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

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Foreword

This two-part publication presents standard calculation procedures for static petroleum liquids. The two parts consist of the following:

— Part 1—Upright Cylindrical Tanks and Marine Vessels

— Part 2—Calculation Procedure for Tank Cars

This publication was prepared jointly by the American Petroleum Institute Committee on Petroleum Measurement and the Energy Institute Hydrocarbon Management Committee.

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Introduction

These procedures are intended to encourage a uniform approach to volumetric and mass calculation of crude oil, petroleum products, and petrochemicals when contained in tanks. This publication will also address calculation sequences, rounding, and significant digits, with the aim that different operators can produce identical results from the same observed data.

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

1 Scope

This standard is intended to guide 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 have to 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, non-liquid 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.

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.

2.1 API Documents

MPMS, Chapter 2.8A, *Calibration of Tanks on Ships and Oceangoing Barges*

MPMS, Chapter 11.5.1, *Conversions of API Gravity at 60 °F*

MPMS, Chapter 11.5.2, *Conversions for Relative Density (60/60 °F)*

MPMS, Chapter 11.5.3, *Conversions for Absolute Density at 15 °C*

MPMS Chapter 12.3, *Calculation of Volumetric Shrinkage From Blending Light Hydrocarbons with Crude Oil*

MPMS Chapter 16.2, *Mass Measurement of Liquid Hydrocarbons in Vertical Cylindrical Storage Tanks by Hydrostatic Tank Gauging*

MPMS Chapter 17.4, *Method for Quantification of Small Volumes on Marine Vessels (OBQ/ROB)*

MPMS Chapter 17.12, *Procedures for Bulk Liquid Chemical Cargo Inspections*

2.2 EI Documents

HM 51, *Procedures for bulk liquid chemical cargo inspections*

Adjunct to IP 200 [1], *Temperature and Pressure Volume Correction Factors for Generalized Crude Oils, Refined Products, and Lubricating Oils*

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[1] Energy Institute, formerly the Institute of Petroleum, 61 New Cavendish Street, London W1G 7AR, UK, www.energyinst.org.