Manual of Petroleum Measurement Standards Chapter 6.2A

Metering Assemblies—Truck and Rail Loading and Unloading Measurement Systems

FIRST EDITION, JULY 2021

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. The use of API publications is voluntary. In some cases, third parties or authorities having jurisdiction may choose to incorporate API standards by reference and may mandate compliance.

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 used. 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

Revision of API *MPMS* Chapter 6, *Metering Assemblies*, First Edition (2021) is ongoing. The revision supersedes all previous API *MPMS* Chapter 6 standards with the following four separate standards:

— API *MPMS* Chapter 6.1A, Metering Assemblies—General Considerations, First Edition (2021);

— API *MPMS* Chapter 6.2A*, Truck and Rail Loading and Unloading Measurement Systems*, First Edition (2021);

— API *MPMS* Chapter 6.3A, *Pipeline and Marine Loading/Unloading Measurement Systems*, First Edition (2021);

— API *MPMS* Chapter 6.4A, *LACT Systems*, First Edition (2021).

These standards supersede the previous API *MPMS* Chapter 6 standards as follows:

— API *MPMS* Chapter 6.1A, *Metering Assemblies—General Considerations*, First Edition (2021) specifies the common requirements for all metering systems and does not supersede any previous API *MPMS* Chapter 6 standards.

— API *MPMS* Chapter 6.2A, *Truck and Rail Loading and Unloading Measurement Systems*, First Edition (2021), supersedes API *MPMS* Chapter 6.2, *Loading Rack Metering Systems*, Third Edition (2004), which will be withdrawn on the publication of API *MPMS* Chapter 6.2A.

— API *MPMS* Chapter 6.3A, *Pipeline and Marine Loading/Unloading Measurement Systems*, First Edition (2021), supersedes API *MPMS* Chapter 6.5, *Metering Systems for Loading Marine Bulk Carriers*, Second Edition (1991), and API *MPMS* Chapter 6.6, *Pipeline Metering Systems*, Second Edition (1991). Section 5.3.5 of Chapter 6.3A supersedes API *MPMS* Chapter 6.7, *Metering Viscous Hydrocarbons*, Second Edition (1991), all of which will be withdrawn.

— API *MPMS* Chapter 6.4A, *LACT Systems*, First Edition (2021), supersedes API *MPMS* Chapter 6.1, *Lease Automatic Custody Transfer (LACT) Systems*, Second Edition (1991), and Section 5.2 of Chapter 6.4A supersedes API *MPMS* Chapter 6.7, *Metering Viscous Hydrocarbons*, Second Edition (1991), all of which will be withdrawn on the publication of API *MPMS* Chapter 6.4A.

NOTE API *MPMS* Chapter 6.7 is superseded by both Chapter 6.3A and Chapter 6.4A. Therefore, API *MPMS* Chapter 6.7 will be withdrawn when both Chapter 6.3A and Chapter 6.4A are published.

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.

The verbal forms used to express the provisions in this document are as follows.

Shall: As used in a standard, “shall” denotes a minimum requirement to conform to the standard.

Should: As used in a standard, “should” denotes a recommendation or that which is advised but not required to conform to the standard.

May: As used in a standard, “may” denotes a course of action permissible within the limits of a standard.

Can: As used in a standard, “can” denotes a statement of possibility or capability.

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, 200 Massachusetts Avenue, Suite 1100, Washington, DC 20001. 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, 200 Massachusetts Avenue, Suite 1100, Washington, DC 20001.

Suggested revisions are invited and should be submitted to the Standards Department, API, 200 Massachusetts Avenue, Suite 1100, Washington, DC 20001, standards@api.org.

Contents

Contents

Figures

Introduction

This standard serves as a guide in the selection, installation, and operation of truck and rail loading and unloading measurement systems. This standard does not cover truck and rail mounted flow meters. This standard does not endorse or advocate the preferential use of any specific type of metering system or meter.

In general, metering system installations should meet certain fundamental requirements, including those that ensure proper meter type, size, installation, and adequate protective and readout devices (such as presets, registers [counters], strainers, relief valves, pressure and flow control valves, and air eliminators, where required). Descriptions of these and other system components are covered elsewhere in this standard or other API standards. Also, to ensure compliance with state laws and regulations, the latest editions of NIST Handbook 44, Handbook 12, or other applicable standards, as well as specific local weights-and-measures requirements, should be considered.

Chapter 6 documents describe metering system design. API *MPMS* Chapter 6.1A describes the general considerations applicable to all metering systems and shall be consulted together with this standard, API *MPMS* Chapter 6.2A, when designing truck and rail loading and unloading systems. For the purpose of API *MPMS* Chapter 6.2A, the equipment that is covered as part of a truck or rail loading or unloading meter system will be limited to that which is necessary for the proper operation, calibration, and performance of the primary, secondary, and tertiary devices, as well as equipment that can affect the agreement between the ticketed quantity (also called quantity transaction record, batch ticket, or measurement ticket) and delivered quantity. When aspects are covered under the scope of other chapters of the API *Manual of Petroleum Measurement Standards*, and to avoid replication and conflict, they are not covered by this standard. In these cases, this standard provides limited information and refers the user to those chapters.

Work sites and equipment operations may differ. Users are solely responsible for assessing their specific equipment and premises in determining the appropriateness of applying the *MPMS*. At all times, users should employ sound business, scientific, engineering, and judgment safety when using the *MPMS*.

The following scenarios are merely examples for illustration purposes only. (Each company should develop its own approach.) They are not to be considered exclusive or exhaustive in nature. API makes no warranties, express or implied, for reliance on or any omissions from the information contained in this document.

Metering Assemblies—Truck and Rail Loading and Unloading Measurement Systems

1 Scope

This standard is part of a set of documents that detail the minimum requirements for the design, selection, and operation of truck and rail loading and unloading metering systems for single phase liquid hydrocarbons.

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 (all sections), *Proving Systems*

API *MPMS* Chapter 4.2, *Displacement Provers*

API *MPMS* Chapter 4.4, *Tank Provers*

API *MPMS* Chapter 4.5, *Master Meter Provers*

API *MPMS* Chapter 4.6, *Pulse Interpolation*

API *MPMS* Chapter 5 (all sections), *Metering*

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

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

API *MPMS* Chapter 7 (all sections), *Temperature Determination*

API *MPMS* Chapter 11.1, *Physical Properties Data*

API *MPMS* Chapter 12 (all sections), *Calculation of Petroleum Quantities Using Dynamic Measurement Methods and Volumetric Correction Factors*

API *MPMS* Chapter 21.2, *Electronic Liquid Volume Measurement Using Positive Displacement and Turbine Meters*

API RP 1004, *Bottom Loading and Vapor Recovery for MC-306 & DOT 406 Tank Motor Vehicles*

API RP 2003, *Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents*

NIST Handbook 44,[1] *Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices*

3 Terms and Definitions

For the purposes of this document, the following terms and definitions apply. Terms of more general use can be found in the API *MPMS* Chapter 1 Online Terms and Definitions Database.

[1] National Institute of Standards and Technology, 100 Bureau Drive, Gaithersburg, Maryland 20899, www.nist.gov.