

Manual of Petroleum Measurement Standards Chapter 2—Tank Calibration

Section 8A—Calibration of Tanks on Ships and Oceangoing Barges

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FOREWORD

This standard has been prepared as a guide for the calibration of tanks on ships and oceangoing barges by liquid calibration or by vessel drawings. This document and Chapter 2, Section 7, "Calibration of Barge Tanks," of the *API Manual of Petroleum Measurement Standards* (MPMS) supersede the previous API Standard 2553, "Standard Method for Measurement and Calibration of Barges" (ASTM D 1407).

Other sections of Chapter 2 contain an overview of tank calibration, detailed procedures for calibrating various types of tanks, and a detailed discussion of liquid calibration. Upon revision, Chapter 2 will be divided into eleven sections, as follows:

- 2.1 Introduction to Tank Calibration.
- 2.2A Calibration of Upright Cylindrical Tanks (API Standard 2550).
- 2.2B Calibration of Upright Cylindrical Tanks Using the Optical Reference Line Method.
- 2.3 Calibration of Underground Tanks.
- 2.4 Calibration of Horizontal Tanks.
- 2.5 Calibration of Tank Cars and Trucks.
- 2.6 Calibration of Spherical and Spheroidal Tanks.
- 2.7 Calibration of Barge Tanks.
- 2.8A Calibration of Tanks on Ships and Oceangoing Barges.
- 2.8B Recommended Practice for the Establishment of the Location of the Reference Gauge Point and the Reference Gauge Height of Tanks on Marine Tank Vessels.
- 2.9 Liquid Calibration.

Note: Users of this chapter and any of its sections should be aware of and comply with any federal, state, or municipal regulations that have a bearing on the procedures described, including, in particular, those regulations dealing with the safe handling of volatile materials, worker safety, and environmental protection.

This standard requires the purchaser to specify certain details and features. Although it is recognized that the purchaser may desire to modify, delete, or amplify sections of the standard, it is strongly recommended that such modifications, deletions, and amplifications be made by supplementing this standard rather than by rewriting or incorporating sections of this standard into another complete standard.

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Suggested revisions are invited and should be submitted to the director of the Measurement Coordination Department, American Petroleum Institute, 200 Massachusetts Avenue, NW, Washington, DC 20001.

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Chapter 2—Tank Calibration

SECTION 8A—CALIBRATION OF TANKS ON SHIPS AND OCEANGOING BARGES

2.8A.1 Scope

This standard describes three methods for determining the total and incremental volumes of liquids in tanks on ships, oceangoing barges, and integrated tug barge units that have integral hull tanks. The three methods are:

- a. Liquid calibration.
- b. Calibration by linear measurement.
- c. Calibration from vessel drawings.

Paragraphs 2.8A.5 through 2.8A.7 describe procedures and equipment for obtaining the field measurement data and suggestions for the orderly and complete recording of field data. Paragraphs 2.8A.8 through 2.8A.10 include procedures for calculating the total and incremental tank capacities from field data and suggestions for the presentation of capacity tables. An example of a typical form for such calculations is presented in Appendix A. Terms specific to the maritime industry are defined in Appendix B.

For vessels having independent tanks, refer to other sections of Chapter 2 for a similar discussion of horizontal, spherical, upright, and other mobile tanks. For smaller coastal and inland waterway barges, refer to Chapter 2, Section 7.

This standard addresses liquid calibration procedures pertaining to ships. For details relating to metering systems, installation, meter proving requirements, and other guidelines relating to liquid calibration, refer to API Standard 2555.

The capacity tables should be computed so that volume is given at standard conditions, that is, at 60°F (15°C). Appropriate liquid and tape temperature corrections to 60°F (15°C) shall be applied. API Standard 2543 and Chapter 17 should be consulted for temperature determination in the marine environment.

2.8A.2 Field of Application

Although primarily intended for the calibration of cargo tanks on tankers, the procedures described here also apply to calibration of tanks for fuel oil, ballast, and fresh water on all types of seagoing vessels.

2.8A.3 Safety

Before entering any compartment, permission must be obtained from the vessel's master, senior deck officer, authorized shipyard official, or other responsible person in charge. This responsible person should supply information regarding particular materials and conditions or the applicable Material Safety Data Sheet (MSDS).

Due consideration should be given to applicable safety procedures. Safety considerations include, but are not limited to, potential electrostatic hazards, potential personnel exposure (and associated protective clothing and equipment requirements), and potential explosive and toxic hazards associated with a cargo tank's atmosphere, among others. The physical characteristics of the cargo and existing operational conditions should be evaluated, and applicable international, federal, state, and local regulations should be observed.

In addition, before entering a compartment, a valid marine chemist's certificate must be obtained and indicate that the compartment is "Safe for Workers" and/or "Safe for Hot Work," as prescribed in NFPA 306, U.S. Coast Guard, OSHA, or other international, federal, state, or local regulations that may apply. Testing must be made at least every 24 hours or more frequently when changing conditions warrant.

In addition, safety procedures designated by the employer, the vessel operator, and other concerned parties should also be observed. Internationally, the *International Safety Guide for Oil Tankers and Terminals (ISGOTT)*, and publications of the Oil Companies International Marine Forum and API provide additional safety information and should be consulted. See Appendix C.

Furthermore, another person should stand watch at the compartment entrance for the duration of an entry and sound an alarm if an emergency occurs. Appropriate protective clothing and equipment should be used. Normal safety precautions with respect to staging and ladders must also be observed.

2.8A.4 Referenced Publications

The most recent editions of the following standards, codes, and specifications are cited in this chapter.

API

Manual of Petroleum Measurement Standards, Chapter 1, "Vocabulary"; Chapter 2, "Tank Calibration," Section 7, "Calibration of Barge Tanks"; Chapter 17, "Marine Measurement"

Publ 2026 *Safe Descent Onto Floating Roofs of Tanks in Petroleum Service*

Publ 2217 *Guidelines for Work in Confined Spaces in the Petroleum Industry*.

Std 2543 Method of Measuring the Temperature of Petroleum and Petroleum Products (ANSI/ASTM¹ D 1086).

¹American Society for Testing Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.