

Overfill Prevention for Storage Tanks in Petroleum Facilities

ANSI/API STANDARD 2350
FIFTH EDITION, SEPTEMBER 2020

ERRATA 1, APRIL 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 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.

Copyright © 2020 American Petroleum Institute. 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.

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.

Contents

	Page
1 Scope	1
1.1 Scope	1
1.2 Minimum Requirements	2
2 Normative References	1
3 Terms, Definitions, and Acronyms	2
3.1 Terms and Definition	2
3.2 Acronyms	6
4 Overfill Prevention System (OPS)	7
4.1 Overview	7
4.2 Requirements for the Management System	8
4.3 Requirements for Risk Assessment	9
4.4 Defining Operating Parameters	10
4.5 Requirements for Overfill Prevention System (OPS) Procedures	14
5 Overfill Prevention Systems	20
5.1 Types of Overfill Prevention Systems	20
5.2 Tank Category Criteria	21
5.3 Instruments and Equipment Used for Overfill Prevention	22
Annex A (normative) Automated Overfill Prevention Systems (AOPS)	26
Annex B (informative) Management Systems (deleted)	30
Annex C (informative) Liquid Level Instrumentation Considerations	31
Annex D (informative) Determining Levels of Concern and Tank Capacity	33
Annex E (informative) Risk Assessment	44
Annex F (informative) Transporter/Owner Operator Interface	52
Annex G (normative, if used) Tank Categories	55
Annex H (informative) Proof Testing	62
Bibliography	64
Figures	
1 Tank Levels of Concern (LOCs)	11
A.1 AOPS Fail Safe Design and AOPS Valve Loss of Motive Power Alarm	28
D.1 Example 1 Tank Information	35
D.2 Example 2 Tank Information	37
D.3 Example 3 Tank Information	40
E.1 Risk Matrix Example from API 353	48
E.2 Event Tree Model	49
F.1 Delivery to a Third-party Facility via Pipeline	52
F.2 Multiple Concurrent Third-party Operations	53
F.3 Marine Inbound Operations	53
F.4 Data Transfer Between Parties	54
G.1 Illustration of Categories Applied to Overfill Prevention Systems	57
G.2 Illustration of Category 0	58
G.3 Illustration of Category 1 Overfill Prevention Systems	59

Contents

	Page
G.4 Illustration of Category 2 Applied to Overfill Prevention Systems.....	60
G.5 Illustration of Category 3 Applied to Overfill Prevention Systems.....	61
H.1 Modes of Proof Testing	62

Tables

1 Minimum High-High (HH) Response Time	13
2 Monitoring Product During Receipt.....	21
C.1 Commonly Used Types of Liquid Level Sensors	32
D.1 Example 1 Tank Measurements.....	35
D.2 Example 2 Tank Measurements.....	37
D.3 Example 3 Tank Measurements.....	40
G.1 Tank Categories.....	56

Overfill Prevention for Atmospheric Storage Tanks in Petroleum Facilities

1 Scope

1.1 Scope

This document applies to atmospheric storage tanks associated with refining, marketing, pipeline, and terminals that contain NFPA Class I or Class II liquids. This standard does not apply to:

- tanks of 1320 US gallons (5000 liters) or less, unless connected to a transporter or marine delivery system;
- tanks that are covered by PEI RP 600;
- tanks filled exclusively from wheeled vehicles (i.e. tank trucks or railroad tank cars), where the fill rate is less than 630 bbl/hr (440 gpm) (100m³/hour);
- dedicated pipeline relief tanks; and
- tanks storing LPG and LNG.

The purpose of this standard is to assist owner/operators and operating personnel in the prevention of tank overfilling by implementation of a comprehensive overfill prevention system (OFS). The goal is to receive product into the intended storage tank without overfilling or mechanical damage.

1.2 Minimum Requirements

This standard is one of minimum requirements. Alternate approaches or variations on the principles of this standard that provide equivalent or more robust overfill prevention are acceptable. Alternate approaches may be needed when the tank system varies from the typical configurations described in this standard. The rationale for the implementation of each overfill prevention process (OPP) should be documented and retained by the owner/operator. This standard is not intended to prevent the use of systems, methods, or devices of equivalent or superior quality, effectiveness, durability, and safety over those provided in this standard. Where the rules in API 2350 conflict with local, state, or federal regulations, the regulations shall take precedence over API 2350. In the event that there are conflicts, the more stringent of API 2350 or the regulations shall be applied.

2 Normative References

The following referenced documents are necessary 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 3.1A, *Standard Practice for the Manual Gauging of Petroleum and Petroleum Products*

API MPMS Chapter 3.1B, *Standard Practice for Level Measurement of Liquid Hydrocarbons in Stationary Tanks by Automatic Tank Gauging*

IEC 61511¹, *Functional Safety – Safety instrumented systems for the process industry sector – Part 1: Framework definitions, system, hardware, and software requirements* (This document is only classified as normative when chosen as an option by the owner/operator.)

Other references in the document, including those in the Bibliography, are provided for information only and are not normative to this standard.

¹ International Electrotechnical Commission, 3 rue de Varembe, PO Box 131, CH-1211 Geneva 20 Switzerland, www.iec.ch.