

Tank Systems for Refrigerated Liquefied Gas Storage

API STANDARD 625
FIRST EDITION, AUGUST 2010

ADDENDUM 1, JULY 2013
ADDENDUM 2, NOVEMBER 2014
ADDENDUM 3, JUNE 2018



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.

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, 1220 L Street, NW, Washington, DC 20005.

Copyright © 2010, 2013, 2014, 2018 American Petroleum Institute

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.

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, 1220 L Street, NW, Washington, DC 20005. Requests for permission to reproduce or translate all or any part of the material published herein should also be addressed to the director.

14 The American Petroleum Institute maintains this standard under continuous maintenance procedures. These procedures establish a documented program for regular publication of addenda or revisions, including timely and documented consensus action on requests for revisions to any part of the standard. See Annex E for additional information. Proposed revisions shall be submitted at any time to the Director, Standards, American Petroleum Institute, 1220 L Street, NW, Washington, D.C. 20005-4070, standards@api.org.

Contents

	Page	
1	Scope	1-1
1.1	General	1-1
1.2	Coverage	1-1
1.3	Configuration	1-1
1.4	Metallic Containers	1-2
1.5	Concrete Containers	1-2
1.6	Boundaries	1-2
2	Normative References	2-1 13
3	Terms and Definitions	3-1
3.1	General	3-1
3.2	Definitions	3-1 14
4	Responsibilities	4-1
4.1	General	4-1 13
4.2	Design Information	4-1
5	Selection of Storage Concept	5-1
5.1	General	5-1
5.2	Single Containment Tank System	5-1
5.3	Double Containment Tank System	5-4
5.4	Full Containment Tank System	5-6
5.5	Double or Full Containment Tank System with Penetrations	5-6
5.6	Guidance on Selection of Storage Concept	5-6 14
6	Design and Performance Criteria	6-1
6.1	General	6-1
6.2	Spacing Requirements	6-1
6.3	Liquid Levels and Volumes	6-1
6.4	Performance Criteria	6-1 14
6.5	Design Loads and Load Combinations	6-5
6.6	Seismic Analysis	6-6
6.7	Foundation Design	6-7
6.8	Thermal Corner Protection System (TCP) for Concrete Tanks	6-8 13
7	Accessories and Appurtenances	7-1
7.1	General	7-1
7.2	Access	7-1
7.3	Process Piping	7-1
7.4	Relief Valves	7-3 14
7.5	Instrumentation	7-4 13
7.6	Foundation Accessories	7-5 14
7.7	Fire, Gas, and Spill Protection	7-6
7.8	Electrical	7-6
7.9	Miscellaneous	7-7
8	Quality Assurance and Quality Control	8-1
8.1	Introduction	8-1 14
8.2	NDE, Testing, and Tolerances	8-1 13
9	Insulation	9-1
9.1	System Design	9-1
9.2	General Requirements	9-1
9.3	Load Bearing Bottom and Thermal Corner Protection (TCP) Insulation	9-1
9.4	External Wall and Roof Insulation	9-3

14	9.5	Internal Wall Insulation	9-3
	9.6	Suspended Deck Insulation	9-4
	9.7	Penetration and Internal Piping Insulation	9-4
14	9.8	Specifications for Insulation	9-4
	10	Post Construction Activities	10-1
	10.1	Scope	10-1
	10.2	General	10-1
13	10.3	Hydrostatic and Pneumatic Testing	10-1
14	10.4	Drying and Purging	10-2
	10.5	Cool Down	10-3
	11	Marking	11-1
14	11.1	Nameplates	11-1
	11.2	Certification	11-2
	11.3	Report	11-2
		Annex A (informative) Properties of Gases	A-1
		Annex B (informative) Recommendations on Foundation Settlement	B-1
		Annex C (informative) Commentary On Storage Concepts	C-1
13		Annex D (informative) Recommendations on Selection of Storage Concept Based on Assessment of Risk	D-1
14		Annex E (informative) Inquiries and Suggestions for Change	E-1
		Figures	
	5.1	Single Containment Tank System Single Wall with Steel Primary Container and Suspended Insulation Deck	5-2
	5.2	Single Containment Tank System Single Wall with Steel Primary Container and External Insulation	5-2
	5.3	Single Containment Tank System Double Wall with Steel Primary Container and Steel Vapor Container	5-3
	5.4	Single Containment Tank System Double Wall with Steel Primary Container and Steel Purge Gas Container	5-3
	5.5	Double Containment Tank System Steel Primary Container and Steel Secondary Container	5-4
	5.6	Double Containment Tank System Steel Primary Container, Steel Vapor Container, and Concrete Secondary Container	5-5
	5.7	Full Containment Tank System Steel Primary Container, Steel Secondary Container, and Steel Roof	5-7
14	5.8	Full Containment Tank System Steel Primary Container, Concrete Secondary Container, and Steel Roof	5-7
	5.9	Full Containment Tank System Steel Primary Container, Concrete Secondary Container, and Concrete Roof	5-8
	5.10	Full Containment Tank System Concrete Primary Container, Concrete Secondary Container, and Concrete Roof	5-8
	6.1	Liquid Levels and Volumes	6-2
	11.1a	General Information and Primary Liquid Container Nameplate	11-3
14	11.1b	Additional Container Nameplate	11-4
	11.2	Contractor's Certification for a Tank System Built to API Standard 625	11-4
		Tables	
13	1.1	Status of Annexes to API Standard 625	1-1
	10.1	Recommended Drying and Nitrogen Purging End Points for Steel Tanks	10-3
	A.1	Physical Properties of Gases (SI)	A-2
	A.2	Physical Properties of Gases (US Customary Units)	A-3

Tank Systems for Refrigerated Liquefied Gas Storage

SECTION 1—SCOPE

1.1 General

1.1.1 This standard covers low pressure, aboveground, vertical, and cylindrical tank systems storing liquefied gases requiring refrigeration. This standard provides general requirements on responsibilities, selection of storage concept, performance criteria, accessories/appurtenances, quality assurance, insulation, and commissioning of tank systems.

1.1.2 Additional information and recommendations are given in annexes. These general requirements address issues common to all of these tank systems, issues involving coordination of the components of the tank system, and issues of the tank system acting in an integrated way. The detailed requirements applicable to the metallic and concrete containers respectively are contained in the standards named in 1.4 and 1.5.

1.1.3 The annexes of this standard provide additional information that may be used in the selection and design of refrigerated tank systems. See Table 1.1 for the status of each Annex.

Table 1.1—Status of Annexes to API Standard 625

Annex	Title	Status
A	Properties of Gases	Information (informative)
B	Recommendations on Foundation Settlement	Recommendations (informative)
C	Commentary on Storage Concepts	Information (informative)
D	Recommendations on Selection of Storage Concept based on Assessment of Risk	Recommendations (informative)
E	Inquiries and Suggestions for Change	Recommendations (informative)

13

1.2 Coverage

1.2.1 This standard covers tank systems having a storage capacity of 800 cubic meters (5000 bbls) and larger.

1.2.2 Stored product shall be liquids which are in a gaseous state at ambient temperature and pressure and require refrigeration to less than 5 °C (40 °F) to maintain a liquid phase.

1.2.3 Tank systems with a minimum design temperature of –198 °C (–325 °F) (see note), a maximum design internal pressure of 50 kPa (7 psig), and a maximum design uniform external pressure of 1.75 kPa (0.25 psig) are covered.

NOTE Note for concrete containers, that ACI 376 states it “has been developed with the lowest operating temperature of –168 °C (–270 °F). However lower product temperatures could also be used, provided appropriate additional engineering analysis and justification is performed for each proposed application.”

1.3 Configuration

The tank system configurations covered are described in Section 5. These configurations consist of a primary liquid and vapor containment constructed of metal, concrete, or a metal/concrete combination and, when required, a secondary liquid containment.