

# **Manual of Petroleum Measurement Standards Chapter 17.14.1**

## **Measurement of Bulk Cargoes by Draft Survey—Ocean-going Vessels**

FIRST EDITION, OCTOBER 2019



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.

Classified areas may vary depending on the location, conditions, equipment, and substances involved in any given situation. Users of this document should consult with the appropriate authorities having jurisdiction.

Users of this document should not rely exclusively on the information contained in this document. Sound business, scientific, engineering, and safety judgment should be used in employing the information contained herein.

API is not undertaking to meet the duties of employers, manufacturers, or suppliers to warn and properly train and equip their employees, and others exposed, concerning health and safety risks and precautions, nor undertaking their obligations to comply with authorities having jurisdiction.

Information concerning safety and health risks and proper precautions with respect to particular materials and conditions should be obtained from the employer, the manufacturer or supplier of that material, or the material safety data sheet.

Where applicable, authorities having jurisdiction should be consulted.

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 document. At all times users should employ sound business, scientific, engineering, and judgment safety when using this document.

The scenarios in this document 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.

All rights reserved. No part of this work may be reproduced, translated, stored in a retrieval system, or transmitted by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission from the publisher. Contact the Publisher, API Publishing Services, 200 Massachusetts Avenue, NW, Suite 1100, Washington, DC 20001-5571.

## Foreword

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 in order to conform to the standard.

Should: As used in a standard, “should” denotes a recommendation or that which is advised but not required in order 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](mailto:standards@api.org).

## Contents

	Page
1 Scope .....	1
2 Normative References.....	1
3 Terms and Definitions.....	1
4 Significance and Use.....	4
5 Health and Safety Precautions.....	4
5.1 General.....	4
5.2 Static Electricity Hazards.....	4
6 Communication and Vessel Familiarization.....	5
6.1 Key Meeting .....	5
7 The Survey .....	5
7.1 Tools Required for the Survey .....	6
7.2 Determining the Draft .....	6
7.3 Measuring Variable and Consumable Items.....	8
8 Calculation Process.....	12
8.1 Adjusting the Draft Readings to the Perpendiculars.....	12
8.2 Calculating the Three-Quarter ( $\frac{3}{4}$ ) Mean Draft.....	13
8.3 Determining the Corrected Displacement .....	14
8.4 Determination of Net Weights.....	16
9 Reporting.....	17
9.1 Initial and Final Survey Spreadsheet.....	17
Annex A (informative) Tools Required for the Survey .....	21
Annex B (Informative) Using a Manometer .....	22
Annex C (informative) Hydrometers .....	26
Annex D (informative) Salinity Refractometers.....	28
Annex E (informative) Survey Template .....	30
Bibliography.....	31

## Figures

1 Draft Marks (Shown in Metric Decimeters).....	6
2 Draft Marks (Shown in US Customary Fee) .....	7
3 Vessel Trimmed by the Stern .....	9
4 Small Quantity of Liquid in Vessel Trimmed by the Stern.....	10
5 Reading the Hydrometer .....	12
6 Initial Survey Worksheet.....	18

## Contents

	Page
7 Final Survey Worksheet .....	19
8 Summary Report Worksheet .....	20
B.1 Manometer Long Enough to Reach Vessel Sides .....	23
B.2 Manometer Not Long Enough to Reach Vessel Sides .....	24
B.3 Manometer Showing Plastic Tubing (30–40 m long) .....	25
C.1 Glass Hydrometer .....	27
D.1 Refractometer .....	28

## Tables

1 Example of Draft Readings Adjusted to Perpendiculars .....	13
--------------------------------------------------------------	----

# Measurement of Bulk Cargoes by Draft Survey—Ocean-going Vessels

## 1 Scope

This document describes the procedure for determining the transferred quantity of non-liquid petroleum products loaded onto or discharged from ocean-going vessels by draft survey. This procedure is not an alternative where effective static or dynamic liquid measurement methods can be used.

## 2 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirement 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 MPMS Chapter 11.5, *Density/Weight/Volume Intraconversion*

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

## 3 Terms and Definitions

For the purposes of this document, the following definitions apply.

### 3.1

#### **aft draft**

The distance from the bottom of the keel to the waterline on aft perpendicular.

### 3.2

#### **aft perpendicular**

A vertical line drawn at the intersection of the waterline at the vessel's summer draft marks and the aft edge of the rudder post, or, in the case of most modern ships where no rudder post is fitted, the center line of the rudder stock.

### 3.3

#### **apparent trim**

The difference between the forward draft and the aft draft as read and not corrected to the vessel's perpendiculars.

### 3.4

#### **apparent weight**

Weight in air.

### 3.5

#### **beam**

The transverse dimensions in a horizontal plane expressing the breadth or width of the ship or ocean-going barge, and measured from side shell plating to side shell plating.

### 3.6

#### **corrected mean draft (CMD)**

The draft as calculated at the center of flotation; may not be equal to the average of the drafts forward and aft. An inland barge's final draft is calculated using the quarter mean method.

### 3.7

#### **corrected trim**

The apparent trim corrected to the perpendiculars.