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

**API 510**

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;
- non-standard vessels—a vessel fabricated to a recognized construction code but has lost its nameplate or stamping.

**API 570**

Covers the inspection, rating, repair, and alteration of piping systems. (includes addenda to the current edition of the code)

**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. This RP covers over 60 damage mechanisms. Each write-up consists of a general description of the damage, susceptible materials, 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

**RP 572**

Inspection Practices for 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

**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: 109
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: $136.00

RP 574 * Inspection Practices for Piping System Components—Chinese
Chinese translation of RP 574.
3rd Edition | November 2009 | Product Number: C57403C | Price: $96.00

RP 575 ● Inspection Practices for Atmospheric and Low-Pressure Storage Tanks
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 recommended practice 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: 96
3rd Edition | April 2014 | Product Number: C57503 | Price: $190.00

RP 575 * Inspection Practices for Atmospheric and Low-Pressure Storage Tanks—Chinese
Chinese translation of RP 575.
3rd Edition | April 2014 | Product Number: C57503C | Price: $133.00

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 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
Product Number: C57603 | Price: $134.00

RP 576 * Inspection of Pressure-Relieving Devices—Chinese
Chinese translation of RP 576.
3rd Edition | November 2009 | Product Number: C57603C | Price: $94.00

RP 577 ● Welding Processes, 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: 145
2nd Edition | December 2013 | Product Number: C57702 | Price: $225.00

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
Product Number: C57802 | Price: $129.00

RP 578 * Material Verification Program for New and Existing Alloy Piping Systems—Chinese
Chinese translation of RP 578.
2nd Edition | March 2010 | Product Number: C57802C | Price: $91.00

RP 578 * Material Verification Program for New and Existing Alloy Piping Systems—Russian
Russian translation of RP 578.
2nd Edition | March 2010 | Product Number: C57802R | Price: $91.00

API 579-1/ASME FFS-1 Fitness-For-Service
Methods and procedures in this standard augment the requirements in API 510, API 570, Std 653, and other post-construction codes that reference FFS evaluations, such as NB-23. The procedures in this standard can be used for Fitness-For-Service assessments and/or rerating of equipment designed and constructed to recognized codes and standards, including international and internal corporate standards. This standard has a broad application, since the assessment procedures are based on allowable stress methods and plastic collapse loads for non-crack-like flaws, and the failure assessment diagram (FAD) approach for crack-like flaws.
The Fitness-For-Service assessment procedures in this standard cover both the present integrity of the component given to a current state of damage and the projected remaining life. Assessment techniques are included to evaluate the following flaws: general and localized corrosion; widespread and localized pitting; blisters and hydrogen damage; weld misalignment and...
Product Number: C58002 | Price: $189.00

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 Std 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: C58002C | Price: $133.00

API Risk-Based Inspection Software
API RBI software, created by petroleum refinery and chemical plant owner/users for owner/users, finds its basis in API Publication 581, Base Resource Document–Risk-Based Inspection. Practical, valuable features are built into the 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 a highly effective inspection program; and
- Systematically manage the risks associated with equipment failures.

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

For more information: e-mail rbi@api.org or call 281-537-8848
Refining

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RP 582
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 items, when referenced by an applicable purchase document.

This document is general in nature and augments 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: $124.00

RP 582 *
Welding Guidelines for the Chemical, Oil, and Gas Industries—Russian
Russian translation of RP 582.

2nd Edition | December 2009 | Product Number: C58202R | Price: $100.00

RP 583 ◆
Corrosion Under Insulation and Fireproofing
Covers the design, maintenance, inspection, and mitigation practices to address external corrosion under insulation (CUI) and corrosion under fireproofing (CUF). The document discusses the external corrosion of carbon and low alloy steels under insulation and fireproofing, and external chloride stress corrosion cracking (ECSCC) of austenitic and duplex stainless steels under insulation. The document does not cover atmospheric corrosion or corrosion at uninsulated pipe supports, but does discuss corrosion at insulated pipe supports.

The purpose of this RP is to:

- help owner/users understand the complexity of the many CUI/CUF issues,
- provide owner/users with understanding the advantages and limitations of the various NDE methods used to identify CUI and CUF damage,
- provide owner/users with an approach to risk assessment (i.e. likelihood of failure, and consequence of failure) for CUI and CUF damage, and
- provide owner/users guidance on how to design, install, and maintain insulation systems to avoid CUI and CUF damage. Pages: 88

1st Edition | May 2014 | Product Number: C58301 | Price: $170.00

RP 584 ◆
Integrity Operating Windows
Explains the importance of IOWs for process safety management and to guide users in how to establish and implement an IOW program for refining and petrochemical process facilities for the express purpose of avoiding unexpected equipment degradation that could lead to loss of containment. It is not the intent of this document to provide a complete list of specific IOWs or operating variables that might need IOWs for the numerous types of hydrocarbon process units in the industry (though some generic examples are provided in the text and in Appendix A), but rather to provide the user with information and guidance on the work process for development and implementation of IOWs for each process unit. Pages: 35

1st Edition | May 2014 | Product Number: C58401 | Price: $120.00

RP 585 ◆
Pressure Equipment Integrity Incident Investigation
Provides owner/users with guidelines and recommended practices for developing, implementing, sustaining, and enhancing an investigation program for pressure equipment integrity incidents. This recommended practice describes characteristics of an effective investigation and how organizations can learn from pressure equipment integrity incident investigations. This RP is intended to supplement and provide additional guidance for the OSHA Process Safety Management (PSM) Standard 29 CFR 1910.119 (m) incident investigation requirements, with a specific focus on incidents caused by integrity failures of pressure equipment. Pages: 41

1st Edition | April 2014 | Product Number: C58501 | Price: $125.00

Std 653 ◆
Tank Inspection, Repair, Alteration, and Reconstruction
Covers steel storage tanks built to Std 650 and its predecessor Spec 12C. It provides minimum requirements for maintaining the integrity of such tanks after they have been placed in service and addresses inspection, repair, alteration, relocation, and reconstruction.

The scope is limited to the tank foundation, bottom, shell, structure, roof, attached appurtenances, and nozzles to the face of the first flange, first thread joint, or first welding-end connection. Many of the design, welding, examination, and material requirements of Std 650 can be applied in the maintenance inspection, rating, repair, and alteration of in-service tanks. In the case of apparent conflicts between the requirements of this standard and Std 650 or its predecessor Spec 12C, this standard shall govern for tanks that have been placed in service.

This standard employs the principles of Std 650; however, storage tank owner/operators, based on consideration of specific construction and operating details, may apply this standard to any steel tank constructed in accordance with a tank specification.

This standard is intended for use by organizations that maintain or have access to engineering and inspection personnel technically trained and experienced in tank design, fabrication, repair, construction, and inspection.

This standard does not contain rules or guidelines to cover all the varied conditions which may occur in an existing tank. When design and construction details are not given, and are not available in the as-built standard, details that will provide a level of integrity equal to the level provided by the current edition of Std 650 must be used.

This standard recognizes fitness-for-service assessment concepts for evaluating in-service degradation of pressure containing components. API 579-1/ASME FFS-1, Fitness-For-Service, provides detailed assessment procedures or acceptance criteria for specific types of degradation referenced in this standard. When this standard does not provide specific evaluation procedures or acceptance criteria for a specific type of degradation or when this standard explicitly allows the use of fitness-for-service criteria, API 579-1/ASME FFS-1 may be used to evaluate the various types of degradation or test requirements addressed in this standard. Pages: 162


You may access the 3rd and 4th Editions of Std 653 in a read-only platform: publications.api.org

Std 653 *
Tank Inspection, Repair, Alteration, and Reconstruction—Chinese
Chinese translation of Std 653.

5th Edition | November 2014 | Product Number: C65305C | Price: $165.00

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This publication is a new entry in this catalog. This publication is related to an API licensing, certification, or accreditation program.
MECHANICAL EQUIPMENT STANDARDS FOR REFINERY SERVICE

Std 610/ISO 13709:2009
Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries
(ANSI/API Std 610)
(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: C61011 | Price: $257.00

Std 611
General Purpose Steam Turbines for Petroleum, Chemical, and Gas Industry Services
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

Product Number: C61105 | Price: $147.00

Std 612/ISO 10437:2003
Petroleum Petrochemical and Natural Gas Industries—Steam Turbines—Special-Purpose Applications
Specifies the minimum requirements for steam turbines for special-purpose applications for use in the petroleum, petrochemical, and natural gas industries. These requirements include basic design, materials, fabrication, inspection testing, and preparation for shipment. 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. Pages: 146

7th Edition | August 2014 | Product Number: C61207 | Price: $220.00

Std 613
Special Purpose Gear Units for Petroleum, Chemical and Gas Industry Services
(ANSI/API Std 613)
(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

Product Number: C61305 | Price: $165.00

Std 614/ISO 10438-1:2007
Lubrication, Shaft-Sealing and Oil-Control Systems and Auxiliaries
(ANSI/API Std 614)
(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 are: 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

Product Number: CX61402 | Price: $293.00

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: $206.00

Std 617
Axial and Centrifugal Compressors and Expander-Compressors
Covers the minimum requirements for centrifugal compressors used in petroleum, chemical, and gas industry services that handle air or gas, including process gear mounted. Does not apply to fans or blowers that develop less than 34 kPa (5 psi) pressure rise above atmospheric pressure; these are covered by Std 673. This standard also does not apply to packaged, integrally geared centrifugal air compressors, which are covered by Std 672. Pages: 374

8th Edition | September 2014 | Product Number: C61707 | Price: $240.00

Std 618
Reciprocating Compressors for Petroleum, Chemical and Gas Industry Services
(ANSI/API Std 618)
(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: $181.00

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: $216.00
This publication is a new entry in this catalog.

This publication is related to an API licensing, certification, or accreditation program.
Std 682
Pumps—Shaft Sealing Systems for Centrifugal and Rotary Pumps

Specifies requirements and gives recommendations for sealing systems for centrifugal and rotary pumps used in the petroleum, natural gas, and chemical industries. See A.1.1 and A.1.2. It is the responsibility of the purchaser or seal vendor to ensure that the selected seal and auxiliaries are suitable for the intended service condition. It is applicable mainly for hazardous, flammable, and/or toxic services where a greater degree of reliability is required for the improvement of equipment availability and the reduction of both emissions to the atmosphere and life-cycle sealing costs. 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 standard into categories, types, arrangements, and orientations is provided.

This standard is referenced normatively in Std 610. It is applicable to both new and retrofitted pumps and to pumps other than Std 610 pumps (e.g. ASME B73.1, ASME B73.2, and Std 676 pumps). This standard might also be referenced by other machinery standards such as other pumps, compressors, and agitators. Users are cautioned that this standard is not specifically written to address all of the potential applications that a purchaser may specify. This is especially true for the size envelope specified for Std 682 seals. The purchaser and seal vendor shall mutually agree on the features taken from this standard and used in the application. Pages: 256

4th Edition | May 2014 | Product Number: C68204 | Price: $255.00

Std 682 *■
Pumps—Shaft Sealing Systems for Centrifugal and Rotary Pumps—Chinese

Chinese translation of Std 682.

4th Edition | May 2014 | Product Number: C68204C | Price: $179.00

RP 684

Describes, discusses, and clarifies the section of the API Standard Paragraphs that outline the complete lateral and torsional rotodynamics 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: $176.00

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: $206.00

RP 686
Recommended Practice for Machinery Installation and Installation Design

Provides 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

Product Number: C68602 | Price: $187.00

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

Product Number: C68701 | Price: $267.00

RP 687
Rotor Repair—Data CD

CD-ROM containing all datasheets from RP 687.

1st Edition | September 2001 | Product Number: C68701 | Price: $247.00

RP 688
Pulsation and Vibration Control in Positive Displacement Machinery Systems for Petroleum, Petrochemical, and Natural Gas Industry Services

Provides guidance on the application of pulsation and vibration control requirements found in the API purchasing specifications for positive displacement machinery. The fundamentals of pulsation and piping system analysis are presented in Part 1. Part 2 deals specifically with reciprocating compressors and provides commentary regarding each paragraph of Section 7.9 of Std 618, 5th Edition. Pages: 128

1st Edition | April 2012 | Product Number: C68801 | Price: $156.00

Std 689/ISO 14224:2006
Collection and Exchange of Reliability and Maintenance Data for Equipment (ANSI/API Std 689)

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. Std 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: $213.00
Refining

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EQUIPMENT Datasheets

Electronically formatted mechanical equipment standards datasheets are now available in electronic format (Excel 5.0 spreadsheets):

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- Std 537 2nd Edition
- Std 546 3rd Edition
- Std 560 4th Edition
- Std 610 11th Edition
- Std 611 5th Edition
- Std 612 7th Edition
- Std 613 5th Edition
- Std 614 5th Edition
- Std 615 5th Edition
- Std 616 5th Edition
- Std 617 8th Edition
- Std 618 5th Edition
- Std 619 5th 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: $115.00

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The American Petroleum Institute Specification Database provides a knowledge-management toolset for the project engineering team. Facilitates the entire equipment specification process including the entry of process data and release to design to the final entry of mechanical datasheets 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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STORAGE TANKS

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 the American Petroleum Institute 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 needs and required 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 synopses and bibliographic information for all articles reviewed for the project is organized by article index number. Reference numbers cited in this report refer to the article index number. Pages: 25

January 2003 | Executive Summary | Price: $65.00
Appendix A—Literature Review | Price $127.00

* 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 620

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

(covers Addendum 2 dated November 2014)

Covers the design and construction of large field-assembled, welded, low-pressure carbon steel above ground storage tanks (including flat-bottom tanks) that have a single vertical axis of revolution, 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.

Covered are tanks designed for metal temperatures not greater than 250 °F and with pressures in their gas or vapor spaces not more than 15 pounds per square inch gauge. The basic rules in this standard provide for installation in areas where the lowest recorded 1-day mean atmospheric temperature is -50 °F. Annex S covers stainless steel low-pressure storage tanks in ambient temperature service in all areas, without limit on low temperatures. Annex R covers low-pressure storage tanks for refrigerated products at temperatures from +40 °F to -60 °F. Annex Q covers low-pressure storage tanks for liquefied gases at temperatures not lower than -325 °F.

This standard is applicable to tanks that (a) hold or store liquids with gases or vapors above their surface or (b) hold or store gases or vapors alone. These rules do not apply to lift-type gas holders.

Although the rules in this standard do not cover horizontal tanks, they are not intended to preclude the application of appropriate portions to the design and construction of horizontal tanks designed in accordance with good engineering practice. Pages: 277


You may access the 11th Edition of Std 620 in a read-only platform: publications.api.org

Std 620 *

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

Chinese translation of Std 620.

12th Edition | October 2013 | Product Number: C62012C | Price: $305.00

Std 625

Tank Systems for Refrigerated Liquefied Gas Storage

(covers Addendum 1 dated July 2013, Addendum 2 dated November 2014)

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/appurtenances, quality assurance, insulation, and commissioning of tank systems. Included are 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. Also covered are 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).

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. Pages: 63

1st Edition | August 2010 | Product Number: C62501 | Price: $232.00

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* This publication is a new entry in this catalog.  ◆ This publication is related to an API licensing, certification, or accreditation program.
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Std 650 ♦
Welded Tanks for Oil Storage
(includes Addendum 1 dated September 2014, Addendum 2 dated January 2016, Errata 1 dated July 2013, and Errata 2 dated December 2014)

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: 498

12th Edition | March 2013 | Product Number: C65012 | Price: $475.00
You may access the 3rd Edition of RP 651 in a read-only platform: publications.api.org

Std 650 *
Welded Tanks for Oil Storage—Chinese
Chinese translation of Std 650.

12th Edition | March 2013 | Product Number: C65012C | Price: $333.00

RP 651 ♦
Cathodic Protection of Aboveground Petroleum Storage Tanks

Presents procedures and practices for achieving effective corrosion control on aboveground storage tank bottoms through the use of cathodic protection. This RP contains provisions for the application of cathodic protection to existing and new aboveground storage tanks. Corrosion control methods based on chemical control of the environment or the use of protective coatings are not covered in detail.

When cathodic protection is used for aboveground storage tank applications, it is the intent of this RP to provide information and guidance specific to aboveground metallic storage tanks in hydrocarbon service. Certain practices recommended herein may also be applicable to tanks in other services. It is intended to serve only as a guide to persons interested in cathodic protection. Specific cathodic protection designs are not provided. Such designs should be developed by a person thoroughly familiar with cathodic protection practices for aboveground petroleum storage tanks.

This RP does not designate specific practices for every situation because of the wide variety of service environments. This recommended practice does not designate specific tank bottom linings for every situation because of the wide variety of service environments. Pages: 46

4th Edition | September 2014 | Product Number: C65104 | Price: $125.00
You may access the 3rd Edition of RP 651 in a read-only platform: publications.api.org

RP 651 * *
Cathodic Protection of Aboveground Petroleum Storage Tanks—Chinese

Chinese translation of RP 651.

4th Edition | September 2014 | Product Number: C65104C | Price: $88.00

RP 652 ♦
Linings of Aboveground Petroleum Storage Tank Bottoms

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.

This publication is related to an API licensing, certification, or accreditation program.
petrochemical plants, and tank farms. This standard covers storage vessels, pressure vessels and related equipment against overpressure from operating allowable working pressure of 15 psig (103 kPag) or greater. The pressure loading and unloading systems, piping, and related equipment. Pages: 22

TR 939-D
Stress Corrosion Cracking of Carbon Steel in Fuel Grade Ethanol—Review, Experience Survey, Field Monitoring, and Laboratory Testing (includes Addendum 1 dated October 2013)
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, and information on mitigation and prevention. Pages: 172

2nd Edition | May 2007 | Product Number: C939D0 | Price: $160.00

Std 2510
Design and Construction of LPG Installations
Provides minimum requirements for the design and construction of installations for the storage and handling of liquefied petroleum gas (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

Product Number: C25108 | Price: $103.00

Std 2510 *
Design and Construction of LPG Installations—Spanish
Spanish translation of Std 2510.

8th Edition | May 2001 | Product Number: C25108SP | Price: $103.00

PRESSURE-RELIEVING SYSTEMS FOR REFINERY SERVICE

Std 520, Part I
Sizing, Selection, and Installation of Pressure-Relieving Devices—Part I—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 unfrangible 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 Std 2000 and pressure vessels used for the transportation of product 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: 143


Std 520, Part I ■
Sizing, Selection, and Installation of Pressure-Relieving Devices—Part I—Sizing and Selection—Russian
Russian translation of Std 520, Part I.


RP 520, Part II ■
Sizing, Selection, and Installation of Pressure-Relieving Devices—Part II—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: 55


Std 521
Pressure-Relieving and Depressuring Systems
Applies to pressure relieving and vapor depressing systems. Although intended for use primarily in oil refineries, it is also applicable to petrochemical facilities, gas plants, liquefied natural gas (LNG) facilities, and oil and gas production facilities. 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 standard specifies requirements and gives guidelines for the following:

• examining the principal causes of overpressure;
• determining individual relieving rates;
• selecting and designing disposal systems, including such component parts as piping, vessels, flames, and vent stacks.

This standard does not apply to direct-fired steam boilers. Pages: 248


Std 526
Flanged Steel Pressure-Relief Valves
(includes Errata 1 dated May 2009 and Errata 2 dated October 2012)
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;
• materials;
• pressure-temperature limits;
• center-to-face dimensions, inlet and outlet.

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

Product Number: C52606 | Price: $156.00

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◆ This publication is related to an API licensing, certification, or accreditation program.

96
This International Standard does not apply to external floating-roof tanks. Pages: 87

7th Edition | March 2014 | Product Number: C20007 | Price: $225.00

Piping Component and Valve Standards

API 570
Piping Inspection Code: In-service Inspection, Rating, Repair, and Alteration of Piping Systems
(includes addenda to the current edition of the code)
Covers the inspection, rating, repair, and alteration procedures for metallic and fiberglass reinforced plastic 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
Product Number: C57003 | Price: $134.00

API 570
Piping Inspection Code: In-Service Inspection, Rating, Repair, and Alteration of Piping System—Chinese
Chinese translation of API 570.
Product Number: C57003C | 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 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
Product Number: C57403 | Price: $136.00

RP 574
Inspection Practices for Piping System Components—Chinese
Chinese translation of RP 574.
3rd Edition | November 2009 | Product Number: C57403C | Price: $96.00

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This publication is a new entry in this catalog.
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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.

• 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: 2

7th Edition | September 2010 | Effective Date: March 1, 2011
Product Number: C59407 | Price: $106.00

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Std 601 •
Steel Gate Valves—Flanged and Butt-Welding Ends, Bolted Bonnets—Chinese
Chinese translation of Std 600.

13th Edition | January 2015 | Product Number: C60013C | Price: $95.00

Std 602 •
Gate, Globe, and Check Valves for Sizes DN 100 (NPS 4) and Smaller for the Petroleum and Natural Gas Industries
This international standard 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 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 2 1/2 (8 DN 65) and pressure designations including Class 800.
- Inside screw with rising stems (ISR5), 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 seat body 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 through 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 1/2 NPS 2 (8 DN 50). It covers bellows stem seal type testing requirements. Pages: 57
Product Number: C60210 | Price: $125.00

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: 19
8th Edition | February 2013 | Product Number: C60308 | Price: $80.00

Std 604 •
Butterfly Valves: Double-Flanged, Lug- and Wafer-Type
 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 24.

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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  2-Year Extension: November 2014 | Product Number: C60907 | Price: $92.00

Std 609 *
Butterfly Valves: Double-Flanged, Lug- and Wafer-Type—Chinese

Chinese translation of Std 609.


Std 609 *
Butterfly Valves: Double-Flanged, Lug- and Wafer-Type—Russian

Russian translation of Std 609.

7th Edition | October 2009 | Product Number: C60907R | Price: $73.00

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: $76.00

RP 621
Reconditioning of Metallic Gate, Globe, and Check Valves

Provides guidelines for reconditioning heavy wall (Std 600 and Std 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: $140.00

RP 621 *
Reconditioning of Metallic Gate, Globe, and Check Valves—Russian

Russian translation of RP 621.

3rd Edition | August 2010 | Product Number: C62103R | Price: $112.00

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: $140.00

Std 623
Steel Globe Valves—Flanged and Butt-Welding Ends, Bolted Bonnets

Specifies the requirements for a heavy-duty series of bolted bonnet steel globe valves for petroleum refinery and related applications where corrosion, erosion, and other service conditions would indicate a need for heavy wall sections and large stem diameters. This standard sets forth the requirements for the following globe valve features:

• bolted bonnet,
• outside screw and yoke,
• rotating rising stems, and nonrotating rising stems,
• rising handwheels and nonrising handwheels,
• conventional, y-pattern, right-angle,
• stop-check (nonreturn type globe valves in which the disc may be positioned against the seat by action of the stem, but is free to rise as a check valve due to flow from under the disc, when the stem is in a full or partially open position),
• plug, narrow, conical, ball, or guided disc,
• metallic seating surfaces,
• flanged or butt-welding ends.

It covers valves of the nominal pipe sizes NPS:

• 2, 2 1/2, 3, 4, 6, 8, 10, 12, 14, 16, 18, 20, 24;
• corresponding to nominal pipe sizes DN:

• 50, 65, 80, 100, 150, 200, 250, 300, 350, 400, 450, 500, 600;

applies for pressure class designations:

• 150, 300, 600, 900, 1500, 2500. Pages: 27

1st Edition | September 2013 | Product Number: C62301 | Price: $75.00

Std 624
Type Testing of Rising Stem Valves Equipped with Flexible Graphite Packing for Fugitive Emissions

Specifies the requirements and acceptance criteria (100 ppmv) for fugitive emission type testing of rising and rising-rotating stem valves equipped with packing previously tested in accordance with Std 622. Packing shall be suitable for use at service temperatures −29 °C to 538 °C (−20 °F to 1000 °F). The type testing requirements contained herein are based upon elements of EPA Method 21. Valves larger than NPS 24 or valves greater than class 1500 are outside the scope of this standard. Pages: 12

1st Edition | February 2014 | Product Number: C62401 | Price: $85.00

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

(includes Errata 1 dated January 2014)

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: 146

3rd Edition | December 2012 | Product Number: C50003 | Price: $279.00

You may access the 2nd Edition of RP 500 in a read-only platform: publications.api.org

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- Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2—Kazakh (ANSI/API 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
- Electrical Installations in Petroleum Processing Plants
- Form-Wound Squirrel Cage Induction Motors—375 kW (500 Horsepower) and Larger
- Recommended Practice for Lightning Protection of Aboveground Storage Tanks for Flammable or Combustible Liquids
- Verification of Lightning Protection Requirements for Above Ground Hydrocarbon Storage Tanks

- 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 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

- 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

- 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: 160

- Replaces the requirements of RP 2003 regarding lightning protection for preventing fires in storage tanks with flammable or combustible contents. This recommended practice (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

- Verifies the lightning protection requirements for 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

- 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:
  - The conventional salient-pole rotor with solid or laminated poles, and
  - The cylindrical rotor with solid or laminated construction.

- Also included are new datasheet guidelines to help clarify the datasheet requirements. Pages: 191

- 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

- 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 fired heaters for the petroleum, petrochemical, and natural gas industries. 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 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; Annex A describes a technique for estimating the life remaining for a heater tube. Pages: 264

- Also included are new datasheet guidelines to help clarify the datasheet requirements. Pages: 191

- 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 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

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  - 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

- 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:
  - The conventional salient-pole rotor with solid or laminated poles, and
  - The cylindrical rotor with solid or laminated construction.

- Also included are new datasheet guidelines to help clarify the datasheet requirements. Pages: 191

- 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

- 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 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

- 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

- 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: 160

- Replaces the requirements of RP 2003 regarding lightning protection for preventing fires in storage tanks with flammable or combustible contents. This recommended practice (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

- Verifies the lightning protection requirements for 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

- 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:
  - The conventional salient-pole rotor with solid or laminated poles, and
  - The cylindrical rotor with solid or laminated construction.

- Also included are new datasheet guidelines to help clarify the datasheet requirements. Pages: 191
RP 534
Heat Recovery Steam Generators
Provides guidelines for the selection and 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
Product Number: C53402 | Price: $95.00

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. The burner types discussed are those currently in industry use. It is not intended to imply that other burner types are not available or recommended. Many of the individual features described in these guidelines are applicable to most burner types.
In addition to specification of burners, this RP has been updated to include practical guidelines for troubleshooting in service burners as well as including considerations for safe operation. Pages: 84
3rd Edition | May 2014 | Product Number: C53503 | Price: $150.00

RP 536
Post Combustion NO\textsubscript{x} Control for Fired Equipment in General Refinery Services
Covers the mechanical description, operation, maintenance, and test procedures of post-combustion NO\textsubscript{x} control equipment. It covers the Selective Non-Catalytic Reduction and Selective Catalytic Reduction methods of post-combustion NO\textsubscript{x} reduction. It does not cover reduced NO\textsubscript{x} formation through burner design techniques, such as external flue gas recirculation (FGR). Pages: 41
2nd Edition | December 2006 | Reaffirmed: September 2013
Product Number: C53602 | Price: $97.00

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 vapor-depressurizing systems for the 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
Product Number: C53702 | Price: $217.00

Std 537/ISO 25457:2008
Flare Details for General Refinery and Petrochemical Service—Chinese
Chinese translation of Std 537.
2nd Edition | December 2008 | Product Number: C53702C | Price: $152.00

RP 538
Industrial Fired Boilers for General Refinery and Petrochemical Service
Specifies requirements and gives recommendations for design, operation, maintenance, and troubleshooting considerations for industrial fired boilers used in refineries and chemical plants. Covers waterside control, combustion control, burner management systems, feedwater preparation, steam purity, emissions, and more.
This recommended practice (RP) is based on the accumulated knowledge and experience of manufacturers and users of industrial fired boilers. It directly meets the business needs of refining and petrochemical industry operator-users, equipment vendors and manufacturers, and contractors. This RP reflects prevailing technical expertise.
This RP does not apply to fire tube boilers, gas turbine exhaust boilers, or fluidized bed boilers. It does not cover boiler mechanical construction, nor does it cover forced circulation boilers. Pages: 348
1st Edition | October 2015 | Product Number: C53801 | Price: $305.00

Std 560/ISO 13705:2006
Fired Heaters for General Refinery Services (ANSI/API Std 560)
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 does not apply to the design of steam reformers or pyrolysis furnaces.
This edition of API Std 560 is an identical national adoption of ISO 13705. Pages: 266
Product Number: G56004 | Price: $302.00

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: 109
3rd Edition | October 2013 | Product Number: C57303 | Price: $150.00

Std 660
Shell-and-Tube Heat Exchangers
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. This standard is not applicable to vacuum-operated steam surface condensers and feed-water heaters. Pages: 62
9th Edition | March 2015 | Product Number: C66009 | Price: $185.00

Std 661
Petroleum, Petrochemical, and Natural Gas Industries—Air-Cooled Heat Exchangers for General Refinery Service
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, petrochemical, 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. Pages: 147
7th Edition | July 2013 | Product Number: C66107 | Price: $250.00

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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)
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 Std 662-1 is an identical national adoption of ISO 15547-1:2005. Pages: 34
Product Number: CX662101 | Price: $132.00

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)
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 Std 662-2 is an identical national adoption of ISO 15547-2:2005. Pages: 34
Product Number: CX662201 | Price: $132.00

Std 663
Hairpin-Type Heat Exchangers
Specifies requirements and gives recommendations for the mechanical design, materials selection, fabrication, inspection, testing, and preparation for shipment of hairpin heat exchangers for use in the petroleum, petrochemical, and natural gas industries. Hairpin heat exchangers include double-pipe and multi-tube type heat exchangers. Pages: 44
1st Edition | May 2014 | Product Number: C66301 | Price: $175.00

Std 664
Spiral Plate Heat Exchangers
Specifies the requirements and gives recommendations for the mechanical design, materials selection, fabrication, inspection, testing, and preparation for shipment of spiral plate heat exchangers for use in the petroleum, petrochemical, and natural gas industries. It is applicable to standalone spiral plate heat exchangers and those integral with a pressure vessel. Pages: 39
1st Edition | March 2014 | Product Number: C66401 | Price: $175.00

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
Product Number: C55100 | Price: $125.00

RP 551 *
Process Measurement Instrumentation—Russian
Russian translation of RP 551.
1st Edition | May 1993 | Product Number: C55100R | Price: $100.00

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: August 2015
2-Year Extension: November 2012
Product Number: C55201 | Price: $109.00

RP 553
Refinery Valves and Accessories for Control and Safety Instrumented Systems
Addresses the special needs of automated valves in refinery services. The knowledge and experience of the industry has been captured to provide proven solutions to well-known problems. This document provides recommended criteria for the selection, specification, and application of piston (i.e. double-acting and spring-return) and diaphragm-actuated (spring-return) control valves. Control valve design considerations are outlined such as valve selection, material selection, flow characteristic evaluation, and valve accessories. It also discusses control valve sizing, fugitive emissions, and consideration of the effects of flushing, cavitation, and noise. Recommendations for emergency block and vent valves, on/off valves intended for safety instrumented systems, and special design valves for refinery services, such as Fluid Catalytic Cracking Unit (FCCU) slide valves and vapor depressurizing systems, are also included in this recommended practice. Pages: 109
2nd Edition | October 2012 | Product Number: C55302 | Price: $145.00

RP 554, Part 1
Addresses the processes required to successfully implement process control systems for refinery and petrochemical services. The major topics 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
Product Number: C55402 | Price: $139.00

RP 554, Part 1 *
2nd Edition | July 2007 | Product Number: C55402R | Price: $112.00

RP 554, Part 2
Process Control Systems, Part 2—Process 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
Product Number: C554201 | Price: $139.00

RP 554, Part 2 *
Russian translation of RP 554, Part 2.
1st Edition | October 2008 | Product Number: C554201R | Price: $112.00

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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 system. Pages: 40
Product Number: C554301 | Price: $107.00

API 555
Process Analyzers

Addresses the considerations in the application of analyzers and associated systems, installation, and maintenance. Process monitors that measure and transmit information about chemical composition, physical properties, or chemical properties are known as process analyzer systems. Process analyzers are now used widely in the refining industry for:
• monitoring and controlling product quality,
• implementing advanced control strategies in improving process operations,
• enhancing area safety, and
• continuous emission monitoring and environmental measurement of air and water quality. Pages: 314
3rd Edition | June 2013 | Product Number: C55502 | Price: $190.00

RP 556
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 and refining facilities. This report provides descriptions of the test procedures, thermophysical property data on a few widely varying crude oil refining and processing systems, installation, and maintenance of advanced control system applications in refinery service. Pages: 66
2nd Edition | April 2011 | Product Number: C55602 | Price: $152.00

RP 556 *
Instrumentation, Control, and Protective Systems for Gas Fired Heaters—Russian

Russian translation of RP 556.
2nd Edition | April 2011 | Product Number: C55602R | Price: $122.00

RP 557
Guide to Advanced Control Systems

Addresses the implementation and ownership of advanced control systems for refinery purposes. The document also described commonly used practices for the opportunity identification, justification, project management, implementation, and maintenance of advanced control system applications in refinery service. Pages: 45
2nd Edition | October 2013 | Product Number: C55702 | Price: $110.00

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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. 7. Analytical Data on Reference Clay Minerals
No. 8. Infrared Spectra of Clay Minerals

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: $211.00

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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 spectral data.
Publ 705, Tetralin, 1978
Publ 706, cis- and trans-Decalin, 1978

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Publ 707, Naphthalene, 1978
Publ 708, Anthracene and Phenanthrene, 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, Acenaphthene, Acenaphthene, Fluorene, and Fluoranthene, 1981
Publ 716, Carbazole, 9-Methylcarbazole, and Acridine, 1981
Publ 717, Thiophene, 2,3- and 2,5-Dihydrothiophene, and Tetrahydrothiophene, 1981
Publ 718, Anilines, 1982
Publ 719, Indoles, 1982
Publ 720, 2-, 3-, and 4-Methylanilines, 1983
Publ 721, Benzofuran, Dibenzofuran, and Benzofuranfurans, 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 Dibenzoanthracenes, 1985

Thermodynamic Properties and Characterization of Petroleum Fractions
February 1988

MATERIALS ENGINEERING PUBLICATIONS

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; and 6. Repair Procedures.

Three of the six areas, Operation Information, Inspection Practices and Deterioration Experience, were not covered in previous industry surveys. Three of the six areas, Operation Information, Inspection Practices and Deterioration Experience, were not covered in previous industry surveys. The database synopsis and related components. This review is intended to assist decision-makers on further 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 USL 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...
TR 932-A
A 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. Pages: 49
2nd Edition | September 2002 | Product Number: C932A0 | Price: $151.00

Publ 932-B
Design, Materials, Fabrication, Operation, and Inspection Guidelines for Corrosion Control in Hydroprocessing Reactor Effluent Air Cooler (REAC) Systems
(Includes Errata 1 dated January 2014)

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. The reactor effluent system includes all equipment and piping between the exchanger upstream of the wash water injection point and the cold, low-pressure separator (CLPS). The majority of these systems have an air cooler; however, some systems utilize only shell-and-tube heat exchangers. Reactor effluent systems are prone to fouling and corrosion by ammonium bisulfide (NH₄HS) and ammonium chloride (NH₄Cl) salts. Pages: 44
2nd Edition | March 2012 | Product Number: C932B02 | Price: $257.00

RP 934-A
Materials and Fabrication of 2 1/4Cr-1Mo, 2 1/4Cr-1Mo-1/4V, 3Cr-1Mo, and 3Cr-1Mo-1/4V Steel Heavy Wall Pressure Vessels for High-Temperature, High-Pressure Hydrogen Service
(Includes Addendum 1 dated February 2010 and Addendum 2 dated March 2012)

Presents materials and fabrication requirements for new 2 1/4Cr and 3Cr steel heavy wall pressure vessels for high-temperature, high-pressure hydrogen service. It applies to vessels that are designed, fabricated, certified, and documented in accordance with ASME BPVC, Section VIII, Division 2, including Section 3.4, Supplemental Requirements for Cr-Mo Steels and ASME Code Case 2151, as applicable. This document may also be used as a resource when planning to modify an existing heavy wall pressure vessel. A newer ASME BPVC, Section VIII, Division 3, is available and has higher design allowances; however, it has much stricter design rules (e.g., fatigue and fracture mechanics analyses required) and material testing requirements. It is outside the scope of this document.

Materials covered by this recommended practice are conventional steels, including standard 2 1/4Cr-1Mo and 3Cr-1Mo steels, and advanced steels, which include 2 1/4Cr-1Mo-1/4V, 3Cr-1Mo-1/4V-Ti-B, and 3Cr-1Mo-1/4V-Nb-Ca steels. This document may be used as a reference for the fabrication of vessels made of enhanced steels (steels with mechanical properties augmented by special heat treatments) at purchaser discretion. However, no attempt has been made to cover specific requirements for the enhanced steels. Pages: 19
Product Number: C934A02 | Price: $107.00

RP 934-A *
Materials and Fabrication of 2 1/4Cr-1Mo, 2 1/4Cr-1Mo-1/4V, 3Cr-1Mo, and 3Cr-1Mo-1/4V Steel Heavy Wall Pressure Vessels for High-Temperature, High-Pressure Hydrogen Service—Russian

Russian translation of RP 934-A.
2nd Edition | May 2008 | Product Number: C934A02R | Price: $86.00

TR 934-B
Fabrication Considerations for Vanadium-Modified Cr-Mo Steel Heavy Wall Pressure Vessels

Best practice guidance 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. This 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: 29
1st Edition | April 2011 | Product Number: C934B01 | Price: $135.00

RP 934-C
Materials and Fabrication of 1 1/4Cr-1/2Mo Steel Heavy Wall Pressure Vessels for High Pressure Hydrogen Service Operating at or Below 825 °F (441 °C)

Presents materials and fabrication requirements for new 1 1/4Cr-1/2Mo steel heavy wall pressure vessels and heat exchangers for high-temperature, high-pressure hydrogen service. It applies to vessels that are designed, fabricated, certified, and documented in accordance with ASME BPVC, Section VIII, Division 1 or Division 2. This document may also be used as a resource for equipment fabricated using 1Cr-1/2Mo Steel. This document may also be used as a resource when planning to modify an existing heavy-wall pressure vessel. The interior surfaces of these heavy-wall pressure vessels may have an austenitic stainless steel or ferritic stainless steel weld overlay or cladding to provide additional corrosion resistance. For this recommended practice, the heavy wall is defined as a shell thickness of 2 in. (50 mm) or greater, but less than or equal to 4 in. (100 mm). Integraded 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 1/4Cr-1/2Mo has been shown to have difficulty meeting the toughness requirements given in this document. Although outside of the scope of this document, it can be used as a resource for vessels down to 1 in. (25 mm) shell thickness with changes defined by the purchaser. This recommended practice is not intended for use for equipment operating above 825 °F (441 °C) or in the creep range. Pages: 15
Product Number: C934C01 | Price: $107.00

RP 934-C *
Materials and Fabrication of 1 1/4Cr-1/2Mo Steel Heavy Wall Pressure Vessels for High Pressure Hydrogen Service Operating at or Below 825 °F (441 °C)—Russian

Russian translation of RP 934-C.
1st Edition | May 2008 | Product Number: C934C01R | Price: $86.00

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Coverings, etc. can be greater than 4 in. (100 mm). At shell or head 1 1/4Cr-1/2Mo steels. Whereas RP 934-A continues to provide implementation of RP 934-C. In recent years it has been recognized cladding may also be required.

This report provides background information and guidance on the implementation of RP 934-C. In recent years it has been recognized that there are important distinctions that need to be considered for 1 1/4/1Cr-1/2Mo steels. Whereas RP 934-A continues to provide materials and fabrication requirements for new 2 1/4/3Cr-1Mo and 2 1/2/3Cr-1Mo-Y1/4 steel heavy wall pressure vessels in high temperature, high pressure hydrogen service, different material, and fabrication requirements have been developed for 1 1/4/1Cr-1/2Mo steel heavy wall pressure vessels. These requirements are covered in RP 934-C and 934-E. This document contains a description of key damage mechanisms that relate specifically to 1 1/4/1Cr-1/2Mo pressure vessels used in a variety of services. These damage mechanisms include elevated temperature damage such as “reheat cracking” or “creep embrittlement,” as well as other damage mechanisms that may occur at lower temperatures. This document provides information and guidance on successful practices for fabrication of 1 1/4/1Cr-1/2Mo steel heavy wall pressure vessels for the intended services of both RP 934-C and RP 934-E. The survey of steel producers and vessel fabricators (Annex 1) indicates that there is a need to evaluate the effect of heat treat cycles on materials properties (CVN toughness, tensile and yield strength). Pages: 56

1st Edition | September 2010 | Product Number: C934D01 | Price: $135.00

**RP 934-E**

**Recommended Practice for Materials and Fabrication of 1 1/4/4Cr-1/2Mo Steel Pressure Vessels for Service Above 825 °F (440 °C)**

Includes materials and fabrication requirements for new 1 1/4/4Cr-1/2Mo steel and 1Cr-1/2Mo pressure vessels and heat exchangers for high temperature service. It applies to vessels that are designed, fabricated, certified and documented in accordance with ASME BPVC Section VIII, Division 1. This data may 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 recommended practice is applicable to wall (shell) thicknesses from 1 in. (25 mm) to 4 in. (100 mm). Integally 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 1/4/4Cr-1/2Mo and 1Cr-1/2Mo 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: $107.00

* 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.
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: C939B01 | Price: $109.00

TR 939-C

Use of Duplex Stainless Steels in the Oil Refining Industry

Covers many of the "lean," "standard," "super," and "hyper" grades of duplex stainless steels (DSSs) most commonly used within refineries. DSSs are finding increasing use in the refining industry, primarily because they often offer an economical combination of strength and corrosion resistance. These stainless steels typically have an annealed structure that is generally half ferrite and half austenite, although the ratios can vary from approximately 35/65 to 55/45. Most refinery applications where DSSs are used are corrosive, and DSSs or other higher alloys are required for adequate corrosion resistance. However, some plants are also starting to consider DSS as a "baseline" material. These plants are using DSS in applications where carbon steel may be acceptable, but DSSs have been shown to be more economical considering their higher strength and better long-term reliability.

The product forms within the scope are tubing, plate, sheet, forgings, pipe, and fittings for piping, vessel, exchanger, and tank applications. The Third Edition of this report has added castings and hot isostatically-pressed (HIP) components for pumps, valves, and other applications. The limited use of DSS as a cladding is also briefly covered within the document. Pages: 59

3rd Edition | February 2015 | Product Number: C939C03 | Price: $180.00

TR 939-A

Research Report on Characterization and Monitoring of Cracking in Wet H₂S 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: $156.00

Publ 939-B

Repair and Remediation Strategies for Equipment Operating in Wet H₂S Service

Presents data relative to the fabrication requirements for 2 1/4 Cr 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 recommended practice 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: $171.00

RP 939-C

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

Applies 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 H₂S levels as low as 1 ppm. Nickel based 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: $114.00

TR 939-D

Stress Corrosion Cracking of Carbon Steel in Fuel-Grade Ethanol: Review, Experience Survey, Field Monitoring, and Laboratory Testing (includes Addendum 1 dated October 2013)

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, and information on mitigation and prevention. Pages: 172

2nd Edition | May 2007 | Product Number: C939D0 | Price: $160.00

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:

- 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: 42

2nd Edition | August 2013 | Product Number: C939E02 | Price: $160.00

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 recommended practice (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 facilties, 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.

Hydrogenation processes usually require standards and materials that may not be warranted in other operations of the petroleum industry. At certain combinations of elevated temperature and hydrogen partial pressure, both chemical and metallurgical changes occur in carbon steel, which in advanced stages can render it unsuitable for safe operation. Alloy steels containing chromium and molybdenum can be used under such conditions. The steels discussed in this RP resist high temperature hydrogen attack (HTHA) when...
operated within the guidelines given. However, they may not be resistant to other corrosives present in a process stream or to other metallurgical damage mechanisms operating in the HTHA range.

This RP also does not address the issues surrounding possible damage from rapid cooling of the metal after it has been in high temperature, high pressure hydrogen service (e.g. possible need for outgassing hydroprocessing reactors). This RP will discuss in detail only the resistance of steels to HTHA. Presented in this document are curves that indicate the operating limits of temperature and hydrogen partial pressure for satisfactory performance of carbon steel and Cr-Mo steels in elevated temperature, hydrogen service. In addition, it includes a summary of inspection methods to evaluate equipment for the existence of HTHA. Pages: 32

Product Number: C94503 | Price: $101.00

TR 941
The Technical Basis Document for API RP 941
Even before the first 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 material 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: C94107 | Price: $125.00

TR 942-A
Materials, Fabrication, and Repair Considerations for Hydrogen Refractor Furnace Outlet Pigtauls and Manifolds
Addresses materials, fabrication, and repair issues related to hydrogen and syngas reformer furnace outlet pigtauls and manifolds. High reliability of outlet pigtauls and manifold components, such as headers, tees, and fittings, is important to the successful long-term operation of hydrogen and syngas reformer furnaces. These components typically operate at high temperatures in the range of 750 to 950 °C (1382 to 1742 °F) where they are potentially subject to high-temperature creep, stress relaxation, hot corrosion, and thermal fatigue damage. In recent years a number of reformer furnace operators have encountered problems of in-service degradation and cracking of outlet pigtauls and manifold components, while others have had little or no problems of this type. Both direct experience in addressing specific cases of outlet pigtaul and manifold cracking problems and indirect experience gained from surveying industry with regard to these problems were used in preparing this report. The objective of the project was to develop an understanding, based on published literature and industry experience, of why some reformer furnaces have had problems with embrittlement and cracking of outlet pigtauls and manifold components in service, while others have not had such problems. Pages: 53

1st Edition | June 2014 | Product Number: C942A01 | Price: $140.00

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 ensure 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

2-Year Extension: April 2013 | Product Number: C94503 | Price: $101.00

Pub 959
Characterization Study of Temper Embrittlement of Chromium-Molybdenum Steels
Evaluates the temper embrittlement characteristics of Cr-Mo pressure vessel steels. The steels are designated A387 in Part 4 of the ASTM Book of Standards. Most of the samples studied were of Grade 22 (2-1/4-1Mo) and a few samples of Grades 11 and 21 were also included, (1-1/4Cr-1/2Mo, 3Cr-1Mo). The 64 samples studied represented a wide range of commercially available steel, including qualification welds in 1-in. and 6-in. steel plate, large nozzle cut-outs, and randomly-shaped pieces of forging material. These materials received heat treatment typical of hydro-treater reactor fabrication.

The objective of this program was to characterize typical commercial reactor steels and weldments in terms of toughness and other physical properties prior to being placed in service and the changes anticipated in toughness due to long-time service at elevated temperatures.

It is important to note that the materials studied were typical of commercial production and fabrication up to about 1975 and are not representative of plate, forgings, and weld metal having low temper embrittlement susceptibility, generally available after 1975. Pages: 145

1st Edition | January 1982 | Product Number: C95900 | Price: $157.00

PETROLEUM PRODUCTS AND PETROLEUM PRODUCT SURVEYS

API/NPRA Survey
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: $65.00

Aviation Turbines Fuels, 2001
Heating Oils, 2002
Motor Gasolines, Winter 2001-2002
Motor Gasolines, Summer 2001
Diesel Fuel Oils, 2002

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

Order these petroleum product surveys from:
TRW Petroleum Technologies
P.O. Box 2543 | Bartlesville, OK 74005
Attn: Cheryl Dickenson
918-338-4419

Pub 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 Pub 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: $162.00

Pub 4262
Methanol Vehicle Emissions
December 1990 | Product Number: F42620 | Price: $125.00

This publication is a new entry in this catalog.
PROCESS SAFETY STANDARDS

RP 752
Management of Hazards Associated with Location of Process Plant Permanent 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.

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. This 3rd Edition of RP 752:2009 supersedes all previous editions, including the technical data provided in those documents.

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. The 2nd Edition of RP 752 covered all building types both permanent and portable. This 3rd 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 RP 753 and RP 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 753). All other portable buildings are covered by API RP 753.” Pages: 27

3rd Edition | December 2009 | Product Number: K75203 | Price: $141.00

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 shut-down 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 | Reaffirmed: January 2012
Product Number: K75301 | Price: $141.00

RP 754
Process Safety Performance Indicators for the Refining and Petrochemical Industries (ANSI/API RP 754)
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 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.

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.

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


RP 755
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 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.

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 this document.

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.

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: $83.00

TR 755-1
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.

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).

One of the key benefits of FRMS is that it is a data-driven, risk-informed, safety performance-based system. The history of FRMS was recently summarized.

The focus of this RP is primarily on process related hazards. However, non-process related hazards may exist which could present risks to tent occupants. Previous accidents have demonstrated that tent occupants are susceptible to injuries from fires originating inside the tent, from tent collapse due to extreme weather, and from falling objects. Some of these hazards are addressed by tent design standards, manufacturer’s recommendations, and local regulations.

TR 756-1
Process Plant Tent Responses to Vapor Cloud Explosions—Results of the American Petroleum Institute Tent Testing Program

Beginning in 2011, the American Petroleum Institute (API) to performed vapor cloud explosion (VCE) tests to determine the response of tents to the potential explosion hazards that may be present at refineries, petrochemical and chemical operations, natural gas liquids extraction plants, natural gas liquefaction plants, and other onshore facilities covered by OSHA 29 CFR 1910.119.

The focus of this RP is primarily on process related hazards. However, non-process related hazards may exist which could present risks to tent occupants. Previous accidents have demonstrated that tent occupants are susceptible to injuries from fires originating inside the tent, from tent collapse due to extreme weather, and from falling objects. Some of these hazards are addressed by tent design standards, manufacturer’s recommendations, and local regulations.

HEALTH, ENVIRONMENT, AND SAFETY: GENERAL

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

RP 751
Safe Operation of Hydrofluoric Acid Alkylation Units

The refining industry has long demonstrated that HF acid alkylation units can be operated safely and responsibly. Like many industrial processes, the HF acid alkylation process presents operational risk and must be properly designed, well-maintained and operated to assure safe operation. RP 751 is an industry document that communicates proven industry practices to support the safe operation of an HF acid alkylation unit. The philosophy of this 4th Edition is to build on the previous editions’ base of recommendations for HF acid leak prevention, detection, and mitigation with the document section topics of hazard management, operating procedures and worker protection, material inspection and maintenance, transportation and inventory control, relief and utility systems, and risk mitigation. This edition changes some previous provisions from recommendations (should) to requirements (shall) based on regulatory requirements, broad industry acceptance and proven effective industry practices along with the addition of some new recommendations and requirements. The recommendations presented in the document are those that have been found effective or those which are advised for safe operations.

4th Edition | May 2013 | Product Number: K75104 | Price: $150.00

RP 2350
Overfill Protection for Storage Tanks in Petroleum Facilities

Applies to storage tanks associated with marketing, refining, pipeline, and terminals operations and with tanks containing Class I or Class II petroleum liquids and use is recommended for Class III petroleum liquids. This standard addresses overfill protection for petroleum storage tanks. It recognizes that prevention provides the most basic level of protection, thus while using both terms “protection” and “prevention,” the document emphasizes prevention. The standard’s scope covers overfill (and damage) prevention practices for aboveground storage tanks in petroleum facilities, including refineries, marketing terminals, bulk plants, and pipeline terminals that receive flammable and combustible liquids. The fourth edition continues to build on experience and new technology through the use of management systems. Since operations are the primary overfill prevention safeguard, new definitions and requirements are established for alarms. Risk reduction is also addressed by current and generally accepted industry practices.

The essential elements of this document are based on current industry safe operating practices and existing consensus standards. Federal, state, and local regulations or laws may contain additional requirements for tank overfill prevention programs. For existing facilities, the results of a risk-based analysis of aboveground atmospheric petroleum storage tanks may indicate the need for more protection against overfilling. In such cases, some provisions from this standard may be suitable.

The purpose of this standard is to assist owner/operators and operating personnel in the prevention of tank overfills by implementation of a comprehensive overfill prevention process (OFP). The goal is to receive product into the intended storage tank without overfill or loss of containment.

This standard does not apply to: underground storage tanks; aboveground tanks of 1320 U.S. gallons (5000 liters) or less; aboveground tanks which comply with PEI 600; pressure vessels; tanks containing non-petroleum liquids; tanks storing LPG and LNG; tanks at service stations; tanks filled exclusively from wheeled vehicles (i.e. tank trucks or railroad tank cars); and tanks covered by OSHA 29 CFR 1910.119 and EPA 40 CFR 68, or similar regulations.

4th Edition | May 2012 | Product Number: K235004 | Price: $114.00

You may access the 3rd and 4th Editions of RP 2350 in a read-only platform: publications.api.org

HEALTH, ENVIRONMENT, AND SAFETY: SOIL AND GROUNDWATER

Pubb 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.

9
1st Edition | October 1994 | Product Number: C42201 | Price: $65.00
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 discussion of applicable federal statutes and regulations; and annotations for pertinent regulatory programs under the 5 principal statutes that apply to refinery operations. Pages: 145

1st Edition | September 1988 | Product Number: C80000 | Price: $92.00

Security Guidelines for the Petroleum Industry

API's 3rd 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: 58

3rd Edition | April 2005 | Product Number: OS0002 | Price: $191.00

You may access this document in a read-only platform: 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: $191.00

You may access this in a read-only platform: publications.api.org