Manual of Petroleum Measurement Standards Chapter 4—Proving Systems

Section 9—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

FIRST EDITION, APRIL 2010

AMERICAN PETROLEUM INSTITUTE

Manual of Petroleum Measurement Standards Chapter 4—Proving Systems

Section 9—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

Measurement Coordination

FIRST EDITION, APRIL 2010

energy API

AMERICAN PETROLEUM INSTITUTE

Special Notes

API publications necessarily address problems of a general nature. With respect to particular circumstances, local, state, and federal laws and regulations should be reviewed.

Neither API nor any of API's employees, subcontractors, consultants, committees, or other assignees make any warranty or representation, either express or implied, with respect to the accuracy, completeness, or usefulness of the information contained herein, or assume any liability or responsibility for any use, or the results of such use, of any information or process disclosed in this publication. Neither API nor any of API's employees, subcontractors, consultants, or other assignees represent that use of this publication would not infringe upon privately owned rights.

API publications may be used by anyone desiring to do so. Every effort has been made by the Institute to assure the accuracy and reliability of the data contained in them; however, the Institute makes no representation, warranty, or guarantee in connection with this publication and hereby expressly disclaims any liability or responsibility for loss or damage resulting from its use or for the violation of any authorities having jurisdiction with which this publication may conflict.

API publications are published to facilitate the broad availability of proven, sound engineering and operating practices. These publications are not intended to obviate the need for applying sound engineering judgment regarding when and where these publications should be utilized. The formulation and publication of API publications is not intended in any way to inhibit anyone from using any other practices.

Any manufacturer marking equipment or materials in conformance with the marking requirements of an API standard is solely responsible for complying with all the applicable requirements of that standard. API does not represent, warrant, or guarantee that such products do in fact conform to the applicable API standard.

Foreword

This multi-part publication consolidates and standardizes calibration procedures for displacement and volumetric tank provers used in the metering of petroleum liquids. It provides essential information on the operations involved in obtaining a valid, accurate and acceptable prover volume by different calibration methods. Units of measure in this publication are in the International System (SI) and United States Customary (USC) units consistent with North American industry practices. This section consists of the following four parts:

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

— Part 2—*Determination of the Volume of Displacement and Tank Provers by the Waterdraw Method of Calibration*;

— Part 3—*Determination of the Volume of Displacement Provers by the Master Meter Method of Calibration*;

— Part 4—*Determination of the Volume of Displacement and Tank Provers by the Gravimetric Method of Calibration*.

Throughout this document issues of traceability are addressed by references to the National Institute of Standards and Technology (NIST). However, other appropriate national metrology institutes (NMIs) can be referenced.

Nothing contained in any API publication is to be construed as granting any right, by implication or otherwise, for the manufacture, sale, or use of any method, apparatus, or product covered by letters patent. Neither should anything contained in the publication be construed as insuring anyone against liability for infringement of letters patent.

This document was produced under API standardization procedures that ensure appropriate notification and participation in the developmental process and is designated as an API standard. Questions concerning the interpretation of the content of this publication or comments and questions concerning the procedures under which this publication was developed should be directed in writing to the Director of Standards, American Petroleum Institute, 1220 L Street, NW, Washington, DC 20005. Requests for permission to reproduce or translate all or any part of the material published herein should also be addressed to the director.

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.

Contents

Chapter 4—Proving Systems
Section 9—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

1 Scope

This standard 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 of calibration.

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 *Manual of Petroleum Measurement Standards* (*MPMS*) Chapter 4.2, *Displacement Provers*

API *MPMS* Chapter 4.4, *Tank Provers*

API *MPMS* Chapter 4.6, *Pulse Interpolation*

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

API *MPMS* Chapter 4.9.1-2005, *Methods of Calibration for Displacement and Volumetric Tank Provers*, Part 1—*Introduction to the Determination of the Volume of Displacement and Tank Provers*

API *MPMS* Chapter 4.9.2-2005, *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*

API *MPMS* Chapter 12.2.3-1998, *Calculation of Petroleum Quantities Using Dynamic Measurement Methods and Volumetric Correction Factors*, Part 3—*Proving Reports*

API *MPMS* Chapter 12.2.5-2001, *Calculation of Petroleum Quantities Using Dynamic Measurement Methods and Volumetric Correction Factors*, Part 5—*Base Prover Volume Using Master Meter Methods*

NOTE For readability, references to API *Manual of Petroleum Measurement Standards* are abbreviated as API *MPMS*. Reference to parts of chapters will follow the convention of “Chapter.Section.Part.Subpart”. For example, this standard, *American Petroleum Institute Manual of Petroleum Measurement Standards*, Chapter 4, Section 9, Part 3, would be called API *MPMS* Chapter 4.9.3.

3 Terms and Applications

3.1 Terms

No definitions are unique to this document. Unfamiliar terms not explained in adjoining text are found in the publications listed in Section 2 and the Bibliography, chiefly API *MPMS* Ch. 1, API *MPMS* Ch. 4.9.1, and API *MPMS* Ch. 12.2.