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MANUAL OF PETROLEUM MEASUREMENT STANDARDS

API currently maintains a comprehensive *Manual of Petroleum Measurement Standards (MPMS)*. This manual is an ongoing project, as new chapters and revisions of old chapters will be released periodically. Publications regarding measurement of evaporative loss are listed under Chapter 19 of the API *MPMS*.

Manual of Petroleum Measurement Standards (Complete Set)

The price of the complete set is subject to change as new chapters and sub-chapters are released; an order for one complete set would not include the chapters released after the release date of this catalog (but before order receipt) and the binders to house the set.

NOTE: Chapter 11 Standards, Chapter 19 Standards, and Spanish translations must be ordered separately.

Price: \$8,800.00 | *Price subject to change (if purchased individually, a complete set would cost approximately \$10,000.00)

Chapter 1 Vocabulary

Provides definitions and terms used throughout the API *Manual of Petroleum Measurement Standards (MPMS)*. Pages: 70

2nd Edition | July 1994 | Product Number: H01002 | Price: \$105.00
You may access Ch. 1 in a read-only platform: publications.api.org

Chapter 1 * Vocabulary—Spanish

Spanish translation of Chapter 1.

2nd Edition | July 1994 | Product Number: H010SP | Price: \$111.00

Chapter 2 Tank Calibration

Contains procedures necessary for calibrating closed storage vessels larger than a drum and methods for computing the volumes contained therein. The following API Standards cover the subject of tank calibration and are included in the manual.

Chapter 2.2A Measurement and Calibration of Upright Cylindrical Tanks by the Manual Strapping Method

Contains procedures for calibrating upright cylindrical tanks used primarily for the storage of petroleum liquids. Chapter 2.2A addresses necessary measurement procedures to determine total and incremental tank volumes and procedures for computing volumes. Both metric and customary units are included. The metric units reflect what is available in commercial equipment. The Standard also provides guidelines for recalibration and computerization of capacity tables. Chapter 2.2A should be used in conjunction with Chapter 2.2B. These two Standards combined supersede the previous Std 2550. Pages: 58

1st Edition | February 1995 | Reaffirmed: February 2007

Product Number: H022A1 | Price: \$121.00

You may access Ch. 2.2A in a read-only platform: publications.api.org

Chapter 2.2B Calibration of Upright Cylindrical Tanks Using the Optical Reference Line Method

Describes measurement and calculation procedures for determining the diameters of upright, welded (lap/butt) cylindrical tanks, or vertical cylindrical tanks, with a smooth outside surface and either floating or fixed roofs. The optical reference line method is an alternative to the manual tank strapping method for determining tank diameter. Chapter 2.2B should be used in conjunction with Chapter 2.2A. Pages: 8

1st Edition | March 1989 | Reaffirmed: December 2007

Product Number: H30023 | Price: \$80.00

You may access Ch. 2.2B in a read-only platform: publications.api.org

Chapter 2.2C/ISO 7507-3:1993 Calibration of Upright Cylindrical Tanks Using the Optical-Triangulation Method (ANSI/API MPMS 2.2C-2002)

Describes the calibration of vertical cylindrical tanks by means of optical triangulation using theodolites. The method is an alternative to other methods such as strapping (Chapter 2.2A) and the optical-reference-line method (Chapter 2.2B).

This edition of Chapter 2.2C is the national adoption of ISO 7507-3:1993. Pages: 19

1st Edition | January 2002 | Reaffirmed: May 2008

Product Number: H022C1 | Price: \$80.00

Chapter 2.2D/ISO 7507-4:1995 Calibration of Upright Cylindrical Tanks Using the Internal Electro-Optical Distance Ranging Method (ANSI/API MPMS 2.2D-2003)

Specifies a method for the calibration of upright cylindrical tanks having diameters greater than 5 m by means of internal measurements using an electro-optical distance-ranging instrument, and for the subsequent compilation of tank capacity tables.

This edition of Chapter 2.2D is the national adoption of ISO 7507-4:1995. Pages: 13

1st Edition | August 2003 | Reaffirmed: February 2009

Product Number: H022D1 | Price: \$80.00

Chapter 2.2E/ISO 12917-1:2002 Petroleum and Liquid Petroleum Products—Calibration of Horizontal Cylindrical Tanks—Part 1: Manual Methods (includes Errata 1 dated November 2009) (ANSI/API MPMS 2.2E-2004)

Specifies manual methods for the calibration of nominally horizontal cylindrical tanks, installed at a fixed location. It is applicable to horizontal tanks up to 4 m (13 ft) in diameter and 30 m (100 ft) in length. The methods are applicable to insulated and non-insulated tanks, either when they are above-ground or underground. The methods are applicable to pressurized tanks, and to both knuckle-dish-end and flat-end cylindrical tanks as well as elliptical and spherical head tanks. This Chapter is applicable to tanks inclined by up to 10 % from the horizontal provided a correction is applied for the measured tilt. For tanks over and above these dimensions and angle of tilt, appropriate corrections for tilt and appropriate volume computations should be based on the “Coats” equation.

This edition of Chapter 2.2E is the national adoption of ISO 12917-1:2002. Pages: 18

1st Edition | April 2004 | Reaffirmed: October 2009

Product Number: HX202E01 | Price: \$85.00

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Chapter 2.2F/ISO 12917-2:2002

Petroleum and Liquid Petroleum Products—Calibration of Horizontal Cylindrical Tanks—Part 2: Internal Electro-Optical Distance-Ranging Method

(ANSI/API MPMS 2.2F-2004)

Specifies a method for the calibration of horizontal cylindrical tanks having diameters greater than 2 m (6 ft) by means of internal measurements using an electro-optical distance-ranging instrument, and for the subsequent compilation of tank-capacity tables. This method is known as the internal electro-optical distance-ranging (EODR) method.

This edition of Chapter 2.2F is the national adoption of ISO 12917-2:2002. Pages: 14

1st Edition | April 2004 | Reaffirmed: October 2009

Product Number: HH202F01 | Price: \$74.00

Std 2552

Measurement and Calibration of Spheres and Spheroids

Describes the procedures for calibrating spheres and spheroids, which are used as liquid containers. It outlines the procedures for the measurement and calibration of spherical tanks. Pages: 17

1st Edition | October 1966 | Reaffirmed: October 2007

Product Number: H25520 | Price: \$94.00

You may access Std 2552 in a read-only platform: publications.api.org

Std 2554

Measurement and Calibration of Tank Cars

Describes the procedures for calibrating tank cars. It outlines procedures for nonpressure-type tank cars and pressure-type tank cars. Pages: 41

1st Edition | October 1966 | Reaffirmed: July 2007

Product Number: H25540 | Price: \$111.00

Std 2555

Liquid Calibration of Tanks

Describes the procedure for calibrating tanks, or portions of tanks, larger than a barrel or drum by introducing or withdrawing measured quantities of liquid. Pages: 14

1st Edition | September 1966 | Reaffirmed: March 2009

Product Number: H25550 | Price: \$94.00

You may access Std 2555 in a read-only platform: publications.api.org

RP 2556

Correcting Gauge Tables for Incrustation

Incrustation is defined in this publication as any material that adheres to the internal vertical sidewall surfaces of a tank when the tank is otherwise empty. The tables given in this RP show the percent of error of measurement caused by varying thicknesses of uniform incrustation in tanks of various sizes. Pages: 3

Pages: 3

2nd Edition | August 1993 | Reaffirmed: September 2008

Product Number: H25560 | Price: \$73.00

You may access RP 2556 in a read-only platform: publications.api.org

Chapter 2.7

Calibration of Barge Tanks

Describes three methods for determining the total incremental volumes of liquids in barge tanks for coastal and inland waterway service that have integral hull tanks. The three methods are as follows: (a) liquids calibration, (b) calibration by linear measurement, and (c) calibration from vessel drawings. This document and Chapter 2.8A supersede the previous Std 2553. A joint API/Energy Institute (EI) Standard, it also carries the EI designation Hydrocarbon Management, HM2 Section 5A. Pages: 25

1st Edition | March 1991 | Reaffirmed: May 2008

Product Number: H30044 | Price: \$57.00

Chapter 2.8A

Calibration of Tanks on Ships and Oceangoing Barges

Three methods for determining the total and incremental volumes of liquids in tanks, oceangoing barges, and integrated tug barge units that have integral hull tanks. The three methods include liquid calibration, calibration by linear measurement, and calibration from vessel drawings. This document and Chapter 2.7 supersede the previous Std 2553. A joint API/Energy Institute (EI) Standard, it also carries the EI designation Hydrocarbon Management, HM2 Section 5B. Pages: 22

1st Edition | March 1991 | Reaffirmed: February 2007

Product Number: H30049 | Price: \$86.00

Chapter 2.8B

Establishment of the Location of the Reference Gauge Point and the Gauge Height of Tanks on Marine Tank Vessels

Recommended practice, for use in conjunction with Chapter 2.7 and Chapter 2.8A. Establishes reference gauge heights during calibration of marine tank vessels. A reference gauge point is necessary for converting ullage to innage, and when determining the volume of the quantities remaining on board (ROB). A reference gauge point is also used for wedge formulas and establishing wedge tables. Pages: 26

1st Edition | September 1995 | Reaffirmed: October 2009

Product Number: H028B1 | Price: \$94.00

Chapter 3

Tank Gauging

Covers standardized procedures for gauging liquid hydrocarbons in various types of tanks, containers, and carriers.

Chapter 3.1A

Standard Practice for the Manual Gauging of Petroleum and Petroleum Products

Describes the following: (a) the procedures for manually gauging the liquid level of petroleum and petroleum products in non-pressure fixed-roof, floating-roof tanks and marine tank vessels, (b) procedures for manually gauging the level of free water which may be found with the petroleum or petroleum products, (c) methods used to verify the length of gauge tapes under field conditions and the influence of bob weights and temperature on the gauge tape length, and (d) the influences that may affect the position of gauging reference point (either the datum plate or the reference gauge point). Throughout this Standard the term petroleum is used to denote petroleum, petroleum products, or the liquids normally associated with the petroleum industry. The method used to determine the volume of tank contents determined from gauge readings is not covered in this Standard. The determination of temperature, API gravity, and suspended sediment and water of the tank contents are not within the scope of this Standard. Pages: 25

2nd Edition | August 2005 | Reaffirmed: September 2010

Product Number: H301A02 | Price: \$91.00

You may access Ch. 3.1A in a read-only platform: publications.api.org

Chapter 3.1A *

Standard Practice for the Manual Gauging of Petroleum and Petroleum Products—Spanish

Spanish translation of Chapter 3.1A.

2nd Edition | August 2005 | Product Number: H3010ASP | Price: \$96.00

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Chapter 3.1B

Standard Practice for Level Measurement of Liquid Hydrocarbons in Stationary Tanks by Automatic Tank Gauging

Covers level measurement of liquid hydrocarbons in stationary, aboveground, atmospheric storage tanks using automatic tank gauges (ATGs). This publication discusses automatic tank gauging in general, calibration of ATGs for custody transfer and inventory control, and the requirements for data collection, transmission, and receiving. The appendices discuss the operation and installation of the most commonly used ATG equipment and of the less commonly used, electronic ATGs. Pages: 17

2nd Edition | June 2001 | Reaffirmed: August 2011

Product Number: H301B2 | Price: \$94.00

You may access Ch. 3.1B in a read-only platform: publications.api.org

Chapter 3.2

Standard Practice for Gauging Petroleum and Petroleum Products in Tank Cars

Provides method for measuring liquids and liquefied gases in tank cars by liquid level measurement. Measurement of both vapor space and liquid level are covered. Gauging and temperature measurement equipment used in both open and closed measurement systems are described in this Standard. These procedures reduce variability in the results of measurement and sampling operations when comparing loading terminal data to unloading terminal data. Pages: 20

1st Edition | September 1995 | Reaffirmed: March 2006

Product Number: H03021 | Price: \$94.00

Chapter 3.3

Standard Practice for Level Measurement of Liquid Hydrocarbons in Stationary Pressurized Storage Tanks by Automatic Tank Gauging

Provides guidance on the installation, calibration, and verification of automatic tank gauges (ATGs) used in custody transfer for measuring the level of liquid hydrocarbons having a Reid vapor pressure of 15 psi (103 kilopascals) or greater, stored in stationary, pressurized storage tanks. This Standard also provides guidance on the requirements for data collection, transmission, and receiving. Pages: 10

1st Edition | June 1996 | Reaffirmed: October 2011

Product Number: H03031 | Price: \$80.00

Chapter 3.4

Standard Practice for Level Measurement of Liquid Hydrocarbons on Marine Vessels by Automatic Tank Gauging

Provides guidance on the selection, installation, calibration, and verification of automatic tank gauges (ATGs) for measuring the level of liquid hydrocarbons having a Reid vapor pressure less than 15 pounds per square inch absolute (103 kPa), transported aboard marine vessels (tankers and barges). This Standard also provides guidance on the requirements for data collection, transmission, and receiving. This Standard supersedes all applicable sections of Std 2545. Pages: 10

1st Edition | April 1995 | Reaffirmed: April 2011

Product Number: H03041 | Price: \$80.00

Chapter 3.4 *

Standard Practice for Level Measurement of Liquid Hydrocarbons on Marine Vessels by Automatic Tank Gauging—Spanish

Spanish translation of Chapter 3.4.

1st Edition | April 1995 | Product Number: H03041S | Price: \$84.00

Chapter 3.5

Standard Practice for Level Measurement of Light Hydrocarbon Liquids Onboard Marine Vessels by Automatic Tank Gauging

Covers the standard practice for level measurement of light hydrocarbon liquids onboard marine vessels by automatic tank gauges (ATGs). This publication covers pressurized and refrigerated light hydrocarbon liquids. The light hydrocarbon liquids covered include the following: liquefied petroleum gas (LPG), natural gas liquid (NGL), and other petrochemical liquids where the storage and transportation requirements and the methods of measurement are similar to that for LPG and NGL gauging. This Standard also covers the requirements for data collection, transmission, and receiving. Pages: 8

1st Edition | March 1997 | Reaffirmed: February 2008

Product Number: H03051 | Price: \$80.00

Chapter 3.6

Measurement of Liquid Hydrocarbons by Hybrid Tank Measurement Systems (includes Errata 1 dated September 2005)

Covers selection, installation, commissioning, calibration and verification of Hybrid Tank Measurement Systems (HTMSs) for the measurement of level, static mass, observed and standard volume, and observed and reference density in tanks storing petroleum and petroleum products for custody transfer and/or inventory control purposes. Pages: 26

1st Edition | February 2001 | Reaffirmed: October 2011

Product Number: H03061 | Price: \$93.00

Chapter 4

Proving Systems

Serves as a guide for the design, installation, calibration, and operation of meter proving systems.

Chapter 4.1

Introduction

Provides general introduction to the subject of proving. The requirements in Chapter 4 are based on customary practices that evolved for crude oils and products covered by Chapter 11.1. The prover and meter uncertainties should be appropriate for the measured fluids and should be agreeable to the parties involved. Pages: 4

3rd Edition | February 2005 | Reaffirmed: September 2009

Product Number: H04013 | Price: \$79.00

You may access Ch. 4.1 in a read-only platform: publications.api.org

Chapter 4.2

Displacement Provers

Outlines the essential elements of provers that accumulate meter pulses as a displacing element within the prover travels between detector switches. It provides design and installation details for the types of displacement provers that are currently in use. The provers discussed are designed for proving measurement devices under dynamic operating conditions with single-phase liquid hydrocarbons. Pages: 45

3rd Edition | September 2003 | Reaffirmed: March 2011

Product Number: H04023 | Price: \$119.00

You may access Ch. 4.2 in a read-only platform: publications.api.org

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Chapter 4.4

Tank Provers

Specifies the characteristics of tank provers that are in general use and the procedures for their calibration. This Standard does not apply to weir-type, vapor-condensing, dual-tank water-displacement, or gas-displacement provers. Pages: 11

2nd Edition | May 1998 | Reaffirmed: September 2010

Product Number: H04042 | Price: \$80.00

You may access Ch. 4.4 in a read-only platform: publications.api.org

Chapter 4.5 ■

Master-Meter Provers

Covers the use of displacement, turbine, Coriolis, and ultrasonic meters as master meters. The requirements in this Standard are intended for single-phase liquid hydrocarbons. Meter proving requirements for other fluids should be appropriate for the overall custody transfer accuracy and should be agreeable to the parties involved. This document does not cover master meters to be used for the calibration of provers. For information concerning master meter calibration of provers, see Chapter 4.9.3. Pages: 14

3rd Edition | November 2011

Product Number: H40303 | Price: \$70.00

You may access Ch. 4.5 in a read-only platform: publications.api.org

Chapter 4.6

Pulse Interpolation

(includes Errata 1 dated April 2007)

Describes how the double-chronometry method of pulse interpolation, including system operating requirements and equipment testing, is applied to meter proving. Pages: 8

2nd Edition | May 1999 | Reaffirmed: May 2008

Product Number: H04062 | Price: \$63.00

You may access Ch. 4.6 in a read-only platform: publications.api.org

Chapter 4.7

Field Standard Test Measures

Details the essential elements of field standard test measures by providing descriptions, construction requirements, as well as inspection, handling, and calibration methods. Bottom-neck scale test measures and prover tanks are not addressed in this document. The scope of this Standard is limited to the certification of "delivered volumes" of test measures. Pages: 19

3rd Edition | April 2009 | Product Number: H40703 | Price: \$83.00

You may access Ch. 4.7 in a read-only platform: publications.api.org

Chapter 4.8

Operation of Proving Systems

Covers the operation of various meter-proving systems used in the petroleum industry. Liquid petroleum meters used for custody transfer measurement require periodic proving to verify accuracy and repeatability and to establish valid meter factors. Pages: 70

1st Edition | November 1995 | Reaffirmed: March 2007

Product Number: H04081 | Price: \$105.00

Chapter 4.9.1

Methods of Calibration for Displacement and Volumetric Tank Provers

Part 1—Introduction to the Determination of the Volume of Displacement and Tank Provers

Provers are precision devices, defined as volumetric standards, which are used to verify the accuracy of liquid volumetric meters used for custody transfer measurement. Both displacement and tank provers are used to prove a meter in order to obtain its meter factor, which is then used to correct for meter error caused by differences between the metered volume and the true volume. The base volume of a displacement or tank prover,

determined by calibration, is an essential requirement in the determination of these meter factors. The accuracy of a meter factor is limited by several considerations, as shown below.

- Equipment performance.
- Observation errors.
- Prover volume calibration errors.
- Calculation errors. Pages: 28

1st Edition | October 2005 | Reaffirmed: September 2010

Product Number: H409011 | Price: \$73.00

Chapter 4.9.2

Methods of Calibration for Displacement and Volumetric Tank Provers Part 2—Determination of the Volume of Displacement and Tank Provers by the Waterdraw Method of Calibration

All prover volumes used to calibrate meters shall be determined by calibration and not by theoretical calculation. Volumetric provers have an exact reference volume, which has been determined by a recognized method of calibration. Techniques for the determination of this reference volume include the waterdraw, master meter and gravimetric methods of calibration. This Standard describes only the waterdraw method of calibration, which is used to accurately determine the calibrated volume of both displacement and tank provers. Pages: 92

1st Edition | December 2005 | Reaffirmed: September 2010

Product Number: H409021 | Price: \$176.00

Chapter 4.9.3

Methods of Calibration for Displacement and Volumetric Tank Provers Part 3—Determination of the Volume of Displacement Provers by the Master Meter Method of Calibration

Covers the procedures required to determine the field data necessary to calculate a Base Prover Volume (BPV) of a field displacement prover by the master meter method for calibration. This Standard applies to liquids that for all practical purposes are considered to be clean, single-phase, homogeneous, and Newtonian at metering conditions. Detailed calculation procedures are not included in this Standard: see Chapter 12.2.5. Pages: 19

1st Edition | April 2010 | Product Number: H409031 | Price: \$71.00

Chapter 4.9.4

Methods of Calibration for Displacement and Volumetric Tank Provers Part 4—Determination of the Volume of Displacement and Tank Provers by the Gravimetric Method of Calibration

Covers the specific procedures, equipment, and calculations required to determine the base prover volume (BPV), of both tank and displacement provers by the gravimetric method of calibration (GM). This Standard presents both USC and SI units, and may be implemented in either system of units. The presentation of both units is for the convenience of the user, and is not necessarily the exact conversions. The system of units to be used is typically determined by contract, regulatory requirement, the manufacturer, or the user's calibration program. Throughout this document issues of traceability are addressed by references to National Institute of Standards and Technology (NIST). However, other appropriate national metrology institutes can be referenced. There is no intent to cover safety aspects of conducting the work described in this Standard, and it is the duty of the user to be familiar with all applicable safe work practices. It is also the duty of the user to comply with all existing federal, state, or local regulations [e.g. the Occupational Safety and Health Administration (OSHA)] that govern the types of activities described in this Standard, and to be familiar with all such safety and health regulations. Pages: 38

1st Edition | October 2010 | Product Number: H4090401 | Price: \$80.00

Chapter 5 Metering

Covers the dynamic measurement of liquid hydrocarbons, by means of meters and accessory equipment.

Chapter 5.1

General Considerations for Measurement by Meters (includes Errata 1 dated June 2008 and Errata 2 dated June 2011)

Intended to be a guide for the proper specification, installation, and operation of meter runs designed to dynamically measure liquid hydrocarbons so that acceptable accuracy, service life, safety, reliability, and quality control can be achieved. Chapter 5 also includes information that will assist in troubleshooting and improving the performance of meters. Pages: 8

4th Edition | October 2005 | Reaffirmed: March 2011

Product Number: H05014 | Price: \$91.00

You may access Ch. 5.1 in a read-only platform: publications.api.org

Chapter 5.2

Measurement of Liquid Hydrocarbons by Displacement Meters

Chapter 5.2, together with the general considerations for measurement by meters found in Chapter 5.1, describes methods for obtaining accurate quantity measurement with displacement meters in liquid hydrocarbon service. It covers the unique performance characteristics of displacement meters in liquid hydrocarbon service. It does not apply to the measurement of two-phase fluids. Pages: 3

3rd Edition | October 2005 | Reaffirmed: September 2010

Product Number: H05023 | Price: \$84.00

You may access Ch. 5.2 in a read-only platform: publications.api.org

Chapter 5.3

Measurement of Liquid Hydrocarbons by Turbine Meters (includes Addendum 1 dated July 2009)

Defines the application criteria for turbine meters and discusses appropriate considerations regarding the liquids to be measured. Discusses the installation of a turbine metering system and the performance, operation, and maintenance of turbine meters in liquid hydrocarbon service. Includes "Selecting a Meter and Accessory Equipment" and information on the recommended location for prover connections. Pages: 11

5th Edition | September 2005 | Product Number: H05035 | Price: \$102.00

You may access Ch. 5.3 in a read-only platform: publications.api.org

Chapter 5.4

Accessory Equipment for Liquid Meters

Describes the characteristics of accessory equipment used with displacement and turbine meters in liquid hydrocarbon service. Includes guidance on the use of electronic flow computers. Pages: 8

4th Edition | September 2005 | Reaffirmed: September 2010

Product Number: H05044 | Price: \$91.00

You may access Ch. 5.4 in a read-only platform: publications.api.org

Chapter 5.5

Fidelity and Security of Flow Measurement Pulsed-Data Transmission Systems

Serves as a guide for the selection, operation, and maintenance of various types of pulsed-data, cabled transmission systems for fluid metering systems to provide the desired level of fidelity and security of transmitted flow pulse data. This publication does not endorse or advocate the preferential use of any specific type of equipment or systems, nor is it intended to restrict future development of such equipment. Pages: 8

2nd Edition | July 2005 | Reaffirmed: September 2010

Product Number: H05002 | Price: \$67.00

Chapter 5.6

Measurement of Liquid Hydrocarbons by Coriolis Meters (ANSI/API MPMS 5.6-2002)

Describes methods for achieving custody transfer levels of accuracy when a Coriolis meter is used to measure liquid hydrocarbons. Topics covered include the following: applicable API Standards used in the operation of Coriolis meters; proving and verification using both mass- and volume-based methods; installation, operation, and maintenance. Both mass and volume-based calculation procedures for proving and quantity determination are included in Appendix E. Pages: 48

1st Edition | October 2002 | Reaffirmed: March 2008

Product Number: H05061 | Price: \$134.00

Chapter 5.8 ■

Measurement of Liquid Hydrocarbons by Ultrasonic Flow Meters

Defines the application criteria for UFM's and addresses the appropriate considerations regarding the liquids to be measured. This document addresses the installation, operation, and maintenance of UFM's in liquid hydrocarbon service. The field of application of this Standard is the dynamic measurement of liquid hydrocarbons. While this document is specifically written for custody transfer measurement, other acceptable applications may include allocation measurement, check meter measurement, and leak detection measurement. This document only pertains to spool type, multi-path ultrasonic flow meters with permanently affixed acoustic transducer assemblies. Pages: 23

2nd Edition | November 2011 | Product Number: H050802 | Price: \$83.00

Draft Standard

Vortex Shedding Flowmeter for Measurement of Hydrocarbon Fluids

Describes the design, installation and operation of vortex shedding flowmeters for the measurement of fluid flows, especially hydrocarbon flow measurement. It is being issued initially as a draft standard in order for the industry to obtain more experience with the technology, as well as to determine where this technology may best be applied within the industry. One particular area where additional experience is needed prior to converting this to a custody transfer standard is in the area of proving. However, this document may provide guidance for non-custody application where the technology provides benefits. Pages: 32

1st Edition | January 2007 | Product Number: HDVSF00 | Price: \$93.00

Chapter 6

Metering Assemblies

Discussion of the design, installation and operation of metering systems for coping with special situations in hydrocarbon measurement.

Chapter 6.1

Lease Automatic Custody Transfer (LACT) Systems

Prepared as a guide for the design, installation, calibration, and operation of a lease automatic custody transfer (LACT) system. It applies to unattended and automatic measurement by meter of hydrocarbon liquids produced in the field and transferred to a pipeline in either a scheduled or nonscheduled operation. Pages: 6

2nd Edition | May 1991 | Reaffirmed: April 2007

Product Number: H30121 | Price: \$58.00

Chapter 6.2

Loading Rack Metering Systems

Serves as a guide in the selection, installation and operation of loading rack metering systems for petroleum products, including liquefied petroleum gas. This Standard does not endorse or advocate the preferential use of any specific type of metering system or meter. Pages: 30

3rd Edition | February 2004 | Reaffirmed: August 2011

Product Number: H60203 | Price: \$76.00

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Chapter 6.4

Metering Systems for Aviation Fueling Facilities

General requirements of flow metering of aviation fuel as it is either dispensed to an aircraft or used to defuel an aircraft. Pages: 9

2nd Edition | January 2007 | Reaffirmed: January 2012

Product Number: H60402 | Price: \$63.00

Chapter 6.5

Metering Systems for Loading and Unloading Marine Bulk Carriers

Deals with the operation and special arrangements of meters, provers, manifolding, instrumentation, and accessory equipment used for measurement during loading and unloading of marine bulk carriers. Pages: 6

2nd Edition | May 1991 | Reaffirmed: April 2007

Product Number: H30125 | Price: \$63.00

Chapter 6.6

Pipeline Metering Systems

Provides guidelines for selection of the type and size of meters to be used to measure pipeline oil movements, as well as the relative advantages and disadvantages of the methods of proving meters by tank prover, conventional pipe prover, small volume prover, and master meter. It also includes discussion on obtaining the best operating results from a pipeline-meter station. Pages: 9

2nd Edition | May 1991 | Reaffirmed: January 2012

Product Number: H30126 | Price: \$63.00

You may access Ch. 6.6 in a read-only platform: publications.api.org

Chapter 6.7

Metering Viscous Hydrocarbons

Serves as a guide for the design, installation, operation and proving of meters and auxiliary equipment used in metering viscous hydrocarbons. It defines viscous hydrocarbons and describes the difficulties that arise when viscous hydrocarbons are raised to high temperature. The effects of such temperatures on meters, auxiliary equipment, and fittings are discussed, and advice and warnings to overcome or mitigate difficulties are included. Pages: 6

2nd Edition | May 1991 | Reaffirmed: April 2007

Product Number: H30127 | Price: \$63.00

You may access Ch. 6.7 in a read-only platform: publications.api.org

Chapter 7

Temperature Determination

(includes Addendum 1 dated October 2011)

Describes methods and practices that may be used to obtain accurate measurements of temperature of petroleum and petroleum products in pipelines, storage tanks, gathering tanks, ships, barges, tank cars, pipe provers, tank provers and test measures under both static and dynamic conditions using electronic temperature measuring devices or mercury-in-glass thermometers. Describes the methods, equipment, and procedures for determining the temperature of petroleum and petroleum products under both static and dynamic conditions. This chapter discusses temperature measurement requirements in general for custody transfer, inventory control, and marine measurements. The actual method and equipment selected for temperature determination are left to the agreement of the parties involved. Pages: 38

1st Edition | June 2001 | Reaffirmed: March 2007

Product Number: H07001 | Price: \$191.00

You may access Ch. 7 in a read-only platform: publications.api.org

Chapter 7.3 ■

Fixed Automatic Tank Temperature Systems

Describes the methods, equipment, and procedures for determining the temperature of petroleum and petroleum products under static conditions by the use of an automatic method. Automatic temperature measurement is discussed for custody transfer and inventory control for both onshore and marine measurement applications. Temperatures of hydrocarbon liquids under static conditions can be determined by measuring the temperature of the liquid at specific locations. Examples of where static temperature determination is required include storage tanks, ships and barges. The application of this Standard is restricted to automatic methods for the determination of temperature using fixed automatic tank thermometer (ATT) systems for hydrocarbons having a Reid Vapor Pressure at or below 101.325 kPa (14.696 psia). Although not included in the scope, requirements in this Standard or other Chapter 7 Sections (see the Foreword) can be used for other fluids and other applications including petroleum liquids having Reid vapor pressures in excess of 101.325 kPa (14.696 psia) tanks with inert gas systems and cryogenic liquids. However, such applications can require different performance and installation specifications. Pages: 27

2nd Edition | October 2011 | Product Number: H70302 | Price: \$80.00

Chapter 8

Sampling

Covers standardized procedures for sampling crude oil or its products.

Chapter 8.1

Manual Sampling of Petroleum and Petroleum Products (ANSI/ASTM D4057)

Covers the procedures for obtaining representative samples of shipments of uniform petroleum products, except electrical insulating oils and fluid power hydraulic fluids. It also covers sampling of crude petroleum and nonuniform petroleum products and shipments. It does not cover butane, propane, and gas liquids with a Reid Vapor Pressure (RVP) above 26 psi. The major addition to the Standard is a section on extended-tube sampling. Pages: 24

3rd Edition | October 1995 | Reaffirmed: May 2011

Product Number: H08013 | Price: \$94.00

You may access Ch. 8.1 in a read-only platform: publications.api.org

Chapter 8.1 *

Manual Sampling of Petroleum and Petroleum Products—Spanish

Spanish translation of Chapter 8.1.

3rd Edition | October 1995 | Product Number: H08013SP | Price: \$99.00

Chapter 8.2

Automatic Sampling of Petroleum and Petroleum Products (ANSI/ASTM D4177)

Covers automatic procedures for obtaining representative samples of petroleum and nonuniform stocks or shipments, except electrical insulating oil. Pages: 32

2nd Edition | October 1995 | Reaffirmed: March 2010

Product Number: H08022 | Price: \$94.00

You may access Ch. 8.2 in a read-only platform: publications.api.org

Chapter 8.2 *

Automatic Sampling of Petroleum and Petroleum Products—Spanish

Spanish translation of Chapter 8.2.

2nd Edition | October 1995 | Product Number: H80202SP | Price: \$99.00

*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.

Chapter 8.3

Standard Practice for Mixing and Handling of Liquid Samples of Petroleum and Petroleum Products

(includes Errata 1 dated March 1996)
(ANSI/ASTM D5854)

Covers the handling, mixing, and conditioning procedures required to ensure that a representative sample of the liquid petroleum or petroleum product is delivered from the primary sample container/receiver into the analytical test apparatus or into intermediate containers. For sampling procedures, refer to Chapters 8.1 and 8.2. Refer to Chapter 8.4 for the mixing and handling of light fuels for volatility measurement. Pages: 27

1st Edition | October 1995 | Reaffirmed: March 2010

Product Number: H08031 | Price: \$86.00

Chapter 8.3 *

Standard Practice for Mixing and Handling of Liquid Samples of Petroleum and Petroleum Products—Spanish

Spanish translation of Chapter 8.3.

1st Edition | October 1995 | Product Number: H80301SP | Price: \$91.00

Chapter 8.4

Standard Practice for Sampling and Handling of Fuels for Volatility Measurement

(ASTM D5842)

Covers procedures and equipment for obtaining, mixing, and handling representative samples of volatile fuels for the purpose of testing for compliance with the standards set forth for volatility related measurements applicable to light fuels. The applicable dry vapor pressure equivalent range of this practice is 13 to 105 kPa (2 to 16 psia). This practice is applicable to the sampling, mixing, and handling of reformulated fuels including those containing oxygenates. Pages: 7

2nd Edition | December 2004 | Reaffirmed: June 2009

Product Number: H80402 | Price: \$37.00

Chapter 9

Density Determination

Describes the standard methods and apparatus used to determine the specific gravity of crude oil and petroleum products normally handled as liquids.

Chapter 9.1

Standard Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method

(ANSI/ASTM D1298)

Describes the methods and practices relating to the determination of the density, relative density, or API gravity of crude petroleum and liquid petroleum products using the hydrometer method (laboratory determination). Pages: 6

2nd Edition | December 2002 | Reaffirmed: October 2005

Product Number: H09012 | Price: \$37.00

You may access Ch. 9.1 in a read-only platform: publications.api.org

Chapter 9.2

Standard Test Method for Density or Relative Density of Light Hydrocarbons by Pressure Hydrometer

(ANSI/ASTM D1657)

Provides a guide for determining the density or relative density (specific gravity) or API gravity of light hydrocarbons, including liquefied petroleum gases, using a pressure hydrometer. Pages: 4

2nd Edition | March 2003 | Reaffirmed: June 2007

Product Number: H09022 | Price: \$37.00

You may access Ch. 9.2 in a read-only platform: publications.api.org

Chapter 9.3

Standard Test Method for Density, Relative Density, and API Gravity of Crude Petroleum and Liquid Petroleum Products by

Thermohydrometer Method

(ANSI/ASTM D6822)

Describes methods and practices suitable for the determination of density or API gravity of crude petroleum and liquid petroleum products using thermohydrometers. The test method covers petroleum and liquid petroleum products with Reid vapor pressure of 179 kPa (26 psi) or less. Pages: 7

2nd Edition | November 2002 | Reaffirmed: March 2008

Product Number: H09032 | Price: \$37.00

Chapter 10

Sediment and Water

Describes methods for determining the amount of sediment and water, either together or separately in petroleum products. Laboratory and field methods are covered.

Chapter 10.1

Standard Test Method for Sediment in Crude Oils and Fuel Oils by the Extraction Method

(ANSI/ASTM D473)

Covers the determination of sediment in crude oils and fuel oils by extraction with toluene. The precision applies to a range of sediment levels from 0.01 to 0.40 % mass, although higher levels may be determined. Pages: 6

3rd Edition | November 2007 | Product Number: H10013 | Price: \$37.00

You may access Ch. 10.1 in a read-only platform: publications.api.org

Chapter 10.2

Standard Test Method for Water in Crude Oil by Distillation

(ANSI/ASTM D4006)

Specifies a method for the determination of water in crude petroleum by distillation. Pages: 11

2nd Edition | November 2007 | Product Number: H30202 | Price: \$43.00

You may access Ch. 10.2 in a read-only platform: publications.api.org

Chapter 10.3

Standard Test Method for Water and Sediment in Crude Oil by the Centrifuge Method (Laboratory Procedure)

(ANSI/ASTM D4007)

Describes a method of laboratory determination of water and sediment in crude oil by means of the centrifuge procedure. Pages: 13

3rd Edition | May 2008 | Product Number: H10033 | Price: \$43.00

You may access Ch. 10.3 in a read-only platform: publications.api.org

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Petroleum Measurement

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Chapter 10.4

Determination of Sediment and Water in Crude Oil by the Centrifuge Method (Field Procedure)

Describes a method for determining both water and sediment or sediment only in crude oils using the field centrifuge procedure. Pages: 10

3rd Edition | December 1999 | Reaffirmed: September 2010

Product Number: H30204 | Price: \$73.00

You may access Ch. 10.4 in a read-only platform: publications.api.org

Chapter 10.5

Standard Test Method for Water in Petroleum Products and Bituminous Materials by Distillation (ANSI/ASTM D95)

Covers the determination of water in the range from 0 to 25 % volume in petroleum products, tars, and other bituminous materials by the distillation method. Pages: 7

4th Edition | August 2005 | Reaffirmed: March 2010

Product Number: H100504 | Price: \$37.00

Chapter 10.6

Standard Test Method for Water and Sediment in Fuel Oils by the Centrifuge Method (Laboratory Procedure) (ANSI/ASTM D1796)

Describes the laboratory determination of water and sediment in fuel oils in the range from 0 to 30 % volume by means of the centrifuge procedure. Pages: 7

4th Edition | December 2004 | Reaffirmed: April 2009

Product Number: H100604 | Price: \$37.00

Chapter 10.7

Standard Test Method for Water in Crude Oils by Potentiometric Karl Fischer Titration (ANSI/ASTM D4377)

Describes the procedure for the determination of water in crude oils by Karl Fischer titration (potentiometric.) This test method covers the determination of water in the range from 0.02 to 2 mass percent in crude oils. Mercaptan and sulfide (S^{2-} or H_2S) sulfur are known to interfere with the method. Pages: 6

2nd Edition | December 2002 | Reaffirmed: May 2011

Product Number: H10072 | Price: \$37.00

Chapter 10.8

Standard Test Method for Sediment in Crude Oil by Membrane Filtration (ANSI/ASTM D4807)

Covers the determination of sediment in crude oils by membrane filtration. This test method has been validated for crude oils with sediments up to approximately 0.15 mass %. The accepted unit of measure for this test method is mass %, but an equation to convert to volume % is provided. Pages: 5

2nd Edition | November 2005 | Reaffirmed: March 2010

Product Number: H100802 | Price: \$37.00

Chapter 10.9

Standard Test Method for Water in Crude Oils by Coulometric Karl Fischer Titration (ANSI/ASTM D4928)

Covers the determination of water in the range from 0.02 to 5.0 percent in crude oils. The test method presents two procedures for the direct determination of water content in crude oils; weight and volume. Pages: 5

2nd Edition | December 2002 | Reaffirmed: June 2010

Product Number: H10092 | Price: \$37.00

You may access Ch. 10.9 in a read-only platform: publications.api.org

TR 2570

Continuous On-Line Measurement of Water in Petroleum (Crude Oil and Condensate)

Provides guidance for the application, installation, operation, verification, and proving of on-line water devices (OWDs) for use in the non-custody transfer measurement of water in crude oil and condensate. Pages: 17

1st Edition | October 2010 | Product Number: H25701 | Price: \$70.00

Chapter 11.1

Physical Properties Data (Volume Correction Factors)

Chapter 11 is the physical data that has direct application to volumetric measurement of liquid hydrocarbons. It is presented in tabular form, in equations relating volume to temperature and pressure, and computer subroutines. The subroutines for Chapter 11.1 are available in electronic form. This Standard is not included in the complete set of API *Manual of Petroleum Measurement Standards*. Each element of Chapter 11 must be ordered separately.

Chapter 11.1-2004

Volume Correction Factors

(the 2004 edition of this Standard also supersedes Chapters 11.2.1 and 11.2.1M)

The (2004 edition of this) Standard (Revised Standard) was effective on the date of publication and supersedes the previous (1980) edition of the Standard(s). However, due to the nature of the changes in this Revised Standard, it is recognized that guidance concerning an implementation period may be needed in order to avoid disruptions within the industry and ensure proper application. As a result, it is recommended that this Revised Standard be utilized on all new applications no later than TWO YEARS after the publication date. An application for this purpose is defined as the point where the calculation is applied. Once the Revised Standard is implemented in a particular application, the Previous Standard will no longer be used in that application. If an existing application complies with the Previous Standard(s) then it shall be considered in compliance with this Revised Standard. However, the use of API Standards remains voluntary and the decision on when to utilize a standard is an issue that is subject to the negotiations between the parties involved in the transaction.

See the listing for "Chapter 11.1-1980" on page 157 of this Catalog for more information on the previous edition of the Standard(s).

Chapter 11.1

Temperature and Pressure Volume Correction Factors for Generalized Crude Oils, Refined Products, and Lubricating Oils (includes Addendum 1 dated September 2007)

Provides the algorithm and implementation procedure for the correction of temperature and pressure effects on density and volume of liquid hydrocarbons which fall within the categories of crude oil, refined products, or lubricating oils; NGLs and LPGs are excluded from consideration in this Standard. This document is distributed on CD-ROM in Portable Document Format (PDF). A utility program is included on the CD to allow users to calculate corrections for temperature and pressure effects and to print pages of correction factors for a user-defined range of temperature, pressure and density in both US Customary and Metric units of measure. The utility is used within a supported web browser and uses the Java language. Internet access is not required. (Printed tables are not available from either API or ASTM for this edition of Chapter 11.1.)

September 2004 | Product Number: H11013

Single User | Price: \$497.00

2 to 10 Users | Price: \$709.00

11 to 50 Users | Price: \$919.00

51+ Users | Price: \$1,391.00

You may access Ch. 11.1 (without the utility program) in a read-only platform: publications.api.org

Chapter 11.1

Add-In Program for Microsoft® Excel

A Microsoft® Windows compatible 32-bit add-in for Microsoft® Excel that provides callable functions for Density, CTPL and Fp. These functions allow calculating density at base conditions or at alternate conditions, CTPL correction factor used to transform volume and density data to base or desired conditions and the scaled compensation factor for transformation from alternate to base conditions or from observed to base conditions for generalized crude oils, refined products and lubricating oils. They support the following process variables: Density (API gravity, relative density & kg/m³), Temperature (°F & °C) and Pressure (psig, Bar & kPa).

To order the Add-in, contact Flow-Cal, Inc. at +1 (281) 282-0865 or send an e-mail to APIstandards@flowcal.com.

XL Add-in—runs on a single standalone computer with no network access
Price: \$750.00

XL Add-in—installed on less than 15 standalone computers or ran on a network with less than 15 nodes | Price: \$5,000.00

XL Add-in—installed on less than 50 standalone computers or ran on a network with less than 50 nodes | Price: \$7,500.00

XL Add-in—installed on an unlimited number of standalone computers or ran on a network with unlimited nodes | Price: \$11,000.00

Chapter 11.1

Dynamic Link Library (DLL)

The Dynamic Link Library (DLL) is compiled from source code written in the C programming language. The DLL provides subroutines that can be called from applications written in C or other programming languages. These subroutines are subdivided into three groups (density, volume correction factors and scaled compressibility factor) for generalized crude oils, refined products and lubricating oils.

- The density subroutines have two sets of density functions allowing calculations at base conditions or at alternate conditions.
- The volume correction factor subroutines calculate a CTPL, CTL & CPL which are used to transform volume and density data to base or desired conditions
- The scaled compressibility factor subroutines will convert from alternate to base conditions or from observed to base conditions.

The DLL supports the following process units, densities in API gravity, relative density & kg/m³, temperatures in °F & °C and pressures in psig, Bar & kPa. This version is compatible with and can coexist with the 1980 version DLL.

To order the DLL, contact Flow-Cal, Inc. at +1 (281) 282-0865 or send an e-mail to APIstandards@flowcal.com.

DLL—runs on a single standalone computer with no network access
Price: \$2,000.00

DLL—installed on less than 15 standalone computers or ran on a network with less than 15 nodes | Price \$7,500.00

DLL—installed on less than 50 standalone computers or ran on a network with less than 50 nodes | Price \$15,000.00

DLL—installed on an unlimited number of standalone computers or ran on a network with unlimited nodes | Price \$20,000.00

DLL—compiled as part of an application for distribution (software distributor)
Price: \$30,000.00

Chapter 11.1

Source Code

ANSI C-Code used to compile the DLLs. The source code may be compiled into user programs to calculate temperature and pressure volume correction factors for generalized crude oils, refined products, and lubricating oils. Note: An experienced C programmer will be needed to implement the C-Code subroutines. The API does not directly provide technical support for the C-Code; however, a support program is available from Flow-Cal, Inc.

To order the C-Code Subroutines, contact Flow-Cal, Inc. at +1 (281) 282-0865 or send an e-mail to APIstandards@flowcal.com.

C-Code—compiled to run on a network with less than 50 nodes
Price: \$22,500.00

C-Code—compiled to run on a network with unlimited nodes
Price: \$30,000.00

C-Code—compiled as part of an application for distribution (software distributor) | Price: \$45,000.00

Chapter 11.1

Source Code, DLL & XL Add-In—Combined

To order the C-Code Subroutines, Add-in and DLL, contact Flow-Cal, Inc. at +1 (281) 282-0865 or send an e-mail to APIstandards@flowcal.com.

C-Code, DLL and XL Add-in—compiled to run on a network with less than 50 nodes | Price: \$27,500.00

C-Code, DLL and XL Add-in—compiled to run on a network with unlimited nodes | Price: \$37,000.00

C-Code, DLL and XL Add-in—compiled as part of an application for distribution (software distributor) | Price: \$55,000.00

Chapter 11.2.2

Compressibility Factors for Hydrocarbons: 0.350–0.637 Relative Density (60 °F/60 °F) and –50 °F to 140 °F Metering Temperature

Provides tables to correct hydrocarbon volumes metered under pressure for the metered temperature. Contains compressibility factors related to the meter temperature and relative density (60 °F/60 °F) of the metered material.

2nd Edition | October 1986 | Reaffirmed: December 2007

Product Number: H27307 | Price: \$166.00

You may access Ch. 11.2.2 in a read-only platform: publications.api.org

Chapter 11.2.2M

Compressibility Factors for Hydrocarbons: 350–637 Kilograms per Cubic Meter Density (15 °C) and –46 °C to 60 °C Metering Temperature

Provides tables to correct hydrocarbon volumes metered under pressure to corresponding volumes at equilibrium pressure for the metered temperature. The Standard contains compressibility factors related to the meter temperature and density (15 °C) of the metered material. Pages: 264

1st Edition | October 1986 | Reaffirmed: December 2007

Product Number: H27309 | Price: \$166.00

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Chapter 11.2

Data File of Chapters 11.2.2 and 11.2.2M

This package includes a data file of tables found in Chapters 11.2.2 and 11.2.2M. The tables, presented in both U.S. customary (USC) and metric (SI) units, cover compressibility factors for light hydrocarbons.

1st Edition | August 1984 | Product Number: H27320 | Price: \$287.00

Chapter 11.2.4

Temperature Correction for the Volume of NGL and LPG

Tables 23E, 24E, 53E, 54E, 59E, 60E

This publication is an updated version of TP-25. The actual Standard represented by this report consists of the explicit implementation procedures. Sample tables, flow charts, and specific examples created from a computerized version of these implementation procedures are included. The examples are to provide guides and checkpoints for those who wish to implement a computerized procedure to represent the Standard, however these are not part of the actual Standard. This Standard covers a 60 °F relative Density range of 0.3500 to 0.6880 which nominally equates to a density at 15 °C of 351.7 to 687.8 kg/m³ and a density at 20 °C of 331.7 to 686.6 kg/m³. The temperature range of this Standard is 50.8 to 199.4 °F (-46 to 93 °C). At all conditions, the pressure is assumed to be at saturation conditions (also known as bubble point or saturation vapor pressure). Pages: 149

1st Edition | September 2007 | Product Number: H1102041 | Price: \$174.00

Chapter 11.2.5

A Simplified Vapor Pressure Correlation for Commercial NGLs (supersedes the Addendum to Chapter 11.2.2-1994)

Methods used for calculation of the correction factor for pressure effects such as Chapter 11.2.1-1984 (now superseded by Chapter 11.1-2004) and Chapter 11.2.2-1986 require knowledge of the equilibrium bubble point pressure (vapor pressure) at the measured conditions. However, the vapor pressure of the process liquid is generally not measured. The vapor pressure can also be calculated from compositional information, but the composition is not always measured for natural gas liquids, NGLs. Therefore, a correlation for the vapor pressure of NGLs is based upon normally measured properties is required and is documented in this publication. Pages: 27

1st Edition | September 2007 | Product Number: H1102051 | Price: \$87.00

Chapter 11.3.2.1

Ethylene Density

An electronic FORTRAN Source Code text file on CD-ROM that will produce either a density (pounds/ft³) or a compressibility factor for vapor phase ethylene over the temperature range from 65 °F to 167 °F and the pressure range from 200 to 2100 psia. A documentation file is also included.

January 1974 | Reaffirmed: March 2008
Product Number: H25650 | Price: \$287.00

Chapter 11.3.3

Ethanol Density and Volume Correction Factors

This Standard covers density and volume correction factors for pure and denatured fuel ethanol. The actual Standard consists of the explicit implementation procedures set forth in this document. Sample tables and other examples created from a computerized version of this implementation procedure are presented as examples only and do not represent the Standard. This Standard is applicable at any liquid operating temperature to pure (99+ %) ethanol and denatured ethanol containing ASTM D4806 allowed denaturants (natural gasoline, gasoline blend stocks, and unleaded gasoline) in the 2 % to 5 % by volume range. Pages: 13

1st Edition | July 2011 | Product Number: H1103031 | Price: \$120.00

Chapter 11.3.3.2

Propylene Compressibility

An electronic FORTRAN Source Code text file on CD-ROM that will produce a table of values applicable to liquid propylene in the following ranges: temperature, 30 °F to 165 °F; and saturation pressure to 1600 psia. It computes the following two values: density (pounds/ft³) at flowing temperature and pressure, and ratio of density at flowing conditions to density at 60 °F and saturation pressure. A documentation file is also included.

January 1974 | Reaffirmed: July 2007
Product Number: H25656 | Price: \$287.00

Chapter 11.4.1

Properties of Reference Materials

Part 1—Density of Water and Water Volume Correction Factors for Calibration of Volumetric Provers

(replaces Chapters 11.2.3 and 11.2.3M)

This chapter specifies the density of water to be used in all applicable API *MPMS* Standards. It also specifies the volume correction factor equation for water and demonstrates its use for water calibration of volumetric provers. Pages: 14

1st Edition | December 2003 | Reaffirmed: August 2008
Product Number: H11411 | Price: \$51.00

Chapter 11.5

Density/Weight/Volume Intraconversion

[replaces Chapter 11.1-1980 Volumes XI/XII (ASTM D1250-80, IP 200/80)]

These intraconversion tables are applicable to all crude oils, petroleum products, and petrochemicals. These standards are intended for application to bulk liquid quantities. Chapters 11.5, Parts 1 to 3 are available collectively on one CD-ROM.

1st Edition | March 2009 | Product Number: H1105CD | Price: \$240.00

Part 1—Conversions of API Gravity at 60 °F

(includes Errata dated September 2011)

Provides implementation procedures for conversion of API gravity at 60 °F to equivalent densities in both in vacuo and in air values. This Standard gives the following equivalents for any value of API gravity at 60 °F:

- relative density at 60 °F (old Table 3);
- absolute density at 60 °F;
- absolute density at 15 °C (old Table 3);
- pounds per U.S. gallon at 60 °F in vacuo and in air (old Table 8);
- U.S. gallons per pound at 60 °F in vacuo and in air (old Table 8);
- short tons per 1000 U.S. gallons at 60 °F in vacuo and in air (old Table 9);
- U.S. gallons per short ton at 60 °F in vacuo and in air (old Table 10);
- short tons per barrel at 60 °F in vacuo and in air (old Table 9);
- barrels per short ton at 60 °F in vacuo and in air (old Table 10);
- long tons per 1000 U.S. gallons at 60 °F in vacuo and in air (old Table 11);
- U.S. gallons per long ton at 60 °F in vacuo and in air (old Table 12);
- long tons per barrel at 60 °F in vacuo and in air (old Table 11);
- barrels per long ton at 60 °F in vacuo and in air (old Table 12);
- metric tons per 1000 U.S. gallons at 60 °F in vacuo and in air (old Table 13);
- metric tons per barrel at 60 °F in vacuo and in air (old Table 13);
- barrels per metric ton at 60 °F in vacuo and in air;
- cubic metres per short ton at 15 °C in vacuo and in air (old Table 14);
- cubic metres per long ton at 15 °C in vacuo and in air (old Table 14).

While not related to API gravity, the following are included for user convenience:

- U.S. gallons at 60 °F to litres at 15 °C (old Table 4);
- barrels at 60 °F to litres at 15 °C (old Table 4).

Part 2—Conversions for Relative Density (60/60 °F)

Provides implementation procedures for conversion of relative density (60/60 °F) to equivalent densities in both in vacuo and in air values. This Standard gives the following equivalents for any value of relative density (60/60 °F):

- API gravity at 60 °F (old Table 21);
- absolute density at 60 °F;
- absolute density at 15 °F (old Table 21);
- pounds per U.S. gallon at 60 °F in and in air (old Table 26);
- U.S. gallons per pound at 60 °F in vacuo and in air (old Table 26);
- short tons per 1000 U.S. gallons at 60 °F in vacuo and in air (old Table 27);
- U.S. gallons per short ton at 60 °F in vacuo and in air (old Table 28);
- short tons per barrel at 60 °F in vacuo and in air (old Table 27);
- barrels per short ton at 60 °F in vacuo and in air (old Table 28);
- long tons per 1000 U.S. gallons at 60 °F in vacuo and in air (old Table 29);
- U.S. gallons per long ton at 60 °F in vacuo and in air (old Table 30);
- long tons per barrel at 60 °F in vacuo and in air (old Table 29);
- barrels per long ton at 60 °F in vacuo and in air (old Table 30);
- metric tons per 1000 U.S. gallons at 60 °F in vacuo and in air;
- metric tons per barrel at 60 °F in vacuo and in air;
- barrels per metric ton at 60 °F in vacuo and in air;
- cubic metres per short ton at 15 °C in vacuo and in air (old Table 31);
- cubic metres per long ton at 15 °C in vacuo and in air (old Table 31).

While not related to relative density, the following are included for user convenience:

- U.S. gallons at 60 °F to litres at 15 °C (old Table 22);
- barrels at 60 °F to litres at 15 °C (old Table 22, Table 52).

Part 3—Conversions for Absolute Density at 15 °C

Provides implementation procedures for conversion of absolute density at 15 °C to equivalent densities in both in vacuo and in air values. This Standard gives the following equivalents for any value of absolute density at 15 °C:

- relative density at 15 °C;
- absolute density at 60 °F;
- relative density at 60 °F (old Table 51);
- API gravity at 60 °F (old Table 51);
- density at 15 °C (similar to old Table 56);
- conversion of apparent density at 15 °C to absolute density at 15 °C;
- cubic metres per metric ton at 15 °C in vacuo and in air (similar to old Table 56);
- cubic metres per short ton at 15 °C in vacuo and in air;
- cubic metres per long ton at 15 °C in vacuo and in air;
- pounds per U.S. gallon at 60 °F in vacuo and in air;
- U.S. gallons per pound at 60 °F in vacuo and in air;
- short tons per 1000 litres (cubic metres) at 15 °C in vacuo and in air (old Table 57);
- short tons per 1000 U.S. gallons at 60 °F in vacuo and in air;
- U.S. gallons per short ton at 60 °F in vacuo and in air;
- short tons per barrel at 60 °F in vacuo and in air;
- barrels per short ton at 60 °F in vacuo and in air;
- long tons per 1000 litres (cubic metres) at 15 °C in vacuo and in air (old Table 57);
- U.S. gallons per metric ton at 60 °F in vacuo and in air (old Table 58);
- barrels per metric ton at 60 °F in vacuo and in air (old Table 58);
- long tons per 1000 U.S. gallons at 60 °F in vacuo and in air;

- U.S. gallons per long ton at 60 °F in vacuo and in air;
- long tons per barrel at 60 °F in vacuo and in air;
- barrels per long ton at 60 °F in vacuo and in air.

While not related to relative density, the following are included for user convenience:

- litres at 15 °C to U.S. gallons at 60 °F;
- cubic metres at 15 °C to barrels at 60 °F (old Table 52).

1st Edition | March 2009 | Product Number: H1105CD | Price: \$240.00

Chapter 12

Calculation of Petroleum Quantities

Describes the standard procedures for calculating net standard volumes, including the application of correction factors and the importance of significant figures. The purpose of standardizing the calculation procedure is to achieve the same result regardless of which person or computer does the calculating.

Chapter 12.1.1

Calculation of Static Petroleum Quantities, Part 1—Upright Cylindrical Tanks and Marine Vessels

(includes Chapter 12 Addendum 1 dated August 2007)

Guides the user through the steps necessary to calculate static liquid quantities, at atmospheric conditions, in upright, cylindrical tanks and marine tank vessels. The Standard defines terms employed in the calculation of static petroleum quantities. The Standard also specifies equations that allow the values of some correction factors to be computed. Fundamental to this process is the understanding that in order for different parties to be able to reconcile volumes, they must start with the same basic information (tank capacity table, levels, temperatures, and so forth) regardless of whether the information is gathered automatically or manually. This Standard does not address the calculation of clingage, nonliquid material, small quantities (such as onboard quantities, quantities remaining on board, and wedge formula, where material is not touching all bulkheads on marine vessels), and vapor space calculations. Pages: 34

2nd Edition | November 2001 | Reaffirmed: February 2008

Product Number: H12112 | Price: \$91.00

Chapter 12.1.1 *

Calculation of Static Petroleum Quantities, Part 1—Upright Cylindrical Tanks and Marine Vessels—Spanish

Spanish translation of Chapter 12.1.1.

2nd Edition | November 2001 | Product Number: H120101SP | Price: \$96.00

Chapter 12.1.2

Calculation of Static Petroleum Quantities, Part 2—Calculation Procedures for Tank Cars

(includes Chapter 12 Addendum 1 dated August 2007)

Describes the standardized method for calculating target loading quantities and actual loading quantities of liquids in tank cars. Also explained are the factors required for the calculations. This information is applicable to all crude oils, petroleum products, and petrochemicals (including LPGs and other liquefied gases) transported by rail tank car. It does not cover any products loaded or measured as solids. It defines the terms required to understand the calculations, and provides instructions for their use; includes thirteen calculation examples in Appendix E. Pages: 39

1st Edition | May 2003 | Reaffirmed: May 2011

Product Number: H12121 | Price: \$107.00

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Chapter 12.2.1

Calculation of Petroleum Quantities Using Dynamic Measurement Methods and Volume Correction Factors,

Part 1—Introduction

(includes Chapter 12 Addendum 1 dated August 2007 and Errata 1 dated July 2009)

Provides the general introduction of this Standard which is divided into five parts, each published separately. The base (reference or standard) volumetric determination of metered quantities is discussed along with the general terms required for solution of the various equations. General rules for rounding of numbers, including field data, intermediate calculations numbers, and discrimination levels are specified. Pages: 23

2nd Edition | May 1995 | Reaffirmed: February 2009

Product Number: H12021 | Price: \$105.00

You may access Ch. 12.2.1 in a read-only platform: publications.api.org

Chapter 12.2.2

Calculation of Petroleum Quantities Using Dynamic Measurement Methods and Volumetric Correction Factors,

Part 2—Measurement Tickets

(includes Chapter 12 Addendum 1 dated August 2007)

Provides standardized calculation methods for the quantification of liquids and the determination of base prover volumes under defined conditions, regardless of the point of origin or destination or the units of measure required by governmental customs or statute. The publication rigorously specifies the equations for computing correction factors, rules for rounding, calculational sequence, and discrimination levels to be employed in the calculations. Pages: 18

3rd Edition | June 2003 | Reaffirmed: September 2010

Product Number: H12223 | Price: \$98.00

You may access Ch. 12.2.2 in a read-only platform: publications.api.org

Chapter 12.2.3

Calculation of Petroleum Quantities Using Dynamic Measurement Methods and Volumetric Correction Factors,

Part 3—Proving Reports

(includes Chapter 12 Addendum 1 dated August 2007)

Consolidates and standardizes calculations for metering petroleum liquids using turbine or displacement meters and clarifies terms and expressions by eliminating local variations among terms. This Standard provides calculation methods for the determination of meter factors under defined conditions, regardless of the point of origin or destination or units of measure required by governmental customs or statute. This document specifies the equations for computing correction factors, including the calculation sequence, discrimination levels, and rules for rounding. Pages: 59

1st Edition | October 1998 | Reaffirmed: March 2009

Product Number: H12023 | Price: \$115.00

Chapter 12.2.4

Calculation of Petroleum Quantities Using Dynamic Measurement Methods and Volume Correction Factors,

Part 4—Calculation of Base Prover Volumes by Waterdraw Method

(includes Chapter 12 Addendum 1 dated August 2007 and Errata 1 dated July 2009)

Provides a standardized calculation method to determine a base prover volume under defined conditions. Specifically, this Standard discusses the calculation procedures for the waterdraw calibration method, which is one of several different procedures used to determine Base Prover Volume (BPV) of a displacement prover. Pages: 58

1st Edition | December 1997 | Reaffirmed: March 2009

Product Number: H12024 | Price: \$118.00

Chapter 12.2.5

Calculation of Petroleum Quantities Using Dynamic Measurement Methods and Volumetric Correction Factors,

Part 5—Base Prover Volume Using Master Meter Method

(includes Chapter 12 Addendum 1 dated August 2007 and Errata 1 dated July 2009)

Provides standardized calculation methods for the quantification of liquids and the determination of base prover volumes under defined conditions, regardless of the point of origin or destination or units of measure required by governmental customs or statute. The criteria contained in this document allow different entities using various computer languages on different computer hardware (or manual calculations) to arrive at identical results using the same standardized input data. Pages: 108

1st Edition | September 2001 | Reaffirmed: August 2011

Product Number: H12025 | Price: \$165.00

Chapter 12.3

Calculation of Volumetric Shrinkage From Blending Light Hydrocarbons With Crude Oil

(includes Chapter 12 Addendum 1 dated August 2007)

Provides background, theory, calculation examples, and tables to correct for volumetric shrinkage resulting when blending volatile hydrocarbons with crude oil. The tables are entered with density differentials at Standard conditions and percentage light hydrocarbon in total mix. This Standard supersedes and replaces Bull 2509C, 2nd Edition, 1967. Pages: 110

1st Edition | July 1996 | Reaffirmed: April 2011

Product Number: H12031 | Price: \$86.00

Chapter 13

Statistical Aspects of Measuring and Sampling

The more accurate petroleum measurement becomes, the more its practitioners stand in need of statistical methods to express residual uncertainties. This chapter covers the application of statistical methods to petroleum measurement and sampling.

Chapter 13.1

Statistical Concepts and Procedures in Measurement

Designed to help those who make measurement of bulk oil quantities improve the value of their result statement by making proper estimates of the uncertainty or probable error involved in measurements. Pages: 17

1st Edition | June 1985 | Reaffirmed: February 2011

Product Number: H30321 | Price: \$80.00

Chapter 13.2

Statistical Methods of Evaluating Meter Proving Data

Addresses procedures for evaluating any meter's performance where meter proving factors are developed in accordance with Chapter 12.2. The data in examples used in this chapter are intended to be typical of custody transfer operations of low-vapor-pressure fluids using displacement or turbine meters in accordance with Chapters 4, 5, and 6 of API's *Manual of Petroleum Measurement Standards*. However, the procedures in Chapter 13.2 can be used for noncustody transfer metering applications and for custody transfer metering of high -vapor-pressure and gaseous fluids where meter proving data are available. Pages: 41

1st Edition | November 1994 | Reaffirmed: February 2011

Product Number: H13021 | Price: \$94.00

Chapter 14

Natural Gas Fluids Measurement

Standardizes practices for measuring, sampling and testing natural gas fluids.

Chapter 14.1

Collecting and Handling of Natural Gas Samples for Custody Transfer

Concentrates on proper sampling systems and procedures. It recognizes the critical impact of hydrocarbon dew point consideration to the overall accuracy and success of these practices and procedures. Analyses of gas samples are used for many purposes and are applied to various calculations, some of which have an impact on the accuracy of custody transfer calculations (quantity and quality). Pages: 58

6th Edition | February 2006 | Reaffirmed: September 2011

Product Number: H140106 | Price: \$176.00

Chapter 14.2

Compressibility Factors of Natural Gas and Other Related Hydrocarbon Gases

(AGA Report No. 8)(GPA 8185-90)

Presents detailed information for precise computations of compressibility factors and densities for natural gas and other hydrocarbon gases. Also included are calculation uncertainty estimations and FORTRAN computer program listings.

2nd Edition | August 1994 | Reaffirmed: March 2006

Order from American Gas Association 400 N. Capitol Street NW, Washington, DC 20001 | (202)-824-7000

Chapter 14.3.1

Concentric, Square-Edged Orifice Meters

Part 1—General Equations and Uncertainty Guidelines

(includes Errata dated July 1991 and June 1993)
(ANSI/API MPMS 14.3.1-2003) (AGA Report No. 3, Part 1)
(GPA 8185-90, Part 1)

Provides the basic equations and uncertainty statements for computing the flow through orifice meters. In Part 1, the traditional basic orifice factor and Reynolds number factor found in the 1985 edition have been replaced with a more fundamental coefficient of discharge that is a function of line size, beta ratio, and pipe Reynolds number. The upstream expansion factor is not changed from the 1985 edition. The downstream expansion factor has been reanalyzed to include compressibility. Although each part of the document can be used independently for many applications, users with natural gas applications should review Parts 3 and 4 before implementing Part 1. Pages: 51

3rd Edition | September 1990 | Reaffirmed: February 2009

Product Number: H30350 | Price: \$159.00

Chapter 14.3.2

Concentric, Square-Edged Orifice Meters

Part 2—Specification and Installation Requirements

(ANSI/API MPMS 14.3.2-2000) (AGA Report No. 3, Part 2)
(GPA 8185-00, Part 2)

Outlines the specification and installation requirements for the measurement of single-phase, homogeneous Newtonian fluids using concentric, square-edged, flange-tapped orifice meters. It provides specifications for the construction and installation of orifice plates, meter tubes, and associated fittings when designing metering facilities using orifice meters. Pages: 70

4th Edition | April 2000 | Reaffirmed: May 2011

Product Number: H14324 | Price: \$182.00

You may access Ch. 14.3.2 in a read-only platform: publications.api.org

Chapter 14.3.3

Concentric, Square-Edged Orifice Meters

Part 3—Natural Gas Applications

(includes Errata 1 dated March 1994)
(ANSI/API MPMS 14.3.3-2003) (AGA Report No. 3, Part 3)
(GPA 8185, Part 3)

Developed as an application guide for the calculation of natural gas flow through a flange-tapped, concentric orifice meter, using the inch-pound system of units. It also provides practical guidelines for applying Chapter 14.3, Parts 1 and 2, to the measurement of natural gas. Pages: 103

3rd Edition | August 1992 | Reaffirmed: February 2009

Product Number: H30353 | Price: \$159.00

You may access Ch. 14.3.3 in a read-only platform: publications.api.org

Chapter 14.3.4

Concentric, Square-Edged Orifice Meters

Part 4—Background, Development, Implementation Procedures and Subroutine Documentation

(AGA Report No. 3, Part 4) (GPA 8185, Part 4)

Describes the background and development of the equation for the coefficient of discharge of flange-tapped square-edged concentric orifice meters and recommends a flow rate calculation procedure. The recommended procedures provide consistent computational results for the quantification of fluid flow under defined conditions, regardless of the point of origin or destination, or the units of measure required by governmental customs or statute. The procedures allow different users with different computer languages on different computing hardware to arrive at almost identical results using the same standardized input data. Pages: 138

3rd Edition | November 1992 | Reaffirmed: August 2011

Product Number: H30354 | Price: \$159.00

Chapter 14.4

Converting Mass of Natural Gas Liquids and Vapors to Equivalent Liquid Volumes

(GPA 8173-91)

Prescribes a method for converting the measured mass of natural gas liquids or natural gas vapors at operating conditions to equivalent liquid volume of the components at 60 °F and equivalent liquid volumes of the components at 15 °C and equilibrium pressure for SI units. Pages: 3

1st Edition | April 1991 | Reaffirmed: January 2012

Product Number: H30344 | Price: \$57.00

Chapter 14.5

Calculation of Gross Heating Value, Relative Density, Compressibility and Theoretical Hydrocarbon Liquid Content for Natural Gas Mixtures for Custody Transfer

(ANSI/API MPMS 14.5-2009) (GPA 8172-09)

Presents procedures for calculating, at base conditions from composition, the following properties of natural gas mixtures: gross heating value, relative density (real and ideal), compressibility factor and theoretical hydrocarbon liquid content which in the U.S. is typically expressed as GPM, the abbreviation for gallons of liquid per thousand cubic feet of gas. Rigorous calculation of the effect of water upon these calculations is complicated. Because this document relates primarily to custody transfer, the water effect included is an acceptable contractual calculation. Annex A of this Standard contains a detailed investigation of the effect of water and detailed derivations of the equations presented in the Standard. Pages: 41

3rd Edition | January 2009 | Product Number: H140503 | Price: \$70.00

You may access Ch. 14.5 in a read-only platform: publications.api.org

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Chapter 14.6

Continuous Density Measurement

(includes Errata 1 dated August 1998) (ANSI/API MPMS 14.6-1991)

Provides criteria and procedures for designing, installing, and operating continuous density measurement systems for Newtonian fluids in the petroleum, chemical, and natural gas industries. The application of this Standard is limited to clean, homogeneous, single-phase liquids or supercritical fluids. The procedures and criteria in this Standard have been successfully applied to fluids whose flowing density is greater than 0.3 grams per cubic centimeter at operating conditions of 60 °F (15.6 °C) and saturation pressure. The intent of the Standard is to provide the user with a density accuracy of 0.10 % for most applications. The errata provides editorial clarification regarding conversion factors and variables used in various calculation equations. Pages: 51

2nd Edition | April 1991 | Reaffirmed: March 2006

Product Number: H30346 | Price: \$128.00

You may access Ch. 14.6 in a read-only platform: publications.api.org

Chapter 14.7

Mass Measurement of Natural Gas Liquids

(GPA 8182-03)

Serves as a reference for the selection, design, installation, operation and maintenance of single-phase dynamic liquid mass measurement systems that operate in the 350 to 688 kg/m³ (0.350 to 0.689 relative density at 60 °F) density range. The mass measurement systems within the scope of this document include inferred mass measurement, where volume at flowing conditions is combined with density at similar conditions to result in measured mass, as well as Coriolis mass measurement. Liquids with density below 350 and above 688 kg/m³ (below 0.350 and above 0.689 relative density at 60 °F) and cryogenic fluids (colder than approximately -50 °F) are excluded from the scope of this document, but the principles described herein may apply to such streams. Sampling equipment and techniques are covered including standards for analytical methods used to determine the composition of the sampled product. Equations of state and correlations used to calculate the density of the product are discussed. The standard used to convert mass to equivalent liquid volumes of components is also discussed. Pages: 6

3rd Edition | October 2009 | Product Number: H140703 | Price: \$57.00

Chapter 14.8

Liquefied Petroleum Gas Measurement

Describes dynamic and static metering systems used to measure liquefied petroleum gas in the density range of 0.30 to 0.70 grams per cubic centimeter. This edition revises the February 1983 version of the Standard to incorporate the 1992 version of the Chapter 14.3 orifice meter discharge coefficient equation and revises and simplifies the mass flow rate sample calculations. Pages: 20

2nd Edition | July 1997 | Reaffirmed: October 2011

Product Number: H14082 | Price: \$94.00

You may access Ch. 14.8 in a read-only platform: publications.api.org

Chapter 14.9

Measurement of Natural Gas by Coriolis Meter

(AGA Report No. 11-2003)

Developed to assist designers and users in operating, calibrating, installing, maintaining and verifying Coriolis flow meters used for natural gas flow measurement.

1st Edition | January 2003

Order from the American Gas Association 500 N. Capitol Street NW, Washington, DC 20001 | (202)-824-7000

Chapter 14.10

Measurement of Flow to Flares

Addresses measurement of flow to flares, and includes the following:

- Application considerations.
- Selection criteria and other considerations for flare meters and related instrumentation.
- Installation considerations.
- Limitations of flare measurement technologies.
- Calibration.
- Operation.
- Uncertainty and propagation of error.
- Calculations.

The scope of this Standard does not include analytical instrumentation. Pages: 54

1st Edition | July 2007 | Product Number: H140101 | Price: \$103.00

Chapter 15

Guidelines for Use of the International System of Units (SI) in the Petroleum and Allied Industries

Specifies the API preferred units for quantities involved in petroleum industry measurements and indicates factors for conversion of quantities expressed in customary units to the API-preferred metric units. The quantities that comprise the tables are grouped into convenient categories related to their use. They were chosen to meet the needs of the many and varied aspects of the petroleum industry but also should be useful in similar process industries. Pages: 43

3rd Edition | December 2001 | Reaffirmed: May 2007

Product Number: H15003 | Price: \$111.00

Chapter 16

Measurement of Hydrocarbon Fluids by Weight or Mass

Covers the static and dynamic measurement of hydrocarbon fluids by weight or mass.

Chapter 16.2

Mass Measurement of Liquid Hydrocarbons in Vertical Cylindrical Storage Tanks by Hydrostatic Tank Gauging

Provides guidance on the installation, commissioning, maintenance, validation, and calibration of hydrostatic tank gauging (HTG) systems for the direct measurement of static mass of liquid hydrocarbons in storage tanks. This edition is applicable to hydrostatic tank gauging systems that use pressure sensors with one port open to the atmosphere. It is also applicable for use on vertical cylindrical atmospheric storage tanks with either fixed or floating roofs. (Based entirely on ISO 11223.) Pages: 20

1st Edition | November 1994 | Reaffirmed: February 2007

Product Number: H16021 | Price: \$94.00

Chapter 17

Marine Measurement

Provides guidelines for the measurement and reporting of crude oil or petroleum product transfers by shore terminal operators, vessel personnel, and other parties involved in marine cargo transfer measurement and accountability operations.

Chapter 17.1

Guidelines for Marine Cargo Inspection

Encourages uniform inspection practices for marine petroleum cargo quantity and quality control. These guidelines specify the policy and minimum recommended practices for manual and automatic measurement, sampling and accounting for bulk quantities of crude oil (including spiked, blended, and reconstituted crude oil) and petroleum products that are transferred from one port to another on marine vessels. Activities described include actions by producers, buyers, sellers, shore terminal operators,

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vessel owners and their crews, customs authorities, independent inspectors and other parties with an interest in oil measurement. Use also will simplify the making of agreements for transferring volumes of petroleum cargoes and will help ensure that the agreements can be clearly interpreted and executed between parties. Included in this text are sample forms designed to provide a standard comprehensive format to record and report essential data obtained during the marine cargo inspection procedure.

5th Edition | March 2008 | Product Number: H170105 | Price: \$125.00

Chapter 17.1 *

Guidelines for Marine Cargo Inspection—Spanish

Spanish translation of Chapter 17.1.

5th Edition | March 2008 | Product Number: H1701SP | Price: \$131.00

Chapter 17.2

Measurement of Cargoes on Board Tank Vessels (includes Errata 1 dated April 2000)

Covers manual portable measurement units (PMUs) through deck-fitted vapor control valves (VCVs) and fixed automatic tank gauge (ATG) systems for use when a marine vessel's cargo tanks may not be open to the atmosphere. It establishes the procedures for obtaining the level measurements of cargo, free water, and onboard quantity/remaining onboard (OBQ/ROB), as well as taking the temperatures and samples required for the marine custody transfer of bulk liquid petroleum cargoes under closed or restricted system measurement conditions. This Standard is not intended for use with pressurized or refrigerated cargoes such as LPG and LNG. Pages: 19

2nd Edition | May 1999 | Reaffirmed: September 2011
Product Number: H17022 | Price: \$128.00

Chapter 17.2 *

Measurement of Cargoes on Board Tank Vessels—Spanish

Spanish translation of Chapter 17.2.

2nd Edition | May 1999 | Product Number: H1702SP | Price: \$134.00

Chapter 17.3

Guidelines for Identification of the Source of Free Waters Associated With Marine Petroleum Cargo Movements (includes Errata 1 dated November 1992)

Provides guidelines for identifying the source of free waters associated with marine petroleum cargo movements. The presence of free water is a factor in marine custody transfers of bulk petroleum, especially in the case of crude oil cargoes. This Standard recommends the water samples and volumes to be taken, the containers to be used, the care and distribution of the samples, and the analytical procedures of use in identifying sources of free water associated with marine petroleum cargoes. Pages: 26

1st Edition | April 1992 | Reaffirmed: September 2009
Product Number: H30407 | Price: \$105.00

Chapter 17.4

Method for Quantification of Small Volumes on Marine Vessels (OBQ/ROB) (includes Errata 1 dated September 2004)

Provides a method for determining the small volumes of On-Board Quantity (OBQ) prior to loading or material Remaining On-Board (ROB) a vessel on completion of discharge. This Standard applies only to quantification by manual gauging of small volumes on marine vessels prior to loading or upon completion of discharge. The OBQ/ROB material may include any combination of water, oil, slops, oil residue, oil/water emulsion, and

sediment, present in the vessel's cargo tanks, void spaces, and pipelines. It does not address clingage, hydrocarbon vapors, cargoes in transit, or cargo pumpability (refer to Chapter 3). Pages: 20

1st Edition | October 1994 | Reaffirmed: August 2009
Product Number: H30410 | Price: \$94.00

Chapter 17.4 *

Method for Quantification of Small Volumes on Marine Vessels (OBQ/ROB)—Spanish

Spanish translation of Chapter 17.4.

1st Edition | October 1994 | Product Number: H30410SP | Price: \$98.00

Chapter 17.5

Guidelines for Cargo Analysis and Reconciliation

Covers guidelines for marine cargo analysis and reconciliation. These guidelines are intended to provide a basis for analyzing and reconciling the quantity differences (gains/losses) resulting from marine custody transfer movement(s) of petroleum and petroleum product cargoes. As such, the guidelines are complementary to, but do not replace, normal inspection procedures. The shipment of petroleum or petroleum products by marine vessels often results in a difference between the load port (Bill of Lading) and discharge port (Outturn) quantities. The objective of cargo analysis and reconciliation is to determine if a marine petroleum shipment results in excessive gain or loss, and if so, to identify the reason(s) for volume differences in an effort to correct petroleum measurement problems. Describes the primary steps for marine cargo analysis and reconciliation. Those steps are the following: (a) Voyage Data Collection; (b) Voyage Data Analysis; and (c) Voyage Summary and Reconciliation. Pages: 25

2nd Edition | November 2003 | Reaffirmed: July 2010
Product Number: H17052 | Price: \$100.00

Chapter 17.5 *

Guidelines for Cargo Analysis and Reconciliation—Spanish

Spanish translation of Chapter 17.5.

2nd Edition | November 2003 | Product Number: H1705SP | Price: \$101.00

Chapter 17.6

Guidelines for Determining Fullness of Pipelines Between Vessels and Shore Tanks

Designed to improve the accuracy of custody transfer volumes by establishing recommended procedures for determining the amount of crude oil and petroleum products in shore or vessel pipeline systems before and after the liquid is loaded onto or discharged from marine vessels. These procedures will improve line fill determination activities and assist in making results reproducible at loading and discharge ports. Pages: 20

1st Edition | August 1994 | Reaffirmed: May 2010
Product Number: H17061 | Price: \$94.00

Chapter 17.6 *

Guidelines for Determining Fullness of Pipelines Between Vessels and Shore Tanks—Spanish

Spanish translation of Chapter 17.6.

1st Edition | August 1994 | Product Number: H17061SP | Price: \$98.00

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Chapter 17.7

Recommended Practices for Developing Barge Control Factors (Volume Ratio)

Describes the procedure to determine a fixed barge/shore ratio that can be used either when no reliable vessel experience factor (VEF) is available or to verify and validate an existing VEF. The resultant ratio may be used as a "control factor" to ascertain a corrected barge volume for comparison against future shore delivery or receipt volumes. These procedures apply to a single transfer between the shore and the barge, using a light or medium product or chemical with an approximate volume of at least 80% fill of the barge capacity. This publication should be utilized for inland waterway barges. Ocean-going barges should use the VEF method. Pages: 6

1st Edition | September 1995 | Reaffirmed: January 2012
Product Number: H17071 | Price: \$94.00

Chapter 17.8

Guidelines for Pre-Loading Inspection of Marine Vessel Cargo Tanks

Outlines procedures for determining that cargo tanks and associated loading equipment of marine vessels are clean and in appropriate condition to receive the intended cargoes. This document provides different levels of inspections for typical cargoes and a recommended format for report preparation. Pages: 14

1st Edition | August 1998 | Reaffirmed: September 2009
Product Number: H17081 | Price: \$94.00

Chapter 17.8 *

Guidelines for Pre-Loading Inspection of Marine Vessel Cargo Tanks—Spanish

Spanish translation of Chapter 17.8.

1st Edition | August 1998 | Product Number: H1708SP | Price: \$98.00

Chapter 17.9

Vessel Experience Factor (VEF)

Provides a recommended practice for the calculation and application of a VEF and provides guidelines for data compilation, data validation, and recommendations on the appropriate use of VEF during custody transfer involving marine tank vessels. It also provides clear guidance on maintenance of quantity data on board the vessel, calculation of VEFs and application of VEFs. The key aim is to provide a single unambiguous figure for VEFL or VEFD and to remove the possibility of any arbitrary inclusion or exclusion of data on the part of the individual(s) performing the final calculation. Also provides instruction for parcel tankers, part cargoes, compartmental VEFs, and vessel-to-vessel transfers. The methods are applicable to liquid bulk cargoes including crude oil, petroleum products, chemicals, and LPGs. Pages: 21

1st Edition | November 2005 | Product Number: H17091 | Price: \$146.00

Chapter 17.9 *

Vessel Experience Factor (VEF)—Spanish

Spanish translation of Chapter 17.9.

1st Edition | November 2005 | Product Number: H17091SP | Price: \$148.00

Chapter 17.10.2

Measurement of Refrigerated and/or Pressurized Cargoes on Board Marine Gas Carriers

Part 2—Liquefied Petroleum and Chemical Gases (includes Errata 1 dated September 2010)

Provides guidance to vessel and shore personnel regarding accepted methods for determining quantities of Liquefied Petroleum and Chemical Gas cargoes (excluding LNG) on board refrigerated and/or pressurized carriers. This Standard covers all measurement systems commonly used on

refrigerated and/or pressurized gas carriers designed to carry those types of cargoes and includes recommended methods for measuring, sampling, documenting and reporting quantities on board these vessels. Pages: 80

1st Edition | November 2007 | Product Number: H1701002 | Price: \$109.00

Chapter 17.11

Measurement and Sampling of Cargoes on Board Tank Vessels Using Closed/Restricted Equipment

Provides guidance on the use, maintenance and calibration of restricted and closed measurement and sampling equipment. It also provides guidance on preferred size and positioning for gauging and sampling fittings on vessels. Pages: 17

1st Edition | May 2009 | Product Number: H170111 | Price: \$95.00

Chapter 17.12

Procedure for Bulk Liquid Chemical Cargo Inspection by Cargo Inspectors

Provides systematic cargo measurement procedures for use primarily by cargo inspectors and to specify procedures directed at minimizing cargo contamination and losses, in the absence of, or in conjunction with, specific client guidelines. This document should be considered a summary of best practices used within the industry. Pages: 31

1st Edition | September 2008 | Product Number: H170121 | Price: \$129.00

Chapter 18

Custody Transfer

Covers application of other measurement standards to unique custody transfer situations.

Chapter 18.1

Measurement Procedures for Crude Oil Gathered From Small Tanks by Truck

Describes procedures to encourage uniform custody transfer measurement and testing practices for crude oil gathered from small tanks (1,000 barrels or less in capacity) by truck. The publication contains recommended steps for manually determining the quantity and quality of crude oil being transferred in trucks under field conditions. This publication is of interest to measurement personnel and crude oil producers and transporters. Pages: 13

2nd Edition | April 1997 | Reaffirmed: February 2007
Product Number: H18012 | Price: \$111.00

Chapter 19

Evaporation Loss Measurement

This chapter covers methods for estimating hydrocarbon evaporation losses from various types of tanks. Note that Chapter 19 is not included in the complete set of API *Manual of Petroleum Measurement Standards*.

Chapter 19.1

Evaporative Loss From Fixed-Roof Tanks (includes Addendum 1 dated August 2008) (previously Publication 2518)

Contains an improved method for estimating the total evaporative losses or the equivalent atmospheric hydrocarbon emissions from fixed-roof tanks that contain multicomponent hydrocarbon mixture stocks (such as petroleum liquid stocks like crude oils) or single-component hydrocarbon stocks (such as petrochemical stocks like ethanol). Pages: 68

3rd Edition | March 2002 | Reaffirmed: January 2007
Product Number: H19013 | Price: \$122.00

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Chapter 19.1D

Documentation File for API Manual of Petroleum Measurement Standards Chapter 19.1—Evaporative Loss From Fixed-Roof Tanks (previously Bulletin 2518) (includes Errata 1 dated June 1994)

Presents information on the development of theoretical equations; comparisons with test data; a sensitivity analysis of the loss equation; and other pertinent information that was developed during the preparation of Chapter 19.1. Pages: 190

1st Edition | March 1993 | Product Number: H30553 | Price: \$166.00

Chapter 19.2

Evaporative Loss From Floating-Roof Tanks (previously Publications 2517 and 2519)

Contains methods for estimating the total evaporative losses or the equivalent atmospheric hydrocarbon emissions from external floating-roof tanks (EFRTs) and freely vented internal floating-roof tanks (IFRTs), as well as for tanks with external-type floating roofs that also have a freely vented fixed roof. This type of tank is referred to as a covered floating-roof tank (CFRT) in this document. Pages: 83

2nd Edition | September 2003 | Reaffirmed: August 2008
Product Number: H19022 | Price: \$159.00

Chapter 19.3, Part A

Wind Tunnel Test Method for the Measurement of Deck-Fitting Loss Factors for External Floating-Roof Tanks

Describes the procedures to establish evaporative loss factors for deck fittings on external floating-roof tanks. The test method involves measuring the weight loss of a test assembly over time. The Standard specifies the test apparatus, instruments, test procedures and calculation procedures to be used. It also addresses the variables to be measured, format for reporting the test values and their associated uncertainty. Pages: 27

1st Edition | June 1997 | Reaffirmed: March 2007
Product Number: H1903A | Price: \$118.00

Chapter 19.3, Part B

Air Concentration Test Method—Rim-Seal Loss Factors for Floating-Roof Tanks

Describes the procedures to establish evaporative rim-seal loss factors for rim seals used on external floating-roof tanks. The test method involves passing a controlled flow rate of air through a test chamber that contains a test liquid and a test rim seal, and measuring the concentration of the test liquid vapor in the air streams entering and leaving the test chamber. The Standard specifies the test apparatus, instruments, test procedures, and calculation procedures to be used. It also addresses the variables to be measured, format for reporting the test values, and their associated uncertainty. Pages: 30

1st Edition | August 1997 | Reaffirmed: July 2007
Product Number: H1903B | Price: \$118.00

Chapter 19.3, Part C

Weight Loss Test Method for the Measurement of Rim-Seal Loss Factors for Internal Floating-Roof Tanks

Provides a uniform method for measuring evaporative loss from rim seals used on aboveground storage tanks. This information can be utilized to establish product specific loss factors in terms of loss rate and seal gap area. Pages: 29

1st Edition | July 1998 | Reaffirmed: October 2007
Product Number: H1903C | Price: \$118.00

Chapter 19.3, Part D

Fugitive Emission Test Method for the Measurement of Deck-Seam Loss Factors for Internal Floating-Roof Tanks

Establishes a uniform method for measuring evaporative deck-seam loss factors and deck-joint loss factors of mechanically-joined deck seams that are used on internal floating-roof tanks. These deck-seam loss factors and deck-joint loss factors are to be determined in terms of their loss rate at specified pressure differences across the deck seam or deck joint for certification purposes. Pages: 31

1st Edition | June 2001 | Reaffirmed: December 2007
Product Number: H1903D | Price: \$118.00

Chapter 19.3, Part E

Weight Loss Test Method for the Measurement of Deck-Fitting Loss Factors for Internal Floating-Roof Tanks

Describes the test methods to be used to establish evaporative loss factors for deck fittings on internal floating-roof tanks. This chapter specifies the test apparatus, instruments, test procedures, and calculation procedures to be used. The Standard also addresses the requirements for reporting test report values. Pages: 30

1st Edition | May 1997 | Reaffirmed: December 2007
Product Number: H1903E | Price: \$118.00

Chapter 19.3, Part H

Tank Seals and Fittings Certification—Administration

Provides guidance for the administration of the former API Tank Seals and Fittings Certification Program. The document includes detailed methods for monitoring and analysis of tests conducted on individual devices and describes the steps in the certification process. Pages: 53

1st Edition | March 1998 | Reaffirmed: February 2009
Product Number: H1903H | Price: \$118.00

Chapter 19.4

Recommended Practice for Speciation of Evaporative Losses (includes Errata 1 dated March 2007)

Contains recommended methods for estimating specific organic compound emissions from storage tanks, and marine vessel transfer operations handling multi-component hydrocarbon mixtures (such as crude oils and gasoline) associated with petroleum operations. Pages: 77

2nd Edition | September 2005 | Product Number: H19042 | Price: \$118.00

Chapter 19.5

Atmospheric Hydrocarbon Emissions From Marine Vessel Transfer Operations (formerly Publication 2514A)

Provides methods for estimating evaporative loss from marine vessel transfer operations. Specifically, this Standard addresses

- 1) loading stock into:
 - a) ship or ocean barges, or
 - b) shallow draft barges, and
- 2) loading ballast water into ship or ocean barges from which crude oil has been unloaded.

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The emission estimates are for uncontrolled loading operations and do not apply to operations using vapor balance or vapor control systems or ballasting of ships with segregated ballast tanks. This Standard does not address evaporative loss for:

- 1) very large crude carriers (VLCCs) or ultra large crude carriers (ULCCs) (unless the saturation factor KS is determined);
- 2) marine vessels employing crude oil washing;
- 3) marine vessel transit loss;
- 4) loading ballast water into marine vessels that, prior to dockside unloading, held anything other than crude oil (unless the saturation factor KS is determined); or
- 5) unloading marine vessels.

This Standard supersedes API 2514A, 2nd Edition, September 1981, which is withdrawn. Pages: 31

1st Edition | September 2009 | Product Number: H19051 | Price: \$120.00

Publ 2524

Impact Assessment of New Data on the Validity of American Petroleum Institute Marine Transfer Operation Emission Factors

Consultant CH2M Hill confirmed the validity of the model used in Publ 2514A by comparing emission test data with predictive emission models developed by API, ARCO, and Exxon. The study found that the API model adequately predicts emissions for tanks ranging in size from 17,000 to 35,000 dead weight tons and for tanks being loaded within the lower-48 states. The model does not appear to apply to crude oil loading of tankers in Valdez, Alaska, because of unique local operating conditions. However, no known test data invalidates the model for predicting crude oil loading emissions from carriers smaller than very large crude carriers in the lower-48 states. Pages: 194

July 1992 | Product Number: H25240 | Price: \$152.00

Publ 2558

Wind Tunnel Testing of External Floating-Roof Storage Tanks

Presents the results of a wind tunnel study to determine the local wind velocities, wind directions, and roof pressures on external floating roof tanks. Pages: 13

1st Edition | June 1993 | Product Number: H25580 | Price: \$189.00

TR 2567

Evaporative Loss From Storage Tank Floating Roof Landings

Investigates storage tank emissions that may result from landing and subsequently refloating a floating roof. The existing emission factors for floating-roof tanks are based on the assumption that the floating roof is continuously floating on the stored stock liquid. Additional emissions may occur, however, if the tank is emptied such that the floating roof is no longer floating. This study sought to quantify these floating-roof landing loss emissions. Pages: 26

1st Edition | April 2005 | Product Number: H256701 | Price: \$102.00

TR 2568

Evaporative Loss From the Cleaning of Storage Tanks

Provides guidance for estimating emissions that result from removing the liquid heel (free-standing stock liquid) and cleaning the remaining deposits of stock liquid mixed with residue and water (sludge) from the bottoms of aboveground storage tanks. The emissions addressed in this report are those that leave the tank during the tank cleaning process. This report does not address:

- the fate of vapors after they have left the tank (other accounting for the efficiency of the control device)
- the fate of sludge after it has left the tank (or emissions that may occur during sludge treatment or disposal), or
- emissions that may be expelled by the vacuum pump of a vacuum truck or suction pump, if such devices are used in the tank cleaning process.

In other words, this report addresses the estimation of the mass of volatile organic compounds that leave the tank as vapor during the tank cleaning process. It does not address emissions that may result from the handling of

liquids or sludge after such materials have been removed from the tank. This report is intended to reduce the effort required to generate a good faith estimate of tank cleaning emissions, and to result in more uniformity in the resulting emissions estimates. Pages: 47

1st Edition | November 2007 | Product Number: H25680 | Price: \$103.00

TR 2569

Evaporative Loss From Closed-Vent Internal Floating-Roof Storage Tanks

Addresses evaporative loss from internal floating-roof tanks (IFRTs) with closed vents. When the vents in the fixed roof of an IFRT are closed, rather than open, estimation of emissions is shown to be highly complex. This subject is not covered in other API Standards such as Chapter 19.1, which specifically excludes fixed-roof tanks that have an internal floating roof, and Chapter 19.2, which specifically excludes closed internal floating-roof tanks (that is, tanks vented only through a pressure-vacuum relief vent, blanketed with an inert gas, vented to a vapor processing unit, or otherwise restricted from being freely vented). Pages: 26

1st Edition | August 2008 | Product Number: H25690 | Price: \$103.00

Chapter 20

Allocation Measurement of Oil and Natural Gas

Chapter 20.1

Allocation Measurement

Provides design and operating guidelines for liquid and gas allocation measurement systems. Included are recommendations for metering, static measurement, sampling, proving, calibrating and calculating procedures. Pages: 67

1st Edition | August 1993 | Reaffirmed: September 2011

Product Number: H30701 | Price: \$105.00

You may access Ch. 20.1 in a read-only platform: publications.api.org

RP 85

Use of Subsea Wet-Gas Flowmeters in Allocation Measurement Systems

Presents a recommended allocation methodology that best fits the application, and that equitably accommodates variances in the uncertainty level between meters in the system. It is intended to advise the user on various aspects of the use of subsea wet-gas flowmeters in allocation measurement systems. Meterization, operation, abnormal operation, and meter testing are important topics included here, but, foremost, this document proposes techniques to be used in the allocation of total production to individual contributing streams. Pages: 64

1st Edition | March 2003 | Reaffirmed: August 2008

Product Number: G08501 | Price: \$119.00

RP 86

Recommended Practice for Measurement of Multiphase Flow

Addresses how the user measures (multiphase) flow rates of oil, gas, water, and any other fluids that are present in the effluent stream of a single well. This requires the definition not only of the methodology which is to be employed, but also the provision of evidence that this methodology will produce a quality measurement in the intended environment. Most often, this evidence will take the form of a statement of the uncertainty of the measurement, emphasizing how the uncertainty statement was derived. Pages: 78

1st Edition | September 2005 | Product Number: G08601 | Price: \$164.00

RP 87

Recommended Practice for Field Analysis of Crude Oil Samples Containing from Two to Fifty Percent Water by Volume

Provides the user with recommended 'field' methods of sampling, sample handling and analysis for high water content streams up to 50 % water on a volumetric basis. In particular, this RP was developed giving consideration to offshore installations (both floating and fixed platforms). These installations are generally subject to motion and vibrations, have minimal laboratory equipment and perform S&W analysis with multi-skilled operations personnel as opposed to laboratory chemists. The techniques described, however, are applicable to onshore locations. Provides design and operating guidelines for sampling, sample handling and analysis for high water content streams, up to 50 % water on a volumetric basis. As a guide, this RP targets a relative accuracy of 5 % of reading up to a maximum of 50 % water content as a qualifier for various methods described herein. For example, the corresponding absolute accuracy for a 10% water content stream is ± 0.5 % and for 20 % water content is ± 1.0 %. Pages: 19

1st Edition | August 2007 | Product Number: G08701 | Price: \$87.00

Chapter 21

Flow Measurement Using Electronic Metering Systems

Describes standard practices and minimum specifications for electronic measurement systems used in the measurement and recording of flow parameters. This chapter covers natural gas fluid and petroleum and petroleum product custody transfer applications using industry-recognized primary measurement devices.

Chapter 21.1

Electronic Gas Measurement

Describes the minimum specifications for electronic gas measurement systems used in the measurement and recording of flow parameters of gaseous phase hydrocarbons. Topics covered include definitions, calculational algorithms, data availability, audit and reporting requirements, equipment installation, calibration, and verification and security. Pages: 38

1st Edition | August 1993 | Reaffirmed: December 2011

Product Number: H30730 | Price: \$111.00

You may access Ch. 21.1 in a read-only platform: publications.api.org

Chapter 21.2

Electronic Liquid Volume Measurement Using Positive Displacement and Turbine Meters

Provides guidance for the effective use of electronic liquid measurement systems for custody transfer measurement of liquid hydrocarbons under the following conditions. Use of the measurement systems must fall within the scope and field of application of Chapter 12.2. Guidance applies to systems using turbine or positive displacement meters. Guidance applies to systems using on-line CTL and CPL compensation. The procedures and techniques in Chapter 21.2 are recommended for new measurement applications. This Standard provides custody transfer measurement procedures for pipeline and other electronic liquid metering systems including design, selection, use, auditing, reporting, calibration, verification and security. Pages: 60

1st Edition | June 1998 | Reaffirmed: August 2011

Product Number: H21021 | Price: \$185.00

Chapter 21.2-A1

Addendum 1 to Flow Measurement Using Electronic Metering Systems, Inferred Mass

1st Edition | August 2000 | Reaffirmed: August 2011

Product Number: H2102A | Price: \$58.00

Chapter 22.1

Testing Protocols—General Guidelines for Developing Testing Protocols for Devices Used in the Measurement of Hydrocarbon Fluids

Intended to be a guideline for the development of testing protocols to document the performance characteristics of any of the following hydrocarbon fluid measurement devices:

- Meter or device designed for measurement of flow,
- Instruments or devices for determining hydrocarbon fluid properties,
- Instruments or devices used to monitor and/or record operating conditions,
- Devices or instruments used to monitor, calculate, or measure key parameters in custody transfer applications. Pages: 16

1st Edition | November 2006 | Reaffirmed: December 2011

Product Number: H22011 | Price: \$73.00

Chapter 22.2

Testing Protocols—Differential Pressure Flow Measurement Devices (supersedes Chapter 5.7)

Defines the testing and reporting protocols for flow measurement devices based on the detection of a pressure differential that is created by the device in a flowing stream. This protocol is designed to supply industry with a comparable description of the capabilities of these devices for the measurement of single-phase fluid flow when they are used under similar operating conditions. The objectives of this Testing Protocol are as follows:

- Ensure that the user of any differential pressure flow meter knows the performance characteristics of the meter over a range of Reynolds numbers as applicable or defined by tests,
- Facilitate both the understanding and the introduction of new technologies,
- Provide a standardized vehicle for validating manufacturer's performance specifications,
- Provide information about relative performance characteristics of the primary elements of the differential pressure metering devices under standardized testing protocol,
- Quantify the uncertainty of these devices and define the operating and installation conditions for which the stated uncertainties apply. Pages: 29

1st Edition | August 2005 | Product Number: H220201 | Price: \$84.00

Std 2560

Reconciliation of Liquid Pipeline Quantities

Provides methodologies for monitoring liquid pipeline loss/gain, and for determining the normal loss/gain level for any given pipeline system. Troubleshooting suggestions are also presented. Pages: 19

1st Edition | December 2003 | Reaffirmed: January 2010

Product Number: H25601 | Price: \$76.00

Publ 2566

State of the Art Multiphase Flow Metering

Provides information on multiphase flow metering systems gleaned from more than 150 published documents that are in the public domain. The documentation was prepared from information obtained through mid-2002. It should be noted that the indicated performances data stated in these published documents have not necessarily been verified by an independent body. The listing of these references in the Appendix 2 is intended to provide a comprehensive source of data and information on multiphase metering; the reader needs to carefully review the source of the data in the documents when utilizing the information. Pages: 80

1st Edition | May 2004 | Product Number: H25661 | Price: \$123.00

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TR 2571 ■

Fuel Gas Measurement

Provides a performance-based methodology for the measurement and reporting of fuel gas consumption. The document provides guidance in the following areas to allow the user to achieve a targeted uncertainty of measurement:

- selection of flow meter type; differential pressure (DP), displacement, ultrasonic, Coriolis, vortex, turbine, thermal, and others;
- associated instrumentation for measuring fluid properties and flowing conditions, such as pressure and temperature transmitters, densitometers, gas chromatographs;
- obtaining and use of gas composition or other analytical data;
- design and installation requirements of the measurement system;
- inspection, verification and calibration practices of flow meters and their associated accessory instrumentation; and
- simplified uncertainty calculations with examples to illustrate the methodology.

Techniques are described to assess the uncertainty contribution of individual components of fuel gas measurement systems and overall facility fuel gas measurement uncertainty. Pages: 67

1st Edition | March 2011 | Product Number: H257101 | Price: \$120.00