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## INSPECTION OF REFINERY EQUIPMENT

### API 510 ◆

#### Pressure Vessel Inspection Code: Maintenance Inspection, Rating, Repair, and Alteration

(ANSI/API 510-2006)

(Purchase includes addenda to the current edition of the code)

Covers the in-service inspection, repair, alteration, and rerating activities for pressure vessels and the pressure-relieving devices protecting these vessels. This inspection code applies to most refining and chemical process vessels that have been placed in service. This includes:

- vessels constructed in accordance with an applicable construction code
- vessels constructed without a construction code (non-code): a vessel not fabricated to a recognized construction code and meeting no known recognized standard
- vessels constructed and approved as jurisdictional special based upon jurisdiction acceptance of particular design, fabrication, inspection, testing, and installation.
- nonstandard vessels: a vessel fabricated to a recognized construction code but has lost its nameplate or stamping. Pages: 56

9th Edition | June 2006 | Product Number: C51009 | Price: \$146.00

You may access API 510 in a read-only platform: [publications.api.org](http://publications.api.org)

### API 510 \*

#### Pressure Vessel Inspection Code: Maintenance Inspection, Rating, Repair, and Alteration—Chinese

Chinese translation of API 510.

9th Edition | June 2006 | Product Number: C51009C | Price: \$154.00

### API 570 ◆

#### Piping Inspection Code: In-Service Inspection, Rating, Repair, and Alteration of Piping Systems

(Purchase includes addenda to the current edition of the code)

Covers the inspection, rating, repair, and alteration procedures for metallic and FRP piping systems and their associated pressure relieving devices that have been in-service.

The intent of this code is to specify the in-service inspection and condition-monitoring program that is needed to determine the integrity of piping. That program should provide reasonably accurate and timely assessments to determine if any changes in the condition of piping could possibly compromise continued safe operation.

API 570 was developed for the petroleum refining and chemical process industries but may be used, where practical, for any piping system. It is intended for use by organizations that maintain or have access to an authorized inspection agency, a repair organization, and technically qualified piping engineers, inspectors, and examiners. Intended for use by organizations that maintain or have access to an authorized inspection agency, repair organization, and technically qualified personnel. May be used, where practical, for any piping system. Piping inspectors are to be certified as stated in this inspection code. Pages: 65

3rd Edition | November 2009 | Product Number: C57003 | Price: \$130.00

### API 570 \*

#### Piping Inspection Code: In-Service Inspection, Rating, Repair, and Alteration of Piping Systems—Chinese

Chinese translation of API 570.

3rd Edition | November 2009 | Product Number: C5703C | Price: \$137.00

### RP 571 ◆■

#### Damage Mechanisms Affecting Fixed Equipment in the Refining Industry

Provides background information on damage that can occur to equipment in the refining process. It is intended to supplement Risk Based Inspection (RP 580 and Publ 581) and Fitness-for-Service (RP 579) technologies developed in recent years by API to manage existing refining equipment integrity. It is also an excellent reference for inspection, operations, and maintenance personnel. Covers over 60 damage mechanism. Each write-up consists of a general description of the damage, susceptible materials, of construction, critical factors, inspection method selection guidelines, and control measures. Wherever possible, pictures are included and references are provided for each mechanism. In addition, generic process flow diagrams have been included that contain a summary of the major damage flow mechanism expected for typical refinery process units. Pages: 362

2nd Edition | April 2011 | Product Number: C57102 | Price: \$319.00

### RP 572 ◆

#### Inspection of Pressure Vessels

Covers the inspection of pressure vessels. It includes a description of the various types of pressure vessels (including pressure vessels with a design pressure below 15 psig) and the standards for their construction and maintenance. RP 572 also includes reasons for inspection, causes of deterioration, frequency and methods of inspection, methods of repair, and preparation of records and reports. Pages: 136

3rd Edition | November 2009 | Product Number: C57203 | Price: \$149.00

### RP 572 \*

#### Inspection Practices for Pressure Vessels—Chinese

Chinese translation of RP 572.

3rd Edition | November 2009 | Product Number: C57203C | Price: \$157.00

### RP 573

#### Inspection of Fired Boilers and Heaters

Covers the inspection practices for fired boilers and process heaters (furnaces) used in petroleum refineries and petrochemical plants. The practices described in this document are focused to improve equipment reliability and plant safety by describing the operating variables which impact reliability, and to ensure that inspection practices obtain the appropriate data, both on-stream and off-stream, to assess current and future performance of the equipment. Pages: 69

2nd Edition | December 2002 | Reaffirmed: December 2010

Product Number: C57302 | Price: \$94.00

### RP 574 ◆

#### Inspection Practices for Piping System Components

Supplements API 570 by providing piping inspectors with information that can improve skill and increase basic knowledge and practices. This RP describes inspection practices for piping, tubing, valves (other than control valves), and fittings used in petroleum refineries and chemical plants. Common piping components, valve types, pipe joining methods, inspection planning processes, inspection intervals and techniques, and types of

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# Refining

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records are described to aid the inspector in fulfilling their role implementing API 570. This publication does not cover inspection of specialty items, including instrumentation and control valves. Pages: 88

3rd Edition | November 2009 | Product Number: C57403 | Price: \$132.00

## RP 574 \*

### Inspection Practices for Piping System Components—Chinese

Chinese translation of RP 574.

3rd Edition | November 2009 | Product Number: C57403C | Price: \$139.00

## RP 575 ♦

### Inspection of Atmospheric and Low Pressure Storage Tanks (ANSI/API RP 575-2004)

Covers the inspection of atmospheric and low-pressure storage tanks that have been designed to operate at pressures from atmospheric to 15 psig. Includes reasons for inspection, frequency and methods of inspection, methods of repair, and preparation of records and reports. This RP is intended to supplement Std 653, which covers the minimum requirements for maintaining the integrity of storage tanks after they have been placed in service. Pages: 60

2nd Edition | April 2005 | Product Number: C57502 | Price: \$126.00

## RP 575 \*

### Inspection of Atmospheric and Low Pressure Storage Tanks—Chinese

Chinese translation of RP 575.

2nd Edition | April 2005 | Product Number: C57502C | Price: \$132.00

## RP 576 ♦

### Inspection of Pressure-Relieving Devices

Describes the inspection and repair practices for automatic pressure-relieving devices commonly used in the oil and petrochemical industries. As a guide to the inspection and repair of these devices in the user's plant, it is intended to ensure their proper performance. This publication covers such automatic devices as pressure-relief valves, pilot-operated pressure-relief valves, rupture disks, and weight-loaded pressure-vacuum vents.

The scope of this RP includes the inspection and repair of automatic pressure-relieving devices commonly used in the oil and petrochemical industry. This publication does not cover weak seams or sections in tanks, explosion doors, fusible plugs, control valves, and other devices that either depend on an external source of power for operation or are manually operated. Inspections and tests made at manufacturers' plants, which are usually covered by codes or purchase specifications, are not covered by this publication.

This publication does not cover training requirements for mechanics involved in the inspection and repair of pressure-relieving devices. Those seeking these requirements should see API 510, which gives the requirements for a quality control system and specifies that the repair organization maintain and document a training program ensuring that personnel are qualified. Pages: 65

3rd Edition | November 2009 | Product Number: C57603 | Price: \$130.00

## RP 576 \*

### Inspection of Pressure-Relieving Devices—Chinese

Chinese translation of RP 576.

3rd Edition | November 2009 | Product Number: C57603C | Price: \$137.00

## RP 577 ♦

### Welding Inspection and Metallurgy

Provides guidance to the API authorized inspector on welding inspection as encountered with fabrication and repair of refinery and chemical plant equipment and piping. Common welding processes, welding procedures, welder qualifications, metallurgical effects from welding, and inspection techniques are described to aid the inspector in fulfilling their role implementing API 510, API 570, Std 653 and RP 582. The level of learning and training obtained from this document is not a replacement for the training and experience required to be an American Welding Society (AWS) Certified Welding Inspector (CWI). Pages: 100

1st Edition | October 2004 | Product Number: C57701 | Price: \$164.00

## RP 577 \*

### Welding Inspection and Metallurgy—Chinese

Chinese translation of RP 577.

1st Edition | October 2004 | Product Number: C57701C | Price: \$172.00

## RP 578 ♦

### Material Verification Program for New and Existing Alloy Piping Systems

Provides the guidelines for a material and quality assurance system to verify that the nominal composition of alloy components within the pressure envelope of a piping system is consistent with the selected or specified construction materials to minimize the potential for catastrophic release of toxic or hazardous liquids or vapors. This RP provides the guidelines for material control and material verification programs on ferrous and nonferrous alloys during the construction, installation, maintenance, and inspection of new and existing process piping systems covered by the ASME B31.3 and API 570 piping codes. This RP applies to metallic alloy materials purchased for use either directly by the owner/user or indirectly through vendors, fabricators, or contractors and includes the supply, fabrication, and erection of these materials. Carbon steel components specified in new or existing piping systems are not specifically covered under the scope of this document unless minor/trace alloying elements are critical to component corrosion resistance or similar degradation. Pages: 13

2nd Edition | March 2010 | Product Number: C57802 | Price: \$125.00

## Std 579-1/ASME FFS-1

### Fitness-For-Service

Describes standardized fitness-for-service assessment techniques for pressurized equipment used in the petrochemical industry. Fitness-for-service is defined as the ability to demonstrate the structural integrity of an in-service component containing a flaw. This publication is intended to supplement the requirements in API 510, 570, and 653 by: (i) ensuring safety of plant personnel and the public while older equipment continues to operate; (ii) providing technically sound fitness-for-service assessment procedures to ensure that different service providers furnish consistent life predictions; and (iii) helping optimize maintenance and operation of existing facilities to maintain the availability of older plants and enhance their long term economic viability.

The assessment procedures in this publication can be used for fitness-for-service evaluation and rerating of pressure vessels designed and constructed to the ASME Boiler and Pressure Vessel Code; piping systems designed and constructed to the ASME B31.3 Piping Code; and aboveground storage tanks designed and constructed to API 650 and 620. The assessment procedures cover the present integrity of pressure containing equipment given a current state of damage and the projected remaining life. This publication can also be applied to pressure containing equipment constructed to other recognized codes and standards as defined in this publication.

2nd Edition | June 2007

Hard Copy Only Price: \$704.00

CD Only Price: \$839.00

Hard Copy and CD Price: \$1,133.00

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## API 579-2/ASME FFS-2

### Example Problem Manual

Fitness-For-Service (FFS) assessments in API 579-1/ASME FFS-1 *Fitness-For-Service* are engineering evaluations that are performed to demonstrate the structural integrity of an in-service component that may contain a flaw or damage or that may be operating under specific conditions that could produce a failure. API 579-1/ASME FFS-1 provides guidance for conducting FFS assessments using methodologies specifically prepared for pressurized equipment. The guidelines provided in this Standard may be used to make run-repair-replace decisions to help determine if pressurized equipment containing flaws that have been identified by inspection can continue to operate safely for some period of time. These FFS assessments of API 579-1/ASME FFS-1 are currently recognized and referenced by the API Codes and Standards (510, 570, and 653), and by NB-23 as suitable means for evaluating the structural integrity of pressure vessels, piping systems and storage tanks where inspection has revealed degradation and flaws in the equipment or where operating conditions suggest that a risk of failure may be present. Example problems illustrating the use and calculations required for Fitness-For-Service Assessments described in API 579-1/ASME FFS-1 are provided in this document. Example problems are provided for all calculation procedures in both SI and US Customary units.

An introduction to the example problems in this document is described in Part 2 of this Standard. The remaining Parts of this document contain the example problems. The Parts in this document coincide with the Parts in API 579-1/ASME FFS-1. For example, example problems illustrating calculations for local thin areas are provided in Part 5 of this document. This coincides with the assessment procedures for local thin areas contained in Part 5 of API 579-1/ASME FFS-1. Pages: 366

1st Edition | August 2009 | Product Number: C57921 | Price: \$150.00

## RP 580 ♦

### Risk-Based Inspection

Provides users with the basic elements for developing and implementing a risk-based inspection (RBI) program for fixed equipment and piping in the hydrocarbon and chemical process industries. RP 580 is intended to supplement API 510, API 570, and API 653. These API inspection codes and standards allow an owner/user latitude to plan an inspection strategy and increase or decrease the code-designated inspection frequencies based on the results of a RBI assessment. Pages: 83

2nd Edition | November 2009 | Product Number: C58002 | Price: \$183.00

## RP 581

### Risk-Based Inspection Technology

API has researched and developed an approach to risk-based inspection (RBI). This document details the procedures and methodology of RBI. RBI is an integrated methodology that uses risk as a basis for prioritizing and managing an in-service equipment inspection program by combining both the likelihood of failure and the consequence of failure. Utilizing the output of the RBI, the user can design an inspection program that manages or maintains the risk of equipment failures. The following are three major goals of the RBI program:

1. Provide the capability to define and quantify the risk of process equipment failure, creating an effective tool for managing many of the important elements of a process plant.
2. Allow management to review safety, environmental, and business-interruption risks in an integrated, cost effective manner.
3. Systematically reduce the likelihood and consequence of failure by allocating inspection resources to high risk equipment. The RBI methodology provides the basis for managing risk, by making informed decisions on the inspection method, coverage required and frequency of inspections. In most plants, a large percent of the total unit risk will be concentrated in a relatively small percent of the equipment items. These potential high risk components may require greater attention, perhaps through a revised inspection plan. With an RBI program in place, inspections will continue to be conducted as

defined in existing working documents, but priorities and frequencies will be guided by the RBI procedure. The RBI analysis looks not only at inspection, equipment design, and maintenance records, but also at numerous process safety management issues and all other significant issues that can affect the overall mechanical integrity and safety of a process unit. Pages: 607

2nd Edition | September 2008 | Product Number: C58102

Hard Copy Only Price: \$700.00

CD Only Price: \$800.00

Hard Copy and CD Price: \$1,100.00

## API Risk-Based Inspection Software

API RBI software, created by petroleum refinery and chemical plant owner/users for owner/users, finds its basis in Publ 581. Practical, valuable features are built into technology, which is based on recognized and generally accepted good engineering practices.

The purposes of the Risk-Based Inspection Program are:

- Screen operating units within a plant to identify areas of high risk
- Estimate a risk value associated with the operation of each equipment item in a refinery or chemical process plant based on a consistent methodology
- Prioritize the equipment based on the measured risk.
- Design highly effective inspection program.
- Systematically manage the risks associated with equilibrium failures.

The RBI method defines the risk of operating equipment as the combination of two separate terms: the consequences of failure and the likelihood of failure.

For more information: e-mail [rbi@api.org](mailto:rbi@api.org) or call (281) 537-8848

## RP 582

### Recommended Practice Welding Guidelines for the Chemical, Oil, and Gas Industries

Provides supplementary guidelines and practices for welding and welding related topics for shop and field fabrication, repair and modification of the following: a) pressure-containing equipment such as pressure vessels, heat exchangers, piping, heater tubes, and pressure boundaries of rotating equipment and attachments welded thereto; b) tanks and attachments welded thereto; c) nonremovable internals for process equipment; d) structural items attached and related to process equipment; e) other equipment or component item when referenced by an applicable purchase document. This document is general in nature and is intended to augment the welding requirements of ASME BPVC Section IX and similar codes, standards, specifications and practices such as those listed in Section 2. The intent of this document is to be inclusive of chemical, oil and gas industry standards, although there are many areas not covered herein, e.g. pipeline welding and offshore structural welding are intentionally not covered. This document is based on industry experience and any restrictions or limitations may be waived or augmented by the purchaser. Pages: 28

2nd Edition | December 2009 | Product Number: C58202 | Price: \$120.00

## Std 653 ♦

### Tank Inspection, Repair, Alteration, and Reconstruction

Covers the inspection, repair, alteration, and reconstruction of steel aboveground storage tanks used in the petroleum and chemical industries. Provides the minimum requirements for maintaining the integrity of welded or riveted, nonrefrigerated, atmospheric pressure, aboveground storage tanks after they have been placed in service. Pages: 152

4th Edition | April 2009 | Product Number: C65304 | Price: \$205.00

## Std 653 \*

### Tank Inspection, Repair, Alteration, and Reconstruction—Chinese

Chinese translation of Std 653.

4th Edition | April 2009 | Product Number: C65304C | Price: \$215.00

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## INSPECTION OF REFINERY EQUIPMENT—TRAINING COURSES

### **Fitness-For-Service (FFS) Based on API RP 579** [www.api.org/apiucalendar](http://www.api.org/apiucalendar)

The instructors, who are also the principal authors of RP 579, give their insights into the background and logic behind the assessment procedures. In addition, both courses include other highlights: Discussion of damage mechanisms and the importance of identification, Various detailed inspection techniques for damage mechanisms, with focus on flaw characterization (this is not covered in the 1 1/2-day course). Overview of remaining life assessment, remediation, and methods to extend the life of damaged equipment, Presentation of practical examples of FFS procedures, Details on how to assess damage/flaws that are not directly covered in API 579.

### **Risk-Based Inspection (RBI) Based on API RP 580/581** [www.api.org/apiucalendar](http://www.api.org/apiucalendar)

Using semi-quantitative and quantitative approaches, the course covers technical content that is both broad and deep. Class discussions are an effective way for students to gain insights about the focus of various RBI methods and parameters to include in an effective analytical program.

### **Damage Mechanisms in Refining Based on API RP 571** [www.api.org/apiucalendar](http://www.api.org/apiucalendar)

This course, which is taught by the primary authors of RP 571, includes many special features: an overview of basic metallurgy applicable to refinery construction materials, a description of common refining processes on the process flow diagram level, highlighting where various damage mechanisms are usually observed, an analysis of typical NDE methods and their ability to detect and characterize equipment damage, detailed discussions of the more than 60 damage mechanisms that are found in refineries covered by RP 571, examples of equipment damage and failures, as well as learning exercises for students.

## MECHANICAL EQUIPMENT STANDARDS FOR REFINERY SERVICE

### **Std 610/ISO 13709:2009** **Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries** (ANSI/API Std 610-2004) (includes Errata 1 dated July 2011)

Specifies requirements for centrifugal pumps, including pumps running in reverse as hydraulic power recovery turbines, for use in petroleum, petrochemical, and gas industry process services. This International Standard is applicable to overhung pumps, between bearings pumps, and vertically suspended pumps. Clause 9 provides requirements applicable to specific types of pumps. All other clauses of this International Standard apply to all pump types. Illustrations are provided of the various specific pump types and the designations assigned to each specific pump type. It does not cover sealless pumps.

This edition of API Std 610 is the identical national adoption of ISO 13709:2009. Pages: 205

11th Edition | September 2010 | Product Number: CX61011 | Price: \$249.00  
You may access Std 610 in a read-only platform: [publications.api.org](http://publications.api.org)

### **Std 611** **General Purpose Steam Turbines for Petroleum, Chemical, and Gas Industry Services** (includes Errata 1 dated May 2008)

Covers the minimum requirements for general-purpose steam turbines. These requirements include basic design, materials, related lubrication systems, controls, auxiliary equipment, and accessories. General-purpose turbines are horizontal or vertical turbines used to drive equipment that is usually spared, is relatively small in size, or is in non-critical service. They are generally used where steam conditions will not exceed a pressure of 48 bar

(700 psig) and a temperature of 400 °C (750 °F) or where speed will not exceed 6000 rpm. This Standard does not cover special-purpose turbines. Pages: 118

5th Edition | March 2008 | Product Number: C61105 | Price: \$142.00

### **Std 612/ISO 10437:2003** **Petroleum Petrochemical and Natural Gas Industries—Steam Turbines—Special-Purpose Applications** (ANSI/API Std 612-2005)

Specifies requirements and gives recommendations for the design, materials, fabrication, inspection, testing and preparation for shipment for special-purpose steam turbines. It also covers the related lube-oil systems, instrumentation, control systems and auxiliary equipment. It is not applicable to general-purpose steam turbines, which are covered in Std 611.

This edition of API Std 612 is the identical national adoption of ISO 10437:2003. Pages: 113

6th Edition | November 2005 | Product Number: CX61206 | Price: \$192.00

### **Std 613** **Special Purpose Gear Units for Petroleum, Chemical and Gas Industry Services** (ANSI/API Std 613-2002) (includes Errata 1 dated December 2005)

Covers the minimum requirements for special-purpose, enclosed, precision single- and double-helical one- and two-stage speed increasers and reducers of parallel-shaft design for refinery services. Primarily intended for gear units that are in continuous service without installed spare equipment. Pages: 94

5th Edition | February 2003 | Reaffirmed: August 2007  
Product Number: C61305 | Price: \$160.00

### **Std 614/ISO 10438-1:2007** **Lubrication, Shaft-Sealing, and Control-Oil Systems and Auxiliaries for Petroleum, Chemical and Gas Industry Services** (includes Errata 1 dated May 2008)

Covers the minimum requirements for General Purpose and Special Purpose Oil Systems. The Standard also includes requirements for Self-acting Gas Seal Support Systems. The Standard includes the systems' components, along with the required controls and instrumentation. Chapters included in Std 614: 1. General Requirements; 2. Special-purpose Oil Systems; 3. General-purpose Oil Systems; and 4. Self-acting Gas Seal Support Systems.

This edition of API Std 614 is the identical national adoption of ISO 10438:2007. Pages: 202

5th Edition | April 2008 | Product Number: CX61402 | Price: \$284.00

### **Std 616** **Gas Turbines for the Petroleum, Chemical and Gas Industry Services**

Covers the minimum requirements for open, simple, and regenerative-cycle combustion gas turbine units for services of mechanical drive, generator drive, or process gas generation. All auxiliary equipment required for operating, starting, controlling, and protecting gas turbine units are either discussed directly in this Standard or referred to in this Standard through references to other publications. Specifically, gas turbine units that are capable of firing gas or liquid or both are covered by this Standard. This Standard covers both industrial and aeroderivative gas turbines. Pages: 168

5th Edition | January 2011 | Product Number: C61605 | Price: \$200.00

### **Std 617** **Axial and Centrifugal Compressors and Expander-Compressors for Petroleum, Chemical and Gas Industry Services** (ANSI/API Std 617-2002) (includes Errata 1 dated June 2003)

Covers the minimum requirements for axial compressors, single-shaft and integrally geared process centrifugal compressors and expander-compressor for use in the petroleum, chemical, and gas industries services that handle air or gas. This Standard does not apply to fans (covered by Std 673) or

blowers that develop less than 34 kPa (5 psi) pressure rise above atmospheric pressure. This Standard also does not apply to packaged, integrally-gear centrifugal plant and instrument air compressors (covered by Std 672). Hot gas expanders over 300 °C (570 °F) are not covered in this Standard. Pages: 193

7th Edition | July 2002 | Reaffirmed: January 2009  
Product Number: C61707 | Price: \$212.00

## Std 618

### Reciprocating Compressors for Petroleum, Chemical and Gas Industry Services

(ANSI/API Std 618-2008)

(includes Errata 1 dated November 2009 and Errata 2 dated July 2010)

Covers the minimum requirements for reciprocating compressors and their drivers used in petroleum, chemical, and gas industry services for handling process air or gas with either lubricated or nonlubricated cylinders. Compressors covered by this Standard are of low-to-moderate speed and in critical services. Also covered are related lubricating systems, controls, instrumentation, intercoolers, aftercoolers, pulsation suppression devices, and other auxiliary equipment. Pages: 190

5th Edition | December 2007 | Product Number: C61805 | Price: \$175.00

## Std 619/ISO 10440-1:2007

### Rotary-Type Positive Displacement Compressors for Petroleum, Petrochemical and Natural Gas Industries

Specifies requirements for dry and oil-flooded, helical-lobe rotary compressors used for vacuum or pressure or both in petroleum, petrochemical, and gas industry services. It is intended for compressors that are in special-purpose applications. It is not applicable to general-purpose air compressors, liquid-ring compressors, or vane-type compressors.

This edition of API Std 619 is the identical national adoption of ISO 10440-1:2007. Pages: 135

5th Edition | December 2010 | Product Number: CX61905 | Price: \$209.00

## Std 670

### Machinery Protection Systems

This Standard covers the minimum requirements for a machinery protection system measuring radial shaft vibration, casing vibration, shaft axial position, shaft rotational speed, piston rod drop, phase reference, overspeed, and critical machinery temperatures (such as bearing metal and motor windings). It covers requirements for hardware (transducer and monitor systems), installation, documentation, and testing. Pages: 96

4th Edition | December 2000 | Reaffirmed: November 2010  
Product Number: C67004 | Price: \$174.00

## Std 671/ISO 10441:2007

### Special Purpose Couplings for Petroleum, Chemical and Gas Industry Services

Specifies the requirements for couplings for the transmission of power between the rotating shafts of two machines in special-purpose applications in the petroleum, petrochemical and natural gas industries. Such applications are typically in large and/or high speed machines, in services that can be required to operate continuously for extended periods, are often unspared and are critical to the continued operation of the installation. By agreement, it can be used for other applications or services.

Couplings covered are designed to accommodate parallel (or lateral) offset, angular misalignment and axial displacement of the shafts without imposing unacceptable mechanical loading on the coupled machines. It is applicable to gear, metallic flexible element, quill shaft and torsionally resilient type couplings. Torsional damping and resilient type couplings are detailed in Annex A; gear-type couplings are detailed in Annex B and quill shaft style coupling are detailed in Annex C. Also covers the design, materials of construction, manufacturing quality, inspection and testing special purpose couplings.

This edition of API Std 671 is the identical national adoption of ISO 10441:2007. Pages: 56

4th Edition | August 2007 | Reaffirmed: September 2010

Product Number: C67104 | Price: \$162.00

You may access Std 671 in a read-only platform: [publications.api.org](http://publications.api.org)

## Std 672

### Packaged, Integrally Geared Centrifugal Air Compressors for Petroleum, Chemical, and Gas Industry Services

(includes Errata 1 dated October 2007 and Errata 2 dated July 2010)

Covers the minimum requirements for constant-speed, packaged, general purpose integrally geared centrifugal air compressors, including their accessories. This Standard is not applicable to machines that develop a pressure rise of less than 0.35 bar (5.0 psi) above atmospheric pressure, which are classed as fans or blowers. Pages: 136

4th Edition | March 2004 | Reaffirmed: December 2008

Product Number: C67204 | Price: \$228.00

## Std 673

### Centrifugal Fans for Petroleum, Chemical and Gas Industry Services (includes Errata 1 dated October 2002)

Covers the minimum requirements for centrifugal fans intended for continuous duty in petroleum, chemical, and gas industry services. Fan pressure rise is limited to differential from a single impeller, usually not exceeding 100 inches of water Equivalent Air Pressure (EAP). Cooling tower, aerial cooler, and ventilation fans; and positive displacement blowers are NOT covered by this Standard. Pages: 89

2nd Edition | January 2002 | Reaffirmed: November 2010

Product Number: C67302 | Price: \$146.00

## Std 674

### Positive Displacement Pumps—Reciprocating

Covers the minimum requirements for reciprocating positive displacement pumps and pump units for use in the petroleum, petrochemical, and gas industry services. Both direct-acting and power-frame types are included. Controlled-volume pumps, hydraulically driven pumps, and rotary pumps are not included. Pages: 95

3rd Edition | December 2010 | Product Number: C67403 | Price: \$180.00

## Std 675

### Positive Displacement Pumps—Controlled Volume

Covers the minimum requirements for controlled volume positive displacement pumps for use in service in the petroleum, chemical, and gas industries. Both packed-plunger and diaphragm types are included. Diaphragm pumps that use direct mechanical actuation are excluded. Pages: 38

2nd Edition | October 1994 | Reaffirmed: June 2005

Product Number: C67502 | Price: \$111.00

You may access Std 675 in a read-only platform: [publications.api.org](http://publications.api.org)

## Std 676

### Positive Displacement Pumps—Rotary

Covers the minimum requirements for rotary positive displacement process pumps and pump units for use in the petroleum, petrochemical, and gas industry services. Controlled-volume pumps, hydraulically driven pumps and positive displacement reciprocating pumps are not included. Pages: 102

3rd Edition | November 2009 | Product Number: C67603 | Price: \$145.00

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## Std 677

### General-Purpose Gear Units for Petroleum, Chemical and Gas Industry Services

Covers the minimum requirements for general-purpose, enclosed, single and multistage gear units incorporating parallel shaft helical and right angle spiral bevel gears for the petroleum, chemical, and gas industries. Gears manufactured according to this Standard shall be limited to the following pitchline velocities. Helical gears shall not exceed 60 meters per second (12,000 feet per minute), and spiral bevels shall not exceed 40 meters per second (8,000 feet per minute). Typical applications for which this Standard is intended are cooling tower water pump systems, forced and induced draft fan systems, and other general-purpose equipment trains. Pages: 84

3rd Edition | April 2006 | Reaffirmed: November 2010

Product Number: C67703 | Price: \$160.00

## Std 681

### Liquid Ring Vacuum Pumps and Compressors

Defines the minimum requirements for the basic design, inspection, testing, and preparation for shipment of liquid ring vacuum pump and compressor systems for service in the petroleum, chemical, and gas industries. It includes both vacuum pump and compressor design and system design. Pages: 86

1st Edition | February 1996 | Reaffirmed: November 2010

Product Number: C68101 | Price: \$137.00

## Std 682/ISO 21049:2004

### Pumps—Shaft Sealing Systems for Centrifugal and Rotary Pumps (ANSI/API Std 682-2004) (includes Errata 1 dated November 2006)

Specifies requirements and gives recommendations for sealing systems for centrifugal and rotary pumps used in the petroleum, natural gas and chemical industries. It is applicable to hazardous, flammable and/or toxic services where a greater degree of reliability is required for the improvement of equipment availability and the reduction of emissions to the atmosphere. It covers seals for pump shaft diameters from 20 mm (0.75 in.) to 110 mm (4.3 in.). This Standard is also applicable to seal spare parts and can be referred to for the upgrading of existing equipment. A classification system for the seal configurations covered by this International Standard into categories, types, arrangements and orientations is provided.

This edition of API Std 682 is the identical national adoption of ISO 21049:2004. Pages: 195

3rd Edition | September 2004 | Product Number: CX68203 | Price: \$224.00

## RP 684

### API Standard Paragraphs Rotordynamic Tutorial: Lateral Critical Speeds, Unbalance Response, Stability, Train Torsionals, and Rotor Balancing

Describes, discusses, and clarifies the section of the API Standard Paragraphs that outline the complete lateral and torsional rotordynamics and rotor balancing acceptance program designed by API to ensure equipment mechanical reliability. Background material on the fundamentals of these subjects (including terminology) along with rotor modeling utilized in this analysis is presented for those unfamiliar with the subject. This document is an introduction to the major aspects of rotating equipment vibrations that are addressed during a typical lateral dynamics analysis. Pages: 303

2nd Edition | August 2005 | Reaffirmed: November 2010

Product Number: C68402 | Price: \$170.00

## Std 685

### Sealless Centrifugal Pumps for Petroleum, Petrochemical, and Gas Industry Process Service

Specifies the minimum requirements for sealless centrifugal pumps for use in petroleum, heavy duty petrochemical and gas industry services. This Standard is applicable to single stage overhung pumps of two classifications, Magnetic Drive Pumps and Canned Motor Pumps. Pages: 170

2nd Edition | February 2011 | Product Number: C68502 | Price: \$200.00

## RP 686

### Machinery Installation and Installation Design

Intended to provide recommended procedures, practices, and checklists for the installation and precommissioning of new, existing, and reapplied machinery and to assist with the installation design of such machinery for petroleum, chemical, and gas industry services facilities. In general, this RP is intended to supplement vendor instructions and the instructions provided by the original equipment manufacturer (OEM) should be carefully followed with regard to equipment installation and checkout. Most major topics of this RP are subdivided into sections of "Installation Design" and "Installation" with the intent being that each section can be removed and used as needed by the appropriate design or installation personnel. Pages: 254

2nd Edition | December 2009 | Product Number: C68602 | Price: \$181.00

## RP 687

### Rotor Repair

Covers the minimum requirements for the inspection and repair of special purpose rotating equipment rotors, bearings and couplings used in petroleum, chemical, and gas industry service. Pages: 540

1st Edition | September 2001 | Reaffirmed: January 2009

Product Number: C68701 | Price: \$259.00

## RP 687

### Rotor Repair—Data CD

CD-ROM containing all datasheets from RP 687.

1st Edition | September 2001 | Product Number: C68701 | Price: \$239.00

## Std 689/ISO 14224:2006

### Collection and Exchange of Reliability and Maintenance Data for Equipment (ANSI/API Std 689-2007)

This Standard provides a comprehensive basis for the collection of reliability and maintenance (RM) data in a standard format for equipment in all facilities and operations within the petroleum, natural gas and petrochemical industries during the operational life cycle of equipment. It describes data-collection principles and associated terms and definitions that constitute "reliability language" that can be useful for communicating operational experience. The failure modes defined in the normative part of this Standard can be used as a "reliability thesaurus" for various quantitative as well as qualitative applications. This Standard also describes data quality control and assurance practices to provide guidance for the user. API 689 establishes requirements that any inhouse or commercially available RM data system is required to meet when designed for RM data exchange. Examples, guidelines and principles for the exchange and merging of such RM data are addressed.

This edition of API Std 689 is the identical national adoption of ISO 14224:2006. Pages: 171

1st Edition | July 2007 | Product Number: CC68901 | Price: \$206.00

## EQUIPMENT DATASHEETS

Electronically Formatted Mechanical Equipment Standards Datasheets are now available in electronic format (Excel 5.0 spreadsheets):

All of the following Datasheets are available for single user at \$57.00 each or for intranet licensing at \$299.00 each.

Std 537	2nd Edition	Std 660	8th Edition
Std 546	3rd Edition	Std 662	2nd Edition
Std 560	4th Edition	Std 670	4th Edition
Std 610	11th Edition	Std 671	4rd Edition
Std 611	5th Edition	Std 672	4rd Edition
Std 612	6th Edition	Std 673	2nd Edition
Std 613	5th Edition	Std 674	3rd Edition
Std 614	5th Edition	Std 675	2nd Edition
Std 616	5th Edition	Std 676	3rd Edition
Std 617	7th Edition	Std 677	3rd Edition
Std 618	5th Edition	Std 682	3rd Edition
Std 619	5th Edition	Std 685	2nd Edition

### Mechanical Equipment Residual Unbalance Worksheets

Electronic versions of the Residual Unbalance Worksheets that appear in Mechanical Equipment standards (Excel) along with instructions (Word).

Price: \$111.00

### The API Specification Database

The American Petroleum Institute Specification Database Software™ provides a knowledge-management toolset for the project engineering team. Facilitate the entire equipment specification process including the entry of process data and release to design to the final entry of mechanical data sheets and development of the technical bid specification package. Electronic outputs can be combined to form a master technical specification bid package for quotation and purchasing purposes with a modern tree-view format for ease of navigation. Completed projects provide on-going documentation for plant equipment assets—improving safety and reliability. Available in a full-featured corporate wide Oracle® format or a portable ODBC database format with primary focus on equipment datasheets.

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## MECHANICAL EQUIPMENT—TRAINING COURSES

### Rotor Repair based on API 687

[www.api.org/apiucalendar](http://www.api.org/apiucalendar)

The API Rotor Repair Course, based on Std 687, covers the minimum requirements for the inspection and repair of rotating equipment rotors, bearings, and couplings used in the petroleum, chemical and gas industry services.

### Specifying Reliable Cost Effective Machinery Designs

[www.api.org/apiucalendar](http://www.api.org/apiucalendar)

Take advantage of over 800 man years of expert experience in specifying, design, testing, installation and repair of rotating equipment by attending this new course covering the API Mechanical Equipment Standards. Learn the API mechanical equipment standard requirements, the reasons behind the requirements and how to knowledgeably apply these specifications.

## STORAGE TANKS

### Std 620

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

The API Downstream Segment has prepared this Standard to cover large, field-assembled storage tanks of the type described in 1.2 that contain petroleum intermediates (gases or vapors) and finished products, as well as other liquid products commonly handled and stored by the various branches of the industry. The rules presented in this Standard cannot cover all details of design and construction because of the variety of tank sizes and shapes that may be constructed. Where complete rules for a specific design are not given, the intent is for the Manufacturer—subject to the approval of the Purchaser's authorized representative—to provide design and construction details that are as safe as those which would otherwise be provided by this Standard. Pages: 254

11th Edition | February 2008 | Product Number: C62011 | Price: \$353.00  
You may access Std 620 in a read-only platform: [publications.api.org](http://publications.api.org)

### Std 625

#### Tank Systems for Refrigerated Liquefied Gas Storage

This Standard covers low pressure, aboveground, vertical, and cylindrical tank systems storing liquefied gases requiring refrigeration. This Standard provides general requirements on responsibilities, selection of storage concept, performance criteria, accessories/apurtenances, quality assurance, insulation, and commissioning of tank systems.

This Standard covers tank systems having a storage capacity of 800 cubic meters (5000 bbls) and larger. Stored product shall be liquids which are in a gaseous state at ambient temperature and pressure and require refrigeration to less than 5 °C (40 °F) to maintain a liquid phase. Tank systems with a minimum design temperature of -198 °C (-325 °F), a maximum design internal pressure of 50 kPa (7 psig), and a maximum design uniform external pressure of 1.75 kPa (0.25 psig) are covered.

The tank system configurations covered consist of a primary liquid and vapor containment constructed of metal, concrete, or a metal/concrete combination and, when required, a secondary liquid containment. Metallic container materials, design, fabrication, inspection, examination, and testing are covered in API 620 Appendix Q or Appendix R. The applicable appendix of API 620 depends on the design metal temperature and the applicable temperature ranges given in these appendices. Pages: 59

1st Edition | August 2010 | Product Number: C62501 | Price: \$225.00

### Std 650 ♦

#### Welded Tanks for Oil Storage

(Purchase includes addenda to the current edition of the Standard)

Establishes minimum requirements for material, design, fabrication, erection, and testing for vertical, cylindrical, aboveground, closed and open top welded carbon or stainless steel storage tanks in various sizes and capacities for internal pressures approximating atmospheric pressure (internal pressures not exceeding the weight of the roof plates), but a higher internal pressure is permitted when addition requirements are met. This Standard applies only to tanks whose entire bottom is uniformly supported and to tanks in non-refrigerated service that have a maximum design temperature of 93 °C (200 °F) or less. Pages: 376

11th Edition | June 2007 | Product Number: C65011 | Price: \$425.00  
You may access Std 650 in a read-only platform: [publications.api.org](http://publications.api.org)

### Std 650

#### Welded Tanks for Oil Storage—Datasheets

CD-ROM containing all datasheets from Std 650.

11th Edition | June 2007 | Product Number: C65011D  
Price for single user: \$57.00 | Price for intranet licensing: \$299.00

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Phone Orders: 303-397-7956 (Local and International)

## Std 650 \*

### Welded Tanks for Oil Storage—Chinese

Chinese translation of Std 650.

11th Edition | June 2007 | Product Number: C65011C | Price: \$446.00

## RP 651 ◆

### Cathodic Protection of Aboveground Storage Tanks

(ANSI/API RP 651-2006)

Presents procedures and practices for achieving effective corrosion control on aboveground steel storage tank bottoms through the use of cathodic protection. It is the intent of this RP to provide information and guidance for the application of cathodic protection to existing and new storage tanks in hydrocarbon service. Specific cathodic protection designs are not provided. Certain practices recommended herein may also be applicable to tanks in other services. Corrosion control methods based on chemical control of the environment or the use of protective coatings are not covered in detail.

Pages: 33

3rd Edition | January 2007 | Product Number: C65103 | Price: \$102.00

## RP 651 \*

### Cathodic Protection of Aboveground Storage Tanks—Chinese

Chinese translation of RP 651.

3rd Edition | January 2007 | Product Number: C65103C | Price: \$108.00

## RP 652 ◆

### Lining of Aboveground Petroleum Storage Tank Bottoms

(ANSI/API RP 652-2005)

Provides guidance on achieving effective corrosion control by the application of tank bottom linings in aboveground storage tanks in hydrocarbon service. It contains information pertinent to the selection of lining materials, surface preparation, lining application, cure, and inspection of tank bottom linings for existing and new storage tanks. In many cases, tank bottom linings have proven to be an effective method of preventing internal corrosion of steel tank bottoms.

Provides information and guidance specific to aboveground steel storage tanks in hydrocarbon service. Certain practices recommended herein may also be applicable to tanks in other services. This RP is intended to serve only as a guide and detailed tank bottom lining specifications are not included.

Pages: 15

3rd Edition | October 2005 | Product Number: C65203 | Price: \$113.00

You may access RP 652 in a read-only platform: [publications.api.org](http://publications.api.org)

## RP 652 \*

### Lining of Aboveground Petroleum Storage Tank Bottoms—Chinese

Chinese translation of RP 652.

3rd Edition | October 2005 | Product Number: C65203C | Price: \$119.00

## Std 653 ◆

### Tank Inspection, Repair, Alteration, and Reconstruction

Covers the inspection, repair, alteration, and reconstruction of steel aboveground storage tanks used in the petroleum and chemical industries. Provides the minimum requirements for maintaining the integrity of welded or riveted, nonrefrigerated, atmospheric pressure, aboveground storage tanks after they have been placed in service. Pages: 152

4th Edition | April 2009 | Product Number: C65304 | Price: \$205.00

You may access Std 653 in a read-only platform: [publications.api.org](http://publications.api.org)

## Std 653 \*

### Tank Inspection, Repair, Alteration, and Reconstruction—Chinese

Chinese translation of Std 653.

4th Edition | April 2009 | Product Number: C65304C | Price: \$215.00

## Publ 937

### Evaluation of Design Criteria for Storage Tanks With Frangible Roof Joints

Describes research that evaluated the ability of the present API 650 tank design criteria to ensure the desired frangible joint behavior. Particular questions include: (1) evaluation of the area inequality as a method to predict the buckling response of the compression ring, (2) effect of roof slope, tank diameter, and weld size on the frangible joint, and (3) effect of the relative strength of the roof-to-shell joint compared to the shell-to-bottom joint. Pages: 73

1st Edition | April 1996 | Product Number: C93701 | Price: \$131.00

## TR 939-D

### Stress Corrosion Cracking of Carbon Steel in Fuel Grade Ethanol—Review, Experience Survey, Field Monitoring, and Laboratory Testing

Addresses stress corrosion cracking (SCC) in carbon steel equipment used in distribution, transportation, storage, and blending of denatured fuel ethanol. API, with assistance from the Renewable Fuels Association (RFA), conducted research on the potential for metal cracking and product leakage in certain portions of the fuel ethanol distribution system. TR 939-D contains a review of existing literature, results of an industry survey on cracking events and corrosion field monitoring, information on mitigation and prevention. Pages: 172

2nd Edition | May 2007 | Product Number: C939D0 | Price: \$155.00

## Std 2510

### Design and Construction of LPG Installations

Provides minimum requirements for the design and construction of installations for the storage and handling of LPG at marine and pipeline terminals, natural gas processing plants, refineries, petrochemical plants, and tank farms. This Standard covers storage vessels, loading and unloading systems, piping and related equipment. Pages: 22

8th Edition | May 2001 | Product Number: C25108

Reaffirmed: October 2011 | Price: \$100.00

## Impact of Gasoline Blended with Ethanol on the Long-Term Structural Integrity of Liquid Petroleum Storage Systems and Components

Summarizes the results of a literature review conducted for API on the impact of gasoline blended with ethanol on the long-term structural integrity of liquid petroleum storage systems and components. It is anticipated that the use of ethanol in motor fuels will continue to increase. This has generated interest about the potential long-term structural effects of ethanol on liquid petroleum storage systems, including underground storage tanks (USTs), underground piping, and associated components. The objective of the literature review is to determine the state of industry knowledge and research on the effects of ethanol/gasoline blends on the long-term structural integrity of UST systems and components. This review is intended to assist decision-makers on further research requirements and needed changes or supplements to existing standards for underground storage system components used for storing and dispensing gasoline blended with ethanol.

Appendix A may be purchased separately as an electronic database file. The database synopsis' and bibliographic information for all articles reviewed for the project. The report is organized by article index numbers. Reference numbers cited in this report refer to the article index number.

January 2003 | Executive Summary | Price: \$63.00

Appendix A—Literature Review | Price \$123.00

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## PRESSURE-RELIEVING SYSTEMS FOR REFINERY SERVICE

### Std 520, Part 1

#### Sizing, Selection, and Installation of Pressure-Relieving Devices in Refineries—Part 2, Sizing and Selection

Applies to the sizing and selection of pressure relief devices used in refineries and related industries for equipment that has a maximum allowable working pressure of 15 psig (103 kPag) or greater. The pressure relief devices covered in this Standard are intended to protect unfired pressure vessels and related equipment against overpressure from operating and fire contingencies. This Standard includes basic definitions and information about the operational characteristics and applications of various pressure relief devices. It also includes sizing procedures and methods based on steady state flow of Newtonian fluids. Atmospheric and low-pressure storage tanks covered in API 2000 and pressure vessels used for the transportation of products in bulk or shipping containers are not within the scope of this Standard. See Std 521 for information about appropriate ways of reducing pressure and restricting heat input. The rules for overpressure protection of fired vessels are provided in ASME Section I and ASME B31.1, and are not within the scope of this Standard. Pages: 135

8th Edition | December 2008 | Product Number: C52018 | Price: \$241.00

### RP 520, Part 2

#### Sizing, Selection, and Installation of Pressure-Relieving Devices in Refineries—Part 2, Installation

Covers the methods of installation for pressure relief devices for equipment that has a maximum allowable working pressure (MAWP) of 15 psig (1.03 bar g) or greater. Pressure relief valves or rupture disks may be used independently or in combination with each other to provide the required protection against excessive pressure accumulation. The term "pressure relief valve" includes safety relief valves used in either compressible or incompressible fluid service, and relief valves used in incompressible fluid service. Covers gas, vapor, steam, and incompressible fluid service. Pages: 29

5th Edition | August 2003 | Reaffirmed: February 2011  
Product Number: C52025 | Price: \$166.00

### Std 521/ISO 23251:2006

#### Guide for Pressure-Relieving and Depressuring Systems (includes Errata 1 dated June 2007 and Addendum 1 dated May 2008)

Applies to pressure-relieving and vapordepressuring systems intended for use primarily in oil refineries, although it is also applicable to petrochemical facilities, gas plants, liquefied natural gas (LNG) facilities, and oil and gas production facilities. This International Standard specifies requirements and gives guidelines for examining the principal causes of overpressure; determining individual relieving rates; and selecting and designing disposal systems, including such component parts as piping, vessels, flares, and vent stacks. This International Standard does not apply to direct-fired steam boilers. The information provided is designed to aid in the selection of the system that is most appropriate for the risks and circumstances involved in various installations. This International Standard is intended to supplement the practices set forth in RP 5201 or ISO 4126 for establishing a basis of design. Pages: 192

5th Edition | January 2007 | Product Number: C52105 | Price: \$212.00

### Std 526

#### Flanged Steel Pressure-Relief Valves (includes Errata 1 dated May 2009)

This Standard is a purchase specification for flanged steel pressure-relief valves. Basic requirements are given for direct spring-loaded pressure-relief valves and pilot-operated pressure-relief valves as follows:

- orifice designation and area;
- valve size and pressure rating, inlet and outlet;

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- materials;
- pressure-temperature limits;
- center-to-face dimensions, inlet and outlet.

Nameplate nomenclature and requirements for stamping are detailed in Annex A. Pages: 43

6th Edition | April 2009 | Product Number: C52606 | Price: \$151.00

### Std 526 \*

#### Flanged Steel Pressure Relief Valves—Russian

The Russian translation of Standard 526.

5th Edition | June 2002 | Product Number: C52605R | Price: \$125.00

### Std 527

#### Seat Tightness of Pressure Relief Valves (ANSI/API Std 527-1992)

Describes methods of determining the seat tightness of metal- and soft-seated pressure relief valves, including those of conventional, bellows, and pilot-operated designs. Pages: 4

3rd Edition | July 1991 | Reaffirmed: July 2007  
Product Number: C52700 | Price: \$63.00

### Std 527 \*

#### Seat Tightness of Pressure Relief Valves—Russian

Russian translation of Std 527.

3rd Edition | July 1991 | Product Number: C52700R | Price: \$66.00

### RP 576 ♦

#### Inspection of Pressure-Relieving Devices

Describes the inspection and repair practices for automatic pressure-relieving devices commonly used in the oil and petrochemical industries. As a guide to the inspection and repair of these devices in the user's plant, it is intended to ensure their proper performance. This publication covers such automatic devices as pressure-relief valves, pilot-operated pressure-relief valves, rupture disks, and weight-loaded pressure-vacuum vents. The scope of this RP includes the inspection and repair of automatic pressure-relieving devices commonly used in the oil and petrochemical industry. This publication does not cover weak seams or sections in tanks, explosion doors, fusible plugs, control valves, and other devices that either depend on an external source of power for operation or are manually operated. Inspections and tests made at manufacturers' plants, which are usually covered by codes or purchase specifications, are not covered by this publication. This publication does not cover training requirements for mechanics involved in the inspection and repair of pressure-relieving devices. Those seeking these requirements should see API 510, which gives the requirements for a quality control system and specifies that the repair organization maintain and document a training program ensuring that personnel are qualified. Pages: 65

3rd Edition | November 2009 | Product Number: C57603 | Price: \$130.00

### RP 576 \*

#### Inspection of Pressure-Relieving Devices—Chinese

Chinese translation of RP 576.

3rd Edition | November 2009 | Product Number: C57603C | Price: \$137.00

### Std 2000/ISO 28300:2008

#### Venting Atmospheric and Low-Pressure Storage Tanks

Covers the normal and emergency vapour venting requirements for aboveground liquid petroleum or petroleum products storage tanks and aboveground and underground refrigerated storage tanks, designed for operation at pressures from full vacuum through 103,4 kPa (ga) [15 psig].

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Discussed in this International Standard are the causes of overpressure and vacuum; determination of venting requirements; means of venting; selection, and installation of venting devices; and testing and marking of relief devices.

Intended for tanks containing petroleum and petroleum products but it can also be applied to tanks containing other liquids; however, it is necessary to use sound engineering analysis and judgment whenever this International Standard is applied to other liquids.

This International Standard does not apply to external floating-roof tanks.

This edition of API Std 2000 is the identical national adoption of ISO 28300:2008. Pages: 76

6th Edition | November 2009 | Product Number: CX20006 | Price: \$143.00

## PRESSURE-RELIEVING SYSTEMS FOR REFINERY SERVICE—TRAINING COURSE

### Pressure Relieving Systems Based on API RP 520/521 [www.api.org/apiucalendar](http://www.api.org/apiucalendar)

API's 3-day course, taught by the Equity Engineering Group, inc. provides real-world case studies about incidents involving pressure relief valves (PRV). There also are classroom exercises that illustrate procedures for determining relief rates and valve size.

## PIPING COMPONENT AND VALVE STANDARDS

### API 570 ♦ Piping Inspection Code: In-Service Inspection, Rating, Repair, and Alteration of Piping Systems (Purchase includes addenda to the current edition of the code)

Covers the inspection, rating, repair, and alteration procedures for metallic and FRP piping systems and their associated pressure relieving devices that have been in-service. The intent of this code is to specify the in-service inspection and condition-monitoring program that is needed to determine the integrity of piping. That program should provide reasonably accurate and timely assessments to determine if any changes in the condition of piping could possibly compromise continued safe operation. API 570 was developed for the petroleum refining and chemical process industries but may be used, where practical, for any piping system. It is intended for use by organizations that maintain or have access to an authorized inspection agency, a repair organization, and technically qualified piping engineers, inspectors, and examiners. Intended for use by organizations that maintain or have access to an authorized inspection agency, repair organization, and technically qualified personnel. May be used, where practical, for any piping system. Piping inspectors are to be certified as stated in this inspection code. Pages: 65

3rd Edition | November 2009 | Product Number: C57003 | Price: \$130.00

### API 570 \* Piping Inspection Code: In-Service Inspection, Rating, Repair, and Alteration of Piping Systems—Chinese

Chinese translation of API 570.

3rd Edition | November 2009 | Product Number: C5703C | Price: \$137.00

### RP 574 ♦ Inspection Practices for Piping System Components

Supplements API 570 by providing piping inspectors with information that can improve skill and increase basic knowledge and practices. This RP describes inspection practices for piping, tubing, valves (other than control valves), and fittings used in petroleum refineries and chemical plants. Common piping components, valve types, pipe joining methods, inspection planning processes, inspection intervals and techniques, and types of

records are described to aid the inspector in fulfilling their role implementing API 570. This publication does not cover inspection of specialty items, including instrumentation and control valves. Pages: 88

3rd Edition | November 2009 | Product Number: C57403 | Price: \$132.00

### RP 574 \* Inspection Practices for Piping System Components—Chinese

Chinese translation of RP 574.

3rd Edition | November 2009 | Product Number: C57403C | Price: \$139.00

### RP 578 ♦ Material Verification Program for New and Existing Alloy Piping Systems

Provides the guidelines for a material and quality assurance system to verify that the nominal composition of alloy components within the pressure envelope of a piping system is consistent with the selected or specified construction materials to minimize the potential for catastrophic release of toxic or hazardous liquids or vapors. This RP provides the guidelines for material control and material verification programs on ferrous and nonferrous alloys during the construction, installation, maintenance, and inspection of new and existing process piping systems covered by the ASME B31.3 and API 570 piping codes. This RP applies to metallic alloy materials purchased for use either directly by the owner/user or indirectly through vendors, fabricators, or contractors and includes the supply, fabrication, and erection of these materials. Carbon steel components specified in new or existing piping systems are not specifically covered under the scope of this document unless minor/trace alloying elements are critical to component corrosion resistance or similar degradation. Pages: 13

2nd Edition | March 2010 | Product Number: C57802 | Price: \$125.00

### RP 591 Process Valve Qualification Procedure

Provides recommendations for evaluation of a manufacturer's valve construction and quality assurance program for the purpose of determining a manufacturer's capability to provide new valves manufactured in accordance with the applicable API Standards. Qualification of valves under this RP is "manufacturing facility specific" and does not cover valves manufactured by other manufacturing facilities, whether owned by the same manufacturer or a third party. Fugitive emissions testing is outside the scope of this RP. Pages: 16

4th Edition | December 2008 | Product Number: C59104 | Price: \$86.00

### RP 591 \* Process Valve Qualification Procedures—Russian

The Russian translation of Standard 591.

3rd Edition | September 2003 | Product Number: C59103R | Price: \$125.00

### Std 594 ♦ Check Valves: Flanged, Lug, Wafer and Butt-Welding

Covers design, materials, face-to-face dimensions, pressure-temperature ratings, and examination, inspection, and test requirements for two types of check valves:

- Type 'A' check valves are short face-to-face and can be: wafer, lug, or double flanged; single plate or dual plate; gray iron, ductile iron, steel, nickel alloy, or other alloy designed for installation between Classes 125 and 250 cast iron flanges as specified in ASME B16.1, between Classes 150 and 300 ductile iron flanges as specified in ASME B16.42, between Classes 150 and 2500 steel flanges as specified in ASME B16.5, and between Classes 150 and 600 steel pipeline flanges as specified in MSS SP-44 or steel flanges as specified in ASME B16.47.

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- Type 'B' bolted cover swing check valves are long face-to-face as defined in 5.1.2 and can be flanged or butt-welding ends of steel, nickel alloy, or other alloy material. End flanges shall be as specified in ASME B16.5 or ends shall be butt-welding as specified in ASME B16.25. Pages: 21

7th Edition | September 2010 | Effective Date: March 1, 2011

Product Number: C59407 | Price: \$102.00

## Std 594 \*

Check Valves: Flanged, Lug, Wafer, and Butt-welding—Russian

The Russian translation of Standard 594.

6th Edition | November 2004 | Product Number: C59406R | Price: \$93.00

## Std 598

Valve Inspection and Testing

Covers inspection, examination, supplementary examinations, and pressure test requirements for resilient-seated, nonmetallic-seated (e.g. ceramic), and metal-to-metal-seated valves of the gate, globe, plug, ball, check, and butterfly types. Pages: 11

9th Edition | September 2009 | Product Number: C59809 | Price: \$84.00

## Std 598 \*

Valve Inspection and Testing—Russian

Russian translation of Std 598.

9th Edition | May 2004 | Product Number: C59808R | Price: \$80.00

## Std 599 ◆

Metal Plug Valves—Flanged, Threaded and Welding Ends

Covers steel, nickel base and other alloy plug valves with flanged or butt-welding ends and ductile iron plug valves with flanged ends in sizes NPS 1/2 through NPS 24 and threaded or socket-welding ends for sizes NPS 1/2 through NPS 2. Valve bodies conforming to ASME B16.34 may have one flange and one butt-welding end, or one threaded and one socket welding end. Pages: 12

6th Edition | October 2007 | Product Number: C59906 | Price: \$78.00

## Std 599 \*

Metal Plug Valves: Flanged, Threaded, Welding, and Extended-body Ends—Russian

The Russian translation of Standard 599.

5th Edition | August 2002 | Product Number: C59905R | Price: \$125.00

## Std 600 ◆

Steel Gate Valves—Flanged and Butt-Welding Ends, Bolted Bonnets (includes Errata 1 dated November 2009)

Specifies the requirements for a heavy-duty series of bolted bonnet steel gate valves for petroleum refinery and related applications where corrosion, erosion and other service conditions would indicate a need for full port openings, heavy wall sections and large stem diameters. Pages: 22

12th Edition | March 2009 | Effective Date: September 1, 2009

Product Number: C60012 | Price: \$115.00

## Std 600 / ISO 10434 \*

Steel Gate Valves—Flanged and Butt-welding Ends, Bolted Bonnets—Chinese

The Chinese translation of Standard 600.

12th Edition | March 2009 | Product Number: C60012C | Price: \$120.00

## Std 602 ◆

Steel Gate, Globe, and Check Valves for Sizes DN 100 and Smaller for the Petroleum and Natural Gas Industries

Specifies the requirements for a series of compact steel gate, globe and check valves for petroleum and natural gas industry applications.

It is applicable to valves of:

- nominal pipe sizes NPS 1/4, NPS 3/8, NPS 1/2, NPS 3/4, NPS 1, NPS 1 1/4, NPS 1 1/2, NPS 2, NPS 2 1/2, NPS 3, and NPS 4;
- corresponding to nominal sizes DN 8, DN 10, DN 15, DN 20, DN 25, DN 32, DN 40, DN 50, DN 65, DN 80, and DN 100.

It is also applicable to pressure designations of Class 150, Class 300, Class 600, Class 800 and Class 1500. Class 800 is not a listed class designation, but is an intermediate class number widely used for socket welding and threaded end compact valves. It includes provisions for the following valve characteristics.

- Outside screw with rising stems (OS & Y), in sizes 1/4 NPS 4 (8 DN 100) and pressure designations including Class 800.
- Inside screw with rising stems (ISRS), in sizes 1/4 NPS 2 1/2 (8 DN 65) and pressure designations of classes 800.
- Socket welding or threaded ends, in sizes 1/4 NPS 2 1/2 (8 DN 65) and pressure designations of Class 800 and Class 1500.
- Flanged or butt-welding ends, in sizes 1/2 NPS 4 (15 DN 100) and pressure designations of Class 150 through Class 1500, excluding flanged end Class 800.
- Bonnet Joint Construction
- Bolted, welded and threaded with seal weld for classes 1500 and union nut for classes 800.
- Standard and full-bore body seat openings.
- Materials, as specified.
- Testing and inspection.

This publication is applicable to valve end flanges in accordance with ASME B16.5, valve body ends having tapered pipe threads to ASME B1.20.1 or ISO 7-1, valve body ends having socket weld ends to ASME B16.11 and butt-weld connections per the requirements described within this Standard. It is applicable to extended body construction in sizes 1/2 NPS 2 (15 DN 50) and pressure designations of Class 800 and Class 1500, and to bellows and bellows assembly construction as may be adaptable to gate or globe valves in sizes 1/4 NPS 2 (8 DN 50). It covers bellows stem seal type testing requirements. Pages: 50

9th Edition | October 2009 | Effective Date: April 1, 2010

Product Number: C60209 | Price: \$106.00

## Std 603 ◆

Corrosion-Resistant, Bolted Bonnet Gate Valves—Flanged and Butt-Welding Ends

Specifies the requirements for corrosion-resistant bolted bonnet gate valves meeting the requirements of ASME B16.34, Standard Class, for valves having flanged or butt-weld ends in sizes NPS 1/2 through 24, corresponding to nominal pipe sizes in ASME B36.10M, and Classes 150, 300, and 600.

Covers requirements for corrosion resistant gate valves for use in process piping applications. Covered are requirements for outside-screw-and-yoke (OS&Y) valves with rising stems, non-rising hand-wheels, bolted bonnets, and various types of gate configurations. Pages: 12

7th Edition | July 2007 | Product Number: C60307 | Price: \$72.00

## Std 603 \*

Corrosion-Resistant, Bolted Bonnet Gate Valves—Flanged and Butt-Welding Ends—Russian

Russian translation of Std 603.

7th Edition | July 2007 | Product Number: C60307R | Price: \$76.00

\* These translated versions are provided for the convenience of our customers and are not officially endorsed by API. The translated versions shall neither replace nor supersede the English-language versions, which remain the official Standards. API shall not be responsible for any discrepancies or interpretations of these translations. Translations may not include any Addenda or Errata to the document. Please check the English-language versions for any updates to the documents.

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## Std 607

### Fire Test for Quarter-Turn Valves and Valves Equipped With Non-Metallic Seats

Specifies fire type-testing requirements and a fire type-test method for confirming the pressure-containing capability of a valve under pressure during and after the fire test. It does not cover the testing requirements for valve actuators other than manually operated gear boxes or similar mechanisms when these form part of the normal valve assembly. Other types of valve actuators (e.g. electrical, pneumatic, or hydraulic) may need special protection to operate in the environment considered in this valve test, and the fire testing of such actuators is outside the scope of this Standard. Pages: 14

6th Edition | September 2010 | Product Number: C60706 | Price: \$81.00

## Std 608 ◆

### Metal Ball Valves—Flanged, Threaded and Butt-Welding Ends

Specifies the requirements for metal ball valves suitable for petroleum, petrochemical and industrial applications that have butt-welding or flanged ends for NPS 1/2 through NPS 20 and threaded or socket-welding ends for NPS 1/4 through NPS 2, corresponding to the nominal pipe sizes in ASME B36.10M. Also applies to metal ball valves in pressure classes 150, 300, and 600 for flanged and butt-welding ends and in pressure classes 150, 300, 600, and 800 for socket-welding and threaded ends. Establishes requirements for bore sizes described as full bore, single reduced bore, and double reduced bore. Covers additional requirements for ball valves that are otherwise in full conformance to the requirements of ASME B16.34, Standard Class. Pages: 17

4th Edition | December 2008 | Effective Date: June 1, 2009

Product Number: C60804 | Price: \$95.00

## Std 609 ◆

### Butterfly Valves: Double-Flanged, Lug- and Wafer-Type

This Standard covers design, materials, face-to-face dimensions, pressure-temperature ratings, and examination, inspection and test requirements for gray iron, ductile iron, bronze, steel, nickel-based alloy, or special alloy butterfly valves that provide tight shutoff in the closed position. The following two categories of butterfly valves are included.

Category A—Manufacturer's rated cold working pressure (CWP) butterfly valves, usually with a concentric disc and seat configuration. Sizes covered are NPS 2 to NPS 48 for valves having ASME Class 125 or Class 150 flange bolting patterns.

Category B—ASME Class and pressure-temperature rated butterfly valves that have an offset seat and either an eccentric or a concentric disc configuration. These valves may have a seat rating less than the body rating. For lug and wafer, Class 150, 300, and 600, sizes covered are NPS 3 to NPS 24. For double flanged long pattern, Class 150, 300, and 600, sizes covered are NPS 3 to NPS 36. For double flanged short pattern, Class 150 and 300, sizes covered are NPS 3 to NPS 48. For double-flanged short pattern, Class 600, sizes covered are NPS 3 to NPS 24. Pages: 30

7th Edition | October 2009 | Effective Date: April 1, 2010

Product Number: C60907 | Price: \$89.00

## Std 609 \*

### Butterfly Valves: Double-flanged, Lug, Wafer -type—Chinese

The Chinese translation of Standard 594.

7th Edition | October 2009 | Product Number: C60907C | Price: \$95.00

## API 615

### Valve Selection Guide

Provides guidance on the selection of common types of valves used by the petroleum refining, chemical, petrochemical and associated industries. These include gate, ball, plug, butterfly, check, and globe valves covered by API and ASME Standards. Modulating control valves and pressure relief valves are outside the scope of this RP. Pages: 35

1st Edition | June 2010 | Product Number: C61501 | Price: \$73.00

## RP 621

### Reconditioning of Metallic Gate, Globe, and Check Valves

Provides guidelines for reconditioning heavy wall (API 600 and API 594 type) carbon steel, ferritic alloy (up to 9 % Cr), stainless steel, and nickel alloy gate, globe, and check valves for ASME pressure classes 150, 300, 400, 600, 900, 1500, and 2500. Guidelines contained in this RP apply to flanged and butt weld cast or forged valves. This RP does not cover reconditioning or remanufacturing of used or surplus valves intended for resale. The only intent of this RP is to provide guidelines for refurbishing an end user's (Owner) valves for continued service in the Owner's facility. Valves reconditioned or remanufactured to this RP may not meet API Standard requirements for new valves. Pages: 26

3rd Edition | August 2010 | Product Number: C62103 | Price: \$135.00

## Std 622 ■

### Type Testing of Process Valve Packing for Fugitive Emissions

Specifies the requirements for comparative testing of block valve stem packing for process applications where fugitive emissions are a consideration. Packing(s) shall be suitable for use at -29°C to 538°C (-20°F to 1000°F). Factors affecting fugitive emissions performance that are considered by this Standard include temperature, pressure, thermal cycling, mechanical cycling and corrosion. Pages: 29

2nd Edition | October 2011 | Product Number: C62202 | Price: \$135.00

## ELECTRICAL INSTALLATIONS AND EQUIPMENT

## RP 500

### Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2

(ANSI/API RP 500-1998)

Provides guidelines for determining the degree and extent of Class I, Division 1 and Class I, Division 2 locations at petroleum facilities, for the selection and installation of electrical equipment. Basic definitions provided in the "National Electric Code" have been followed in developing this document which applies to the classification of locations for both temporarily and permanently installed electrical equipment. RP 500 is intended to be applied where there may be a risk of ignition due to the presence of flammable gas or vapor, mixed with air under normal atmospheric conditions. Pages: 121

2nd Edition | November 1997 | Reaffirmed: November 2002

Product Number: C50002 | Price: \$197.00

You may access RP 500 in a read-only platform: [publications.api.org](http://publications.api.org)

## RP 505

### Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1 and Zone 2

(ANSI/API RP 505-1998)

Provides guidelines for determining the degree and extent of Class I, Zone 0, Zone 1, and Zone 2 locations at petroleum facilities, for the selection and installation of electrical equipment. Basic definitions provided in the National Electrical Code have been followed in developing this document which applies to the classification of locations for both temporarily and

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permanently installed in electrical equipment. RP 505 is intended to be applied where there may be a risk of ignition due to the presence of flammable gas or vapor, mixed with air under normal atmospheric conditions. Pages: 131

1st Edition | November 1997 | Reaffirmed: November 2002

Product Number: C50501 | Price: \$197.00

You may access RP 505 in a read-only platform: [publications.api.org](http://publications.api.org)

## RP 540

### Electrical Installations in Petroleum Processing Plants

Provides information on electrical installations in petroleum processing plants. It is intended for all individuals and organizations concerned with the safe design, installation and operation of electrical facilities in petroleum processing plants. Pages: 107

4th Edition | April 1999 | Reaffirmed: July 2004

Product Number: C54004 | Price: \$182.00

## Std 541

### Form-Wound Squirrel-Cage Induction Motors 500 Horsepower and Larger

Covers the minimum requirements for all form-wound squirrel-cage induction motors 500 Horsepower and larger for use in petroleum industry services. This Standard may be applied to adjustable speed motors and induction generators with appropriate attention to the specific requirements of such applications. Pages: 84

4th Edition | June 2004 | Product Number: C54104 | Price: \$166.00

## RP 545

### Lightning Protection for Aboveground Storage Tanks

RP 545 replaces the requirements of API 2003 regarding lightning protection for preventing fires in storage tanks with flammable or combustible contents. This RP provides guidance and information to assist owners/operators with lightning protection for tanks. This RP does not provide complete protection for all possible lightning stroke occurrences. Pages: 12

1st Edition | October 2009 | Product Number: C54501 | Price: \$98.00

## TR 545-A

### Verification of Lightning Protection Requirements for Above Ground Hydrocarbon Storage Tanks

Collates a number of research reports investigating the lightning phenomena and the adequacy of lightning protection requirements on above ground hydrocarbon storage tanks. These are as follows:

- review of lightning phenomena and the interaction with above ground storage tanks,
- review of tank base earthing and test current recommendations,
- lightning tests to tank shell/shunt samples,
- visits to oil refinery A and B,
- review of burn-through and hot-spot effects on metallic tank skins from lightning strikes,
- lightning simulation testing to determine the required characteristics for roof bonding cables on external floating roof above ground storage tanks,
- investigative tests on the lightning protection of submerged shunts with parallel roof bonding cables. Pages: 193

1st Edition | October 2009 | Product Number: CLP2009 | Price: \$130.00

## Std 546

### Brushless Synchronous Machines 500 kVA and Larger

Covers the minimum requirements for form- and bar-wound brushless synchronous machines in petroleum-related industry service. The Standard has been updated to include both synchronous motors and generators with two different rotor designs: (1) the conventional salient-pole rotor with solid

or laminated poles, and (2) the cylindrical rotor with solid or laminated construction. Also included are new datasheet guides to help clarify the datasheet requirements. Pages: 191

3rd Edition | September 2008 | Product Number: C54603 | Price: \$201.00

## Std 547 ♦

### General-Purpose Form-Wound Squirrel Cage Induction Motors—250 Horsepower and Larger

Covers the requirements for form-wound induction motors for use in general-purpose petroleum, chemical and other industrial severe duty applications. These motors:

- are rated 250 hp (185 kW) through 3000 hp (2250 kW) for 4, 6 and 8 pole speeds,
- are rated less than 800 hp (600 kW) for two-pole (3000 or 3600 RPM) motors of totally-enclosed construction,
- are rated less than 1250 hp (930 kW) for two-pole motors of WP-II type enclosures,
- drive centrifugal loads,
- drive loads having inertia values within those listed in NEMA MG 1 Part 20),
- are not induction generators. Pages: 30

1st Edition | January 2005 | Product Number: C54701 | Price: \$91.00

## HEAT TRANSFER EQUIPMENT STANDARDS FOR REFINERY SERVICE

### Std 530/ISO 13704:2007

#### Calculation of Heater-Tube Thickness in Petroleum Refineries (includes Errata 1 dated January 2009)

Specifies the requirements and gives recommendations for the procedures and design criteria used for calculating the required wall thickness of new tubes and associated component fittings for petroleum refinery heaters. These procedures are appropriate for designing tubes for service in both corrosive and non-corrosive applications. These procedures have been developed specifically for the design of refinery and related process fired heater tubes (direct-fired, heat-absorbing tubes within enclosures). These procedures are not intended to be used for the design of external piping. This Standard does not give recommendations for tube retirement thickness.

This edition of API Std 530 is the identical national adoption of ISO 13704:2007. Pages: 146

6th Edition | September 2008 | Product Number: C53006 | Price: \$256.00

## RP 534

### Heat Recovery Steam Generators

Provides guidelines for the selection or evaluation of heat recovery steam generator (HRSG) systems. Details of related equipment designs are considered only where they interact with the HRSG system design. The document does not provide rules for design, but indicates areas that need attention and offers information and descriptions of HRSG types available to the designer/user for purposes of selecting the appropriate HRSG. Pages: 60

2nd Edition | February 2007 | Product Number: C53402 | Price: \$92.00

## RP 535

### Burners for Fired Heaters in General Refinery Services

Provides guidelines for the selection and/or evaluation of burners installed in fired heaters in general refinery services. Details of fired heater and related equipment designs are considered only where they interact with the burner selection. This RP does not provide rules for design but indicates areas that need attention. It offers information and descriptions of burner types available to the designer/user for purposes of selecting the appropriate burner for a given application. Pages: 76

2nd Edition | January 2006 | Product Number: C53502 | Price: \$113.00

## RP 536

### Post Combustion NO<sub>x</sub> Control for Equipment in General Refinery Services

Covers the mechanical description, operation, maintenance, and test procedures of post-combustion NO<sub>x</sub> control equipment. It covers the Selective Non-Catalytic Reduction and Selective Catalytic Reduction methods of post-combustion NO<sub>x</sub> reduction. It does not cover reduced NO<sub>x</sub> formation through burner design techniques such as external flue gas recirculation (FGR). Pages: 41

2nd Edition | December 2006 | Product Number: C53602 | Price: \$94.00

## Std 537/ISO 25457:2008

### Flare Details for General Refinery and Petrochemical Service

Specifies requirements and provides guidance for the selection, design, specification, operation and maintenance of flares and related combustion and mechanical components used in pressure-relieving and vapour-depressurizing systems for petroleum, petrochemical and natural gas industries. Although this Standard is primarily intended for new flares and related equipment, it is also possible to use it to evaluate existing flare facilities.

This edition of API Std 537 is the identical national adoption of ISO 25457:2008. Pages: 156

2nd Edition | December 2008 | Product Number: CX53702 | Price: \$210.00

## Std 560/ISO 13705:2006

### Fired Heaters for General Refinery Services (ANSI/API Std 560-2007)

Specifies requirements and gives recommendations for the design, materials, fabrication, inspection, testing, preparation for shipment, and erection of fired heaters, air preheaters, fans and burners for general refinery service. This Standard is not intended to apply to the design of steam reformers or pyrolysis furnace.

This edition of API Std 560 is an identical national adoption of ISO 13705:2006. Pages: 266

4th Edition | August 2007 | Product Number: GX56004 | Price: \$293.00

## RP 573

### Inspection of Fired Boilers and Heaters

Covers the inspection practices for fired boilers and process heaters (furnaces) used in petroleum refineries and petrochemical plants. The practices described in this document are focused to improve equipment reliability and plant safety by describing the operating variables which impact reliability, and to ensure that inspection practices obtain the appropriate data, both on-stream and off-stream, to assess current and future performance of the equipment. Pages: 69

2nd Edition | December 2002 | Reaffirmed: December 2010

Product Number: C57302 | Price: \$94.00

## Std 660/ISO 16812:2007

### Shell-and-Tube Heat Exchangers (ANSI/API Std 660-2007)

Specifies requirements and gives recommendations for the mechanical design, material selection, fabrication, inspection, testing and preparation for shipment of shell-and-tube heat exchangers for the petroleum, petrochemical and natural gas industries. This Standard is applicable to the following types of shell-and-tube heat exchangers: heaters, condensers, coolers and reboilers. It is not applicable to vacuum-operated steam surface condensers and feed-water heaters.

This edition of API Std 660 is the identical national adoption of ISO 16812:2007. Pages: 41

8th Edition | August 2007 | Product Number: CX66008 | Price: \$160.00

## Std 661/ISO 13706:2005

### Air-Cooled Heat Exchangers for General Refinery Service (ANSI/API Std 661-2006)

Gives requirements and recommendations for the design, materials, fabrication, inspection, testing and preparation for shipment of air-cooled heat exchangers for use in the petroleum and natural gas industries. This Standard is applicable to air-cooled heat exchangers with horizontal bundles, but the basic concepts can also be applied to other configurations.

This edition of API Std 661 is an identical national adoption of ISO 13706:2005. Pages: 115

6th Edition | February 2006 | Product Number: CX66106 | Price: \$235.00

## Std 662, Part 1/ISO 15547-1:2005

### Plate Heat Exchangers for General Refinery Services, Part 1—Plate-and-Frame Heat Exchangers (ANSI/API Std 662, Part 1-2011)

Gives requirements and recommendations for the mechanical design, materials selection, fabrication, inspection, testing, and preparation for shipment of plate-and-frame heat exchangers for use in petroleum, petrochemical and natural gas industries. It is applicable to gasketed, semi-welded and welded plate-and frame heat exchangers.

This edition of API Std 662-1 is an identical national adoption of ISO 15547-1:2005. Pages: 34

1st Edition | February 2006 | Reaffirmed: February 2011

Product Number: CX662101 | Price: \$128.00

## Std 662, Part 2/ISO 15547-2:2005

### Plate Heat Exchangers for General Refinery Services, Part 2—Brazed Aluminum Plate-Fin Heat Exchangers (ANSI/API 662, Part 2-2011)

Gives requirements and recommendations for the mechanical design, materials selection, fabrication, inspection, testing, and preparation for shipment of brazed aluminum plate-fin heat exchangers for use in petroleum, petrochemical and natural gas industries.

This edition of API Std 662-2 is an identical national adoption of ISO 15547-2:2005. Pages: 34

1st Edition | February 2006 | Reaffirmed: February 2011

Product Number: CX662201 | Price: \$128.00

## INSTRUMENTATION AND CONTROL SYSTEMS

### RP 551

#### Process Measurement Instrumentation

Provides procedures for the installation of the more generally used measuring and control instruments and related accessories. Pages: 58

1st Edition | May 1993 | Reaffirmed: February 2007

Product Number: C55100 | Price: \$121.00

### RP 552

#### Transmission Systems

Reviews the recommended practices for the installation of electronic and pneumatic measurement and control-signal transmission systems. It does not discuss leased wire, radio, and telemetering transmission. Pages: 39

1st Edition | October 1994 | Reaffirmed: February 2007

Product Number: C55201 | Price: \$105.00

### RP 553

#### Refinery Control Valves

Provides recommended criteria for the selection, specification and application of piston and diaphragm actuated control valves. It also outlines control valve design considerations, discusses control valve sizing, noise, fugitive emissions, and defines types of commonly used control valves and their actuators. Recommendations for emergency block and vent valves, on/

off valves intended for emergency isolation or venting, and special design valves for refinery services, such as FCCU slide valves and vapor depressuring systems, are included. Pages: 26

1st Edition | September 1998 | Reaffirmed: February 2007  
Product Number: C55301 | Price: \$94.00

## RP 554, Part 1

### Process Control Systems, Part 1—Process Control Systems Functions and Functional Specification Development

Addresses the processes required to successfully implement Process Control Systems for refinery and petrochemical services. The major topic addressed in Part 1 is the basic functions that a Process Control System may need to perform, and recommended methodologies for determining the functional and integration requirements for a particular application. Pages: 32

2nd Edition | July 2007 | Product Number: C55402 | Price: \$134.00

## RP 554, Part 2

### Process Control Systems, Part 2—Control System Design

Addresses the processes required to successfully implement Process Control Systems for Refinery and Petrochemical Services. The major topic addressed in Part 2 is practices to select and design the installation for hardware and software required to meet the functional and integration requirements. Pages: 65

1st Edition | October 2008 | Product Number: C554201 | Price: \$134.00

## RP 554, Part 3

### Process Control Systems, Part 3—Project Execution and Process Control System Ownership

Addresses the processes required to successfully implement Process Control Systems for Refinery and Petrochemical Services. The major topic addressed in Part 3 is project organization, skills and management required to execute a Process Control project and then to own and operate a Process Control Systems. Pages: 40

1st Edition | October 2008 | Product Number: C554301 | Price: \$103.00

## API 555

### Process Analyzers

Addresses the considerations in the application of analyzers and associated systems, installation, and maintenance. This Standard covers the following topics: process analyzer considerations, safety and environmental considerations, spectroscopic chemical composition analyzers, non-spectroscopic chemical composition analyzers, physical property analyzers, chemical property analyzers. Pages: 225

2nd Edition | November 2001 | Reaffirmed: February 2007  
Product Number: C55502 | Price: \$141.00

## Instrumentation, Control, and Protective Systems for Gas Fired Heaters

Provides guidelines that specifically apply to instrument, control and protective system installations for gas fired heaters in petroleum production, refineries, petrochemical and chemical plants. Includes primary measuring and actuating instruments, controls, alarms, and protective systems as they apply to fired heaters. Not covered in this RP are the following: oil fired and combination fired heaters; water tube boilers which consist of single or multiple burners and are designed for utility operation or where the primary purpose is steam generation; fired steam generators used to recover heat from combustion turbines; oven and furnaces used for the primary purpose of incineration, oxidation, reduction or destruction of the process medium; water bath or oil bath indirect fired heaters; CO boilers, pyrolysis furnaces, and other specialty heaters. Pages: 66

2nd Edition | April 2011 | Product Number: C55602 | Price: \$147.00

## RP 557

### Guide to Advanced Control Systems

Addresses the implementation and ownership of advanced control systems for refinery purposes. Describes commonly used practices for the opportunity identification, justification, project management, implementation and maintenance of advanced control system applications in refinery services. Pages: 28

1st Edition | December 2000 | Reaffirmed: February 2007  
Product Number: C55701 | Price: \$94.00

## TECHNICAL DATA BOOK PETROLEUM REFINING

### Electronic Version of the API Technical Data Book

Improve the overall design and operations in today's highly complex petroleum refinery process systems with the API Technical Database. Version 1.0 of the API Technical Database replaces the printed format of the popular API Tech Data Books with a modern Windows interface that is so unique it is patented. This single screen approach provides access to the latest API physical property estimation methods and the software is critically reviewed and approved by the API Technical Data Committee. Included is a database of property data for nearly 900 components, characterization of petroleum fractions, and petroleum fraction distillation interconversions. Users can quickly determine petroleum fraction physical property data such as critical properties, vapor pressure, density, liquid enthalpy, gas enthalpy, heat of vaporization, liquid heat capacity, gas heat capacity, surface tension, liquid viscosity, gas viscosity, liquid thermal conductivity, gas thermal conductivity, and heat of combustion. Temperature-dependant properties can be tabulated and graphed over any range, and distillation interconversions are displayed graphically. This data can then be exported for use in simulation and engineering software programs.

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## TECHNICAL DATA BOOK PETROLEUM REFINING RELATED ITEMS

## TR 997

### Comprehensive Report of API Crude Oil Characterization Measurements

A consortium of API member companies has sponsored a research program consisting of a series of projects on the characterization of crude oils. The goal of this program was to obtain complete sets of assay and thermophysical property data on a few widely varying crude oil refining and refining facilities. This report provides descriptions of the test procedures, discussions of their accuracy, and comprehensive compilation of the data for the crude oils measured under this program. Pages: 129

1st Edition | August 2000 | Product Number: C99701 | Price: \$204.00

## Reports Issued by Research Project 49 1951

API Research Project 49, Reference Clay Minerals, issued a series of eight reports, as follows:

- No. 1, Glossary of Mineral Names
- No. 2, Reference Clay Localities-United States
- No. 3, Differential Thermal Analysis of Reference Clay Mineral Specimens
- No. 4, Reference Clay-Europe
- No. 5, Occurrence and Microscopic Examination of Reference Clay Mineral Specimens
- No. 6, Electron Micrographs of Reference Clay Minerals
- No. 7, Analytical Data on Reference Clay Minerals
- No. 8, Infrared Spectra of Clay Minerals

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## CHARACTERIZATION AND THERMODYNAMICS

### Thermodynamic Properties and Characterization of Petroleum Fractions

February 1988

#### API Monograph Series

Each publication discusses the properties of solid, liquid, and gaseous phases of one or a few closely related, industrially important compounds in a compact, convenient, and systematic form. In addition to the basic physical properties, each publication covers density, molar volume, vapor pressure, enthalpy of vaporization, surface tension, thermodynamic properties, viscosity, thermal conductivity, references to properties of mixtures, and spectrographic data.

Publ 705, Tetralin, 1978

Publ 706, cis- and trans-Decalin, 1978

Publ 707, Naphthalene, 1978

Publ 708, Anthracene and Phenanthrene 9, 1979

Publ 709, Four-Ring Condensed Aromatic Compounds, 1979

Publ 710, Pyridine and Phenylpyridines, 1979

Publ 711, Quinoline, 1979

Publ 712, Isoquinoline, 1979

Publ 713, Indanols, 1980

Publ 714, Indan and Indene, 1980

Publ 715, Acenaphthylene, Acenaphthene, Fluorene, and Fluoranthene, 1981

Publ 716, Carbazole, 9-Methylcarbazole, and Acridine, 1981

Publ 717, Thiphen, 2,3- and 2,5-Dihydrothiophene, and Tetrahydrothiophene, 1981

Publ 718, Aniline, 1982

Publ 719, Indole, 1982

Publ 720, 2-, 3-, and 4-Methylaniline, 1983

Publ 721, Benzofuran, Dibenzofuran, and Benzonaphthofurans, 1983

Publ 722, Isopropylbenzene, and 1-Methyl-2-, -3-, and -4-Isopropylbenzene, 1984

Publ 723, tert-Butyl methyl ether, 1984

Publ 724, 1- and 2-Methylnaphthalene and Dibenzanthracenes, 1985

## MATERIALS ENGINEERING PUBLICATIONS

### RP 571 ◆■

#### Damage Mechanisms Affecting Fixed Equipment in the Refining Industry

Provides background information on damage that can occur to equipment in the refining process. It is intended to supplement Risk Based Inspection (RP 580 and Publ 581) and Fitness-for-Service (RP 579) technologies developed in recent years by API to manage existing refining equipment integrity. It is also an excellent reference for inspection, operations, and maintenance personnel. Covers over 60 damage mechanism. Each write-up consists of a general description of the damage, susceptible materials, of construction, critical factors, inspection method selection guidelines, and control measures. Wherever possible, pictures are included and references are provided for each mechanism. In addition, generic process flow diagrams have been included that contain a summary of the major damage flow mechanism expected for typical refinery process units. Pages: 362

2nd Edition | April 2011 | Product Number: C57102 | Price: \$319.00

### RP 582

#### Recommended Practice Welding Guidelines for the Chemical, Oil, and Gas Industries

Provides supplementary guidelines and practices for welding and welding related topics for shop and field fabrication, repair and modification of the following:

- pressure-containing equipment such as pressure vessels, heat exchangers, piping, heater tubes, and pressure boundaries of rotating equipment and attachments welded thereto;
- tanks and attachments welded thereto;
- nonremovable internals for process equipment;
- structural items attached and related to process equipment;
- other equipment or component item when referenced by an applicable purchase document.

This document is general in nature and is intended to augment the welding requirements of ASME BPVC Section IX and similar codes, standards, specifications and practices such as those listed in Section 2. The intent of this document is to be inclusive of chemical, oil and gas industry standards, although there are many areas not covered herein, e.g. pipeline welding and offshore structural welding are intentionally not covered.

This document is based on industry experience and any restrictions or limitations may be waived or augmented by the purchaser. Pages: 28

2nd Edition | December 2009 | Product Number: C58202 | Price: \$120.00

### TR 932-A

#### The Study of Corrosion in Hydroprocess Reactor Effluent Air Cooler Systems

Provides technical background for controlling corrosion in hydroprocesses reactor effluent systems based on Industry experience and consensus practice. Information for this report has been gathered from open literature, private company reports, and interviews with representatives of major refining companies. The findings in this report are the basis for the guidance in Bull 932-B.

September 2002 | Product Number: C932A0 | Price: \$146.00

### Publ 932-B

#### Design, Materials, Fabrication, Operation, and Inspection Guidelines for Corrosion Control in Hydroprocessing Reactor Effluent Air Cooler (REAC) Systems

Provides guidance to engineering and plant personnel on equipment and piping design, material selection, fabrication, operation, and inspection practices to manage corrosion and fouling in the wet sections of hydroprocessing reactor effluent systems. RP 932-B is applicable to process streams in which  $\text{NH}_4\text{Cl}$  and  $\text{NH}_4\text{HS}$  salts can form and deposit in equipment and piping, or dissolve in water to form aqueous solutions of these salts. An understanding of the variables impacting corrosion and fouling in these systems is necessary to improve the reliability, safety, and environmental impact associated with them. Within the refining industry, continuing equipment replacements, unplanned outages, and catastrophic incidents illustrate the current need to better understand the corrosion characteristics and provide guidance on all factors that can impact fouling and corrosion in REAC systems.

1st Edition | June 2004 | Product Number: C932B1 | Price: \$166.00

### RP 934-A

#### Materials and Fabrication Requirements for 2-1/4/3Cr Alloy Steel Heavy Wall Pressure Vessels for High Temperature, High Pressure Hydrogen Service

(includes Addendum 1 dated February 2010)

Applies to new heavy wall pressure vessels in petroleum refining, petrochemical and chemical facilities in which hydrogen or hydrogen-containing fluids are processed at elevated temperature and pressure. It is based on decades of industry operating experience and the results of experimentation and testing conducted by independent manufacturers, fabricators and users of heavy wall pressure vessels for this service. Pages: 19

2nd Edition | May 2008 | Product Number: C934A02 | Price: \$103.00

## TR 934-B ■

### Fabrication Considerations for Vanadium-Modified Cr-Mo Steel Heavy Wall Pressure Vessels

This document is intended as a best practice guideline to be used by fabricators, in conjunction with RP 934-A, when constructing new heavy wall pressure vessels with vanadium-modified Cr-Mo steels intended for service in petroleum refining, petrochemical or chemical facilities. These materials are primarily used in high temperature, high pressure services which contain hydrogen. The document provides typical practices to be followed during fabrication based upon experience and the knowledge gained from actual problems that have occurred during the fabrication of vanadium-modified Cr-Mo steels. Pages: 42

1st Edition | April 2011 | Product Number: C934B01 | Price: \$131.00

## RP 934-C

### Materials and Fabrication of 1-<sup>1</sup>/<sub>4</sub>Cr-<sup>1</sup>/<sub>2</sub>Mo Steel Heavy Wall Pressure Vessels for High Pressure Hydrogen Service Operating at or Below 825 °F (441 °C)

Covers many of the "lean," "standard," and "super" grades of duplex stainless steels (DSS) most commonly used within refineries. The definitions of these terms have not been firmly established by the industry, and vary between literature references and materials suppliers. Table 1 shows how the various grades are being classified into "families" for the purposes of this report. The UNS numbers of the standard grades being used for corrosive refining services include S31803 and S32205, while the super grades include S31260, S32520, S32550, S32750, S32760, S39274, and S39277. The grades which are labeled as "semi-lean" include S32304 and UNS S32003, have either lower Cr or Mo than the standard grades, and are used in some process services that are less aggressive. These alloys and lean duplexes, such as S32101, have also been used for storage tanks and structural applications primarily for their higher strength compared to carbon steel (CS). It is observed that new DSS alloys are being introduced and are likely to continue to be introduced. These new grades can be reasonably placed in the context of this discussion based on their composition.

The product forms within the scope are tubing, plate, sheet, forgings, pipe, and fittings for piping, vessel, exchanger, and tank applications. The use of DSS for tanks is addressed by API 650, Appendix X. Later revisions of this report may consider expanding the scope to include castings and other product forms for pumps, valves, and other applications. Use of DSS as a cladding is also not included within the scope of this document. Pages: 44

2nd Edition | April 2011 | Product Number: C938C02 | Price: \$103.00

## TR 934-D

### Technical Report on the Materials and Fabrication Issues of 1<sup>1</sup>/<sub>4</sub>Cr-<sup>1</sup>/<sub>2</sub>Mo and 1Cr-<sup>1</sup>/<sub>2</sub>Mo Steel Pressure Vessels

Numerous 1<sup>1</sup>/<sub>4</sub>Cr-<sup>1</sup>/<sub>2</sub>Mo and 1Cr-<sup>1</sup>/<sub>2</sub>Mo vessels have been constructed and successfully used in various applications in petroleum industry and in other types of service applications. These vessels have been constructed to the requirements of the ASME Boiler & Pressure Vessel Code, Section VIII, Divisions 1 and 2, and to various international pressure vessel codes and standards. The 1<sup>1</sup>/<sub>4</sub>Cr-<sup>1</sup>/<sub>2</sub>Mo and 1Cr-<sup>1</sup>/<sub>2</sub>Mo vessels are typically used in service conditions (e.g., high temperature and/or high pressure hydrogen), which require heavy walls and cause in service deterioration. As such, the steels are subject to special requirements, such as notch toughness, elevated temperature tensile properties, hardness, fabrication heat treatments, etc., which may limit the maximum thickness to be able to meet the desired properties. Corrosion protection by stainless steel weld overlay or cladding may also be required. Pages: 56

1st Edition | September 2010 | Product Number: C934D01 | Price: \$131.00

## RP 934-E

### Materials and Fabrication of 1<sup>1</sup>/<sub>4</sub>Cr-<sup>1</sup>/<sub>2</sub>Mo Steel Pressure Vessels for Service Above 825 °F (440 °C)

Includes materials and fabrication requirements for new 1<sup>1</sup>/<sub>4</sub>Cr-<sup>1</sup>/<sub>2</sub>Mo steel and 1Cr-<sup>1</sup>/<sub>2</sub>Mo pressure vessels and heat exchangers for high temperature service. It applies to vessels that are designed, fabricated, certified and

documented in accordance with ASME Code Section VIII, Division 1. This document may also be used as a resource when planning to modify existing pressure vessels. The interior surfaces of these pressure vessels may have an austenitic stainless steel, ferritic stainless steel, or nickel alloy weld overlay or cladding to provide additional corrosion resistance. This RP is applicable to wall (shell) thicknesses from 1 in. (25 mm) to 4 in. (100 mm). Integrally reinforced nozzles, flanges, tubesheets, bolted channel covers, etc. can be greater than 4 in. (100 mm). At shell or head thicknesses greater than 4 in. (100 mm), 1-<sup>1</sup>/<sub>4</sub>Cr-<sup>1</sup>/<sub>2</sub>Mo and 1Cr-<sup>1</sup>/<sub>2</sub>Mo has been shown to have difficulty meeting the toughness requirements given in this document, but this does not preclude the use of this alloy if these properties can be met or if the equipment is designed with stresses below the threshold for brittle fracture. Although outside of the scope, this document can be used as a resource for vessels down to 0.5 in. (12.7 mm) shell thickness with changes defined by the Purchaser. Pages: 26

1st Edition | August 2010 | Product Number: C934E01 | Price: \$103.00

## Publ 935

### Thermal Conductivity Measurement Study of Refractory Castables

Compares the differences between measurement techniques used to develop thermal conductivity of refractory castables. The following procedures were examined: Water Calorimeter, Calorimeter-Pilkington Method, Hot Wire Method, Comparative Thermal Conductivity Method, and Panel Test. The refractory industry uses various methods for measuring and reporting thermal conductivity. The accuracy of reporting and understanding thermal conductivity are vital to developing the most cost effective, efficient, and reliable equipment. The study makes no attempt to rank, classify or assign accuracy to each of the measurement techniques. Pages: 22

1st Edition | September 1999 | Product Number: C93501 | Price: \$58.00

## Std 936 ◆

### Refractory Installation Quality Control Specification—Inspection and Testing Monolithic Refractory Linings and Materials

Provides installation quality control procedures for monolithic refractory linings and may be used to supplement owner specifications. Materials, equipment, and personnel are qualified by the methods described, and applied refractory quality is closely monitored based on defined procedures and acceptance criteria. The responsibilities of inspection personnel who monitor and direct the quality control process are also defined.

3rd Edition | November 2008 | Product Number: C93603 | Price: \$129.00

## Publ 937-A

### Study to Establish Relations for the Relative Strength of API 650 Cone Roof, Roof-to-Shell and Shell-to-Bottom Joints

Investigates the relative strengths of the roof-to-shell and shell-to-bottom joints, with the goal of providing suggestions for frangible roof design criteria applicable to smaller tanks. Pages: 68

1st Edition | August 2005 | Product Number: C937A0 | Price: \$118.00

## Publ 938-A

### An Experimental Study of Causes and Repair of Cracking of 1<sup>1</sup>/<sub>4</sub>Cr-<sup>1</sup>/<sub>2</sub>Mo Steel Equipment

Gives the results of an experimental study conducted to provide the petroleum industry with solutions to recurring incidents of cracking in the application of welded 1<sup>1</sup>/<sub>4</sub>Cr-<sup>1</sup>/<sub>2</sub>Mo steel for hydrogen processing equipment. Pages: 220

1st Edition | May 1996 | Product Number: C93801 | Price: \$159.00

## Publ 938-B

### Use of 9Cr-1Mo-V (Grade 91) Steel in the Oil Refining Industry

Provides guidelines on the proper specifications for base metal and welding consumables and successful fabrication, including welding and heat treatment requirements for use of 9Cr-1Mo-V alloy steel in the oil refinery services. This includes guidelines for preheat, postweld heat treatment, procedure qualification, and mechanical and nondestructive testing. It

Covers the basic material and metallurgical properties of 9Cr-1Mo-V steel, including a summary of the physical and mechanical properties, corrosion and oxidation resistance, indicating possible corrosion and/or mechanical failure mechanisms and how to avoid them. The appropriate base metal heat treatment is also given. This document also defines hardness limits for the base material and welds in order to avoid cracking failures due to wet sulfide stress corrosion cracking or due to other possible failure mechanisms. A discussion of both proper and improper refinery service applications for these steels is also provided. Pages: 40

1st Edition | June 2008 | Product Number: C938B01 | Price: \$105.00

## TR 938-C ■

### Use of Duplex Stainless Steels in the Oil Refining Industry

The economical combination of strength and corrosion resistance of duplex stainless steels (DSSs) has enabled their increasing use in the refining industry. DSS most commonly used today are classified under new grades and have led to improved welding practices. Covers potential environmental-related failure mechanisms and preventative measures to avoid them; typical material and fabrication specification requirements used by refiners; and examples of applications of DSS within refineries. The report also lists the chemistries and UNS numbers of various common DSS, including some first generation DSS for comparison. Pages: 44

2nd Edition | April 2011 | Product Number: C938C02 | Price: \$158.00

## TR 939-A

### Research Report on Characterization and Monitoring of Cracking in Wet H<sub>2</sub>S Service

Demonstrates the ability to characterize and monitor various aspects of crack propagation in pressurized process equipment exposed to wet hydrogen sulfide environments. It represents one of several significant industry-wide efforts to study and to better understand this phenomenon. Pages: 136

1st Edition | October 1994 | Product Number: C93901 | Price: \$151.00

## Publ 939-B

### Repair and Remediation Strategies for Equipment Operating in Wet H<sub>2</sub>S Service

Presents data relative to the fabrication requirements for 2-1/4 3Cr alloy steel heavy wall pressure vessels for high temperature, high pressure hydrogen services. It summarizes the results of industry experience, experimentation, and testing conducted by independent manufacturers, fabricators, and users of heavy wall pressure vessels. This RP applies to equipment in refineries, petrochemical, and chemical facilities in which hydrogen or hydrogen containing fluids are processed at elevated temperature and pressure. Pages: 236

1st Edition | June 2002 | Product Number: C939B0 | Price: \$166.00

## RP 939-C

### Guidelines for Avoiding Sulfidation (Sulfidic) Corrosion Failures in Oil Refineries

Applicable to hydrocarbon process streams containing sulfur compounds, with and without the presence of hydrogen, which operate at temperatures above approximately 450 °F (230 °C) up to about 1000 °F (540 °C). A threshold limit for sulfur content is not provided because within the past decade significant corrosion has occurred in the reboiler/fractionator sections of some hydroprocessing units at sulfur or H<sub>2</sub>S levels as low as 1 ppm. Nickel base alloy corrosion is excluded from the scope of this document. While sulfidation can be a problem in some sulfur recovery units, sulfur plant combustion sections and external corrosion of heater tubes due to firing sulfur containing fuels in heaters are specifically excluded from the scope of this document. Pages: 35

1st Edition | May 2009 | Product Number: C939C01 | Price: \$110.00

## TR 939-D

### Stress Corrosion Cracking of Carbon Steel in Fuel Grade Ethanol—Review, Experience Survey, Field Monitoring, and Laboratory Testing

Addresses stress corrosion cracking (SCC) in carbon steel equipment used in distribution, transportation, storage, and blending of denatured fuel ethanol. API, with assistance from the Renewable Fuels Association (RFA), conducted research on the potential for metal cracking and product leakage in certain portions of the fuel ethanol distribution system. TR 939-D contains a review of existing literature, results of an industry survey on cracking events and corrosion field monitoring, information on mitigation and prevention. Pages: 172

2nd Edition | May 2007 | Product Number: C939D0 | Price: \$155.00

## Bull 939-E

### Identification, Repair, and Mitigation of Cracking of Steel Equipment in Fuel Ethanol Service

Usage of fuel ethanol as an oxygenate additive in gasoline blends is increasing both in the United States and internationally. This document discusses stress corrosion cracking (SCC) of carbon steel tanks, piping and equipment exposed to fuel ethanol as a consequence of being in the distribution system, at ethanol distribution facilities, or end user facilities where the fuel ethanol is eventually added to gasoline. Such equipment includes but is not limited to the following:

- storage tanks,
- piping and related handling equipment, and
- pipelines that are used in distribution, handling, storage and blending of fuel ethanol.

However, data for pipelines in ethanol service is limited and caution should be used when applying guidelines from this document which have been derived mainly from applications involving piping and tanks in ethanol storage and blending facilities. SCC of other metals and alloys is beyond the scope of this document as is the corrosion of steel in this service. Pages: 37

1st Edition | November 2008 | Product Number: C939E01 | Price: \$136.00

## RP 941

### Steels for Hydrogen Service at Elevated Temperatures and Pressures in Petroleum Refineries and Petrochemical Plants

Summarizes the results of experimental tests and actual data acquired from operating plants to establish practical operating limits for carbon and low alloy steels in hydrogen service at elevated temperatures and pressures. The effects on the resistance of steels to hydrogen at elevated temperature and pressure that result from high stress, heat treating, chemical composition, and cladding are discussed. This RP does not address the resistance of steels to hydrogen at lower temperatures [below about 400 °F (204 °C)], where atomic hydrogen enters the steel as a result of an electrochemical mechanism. This RP applies to equipment in refineries, petrochemical facilities, and chemical facilities in which hydrogen or hydrogen-containing fluids are processed at elevated temperature and pressure. The guidelines in this RP can also be applied to hydrogenation plants such as those that manufacture ammonia, methanol, edible oils, and higher alcohols. Pages: 32

7th Edition | August 2008 | Product Number: C94107 | Price: \$121.00

## TR 941

### The Technical Basis Document for API RP 941

Even before the 1st Edition of API Publ 941, *Steels for Hydrogen Service at Elevated Temperatures and Pressures in Petroleum Refineries and Petrochemical Plants* appeared in 1970, there had been fundamental questions regarding the technical basis for the materials performance curves contained in the document (1-6). Based upon sparse laboratory data combined with plant experience, with only a few exceptions, the curves have done an exceptionally good job at safely directing the refining industry in selecting materials based upon operating temperature, hydrogen partial pressure, and the metallurgy of the equipment being considered. Pages: 301

1st Edition | September 2008 | Product Number: C09410 | Price: \$192.00

## RP 945

### Avoiding Environmental Cracking in Amine Units

Discusses environmental cracking problems of carbon steel equipment in amine units. This publication provides guidelines for carbon steel construction materials, including, fabrication, inspection, and repair, to help assure safe and reliable operation. The steels referred to in this document are defined by the ASTM designation system, or equivalent materials contained in other recognized codes or standards. This document is based on current engineering practices and insights from recent industry experience. Pages: 25

3rd Edition | June 2003 | Reaffirmed: April 2008

Product Number: C94503 | Price: \$98.00

## Publ 946

### The Effect of Outgassing Cycles on the Hydrogen Content in Petrochemical Reactor-Vessel Steels

1st Edition | January 1981 | Product Number: D90600

## TR 950

### Survey of Construction Materials and Corrosion in Sour Water Strippers—1978

1st Edition | January 1983

## Publ 959

### Characterization Study of Temper Embrittlement of Chromium-Molybdenum Steels

1st Edition | January 1982 | Product Number: C95900 | Price: \$152.00

## API Coke Drum Survey 1996

### Final Report

In 1996 a survey was sent by the API Subcommittee on Inspection; Coke Drum Task Group, to companies operating coke drums in the United States and abroad. This was the third survey of similar nature conducted by API. Fifty-four surveys were returned representing 17 operating companies and a total of 145 drums. The purpose of the survey was to collect data covering a broad range of issues including: 1. General Information 2. Design 3. Operating Information 4. Inspection Practices 5. Deterioration Experience 6. Repair Procedures Three of the six areas, Operation Information, Inspection Practices and Deterioration Experience were not covered in previous industry surveys. Additionally, this survey requested more detailed information than previous surveys. Pages: 61

October 2003 | Product Number: C096C1 | Price: \$119.00

## Impact of Gasoline Blended With Ethanol on the Long-Term Structural Integrity of Liquid Petroleum Storage Systems and Components

Summarizes the results of a literature review conducted for API on the impact of gasoline blended with ethanol on the long-term structural integrity of liquid petroleum storage systems and components. It is anticipated that the use of ethanol in motor fuels will continue to increase. This has generated interest about the potential long-term structural effects of ethanol on liquid petroleum storage systems, including underground storage tanks (USTs), underground piping, and associated components. The objective of the literature review is to determine the state of industry knowledge and research on the effects of ethanol /gasoline blends on the long-term structural integrity of UST systems and components. This review is intended to assist decision-makers on further research requirements and needed changes or supplements to existing standards for underground storage system components used for storing and dispensing gasoline blended with ethanol.

Appendix A may be purchased separately as an electronic database file. The database synopsis' and bibliographic information for all articles reviewed for the project. The report is organized by article index numbers. Reference numbers cited in this report refer to the article index number.

January 2003 | Executive Summary | Price: \$63.00

Appendix A—Literature Review | Price \$123.00

## PETROLEUM PRODUCTS AND PETROLEUM PRODUCT SURVEYS

## Publ 4261

### Alcohols and Ethers: A Technical Assessment of Their Application as Fuels and Fuel Components

Summarizes information from the technical literature on producing and applying alcohols and ethers as fuels and fuel components for the transportation sector. It assesses the technical advantages and disadvantages of alcohols and ethers with respect to hydrocarbon fuels. Since the amendment of the Clean Air Act in 1977, and subsequently in 1990, public interest in the role of oxygenates in transportation has significantly increased. This edition of Publ 4261 has been updated and expanded to include a review of the oxygenate regulations and the technical literature that has been published since 1988. It provides a technical assessment suitable for policy discussions related to alcohols and ethers in transportation. Pages: 119

3rd Edition | June 2001 | Product Number: C42613 | Price: \$157.00

## Publ 4262

### Methanol Vehicle Emissions

December 1990 | Product Number: F42620 | Price: \$121.00

## API/NPRA Survey

### Final Report: 1996 API/NPRA Survey of Refining Operations and Product Quality

A survey of industry refining data for the period May 1 through August 31, 1996. The report includes information on domestically produced gasoline and diesel product quality as well as aggregate domestic refining capacity and average operating data. Pages: 190

1st Edition | July 1997 | Product Number: F10001 | Price: \$63.00

Aviation Turbines Fuels, 2001 | Price: \$90.00

Heating Oils, 2002 | Price: \$100.00

Motor Gasolines, Winter 2001–2002 | Price: \$120.00

Motor Gasolines, Summer 2001 | Price: \$120.00

Diesel Fuel Oils, 2002 | Price: \$100.00

Magnetic computer tapes of raw data are available upon request. Reports from previous years are also available.

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## PROCESS SAFETY STANDARDS

## RP 752

### Management of Hazards Associated With Location of Process Plant Buildings

Provides guidance for managing the risk from explosions, fires and toxic material releases to on-site personnel located in new and existing buildings intended for occupancy. This RP was developed for use at refineries, petrochemical and chemical operations, natural gas liquids extraction plants, natural gas liquefaction plants, and other onshore facilities covered by the OSHA Process Safety Management of Highly Hazardous Chemicals, 29 *CFR* 1910.119.

# Refining

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Buildings covered by this RP are rigid structures intended for permanent use in fixed locations. Tents, fabric enclosures and other soft-sided structures are outside the scope of this document.

Significant research and development of technology pertinent to building siting evaluations has been performed since the publication of the previous editions of RP 752. Examples of updated technology include prediction of blast damage to buildings, determination of occupant vulnerabilities, and estimates of event frequencies. Prior versions of RP 752 and the technical data included in them should not be used for building siting evaluations.

This edition of RP 752 does not cover portable buildings. Portable buildings are now covered by RP 753. It is recognized, however, that portable buildings specifically designed for significant blast load represent a potential area of overlap between RPs 753 and 752. In accordance with 1.3 of this document:

“Buildings described in API RP 753, *Management of Hazards Associated with Location of Process Plant Portable Buildings*, First Edition, June 2007, as ‘portable buildings specifically designed to resist significant blast loads’ and intended for permanent use in a fixed location are covered in this document (API RP 752). All other portable buildings are covered by API RP 753.” Pages: 27

3rd Edition | December 2009 | Product Number: K75203 | Price: \$136.00  
You may access RP 752 in a read-only platform: [publications.api.org](http://publications.api.org)

## RP 753

### Management of Hazards Associated With Location of Process Plant Portable Buildings

Provides guidance for reducing the risk to personnel located in portable buildings from potential explosion, fire and toxic release hazards. While occupied permanent buildings (e.g. control rooms, operator shelters) located near covered process area are typically constructed to be blast and fire resistant, conventional portable buildings (i.e. light wood trailers) are typically not constructed to be blast and fire resistant. Past explosion accidents have demonstrated that occupants of conventional portable buildings are susceptible to injuries from structural failures, building collapse, and building debris and projectiles.

Guidance is provided based on the following principles:

- Locate personnel away from covered process areas consistent with safe and effective operations.
- Minimize the use of occupied portable buildings in close proximity to covered process areas.
- Manage the occupancy of portable building especially during periods of increased risk including unit start up or planned shutdown operations.
- Design, construct, install, and maintain occupied portable buildings to protect occupants against potential hazards.
- Manage the use of portable buildings as an integral part of the design, construction and maintenance operation of a facility. Pages: 22

1st Edition | June 2007 | Product Number: K75301 | Price: \$136.00  
You may access RP 753 in a read-only platform: [publications.api.org](http://publications.api.org)

## RP 754

### Process Safety Performance Indicators for the Refining and Petrochemical Industries

As a result of the U.S. Chemical Safety and Hazard Investigation Board (CSB) investigation of the 2005 BP Texas City incident, the CSB issued several recommendations including the development of an American National Standards Institute (ANSI) Standard that creates performance indicators for process safety in the refinery and petrochemical industries. Ensure that the Standard identifies leading and lagging indicators for nationwide public reporting as well as indicators for use at individual facilities. Include methods for the development and use of the performance indicators.

RP 754 identifies leading and lagging process safety indicators that are useful for driving performance improvement. The indicators are divided into four tiers that represent a leading and lagging continuum. Tier 1 is the most lagging and Tier 4 is the most leading. Tiers 1 and 2 are suitable for nationwide public reporting and Tiers 3 and 4 are intended for internal use at individual sites.

The document was developed for the refining and petrochemical industries, but may also be applicable to other industries with operating systems and processes where loss of containment has the potential to cause harm. Applicability is not limited to those facilities covered by the OSHA Process Safety Management Standard, 29 *CFR* 1910.119 or similar national and international regulations. Pages: 39

1st Edition | April 2010 | Product Number: K75401 | Price: \$105.00  
You may access RP 754 in a read-only platform: [publications.api.org](http://publications.api.org)

## RP 755

### Fatigue Prevention Guidelines for the Refining and Petrochemical Industries

As a result of the U.S. Chemical Safety and Hazard Investigation Board (CSB) investigation of the 2005 BP Texas City incident, the CSB issued several recommendations including the development of an American National Standards Institute (ANSI) Standard that develops Fatigue prevention guidelines for the refining and petrochemical industries that, at a minimum, limit hours and days of work and address shift work.

RP 755 provides guidance to all stakeholders (e.g. employees, managers, supervisors) on understanding, recognizing and managing fatigue in the workplace. Owners and operators should establish policies and procedures to meet the purpose of RP.

This document was developed for refineries, petrochemical and chemical operations, natural gas liquefaction plants, and other facilities such as those covered by the OSHA Process Safety Management Standard, 29 *CFR* 1910.119. This document is intended to apply to a workforce that is commuting daily to a job location.

RP 755 applies to all employees working night shifts, rotating shifts, extended hours/days or call outs involved in process safety sensitive actions. It should also be considered for others making process safety-sensitive decisions. On-site contractors involved in process safety sensitive actions shall have fatigue risk management systems equivalent to the criteria outlined in this document. Pages: 11

1st Edition | April 2010 | Product Number: K75501 | Price: \$80.00  
You may access RP 755 in a read-only platform: [publications.api.org](http://publications.api.org)

## TR 755-1

### Technical Support Document for ANSI/API RP 755, Fatigue Risk Management Systems for Personnel in the Refining and Petrochemical Industries

Identifies and explains the scientific and operational issues considered during the preparation of RP 755. By providing the reasoning behind the specific wording in the RP 755 document, this document supports each key statement in RP 755 in sequence so that it can be used in parallel with the RP 755 text. To make this document accessible and manageable, key scientific sources and references are provided to help readers gain access to the scientific literature.

Fatigue Risk Management Systems (FRMS) have emerged and been widely recognized as a more effective approach to managing and mitigating employee fatigue risk in the 24/7 workplace. The core feature of the FRMS is that it is a data-driven, risk-informed, safety performance-based system. The FRMS implementation process first identifies all sources of fatigue risk in the business operation, then introduces mitigating policies, technologies, and procedures to reduce the risk, and most importantly then maintains them in a proactively-managed continuous improvement system. The history of FRMS was recently summarized.

This method represents a significant step change from the traditional approaches of either relying on maximum limits to hours of work or minimum limits to hours of rest (variously called Hours of Service, Work-Rest Rules, Working Time Directives), or adopting intermittent or piece-meal solutions (e.g. a fatigue training program or a shift schedule redesign), depending on the interests and initiative of local site managers.

# Refining

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One essential feature of FRMS is that it is a system meant to be improved upon on a regular and continuous basis. It is not a set of guidelines designed for one-time compliance, but instead provides a framework that will evolve over time, driven by the collection of data on fatigue risk and fatigue outcomes (e.g. fatigue-related incidents). Pages: 49

1st Edition | April 2010 | Product Number: K755101 | Price: \$100.00

## PROCESS SAFETY—TRAINING COURSES

### API RP 752 and 753: Facility Siting Regulations and Compliance [www.api.org/apiucalendar](http://www.api.org/apiucalendar)

This course is a management-level overview and addresses the regulatory requirements for facility siting, a review of RP 752 and RP 753, and an overview of the methods to satisfy the requirements. Anyone managing, performing, or reviewing facility siting needs should attend.

### Facility Siting Update: Process Plant Building Hazard Management [www.api.org/apiucalendar](http://www.api.org/apiucalendar)

Learn what you need to do to respond to the new recommended practice on *Location of Process Plant Portable Buildings*. Learn what issues are being addressed in revising RP 752 and what you will need to prepare for in response. The first day is a management overview; the second day is a more technical course designed for the process safety professional who is performing facility siting studies and requires each student to bring a calculator.

### Facility Siting Consequence Analysis Techniques [www.api.org/apiucalendar](http://www.api.org/apiucalendar)

This course is a continuation of the *API RP 752 and 753: Facility Siting Regulations and Compliance* course and is designed for the process safety professional performing facility siting studies. Topics covered will include a review of common methodologies to calculate blast loads and building damage for a facility siting study for both permanent and portable buildings. A significant portion of the course will be spent performing example calculations. Note: each student will need to bring a calculator.

## HEALTH, ENVIRONMENT, AND SAFETY

### Cumulative Impact of Environmental Regulations on the U.S. Petroleum Refining, Transportation and Marketing Industries

1st Edition | Product Number: C00015 | available at [www.api.org](http://www.api.org)

#### RP 751

#### Safe Operation of Hydrofluoric Acid Alkylation Units

Provides guidance to refiners on the safe operations of hydrofluoric acid (HF) alkylation units. Areas specifically covered in the document include hazards management, operating procedures, worker protection, materials & new construction, inspection and maintenance of HF units, transportation, inventory control, relief and utility systems and mitigation options. Provides additional information on elements of a comprehensive HF audit, HF exposure limits, corrosion & materials considerations specific to HF alkylation units, examples of tasks for each type of clothing class and procedures for unloading acid tank trucks & design features of an acid-truck unloading station. Refiners with HF alkylation units will find this document very helpful when performing a Process Hazards Analysis for compliance with OSHA Process Safety Management regulations. Pages: 46

3rd Edition | June 2007 | Product Number: C75103 | Price: \$136.00

You may access RP 751 in a read-only platform: [publications.api.org](http://publications.api.org)

## HEALTH, ENVIRONMENT, AND SAFETY: AIR

#### Publ 337

#### Development of Emission Factors for Leaks in Refinery Components in Heavy Liquid Service

Estimating air pollutants from stationary sources is necessary for compiling emission inventories, determining emission fees, and meeting the conditions of various permits and compliances. This report provides revised emission factors applicable to refinery components in heavy liquid (HL) service, which were based on extensive field measurements. It also provides data analyses to determine whether the type of distillate or residual hydrocarbon in the stream would influence the emission factors. Pages: 68

August 1996 | Product Number: J33700 | Price: \$71.00

## HEALTH, ENVIRONMENT, AND SAFETY: WATER

#### Publ 958

#### Pilot Studies on the Toxicity of Effluents From Conventional and Carbon Enhanced Treatment of Refinery Wastewater—Phase III

January 1981

## HEALTH, ENVIRONMENT AND SAFETY: SOIL AND GROUNDWATER

#### Publ 422

#### Groundwater Protection Programs for Petroleum Refining and Storage Facilities: A Guidance Document

Reflects continuing industry action and commitment to positively address groundwater protection by developing and implementing individual groundwater protection plans. Provides additional guidance to help petroleum facilities identify the types of issues that may need to be addressed in a groundwater protection plan. Intended to help refineries, terminals associated with transportation pipelines, product distribution terminals, and other downstream petroleum storage units develop groundwater protection plans that are tailored to their individual circumstances. Pages: 9

1st Edition | October 1994 | Product Number: C42201 | Price: \$63.00

#### Publ 4760

#### LNAPL Distribution and Recovery Model (LDRM)

The API LNAPL Distribution and Recovery Model (LDRM) simulate the performance proven hydraulic technologies for recovering free-product petroleum liquid releases to groundwater. The LDRM provides information about LNAPL distribution in porous media and allows the user to estimate LNAPL recovery rates, volumes and times. Documentation for the LDRM is provided in 2 volumes. Volume 1—Distribution for the LDRM is porous media documents the LDRM and provides background information necessary to characterize the behavior of LNAPL in porous media with regard to performance of LNAPL liquid recovery technologies. Volume 2—User and Parameter Selection Guide provides step-by-step instructions for LDRM software. Four example problem applications are presented with highlight model use, parameter estimation using the API LNAPL Parameters database, and limitations of scenario-based models

January 2007 | Software and documentation can be downloaded from API's website: [groundwater.api.org/Inapl](http://groundwater.api.org/Inapl)

#### Publ 800

#### Literature Survey: Subsurface and Groundwater Protection Related to Petroleum Refinery Operations

This report is the principal product of an API-sponsored project to prepare a background basis for the development of further information on subsurface and groundwater protection at refineries. It contains an explanation of how the literature survey was conducted; annotations for pertinent articles; a

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discussion of applicable federal statutes and regulations; and annotations for pertinent regulatory programs under the 5 principal statutes that apply to refinery operations.

1st Edition | September 1988 | Product Number: C80000 | Price: \$89.00

### SECURITY

#### API Standard for Third Party Network Connectivity

Provides guidance for implementing secure third-party connections between the information technology systems and network of two companies that have a business relations and a common objective.

The standard will provide suggestions for companies to establish third-party network connections while protecting their individual systems and data from unauthorized access or manipulation. Pages: 36

1st Edition | November 2007 | Product Number: TSTP01 | Price: \$87.00

#### Security Guidance for the Petroleum Industry

API's 2nd Edition of this document is now in use at oil and gas facilities around the world to help managers decide how to deter terrorist attacks. Covering all segments of the industry (production, refining, transportation, pipeline, and marketing), this guidance builds on the existing solid foundation of design and operational regulations, standards, and recommended practices, which relate to facility design and safety, environmental protection, emergency response, and protection from theft and vandalism. Produced in close collaboration with the U.S. Department of Homeland Security and other federal agencies, these guidelines, viewed as a living document, are broadly applicable to facility security in light of September 11, 2001 and provide the starting point for developing security plans at oil and natural gas facilities and operations. Pages: 169

3rd Edition | April 2005 | Product Number: OS0001 | Price: \$185.00

You may access this document in a read-only platform: [publications.api.org](http://publications.api.org)

#### Security Vulnerability Assessment Methodology for the Petroleum and Petrochemical Industries

API and the National Petrochemical & Refiners Association jointly developed a new methodology for evaluating the likelihood and consequences of terrorist attacks against refineries and petrochemical facilities. This document is designed for companies to use in assessing vulnerabilities and potential damages from different kinds of terrorist attacks. In the post September 11 era, companies have reevaluated and enhanced security at their facilities. The methodology will provide officials with a new analytical tool to determine "the likelihood of an adversary successfully exploiting vulnerability and the resulting degree of damage or impact." This vulnerability assessment methodology was produced in close collaboration with the U.S. Department of Homeland Security and other federal agencies. Pages: 155

October 2004 | Product Number: OSVA02 | Price: \$185.00

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### SECURITY—TRAINING COURSES

#### Workshop on Industry Security Vulnerability Assessments (SVAs)

[www.api.org/apiucalendar](http://www.api.org/apiucalendar)

API presents the leading SVA training for the petroleum, petrochemical and chemical industries. The objective of an SVA is to identify security hazards, threats and vulnerabilities facing a facility and to evaluate the countermeasures to provide for the protection of the public, workers, national interests, the environment, and the company.

#### Workshop on USCG Regulations for Facility Security Officers (FSOs)

[www.api.org/apiucalendar](http://www.api.org/apiucalendar)

Learn about the requirements for FSOs released in the U.S. Coast Guard (USCG) Final Rule: Part 105, Subpart B. Course materials include a reference CD of over 30 helpful related documents including the regulation, Navigation and Vessel Inspection Circulars (NVICs), API's Security Vulnerability Assessment Methodology for the Petroleum and Petrochemical Industries, and numerous U.S. Department of Homeland Security bulletins.