

 **API INDUSTRY STANDARDS**

**API Standards Development and Tank Standards Update**

**API Storage Tank Conference  
September 27 – 28, 2006  
Tulsa, Oklahoma**

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American Petroleum Institute  
Washington, DC


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 **API INDUSTRY STANDARDS**




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# NEW API

- API Name and Logo change



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# New Name/Revised Website

- The official name of the API Subcommittee on Pressure Vessels and Tanks (SCPVT) has been changed to the Subcommittee on Aboveground Storage Tanks (SCAST) effective May 4, 2006.
- API Website has been revised/updated  
[www.api.org](http://www.api.org)

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## 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

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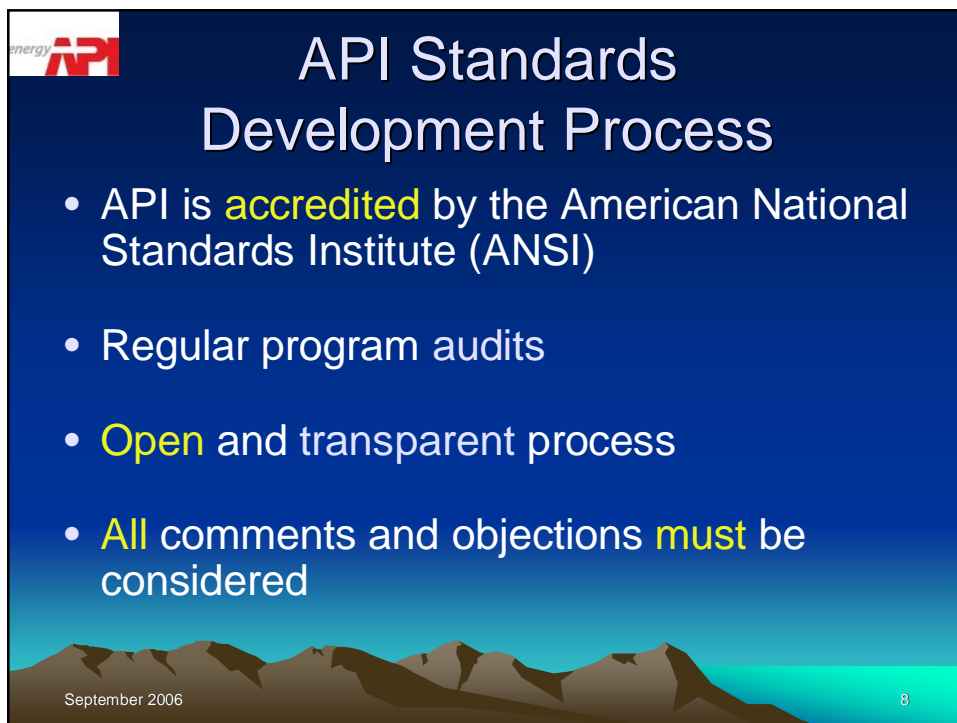
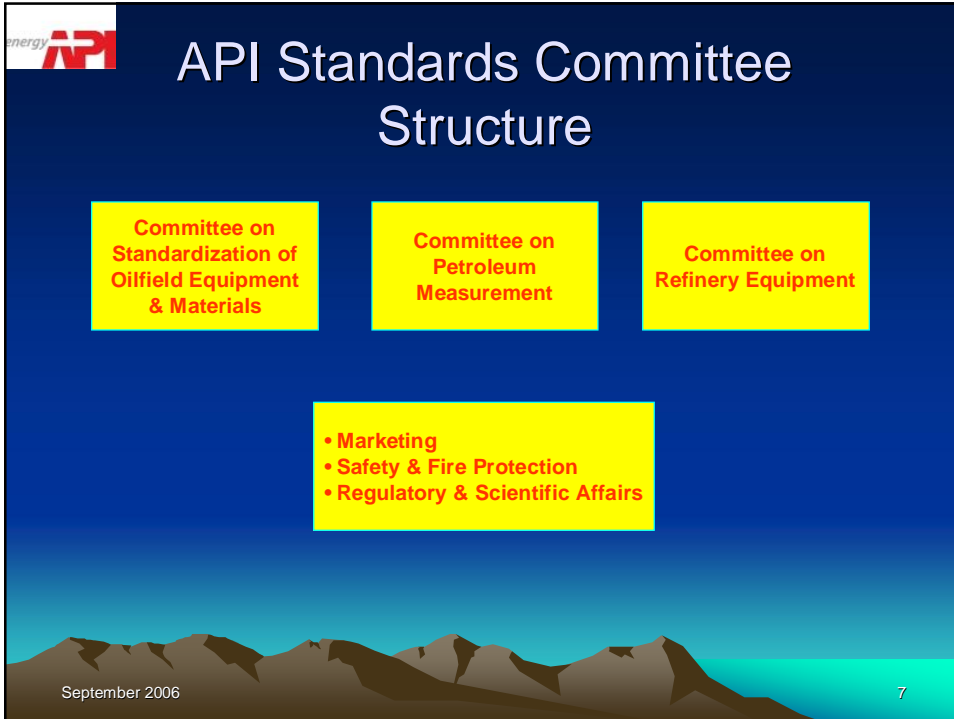


## API Structure

- 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

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## API 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

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## 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

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# AST Standards

- API publishes over 70 standards, recommended practices, and bulletins covering
  - Design & Construction
  - Inspection
  - Measurement and Emissions
  - Safety & Fire Protection - Safe Entry, Overfill Protection
  - Environmental - Leak detection, Release Prevention, Emissions
  - Research
- **API 2610 the tank index to all API AST standards**

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# Design & Construction

- API 620, Design and Construction of Large, Welded, Low-Pressure Storage Tanks
  - Construction code for low-pressure and refrigerated AST's
  - Covers material, design, fabrication, erection, and testing requirements

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# Current Edition of API 620

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

Tenth Edition, Including Addendum 1

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## Changes to API 620

- 620-228 Define load combinations to be evaluated for API 620 tanks (Ref. 5.4.1.f)
- 620-237 Clarify the acceptance criteria for undercut and weld profiles (contours) (Ref. 6.13)
- 620-278 Clarify the extent of examination required after unacceptable welding is repaired (Ref. 6.15, 7.15.1.2)

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## Low Temperature and Cryogenic Tanks (LT & C)

- New API Task Group formed to investigate the need for 620 or other document to address double and full containment (address the finer details)
- API 620, Appendices R & Q only addresses new LT & C tanks partially
- European standards (BS7777 and EN14620) address double and full wall containment (big picture standards)
- API 620 may/will be revised to address the details of double and full wall containment or a new standard will be developed
- Meeting October 5, 2006

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## 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

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## Current Edition of API 650

- API 650 – Welded Steel Tanks for Oil Storage Tenth Edition, Including Addenda 1, 2, 3 and 4 (available March 2006)
- 11th Edition (PIP Merge) - edit late 2006 (publish late 2006).

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## Changes to API 650 in addendum 4

- 650-476 Define the maximum undercut allowed for shell-to-bottom welds and the acceptance criteria for weld profiles (contours) (Ref. 6.5.1.b)
- 650-533 Define the term “Nozzle Neck” (Ref. 3.7, Table 3-4)
- 650-547 Better define the tolerances required for new tank construction (Ref. 5.5)
- 650-564 Clarify that a manhole can be placed at an alternative elevation as allowed by shell nozzles in Table 3-6 (Ref. Table 3-8)
- 650-587 Allow the use of wider plates fabricated by butt-welding two narrower plates together before rolling and erecting them (Ref. 3.1.5.2)
- 650-595 Determine annular plate thickness when Specific Gravity is greater than 1.0 (Ref. 3.5.3, Table 3-1)

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## Changes to API 650 11<sup>th</sup> edition

- 650-506 Frangible Roof Uplift Limitations
- 650-612 Floating Roof Penetration Cautions
- 650-616 Shell Thickness Calculation Method for Stainless Steel

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## Frangible Roof

- Frangible Roof Parts I, II & III
  - Revision Part I addressed frangibility for large diameter tanks >50 ft, based on research (project #1) results showing uplift occurred with frangible joint separation.
  - Research (project #2) produced a program to determine vent requirements based on deflagration variables (combustible gas type, volume and concentration).
  - Part II addressed options for tanks <50' based on research (project #3) providing evaluation of relative strength of the roof-to-shell and shell-to-bottom joints. Options resulting include higher strength bottom weld details, a lower profile roof design and anchorage of the shell.
  - Research resulted in changes to API 650 Appendix F to top joint strength equations.
  - Part III Last change addresses changes to API 653, basically pointing to the API 650 requirements for emergency venting which is the Section (where the section covering frangible roofs is referenced).
  - Task force has disbanded.

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## Seismic

- New Seismic rules issued by IBC and NFPA (enforced by Fire Marshalls and BC officials) based upon new technology and the USGS (Nonbuilding (tanks) structures covered in separate section)
- SCAST revised API 650, APP E to address new Seismic requirements
  - Zones and Zip Codes
  - For International considerations the New Appendix uses peak ground acceleration as a single parameter for seismic requirements and is similar to old APP E
- The agenda item has been passed to publication and will be published late 2006
- The Design Subgroup voted to keep/archive Appendix E as a publication for use (New Appendix E)

## Stainless Steel

- TG working 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 06
- Agenda item 650-536 (adding duplex stainless steels) will be re-balloted over the summer (passed ballot, resolution of comments at CRE meeting)
- There are no stainless steel tank standards, API will be the first to publish stainless tank standard

## 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, Third Edition, Including Addenda 1 and 2

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## Changes to API 653

- 653-204 Similar Service Clarification (already documented in API 653)
- Similar Service – passed letter ballot, final negatives are being addressed and publication is close (one last issue regarding RBI to be resolved)
- Ballot affirmed in early 2006
- Should be published in addendum or 11<sup>th</sup> edition in 2006
- 653-208 Elevated Temperature Tank Foundation Considerations

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## Other Inspection Documents

- 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
  - Good for refining – may not be appropriate for terminals (new document being developed)
- API 575 Inspection of Atmospheric & Low Pressure AST's
  - Supplement to API 653

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## Other SCAST Issues

- Metrication (dual)
- Out of Plane Settlement (continuing research)
- Load Combinations for Cable Suspended Floating Roofs (APP H)
- Sloshing Waves (Seismic)
  - Sunken roofs in Japan and problems in Turkey with roofs due to seismic sloshing
  - Working on joint venture with PAJ
- Jacking and Re-leveling of Tanks
- Hydrotesting requirements
- (24 ballots this half year)

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## Other Notable Publications

- Std 2000 Venting Atmospheric and Low-Pressure Storage Tanks: Nonrefrigerated and Refrigerated
- API 575 Guidelines and Methods for Inspection of Existing Atmospheric and Low-pressure Storage Tanks
- RP 651 Cathodic Protection of Aboveground Storage Tanks
- API 652 Linings of Aboveground Petroleum Storage Tank Bottoms
- STD 2510 Design and Construction of Liquefied Petroleum Gas Installations (LPG)
- Marketing, Inspection, Safety and Fire, Release and Leak Prevention, Emissions and Measurement (see [www.global.ihs.com](http://www.global.ihs.com) for complete listing)

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## API – STI Relationship

- States are adopting STI SP001 and API 653
- Understanding at API that SP001 is right for small & shop fabricated tanks (API 653 for larger tanks > 30 foot diameter)
- SP001 does not compete directly with API 653
- API 653 Inspectors Qualification to perform SP001 inspections (need for training)
- Both Documents will be used for SPCC compliance
- STI has presented at two SCAST meetings in the last year and the relationship grows
- STI to present update at SCAST Joint meeting in October

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# API Industry Standards

Thank you!

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