Copyright © 2005, National Fire Protection Association, All Rights Reserved

NFPA 59A

Standard for the

Production, Storage, and Handling of Liquefied Natural Gas (LNG)

2006 Edition

This edition of NFPA 59A, Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG), was prepared by the Technical Committee on Liquefied Natural Gas and acted on by NFPA at its June Association Technical Meeting held June 6–10, 2005, in Las Vegas, NV. It was issued by the Standards Council on July 29, 2005, with an effective date of August 18, 2005, and supersedes all previous editions.

This edition of NFPA 59A was approved as an American National Standard on August 18, 2005.

Origin and Development of NFPA 59A

A committee of the American Gas Association began work on a standard for liquefied natural gas circa 1960. In the autumn of 1964, a draft was submitted to the NFPA with the request that it be considered as the basis for an NFPA standard. The Sectional Committee on Utility Gas prepared a standard that was adopted tentatively at the 1966 NFPA Annual Meeting at the recommendation of the Committee on Gases.

With the formation of the Committee on Fuel Gases in the summer of 1966, this standard was assigned to that committee and its Subcommittee on Utility Gas Plants. The first official edition was adopted at the 1967 NFPA Annual Meeting under the sponsorship of the Committee on Fuel Gases.

By early 1969, it was apparent that the use of LNG was expanding considerably beyond the utility gas plant applications covered by the 1967 edition. The American Petroleum Institute suggested that its standard PUBL 2510A, *Design and Construction of Liquefied Petroleum Gas (LPG) Installations*, be used to help develop a standard having a broader scope. The Committee on Liquefied Natural Gas was established for this purpose. The 1971 edition was the first edition developed under the broadened scope. Subsequent editions were adopted in 1972, 1975, 1979, 1985, 1990, 1994, 1996, and 2001.

The 2006 edition includes revisions in compliance with the *Manual of Style for NFPA Technical Committee Documents*, such as providing only administrative requirements in Chapter 1, referenced publications in Chapter 2, definitions in Chapter 3, and general requirements in Chapter 4. Former Chapters 2 through 11 have been renumbered as Chapters 5 through 14. In addition, editorial revisions were made to make the text more clear.

Chapter 5 has been revised to cover double and full containment LNG storage containers. Definitions of these types of containers have also been added to the standard. Seismic design criteria for LNG containers have been revised to correlate with the requirements of ASCE 7, Minimum Design Loads for Buildings and Other Structures. Chapter 11 has been revised to add requirements for a contingency plan for potential LNG marine transfer incidents.

Technical Committee on Liquefied Natural Gas

Richard A. Hoffmann, Chair Hoffmann & Feige, NY [SE]

Theodore C. Lemoff, Secretary (Staff — Nonvoting)
National Fire Protection Association, MA

Donald Barber, Enmat International (UK), United Kingdom [SE] Rep. Institute of Gas Engineers/Institute of Energy Christopher Bourne, Massachusetts Dept. of Telecommunications & Energy, MA [E] Leon A. Bowdoin, Jr., Weaver's Cove Energy, MA [U] Rep. NFPA Industrial Fire Protection Section Don H. Coers, Coers and Company, IL [SE] Brian L. Eisentrout, CB&I, IL [M] Rep. Steel Plate Fabricators Association Thomas J. Felleisen, U.S. Coast Guard, DC [E] James J. Gaughan, American Bureau of Shipping, NY [E] Ben Ho, BP Amoco Corporation, TX [U] Stanley T. Kastanas, U.S. Department of Transportation, Francis J. Katulak, Distrigas of Massachusetts, LLC, MA [U] Hans E. Kimmel, Ebara International Corporation, NV [M]

James P. Lewis, Project Technical Liaison Associates, Inc., Alex Pastuhov, AVP Corporation, AZ [SE] Kenneth L. Paul, Chart Industries, Inc., NH [M] Gilford W. Poe, ExxonMobil Development Company, Rep. American Petroleum Institute James J. Regan, Starr Technical Risks Agency Inc., IL [I] Michael F. Schmidt, Tyco Suppression Systems, WI [M] Rep. Fire Equipment Manufacturers' Association Gregory J. Schneller, KeySpan Energy, NY [U] Rep. American Gas Association Chris Smith, Southern LNG, an El Paso Company, Rep. Interstate Natural Gas Association of America James H. Stannard, Jr., Stannard & Company, GA [SE] Ronald W. Tanner, Trunkline LNG Company, LLC, Rep. American Gas Association Joseph E. Zanoni, Baker Engineering & Risk Consultants, Inc., TX [SE]

Alternates

Jeffrey P. Beale, CH-IV International, MD [SE]
(Alt. to J. H. Stannard)
Allan M. Clarke, Duke Energy Corporation, TX [U]
(Alt. to R. W. Tanner)
Dale R. Edlbeck, Tyco Fire & Security/Ansul, WI [M]
(Alt. to M. F. Schmidt)
Thomas D. High, Chart Industries, Inc., NH [M]
(Alt. to K. L. Paul)
Christopher E. Humes, Southern LNG, an El Paso
Company, GA [U]
(Alt. to C. Smith)

Nicholas A. Legatos, Preload Incorporated, NY [M]

Rep. American Concrete Institute

Charles P. (Chuck) Ivey, Atmos Energy, GA [U]
(Alt. to G. J. Schneller)

Jay J. Jablonski, HSB Professional Loss Control, TX [I]
(Alt. to J. J. Regan)

Thomas V. Rodante, Baker Engineering & Risk

Consultants, Inc., TX [SE]
(Alt. to J. E. Zanoni)

Michael R. Schuller, Pitt-Des Moines, Inc., PA [M]
(Alt. to B. L. Eisentrout)

Nonvoting

Swapan Kumar Hazra, Hindustan Aegis LPG Bottling Co., Ltd., India [M]

Theodore C. Lemoff, NFPA Staff Liaison

This list represents the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of the document.

NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on safety and related aspects in the liquefaction of natural gas and the transport, storage, vaporization, transfer, and use of liquefied natural gas.

Contents

Chapter	1 Administration	59A-	5	7.7	Container Purging and Cooldown	59A –22
1.1	Scope	59A-	5	7.8	Relief Devices	59A -22
1.2	Purpose. (Reserved)	59A-	5			
1.3	Equivalency	59A-	5	Chapter 8	_	
1.4	Retroactivity	59A-	5	8.1	Classification of Vaporizers	
1.5	Metric Practices	59A-	5	8.2	Design and Materials of Construction	59A –23
1.6	Referenced Standards	59A-	5	8.3	Vaporizer Piping and Intermediate	~ 0.00
					Fluid Piping and Storage	
Chapter !	2 Referenced Publications			8.4	Relief Devices on Vaporizers	
2.1	General	59A-	5	8.5	Combustion Air Supply	
2.2	NFPA Publications	59A-	5	8.6	Products of Combustion	59A -24
2.3	Other Publications	59A-	6	O1 , (704 94
2.4	References for Extracts in Mandatory				9 Piping Systems and Components	
	Sections	59A-	7	9.1	General	
~			_	9.2	Materials of Construction	
	3 Definitions	59A-	7	9.3	Installation	
3.1	General			9.4	Pipe Supports	
3.2	NFPA Official Definitions			9.5	Piping Identification	
3.3	General Definitions	59A-	7	9.6	Inspection and Testing of Piping	
01	4 G	FO.	0	9.7	Purging of Piping Systems	
_	4 General Requirements			9.8	Safety and Relief Valves	
4.1	Training of Personnel			9.9	Corrosion Control	59A –26
4.2	Training Plan			Character 1	10 To-to-to-to-to-1	
4.3	Corrosion Control Overview			Chapter	10 Instrumentation and Electrical Services	50A 96
4.4	Control Center			10.1		
4.5	Sources of Power			10.1	Liquid Level Gauging	
4.6	Records	59A-	9		Pressure Gauging	
Cl	T Diam Cities and J. T	EO 4	^	10.3	Vacuum Gauging	
_	5 Plant Siting and Layout			10.4	Temperature Indicators	
5.1	Plant Site Provisions	59A-	9	10.5	Emergency Shutdown	
5.2	Site Provisions for Spill and Leak	504	0	10.6	Electrical Equipment	
۲9	Control			10.7	Electrical Grounding and Bonding	59A-29
5.3 = 4	Buildings and Structures			Chanter 1	11 Transfer of LNG and Refrigerants	59A_90
5.4	Designer and Fabricator Competence Soil Protection for Cryogenic	33A	19	11.1	Scope	
5.5	Equipment	504_	15	11.2	General Requirements	
5.6	Falling Ice and Snow			11.3	Piping System	
5.7	Concrete Materials			11.4	Purging	
5.7	Concrete materials	JJA-	13	11.5	Pump and Compressor Control	
Chapter	6 Process Equipment	59A-	15	11.6	Marine Shipping and Receiving	
6.1	Installation of Process Equipment			11.7	Tank Vehicle and Tank Car Loading	JJ11 4.
6.2	Pumps and Compressors			11.7	and Unloading Facilities	59A_31
6.3	Flammable Refrigerant and			11.8	Pipeline Shipping and Receiving	
0.0	Flammable Liquid Storage	59A-	15	11.9	Hoses and Arms	
6.4	Process Equipment			11.10	Communications and Lighting	
•••			- 0	11.10	Communications and Lighting	33A-32
Chapter	7 Stationary LNG Storage Containers	59A-	16	Chapter 1	12 Fire Protection, Safety,	
7.1	Inspection			T	and Security	59A –32
7.2	Design Considerations			12.1	Scope	
7.3	Metal Containers			12.2	General	
7.4	Concrete Containers			12.3	Emergency Shutdown Systems	
7.5	Marking of LNG Containers			12.4	Fire and Leak Detection	
7.6	Testing of LNG Containers			12.5	Fire Protection Water Systems	
					,	