

SPS Chapter 340 Gas Systems

..... LPG & CNG, LNG, GH₂ & LH₂,

12th Annual DSPS\WBIA Industry Days

Country Springs Hotel & Conference Center
2810 Golf Road
Pewaukee WI 53072

April 13-14, 2016

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“Public Awareness” of Gas Systems

- Gas stations not just pumping gasoline and diesel fuel today
- Numerous alternate fuels are readily available with auto dealers offering alternative fuel vehicles direct from the Manufacturer.
- DSPTS wishes to provide a **Basic Awareness** of the changing vehicle fueling market-place.

“Think Safety”

Boiler Safety Program

..... Multi-Responsibilities

- SPS 340 Gas Systems
 - Plan Review and Inspection - Piping B31.3
- SPS 341 Boiler & Pressure Vessels
 - Registration with Periodic Inspection (SBD-6314)
 - Piping B31.1
- SPS 343 Anhydrous Ammonia + Nurse Tanks
 - Plan Review and Inspection - Piping B31.3
- SPS 345 Mechanical Refrigeration
 - Registration with Periodic Inspection (SBD-34)
 - B31.5



SPS 340.40 Gas Systems

Adopted Standards for Gas Systems

- **LPG** NFPA 58- 2011 Liquefied Petroleum Gas
- **CNG** NFPA 52-2010 Compressed Natural Gas
- **LNG** NFPA 59A-2009 Liquid Natural Gas
- **GH2** NFPA 52-2010 Gaseous Hydrogen
- **LH2** NFPA 52-2010 Liquid Hydrogen

Important Notes

- Note1: The above hydrogen stored or dispensed for vehicle fueling fall under Chapter SPS 340 Gas Systems.
- Note2: Hydrogen stored for other purposes, manufacturing processes, turbine sealing fall under SPS 341, Boiler Code.

Natural Gas Fundamentals

System Pressures Perspective

■ Natural Gas Systems

~ 7 inches water column *

- Residential Homes 1/4 PSI
- Apartment Buildings 1/4 - 2 PSI
- Industrial Plants 1/4 - 5 PSI

■ Compressed Natural Gas Systems

- NG Supply 1/4 - 60 PSI
- Storage Vessels 5,200 PSI

■ LPG Storage Tank ... 250 PSI

*Unit measurement Conversion 28" water column = 1 PSI

Compressed Natural Gas

NGV System Design Basics

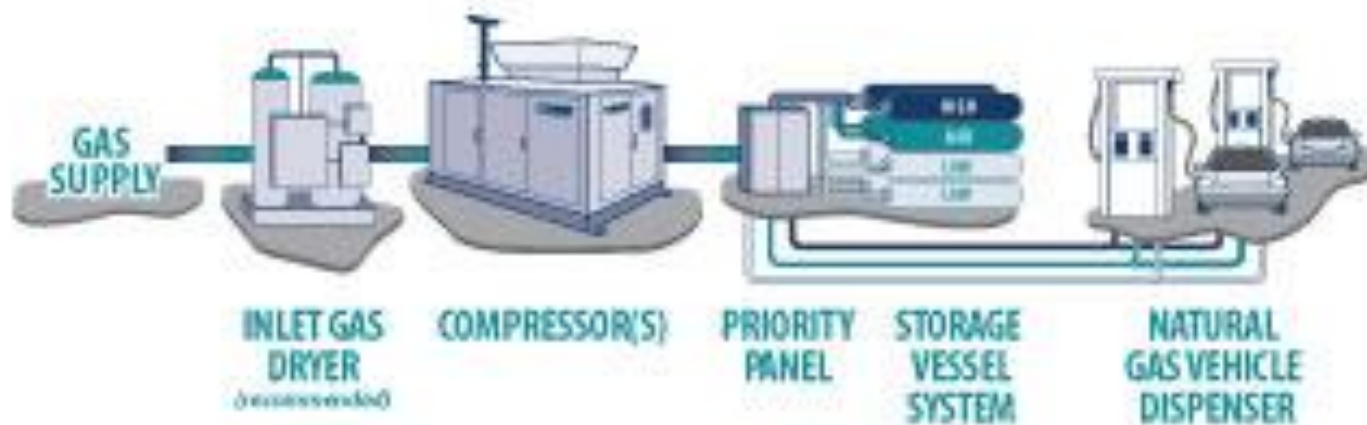
- Standard Station
- Time Fill Station
- Fast Fill Station
- Combination Time and Fast Fill Station
- Residential CNG Fueling Facility
 - Installation in residence (time or “slow” fill)
 - Small Appliance compressor (see above pic)



CNG System Design

From ANGI Energy Website

NGV STANDARD STATION DESIGN



Website @ www.ANGIenergy.com

CNG System Design

From ANGI Energy Website

TIME-FILL STATION APPLICATION

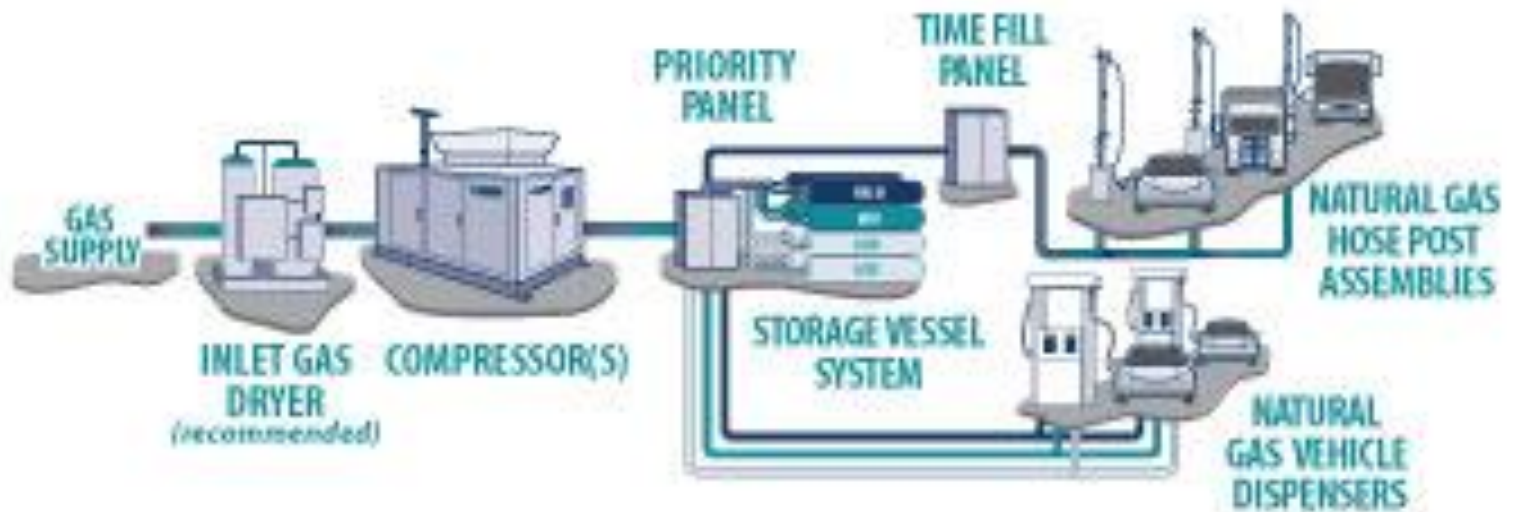


Website @ www.ANGIenergy.com

CNG System Design

From ANGI Energy Website

COMBINATION FAST-FILL & TIME-FILL STATIONS



Website @ www.ANGIenergy.com

CNG System Design

Residential Time-Fill Station

Small Refrigerator and Dehumidifier
“Size Appliances”
connected to Natural Gas lines
Installed in garages.

Wall or Floor Mounted





Code Requirements ..

Adopted Standards per SPS 340

- SPS Chapter 340.40 - adopts standards below:
 - American Petroleum Institute
API 2510 – 2001
 - National Fire Protection Association
NFPA 30A - 2008 Variety fuels dispensing
 - **NFPA 52 - 2010** CNG
 - **NFPA 54 - 2009** Fuel Gas Code
 - **NFPA 58 - 2011** LPG
 - **NFPA 59A - 2009** LNG



Chapter SPS 340 Gas Systems

Fuel Gases Regulated

- SPS 340.11 (1) Scope and application. GENERAL.
- (a) This chapter applies to the design, construction, installation, inspection, operation, testing, maintenance, repair and alteration of gas systems for fueling purposes, such as for heating appliances or engines
- (b) The following gases are regulated by this chapter:
 - 1. Liquefied petroleum gas –**LPG** 250 PSI
 - 2. Liquefied natural gas –**LNG** 175 PSI
 - 3. Compressed natural gas –**CNG** 5200 PSI
 - 4. Gaseous hydrogen –**GH₂** 5-10,000 PSI
 - 5. Liquefied hydrogen –**LH₂**

Chapter SPS 340 Gas Systems

Subchapter V, "LPG"

- SPS 340.50 – 340.53 LPG
- NFPA 58, 2011



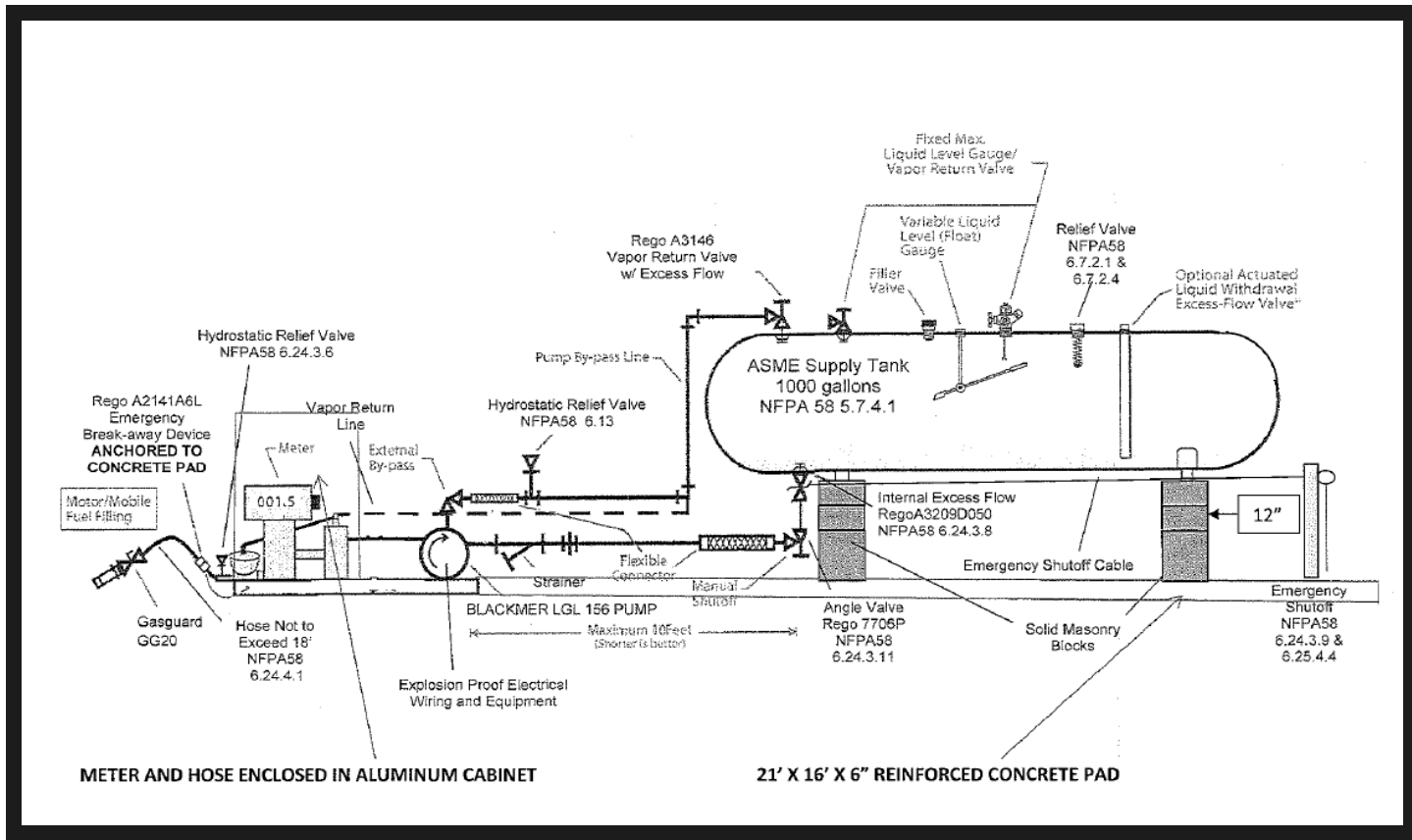
Chapter SPS 340 Gas Systems

"LPG" Skid Mount Tank + Dispensing



Chapter SPS 340 Gas Systems

"LPG" & Dispenser System



Chapter SPS 340 Gas Systems

Subchapter VI, "LNG"

- SPS 340.60 – 61 Liquefied Natural Gas
- NFPA 59A, 2009
- "Thermos-bottles"



Chapter SPS 340 Gas Systems

Subchapter VII, "CNG"

- SPS 340.70 –.71 Compressed Natural Gas
- NFPA 52, 2010

Note: ANGI fuel CNG storage system earlier slides 9-10-11



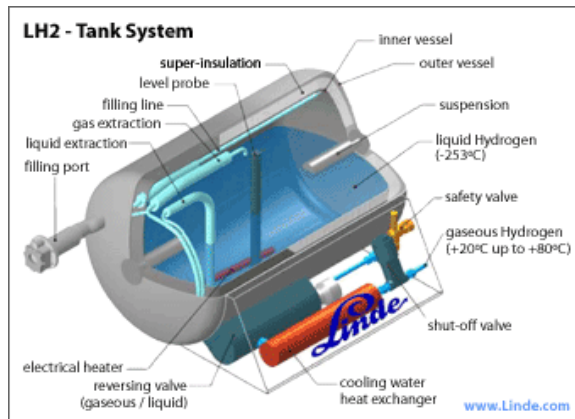
Vehicle storage
Vessels



Chapter SPS 340 Gas Systems

Subchapter VIII, "GH₂" and IX, "LH₂"

- SPS 340.80 – 81 Gaseous Hydrogen - GH₂
- SPS 340.90 – 91 Liquefied Hydrogen - LH₂
- NFPA 52, 2010





Chapter SPS 340 Gas Systems

Local Requirements

- SPS 340.12 Local requirements. This chapter does not limit the power of cities, villages and towns to make or enforce additional or more stringent requirements, provided the requirements do not conflict with this chapter, any other rule of the department, or law.

History: CR 11–002: cr. Register August 2011 No. 668, eff. 9–1–11.



Chapter SPS 340 Gas Systems

Plan Approvals

- SPS 340.30 (1) Plan examination and approval. Plan Approval Before Construction. Plan approval shall be obtained from the department or a first class city before commencing construction, installation or alteration for any system described in Table 340.30. (Table Next slide)

Chapter SPS 340 Gas Systems

Required Plan Submittal

- Gas Systems requiring Plan submittal

Table 340.30

Plan Approval Required

Type of System	Size of System
Liquefied petroleum gas system →	Uses a container with over 2000 gallons water capacity, or containers with an aggregate water capacity exceeding 4000 gallons
Liquefied natural gas system	Any size
Compressed natural gas system →	Any size, except plan approval is not required if outdoors with no storage capacity
Gaseous hydrogen system	Has a total storage capacity of more than 400 cubic feet of compressed hydrogen gas
Liquid hydrogen system	Has a total storage capacity of more than 39.7 gallons of liquefied hydrogen
Vehicle-fuel dispensing system →	Any size


Note: The 400 and 39.7 thresholds in this Table are based on the definitions in NFPA 52 for bulk hydrogen systems.

Chapter SPS 340 Gas Systems

Certificate of Installation form SBD-9656-E

- SPS 340.31 Certificate of installation. (1) Every person, firm, association or corporation installing a gas system shall complete a certificate of installation form, SBD-9656-E. The form shall be completed at the time of installation and shall be provided to the owner of the system. A copy of the form shall be kept at the installation site and available for review by an authorized representative of the department or the first class city. A copy of the form shall be submitted to the local fire department within 10 business days of the installation, except as provided in sub. (2).

Certificate of Installation / Test



Wisconsin Gas Systems - Certificate of Installation/Testing

LPG CNG LNG Hydrogen

Type of Use:				
Residential <input type="checkbox"/>	Commercial <input type="checkbox"/>	Manufacturing or Processing <input type="checkbox"/>	Agriculture / Heat or drying <input type="checkbox"/>	Construction/Temporary Site <input type="checkbox"/>
Owner/Operator Name _____			Installation Date _____	
Address of Installation (Street City State and Zip) _____				
Capacity: Dept of Transportation Cylinder - DOT		ASME Storage Tank /Container		
Cylinder No. _____	Size (lbs) _____	Tank - <input type="checkbox"/> Serial # <input type="checkbox"/> NB # _____	Size (gal) _____	
Installing Company Name _____		Installer's Name (Print) _____		
If applicable, Credential or license # (* See below Note 1) _____		Installer's E-mail address _____		
Company Address (Street City State and Zip) _____			Company Telephone _____	

Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04 (1) (m), Stats.]

I hereby confirm that the design, construction, location and installation of the equipment conform to the applicable rules of the Department, including Administrative Code SPS 323 (Residential /Duplex), 340 (Gas Systems), 365 (Commercial Buildings), or 384 (Plumbing).

Date: _____

Signature of Installer/Tester

SBD-9656-E (R12/11)

Copies to: 1. Site owner/operator 2. Fire Department when required 3. Installer

Applicable SPS 305 and 340, Gas Systems, requirements below

Note 1: Notice to Dwelling contractors, HVAC contractors, HVAC Qualifiers, and Liquefied gas suppliers/ Restricted
 SPS 305.31(4), SPS 305.70(4), SPS 305.71(6), and SPS 305.73(4) respectively hold requirements for the above credential holders. **Reference:** Section 101.16(4)(a), Stats., provides that: The person performing the work of installing equipment utilizing gas systems for fuel purposes shall furnish the user of the equipment a statement, the form of which shall be prescribed by the department showing the design, construction, location and installation of the equipment conforms with the rules promulgated by the Department under this section.

Note 2: Gas System: (includes LPG, LNG, CNG, Gaseous H₂ and Liquid H₂)
 SPS 340.31(1) Every person, firm, association or corporation installing a gas system shall complete a certificate of installation form, SBD-9656-E. The form shall be completed at the time of installation and shall be kept at the installation site and available for review by the authorized representative of the department or the first class city. A copy of the form shall be submitted to the local fire department within 10 business days of the installation except as provided in sub. (2).
 SPS 340.31(2) Submitting form SBD-9656-E to the fire department may not be required for liquefied petroleum gas installations that are exempt from plan approval under SPS 340.30. **Further reference:** Review SPS 341 for requirements relating to pressure vessels for gases that are not used to fuel industrial processes, heating appliances or equipment.

SBD-9656-E

Form Copy

Copies to:

- 1. Site owner /operator**
- 2. Fire Dept when required**
- 3. Installer**

Chapter SPS 340 Gas Systems

Inspection & Notification "5 day"

- SPS 340.34(2)(a) GENERAL INSPECTIONS. Gas systems for which plan approval under s. SPS 340.30 is required shall be inspected by department or the first class city.

Note1: Local governmental units may also conduct inspections in addition to those of the Department.

Note2: See chapter SPS 341 for registration and inspections of gaseous and liquefied hydrogen pressure vessels that are not within the scope of this chapter.

- SPS 340.34(2)(b) The installer shall notify the district inspector or the first class city where the installation is located at least 5 business days prior to the start of construction to arrange for the inspection.



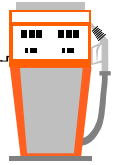
Chapter SPS 340 Gas Systems

Referenced Standards

- SPS 340.40(1) Adoption of standards by reference. Primary Standards. The following standards are hereby incorporated by reference into this chapter, subject to the modifications specified in this chapter:
 - a) API 2510 May 2001
 - b) Nat'l Fire Protection Association (NFPA)
 - ⊙ NFPA 58, 2011 ⊙ NFPA 59A, 2009
 - ⊙ NFPA 30A, 2008 ⊙ **NFPA 52, 2010** ⊙ NFPA 54, 2009
- **Note:** NFPA 30A Motor fuel dispensing facilities & repair garage code

Chapter SPS 340 Gas Systems

Vehicle-fuel Dispensing Systems



- SPS 340.42 Vehicle–fuel dispensing systems. All vehicle–fuel dispensing systems shall comply with whichever of the following are applicable:
 - (1) NFPA 30A section 4.3.7.2 and Chapter 12, if Class I or Class II liquids are dispensed as motor fuels along with a fuel gas regulated by this chapter. (4.3.7.2 = guard post requirements)
 - (2) NFPA 52, if liquefied natural gas, compressed natural gas, gaseous hydrogen or liquefied hydrogen are dispensed in the absence of Class I and Class II liquids.
 - (3) NFPA 58, if liquefied petroleum gas is dispensed in the absence of Class I and Class II liquids.

Note: Class I & II liquids are classified in NFPA 30A as having a flash point below 140°F.

Chapter SPS 340 Gas Systems

Dispensing / Training

- SPS 340.43(1) Dispensing to vehicle fuel tanks, recreational equipment and containers. Public self-service PROHIBITED. Self-service dispensing by the general public of any gas regulated by this chapter is prohibited, except trained members of the general public may fuel compressed natural gas motor vehicles through a fueling connection that complies w/ ANSI NGV1-2006.



Chapter SPS 340 Gas Systems

Dispensing / Training

- SPS 340.43 (2) GENERAL. No person, except for the following, may dispense any gas regulated by this chapter unless the dispensing is through approved dispensing devices:
 - (a) A trained and authorized employee of a bulk storage plant, container charging plant or service station.
 - (b) A trained and authorized employee of an entity operating a commercial fleet of motor vehicles.



Chapter SPS 340 Gas Systems

Dispensing / Training

- SPS 340.43 (3) Location of key-, card or code – operated dispensing systems in areas:
- (a) Public areas if :
 - 1. Dispensing device is listed by nationally recognized test lab
 - 2. Key–cards-code provided to only trained /authorized persons
 - 3. Attendant is on duty at all times during dispensing
- (b) Non-Public areas if:
 - 1. Dispensing area not open to general public
 - 2. Dispensing equipment is approved
 - 3. *Key–cards-code provided to only trained /authorized persons*

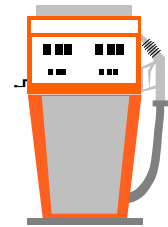
Chapter SPS 340 Gas Systems

Posting of Signs

- SPS 340.43(4) Posting of Signs. A permanent sign providing a 24-hour service – call telephone number in letters at least one inch high shall be posted at the vehicle–fuel dispensing device in all non–attended locations.

..... Be aware of Surroundings

“Be Ready for the Unexpected”





Chapter SPS 340 Gas Systems

CNG Application/ Exemption

- SPS 340.70 Scope. (1) Application. This subchapter applies to the storage, handling and use of compressed natural gas.
- (2) Exemptions. This subchapter does not apply to any of the following:
 - (a) Compressed natural gas systems owned and operated by utilities when the systems are part of the distribution facilities for the utility and are subject to the provisions of ch. PSC 135.
 - (b) The transportation of compressed natural gas.



Chapter SPS 340 Gas Systems

Design, Install, Operating CNG Standard

- SPS 340.71 Design, construction, installation, operation and maintenance of compressed natural gas systems. Compressed natural gas systems shall be designed, constructed, installed, operated and maintained as specified in NFPA 52-2010, except as otherwise provided in this chapter.

Note: Section SPS 340.42 contains requirements for vehicle–fuel dispensing systems



NFPA 52, 2010 “CNG”

Chapter 1, Administration

- 1.6 Enforcement. This code shall be administered and enforced by the authority having jurisdiction designated by the governing authority. (Annex B is sample ordinance)
- 1.7 Training. Persons engaged in the handling and storage of LNG, CNG, GH2, LH2 and L /CNG shall be trained in the hazards and properties of these materials.

NFPA 52, 2010 "CNG"

Chapter 2, Reference Publications

- 2.1 General
- 2.2 NFPA Publications
- 2.3 Other Publications
 - ASME B 31.3 Process Piping
 - ASME Section VIII, Pressure Vessel construction stamp



U



NFPA 52, 2010 “CNG”

Chapter 3, Definitions

- 3.1 General
- 3.2 NFPA Official Definitions
- 3.3.9 Container ... “Definition example”
 - Cargo Transport
 - Composite container - metal inner gas containing component with a filament-resin reinforced outer layer
 - Fuel supply container – mounted on vehicle for fuel supply to vehicle
 - Cylinder - container constructed, inspected and maintained per DOT per 3.3.14



NFPA 52, 2010 “CNG”

Chapter 4, General Equipment Qualifications

- 4.4 Design-Construction-Containers - **ASME or DOT**
- 4.5 Pressure Relief Devices - * **Inlet valves / Venting**
- 4.8 Fuel Lines - **ASME B31.3, Process piping**
- 4.10 Hose and Hose Connections - **Markings**
- 4.11 Vehicle Fueling Connection – **ANSI / IAS NGV1**, Standard for compressed natural gas Vehicle (NGV) fueling Connection devices
- 4.11.2 **The use of adaptors shall be prohibited**

NFPA 52, 2010 "CNG"

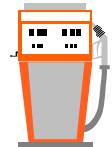
Chapter 8, CNG Storage & Dispensing Systems

- 8.4.2 System Siting **Outdoors**
 - 8.4.2.3 Compression, storage & dispensing "equipment" shall be above ground, not beneath power lines and at least 10 ft from buildings or property lines or from sources of ignition.
 - 8.4.2.4 Equipment at least 10 ft from public street or sidewalk line and 50 ft from the nearest rail of any railroad track.
 - 8.4.2.5 A clear space of at least 3 ft shall be provide for valves, fittings and groups of containers

NFPA 52, 2010 "CNG"

Chapter 8, CNG Storage & Dispensing Systems

- 8.4.2 System Siting **Outdoors**
 - 8.4.2.6 Readily ignitable shall not be within 10 ft of any stationary container
 - 8.4.2.7 Minimum separation between container and above-ground tanks with flammable combustible liquids shall be 20 ft
 - 8.4.2.8 Transfer point at least 10 ft from buildings, sidewalk street and at least 3 ft from storage containers
 - 8.4.2.9 Areas shall be classified in accordance with Table 8.4.2.9 electrical equipment.



NFPA 52, 2010 "CNG"

Chapter 8, CNG Storage & Dispensing Systems

NFPA 52, Section 8.4.2.9 Electrical Classifications per Table 8.4.2.9

Table 8.4.2.9 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
Area containing compression and ancillary equipment	2	Up to 15 ft (4.6 m) from equipment
Dispensing equipment outdoors	1	Inside the dispenser enclosure
Outdoors	2	From 0 to 5 ft (0 to 1.5 m) from the dispenser
Indoors	1	Inside the dispenser enclosure
Indoors	2	Entire-room, with adequate ventilation (see 8.4.3)
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) ←



NFPA 52, 2010 “CNG”

Chapter 8, CNG Storage & Dispensing Systems

8.4. System Siting **Indoors**

- Allowed with emergency shut-down and gas detection equipment that stops flow of gas into building.
- Small units slow fill, residential fueling facilities RFF - CNG



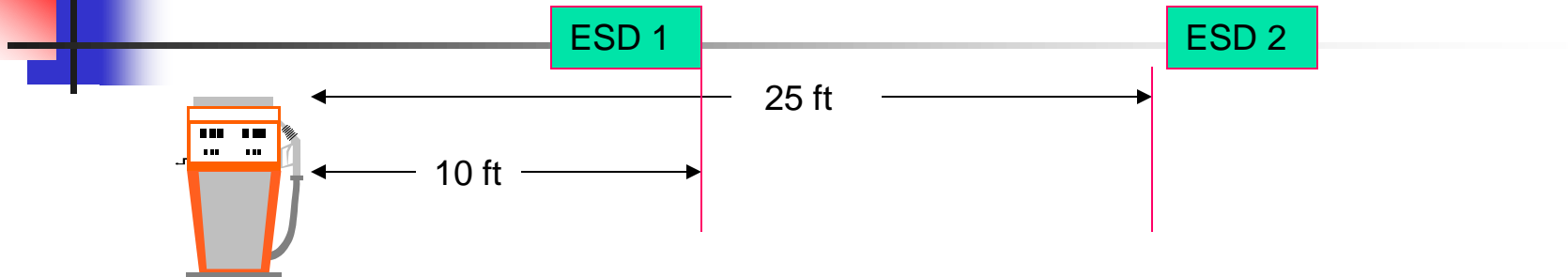
NFPA 52, 2010 “CNG”

Chapter 8, CNG Storage & Dispensing Systems

- 8.6 Install Pressure Relief Valves ... discharge to safe location, escaping gas not to impinge on buildings or equipment or occupied areas
- **8.6.6** Block valves shall be locked open.
- 8.10.2 Pressure relief valves shall be tested every three (3) years

NFPA 52, 2010 "CNG"

Chapter 8, CNG Storage & Dispensing Systems



- 8.11.5 An emergency manual shut-down device shall be provided within 10 ft of the dispensing area and also greater than 25 ft from the dispensing area.
- 8.11.5.1 This device when activated shall shut off power supply and gas supply to compressor and dispenser.
- 8.11.5..2 ESD shall be distinctly marked for easy recognition with a permanently affixed legible sign
- 8.11.6.1 Break-away device shall be installed at every dispensing point



NFPA 52, 2010 “CNG”

Chapter 10 CNG Residential Fueling Facilities

- Chapter 10.1, RFF-CNG
 - 10.1.1 This chapter applies to design construction, install and operation of residential fueling facilities.
 - 10.1.2 The capacity of RFF-CNG shall not exceed 5 scf / min of natural gas.
 - 10.1.3 Storage of CNG shall be prohibited
 - Exception: CNG shall be permitted / stored in the vehicle fuel supply container.



NFPA 52, 2010 “CNG”

Annex B, Sample Ordinance

- Provides Sample Ordinances ...
- Adoption
 - Enforcement
 - Violation
 - Punishment / Fine

Annex not part of Requirements but included for Information only.



NFPA 30A, Chapter 12, Motor Fuel Dispensing Facilities

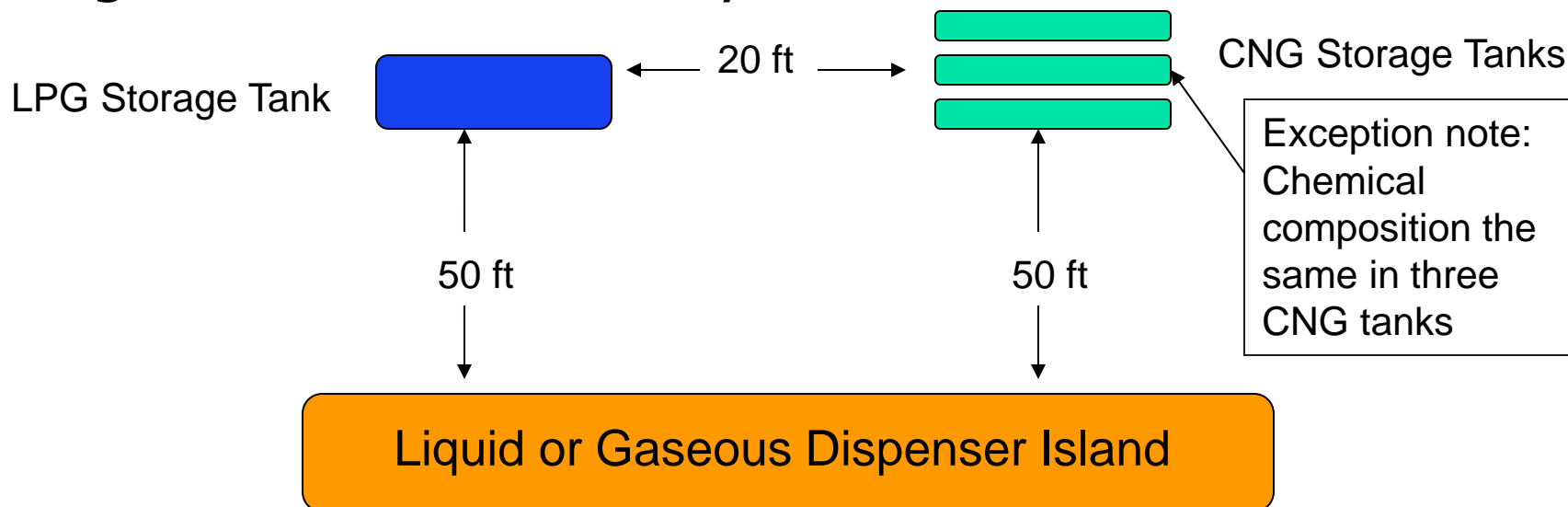
Additional Rules for CNG, LNG, H₂ and LPG

- 12.1 Scope. This chapter shall apply where CNG, LNG Hydrogen and LPG or combinations of these are dispensed as motor fuels along with Class I or Class II liquid that are also dispensed as motor vehicle fuels.
- 12.2.1 Except as modified by this Chapter:
 - Install and use of CNG & H₂ per NFPA 52
 - Install and use of LNG per NFPA 52
 - Install and use of LPG per NFPA 58
- 12.2.3 Dispensers for CNG LNG & LPG shall be listed.

NFPA 30A, Chapter 12, Motor Fuel Dispensing Facilities

Additional Rules for CNG, LNG and LPG

- 12.3.3 Aboveground tanks storing CNG, LNG or LPG shall be separated from each other by at least 20 ft and from dispensing devices that dispense liquid or gaseous motor fuels by at least 50 ft



NFPA 52, 2010 CNG .. “Posted Signs”

Chapter 8, CNG Storage & Dispensing Systems

- SPS 340.43 (4) POSTING OF SIGNS. A permanent sign providing a 24–hour service–call telephone number in letters at least one inch high shall be posted at the vehicle–fuel dispensing device in all non–attended locations



Emergency Contact
Company Name :
Phone Number :
Fire Department :
Police Department :

..... Be aware of Surroundings

“Be Ready for the Unexpected”

Gas Systems Inspector Map

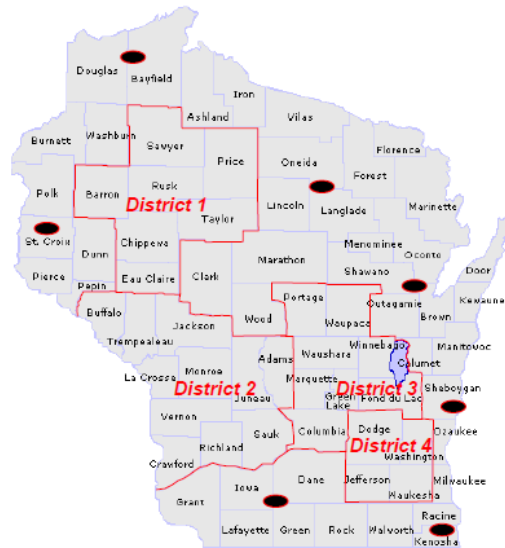


STATE OF WISCONSIN
 Department of Safety and Professional Services
 1400 E Washington Ave. Madison WI 53703
 Web: dps.wi.gov

Governor Scott Walker Secretary Dave Ross

Refrigeration Systems,
 Gas and Anhydrous
 Ammonia Programs

Web: [Refrigeration Systems](#)
[Gas Systems](#)



		Phone	Fax
1 - Duane Leetch Lead Worker	Duane.Leetch@Wisconsin.gov	715-559-8817	608-283-7431
2 - Temporary Assignment			
3 - Michael J. Schmidt	MichaelJ2.Schmidt@Wisconsin.gov	920-360-2193	608-283-7433
4 - Terence Waldbillig	Terence.Waldbillig@Wisconsin.gov	414-303-8575	608-283-7429
Supervisor Kim Schmitt	Kim.Schmitt@Wisconsin.gov	262-524-3950	
Submit general questions to;	DpsSbBoilertech@wisconsin.gov		

● Contact Damarc Quality Inspection Services LLC (866-361-4321) for inspections outside of districts.

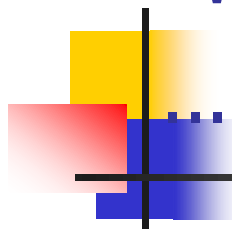
Temporary assignment: Buffalo/Trempealeau/Jackson	Duane Leetch	District 1
Adams/Juneau/Sauk	Michael Schmidt	District 3
La Crosse/Vernon/Monroe/Richland/Crawford		Damarc Quality Insp

Rev. 11/15

Assistance ?

Contact District Inspector in Area of Installation

With a new found “Awareness of Gas Systems”



..... A Quiz for the Day !

Do “all” hydrogen storage pressure vessels require a tag for periodic inspection as required under SPS 341.17 ?



Remember Previous slide #4 ?

No, if storage for gaseous or liquid hydrogen is for “vehicle” fueling / dispensing, it shall comply with **SPS 340, Gas Systems. Plan review and inspection are required and no periodic inspection or PTO is mandated. **Not SPS 341 Boiler Code****



See SPS 341.02 "Scope"

- SPS 341.02(2) OTHER VESSELS. The provisions of this chapter shall apply to vessels used for the storage and transportation of flammable liquids, liquefied petroleum gas, liquefied natural gas, compressed natural gas, anhydrous ammonia and refrigerants, unless these vessels are covered by other Wisconsin administrative or federal codes.

Except for Repairs / Alterations, covered w/SPS 340 Gas Systems



Questions ?

SPS 340 Gas Systems

Try Our Website

DSPS – Division of Industry Services

Programs Link @

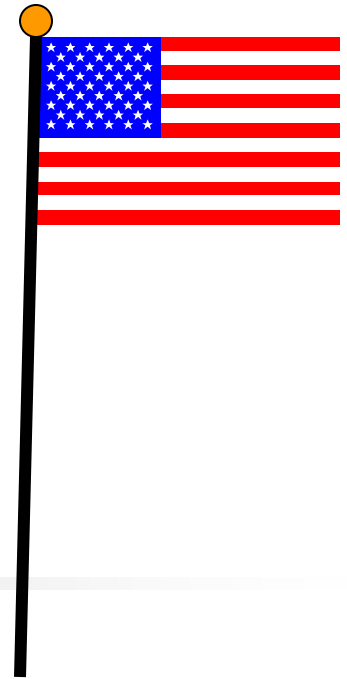
<http://dsps.wi.gov/Programs/Industry-Services/Industry-Services-Programs/>

Gas Systems Link @

<http://dsps.wi.gov/Programs/Industry-Services/Industry-Services-Programs/Gas-Systems/>

THANKS

FOR THE OPPORTUNITY TO EDUCATE



USA #1
Thank a Vet !

Department of Safety and Professional
Services - DSPS

Division of Industry Services

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Go Navy