vehicles for Product Identification at Service Stations and Distribution Terminals

Std 2610 - Design, Construction, Operation, Maintenance & Inspection of Terminal and Tank Facilities

Measurement

MPMS Chap 2 - Tank Calibration

MPMS Chap 3 - Tank Gauging

MPMS Chap 4 - Proving Systems

*MPMS Chap 16 - Measurement of
Hydrocarbon Fluids by Weight or Mass*

*Chap 191 - Evaporative Loss from Fixed Roof
Tanks*

Measurement

MPMS Chap 191 A - Evaporation Loss from Low-Pressure Tanks

MPMS Chap 192 - Evaporative Loss from Floating Roof Tanks

MPMS Std 2551 - Measurement and Calibration of Horizontal Tanks

MPMS Std 2555 - Liquid Calibration of Tanks

Emissions

MPMS Chap 193 Part D - Fugitive Emissions Test Method of Deck-Seam Loss Factors for Floating Roof Tanks

MPMS Chap 194 - Recommended Practice for Speciation of Evaporative Losses

Pub. 2557 - Vapor Collection and Control Operations for Storage and Transfer Operations in the Petroleum Industry

Pub. 4588 - Development of Fugitive Emission Factors and Emission Profiles for Petroleum Marketing Terminals, Volume 1

Safety & Fire Protection

RP 2003 - Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents

Pub. 2009 - Safe Welding and Cutting Practices in Refineries, Gasoline Plants, and Petrochemical Plants

Std 2015 - Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks

RP 2016 - Guidelines and Procedures for Entering and Cleaning Petroleum Storage Tanks

RP 2021 - Management of Atmospheric Storage Tank Fires

RP 2023 - Guide for Safe Storage and Handling of Heated Petroleum-Derived Asphalt Products and Crude Oil Residual

Safety & Fire Protection

Pub. 2026 - Safe Access/Egress Involving Floating Roofs of Storage Tanks in Petroleum Service

Pub. 2201 - Procedures for Welding or Hot Tapping on Equipment in Service

Pub. 2207 - Preparing Tank Bottoms for Hot Work

RP 2210 - Flame Arresters for Vents of Tanks Storing Petroleum Products

Pub. 2217A - Guidelines for Work in Inert Confined Spaces in the Petroleum Industry

RP 2350 - Overfill Protection for Petroleum Tanks in Petroleum Facilities

Other Related Publications

Std 2000 - Venting Atmospheric and Low-Pressure Storage Tanks: Nonrefrigerated and Refrigerated

RP 651 - Cathodic Protection of Aboveground Storage Tanks

STD 2510 - Design and Construction of Liquefied Petroleum Gas Installations (LPG)

Stainless Steel Update

TG completed work to incorporate mixed materials into API 650

- Carbon steel and stainless steel
- Duplex stainless steel (competitive \$ with 304L and 316L)
- Stainless Steel bottom and Carbon steel shell and roof

Agenda item 650-568: (adding mixed material – carbon and stainless steel) – approved in Spring 2006

Agenda item 650-536: (adding duplex stainless steels) - approved summer 2007

Other SCAST Issues

Metrication (dual): Continuing should be complete
Fall 2008.

Out of Plane Settlement: Continuing research.

Load Combinations for Cable Suspended Floating
Roofs - Appendix H.

Other SCAST Issues - Cont.

Sloshing Waves: Seismic - Work continuing between API and PAJ and contractor.

Jacking and Re-leveling of Tanks - work continuing.

API 650 Errata Appendix E and V (Included in 11th Ed, Addendum 1)

API Industry Standards Update

Thank you!

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