

Design and Construction of LPG Installations

API STANDARD 2510
NINTH EDITION, AUGUST 2020



American
Petroleum
Institute

This is a preview. [Click here to purchase the full publication.](#)

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.

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

Users of this Standard 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.

The following examples/samples 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.

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

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 safety data sheet.

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.

Copyright © 2020 American Petroleum Institute

Foreword

This standard provides minimum requirements for the design and construction of installations for the storage and handling of liquefied petroleum gas (LPG) at marine and pipeline terminals, natural gas processing plants, refineries, petrochemical plants, and tank farms. This standard takes into consideration the specialized training and experience of operating personnel in the type of installation discussed. In certain instances, exception to standard practices are noted and alternative methods are described.

This standard does not include information on the production or use of liquefied petroleum gas.

It is not intended that this standard be retroactive or that it take precedence over contractual agreements. Wherever practicable, existing codes and manuals have been used in the preparation of this standard.

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.

As used in this standard, “shall” denotes a minimum requirement to conform to the specification. “Should” denotes a recommendation or that which is advised but not required to conform to the specification. “Shall consider” directly before a design or construction factor (such as a force or safety) indicates that the factor’s effects and significance shall be evaluated using good engineering judgment-through an examination or test if appropriate-and the design may or may not be adjusted accordingly.

Suggested revisions are invited and should be submitted to API, Standards Department, 200 Massachusetts Avenue, NW, Suite 1100, Washington, DC 20001, standards@api.org.

Contents

| | Page |
|---|------|
| 1 Scope | 1 |
| 1.1 General..... | 1 |
| 1.2 Refrigerated Storage | 1 |
| 1.3 Pressurized Storage | 1 |
| 1.4 Numerical Units Used | 1 |
| 1.5 Excluded Items | 1 |
| 1.6 Retroactivity | 1 |
| 1.7 Characteristics of LPG | 1 |
| 1.8 Safety | 2 |
| 2 Normative References | 2 |
| 3 Terms and Definitions | 3 |
| 4 Design of LPG Pressure Vessels | 5 |
| 4.1 Applicable Design Construction Codes | 5 |
| 4.2 Design Pressure and Temperature | 5 |
| 4.3 Design Vacuum | 5 |
| 4.4 Materials of Construction | 6 |
| 4.5 Vessel Connections | 6 |
| 4.6 Previously Constructed Vessels | 6 |
| 5 Siting Requirements and Spill Containment | 6 |
| 5.1 Siting | 6 |
| 5.2 Drainage | 9 |
| 5.3 Spill Containment | 9 |
| 5.4 Remote Impoundment | 10 |
| 5.5 Diking | 10 |
| 6 Foundations and Supports for LPG Storage Containers and Related Piping | 11 |
| 6.1 Applicable Codes, Standards, and Specifications | 11 |
| 6.2 General Design Requirements | 11 |
| 6.3 Foundation Design | 13 |
| 6.4 Corrosion Protection | 14 |
| 7 Container Accessories, Including Pressure and Vacuum-Relieving Devices | 15 |
| 7.1 Mandatory Equipment | 15 |
| 7.2 Tank Accessory Materials | 18 |
| 8 Flammable Product Piping Requirements | 18 |
| 8.1 American Society of Mechanical Engineers Code for Pressure Piping | 18 |
| 8.2 Flammable Piping—General | 18 |
| 8.3 Fittings | 19 |
| 8.4 Plugs | 19 |
| 8.5 Unions | 20 |
| 8.6 Valves | 20 |
| 8.7 Location, Installation, and Flexibility of Piping, Valves, and Fittings | 20 |
| 9 Loading, Product Transfer, and Unloading Facilities | 21 |
| 9.1 General | 21 |
| 9.2 Rates of Loading and Unloading | 21 |

Contents

| | Page |
|---|------|
| 9.3 Transfer, Loading, and Unloading Equipment | 21 |
| 9.4 Grounding and Bonding | 22 |
| 9.5 Hose and Other Flexible Connectors for Product Transfer | 23 |
| 9.6 Blowdown or Venting of Loading and Unloading Lines | 24 |
| 9.7 Marking of Valves in Loading and Unloading Systems..... | 24 |
| 9.8 Metering Equipment Used in Loading and Unloading | 24 |
| 9.9 LPG Odorization | 24 |
| 10 Fire Protection | 24 |
| 10.1 General..... | 24 |
| 10.2 Access for Firefighting | 24 |
| 10.3 Fire Water Use | 24 |
| 10.4 Fire Detection Systems | 27 |
| 10.5 Fire Extinguishers..... | 28 |
| 10.6 Fire-fighting Foam | 28 |
| 10.7 Fireproofing of LPG Vessels..... | 28 |
| 10.8 Fireproofing of Structural Supports | 28 |
| 10.9 Burying and Mounding | 29 |
| 10.10 Electrical Installations and Equipment..... | 29 |
| 10.11 Critical Wiring and Control Systems..... | 29 |
| 10.12 Safety Precaution Signs | 29 |
| 10.13 Lighting | 29 |
| 10.14 Fencing..... | 29 |
| 10.15 Roadways..... | 30 |
| 11 Refrigerated Storage | 30 |
| 11.1 General..... | 30 |
| 11.2 Design Requirements | 30 |
| 11.3 Siting Requirements | 30 |
| 11.4 Thermal Considerations | 32 |
| 11.5 Tank Accessories..... | 32 |
| 11.6 Instrumentation..... | 32 |
| 11.7 Piping Requirements | 32 |
| 11.8 Refrigeration System | 33 |
| Annex A (informative) Piping, Valves, Fittings, and Optional Equipment..... | 34 |
| Annex B (informative) Applicability of API 2510 and NFPA 58 | 37 |
| Bibliography..... | 42 |

Figures

| | |
|--|----|
| B.1 Pipeline Terminal that Receives LP Gas from Pipeline for Delivery to Transporters, Distributors, or Users .. | 37 |
| B.2 Pipeline Terminal Associated with Refineries, Petrochemical Plants, or Gas Plants..... | 38 |
| B.3 Marine Terminal Whose Purpose is the Receipt of LP Gas for Delivery to Transporters, Distributors, or Users | 39 |
| B.4 Refinery, Petrochemical Plant, or Gas Plant | 40 |

Contents

| | |
|--|------|
| | Page |
| B.5 Marine Terminal Supplying Refineries, Petrochemical or Gas Facilities or Delivery of LP Gas to Marine Vessels | 41 |

Tables

| | |
|---|---|
| 1 Minimum Horizontal Distance between Shell of an LPG Pressure Vessel and Line of Adjoining Property That May Be Developed | 8 |
|---|---|