First Revision No. 21-NFPA 52-2023 [Global Input]

Reorganize NFPA 52 in accordance with the following Word Documents.

Supplemental Information

File Name	Description	Approved
52-2023_Chapter_4_Reorg_Clean.docx		
52-2023_Chapter_5_Reorg_Clean.docx		
52-2023_Chapter_6_Reorg_Clean.docx		
52-2023_Chapter_7_Reorg_Clean.docx		
52-2023_Chapter_8_Reorg_Clean.docx		
52-2023_Chapter_9_Reorg_Clean.docx		
52-2023_Chapter_10_Reorg_Clean.docx		
52-2023_Chapter_11_Reorg_Clean.docx		
52-2023_Chapter_Additional_Titles.docx	This document is to add additional chapter or section titles in accordance with the reorganization. For ballot	
52-2023_Chapter_Reorg_Revisions.docx	The following chapters in this list are moved keeping the current structure to new chapters.	
52_Global_FR-21_Reorganization_for_ballot.pdf	For ballot	

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Wed Oct 11 15:41:00 EDT 2023

Committee Statement

Committee Statement: The requirements of NFPA 52 have been reviewed and reorganized to group requirements by fuel system and delete any duplicative language. First Revisions 15, 16, 17,18,19, 20, 23, and 24 are related to this reorganization and change text in relevant requirements.

Response Message: FR-21-NFPA 52-2023

Chapter 4 CNG Facility Operations, Maintenance, and Management

4.1 General.

4.1.1 Application.
This chapter shall apply to facilities containing CNG, LCNG, and LNG fuel supply systems that store and dispense fuel.

~~**4.1.2 Buildings or Structures.**~~
~~Compression, dispensing equipment, and storage containers connected for use shall be permitted to be located inside of buildings reserved exclusively for these purposes or in rooms within or attached to buildings used for other purposes in accordance with this section.~~

~~**4.1.2.1 Rooms Within Buildings.**~~

~~**4.1.2.1.1**~~
~~Rooms within or attached to other buildings shall be constructed of noncombustible or limited-combustible materials.~~

~~**4.1.2.1.2**~~
~~Window glazing shall be permitted to be plastic.~~

~~**4.1.2.1.3**~~
~~Interior walls or partitions shall be continuous from floor to ceiling, be anchored in accordance with the requirements of the building code, and have a fire resistance rating of at least 2 hours.~~

~~**4.1.2.1.4**~~
~~At least one wall shall be an exterior wall.~~

~~**4.1.2.1.5**~~
~~Explosion venting shall be provided in accordance with 11.3.6.2.2.~~

~~**4.1.2.1.6**~~
~~Access to the room shall be from outside the primary structure.~~

~~**4.1.2.1.7**~~
~~If access to the room from outside the primary structure is not possible, access from within the primary structure shall be permitted where such access is made through a barrier space having two vapor-sealing, self-closing fire doors rated for the location where installed.~~

4.2 Reserved.

4.3 Qualifications.

4.3.1
Designers, fabricators, and constructors of LNG, LCNG, and CNG fueling facilities shall be competent and have expertise in the design, fabrication, and construction of LNG, LCNG, and CNG containers; cryogenic equipment; loading and unloading systems; fire protection equipment; detection systems; facility siting; containment; piping systems; and other components of the facility.

4.3.2
The installation of LNG and CNG systems shall be supervised by qualified personnel with reference to their construction and use.

4.4 Equipment Security.

4.4.1
Equipment related to a compression, storage, or dispensing installation shall be protected to prevent damage from vehicles and minimize the possibilities of physical damage and vandalism.

4.4.2
Storage and transfer equipment at unattended facilities shall be secured to prevent tampering.

4.4.3
The fueling facility shall provide protection to minimize unauthorized access and damage to the facility.

4.4.4
Security procedures shall be posted in readily visible areas near the fueling facility.

4.5 Operations and Maintenance.

4.5.1 CNG Programs and Activities.

4.5.1.1* CNG Facility Maintenance.

4.5.1.1.1
The system maintenance requirements of 4.5.1.1 shall be retroactive and shall be applied to existing stations.

4.5.1.1.2
Containers and their appurtenances, piping systems, compression equipment, controls, and detection devices shall be maintained in safe operating condition and according to manufacturers' instructions.

11.3.2.10 System Testing. [Move to 4.5.1.2]

~~**11.3.2.10.1**~~ **[can move with rest of subs to ch 4 and show as delete there]**
~~Piping, tubing and hose, and hose assemblies shall be leak tested after assembly to prove them free from leaks at a pressure equal to at least the maximum operating pressure of that portion of the system.~~

11.3.2.10.2 [4.5.1.2.1]
Compression equipment that has, by design, interstage air movement and ventilation through the crankcase shall not be subjected to leak testing as its inclusion will give an erroneous test reading.

11.3.2.10.3 [4.5.1.2.2]
Pressure relief valves shall be tested and recertified at least every 3 years. ASME code pressure relief valves shall be tested in accordance with NB-514, *Accreditation of "VR" Repair Organizations*.

11.3.2.11 System Maintenance. [4.5.1.3]
The system maintenance requirements of 11.3.2.11 shall be retroactive and shall be applied to existing stations.

11.3.2.11.1 [4.5.1.3.1]
Containers and their appurtenances, piping systems, compression equipment, controls, and detection devices shall be maintained in safe operating condition and according to manufacturers' instructions.

11.3.2.11.2 [4.5.1.3.2]
Written instructions shall be provided for CNG dispensing systems to include the following:

(1) Operating instructions

(2) Emergency shutdown instructions

(3) Maintenance and repair instructions

(4) Instructions for pressure and temperature calibrations and functional checks to assure that the dispenser continues to satisfy the requirements of 11.3.2.13.

11.3.2.11.3 Dispensing System Maintenance. [4.5.1.4]

11.3.2.11.3.1 [4.5.1.4.1]
Dispensing systems shall be maintained in accordance with the instructions required in 11.3.2.11.2 to verify pressure control and pressure relief valves

11.3.2.11.3.2 [4.5.1.4.2]
A written record of maintenance shall be provided.

11.3.2.11.4 [4.5.1.4.3]
After the original installation, vehicle fueling hoses shall be examined visually according to the manufacturers' recommendations or at least monthly to ensure that they are safe for use.

11.3.2.11.5 [4.5.1.4.4]
Hoses shall be tested for leaks in accordance with manufacturers' requirements.

11.3.2.11.5.1 [4.5.1.4.5]
Any leakage or surface cracks shall be reason for rejection and replacement.

11.3.2.11.6 [4.5.1.4.6]
While in transit, fueling hose and flexible metal hose on a cargo vehicle to be used in a transfer operation, including their connections, shall be depressurized and protected from wear and injury.

~~**11.3.2.11.7***~~ **[can move with rest of subs to ch 4 and show as delete there]**
~~PRVs shall be maintained in safe operating condition.~~

11.3.2.11.8 [4.5.1.4.7]
Maintenance personnel shall be trained in leak detection procedures and equipment in accordance with manufacturers' recommendations.

~~**4.5.1.4**~~
~~All LNG facilities shall be free of rubbish, debris, and other material that will present a fire hazard to the distance of at least 25 ft (7.6 m).~~

~~**4.5.1.5**~~
~~Grass areas on the LNG fueling facility grounds shall be maintained in a manner that does not present a fire hazard.~~

~~**4.5.1.10**~~
~~Access routes for movement of fire control equipment to an LNG fueling facility shall be maintained at all times.~~

~~**4.5.2 Manuals. (Reserved)**~~

4.5.~~3~~ 2 Record Requirements.
A written record of maintenance shall be provided.

4.6 CNG Training.
CNG maintenance personnel shall be trained in leak detection procedures and equipment in accordance with manufacturers' recommendations.

4.~~8~~ 7 Special Hazard Requirements.

4.~~8~~7.1
A hazard analysis of the proposed modification and the startup plan shall be required and prepared prior to the modification and operation of the facility.

4.~~8~~7.2
CNG shall not be used to operate any device or equipment that has not been designed or modified for CNG service.

5.1.1.1 Validation. [Move to 4.8]

5.1.1.1.1 [4.8.1]
The validation shall address the following:

(1) Process safety analysis and hazard and operability studies (HAZOPS)

(2) Mitigating fire protection measures such as suppression systems

(3) Aboveground or belowground systems or vaults for the containers

(4) Fire and gas detection systems designed to interface with an emergency shutdown device (ESD)

(5) Ventilation and other facility features

(6) Drainage and impounding for the individual site as administered by a qualified person(s) with proven expertise in these fields

5.1.1.1.2 [4.8.2]
The refueling station and associated storage equipment shall be validated per the specifics of 5.1.1.1.1 upon initial installation and revalidated per 5.1.1.1.1 when a change is made to the last validated design, including, but not limited to, changes in the service pressure. The installation validation shall also be reviewed at least every 4 years to detect any undocumented changes.

5.1.1.1.3 [4.8.3]

The validation shall be conducted by a qualified person(s) with proven expertise in the specific fueling and supporting equipment being installed.

5.1.1.1.4 [4.8.4]
Validation shall be kept on site and provided to the AHJ.

Chapter 5 Facility Fire Protection

5.1 General.

5.1.1 Siting.
LNG, LCNG, CNG, and other gaseous/cryogenic installations shall be permitted to use alternate site distances, operating requirements, and equipment locations with validation by a qualified person(s) with proven expertise in mechanical systems, electrical systems, gaseous storage systems, cryogenic storage systems, fire protection, and gas detection.

5.1.1.2 Fire Extinguishers.
A portable fire extinguisher having a rating of not less than 20-B:C shall be provided at the dispensing area.

5.1.2 Ignition Source Control.

5.1.2.1 Smoking.
Smoking and ignition sources shall be prohibited, except in accordance with 5.1.2.2.

5.1.2.2 Welding, Oxygen-Acetylene Cutting, and Similar Operations.
Welding, oxygen–acetylene cutting, and similar operations shall be conducted only when and where specifically authorized and in accordance with the provisions of NFPA 51B.

5.1.2.3 Vehicles.

5.1.2.3.1
Vehicles shall not be considered a source of ignition with respect to the provisions of this chapter, except as provided in 5.1.2.3.2.

5.1.2.3.2
Vehicles containing fuel-fired equipment (e.g., recreational vehicles and catering trucks) shall be considered a source of ignition unless this equipment is shut off completely before entering an area in which ignition sources are not permitted.

5.1.2.4
Nonelectrical sources of ignition shall not be permitted.

5.2 CNG Supplemental Requirements. (Reserved)

5.2.1 ~~Siting~~Flame Detection. (Reserved)

~~**5.2.1.1 Setbacks.**~~

~~**5.2.1.1.1**~~
~~Compression, storage, and dispensing equipment located outdoors shall be a minimum of 10 ft (3 m) from the nearest important building or line of adjoining property that is able to be built upon or from any source of ignition.~~

~~**5.2.1.1.2**~~
~~Compression, storage, and dispensing equipment located outdoors shall be not less than 10 ft (3 m) from the nearest public street or sidewalk line and at least 50 ft (15 m) from the nearest rail of any railroad main track.~~

~~**5.3 LNG Supplemental Requirements.**~~

Commented [SB1]: Changes to para in FR-15

Commented [KC2]: Numbering is off here -- there is no 5.1.1.1. Make this 5.1.1.1.

Commented [KC3]: Add head: Nonelectrical Sources of Ignition.

Chapter 6 CNG Facility Gas Detection, Alarm, and Emergency Shutdown Systems

6.1 General.

6.1.1 Gas Detection.
Gas detection equipment and alarms for dispensing station systems and dispensing station system components shall be listed or approved.

~~**6.1.2 Flame Detection. (Reserved)**~~

6.2 CNG Supplemental Requirements.

6.2.1 Gas Detection.

6.2.1.1
Where installed, a gas detection system shall be equipped to sound a latched alarm and visually indicate when a maximum of one-fifth of the lower flammable limit is reached.

6.2.1.2
Where attended fast-fill fueling is performed indoors, the following shall be installed:

(1) An emergency manual shutdown device shall be installed as required by 11.3.2.16.5.

(2) A gas detection system equipped to sound a latched alarm and visually indicate when a maximum of one-fifth of the lower flammable limit is reached shall be installed.

6.2.1.3
The actuation of the gas detection system shall shut down the compressor and stop the flow of gas into the structure.

10.3.1.4.6 [Move to 6.2.1.3.1]
Reactivation of the fueling system shall be by manual restart that is conducted by trained personnel.

~~**6.2.1.4 Odorized CNG. (Reserved)**~~

~~**6.2.1.5 Nonodorized CNG. (Reserved)**~~

~~**6.2.1.6 Flame Detection. (Reserved)**~~

6.3 Emergency Shutdown System.

8.4.2.5.1 [Move to 6.3.1]
An emergency manual shutdown device shall be provided within 10 ft (3.0 m) of the dispensing area and also greater than 25 ft (7.6 m) from the dispensing area.

8.4.2.5.1.1 [6.3.1.1]
This device, when activated, shall shut off the power supply and gas supply to the compressor and the dispenser.

8.4.2.5.1.2 [6.3.1.2]
Control circuits shall be arranged so that, when an emergency shutdown device is activated, the systems that shut down shall remain off until manually activated or reset after a safe condition is confirmed.

8.4.2.5.1.3 [6.3.1.3]
When the electric power is cut off (i.e., blackout condition), the systems that shut down shall remain off until manually activated or reset after a safe condition is confirmed.

8.4.2.5.1.4 [6.3.1.4]
When the electric power is interrupted (i.e., brownout condition) or the station is equipped with backup power, the system that shut down should be allowed to reset after power is restored.

Chapter 7 Fuel Quality and Properties

7.1* CNG.

Commented [SB1]: Changes being made in FR-9

Natural gas composition dispensed to vehicles shall comply with ASTM D8080, *Standard Specification for Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG) Used as a Motor Vehicle Fuel*, or other nationally recognized consensus standard.

7.1.1

Natural gas introduced into any CNG system covered by this code shall have a distinctive odor potent enough for its presence to be detected down to a concentration in air of not over one-fifth of the lower limit of flammability.

7.1.2

Methanol or glycol shall not be deliberately added to the natural gas at the fueling station.

7.2 LNG. (Reserved)

Chapter 8 CNG Facility Equipment Components

8.1 Scope.
This chapter shall apply to equipment used for storage and dispensing of CNG and LNG as an engine fuel in fleet and public dispensing operations.

Commented [BS1]: Changes in FR-16

8.2 Application.
CNG and LNG equipment used shall be in accordance with Section 8.3 and the fuel-specific paragraphs of Section 8.4, as applicable. Where there is a conflict between general requirements and fuel-specific requirements, the fuel-specific requirements shall apply.

8.3 General.

8.3.1 System Component Qualifications. (Reserved)

8.3.2* System Approvals.
The following subsystems or components associated with storage and dispensing of CNG and LNG as an engine fuel in fleet and public dispensing operations shall be listed or approved:

(1) Pressure relief devices, including pressure relief valves

(2) Pressure gauges

(3) Pressure regulators

(4) Valves

(5) Hose and hose connections

(6) Vehicle fueling connections (e.g., nozzle and receptacle)

(7) Engine fuel systems

(8) Electrical equipment related to storage or dispensing systems

(9) Gas detection equipment and alarms

(10) Fire protection and suppression equipment

(11) Vehicle fueling appliances (VFAs)

(12) Residential fueling appliances (RFAs)

8.3.3 Equal Level of Safety.
Subsystems or components that are not listed in 8.3.2 shall provide a level of safety equal to that required of those listed in 8.3.2.

8.4.4* Design and Construction of Containers. [Move to 8.3.4]

8.4.4.1 [8.3.4.1]
Containers shall be fabricated of steel, aluminum, or composite materials.

8.4.4.2 [8.3.4.2]
The container shall be designed for CNG service.

8.4.4.3 [8.3.4.3]
The container shall be permanently marked "CNG" by the manufacturer.

8.4.4.4 [8.3.4.4]
Containers manufactured prior to the effective date of this code shall be permitted to be used in CNG service if recommended for CNG service by the container manufacturer or if approved by the authority having jurisdiction.

8.3.4.5 Reserved.

8.4.4.5 ASME Compliance. [8.3.4.6]

8.4.4.5.1 [8.3.4.6.1]

Pressure vessels shall be manufactured, inspected, marked, and tested in accordance with ASME *Boiler and Pressure Vessel Code*, Section VIII or Section X.

8.4.4.5.2 [8.3.4.6.2]
Adherence to applicable ASME *Boiler and Pressure Vessel Code* case interpretations and addenda shall be considered as compliant with the ASME *Boiler and Pressure Vessel Code*.

8.4.4.5.3* [8.3.4.6.3]
Pressure vessels manufactured to the requirements of the ASME *Boiler and Pressure Vessel Code* shall be registered with the National Board of Boiler and Pressure Vessel Inspectors.

8.4.4.5.4 [8.3.4.6.4]
The repair or alteration of an ASME pressure vessel shall comply with the requirements of NB-23, *National Board Inspection Code*.

8.4.4.5.5 [8.3.4.6.5]
Other welding or brazing shall be permitted only on saddle plates, lugs, or brackets attached to the pressure vessel by the pressure vessel manufacturer.

8.4.4.5.6 [8.3.4.7]
The exchange or interchange of pressure vessel appurtenances intended for the same purpose shall not be considered a repair or alteration.

8.4.6 Pressure Gauges. [Move to 8.3.5]
A pressure gauge, if provided, shall be capable of reading at least 1.20 times the maximum allowable working pressure of the station.

8.4.8 Valves. [Move to 8.3.6]

8.4.3.1 [Move to 8.3.6.1]
Shutoff valves for dispensing stations shall have a rated maximum allowable working pressure not less than the rated operating pressure of the system.

10.3.1.7.1.1 [Move to 8.3.6.1.1]
Shutoff valves shall have a rated pressure not less than the MAWP of the piping system on which it is installed.

10.3.1.7.1.2 [Move to 8.3.6.1.2]
Shutoff valves shall be capable of withstanding a hydrostatic test of at least four times the rated service pressure without rupture.

8.4.8.1 [8.3.6.2]
Valves, valve packing, and gaskets shall be designed or selected for the fuel over the full range of pressures and temperatures to which they are subjected under operating conditions.

8.4.8.1.1 [8.3.6.3]
Shutoff valves for dispensing stations shall have a rated maximum allowable working pressure not less than the rated operating pressure of the system and shall be capable of withstanding a hydrostatic test of at least 4 times the rated operating pressure.

8.4.8.1.2 [8.3.6.4]
Leakage shall not occur at less than 1.5 times the rated operating pressure.

8.4.8.2 [8.3.6.5]
Valves of a design that allows the valve stem to be removed without removal of the complete valve bonnet or without disassembly of the valve body shall not be used.

8.4.8.3 Marking. [8.3.6.6]

8.4.8.3.1 [8.3.6.6.1]
The manufacturer shall stamp or otherwise permanently mark the valve body to indicate the maximum allowable working pressure rating.

8.4.8.3.2 [8.3.6.6.2]
Container valves incorporating integral PRDs complying with 8.4.5.1 shall not require additional marking.

8.4.8.4 [8.3.6.7]

Valves of cast irons other than those complying with ASTM A47/A47M, *Standard Specification for Ferritic Malleable Iron Castings*; ASTM A395/A395M, *Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures*; and ASTM A536, *Standard Specification for Ductile Iron Castings*, shall not be used as primary stop valves.

10.3.1.7.2 [Move to 8.3.6.8]
Access to an emergency manual shutoff valve(s) shall not require the use of any key or tool.

11.3.2.9.7 Excess Flow Check Valve(s). [Move to 8.3.7]

11.3.2.9.7.1 [8.3.7.1]
Where excess-flow check valves are used, the closing flow shall be greater than the maximum system design flow over the full range of operating pressures and less than the flow rating of the piping system that results from a complete line failure between the excess-flow valve and the equipment downstream of the excess-flow check valve.

11.3.2.9.7.2 [8.3.7.2]
Provisions shall be made for safe depressurization upstream of the device after it closes.

8.4.9 Vehicle Fueling Connection. [Move to 8.3.8]

8.4.9.1 [8.3.8.1]
CNG vehicle fueling connection devices shall be listed in accordance with CSA/ANSI NGV 1, *Compressed natural gas vehicle (NGV) fueling connection devices*.

8.4.9.2 [8.3.8.2]
The use of adapters to defeat the pressure-specific nozzle and receptacle connections shall be prohibited.

8.3.9 Breakaway Devices. (Reserved)

8.4.7 Piping, Tubing, and Fittings. [Move to 8.3.10]

8.4.7.1 [8.3.10.1]
The following components shall not be used for CNG service:

(1) Fittings, street els, and other piping components of cast irons other than those complying with ASTM A47/A47M, *Standard Specification for Ferritic Malleable Iron Castings*; ASTM A395/A395M, *Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures*; and ASTM A536, *Standard Specification for Ductile Iron Castings*

(2) Plastic pipe, tubing, and fittings for high-pressure service

(3) Galvanized pipe and fittings

(4) Aluminum pipe, tubing, and fittings

(5) Pipe nipples for the initial connection to a container

(6) Copper alloy with copper content exceeding 70 percent

8.4.7.2 [8.3.10.2]
Pipe, tubing, fittings, gaskets, and packing material shall be compatible with the fuel under the maximum service conditions.

8.4.7.3 [8.3.10.3]
Pipe, tubing, fittings, and other components shall be designed with a minimum safety factor of 3.

8.4.7.4 [8.3.10.4]
Natural gas piping shall be fabricated and tested in accordance with ANSI/ASME B31.3, *Process Piping*.

Commented [BS2]: Changes in FR-10

8.4.7.5 [8.3.10.5]
The refueling connection shall be permitted to be made of nonsparking wrought aluminum alloy designed for the pressure employed.

8.4.7.6 [8.3.10.6]
Piping components such as strainers, snubbers, and expansion joints shall be permanently marked by the manufacturer to indicate the service rating.

9.3.6 Connections. [Move to 8.3.11]

9.3.6.1 Piping Connections. [8.3.11.1]

9.3.6.1.1 [8.3.11.1.1]
Manifolds connecting fuel containers shall be fabricated to minimize vibration.

9.3.6.1.1.1 [8.3.11.1.2]
Manifolds shall be installed in a protected location or shielded to prevent damage from unsecured objects.

9.3.6.1.2 [8.3.11.1.3]
A pipe thread jointing material impervious to the action of the natural gas used in system shall be applied to all male pipe threads prior to assembly.

9.3.6.1.3 [8.3.11.1.4]
Threaded piping and fittings shall be clear and free from cutting or threading burrs and scales.

9.3.6.1.3.1 [8.3.11.1.5]
The ends of all piping shall be reamed.

9.3.6.1.4 [8.3.11.1.6]
A bend in piping or tubing shall be prohibited where such a bend weakens the pipe or tubing beyond its designed operating condition.

9.3.6.1.5 [8.3.11.1.7]
A joint or connection shall be located in an accessible location.

9.3.6.1.6 [8.3.11.1.8]
The number of joints shall be minimized and placed in a location considering personnel safety.

8.3.4 Equipment. [Move to 8.4]

8.3.4.1 Pressure Regulators. [8.4.1]

8.3.4.1.1 [8.4.1.1]
Regulators shall be designed, installed, or protected so that their operation is not affected by freezing rain, sleet, snow, ice, mud, insects, or debris.

8.3.4.1.2 [8.4.1.2]
Regulator protection of 8.3.4.1.1 shall be permitted to be integral with the regulator.

8.3.4.2 Pressure Relief Valves (PRVs). [8.4.2]

8.3.4.2.1 [8.4.2.1]
PRVs shall not be fitted with lifting devices.

8.3.4.2.1.1 [8.4.2.2]
The adjustment to PRVs, if external, shall be provided with a means for sealing the adjustment to prevent tampering.

8.3.4.2.1.2 [8.4.2.3]
If at any time it is necessary to break such a seal as provided in 8.3.4.2.1.1, the valve shall be removed from service until it has been reset and sealed.

8.3.4.2.1.3 [8.4.2.4]
PRV adjustments shall be made only by the manufacturer or other companies having competent personnel and facilities for the repair, adjustment, and testing of such valves.

8.3.4.2.1.4 [8.4.2.5]
The organization making such PRV adjustments shall attach a permanent tag with the setting, capacity, and date.

8.4.5.1 [Move to 8.4.2.6]

Pressure vessels complying with 8.4.4.5 used in stationary storage shall be protected with one or more spring-loaded PRVs in accordance with the ASME *Boiler and Pressure Vessel Code*.

8.3.4.2.2 [8.4.2.7]
PRVs protecting ASME pressure vessels shall be repaired, adjusted, and tested in accordance with NB-23, *National Board Inspection Code*.

8.3.4.2.3 [8.4.2.8]
PRVs shall be maintained in safe operating condition.

8.3.4.2.4 [8.4.2.9]
PRVs shall have vent lines to convey escaping gas upward to prevent impinging on buildings, other equipment, or areas open to the public (e.g., sidewalks).

8.3.4.2.5 [8.4.2.10]
The PRV shall not have a setting greater than the maximum allowable working pressure of the line it protects.

8.4.5.2 [Move to 8.4.2.11]
The minimum rate of discharge of PRDs on containers shall be in accordance with CGA S-1.3, *Pressure Relief Device Standards — Part 3 — Stationary Storage Containers for Compressed Gases*, or the ASME *Boiler and Pressure Vessel Code*, whichever is applicable.

8.4.5.8 [Move to 8.4.2.12]
The discharge flow rate of the PRD shall not be reduced below that required for the capacity of the container upon which the device is installed.

11.3.2.2.2 [Move to 8.4.2.13]
Pressure relief valves on pressure vessels shall be installed so that any discharge is in a vertical position.

11.3.2.2.3 [Move to 8.4.2.14]
Pressure relief valve venting systems shall be designed to protect against the elements.

11.3.2.2.4 [Move to 8.4.2.15]
If approved, sized and lockable valves shall be permitted to be installed between the relief valves and the storage vessel or fueling transfer system.

11.3.2.2.5 [Move to 8.4.2.16]
The valves referenced in 11.3.2.2.4 shall be locked open under normal operating condition.

11.3.2.7.9 [Move to 8.4.2.17]
Natural gas shall be vented only to a safe point of discharge.

11.3.2.7.10 [8.4.2.17.1]
A vent pipe or stack shall have the open end protected to prevent entrance of rain, snow, and solid material.

11.3.2.7.11 [8.4.2.17.2]
Vertical vent pipes and stacks shall have provision for drainage.

~~**8.3.4.3 Piping. (Reserved)**~~

~~**8.3.4.4 Piping Connections. (Reserved)**~~

~~**8.3.4.5 Hoses and Breakaway Devices. (Reserved)**~~

~~**8.3.4.6 Valves. (Reserved)**~~

11.3.2.6 Installation of Piping and Hoses. [Move to 8.5]

11.3.2.6.1* [8.5.1]
Piping and hose shall be run directly with provisions for expansion, contraction, jarring, vibration, and settling.

11.3.2.6.1.1 [8.5.2]
Exterior piping shall be either buried or installed above ground and shall be supported and protected against mechanical damage.

11.3.2.6.1.2 [8.5.3]

Underground piping shall be buried not less than 18 in. (460 mm) below the surface of the ground unless otherwise protected from damage by movement of the ground.

11.3.2.6.1.5* [8.5.3.1]
Piping installed in trench systems located below grade where the trench is open to above shall not be considered to be underground. [**55:**7.1.17.1.2]

11.3.2.6.1.4 [8.5.3.2]
Threaded pipe and fittings shall not be used underground.

11.3.2.6.1.3 [8.5.4]
Underground and aboveground piping shall be protected from corrosion in compliance with recognized practices.

11.3.2.8 Installation of Hose and Hose Connections. [Move to 8.5.5]
The use of hose for natural gas service shall be limited to the following:

(1) Vehicle fueling hose

(2) Inlet connection to compression equipment

(3) Section of hose not exceeding 36 in. (910 mm) in length to provide flexibility where necessary

11.3.2.8.1 [Move to 8.5.5.1]
Each section shall be installed so that it is protected against mechanical damage and is visible for inspection.

11.3.2.8.2 [Move to 8.5.5.2]
The manufacturer's identification shall be retained in each section.

8.4.8.5.1 [8.5.5.3]
Hose and metallic hose shall be constructed of or lined with materials that are resistant to corrosion and exposure to natural gas.

8.4.8.5.2 Hose Assemblies. [Move to 8.5.6]

8.4.2.8.1 [8.5.6.1]
Dispensing station hose, metallic hose, flexible metal hose, tubing, and their connections shall be designed or selected for the most severe pressures and temperatures under normal operating conditions with a burst pressure of at least four times the maximum allowable working pressure.

8.4.8.5.2.1 [8.5.6.2]
Metallic hose, flexible metal hose, tubing, and their connections shall be designed or selected for the most severe pressures and temperatures under normal operating conditions with a burst pressure of at least 4 times the operating pressure.

~~**8.4.8.5.2.2**~~
~~Prior to use, hose assemblies shall be tested by the OEM or its designated representative at a pressure of at least twice the operating pressure.~~

8.4.8.5.2.3 [8.5.6.3]
Hose and metallic hose shall be distinctly marked by the OEM or component manufacturer, either by the manufacturer's permanently attached tag or by distinct markings indicating the manufacturer's name or trademark, applicable service identifier, and design pressure.

8.4.2.8 Hose Assemblies. (Reserved) [Move to 8.5.7]

8.4.2.7 System Testing. [Move to 8.6]

8.4.2.7.1 Leak Testing. [8.6.1]

(A)
Piping, tubing and hose, and hose assemblies shall be leak tested after assembly to prove them free from leaks at a pressure equal to at least the maximum operating pressure of that portion of the system. Compression equipment that has, by design, interstage air movement and ventilation through the crankcase shall not be subjected to leak testing as this design will give an erroneous test reading.

(B)

Commented [CK3]: Change to 8.6.1.1

Commented [CK4]: Change to 8.6.1.2

Compression equipment that has, by design, interstage air movement and ventilation through the crankcase shall not be subjected to this system testing, as its inclusion will give an erroneous reading to the system test.

8.4.2.8.2 **[Move to 8.6.2]**
Prior to use, hose assemblies shall be tested by the OEM or its designated representative at a pressure of at least twice the maximum allowable working pressure (MAWP).

8.3.4.7 Electrical Equipment. (Reserved) **[Move to 8.7]**

~~**8.4.2.5 Malfunction Control.**~~

~~**8.4.2.6 Electrical Classification.**~~
~~Electrical classification areas inside dispenser enclosures are determined by the requirements in Table 11.3.2.14.1.~~

~~**8.4.3 Shutoff Valves.**~~

~~**8.4.3.2**~~
~~Shutoff valves shall be capable of withstanding a hydrostatic test of at least four times the rated operating pressure without rupture.~~

~~**8.4.5* Pressure Relief Devices (PRDs).**~~

~~**8.4.5.3**~~
~~PRVs for CNG service shall not be fitted with lifting devices.~~

~~**8.4.5.4**~~
~~The adjustment, if external, shall be provided with a means for sealing the adjustment to prevent tampering.~~

~~**8.4.5.5**~~
~~If at any time it is necessary to break such a seal, the valve shall be removed from service until it has been reset and sealed.~~

~~**8.4.5.6**~~
~~Adjustments shall be made only by the manufacturer or other companies having qualified personnel and facilities for the repair, adjustment, and testing of such valves.~~

~~**8.4.5.7**~~
~~The organization making such adjustments shall attach a permanent tag with the setting, capacity, and date.~~

~~**8.4.8.5 Hose and Hose Connections.**~~

Chapter 9 Outdoor ~~Storage~~ Installation of CNG Station Equipment and Dispensing

9.1 Scope.
This chapter shall apply to the outdoor storage of vehicular gas fuel systems in portable and stationary cylinders, containers, equipment, systems and tanks.

Commented [SB1]: Changes in FR-17

9.2 General. (Reserved)

9.3 CNG Supplemental Requirements.

11.2.1 [Move to 9.3.1]
The installation of CNG systems shall be supervised by personnel familiar with proper practices with reference to their construction and use.

11.2.2 [Move to 9.3.2]
CNG shall not be used to operate any device or equipment that has not been designed or modified for CNG service.

11.3* CNG Dispensing. [Move to 9.4]

11.3.1 General System Requirements. [9.4.1]

11.3.1.1 [9.4.1.1]
Where CNG dispensing systems are served by a gas utility, the gas utility shall be notified of this CNG installation.

11.3.1.2 [9.4.1.2]
Equipment related to a compression, storage, or dispensing installation shall be protected to prevent damage from vehicles and minimize the possibilities of physical damage and vandalism.

11.3.1.3 [9.4.1.3]
The system shall be designed so that internal or external icing or hydrate formation does not cause vehicle or fueling station malfunction.

9.5 Siting.

Commented [SB2]: New section being added with FR-24 Add as placeholder.

9.3.1 Compression, Storage, and Dispensing Equipment Located Outdoors. [Move to 9.6]
A facility in which CNG compression, storage, and dispensing equipment are sheltered by weather protection constructed in accordance with the requirements of the building code and by a roof designed for ventilation and dispersal of escaped gas shall be considered to be located outdoors.

9.3.1.1 [9.6.1]
Compression, storage, and dispensing equipment located outdoors shall be above ground.

9.3.1.2 [9.6.2]
Compression, storage, and dispensing equipment shall not be located where exposed to failure of overhead electric power lines operating over 600 volts unless approved protection is provided.

~~**9.3.1.3**~~
~~Compression, storage, and dispensing equipment located outdoors shall be above ground.~~

9.3.2 Location. [Move to 9.6.3]
CNG storage containers charged with CNG not connected for use shall be located outdoors.

9.3.2.1* Installation of Containers and Container Appurtenances (Other than Pressure Relief Devices). [Move to 9.6.4]

9.3.2.1.1 [9.6.4.1]
Storage containers shall be installed above ground on stable, noncombustible foundations or in vaults with ventilation and drainage. *(See Section 4.2 for noncombustible.)*

9.3.3 ~~Anchoring.~~ [9.6.4.2]
This equipment shall be installed on foundations with anchoring systems designed to meet the requirements of the adopted building code for the applicable seismic and wind conditions.

Commented [KC3]: Delete this head

9.3.2.1.2 [9.6.4.3]
Horizontal containers shall have no more than two points of support longitudinally.

9.3.2.2.2 [9.6.4.4]
Horizontally installed containers shall not be in direct contact with each other.

9.3.2.1.3 [9.6.4.5]
In areas subject to flooding, container(s) shall be anchored to prevent floating.

9.3.2.2 [9.6.4.6]
Containers shall be protected by painting or other equivalent means where necessary to inhibit corrosion.

9.3.2.2.1 [9.6.4.7]
Composite containers shall not be painted without prior permission from the container manufacturer.

9.3.2.2.3 [9.6.4.7.1]
Composite containers shall be protected from UV radiation as required by the manufacturer.

9.3.2.3 [9.6.4.8]
Means shall be provided to prevent the flow or accumulation of flammable or combustible liquids under containers, such as by grading, pads, or diversion curbs.

9.6.5 Setbacks.

9.3.1.4 [9.6.5.1]
Compression, storage, and dispensing equipment located outdoors shall be a minimum of 10 ft (3 m) from the nearest important building or line of adjoining property that is able to be built upon or from any source of ignition.

9.3.1.5 [9.6.5.2]
Compression, storage, and dispensing equipment located outdoors shall be not less than 10 ft (3 m) from the nearest public street or sidewalk line and at least 50 ft (15 m) from the nearest rail of any railroad main track.

5.2.1.1.3 [Move to 9.6.5.3]
Combustible material shall not be permitted within 10 ft (3 m) of any stationary container.

5.2.1.1.4 [Move to 9.6.5.4]
The minimum separation between containers and aboveground tanks containing flammable or combustible liquids shall be 20 ft (6 m).

5.2.1.1.5 Point of Transfer. [Move to 9.6.5.5]

5.2.1.1.5.1 [9.6.5.5.1]
During outdoor fueling operations, the point of transfer shall be located at least 10 ft (3 m) from any important building, mobile home, public sidewalk, highway, street, or road and at least 3 ft (1 m) from storage containers.

5.2.1.1.5.2 [9.6.5.5.2]
The point of transfer shall be permitted to be located at a lesser distance from buildings or walls constructed of concrete or masonry materials or of other material having a fire resistance rating of at least 2 hours, but at least 10 ft (3 m) from any building openings.

5.2.1.1.6 [9.6.5.5.3]
Sources of ignition shall not be permitted within 10 ft (3.0 m) of any filling connection during a transfer operation.

9.3.4 Electrical CNG Installations. [Move to 9.7]
Areas for compression, storage, and dispensing shall be classified in accordance with Table 11.3.2.14.1 for installations of electrical equipment.

11.3.2.14* Installation of Electrical Equipment. [Move to 9.7.1]

~~**11.3.2.14.1 Electrical Installations.**~~ **[Move text to 9.7.1]**
Fixed electrical equipment and wiring within areas specified in Table 11.3.2.14.1 shall comply with Table 11.3.2.14.1 and be installed in accordance with *NFPA 70*.

Table 11.3.2.14.1 Electrical Installations

Location	Division or Zone	Extent of Classified Area
Containers (other than mounted fuel supply containers)	2	Within 10 ft (3 m) of container
Compression and ancillary equipment	2	Up to 15 ft (4.6 m) from equipment
Dispensing equipment outdoors	1	Inside the dispenser enclosure gas compartment
Outdoors	2	From 0 to 5 ft (0 to 1.5 m) from the dispenser enclosure gas compartment
Indoors	1	Inside the dispenser enclosure gas compartment
Indoors	2	Entire room, with adequate ventilation *(see 10.3.1.1)*
Discharge from relief valves or vent		
Outdoors	1	5 ft (1.5 m) in all directions from the point source
Outdoors	2	Beyond 5 ft (1.5 m) but within 15 ft (4.6 m) in all directions from point of discharge
Valves, flanges of screwed fittings	None	Unclassified
Discharge from relief valves within 15 degrees of the line of discharge	1	15 ft (4.6 m)

11.3.2.14.1.1 [9.7.1.2]
Electrical equipment on internal combustion engines installed in accordance with NFPA 37 shall not be subject to 11.3.2.14.1.

11.3.2.14.2 [9.7.1.3]
With the approval of the AHJ, classified areas specified in Table 11.3.2.14.1 shall be permitted to be reduced or eliminated by positive pressure ventilation from a source of clean air or inert gas in conjunction with effective safeguards against ventilator failure by purging methods recognized in NFPA 496.

11.3.2.14.3 Classified Areas. [9.7.1.4]

11.3.2.14.3.1 [9.7.1.4.1]
Classified areas shall not extend beyond an unpierced wall, roof, or vaportight partition.

11.3.2.14.3.2 [9.7.1.5]
Listed dispensers shall be permitted to be installed using classified areas in accordance with the terms of the listing.

11.3.2.14.4 [9.7.1.6]
Space around welded pipe and equipment without flanges, valves, or fittings shall be a nonhazardous location.

~~**9.3.5 Warning Signs.**~~
~~Warning signs for CNG outdoor storage shall follow the requirements in 5.1.3.~~

~~**9.3.7 Separation Distances.**~~

~~**9.3.7.1 Sidewalks (and Rail).**~~
~~Pressure relief valves on storage systems shall have a pressure relief valve vent system to convey escaping gas to the outdoors and then upward to a safe area to prevent impinging on buildings, other equipment, or areas open to the public (e.g., sidewalks).~~

~~**9.3.7.1.1 Installation of PRVs.**~~
~~PRVs shall have vent lines to convey escaping gas to the outdoors and then upward to prevent impinging on buildings, other equipment, or areas open to the public (e.g., sidewalks).~~

5.1.3 Signage. [Move to 9.8]

5.1.3.1 [9.8.1]
The location of signs shall be determined by local conditions.

5.1.3.5 [9.8.1.1]
The wording shall be in plainly legible, bright red letters not less than 1 in. (25 mm) high on a white background.

5.1.3.3 [9.8.2]
A warning sign with the words "NO SMOKING, FLAMMABLE GAS" shall be posted in every compressor and storage area.

5.1.3.4 [9.8.3]
Access doors shall have warning signs with the words "WARNING — NO SMOKING — FLAMMABLE GAS."

11.3.2.16.5.2 [Move to 9.8.4]
Emergency shutdown devices shall be distinctly marked for easy recognition with a permanently affixed legible sign.

5.2.2 Dispensing Area Signage. [Move to 9.8.5]

5.2.2.1 [9.8.5.1]
A warning sign(s) shall be posted at each dispensing point with the following words:

FLAMMABLE GAS — STOP MOTOR, NO SMOKING.
NATURAL GAS VEHICLE FUEL CYLINDERS SHALL BE INSPECTED AT INTERVALS NOT EXCEEDING 3 YEARS TO ENSURE SAFE OPERATION OF THE VEHICLE.
NATURAL GAS FUEL CYLINDERS PAST THEIR END-OF-LIFE DATE SHALL NOT BE REFUELED AND SHALL BE REMOVED FROM SERVICE.

11.3.2.13.13.1 [Move to 9.8.5.2]
Each fast- or slow-fill CNG dispenser shall display a sign stating the following:
THIS CNG DISPENSER HAS TEMPERATURE COMPENSATION.

11.3.2.13.13.2 [Move to 9.8.5.3]
The service pressure of each dispenser shall be posted in view of the operator.

5.1.3.2 [9.8.5.4]
The lettering on signs shall be large enough to be visible and legible from each point of transfer.

9.9 CNG. (Reserved)

Chapter 10 Indoor ~~Storage~~Installation of CNG and LNG Station Equipment and Dispensing

10.1 Scope.
This chapter shall apply to the indoor storage of vehicular gas fuel systems in portable and stationary cylinders, containers, equipment, systems and tanks.

Commented [BS1]: Changes in FR-18

10.2 General. (Reserved)

10.3 CNG Supplemental Requirements.

10.3.1 Indoors.

10.3.1.1 General.
Compression, dispensing equipment, and storage containers connected for use shall be permitted to be located inside of buildings reserved exclusively for these purposes or in rooms within or attached to buildings used for other purposes in accordance with this section.

10.3.1.2 Limits of Storage in Buildings.

10.3.1.2.1
Storage shall be limited to not more than 10,000 scf (283 m^3) of natural gas in each building or room.

10.3.1.2.2
CNG stored in vehicle-mounted fuel supply containers shall not be subject to 10.3.1.2.1.

10.3.1.3 Rooms Within Buildings.

10.3.1.3.1
Rooms within or attached to other buildings shall be constructed of noncombustible or limited-combustible materials.

10.3.1.3.2
Window glazing shall be permitted to be plastic.

4.1.2.2.2 [10.3.1.3.3]
Windows and doors shall be located to permit ready egress in case of emergency.

10.3.1.3.~~3~~ 4
Interior walls or partitions shall be continuous from floor to ceiling, be anchored in accordance with the requirements of the building code, and have a fire resistance rating of at least 2 hours.

10.3.1.3.~~4~~ 5
At least one wall shall be an exterior wall.

~~10.3.1.3.5~~
~~Explosion venting shall be provided in accordance with 11.3.6.2.2.~~

10.3.1.3.6
Access to the room shall be from outside the primary structure.

10.3.1.3.7 [Move to 10.3.1.3.6.1]
If access to the room from outside the primary structure is not possible, access from within the primary structure shall be permitted where such access is made through a barrier space having two vapor-sealing, self-closing fire doors rated for the location where installed.

11.3.6.2.2* Deflagration Venting. [Move to 10.3.2]
Deflagration (explosion) venting shall be provided in exterior walls or roof only.

11.3.6.2.3 Vents. [10.3.2.1]
Vents shall be permitted to consist of any one or any combination of the following:

(1) Walls of light material

(2) Lightly fastened hatch covers

(3) Lightly fastened, outward opening doors in exterior walls

(4) Lightly fastened walls or roofs

11.3.6.2.4 Snow Loads. [10.3.2.2]
Where applicable, snow loads shall be considered.

4.1.2.2 CNG and LNG Building Construction. [Move to 10.4]

4.1.2.2.1 [10.4.1]
Buildings reserved exclusively for an LNG fueling facility shall be of Type I or Type II construction in accordance with *NFPA 5000*.

4.2* Building Construction Materials. [10.4.2]

Commented [BS2]: Changes in FR-4

4.2.1* Noncombustible Material. [10.4.2.1]
A material that complies with any of the following shall be considered a noncombustible material:

(1) *A material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors, when subjected to fire or heat.

(2) A material that is reported as passing ASTM E136, *Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C*.

(3) A material that is reported as complying with the pass/fail criteria of ASTM E136 when tested in accordance with the test method and procedure in ASTM E2652, *Standard Test Method for Assessing Combustibility of Materials Using a Tube Furnace with a Cone-shaped Airflow Stabilizer, at 750°C*.

[***101***:4.6.13.1]

4.2.2* Limited-Combustible Material. [10.4.2.2]
A material shall be considered a limited-combustible material where both of the following are met:

(1) The material does not comply with the requirements for noncombustible material in accordance with 4.2.1.

(2) The material, in the form in which it is used, exhibits a potential heat value not exceeding 3500 Btu/lb (8141 kJ/kg), when tested in accordance with NFPA 259.

[***101***:4.6.14]

4.2.2.1 [10.4.2.3]
The material shall have the structural base of a noncombustible material with a surfacing not exceeding a thickness of 1/8 in. (3.2 mm) where the surfacing exhibits a flame spread index not greater than 50 when tested in accordance with ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials,* or UL 723, *Test for Surface Burning Characteristics of Building Materials*. [***101***:4.6.14.1]

4.2.2.2 [10.4.2.4]
The material shall be composed of materials that, in the form and thickness used, neither exhibit a flame spread index greater than 25 nor evidence of continued progressive combustion when tested in accordance with ASTM E84 or UL 723 and are of such composition that all surfaces that would be exposed by cutting through the material on any plane would exhibit neither a flame spread index greater than 25 nor exhibit evidence of continued progressive combustion when tested in accordance with ASTM E84 or UL 723. [***101***:4.6.14.2]

4.2.2.3 [10.4.2.5]
Materials shall be considered limited-combustible materials where tested in accordance with ASTM E2965, *Standard Test Method for Determination of Low Levels of Heat Release Rate for Materials and Products Using an Oxygen Consumption Calorimeter*, at an incident heat flux of 75 kW/m^2 for a 20-minute exposure and both of the following conditions are met:

(1) The peak heat release rate shall not exceed 150 kW/m^2 for longer than 10 seconds.

(2) The total heat released shall not exceed 8 MJ/m^2.

[***101***:4.6.14.3]

4.2.2.4 [10.4.2.6]
Where the term *limited-combustible* is used in this code, it shall also include the term *noncombustible*.
[***101***:4.6.14.4]

10.3.1.4 Ventilation. [Move to 10.5]

10.3.1.4.1 [10.5.1]
Ventilation shall be by a continuous mechanical ventilation system or by a mechanical ventilation system activated by a continuously monitoring natural gas detection system where a gas concentration of not more than one-fifth of the lower flammable limit is present.

10.3.1.4.2 [10.5.1.1]
In either case in 10.3.1.4.1, the system shall immediately shut down the fueling system in the event of detection of an alarm condition or failure of the ventilation system, the detection system, or the controls.

10.3.1.4.3* [10.5.2]
The ventilation rate shall be at least 1 cfm/12 ft^3 (1 m^3/min/11.3 m^3) of room volume.

10.3.1.4.4 [10.5.3]
A ventilation system for a room within or attached to another building shall be separate from any ventilation system for the other building.

~~**10.3.1.4.5**~~
~~Where installed, a gas detection system shall be equipped to sound a latched alarm and visually indicate when a maximum of one-fifth of the lower flammable limit is reached.~~

~~**10.3.1.4.7**~~
~~Buildings and rooms used for compression, storage, and dispensing shall be classified in accordance with Table 11.3.2.14.1 for installations of electrical equipment.~~

~~**10.3.1.4.8**~~
~~Nonelectrical sources of ignition shall not be permitted.~~

~~**10.3.1.4.9**~~
~~Pressure relief valves on storage systems shall have a pressure relief valve vent system to convey escaping gas to the outdoors and then upward to a safe area to prevent impinging on buildings, other equipment, or areas open to the public (e.g., sidewalks).~~

10.3.1.5 Ventilation Inlets and Outlets. [Move to 10.5.4]

10.3.1.5.1 [10.5.4.1]
Indoor locations shall be ventilated utilizing air supply inlets and exhaust outlets arranged to provide uniform air movement throughout the space.

10.3.1.5.2 [10.5.4.2]
Inlets shall be uniformly arranged on exterior walls near floor level.

10.3.1.5.3 [10.5.4.3]
Outlets shall be located in exterior walls at the high point of the room or in the roof.

10.3.1.7.3 [Move to 10.6]
Gas piping from an outdoor compressor or storage system into a building shall be provided with shutoff valves located outside the building.

Commented [KC3]: Add head: Building Shutoff Valves.

~~**10.3.1.6 PRVs.**~~

~~**10.3.1.6.1**~~
~~PRVs for CNG service shall not be fitted with lifting devices.~~

~~**10.3.1.6.1.1**~~
~~The adjustment to PRVs, if external, shall be provided with a means for sealing the adjustment to prevent tampering.~~

~~**10.3.1.6.1.2**~~
~~If at any time it is necessary to break such a seal as provided in 10.3.1.6.1.1, the valve shall be removed from service until it has been reset and sealed.~~

~~**10.3.1.6.1.3**~~
~~PRV adjustments shall be made only by the manufacturer or other companies having competent personnel and facilities for the repair, adjustment, and testing of such valves.~~

~~**10.3.1.6.1.4**~~
~~The organization making such PRV adjustments shall attach a permanent tag with the setting, capacity, and date.~~

~~**10.3.1.6.2**~~
~~PRVs protecting ASME pressure vessels shall be repaired, adjusted, and tested in accordance with NB-23, *National Board Inspection Code*.~~

~~**10.3.1.6.3***~~
~~PRVs shall be maintained in safe operating condition.~~

~~**10.3.1.6.4**~~
~~PRVs shall have vent lines to convey escaping gas to the outdoors and then upward to prevent impinging on buildings, other equipment, or areas open to the public (e.g., sidewalks).~~

~~**10.3.1.6.5**~~
~~The PRV shall not have a setting greater than the maximum allowable working pressure of the line it protects.~~

~~**10.3.1.7 Shutoff Valves.**~~

~~**10.3.1.7.1 Rating.**~~

~~**10.3.1.8 Interior Walls.**~~
~~Interior walls or partitions shall be continuous from floor to ceiling, be anchored in accordance with the requirements of the building code, and have a fire resistance rating of at least 2 hours.~~

~~**10.3.1.9 Exterior Walls.**~~

~~**10.3.1.9.3**~~
~~Inlets shall be uniformly arranged on exterior walls near floor level.~~

~~**10.3.1.9.4**~~
~~Outlets shall be located in exterior walls at the high point of the room or in the roof.~~

~~**10.3.1.10 Ventilation.**~~

~~**10.3.1.10.1**~~
~~Ventilation shall be by a continuous mechanical ventilation system or by a mechanical ventilation system activated by a continuously monitoring natural gas detection system where a gas concentration not more that on-fifth of the lower flammable limit is present.~~

~~**10.3.1.10.2**~~
~~Where installed, a gas detection system shall be equipped to sound a latched alarm and visually indicate when a maximum of one-fifth of the lower flammable limit is reached.~~

~~**10.3.1.10.3**~~
~~The actuation of the gas detection system shall shut down the compressor and stop the flow of gas into the structure.~~

~~**10.3.1.11 Reactivation.**~~
~~Reactivation of the fueling system shall be by manual restart that is conducted by trained personnel.~~

10.7 Reserved.

10.3.1.12 Residential Storage. (Reserved) **[Move to 10.8]**

~~**10.3.1.13 Maintenance.**~~

~~**10.3.1.13.1**~~
~~Containers and their appurtenances, piping systems, compression equipment, controls, and detection devices shall be maintained in safe operating condition and according to manufacturers' instructions.~~

~~**10.3.1.13.2**~~
~~PRVs shall be maintained in safe operating condition.~~

~~**10.3.1.13.3**~~

~~Maintenance personnel shall be trained in leak detection procedures and equipment in accordance with manufacturers' recommendations.~~

10.4 LNG Supplemental Requirements. **[Move to 10.9]**
LNG container installation for indoor storage shall follow 17.5.7.

Chapter 11 CNG Major Fueling Equipment

11.1 Application.
This chapter shall apply to the design, construction, installation, and operation of containers, pressure vessels, compression equipment, buildings and structures, and associated equipment used for storage and dispensing of CNG as an engine fuel in fleet and public dispensing operations other than residential fueling appliances (RFAs) and nonresidential fueling appliances or vehicle fueling appliances (VFAs), coverage of RFAs and VFAs is provided in Chapter 12 and Chapter 13 of this code, respectively.

Commented [BS1]: Changes in FR-19

11.2 General.

11.3.2 System Component Qualification. **[Move to 11.2.1]**
System components shall comply with the applicable provisions of Chapter 5 as well as 11.3.2.1 through 11.3.2.7.10 and 11.3.2.12 through 11.3.2.17.

Commented [BS2]: Changes to para in FR-20

~~**11.3.1.4 Sources of Ignition.**~~

~~**11.3.1.4.1**~~
~~Vehicles shall not be considered a source of ignition with respect to the provisions of this chapter.~~

~~**11.3.1.4.2**~~
~~Vehicles containing fuel-fired equipment (e.g., recreational vehicles and catering trucks) shall be considered a source of ignition unless this equipment is shut off completely before entering an area in which ignition sources are not permitted.~~

~~**11.3.1.5**~~
~~A hazard analysis of the proposed modification and the startup plan shall be required and prepared prior to the modification and operation of the facility.~~

8.4 CNG Systems. **[Move to 11.3]**

8.4.1 Compressor Systems. **[11.3.1]**

8.4.1.1 Design Temperature and Pressure. **[11.3.1.1]**

8.4.1.1.1 **[11.3.1.1.1]**
Compression equipment shall be designed for use with CNG and for the pressures and temperatures to which it is subjected under operating conditions.

8.4.1.1.2* **[11.3.1.1.2]**
Compression equipment shall incorporate a means to minimize liquid carryover to the storage system.

8.4.1.2 Installation of Pressure Gauges. **[11.3.1.2]**
Gauges or other readout devices shall be installed to indicate compression discharge pressure, storage pressure, and dispenser discharge pressure.

8.4.1.3 Pressure Relief Valves. **[11.3.1.3]**
Compression equipment shall have PRVs that limit each stage pressure to the maximum allowable working pressure for the compression cylinder and piping associated with that stage of compression.

8.4.1.4 Shutdown Control. **[11.3.1.4]**

8.4.1.4.1 **[11.3.1.4.1]**
CNG compression equipment shall be equipped with a high discharge and a low suction pressure automatic shutdown control.

8.4.1.4.2 **[11.3.1.4.2]**
Control circuits that shut down shall remain down until manually activated or reset after a safe condition is restored.

8.4.1.5 Engine Drives. **[11.3.1.5]**
Engine-driven compressor installations shall conform, where applicable, to NFPA 37.

11.3.2.16.11 **[Move to 11.3.1.6]**
A self-closing valve shall be provided on the inlet of the compressor that shuts off the gas supply to the compressor when one of the following occurs:

(1) An emergency shutdown device is activated.

(2) A power failure occurs.

(3) The compressor is switched to the OFF position.

11.3.2.1 Installation of Containers, Cylinders, and Tanks. [Move to 11.3.2]

11.3.2.1.2 [11.3.2.1]
Installation of outdoor tanks shall meet the requirements of Chapter 9.

11.3.2.1.1 [11.3.2.2]
Installation of indoor tanks shall meet the requirements of Chapter 10.

11.3.2.16.1 Manually Operated Container Valve. [Move to 11.3.2.3]

11.3.2.16.1.1 [11.3.2.3.1]
Individual groups of manifolded ASME storage vessels without individual storage vessel valves shall be limited to a maximum of 10,000 scf (283 m^3).

11.3.2.16.1.2 [11.3.2.3.2]
Manifolds serving each group of ASME storage vessels shall be provided with a manually operated shutoff valve.

11.3.2.16.1.3 [11.3.2.3.3]
Individual ASME pressure vessels of any size, not part of a manifold system, shall have a manual shutoff valve.

11.3.2.16.1.4 [11.3.2.3.4]
A manually operated shutoff valve shall be installed at the outlet from the manifold.

11.3.2.16.1.5 [11.3.2.3.5]
The valve in 11.3.2.16.1.3 shall be located downstream of the backflow check valve specified in 11.3.2.16.2.

11.3.2.9.6 [Move to 11.3.2.4]
Where there is a dedicated fill line on a storage container, it shall be equipped with a backflow check valve to prevent discharge of natural gas from the container in case of the rupture of the line, hose, fittings, or other equipment upstream of the storage containers.

8.4.2 Dispensing Systems and Dispensers. [Move to 11.3.3]

8.4.2.1 Operation. [11.3.3.1]

11.3.2.13.3 [Move to 11.3.3.1.1]
Title 49 CFR 571.304 or CSA/ANSI NGV 2 containers shall be charged in accordance with 49 CFR 571.304 regulations or CSA/ANSI NGV 2, *Compressed natural gas vehicle fuel containers*, requirements, as applicable.

8.4.2.1.4 [11.3.3.1.2]
DOT, TC, and CSA/ANSI NGV 2 cylinders shall be charged in accordance with DOT, TC, and CSA/ANSI NGV 2 regulations.

8.4.2.1.2 [11.3.3.1.3]
A fuel supply container shall not be charged in excess of the quantity of fuel that would result in a gas pressure equal to service pressure at a uniform temperature of 70°F (21°C).

8.4.2.1.1 [11.3.3.1.4]
Static protection shall not be required where CNG is transferred by conductive hose, flexible metallic tubing, or pipe connections where both halves of the metallic couplings are in continuous contact.

11.3.2.15.1* [Move to 11.3.3.1.5]
Where stray or impressed currents, such as those from cathodic protection, are used or present on dispensing systems, protective measures shall be taken to prevent ignition.

11.3.2.16.10.1 [Move to 11.3.3.2]
Each line between a gas storage facility and a dispenser at a fast-fill station shall have a valve that closes when one of the following occurs:

(1) The power supply to the dispenser is cut off.

(2) Any emergency shutdown device at the refueling station is activated.

11.3.2.16.10.2 [11.3.3.2.1]
A fast-closing, "quarter turn" manual shutoff valve shall be provided at a fast-fill station upstream of the breakaway device specified in 11.3.2.16.6, where it is accessible to the person dispensing natural gas, unless one of the following occurs:

(1) The self-closing valve referred to in 11.3.2.16.10.1 is located immediately upstream of the dispenser.

(2) The dispenser is equipped with a self-closing valve that closes each time the control arm is turned to the OFF position or when an emergency device is activated.

11.3.2.13.7 [Move to 11.3.3.3]
The transfer of CNG into a fuel supply container shall be performed in accordance with instructions posted at the dispensing station.

11.3.2.13.8 [11.3.3.3.1]
Where CNG is being transferred to or from a motor vehicle, the engine shall be turned off.

8.4.2.2 Vehicle Fill Pressure Control. [11.3.3.4]

8.4.2.2.1 [11.3.3.4.1]
CNG dispensing systems shall be equipped to stop fuel flow automatically when a vehicle fuel supply container reaches the maximum fill conditions of 8.4.2.1.2.

8.4.2.2.2 Malfunctions. [11.3.3.4.2]

8.4.2.2.2.1 [11.3.3.4.2.1]
The dispenser shall be designed to detect any malfunction that fills the vehicle fuel container in excess of the limits specified, or causes the relief valve required in 11.3.2.3 to open.

8.4.2.2.2.2 [11.3.3.4.2.2]
If a malfunction is detected, the following shall occur:

(1) The dispenser shall disable itself and provide clear visual annunciation until it is repaired, calibrated, or serviced.

(2) The dispenser shall notify the vehicle operator or fueling technician shall be notified that the vehicle has been overfilled.

(3) After any such malfunction, the dispenser shall be repaired and calibrated in accordance with 4.5.1.1 before continued operation.

11.3.2.13.6.1 Repairs. [Move to 11.3.3.4.2.3]

(A)
After any such malfunction, the dispenser shall be repaired and calibrated in accordance with 11.3.2.11 before continued operation.
(B)*
The excess fuel shall be removed from the vehicle by qualified person(s) only.

8.4.2.3 Overpressure Protection. [11.3.3.5]

8.4.2.3.1 [11.3.3.5.1]
Transfer systems shall be capable of depressurizing to facilitate disconnection.

8.4.2.3.3 [11.3.3.5.2]
The set pressure of the overpressure protection device shall not exceed 125 percent of the service pressure of the fueling nozzle it supplies.

8.4.2.1.3 [Move to 11.3.3.5.3]
Under no circumstances shall the fuel supply container be subjected to pressure in excess of 1.25 times the service pressure.

8.4.2.3.2 [11.3.3.5.4]
The pressure relief valve shall be redundant to and independent from any operating control system used to control the supplied fuel pressure during dispenser operation.

8.4.2.4 Breakaway Protection. [11.3.3.6]

8.4.2.4.1 [11.3.3.6.1]
Breakaway protection shall be provided in a manner that, in the event of a pullaway, natural gas ceases to flow at any separation.

(A)
A breakaway device shall be arranged to separate using a force not greater than 150 lb (68 kg) when applied in any direction that the vehicle would move.

Commented [KC3]: Change to 11.3.3.6.1.1

(B)
Breakaway devices shall comply with CSA/ANSI NGV 4.4, *Breakaway devices for natural gas dispensing hoses and systems*.

Commented [KC4]: Change to 11.3.3.6.1.2

11.3.2.16.6.1 [Move to 11.3.3.6.2]
A breakaway device shall be installed at every dispensing point.

11.3.2.16.6.2 [11.3.3.6.2(A)]
A breakaway device shall be arranged to separate using a force not greater than 150 lb (68 kg) when applied in any direction that the vehicle would move.

Commented [KC5]: Change to 11.3.3.6.2.1

11.3.2.16.6.3 [11.3.3.6.2(B)]
Breakaway devices shall comply with CSA/ANSI NGV 4.4, *Breakaway devices for natural gas dispensing hoses and systems*.

Commented [KC6]: Change to 11.3.3.6.2.2

11.3.2.13 Vehicle Fueling Dispensing Operation. [Move to 11.3.3.7]

11.3.2.13.4 [Move to 11.3.3.7.1]
The use of adapters to defeat the pressure-specific nozzle and receptacle connections shall be prohibited.

11.3.2.13.9 CNG Transfer. [Move to 11.3.3.8]

11.3.2.13.9.1* [11.3.3.8.1]
During the transfer of CNG to or from CNG bulk transport vehicles, the hand or emergency brake of the vehicle shall be set and chock blocks used to prevent rolling of the vehicle.

11.3.2.13.9.2 [11.3.3.8.2]
Personnel filling CNG bulk transport cylinders or vehicles shall be instructed and trained in accordance with DOT hazardous materials regulations.

11.3.2.13.10 [11.3.3.8.3]
Transfer systems shall be capable of depressurizing to facilitate disconnection.

11.3.2.13.11 [11.3.3.8.4]
Bleed connections shall lead to a safe point of discharge.

11.3.4.2 Outdoor Non-Public Fueling from Transport Vehicles Including Marine Vessels. [Move to 11.4]

11.3.4.2.1 Mobile Refueling Stations. [11.4.1]

11.3.4.2.1.1 [11.4.1.1]
Mobile refueling vehicles, temporary trailers (with or without tractors), and other means of providing vehicle refueling or onsite storage shall be subject to the same requirements as a permanent refueling or storage installation, with the exception of vessel requirements.

11.3.4.2.1.2 [11.4.1.2]
Mobile refueling equipment shall be in accordance with DOT regulations for transportation of hazardous materials.

(A)
The mobile refueling equipment shall prevent overfilling of vehicles or storage containers.

Commented [KC7]: Change to 11.4.1.2.1

(B)
The connections to and from the refueling equipment shall incorporate a breakaway device in accordance with 11.3.2.16.6.

Commented [KC8]: Change to 11.4.1.2.2

~~**11.3.2.2 Installation of Pressure Relief Devices.**~~

~~**11.3.2.2.1**~~

Pressure relief valves shall be arranged so that they discharge to a location where escaping gas does not impinge on buildings, other equipment, or areas that are occupiable by the public *(see 10.3.1.4.9)*.

11.3.2.2.2

Pressure relief valves on pressure vessels shall be installed so that any discharge is in a vertical position.

11.3.2.2.3

Pressure relief valve venting systems shall be designed to protect against the elements.

11.3.2.2.4

If approved, sized and lockable valves shall be permitted to be installed between the relief valves and the storage vessel or fueling transfer system.

11.3.2.2.5

The valves referenced in 11.3.2.2.4 shall be locked open under normal operating condition.

11.3.2.3 Installation of Pressure Relief Devices on Dispensing Systems.

A pressure relief valve shall be installed in the fueling transfer system to prevent vehicle pressure from exceeding 125 percent of the vehicle service pressure.

11.3.2.3.1

The pressure relief valve shall be redundant to and independent from any operating control system used to control the supplied fuel pressure during dispenser operation.

11.3.2.3.2

The set pressure of the overpressure protection device shall not exceed 125 percent of the service pressure of the fueling nozzle it supplies.

11.3.2.4 Installation of Pressure Gauges.

Gauges or other readout devices shall be installed to indicate compression discharge pressure, storage pressure, and dispenser discharge pressure.

11.3.2.5 Installation of Pressure Regulators.

11.3.2.5.1

Regulators shall be designed, installed, or protected so that their operation is not affected by freezing rain, sleet, snow, ice, mud, insects, or debris.

11.3.2.5.2

Regulator protection of 11.3.2.5.1 shall be permitted to be integral with the regulator.

11.3.2.7 Installation of Piping Connections.

11.3.2.7.1

Manifolds connecting fuel containers shall be fabricated to minimize vibration.

11.3.2.7.2

Manifolds shall be installed in a protected location or shielded to prevent damage from unsecured objects.

11.3.2.7.3

A pipe thread jointing material impervious to the action of the natural gas used in system shall be applied to all male pipe threads prior to assembly.

11.3.2.7.4

Threaded piping and fittings shall be clear and free from cutting or threading burrs and scales.

11.3.2.7.5

The ends of all piping shall be reamed.

11.3.2.7.6

A bend in piping or tubing shall be prohibited where such a bend is tighter than the minimum bend radius.

11.3.2.7.7

A joint or connection shall be located in an accessible location.

11.3.2.7.8

The number of joints shall be minimized and placed in a location considering personnel safety.

11.3.2.9 Installation of Valves.

11.3.2.9.1

Individual groups of manifolded ASME storage vessels without individual storage vessel valves shall be limited to a maximum of 10,000 scf (283 m^3).

11.3.2.9.2

Manifolds serving each group of ASME storage vessels shall be provided with a manually operated shutoff valve.

11.3.2.9.3

Individual ASME pressure vessels of any size, not part of a manifold system, shall have a manual shutoff valve.

11.3.2.9.4

A manually operated shutoff valve shall be installed at the outlet from the manifold.

11.3.2.9.5

The valve in 11.3.2.9.4 shall be located downstream of the backflow check valve specified in 11.3.2.9.6.

11.3.2.9.8

Gas piping from an outdoor compressor or storage system into a building shall be provided with shutoff valves located outside the building.

11.3.2.12 Installation of Compression and Gas Processing Equipment.

11.3.2.12.1
Compression equipment shall be designed for use with CNG and for the pressures and temperatures to which it is subjected under operating conditions.
11.3.2.12.2
Compression equipment shall have pressure relief valves that limit each stage pressure to the maximum allowable working pressure for the compression cylinder and piping associated with that stage of compression.
11.3.2.12.3
CNG compression equipment shall be equipped with a high discharge and a low suction pressure automatic shutdown control.
11.3.2.12.4
Control circuits that shut down shall remain down until manually activated or reset after a safe condition is confirmed.
11.3.2.12.5
Engine-driven compressor installations shall conform, where applicable, to NFPA 37.
11.3.2.12.6*
Compression equipment shall incorporate a means to minimize liquid carryover to the storage system.
11.3.2.12.7
A facility in which CNG compression, storage, and dispensing equipment are sheltered by weather protection constructed in accordance with the requirements of the building code and by a roof designed for ventilation and dispersal of escaped gas shall be considered to be located outdoors.
11.3.2.12.8 Location.

11.3.2.12.8.1
Compression, storage, and dispensing equipment located outdoors shall be above ground.
11.3.2.12.8.2
Compression, storage, and dispensing equipment located outdoors shall not be located where exposed to failure of overhead electric power lines operating over 600 volts unless approved protection is provided.
11.3.2.12.8.3
Compression, storage, and dispensing equipment located outdoors shall be a minimum of 10 ft (3 m) from the nearest important building or line of adjoining property that is able to be built upon or from any source of ignition.
11.3.2.12.8.4
Compression, storage, and dispensing equipment located outdoors shall be not less than 10 ft (3 m) from the nearest public street or sidewalk line and at least 50 ft (15 m) from the nearest rail of any railroad main track.
11.3.2.12.9
Areas for compression, storage, and dispensing shall be classified in accordance with Table 11.3.2.14.1 for installations of electrical equipment.
11.3.2.12.10
Gas piping from an outdoor compressor or storage system into a building shall be provided with shutoff valves located outside the building.
11.3.2.12.11
An emergency manual shutdown device shall be provided both within 10 ft (3.0 m) of the dispensing area and greater than 25 ft (7.6 m) from the dispensing area.

11.3.2.13.1
A vehicle fuel supply container shall not be charged in excess of the quantity of fuel that would result in a gas pressure equal to service pressure at a uniform temperature of 70°F (21°C).
11.3.2.13.2
Under no circumstances shall the vehicle fuel supply container be subjected to pressure in excess of 1.25 times the service pressure.
11.3.2.13.5
CNG dispensing systems shall be equipped to stop fuel flow automatically when a vehicle fuel supply container reaches maximum fill conditions of 11.3.2.13.
11.3.2.13.6 Malfunctions.
The dispenser shall be designed to detect any malfunction that fills the vehicle fuel container in excess of the limits specified, or causes the relief valve required in 11.3.2.3 to open. If a malfunction is detected, it shall perform the following:

(1) The dispenser shall disable itself and provide clear visual annunciation until repaired, calibrated, or serviced.

(2) The dispenser shall notify the vehicle operator or fueling technician that the vehicle has been overfilled.

(3) After any such malfunction, the dispenser shall be repaired and calibrated in accordance with 4.5.1.1 before continued operation.

11.3.2.13.12
Sources of ignition shall not be permitted within 10 ft (3.0 m) of any filling connection during a transfer operation.
11.3.2.13.13*
A warning sign(s) shall be posted at the dispensing points with the following words:
"FLAMMABLE GAS — STOP MOTOR, NO SMOKING.
NATURAL GAS VEHICLE FUEL CYLINDERS SHALL BE INSPECTED AT INTERVALS NOT EXCEEDING 3 YEARS TO ENSURE SAFE OPERATION OF THE VEHICLE.
NATURAL GAS FUEL CYLINDERS PAST THEIR END-OF-LIFE DATE SHALL NOT BE REFUELED AND SHALL BE REMOVED FROM SERVICE.
11.3.2.15 Stray or Impressed Current.

11.3.2.15.2*
Static protection shall not be required where CNG is transferred by conductive hose, flexible metallic tubing, or pipe connections where both halves of the metallic couplings are in continuous contact.
11.3.2.16 Installation of Emergency Shutdown Equipment.

11.3.2.16.2
Where there is a dedicated fill line on a storage container, it shall be equipped with a backflow check valve to prevent discharge of natural gas from the container in case of the rupture of the line, hose, fittings, or other equipment upstream of the storage containers.
11.3.2.16.3 Excess-Flow Valve(s).

11.3.2.16.3.1
Where excess-flow check valves are used, the closing flow shall be greater than the maximum system design flow over the full range of operating pressures and less than the flow rating of the piping system that results from a complete line failure between the excess-flow valve and the equipment downstream of the excess-flow check valve.
11.3.2.16.3.2
Provisions shall be made for safe depressurization upstream of the device after it closes.
11.3.2.16.4
Gas piping from an outdoor compressor or storage system into a building shall be provided with shutoff valves located outside the building.
11.3.2.16.5
An emergency manual shutdown device shall be provided within 10 ft (3.0 m) of the dispensing area and also greater than 25 ft (7.6 m) from the dispensing area.
11.3.2.16.5.1
This device, when activated, shall shut off the power supply and gas supply to the compressor and the dispenser.
11.3.2.16.6
Breakaway protection shall be provided in a manner that, in the event of a pullaway, natural gas ceases to flow at any separation.
11.3.2.16.7
Control circuits shall be arranged so that, when an emergency shutdown device is activated, systems that shut down remain off until manually activated or reset after a safe condition is confirmed.
11.3.2.16.8
Control circuits shall be arranged so that, when an electric power is cut off (i.e., blackout condition), systems that shut down remain off until manually activated or reset after a safe condition is confirmed.
11.3.2.16.9
Control circuits shall be arranged so that, when an electric power is interrupted (i.e., brownout condition) or a system is equipped with backup power, systems that shut down should be allowed to reset and resume operation.
11.3.2.16.10 Fast-Fill Station.

11.3.2.17 Fire Protection.
A portable fire extinguisher having a rating of not less than 20-B:C shall be provided at the dispensing area.
11.3.3 Indoor Dispensing to Non-Public Users.

11.3.3.1 Indoor Non-Public Fast-Fill Fueling.

11.3.3.1.1 Indoor Fast-Fill Fueling, Outdoor Storage, and Compression.
Fast-fill fueling indoors shall be permitted where storage and compression equipment is located outdoors complying with 5.2.1.1.1 through 5.2.1.1.4, 9.3.1, 9.3.2, 9.3.6.1, 11.3.4.1.5, and 11.3.4.1.7.
11.3.3.1.1.1
Where attended fast-fill fueling is performed indoors, the following shall be installed:

(1) An emergency manual shutdown device shall be installed as required by 11.3.2.16.5.

(2) A gas detection system equipped to sound a latched alarm and visually indicate when a maximum of one-fifth of the lower flammable limit is reached shall be installed.

~~**11.3.3.1.1.2**~~
~~The actuation of the indoor gas detection system shall shut down the compressor and stop the flow of gas into the structure.~~
~~**11.3.3.1.1.3**~~
~~Reactivation of the fueling system shall be by manual restart that is conducted by trained personnel and in accordance with a process safety analysis.~~
~~**11.3.3.1.2 Equipment Location. (Reserved)**~~

~~**11.3.3.1.3 Ventilation. (Reserved)**~~

~~**11.3.3.1.4 Electrical Classification. (Reserved)**~~

~~**11.3.3.1.5 Fire Detection. (Reserved)**~~

~~**11.3.3.1.6 Fire Alarm System. (Reserved)**~~

~~**11.3.3.1.7 Emergency Shutdown System. (Reserved)**~~

~~**11.3.3.1.8 Dispensing Equipment. (Reserved)**~~

~~**11.3.3.2 Indoor Non-Public Slow-Fill Fueling. (Reserved)**~~

~~**11.3.4 Outdoor Non-Public Fueling.**~~

~~**11.3.4.1 General.**~~

~~**11.3.4.1.1**~~
~~A facility in which CNG compression, storage, and dispensing equipment are sheltered by weather protection constructed in accordance with the requirements of the building code and by a roof designed for ventilation and dispersal of escaped gas shall be considered to be located outdoors.~~
~~**11.3.4.1.2**~~
~~Compression, storage, and dispensing equipment located outdoors shall be above ground.~~
~~**11.3.4.1.2.1**~~
~~Compression, storage, and dispensing equipment located outdoors shall not be beneath electric power lines or where exposed by their failure.~~
~~**11.3.4.1.2.2**~~
~~Compression, storage, and dispensing equipment located outdoors shall be a minimum of 10 ft (3 m) from the nearest important building or line of adjoining property that is able to be built upon or from any source of ignition.~~
~~**11.3.4.1.3**~~
~~Compression, storage, and dispensing equipment located outdoors shall be not less than 10 ft (3 m) from the nearest public street or sidewalk line and at least 50 ft (15 m) from the nearest rail of any railroad main track.~~
~~**11.3.4.1.4**~~
~~Combustible material shall not be permitted within 10 ft (3 m) of any stationary container.~~
~~**11.3.4.1.5**~~
~~The minimum separation between containers and aboveground tanks containing flammable or combustible liquids shall be 20 ft (6 m).~~
~~**11.3.4.1.6 Point of Transfer.**~~
~~**11.3.4.1.6.1**~~
~~During outdoor fueling operations, the point of transfer shall be located at least 10 ft (3 m) from any important building, mobile home, public sidewalk, highway, street, or road and at least 3 ft (1 m) from storage containers.~~
~~**11.3.4.1.6.2**~~
~~The point of transfer shall be permitted to be located at a lesser distance from buildings or walls constructed of concrete or masonry materials or of other material having a fire resistance rating of at least 2 hours, but at least 10 ft (3 m) from any building openings.~~
~~**11.3.4.1.7**~~
~~Areas for compression, storage, and dispensing shall be classified in accordance with Table 11.3.2.14.1 for installations of electrical equipment.~~
~~**11.3.5 Storage.**~~
~~CNG storage shall be in accordance with Chapters 9 and 10.~~
~~**11.3.6 Dispensing to the Public.**~~

~~**11.3.6.1 General.**~~

~~**11.3.6.1.1**~~
~~CNG compression, storage, and dispensing shall be located and conducted in compliance with this section.~~
~~**11.3.6.1.2**~~

Compression, dispensing equipment, and storage containers connected for use shall be permitted to be located inside of buildings reserved exclusively for these purposes or in rooms within or attached to buildings used for other purposes in accordance with this section.

11.3.6.2 Indoor Public Fueling.

11.3.6.2.1 General.

Compression, dispensing equipment, and storage containers connected for use shall be permitted to be located inside of buildings reserved exclusively for these purposes or in rooms within or attached to buildings used for other purposes in accordance with this section.

11.3.6.2.1.1

Nonelectrical sources of ignition shall not be permitted.

11.3.6.2.1.2

Pressure relief valves on storage systems shall have a pressure relief valve vent system to convey escaping gas to the outdoors and then upward to a safe area to prevent impinging on buildings, other equipment, or areas open to the public (e.g., sidewalks).

11.3.6.2.5 Rooms Within Buildings.

11.3.6.2.5.1

Rooms within or attached to other buildings shall be constructed of noncombustible or limited-combustible materials.

11.3.6.2.5.2

Window glazing shall be permitted to be plastic.

11.3.6.2.5.3

Interior walls or partitions shall be continuous from floor to ceiling, be anchored in accordance with the requirements of the building code, and have a fire resistance rating of at least 2 hours.

11.3.6.2.5.4

At least one wall shall be an exterior wall.

11.3.6.2.5.5

Explosion venting shall be provided in accordance with 11.3.6.2.2.

11.3.6.2.5.6

Access to the room shall be from outside the primary structure.

11.3.6.2.5.7

If access to the room from outside the primary structure is not possible, access from within the primary structure shall be permitted where such access is made through a barrier space having two vapor-sealing, self-closing fire doors rated for the location where installed.

11.3.6.2.6 Ventilation.

11.3.6.2.6.1

Indoor locations shall be ventilated utilizing air supply inlets and exhaust outlets arranged to provide uniform air movement throughout the space.

11.3.6.2.6.2

Inlets shall be uniformly arranged on exterior walls near floor level.

11.3.6.2.6.3

Outlets shall be located in exterior walls at the high point of the room or in the roof.

11.3.6.2.6.4

Ventilation shall be by a continuous mechanical ventilation system or by a mechanical ventilation system activated by a continuously monitoring natural gas detection system where a gas concentration of not more than one-fifth of the lower flammable limit is present.

11.3.6.2.6.5

In either case in 11.3.6.2.6.4, the system shall immediately shut down the fueling system in the event of detection of an alarm condition or failure of the ventilation system, the detection system, or the controls.

11.3.6.2.6.6*

The ventilation rate shall be at least 1 cfm/min/12 ft^3 (1 m^3/min/11.3 m^3) of room volume.

11.3.6.2.6.7

A ventilation system for a room within or attached to another building shall be separate from any ventilation system for the other building.

11.3.6.2.6.8

Buildings and rooms used for compression, storage, and dispensing shall be classified in accordance with Table 11.3.2.14.1 for installations of electrical equipment.

11.3.6.2.7 Gas Detection.

Where installed, a gas detection system shall be equipped to sound a latched alarm and visually indicate when a maximum of one-fifth of the lower flammable limit is reached.

11.3.6.2.8 Reactivation.

Reactivation of the fueling system shall be by manual restart that is conducted by trained personnel.

11.3.6.2.9 Warning Signs.

~~**11.3.6.2.9.1**~~
~~Access doors shall have warning signs with the words "WARNING — NO SMOKING — FLAMMABLE GAS."~~
~~**11.3.6.2.9.2**~~
~~The wording shall be in plainly legible, bright red letters not less than 1 in. (25 mm) high on a white background.~~
~~**11.3.6.3 Indoor Fast-Fill Fueling, Outdoor Storage, and Compression.**~~
~~Fast-fill fueling indoors shall be permitted where storage and compression equipment is located outdoors complying with 5.2.1.1.1, 5.2.1.1.2, 5.2.1.1.3, 5.2.1.1.4, 9.3.1, 9.3.2, 11.3.4.1.5, and 11.3.4.1.7.~~
~~**11.3.6.3.1**~~
~~Where attended fast-fill fueling is performed indoors, the following shall be installed:~~

~~(1) An emergency manual shutdown device shall be installed as required by 11.3.2.16.5.~~

~~(2) A gas detection system equipped to sound a latched alarm and visually indicate when a maximum of one-fifth of the lower flammable limit is reached shall be installed.~~

~~**11.3.6.3.2**~~
~~The actuation of the gas detection system shall shut down the compressor and stop the flow of gas into the structure.~~
~~**11.3.7 Outdoor Public Fueling.**~~

~~**11.3.7.1 General.**~~

~~**11.3.7.1.1**~~
~~A facility in which CNG compression, storage, and dispensing equipment are sheltered by weather protection constructed in accordance with the requirements of the building code and by a roof designed for ventilation and dispersal of escaped gas shall be considered to be located outdoors.~~
~~**11.3.7.1.2**~~
~~Compression, storage, and dispensing equipment located outdoors shall be above ground.~~
~~**11.3.7.1.3 Dispensing Equipment Location.**~~

~~**11.3.7.1.3.1**~~
~~Compression, storage, and dispensing equipment located outdoors shall not be beneath electric power lines or where exposed by their failure.~~
~~**11.3.7.1.3.2**~~
~~Compression, storage, and dispensing equipment located outdoors shall be a minimum of 10 ft (3 m) from the nearest important building or line of adjoining property that is able to be built upon or from any source of ignition.~~
~~**11.3.7.1.3.3**~~
~~Compression, storage, and dispensing equipment located outdoors shall be not less than 10 ft (3 m) from the nearest public street or sidewalk line and at least 50 ft (15 m) from the nearest rail of any railroad main track.~~
~~**11.3.7.1.4 Point of Transfer.**~~

~~**11.3.7.1.4.1**~~
~~During outdoor fueling operations, the point of transfer shall be located at least 10 ft (3 m) from any important building, mobile home, public sidewalk, highway, street, or road and at least 3 ft (1 m) from storage containers.~~
~~**11.3.7.1.4.2**~~
~~The point of transfer shall be permitted to be located at a lesser distance from buildings or walls constructed of concrete or masonry materials or of other material having a fire resistance rating of at least 2 hours, but at least 10 ft (3 m) from any building openings.~~

Chapter 15 LNG Facility Management —NEW CHAPTER [Global FR-21]

15.1 Scope. (Reserved)

15.2 General. (Reserved)

15.3 Qualifications. (Reserved)

4.5.1.2* LNG Facility Maintenance. [Move to 15.4]

4.5.1.2.1 [15.4.1]
Each facility shall have written maintenance procedures based on experience, knowledge of similar facilities, and conditions under which the facilities will be maintained.

4.5.1.2.2 [15.4.2]
The maintenance program shall be carried out by a qualified representative of the equipment owner.

4.5.1.2.3 Maintenance Manual. [15.4.3]

4.5.1.2.3.1 [15.4.3.1]
Each operating company shall prepare a written manual that sets out an inspection and maintenance program for identified components that are used in the facility.

4.5.1.2.3.2 [15.4.3.2]
The maintenance manual for facility components shall include the following:

(1) The manner of carrying out and the frequency of the inspections and tests referred to in 4.5.1.3

(2) A description of any other action in addition to those referred to in 4.5.1.2.3.2(1) that is necessary to maintain the facility in accordance with this standard

(3) All procedures to be followed during repairs on a component that is operating while it is being repaired, to ensure the safety of persons and property at the facility

4.5.1.2.3.3 [15.4.3.3]
Each operating company shall conduct the facility's maintenance program in accordance with the written manual for facility components.

4.5.1.2.4 [15.4.4]
Maintenance shall be performed based on the component manufacturers' recommendations and not less than every six months.

4.5.1.2.5 [15.4.5]
Stationary LNG container relief valves shall be inspected and set-point tested at least once every 2 calendar years, with intervals not exceeding 30 months.

4.5.1.2.6 [15.4.6]
All other relief valves protecting hazardous fluid components shall be inspected and set-point tested at the intervals specified in 4.5.1.2.6.1 and 4.5.1.2.6.2.

4.5.1.2.6.1[15.4.6.1]
Inspection intervals for in-service equipment shall be in accordance with either of the following:

(1) Inspection intervals not exceeding 1 year plus 6 months in accordance with Section 2 of NB-23, *National Board Inspection Code, Part 2*, *Inspection,* for pressure relief devices, including listed conditions that can be observed on the valves externally

(2) Inspection intervals in accordance with API 510, *Pressure Vessel Inspection Code: In-service Inspection, Rating, Repair, and Alteration*

4.5.1.2.6.2 [15.4.6.2]
Set-point testing intervals shall be in accordance with either of the following:

(1) Intervals not exceeding 5 years plus 3 months

(2) A frequency in accordance with API RP 576, *Inspection of Pressure-Relieving Devices*

4.5.1.2.7 [15.4.7]

The refueling site shall have a maintenance program or process safety analysis program in place.

4.5.1.2.8 [15.4.8]
Each operating company shall maintain for a period of not less than 5 years a record of the date and the type of each maintenance activity performed.

4.5.1.3 [15.4.9]
Each LNG operating company shall carry out periodic inspection, tests, or both on a schedule that is included in the maintenance plan on identified components and its support system in service in the LNG facility, to verify that the components are maintained in accordance with the equipment manufacturer's recommendations and the following:

(1) The support system or foundation of each component shall be inspected at least annually to ensure that the support system or foundation is sound.

(2) Each uninterrupted power supply powering safety equipment at the LNG station shall be tested annually to ensure that it can perform at its intended operating capacity.

(3) When a safety device serving a single component is taken out of service for maintenance or repair, the component shall also be taken out of service, except where the safety function is provided by an alternative means.

(4) Where the operation of a component that is taken out of service could cause a hazardous condition, a tag bearing the words "Do Not Operate," or equivalent, shall be attached to the controls of the component, or the component shall be locked out.

(5) Stop valves for isolating pressure or vacuum-relief valves shall be locked or sealed open and shall be operated only by a qualified person.

(6) No more than one pressure or vacuum relief valve stop valve shall be closed at one time on an LNG container.

4.5.1.3.1 [15.4.10]
All maintenance and servicing shall be done in accordance with 29 CFR 1910 for energy control.

4.5.1.6 [15.4.11]
Safety and fire protection equipment shall be tested or inspected at intervals not to exceed six months.

4.5.1.7 [15.4.12]
Control systems that are used as part of the fire protection system at the LNG station shall be inspected and tested in accordance with the applicable fire codes and standards and conform to the following criteria:

(1) Monitoring equipment shall be maintained in accordance with *NFPA 72* and NFPA 1221.

(2) Portable or wheeled fire extinguishers suitable for gas fires, preferably of the dry-chemical type, shall be available at strategic locations, as determined in accordance with Chapter 14, within an LNG facility and on tank vehicles, and shall be maintained in accordance with NFPA 10.

(3) Where installed, fixed fire extinguishers and other fire-control systems shall be maintained in accordance with NFPA 11, NFPA 12, NFPA 12A, NFPA 16, and NFPA 17.

4.5.1.8 [15.4.13]
Maintenance activities on fire control equipment shall be scheduled so that a minimum of equipment is taken out of service at any one time, and fire prevention safety is not comprised.

4.5.1.9 [15.4.14]
LNG storage facilities and, in particular, the storage container and its foundation shall be externally inspected annually and after each major meteorological disturbance to ensure that the structural integrity of the LNG facility is intact.

4.5.1.11 Operations and Maintenance. [Move to 15.5]

~~**4.5.1.11.1**~~ **[can move with rest of subs to ch 15 and show delete there]**
~~Each facility shall have written operating, maintenance, and training procedures based on experience, knowledge of similar facilities, and conditions under which the facility will be operated.~~

4.5.1.11.1.1 Basic Operations Requirement. [15.5.1]
Each LNG facility shall meet the following requirements:

(1) Have written procedures covering operation, maintenance, and training

(2) Keep up-to-date drawings of LNG facility equipment showing all revisions made after installation

(3) Revise the plans and procedures as operating conditions or facility equipment require

(4) Establish a written emergency plan

(5) Establish liaison with appropriate local authorities such as police, fire department, or municipal works and inform them of the emergency plans and their role in emergency situations

(6) Analyze and document all safety-related malfunctions and incidents for the purpose of determining their causes and preventing the possibility of recurrence

4.5.1.11.1.2 Operating Procedures Manual. [15.6]

(A)
The operations manual shall contain procedures to ensure that the cool down of each system of components under its control and subjected to cryogenic temperatures is limited to a rate and a distribution pattern that maintain the thermal stresses within the design limits of the system during the cool down period, having regard for the performance of expansion and contraction devices.

Commented [KC1]: Change to 15.6.1

(B)
Each operations manual shall include purging procedures [in accordance with NFPA 56] that, when implemented, minimize the presence of a combustible mixture in LNG facility piping or equipment when a system is being placed into or taken out of operation.

Commented [KC2]: Change to 15.6.2

(C)
The operations manual shall contain procedures for loading or unloading operations applicable to all transfers, including the following:

Commented [KC3]: Change to 15.6.3

(1) Written procedures shall cover all transfer operations and shall cover emergency as well as normal operating procedures.

(2) Written procedures shall be kept up-to-date and available to all personnel engaged in transfer operations.

(3) Prior to transfer, gauge readings shall be obtained or inventory established to ensure that the receiving vessel cannot be overfilled.

(4) Levels of the receiving vessel shall be checked during transfer operations.

(5) The transfer system shall be checked prior to use to ensure that valves are in the correct position.

(6) Pressure and temperature conditions shall be observed during the transfer operation.

(D)
The manual shall be accessible to operating and maintenance personnel.

Commented [KC4]: Change to 15.6.4

(E)
The manual shall be updated when changes in equipment or procedures are made.

Commented [KC5]: Change to 15.6.5

4.7* LNG Training. [Move to 15.7]

4.7.1 [15.7.1]
All persons employed in handling and dispensing LNG shall be trained in handling and operating duties and procedures.

4.7.2 [15.7.2]
Protective clothing, face shield/goggles, and gloves shall be provided for all operators dispensing and handling LNG, except as provided in 4.7.3.

4.7.3 [15.7.3]
The requirements specified in 4.7.2 shall be permitted to be excluded where equipment is demonstrated to operate without exposing operators to the release of LNG or cold gases.

4.7.4* [15.7.4]
Training shall be conducted upon employment and every 2 years thereafter.

4.7.5 Training. [15.7.5]

4.7.5.1 [15.7.5.1]
Training shall include the following:

(1) Information on the nature, properties, and hazards of LNG in both the liquid and gaseous phases

(2) Specific instructions on the facility equipment to be used

(3) Information on materials that are compatible for use with LNG

(4) Use and care of protective equipment and clothing

(5) Standard first aid and self-aid instruction

(6) Response to emergency situations such as fires, leaks, and spills

(7) Good housekeeping practices

(8) Emergency response plan as required in 5.3.2.4

(9) Evacuation and fire drills

4.7.5.2 [15.7.5.2]
Each operator shall provide and implement a written plan of initial training to instruct all designated operating and supervisory personnel in the characteristics and hazards of LNG used or handled at the site, including low LNG temperature, flammability of mixtures with air, odorless vapor, boil-off characteristics, and reaction to water and water spray; the potential hazards involved in operating activities; and how to carry out the emergency procedures that relate to personnel functions and to provide detailed instructions on mobile LNG operations.

Chapter 16 LNG Site Safety, Fire Protection, and Gas Detection—NEW CHAPTER [Global FR-21]

5.3.1 Application. [Move to 16.1]

This section applies to LNG fire protection, personnel safety, security, LNG fueling facilities and training for LNG vehicles, and warning signs.

5.3.2 Fire Protection, Safety, and Security. [Move to 16.2]

5.3.2.1 [16.2.1]

Fire protection shall be provided for all LNG fueling facilities.

5.3.2.1.1 [16.2.1.1]

The extent of such protection shall be determined by an evaluation based on sound fire protection and methane detection engineering principles, analysis of local conditions, vehicle operations, hazards within the facility, exposure to or from other property, and the size of the LNG containers.

5.3.2.1.2 [16.2.1.2]

Guidance factors for making such an evaluation shall include the following:

(1) Type, quantity, and location of equipment necessary for the detection and control of fires, leaks, and spills of LNG, flammable refrigerants, and flammable gases or liquids

(2) Methods necessary for the protection of vehicles, equipment, and structures from the effects of fire exposure

(3) Equipment and processes to be incorporated within the ESD system

(4) Type, quantity, and location of sensors necessary to initiate automatic operation of the ESD system

(5) Availability and duties of individual facility personnel and the availability of external response personnel during an emergency

(6) Protective equipment and special training required by personnel for emergency duties

5.3.2.2 [16.2.2]

The planning for emergency response measures shall be coordinated with the appropriate local emergency agencies.

5.3.2.3 [16.2.3]

All-weather accessibility to the site for emergency services equipment shall be provided.

5.3.2.4* [16.2.4]

An emergency response plan shall be prepared to cover foreseeable emergency conditions.

5.3.2.5 [16.2.5]

The fire protection and methane detection equipment shall be maintained in accordance with the manufacturer's instructions and the AHJ.

5.3.2.6 [16.2.6]

An operating, portable, flammable-gas detector shall be readily available.

16.3 Reserved.

5.3.4 Ignition Source Control. [Move to 16.4]

5.3.4.1 [16.4.1]

LNG fueling facilities shall be free from rubbish, debris, and other material that present a fire hazard to a distance of at least 25 ft (7.6 m).

5.3.4.2 [16.4.2]

Grass areas on the LNG fueling facility grounds shall be maintained in a manner that does not present a fire hazard.

5.3.4.3 [16.4.3]

Gas leak detection and fire detection shall be installed based on the evaluation required in 5.3.2.1.1.

5.3.4.4 [16.4.4]

LNG vehicles shall be permitted to be parked indoors, provided such facilities or vehicles are equipped to prevent an accumulation of gas in a combustible mixture or the onboard fuel storage tank and fuel system are drained of LNG and purged with inert gas or depressurized.

5.3.5 Vehicles. [Move to 16.5]

5.3.5.1 [16.5.1]

Vehicles and other mobile equipment that constitute a potential ignition source shall be prohibited except where specifically authorized and under constant supervision or when at a transfer point specifically for the purpose of transfer.

5.3.5.2 [16.5.2]

Vehicles delivering LNG to the facility or vehicles being fueled from the facility shall not be considered sources of ignition.

5.3.5.3 [16.5.3]

Vehicles containing fuel-fired equipment (e.g., recreational vehicles and catering trucks) shall be considered a source of ignition unless all sources of ignition such as pilot lights, electric igniters, burners, electrical appliances, and engines located on the vehicle being refueled are shut off completely before entering an area where ignition sources are prohibited.

5.3.6 Electrical Classifications. [Move to 16.6]

5.3.6.1 [16.6.1]

Fired equipment shall be located in accordance with Table 14.3.2.21.1 from any impounding area or container drainage system.

5.3.6.2 [16.6.2]

Buildings and rooms used for storage or dispensing shall be classified in accordance with Table 14.3.2.21.1 for installations of electrical equipment.

5.3.7 Signage. [Move to 16.7]

For all LNG fueling facilities, the following signs shall be displayed in bright red letters on a white background, with letters not less than 6 in. (152 mm) high:

(1) "No Smoking" or "No Smoking within 25 ft (7.6 m)"

(2) "Stop Motor"

(3) "No Open Flames Permitted"

(4) "Cryogenic Liquid or Cold Gas"

(5) "Flammable Gas"

(6) "Unodorized Gas"

5.3.8 Emergency Response Measures. [Move to 16.8]

5.3.8.1 [16.8.1]

Safety and fire protection equipment shall be tested or inspected at intervals not to exceed 6 months.

5.3.8.2 [16.8.2]

Maintenance activities on fire control equipment shall be scheduled so that a minimum of equipment is taken out of service at any one time and fire prevention safety is not compromised.

5.3.8.3 [16.8.3]

Access routes for movement of fire control equipment to an LNG fueling facility shall be maintained at all times.

6.3 LNG Supplemental Requirements. [Move to 16.9]

6.3.1 Gas Detection. [16.9.1]

6.3.1.1 [16.9.1.1]

A gas detection system shall be provided in all buildings containing LNG.

6.3.1.2 [16.9.1.2]

The gas detection system shall activate a latched alarm when a maximum of 20 percent of the LFL is reached.

9.4.4 Cargo Transport Unloading. [Move to 16.10]

Subsection 9.4.4 shall apply to the transfer of LNG between cargo transport containers and fueling facility containers.

9.4.4.1 [16.10.1]

When transfers are made into fueling facility containers, the LNG shall be transferred at a pressure that does not overpressurize the receiving tank.

9.4.4.1.1 [16.10.1.1]

Venting of on-site containers shall be done only under emergency conditions and in a manner acceptable to the authority having jurisdiction.

9.4.4.2 Isolation Valves. [16.10.2]

9.4.4.2.1 [16.10.2.1]

The transfer piping shall have isolation valves at both ends.

9.4.4.2.2 [16.10.2.2]

On facility containers with a capacity greater than 2000 gal (7.6 m^3), one remotely operated valve, automatic closing valve, or check valve shall be used to prevent backflow.

9.4.4.3 [16.10.2.3]

If the fueling facility tank or transfer equipment is located in a remote area, operating status indicators, such as those that indicate container level, shall be provided in the unloading area.

9.4.4.4 [16.10.2.4]

At least one qualified person shall be in continuous attendance with an unobstructed view of the transfer point while unloading is in progress.

9.4.4.5 [16.10.2.5]

Sources of ignition shall not be permitted in the unloading area while transfer is in progress.

9.4.4.6 Methane Detection. [16.10.3]

9.4.4.6.1 [16.10.3.1]

Offloading site methane detection and fire protection shall be provided.

9.4.4.6.2 [16.10.3.2]

The methane detection system shall be capable of detection at multiple locations beyond the full radius of the transfer hose, measured at each point of transfer and receipt of LNG.

9.4.4.7 Bleed Connections. [16.10.4]

9.4.4.7.1 [16.10.4.1]

Bleed or vent connections shall be provided so that loading arms and hoses can be drained and depressurized prior to disconnection if necessary.

9.4.4.7.2 [16.10.4.2]

The connections shall relieve to a safe area.

9.4.4.8 [16.10.5]

Prior to connection, a cargo transport vehicle's wheels shall be rendered immobile.

9.4.4.9 [16.10.6]

The cargo transport vehicle’s engine shall be shut off while the transfer hose or piping is being connected or disconnected.

9.4.4.10 [16.10.6.1]

If required for LNG transfer, the engine shall be permitted to be started and used during the liquid transfer operations.

9.4.4.11 [16.10.7]

The LNG cargo transport unloading connection shall be at least 1.5 ft (0.46 m) from a storage container.

Chapter 19 LNG Siting and Construction Requirements—NEW CHAPTER [Global FR-21]

19.1 General.

19.1.1 Alternate Siting.

Commented [SB1]: Section being added with Detail FR-23. Add placeholder.

5.3.3 Siting. [Move to 19.2]

~~5.3.3.1~~ [both can move with subs to ch 19 and show as delete there]
~~LNG tanks and their associated equipment shall not be located where exposed to failure of overhead electric power lines operating over 600 volts unless approved protection is provided.~~

~~5.3.3.2~~
~~Vaulted or underground installations shall be deemed to provide engineered protection from overhead power lines.~~

5.3.3.3 [19.2.1]
If other combustible or hazardous liquids are able to encroach on the LNG fueling facility, means shall be provided to protect the LNG facility.

5.3.3.4 [19.2.2]
Points of transfer shall be located not less than 25 ft (7.6 m) from the nearest important building not associated with the LNG facility, from the line of adjoining property that is able to be built upon, or from fixed sources of ignition.

5.3.3.5 [19.2.3]
Flammable liquid storage tanks shall not be located within an LNG container impounding area.

19.3 Reserved.

19.4 Reserved.

19.5 Reserved.

9.4 LNG Supplemental Requirements. [Move to 19.6]

9.4.1 Spill Containment. [19.6.1]
LNG outdoor storage spill containment shall follow the requirements of 14.3.2.15.2.

9.4.2 LNG ASME Tanks. [19.6.2]
ASME tanks for LNG shall follow the requirements of Chapter 17.

9.4.3 Separation Distances. [Move to 19.7]

9.4.3.1 Adjacent Buildings. [19.7.1]
Separation distances between adjacent buildings shall align with the minimum distances in Table 17.5.

9.4.3.2 Power Lines. [19.7.2]

9.4.3.2.1 [19.7.2.1]
LNG tanks and their associated equipment shall not be located where exposed to failure of overhead electric power lines operating over 600 volts unless approved protection is provided.

9.4.3.2.2 [19.7.2.2]
Vaulted or underground installations shall be deemed to provide engineered protection from overhead power lines.

9.4.3.3 Stationary Containers. [19.7.3]
Separation distances between stationary containers shall align with the minimum distances in Table 17.5.

9.4.3.4 Aboveground/Underground Storage Tanks. [19.7.4]
Separation distances between aboveground/underground storage tanks shall align with the minimum distances in Table 17.5 and Table 17.5.2.

9.4.3.5 Buildings, Highways, Streets, and Roads. [19.7.5]
Separation distances between buildings, highways, streets, and roads shall align with the minimum distances in Table 17.5.

First Revision No. 23-NFPA 52-2023 [Detail]

19.1.1 Alternate Siting.
LNG, and LCNG and other gaseous/cryogenic installations shall be permitted to use alternate site distances, operating requirements, and equipment locations with validation by a qualified person(s) with proven expertise in mechanical systems, electrical systems, gaseous storage systems, cryogenic storage systems, fire protection, and gas detection.

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Thu Nov 09 15:40:37 EST 2023

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.3.9.3.2 and 4.3.9.3.3 of the Regulations Governing the Development of NFPA Standards (www.nfpa.org/regs).

This alternate siting provision section is being added to a new reorganized chapter 19 to provide separate correlated LNG and LCNG siting requirements. First Revisions 15, 16, 17,18,19, 20, and 22 are related to this reorganization and change text in relevant requirements.

Response Message: FR-23-NFPA 52-2023

First Revision No. 1-NFPA 52-2023 [Section No. 2.3]

2.3 Other Publications.

2.3.1 ACI Publications.

American Concrete Institute, 38800 Country Club Drive, Farmington Hills, MI 48331-3439.

ACI 376, *Code Requirements for Design and Construction of Concrete Structures for the Containment of Refrigerated Liquefied Gases and Commentary*, 2011.

2.3.2 AMPP Publications.

Association for Materials Protection and Performance (formerly NACE International and SSPC), 15835 Park Ten Place, Houston, Texas 77084.

NACE SP0169, *Control of External Corrosion of Underground or Submerged Metallic Piping Systems,* 2013.

SSPC-PA 1, *Shop, Field and Maintenance Painting of Steel*, 2016.

SSPC-PA 2, *Determining Compliance to Required DFT*, ~~2018~~ 2022 .

SSPC-SP 6/NACE No. 3, *Commercial Blast Cleaning*, reaffirmed 2006.

2.3.3 API Publications.

American Petroleum Institute, 200 Massachusetts Avenue, NW, Suite 1100, Washington, DC 20001–5571.

API 510, *Pressure Vessel Inspection Code: In-service Inspection, Rating, Repair, and Alteration*, ~~2018~~ 2022 .

API 620, *Design and Construction of Large, Welded, Low-Pressure Storage Tanks*, 2013.

API RP 576, *Inspection of Pressure-Relieving Devices*, 2017.

2.3.4 ASCE Publications.

American Society of Civil Engineers, 1801 Alexander Bell Drive, Reston, VA 20191-4400.

ASCE 7, *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*, ~~2016~~ 2022 .

2.3.5 ASME Publications.

American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990.

ANSI/ASME B31.3, *Process Piping*, ~~2018~~ 2023 .

ASME *Boiler and Pressure Vessel Code*, ~~2019~~ 2023 .

2.3.6 ASTM Publications.

ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM A47/A47M, *Standard Specification for Ferritic Malleable Iron Castings*, 1999, reaffirmed ~~2018e1~~ 2022e1 .

ASTM A395/A395M, *Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures*, 1999, reaffirmed ~~2018~~ 2022 .

ASTM A536, *Standard Specification for Ductile Iron Castings*, 1984, reaffirmed 2019e1.

~~ASTM D8080, *Standard Specification for Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG) Used as a Motor Vehicle Fuel,* 2021.~~

ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, ~~2021a~~ 2023 .

ASTM E136, *Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C*, ~~2019a~~ 2022 .

ASTM E2652, *Standard Test Method for Assessing Combustibility of Materials Using a Tube Furnace with a Cone-shaped Airflow Stabilizer, at 750°C*, ~~2018~~ 2022 .

ASTM E2965, *Standard Test Method for Determination of Low Levels of Heat Release Rate for Materials and Products Using an Oxygen Consumption Calorimeter*, ~~2017~~ 2022 .

2.3.7 CGA Publications.

Compressed Gas Association, 8484 Westpark Drive, Suite 220, McLean, VA 22102.

CGA 341, *Standard for Insulated Cargo Tank Specification for Nonflammable Cryogenic Liquids*, 2017.

CGA C-6.4, *Methods for External Visual Inspection of Natural Gas Vehicle (NGV) and Hydrogen Vehicle (HGV) Fuel Containers and Their Installations*, 2012, reaffirmed 2018.

CGA S-1.1, *Pressure Relief Device Standards — Part 1 — Cylinders for Compressed Gases*, ~~2019~~ 2022 .

CGA S-1.2, *Pressure Relief Device Standards — Part 2 — Portable Containers for Compressed Gases,* 2019.

CGA S-1.3, *Pressure Relief Device Standards — Part 3 — Stationary Storage Containers for Compressed Gases*, 2020.

2.3.8 CSA Group Publications.

CSA Group, ~~[corporate office:]~~ 178 Rexdale Blvd., Toronto, ON M9W 1R3, Canada.

CSA B51, *Boiler, pressure vessel, and pressure piping code,* Part 3, 2019.

CSA/ANSI NGV 1, *Compressed natural gas vehicle (NGV) fueling connection devices*, ~~2017~~ 2022 .

CSA/ANSI NGV 2, *Compressed natural gas vehicle fuel containers*, ~~2019~~ 2023 .

CSA/ANSI NGV 3.1, *Fuel system components for compressed natural gas powered vehicles*, 2020.

CSA/ANSI NGV4.4, *Breakaway devices for natural gas dispensing hoses and systems*, 2021.

CSA/ANSI NGV 5.1, *Residential fueling appliances,*~~2016~~ 2023 .

CSA/ANSI NGV 5.2, *Vehicle fueling appliances (VFA)*, ~~2017~~ 2023 .

CSA/ANSI NGV 6.1, *Compressed natural gas (CNG) fuel storage and delivery systems for road vehicles*, 2021.

CSA/ANSI PRD 1, *Pressure relief devices for natural gas vehicle (NGV) fuel containers*, 2020.

2.3.9 IEEE Publications.

IEEE Operations Center, 445 Hoes Lane, Piscataway, NJ 08854-4141.

IEEE/ASTM SI 10, *American National Standard for Metric Practice*, 2016.

2.3.10 National Board Publications.

National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229.

NB-23, *National Board Inspection Code*, ~~*Part 2, Inspection* , 2019~~ 2021 .

NB-514, *Accreditation of "VR" Repair Organizations*, ~~2020~~ 2022 .

2.3.11 UL Publications.

Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 723, *Test for Surface Burning Characteristics of Building Materials*, 2018, revised 2023 .

UL 969, *Marking and Labeling Systems*, 2017, revised 2023 .

2.3.12 US Government Publications.

US Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

Title 29, Code of Federal Regulations, Part 1910.

Title 49, Code of Federal Regulations, Part 178.57, "Specification 4L Welded Insulated Cylinders."

Title 49, Code of Federal Regulations, Part 390.5, "Federal Motor Carrier Safety Regulations; General."

Title 49, Code of Federal Regulations, Part 390.21, "Marking of Commercial Motor Vehicles."

Title 49, Code of Federal Regulations, Part 571.304,"Compressed Natural Gas Fuel Container Integrity."

49 U.S.C. 5103, "General Regulatory Authority."

2.3.13 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, ~~2003~~ 2020 .

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Wed Aug 09 09:11:33 EDT 2023

Committee Statement

Committee Statement: Reference standards are being updated to the latest edition year.

Response Message: FR-1-NFPA 52-2023

Public Input No. 13-NFPA 52-2023 [Section No. 2.3.11]

Public Input No. 7-NFPA 52-2023 [Section No. 2.3.6]

First Revision No. 5-NFPA 52-2023 [Section No. 2.4]

2.4 References for Extracts in Mandatory Sections.

NFPA 30, *Flammable and Combustible Liquids Code,* ~~2021~~ 2024 edition.

NFPA 55, *Compressed Gases and Cryogenic Fluids Code,* ~~2020~~ 2023 edition.

NFPA 59A, *Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG),* 2019 edition.

NFPA 96, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations,* ~~2021~~ 2024 edition.

~~NFPA *101*® , *Life Safety Code*® , 2021 edition.~~

~~NFPA 1901, *Standard for Automotive Fire Apparatus,* 2016 edition.~~

NFPA 1451, *Standard for a Fire and Emergency Service Vehicle Operations Training Program,* 2018 edition.

NFPA 1910, *Standard for the Inspection, Maintenance, Refurbishment, Testing, and Retirement of In-Service Emergency Vehicles and Marine Fire-Fighting Vessels,* 2024 edition.

~~NFPA 1925, *Standard on Marine Fire-Fighting Vessels,* 2018 edition.~~

NFPA 5000®, *Building Construction and Safety Code*®, 2021 edition.

Submitter Information Verification

Committee: VAF-AAA
Submittal Date: Wed Aug 09 13:32:19 EDT 2023

Committee Statement

Committee Statement: This revision updates extracted text in accordance with the Extract Policy.
Response Message: FR-5-NFPA 52-2023

First Revision No. 6-NFPA 52-2023 [Section No. 3.3.55]

3.3.55 Qualified Person.

A person who, by possession of a recognized degree, certificate, professional standing, or skill, and who, by virtue of education, training, experience, or other special attributes, possesses expertise regarding a particular subject matter, work, or project. [~~**1901**~~ , ~~2016~~ **1451,** 2022]

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Wed Aug 09 13:51:13 EDT 2023

Committee Statement

Committee Statement: This revision updates extracted text in accordance with the Extract Policy. For substantiation on any changes, see the first and second draft reports for the source document.

Response Message: FR-6-NFPA 52-2023

First Revision No. 7-NFPA 52-2023 [Section No. 3.3.72]

3.3.72 Weather Deck.

Any deck that is exposed to the weather and normally accessible to personnel and that permits walking or moving around outboard of the superstructure. [~~**1925**~~ ~~, 2018~~ **1910,** 2024]

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Wed Aug 09 13:55:16 EDT 2023

Committee Statement

Committee Statement: This revision updates extracted text in accordance with the Extract Policy. For substantiation on any changes, see the first and second draft reports for the source document.

Response Message: FR-7-NFPA 52-2023

11.4.2* Building Construction Materials.

11.4.2.1* Noncombustible Material.

A material that complies with any of the following shall be considered a noncombustible material:

(1)* A material that, in the form in which it is used, and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors, when subjected to fire or heat.

(2) A material that is reported as passing ASTM E136, *Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C*.

(3) A material that is reported as complying with the pass/fail criteria of ASTM E136 when tested in accordance with the test method and procedure in ASTM E2652, *Standard Test Method for Assessing Combustibility of Materials Using a Tube Furnace with a Cone-shaped Airflow Stabilizer, at 750°C*.

[~~***101*** : 4.6.13.1~~ **5000:** 7.1.4.1.1]

11.4.2.2* Limited-Combustible Material.

A material shall be considered a limited-combustible material where both of the following are met:

(1) The conditions of 11.4.2.2.1 and 11.4.2.2.2 and the conditions of either 11.4.2.3 or 11.4.2.4 shall be met.

(2) The conditions of 11.4.2.5 shall be met.

[**5000:** 7.1.4.2]

11.4.2.2.1

The material does not comply with the requirements for noncombustible material in accordance with 11.4.2.1. [**5000:** 7.1.4.2.1]

11.4.2.2.2

The material, in the form in which it is used, exhibits a potential heat value not exceeding 3500 Btu/lb (8141 kJ/kg), when tested in accordance with NFPA 259. [**5000:** 7.1.4.2.2]

11.4.2.3

The material shall have the structural base of a noncombustible material with a surfacing not exceeding a thickness of ⅛ in. (3.2 mm) where the surfacing exhibits a flame spread index not greater than 50 when tested in accordance with ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials,* or UL 723, *Test for Surface Burning Characteristics of Building Materials.* ~~[***101*** : 4.6.14.1]~~ [**5000:** 7.1.4.2.3]

11.4.2.4

The material shall be composed of materials that~~,~~ in the form and thickness used~~,~~ neither exhibit a flame spread index greater than 25 nor exhibit evidence of continued progressive combustion when tested in accordance with ASTM E84 or UL 723 and are of such composition that all surfaces that would be exposed by cutting through the material on any plane would exhibit neither a flame spread index greater than 25 nor exhibit evidence of continued progressive combustion when tested in accordance with ASTM E84 or UL 723. ~~[***101*** : 4.6.14.2]~~ [**5000:** 7.1.4.2.4]

11.4.2.5

Materials shall be considered limited-combustible materials where tested in accordance with ASTM E2965, *Standard Test Method for Determination of Low Levels of Heat Release Rate for Materials and Products Using an Oxygen Consumption Calorimeter*, at an incident heat flux of 75 kW/m^2 for a 20-minute exposure, and both ~~of~~ the following conditions are met:

(1) The peak heat release rate shall not exceed 150 kW/m^2 for longer than 10 seconds.

(2) The total heat released shall not exceed 8 MJ/m^2.

[***101*** : 4.6.14.3] [**5000:** 7.1.4.2.5]

11.4.2.6

Where the term *limited-combustible* is used in this code, it shall also include the term *noncombustible*. [***101*** : 4.6.14.4] [**5000:** 7.1.4.2.6]

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Wed Aug 09 12:46:09 EDT 2023

Committee Statement

Committee Statement: This revision updates extracted text in accordance with the Extract Policy. For substantiation on any changes, see the first and second draft reports for the source document.

Response Message: FR-4-NFPA 52-2023

First Revision No. 15-NFPA 52-2023 [Section No. 5.1.1 [Excluding any Sub-Sections]]

~~LNG,~~ CNG, LCNG, ~~CNG,~~ and other gaseous/~~cryogenic~~ installations shall be permitted to use alternate site ~~distances, operating requirements, and equipment locations~~ fire protection with validation by a qualified person(s) with proven expertise in mechanical systems, electrical systems, gaseous storage systems, ~~cryogenic storage systems,~~ fire protection, and gas detection.

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Wed Oct 11 14:50:29 EDT 2023

Committee Statement

Committee Statement: This revision is made in conjunction with the global revision to reorganize NFPA 52 by fuel system type. The revisions are to clarify that this requirement only applies to CNG and LCNG. First Revisions 16, 17,18, 19, 20, and 21 are related to this reorganization.

Response Message: FR-15-NFPA 52-2023

First Revision No. 9-NFPA 52-2023 [Section No. 7.1]

7.1* CNG.

~~Natural gas composition dispensed to vehicles shall comply with ASTM D8080, *Standard Specification for Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG) Used as a Motor Vehicle Fuel* , or other nationally recognized consensus standard.~~

A.7.1

The pressure dew point of the natural gas should be at least 20°F (11°C) below the lowest anticipated temperature in which the vehicle will operate and at the pressure of a full container with a uniform gas temperature equal to the lowest anticipated vehicle operating temperature.

Natural gas composition dispensed to vehicles ~~shall~~ should comply with ~~ASTM D8080, *Standard Specification for Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG) Used as a Motor Vehicle Fuel* , or other~~ a nationally recognized recommended practice or consensus standard.

7.1.1

Natural gas introduced into any CNG system covered by this code shall have a distinctive odor potent enough for its presence to be detected down to a concentration in air of not over one-fifth of the lower limit of flammability.

7.1.2

Methanol or glycol shall not be deliberately added to the natural gas at the fueling station.

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Tue Oct 10 11:59:41 EDT 2023

Committee Statement

Committee Statement: Gas quality or fuel composition is outside the scope of enforcement of fire marshals and AHJ and is a specification of the gas supplier. The current fuel composition in systems might not meet ASTM D8080 but can meet equivalent consensus standards and recommended practices.

Response Message: FR-9-NFPA 52-2023

Public Input No. 8-NFPA 52-2023 [Section No. 7.1 [Excluding any Sub-Sections]]

First Revision No. 16-NFPA 52-2023 [Section No. 8.1]

8.1 Scope.

This chapter shall apply to equipment used for storage and dispensing of CNG ~~and LNG~~ as an engine fuel in fleet and public dispensing operations.

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Wed Oct 11 14:59:44 EDT 2023

Committee Statement

Committee Statement: This revision is made in conjunction with the global revision to reorganize NFPA 52 by fuel system type. LNG is deleted from this requirement as it is in a separate chapter. First Revisions 15, 17,18, 19, 20, and 21 are related to this reorganization.

Response Message: FR-16-NFPA 52-2023

First Revision No. 10-NFPA 52-2023 [Section No. 8.4.7.4]

8.3.10.4

Natural gas piping and tubing shall be fabricated and tested in accordance with ANSI/ASME B31.3, *Process Piping*.

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Tue Oct 10 12:13:11 EDT 2023

Committee Statement

Committee Statement: Natural gas piping can be fabricated from pipe or tubing. NFPA 52 defines "piping systems" as a system consisting of pipe or tubing components and it defines "piping" as a means of transporting natural gas. Adding "piping and tubing" to 8.4.7.4 clarifies that natural gas piping can be fabricated from pipe or tubing.

Response Message: FR-10-NFPA 52-2023

Public Input No. 4-NFPA 52-2023 [Section No. 8.4.7.4]

First Revision No. 17-NFPA 52-2023 [Section No. 9.1]

10.1 Scope.

This chapter shall apply to the outdoor ~~storage~~ installation of vehicular gas fuel systems ~~in portable and stationary cylinders, containers, equipment, systems and tanks~~ .

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Wed Oct 11 15:07:27 EDT 2023

Committee Statement

Committee Statement: This revision is made in conjunction with the global revision to reorganize NFPA 52 by fuel system type. The wording of the requirement is updated to reflect what the chapter now covers. First Revisions 15, 16, 18, 19, 20, and 21 are related to this reorganization.

Response Message: FR-17-NFPA 52-2023

First Revision No. 24-NFPA 52-2023 [New Section after 9.4.4.11]

10.5 Siting.

CNG installations shall be permitted to use alternate site distances, operating requirements, and equipment locations with validation by a qualified person(s) with proven expertise in mechanical systems, electrical systems, gaseous storage systems, cryogenic storage systems, fire protection, and gas detection.

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Mon Nov 13 14:05:23 EST 2023

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.3.9.3.2 and 4.3.9.3.3 of the Regulations Governing the Development of NFPA Standards (www.nfpa.org/regs)

This section is being added in conjunction with a document reorganization to separate out CNG and LNG requirements and this section is being added to correlate siting requirements. First Revisions 15, 16, 17,18,19, 20, and 21 are related to this reorganization

Response Message: FR-24-NFPA 52-2023

First Revision No. 18-NFPA 52-2023 [Section No. 10.1]

11.1* Scope.

This chapter shall apply to the indoor ~~storage~~ installation of vehicular gas fuel systems in portable and stationary cylinders, containers, equipment, systems, and tanks.

A.11.1

This chapter is supplemental to other chapters covering general equipment and siting requirements. Chapter 9 (previously Chapter 10) outlines the requirements in addition to the requirements of Chapter 11 (previously Chapter 9).

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Wed Oct 11 15:15:01 EDT 2023

Committee Statement

Committee Statement: This revision is made in conjunction with the global revision to reorganize NFPA 52 by fuel system type. The annex material is being added to clarify how this chapter is intended to be interpreted. First Revisions 15, 16, 17, 19, 20, and 21 are related to this reorganization.

Response Message: FR-18-NFPA 52-2023

First Revision No. 19-NFPA 52-2023 [Section No. 11.1]

9.1 Application.

This chapter shall apply to the design, construction, and installation~~, and operation~~ of containers, pressure vessels, compression equipment, ~~buildings and structures,~~ and associated equipment used for storage and dispensing of CNG as an engine fuel in fleet and public dispensing operations other than residential fueling appliances (RFAs) and nonresidential fueling appliances or vehicle fueling appliances (VFAs)~~, coverage of RFAs and VFAs is provided in~~ . (See Chapter 13 and Chapter 14 ~~of this code, respectively~~ .)

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Wed Oct 11 15:21:25 EDT 2023

Committee Statement

Committee Statement: This revision is made in conjunction with the global revision to reorganize NFPA 52 by fuel system type. This revision is to update the application of the scope of the remaining requirements in the chapter. First Revisions 15, 16, 17, 18, 20, and 21 are related to this reorganization.

Response Message: FR-19-NFPA 52-2023

First Revision No. 20-NFPA 52-2023 [Section No. 11.3.2 [Excluding any Sub-Sections]]

9.2.1 System Component Qualification.

System components shall comply with the applicable provisions of Chapter 8 ~~5 as well as 11.3.2 through 11.3.2.7.10 and 11.3.2.12 through 11.3.2.17~~ .

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Wed Oct 11 15:27:32 EDT 2023

Committee Statement

Committee Statement: This revision is made in conjunction with the global revision to reorganize NFPA 52 by fuel system type. The cross references are being changed as the reorganization moves these requirements into chapter 8. First Revisions 15, 16, 17, 18, 19, and 21 are related to this reorganization.

Response Message: FR-20-NFPA 52-2023

First Revision No. 11-NFPA 52-2023 [Section No. 15.4.3.2.1]

24.4.3.2.1 Container Protections.

Each cylinder complying with 24.4.3.1.5 shall be fitted with one or more thermally activated pressure relief devices (PRDs) with the number, location, and part number as specified by the cylinder manufacturer and shall be marked and certified in accordance with CSA/ANSI PRD 1, *Pressure relief devices for natural gas vehicle (NGV) fuel containers*. ~~Container shall be permitted to be protected using a combination of fire-resistant barriers and PRDs.~~

24.4.3.2.1.1

Containers shall be permitted to be protected using a combination of fire-resistant barriers and PRDs.

24.4.3.2.1.2

The discharge flow rate of the PRD shall not be reduced below that required for the capacity of the container upon which the device is installed.

24.4.3.2.1.3

Manually activated or integrated PRDs shall conform to CSA/ANSI PRD 1, *Pressure relief devices for natural gas vehicle (NGV) fuel containers* .

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Tue Oct 10 12:59:20 EDT 2023

Committee Statement

Committee Statement: Integrated and manually activated PRDs need to follow the applicable parts of PRD1 for component certification. Duplicated text is also being deleted.

Response Message: FR-11-NFPA 52-2023

Public Input No. 10-NFPA 52-2023 [Section No. 15.4.3.2.1.1]

First Revision No. 12-NFPA 52-2023 [Section No. 16.3.3.6.1.3]

25.3.3.6.1.3

When shut-off valves are attached directly to fuel containers, there shall be a means for the technician to determine if there is still pressure in the container, ~~regardless of the valve position~~ using the installed fuel system components .

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Tue Oct 10 13:25:14 EDT 2023

Committee Statement

Committee Statement: This revision clarifies that the installed fuel system components must provide a means to indicate there is still pressure in the container and this may include a means for troubleshooting procedures.

Response Message: FR-12-NFPA 52-2023

Public Input No. 5-NFPA 52-2023 [Section No. 16.3.3.6.1.3]

Public Input No. 12-NFPA 52-2023 [Section No. 16.3.3.6.1.3]

First Revision No. 13-NFPA 52-2023 [New Section after 16.3.3.8.3]

25.3.3.8.3.1*

If a PRD is remote from the container valve or end plug, it shall be connected with a fuel line that remains pressurized when the container valve is closed.

A.25.3.3.8.3.1

Alternatively, PRD lines that are pressurized can be color coded provided a color legend is made available.

25.3.3.8.3.2

This line shall be labeled to indicate it is always pressurized.

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Tue Oct 10 13:35:01 EDT 2023

Committee Statement

Committee Statement: This revision will harmonize with NGV 6.1 and will also improve safety by indicating that the PRD supply line is always under pressure.

Response Message: FR-13-NFPA 52-2023

Public Input No. 9-NFPA 52-2023 [New Section after 16.3.3.8.3]

First Revision No. 14-NFPA 52-2023 [New Section after 16.3.4.4.4]

25.3.4.4.5

A label shall be applied in close proximity to the defueling connection that identifies the defueling connection.

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Tue Oct 10 13:46:50 EDT 2023

Committee Statement

Committee Statement: The de-fueling connection needs to be identified as some de-fueling connects may look similar to the fueling connection.

Response Message: FR-14-NFPA 52-2023

Public Input No. 11-NFPA 52-2023 [New Section after 16.3.4.4.4]

First Revision No. 3-NFPA 52-2023 [Section No. 17.8.2.2]

21.8.2.2

After acceptance tests are completed, field welding on LNG containers shall be permitted only per 21.8.3. [~~**59A:** 13.12.2~~]

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Wed Aug 09 12:15:43 EDT 2023

Committee Statement

Committee Statement: The extract tag is being deleted as the extracted section no longer exists.

Response Message: FR-3-NFPA 52-2023

First Revision No. 2-NFPA 52-2023 [Section No. D.1.2]

D.1.2 Other Publications.

D.1.2.1 AGA Publications.

American Gas Association, 400 North Capitol Street, NW, Washington, DC 20001.

Introduction to LNG for Personnel Safety, No. X08614 IN1, 1986.

LNG Plant Operator Training Guide, No. X01181-IN1, 1982.

LNG Preventive Maintenance Guide, No. X01084-IN1, 1984.

D.1.2.2 AMPP Publications.

Association for Materials Protection and Performance (formerly NACE International and SSPC), 15835 Park Ten Place, Houston, TX 77084.

NACE SP0169, *Control of External Corrosion on Underground or Submerged Metallic Piping Systems*, 2013.

D.1.2.3 ANSI Publications.

American National Standards Institute~~, Inc. (operations)~~ 25 West 43rd Street, 4th Floor, New York, NY 10036~~; (headquarters) 1899 L Street, NW, 11th Floor, Washington, DC 20036~~ .

ANSI Z535.4, *Product Safety Signs and Labels*, 2011 (R2017).

D.1.2.4 API Publications.

American Petroleum Institute, 200 Massachusetts Avenue, NW, Suite 1100, Washington, DC 20001-5571.

API 510, *Pressure Vessel Inspection Code: In-Service Inspection, Rating, Repair, and Alteration*, ~~2014~~ 2022 .

API ~~RP~~ Standard 520, *Sizing, Selection, and Installation of Pressure-Relieving Devices in Refineries*, Part I, 2014.

API RP 2003, *Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents*, 2015.

D.1.2.5 ASME Publications.

American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990.

ASME *Boiler and Pressure Vessel Code*, ~~2019~~ 2023 .

D.1.2.6 CGA Publications.

Compressed Gas Association, 8484 Westpark Drive, Suite 220, McLean, VA 22102.

CGA C-6, *Standard for Visual Inspection of Steel Compressed Gas Cylinders*, ~~2019~~ 2022 .

CGA C-6.1, *Standard for Visual Inspection of High Pressure Aluminum Compressed Gas Cylinders*, 2019.

CGA C-6.2, *Standard for Visual Inspection and Requalification of Fiber Reinforced High Pressure Cylinders*, 2019.

CGA C-6.4, *Methods for External Visual Inspection of Natural Gas Vehicle (NGV) and Hydrogen Gas Vehicle (HGV) Fuel Containers and Their Installations*, 2012, reaffirmed 2018.

CGA C-10, *Guideline to Prepare Cylinders and Tubes for Gas Service and Changes in Gas Service*, 2019.

CGA S-1.1, *Pressure Relief Device Standards — Part 1 — Cylinders for Compressed Gases*, ~~2019~~ 2022 .

CGA S-1.2, *Pressure Relief Device Standards — Part 2 — Portable Containers for Compressed Gases*, 2019.

D.1.2.7 CSA Group Publications.

CSA Group ~~[corporate office:]~~ , 178 Rexdale Blvd., Toronto, ON M9W 1R3, Canada.

CSA/ANSI NGV 2, *Compressed natural gas vehicle fuel containers*, ~~2019~~ 2023 .

CSA/ANSI NGV 3.1, *Fuel system components for compressed natural gas powered vehicles*, ~~2014~~ 2020 .

CSA/ANSI NGV 4.2, *Hoses for natural gas dispensing systems*, 2014, reaffirmed 2018.

CSA/ANSI NGV 5.1, *Residential fueling appliances*, ~~2016~~ 2023 .

CSA SPE-2.1 SERIES-18, *Best practices for defueling, decommissioning, and disposal of compressed natural gas vehicle fuel containers and liquefied natural gas vehicle fuel tanks*, 2018.

D.1.2.8 GTI Publications.

GTI, 1700 S Mount Prospect Road, Des Plaines, IL 60018-1804. https://www.gti.energy

GRI-02/0013, *Reference Guide for Integration and Use of Natural Gas Vehicle Fuel Systems*, 2002.

D.1.2.9 National Board Publications.

National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229.

NB-23, *National Board Inspection Code*, ~~2019~~ 2023 .

D.1.2.10 SAE Publications.

SAE International, Society of Automotive Engineers, 901 15th Street, NW, Suite 520, Washington, DC 20005.

SAE J2343, *Recommended Practice for LNG Medium and Heavy-Duty Powered Vehicles*, February 2018.

D.1.2.11 US Government Publications.

US Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

Title 49, Code of Federal Regulations, Part 173.

Submitter Information Verification

Committee: VAF-AAA
Submittal Date: Wed Aug 09 11:08:51 EDT 2023

Committee Statement

Committee Statement: Reference standards are being updated to the latest revision year.
Response Message: FR-2-NFPA 52-2023

First Revision No. 8-NFPA 52-2023 [Section No. D.3]

D.3 References for Extracts in Informational Sections.

NFPA 30, *Flammable and Combustible Liquids Code*, ~~2021~~ 2024 edition.

NFPA 55, *Compressed Gases and Cryogenic Fluids Code*, ~~2020~~ 2023 edition.

NFPA *101*®, *Life Safety Code*®, ~~2021~~ 2024 edition.

Submitter Information Verification

Committee: VAF-AAA

Submittal Date: Fri Sep 15 11:59:38 EDT 2023

Committee Statement

Committee Statement: Informational references are being updated to the latest edition year.

Response Message: FR-8-NFPA 52-2023