Manual of Petroleum Measurement Standards Chapter 4.5

Master Meter Provers

FOURTH EDITION, JUNE 2016

AMERICAN PETROLEUM INSTITUTE

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Measurement Coordination Department

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Foreword

Chapter 4 of the Manual of Petroleum Measurement Standards was prepared as a guide for the design, installation, calibration, and operation of meter proving systems commonly used by the majority of petroleum operators. The devices and practices covered in this chapter may not be applicable to all liquid hydrocarbons under all operating conditions. Other types of proving devices that are not covered in this chapter may be appropriate for use if agreed upon by the parties involved.

This publication is primarily intended for use in the United States and is related to the standards, specifications, and procedures of the National Institute of Standards and Technology (NIST). When the information provided herein is used in other countries, the specifications and procedures of the appropriate national standards organizations may apply. Where appropriate, other test codes and procedures for checking pressure and electrical equipment may be used.

For the purposes of business transactions, limits on error or measurement tolerance are usually set by law, regulation, or mutual agreement between contracting parties. This publication is not intended to set tolerances for such purposes; it is intended only to describe methods by which acceptable approaches to any desired accuracy can be achieved.

API *MPMS* Chapter 4 now contains the following sections:

Section 1, *Introduction*

Section 2, *Displacement Provers*

Section 4, *Tank Provers*

Section 5, *Master Meter Provers*

Section 6, *Pulse Interpolation*

Section 7, *Field-Standard Test Measures*

Section 8, *Operation of Proving Systems*

Section 9.1, *Introduction to Determination of the Volume of Displacement and Tank Provers*

Section 9.2, *Determination of the Volume of Displacement and Tank Provers by the Waterdraw Method of Calibration*

Section 9.3, *Determination of the Volume of Displacement Provers by the Master Meter Method of Calibration*

Section 9.4, *Determination of the Volume of Displacement and Tank Provers by the Gravimetric Method of Calibration*

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Generally, API standards are reviewed and revised, reaffirmed, or withdrawn at least every five years. A one-time extension of up to two years may be added to this review cycle. Status of the publication can be ascertained from the API Standards Department, telephone (202) 682-8000. A catalog of API publications and materials is published annually by API, 1220 L Street, NW, Washington, DC 20005.

Suggested revisions are invited and should be submitted to the Standards Department, API, 1220 L Street, NW, Washington, DC 20005, standards@api.org.

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1 Scope

This standard 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 API *MPMS* Chapter 4.9.3.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API *MPMS* Chapter 4.8, *Operation of Proving Systems*

API *MPMS* Chapter 4.9.2, *Determination of the Volume of Displacement and Tank Provers by the Waterdraw Method of Calibration*

API *MPMS* Chapter 4.9.3, *Determination of the Volume of Displacement Provers by the Master Meter Method of Calibration*

API *MPMS* Chapter 5.1, *General Considerations for Measurement by Meters*

API *MPMS* Chapter 5.2, *Measurement of Liquid Hydrocarbons by Displacement Meters*

API *MPMS* Chapter 5.3, *Measurement of Liquid Hydrocarbons by Turbine Meters*

API *MPMS* Chapter 5.6, *Measurement of Liquid Hydrocarbons by Coriolis Meters*

API *MPMS* Chapter 5.8, *Measurement of Liquid Hydrocarbons by Ultrasonic Flow meters Using Transit Time Technology*

API *MPMS* Chapter 12.2.3, *Calculation of Petroleum Quantities Using Dynamic Measurement Methods and Volumetric Correction Factors, Part 3—Proving Reports*

API *MPMS* Chapter 13.1, *Statistical Concepts and Procedures in Measurement*

API *MPMS* Chapter 13.2, *Statistical Methods of Evaluating Meter Proving Data*

API *MPMS* Chapter 20.1, *Allocation Measurement*

ISO 4185, *Measurement of Liquid Flow in Closed Conduits—Weighing Method*

NOTE For additional information regarding gravimetric proving systems.