Manual of Petroleum Measurement Standards Chapter 17.2

Measurement of Cargoes On Board Tank Vessels

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Introduction

This publication is intended to encourage the development of uniform practices for measurement of cargoes aboard marine tank vessels. It presents current methods of cargo measurement, but this is not intended to preclude the use of any new technology or the revision of the methods presented. To gain a better understanding of the methods described in this publication, the reader should review in detail the latest editions of the referenced publications.

Metric (SI) units are listed in this document in a manner that reflects current marine practice.

Nothing contained in this publication is intended to supersede any operating practices recommended by organizations such as the Oil Companies International Marine Forum (OCIMF) or individual operating companies nor is the publication intended to conflict with any safety or environmental considerations, local conditions, or the specific provisions of any contract.

All procedures described in this publication should be performed by or in the presence of the ship's master, the barge captain, or their representatives. For reasons of safety, only nonsparking equipment shall be used for measurements on board marine tank vessels.

Based on present technology, manual gauging, temperature measurement, and sampling are the most accurate overall methods for measuring quantities of cargo, free water, and onboard quantity (OBQ) and/or remaining on board (ROB) on marine tank vessels. Automatic gauging may be as accurate as manual gauging for measuring overall volumes if the manufacturer's instructions are followed and equipment is periodically calibrated and checked using manual gauging as a reference.

Safety and environmental regulations by all levels of government and other regulatory agencies worldwide are limiting and/or prohibiting the release of hydrocarbon vapors to the atmosphere with regard to tank vessel operations. Consequently, numerous measurement methods and devices are now being used, along with the development of new equipment that allow the necessary cargo measurements and samples to be taken without opening the vessel's gauge hatches.

The objective of this publication is to provide guidance to vessel and shore personnel on the generally accepted methods of determining cargo quantities on board marine tank vessels using open, closed, and restricted methods. This publication describes suggested techniques and procedures for measuring, calculating, reporting, and keeping records of quantities of crude oils and petroleum products transported in marine tank vessels.

Measurement of Cargoes On Board Tank Vessels

1 Scope

The determination of the quantity and quality of cargo on board marine tank vessels is frequently complex. It is necessary to accurately gauge, ascertain the temperature of, collect samples of, and calculate the amount of all materials contained in the vessel's lines, cargo tanks, and slop tanks. Other spaces on the vessel may also contain cargo, such as ballast tanks, double bottoms, cofferdams, and numerous other nondesignated cargo spaces, all of which have to be checked, and any volumes contained in them calculated. Measurement accountability (quantity and quality) has to further take into account conditions such as, but not limited to, OBQ/ROB, trim, fullness, preloading tank inspection, closed measurement and sampling systems, and special procedures for chemical and gas cargoes. Reconciliation of the foregoing may be required if gains or losses exceed expected tolerances.

The detailed requirements for performing all of these actions are contained in numerous *MPMS* standards. This publication identifies the methods for performing these procedures on crude oils; petroleum products; chemical cargoes; LPG and LNG, normally carried on board marine tank vessels; and guides the user to the appropriate standard/guidance document within the *MPMS* suite of standards.

2 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any addenda) applies.

API *Manual of Petroleum Measurement Standards* Chapter 3.1A, *Manual Gauging of Petroleum and Petroleum Products*

API *Manual of Petroleum Measurement Standards* Chapter 7.3, *Fixed Automatic Tank Temperature Systems*

API *Manual of Petroleum Measurement Standards* Chapter 8.2/ASTM D4177,[1] *Automatic Sampling of Petroleum and Petroleum Products*

API *Manual of Petroleum Measurement Standards* Chapter 17.4, *Method for Quantification of Small Volumes on Marine Vessels (OBQ/ROB)*

3 Terms, Definitions, Acronyms, and Abbreviations

3.1 Terms and Definitions

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

3.1.1
all levels sample
A sample obtained by lowering the closed sampling device to the bottom of the outlet suction level, but always above free water, then opening the sampler and raising it at a uniform rate such that it is between 70 % and 85 % full when withdrawn from the product.

[1] American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, Pennsylvania 19428-2959, www.astm.org.